Vodacom's Disaster Response Strategy to KZN Floods

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Table of Contents

ABSTRACT

This paper presents an analysis of Vodacom's Disaster Response Strategy implemented in response to the floods that struck the KwaZulu-Natal (KZN) region. The strategy encompasses a comprehensive approach focusing on effective leadership, stakeholder engagement, resilient infrastructure, advanced technology integration, adaptive processes, collaboration with municipalities, and key components of disaster response. Through community-based approaches, environmental sustainability, crisis communication, psychosocial support, logistics and supply chain management, legal and regulatory frameworks, ethical

considerations, innovation and technology transfer, and cross-sectoral coordination, Vodacom aimed to enhance disaster response effectiveness, resilience, and sustainability.

The paper highlights the significance of inclusive and participatory approaches, interdisciplinary research and innovation, resilient urban planning and design, education and capacity building, financial mechanisms and risk transfer, and knowledge exchange, humanitarian diplomacy and advocacy, and recommendations for future research. The analysis underscores the importance of continuous improvement, learning, and adaptation in disaster response and risk reduction endeavours, emphasising collaboration with municipalities and other stakeholders.

ACADEMIC INTEGRITY DECLARATION

I Tshilidzi Maake declare that this research report entitled Vodacom's Disaster Response Strategy to KZN Floods' is my own unaided work. I have acknowledged, attributed, and referenced all ideas sourced elsewhere. I am hereby submitting it in partial fulfilment of the requirements of the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. I have not submitted this report before for any other degree or examination to any other institution.

Tshilidzi Maake

Signed at Pretoria on 27th February 2024

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First and foremost, I attribute all glory to God! It is by His strength that I am able to accomplish anything.

I am deeply grateful to Vodacom for enabling me to conduct research within their organisation and providing invaluable insights into disaster response strategies, especially concerning the KwaZulu-Natal floods.

A special acknowledgment goes to the leaders and employees of the KwaZulu-Natal region for generously allowing me to interview key stakeholders and gather invaluable insights into the challenges and opportunities posed by the floods. Their openness and cooperation have significantly contributed to informing our disaster response strategy.

I extend my sincere appreciation to my supervisor for her guidance and support, in shaping the direction and quality of this study.

Lastly, I thank my family for their unwavering support, which has been a constant source of strength and motivation.

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION

Table 1: Abbreviations

Abbreviations	Name
KZN	KwaZulu Natal
NDN	Never Die Network
Telecoms	Telecommunication
4G	Fourth-generation wireless
LTE	Long Term Evolution
UNDRR	The United Nations Office for Disaster Risk Reduction
ITU	International Telecommunication Union
NGOs	Non-Governmental Organizations
AI	Artificial Intelligence
IoT	Internet of Things
IDRM	Integrated Disaster Risk Management

CHAPTER 1

INTRODUCTION

1.1. Introduction

The research aimed to evaluate the effectiveness of Vodacom's disaster response strategy in addressing the impact of the KwaZulu-Natal (KZN) flood on its operations and services in the region. Through a qualitative approach, the study identified the strategies implemented by Vodacom during the disaster response and assessed their effectiveness in communication, network infrastructure, customer support, and coordination with other organizations involved in disaster response efforts.

Vodacom, one of the leading telecommunications companies in South Africa, operated through a network of regional offices strategically located across the country (Vodacom, 2023). According to Vodacom's (2023) report, these regional offices, including those in Durban, Gauteng, Mbombela, Bloemfontein, Port Elizabeth, Polokwane, and Cape Town, played a critical role in ensuring network infrastructure and service provision throughout South Africa. The challenges encountered during the KZN floods of 2022 highlighted the need for effective disaster response strategies, particularly in regions prone to natural disasters.

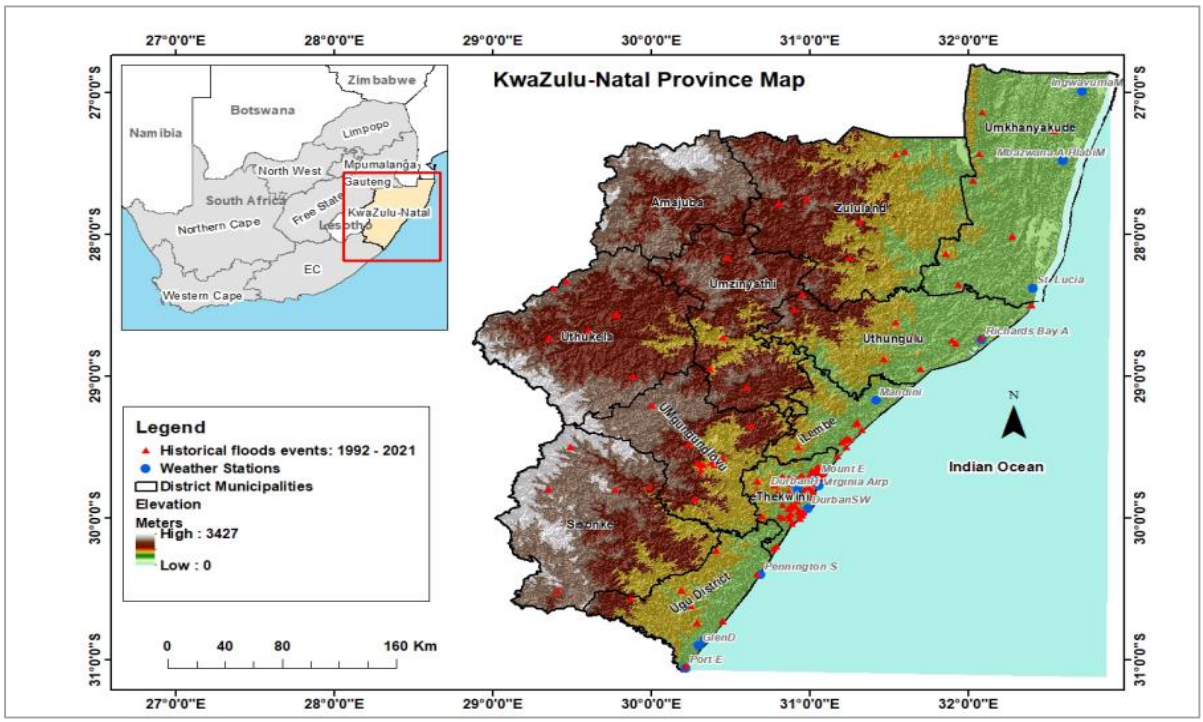

Figure 1: KZN geographical positioning

Adapted from **(Mashao, et al., 2022)**.

Figure 1 illustrates the geographical positioning of South Africa and showcases the terrain features of the eastern region, specifically the KwaZulu-Natal Province. KwaZulu-Natal (KZN), situated on the eastern coast of South Africa, is one such region highly susceptible to natural disasters, including floods. In recent years, KZN has experienced several notable flood events, including the floods of 2022, which had significant impacts on the region's telecommunications infrastructure and services. These floods disrupted not only Vodacom's operations but also communication networks vital for emergency response and coordination efforts.

The challenges faced by Vodacom during the KZN floods of 2022 underscore the importance of effective disaster response strategies in the region. As one of the major telecommunications providers serving KZN, Vodacom's ability to navigate these challenges is crucial for maintaining communication channels during emergencies and facilitating swift response and recovery efforts.

The study aims to address this gap by investigating Vodacom's role in disaster response during the KZN floods. It outlines the thesis statement, research purpose, context, problem statement, objectives, research questions, rationale, delimitations, assumptions, and the structure of the dissertation. Through a qualitative approach, the research seeks to provide valuable insights, identify best practices, and offer recommendations for improving disaster response strategies, ultimately contributing to the existing literature on disaster management.

1.2. Background of the study

In recent years, the world has witnessed an alarming increase in the frequency and intensity of natural disasters such as floods, hurricanes, earthquakes, and tsunamis, resulting in widespread devastation (Oxfam, 2020). The United Nations Office for Disaster Risk Reduction (UNDRR, 2020) reports staggering economic losses exceeding $2.3 trillion globally between 2000 and 2019, with Asia emerging as the most adversely affected region. Tragically, over 1.23 million lives were lost, and a staggering 4.2 billion people were impacted during the same period.

These escalating disasters underscore the critical need for effective disaster response strategies. Telecommunications technology has emerged as a pivotal tool in enhancing response efforts, facilitating communication between emergency responders and affected communities, providing situational awareness, and enabling the coordination of relief efforts (GSMA, 2020).

Historically, traditional telecommunications companies played a crucial role in disaster response by providing emergency services with access to landline telephones and mobile

phones, facilitating coordinated rescue and relief efforts (Haddow & Haddow, 2014). However, recent trends indicate a transformative shift in the role of telecommunications, with the emergence of social media platforms, artificial intelligence, and mobile apps as valuable tools for disseminating information and coordinating rescue efforts (Cheng et al., 2019; Moodley, 2019).

Global studies highlight the varying preparedness and response strategies of telecommunication companies in disaster scenarios across countries, regions, and sectors (Lopez-Carresi et al., 2016). While challenges such as infrastructure damage and coordination issues have been reported, some regions, like China, have successfully leveraged social media and communication technologies to improve the speed and effectiveness of disaster response efforts (Liu et al., 2018).

As of 2020, the International Telecommunication Union ITU (2020) reports that 83% of the global population has access to mobile networks, with 5.3 billion mobile broadband subscriptions. However, challenges persist, particularly in rural areas, where reliable mobile network access remains limited, as evidenced in sub-Saharan Africa (GSMA, 2020).

In Africa, telecommunication companies have been recognized for their crucial role in disaster response (Akuoko et al., 2021). For instance, floods, accounting for over 50% of all reported disasters, are a significant concern in South Africa, with the KZN floods of 2019 highlighting the vital role played by telecommunications companies (Biztech Africa, 2023).

Despite the global recognition of the importance of telecommunications in disaster response, a significant research gap exists concerning the empirical effectiveness of these efforts in South Africa, particularly in the context of the KZN floods. This study aims to address this gap by investigating the role of telecommunications, with a focus on Vodacom, a major telecommunications provider operating in KwaZulu-Natal, South Africa.

The thesis statement asserts that telecommunication companies play a critical role in disaster response, emphasizing the need for effective utilization of telecommunications for efficient disaster response. However, it acknowledges significant challenges, particularly in developing countries like South Africa.

This study contributed valuable insights into the role of Vodacom in disaster response during the KZN floods, offering specific contributions to the existing literature on disaster response. The research aimed to identify best practices, focusing on infrastructure, interoperability, last-mile connectivity, and effective disaster response strategies. The findings were expected to

offer recommendations for policymakers, emergency responders, and telecommunication companies, fostering improved disaster response strategies globally.

1.3. Statement of purpose

The purpose of this research was to evaluate the effectiveness of Vodacom's disaster response strategy in addressing the impact of the KwaZulu-Natal (KZN) flood on its operations and services in the region. The study identified the strategies implemented by Vodacom during the disaster response and evaluated their effectiveness in terms of communication, network infrastructure, customer support, and coordination with other organizations involved in disaster response efforts. Through qualitative approach, the research provided insights into the strengths and weaknesses of Vodacom's disaster response strategy and provided a framework for improving Vodacom's disaster response strategy and that of other organizations in the event of similar disasters in the future.

1.4. Context of the Study

The context of the study was the impact of the KZN floods on the affected communities and the response efforts of various stakeholders, with a focus on Vodacom's role in disaster response. The study sought to contribute to the understanding of effective disaster response strategies and the potential of telecommunications companies to contribute to disaster response efforts in developing countries like South Africa.

1.5. Research problem

The recent floods in KwaZulu-Natal (KZN) in South Africa highlighted the need for effective disaster response strategies in the telecommunications industry. Vodacom, one of the leading telecommunications companies in South Africa, was one of the companies that were affected by the floods, which disrupted its operations and services. While Vodacom implemented disaster response strategies to address the impact of the flood, it was unclear how effective these strategies were in mitigating the impact of the disaster on the company's operations and services. Therefore, the problem of this study was to assess the effectiveness of Vodacom's disaster response strategy to the KZN flood.

The need for effective disaster response strategies in the telecommunications industry was highlighted in previous research. For example, the National Academies of Sciences, Engineering, and Medicine (2019) reported that the telecommunications industry was a critical component of disaster response efforts, and that disruptions to communication networks and infrastructure could have significant consequences for disaster response and recovery efforts.

Similarly, Daramola, Oni, and Ogundele (2016) noted that the resilience of communication networks was essential for ensuring the continuity of critical services during and after disasters.

Moreover, previous research highlighted the importance of evaluating the effectiveness of disaster response strategies to improve future response efforts. For example, Lopez-Carresi, Fordham, Wisner, Kelman, and Gaillard (2016) noted that evaluating the effectiveness of communication strategies used in disaster response could help to identify areas for improvement and inform future response efforts.

Despite the significant role played by telecommunications providers in disaster response efforts, there was a need to assess and understand the specific factors that contributed to the effectiveness of their strategies. In the context of the KZN floods, it was crucial to determine whether the presence of effective leadership, resilient infrastructure, financial stability, stakeholder management, process efficiency, and advanced technology led to improved disaster response outcomes. The problem addressed in this study was the need to evaluate the specific factors that contributed to the effectiveness of disaster response strategies employed by telecommunications providers, with a specific focus on Vodacom during the KZN floods.

1.6. Research objectives and research questions

This research aimed to explore Vodacom's response to the KZN floods, focusing on key areas. Our investigation was guided by the following objectives:

1. Assessing the Impact of Effective Leadership and Stakeholder Management
2. Examining the Significance of Resilient Infrastructure and Advanced Technology
3. Evaluating the Role of Processes in Strengthening Disaster Response Capabilities
4. Assessing the Current Disaster Response Strategy Implemented by Vodacom
5. Providing a Framework for Improving Disaster Response Strategies

1.7. Research questions

This study aimed to understand how Vodacom handled the KZN floods. It closely analysed different factors that were crucial for its success. These questions guided the research:

1. How did effective leadership and stakeholder management impact the success of Vodacom's disaster response strategies during the KZN floods?

2. What role did resilient infrastructure and advanced technology play in enhancing Vodacom's disaster response efforts during the KZN floods, and how did they contribute to the overall effectiveness of the response?
3. How did the implementation of processes strengthen Vodacom's disaster response capabilities during the KZN floods, and what were the key factors influencing their effectiveness?
4. What were the key components of Vodacom's disaster response strategy during the KZN floods, and how effective were they in addressing the challenges posed by the disaster?
5. Based on the strengths and weaknesses identified in Vodacom's disaster response strategy during the KZN floods, what framework can be proposed for improving disaster response strategies for Vodacom and other organizations facing similar disasters in the future?

1.8. Rationale

The purpose of this study was to investigate the role of telecoms, specifically Vodacom, in disaster response during the KZN floods in South Africa. The rationale for this study was based on the increasing importance of mobile technology in disaster response and the potential impact it could have in mitigating the effects of disasters.

According to (UNDRR, 2020), mobile technology has the potential to transform disaster management by improving preparedness, response, and recovery efforts. Telecommunication (Telecoms) companies like Vodacom play a crucial role in providing this technology and infrastructure to support disaster response efforts.

Furthermore, research has shown that mobile networks can be used to track the movement of people during disasters and provide real-time updates on their location (Kang, Sun, & Xue, 2016). This information can be used to help rescue teams locate and assist people in need. Additionally, studies have highlighted the role of mobile communication in facilitating coordination among responders and affected communities during disasters (Al-Haidari & Rahman, 2019).

The KZN floods in South Africa in 2019 were a significant disaster that affected thousands of people and highlighted the need for effective disaster response mechanisms. Vodacom was one

of the key telecom's companies involved in providing support during the disaster, and their response can provide valuable insights into the role of telecoms in disaster response.

Thus, this study aimed to explore the role of Vodacom in disaster response during the KZN floods and to identify areas where they were successful in providing support as well as areas for improvement. The findings of this study could be used to inform future disaster response strategies and help to ensure that the potential of mobile technology was fully utilized in disaster response efforts.

1.9. Delimitations of the study

The delimitations of the study focusing on Vodacom's role in disaster response during the KZN floods included the following:

1. The study focused only on Vodacom's role in disaster response in the KwaZulu-Natal (KZN) region of South Africa during the floods of 2019. It did not examine Vodacom's response to other disasters or events in other regions of South Africa or globally.
2. The study focused only on the floods that occurred in KZN in 2019 and did not cover other disasters or events that Vodacom may have responded to before or after that period.
3. The study focused on Vodacom's role in disaster response from the perspective of the company and its employees. It did not examine the views or experiences of other stakeholders, such as government agencies, NGOs, or members of the affected communities.
4. The study did not compare Vodacom's response to the KZN floods with other telecoms that may have also provided disaster response services in the region.

1.10. Definition of terms

Disaster: A disaster is defined as a "catastrophic disturbance in the operation of a community or civilization of any size, resulting in human lives lost, property damaged, money lost, and/or environmental harm" (UNDDR, 2023).

Disaster management: In this context, the term "disaster management" refers to the broad spectrum of efforts made before, during, and after disasters to keep them under control and to offer a structure for assisting vulnerable individuals and communities in avoiding, mitigating, and recovering from their effects (Law Insider, 2023).

Telecoms: which stands for telecommunication is the transmission of information over long distances using electronic or other means of communication (Umsl.edu, 2023).

Disaster Response: Disaster response is the collaborative effort of government agencies, NGOs, and other stakeholders to help those who have been impacted by a natural disaster. (IGI Global, 2023).

Floods: A flood is defined as an overflow of water onto normally dry land, typically caused by heavy rainfall, melting snow, or the rapid thawing of ice. Floods can occur in various forms, including riverine floods, coastal floods, flash floods, and urban flooding, and can result in extensive damage to property, infrastructure, and loss of life (Dictionary.com, 2023).

1.11. Assumptions

The assumptions of the study focusing on Vodacom's role in disaster response during the KZN floods included the following:

1. Based on reports and public statements made by the firm and other sources, the study assumed that Vodacom played a significant role in disaster response during the KZN floods in 2019.
2. The study assumed that Vodacom's response to the KZN floods was effective in providing essential communication services and assistance to affected communities. This assumption was based on the company's reputation for providing reliable and innovative telecommunications services.
3. The study assumed that Vodacom had the necessary resources and infrastructure, such as mobile networks and trained staff, to provide disaster response services during the KZN floods. This assumption was based on the company's status as one of the largest telecommunications providers in South Africa.
4. The study assumed that Vodacom's disaster response during the KZN floods was guided by established protocols and standard operating procedures. This assumption was based on the company's experience in providing disaster response services in other contexts and its commitment to corporate social responsibility.
5. The study assumed that Vodacom's response to the KZN floods was consistent with industry standards and best practices for telecommunications companies in disaster response situations. This assumption was based on the company's adherence to international standards and guidelines for disaster response and its participation in industry associations and forums.

1.12. Structure of the Dissertation

The dissertation is structured as follows: firstly, an introduction sets the stage for the study, followed by a discussion of the background and contextual framework informing the research. Clear research questions and objectives are delineated, alongside an exploration of the rationale behind the study. A comprehensive literature review provides a foundation for understanding disasters and disaster response. Methodology outlines the approach taken in the research process, leading to the presentation of results. These results are then discussed in detail, considering their implications and relevance. Limitations of the study are acknowledged, followed by a concluding section that synthesizes key findings and offers insights for future research and practice.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

Disaster management, particularly in the realm of telecommunications, has become increasingly critical in recent years, given the escalating frequency and severity of natural disasters (UNDDR, 2023). This introduction delves into the historical context, challenges, and evolution of disaster management in the telecommunications sector, setting the stage for a comprehensive exploration of disaster response strategies and their effectiveness, with a specific focus on the KZN floods and Vodacom's response. Additionally, the study will employ a theoretical framework and conceptual framework providing a structured approach to understanding the dynamics of disaster response in the telecommunications context.

2.2. History of Natural Disasters

The history of natural disasters has been marked by devastating events that have had a significant impact on the lives and properties of people, as well as the economy of a country (Barnes, Dunn, & Wilkinson, 2019). According to the United Nations (2019), natural disasters have been a major threat to human populations throughout history, with records of floods, earthquakes, and volcanic eruptions dating back thousands of years. The frequency and severity of natural disasters have increased significantly over the past century, with climate change and urbanization being major contributing factors (IPCC, 2019).

In recent years, disaster response strategies have become a crucial aspect of disaster management, especially for organizations such as Vodacom in the telecommunications sector (Al-Haidari & Rahman, 2019). The field of disaster management has evolved significantly over the years, from reactive approaches focused on immediate response to proactive strategies aimed at preventing disasters and reducing their impact (Sawalha, 2023). Jia et al. (2015) noted that the telecommunications sector has become increasingly important in disaster response management due to its ability to provide timely and reliable communication.

The telecommunications sector plays a significant role in disaster response by providing communication infrastructure, which enables timely and effective communication among response agencies and affected individuals (GSMA, 2020; Marshall, Wilson, & Dale, 2018).

The effectiveness of disaster response strategies is critical in ensuring that the necessary assistance is provided to affected communities and individuals promptly. According to Jia et al. (2015), the telecommunications sector has become increasingly important in disaster response management due to its ability to provide timely and reliable communication.

Previous research has identified various disaster response strategies that have been effective in responding to disasters, such as COVID-19 (Hao, Xiao, & Chon, 2020). A systematic review by Daramola and Ogundele (2016) and Norris et al. (2008) identified the need for disaster response strategies to be flexible, adaptable, and tailored to the specific context of the disaster. Additionally, the use of technology, such as social media and mobile applications, has been found to be effective in disaster response and recovery (Cheng et al., 2019).

However, effective disaster response strategies must also consider coordination and collaboration between various stakeholders, including government agencies, non-governmental organizations (NGOs), and private sector organizations (Bevilacqua et al., 2012; Medel & Kousar, 2021). Bevilacqua et al. (2012) emphasized the importance of coordination and collaboration in disaster response. Medel and Kousar (2021) noted that disaster response strategies are crucial in ensuring that the necessary measures are taken to address the effects of a disaster.

Natural disasters can cause massive destruction to the lives and properties of people, and this can have a significant impact on the economy of a country (Setiadi, 2014; Panwar & Sen, 2018). In recent years, disaster response strategies have become a crucial aspect of disaster management, especially for organizations such as in the telecommunications sector (Brown et al., 2017). The objective of this literature review is to examine the effectiveness of disaster response strategies to KZN floods, using the case study of Vodacom. This review will provide an overview of empirical studies on disaster response management, identify research gaps, and discuss theoretical models that can be used to improve disaster response strategies.

2.3. Challenges and Benefits of Telecommunication disaster response

Telecommunications play a critical role in disaster response and recovery efforts and in the event of a disaster, telecommunication networks can be severely affected, making it difficult for emergency responders to communicate and coordinate their efforts (Alhaidari & Rahman, 2019; Marshall, Wilson, & Dale, 2018).

2.3.1 Challenges

During a disaster, communication traffic increases significantly, causing network congestion and potentially overloading the system (Gao & Goolsby, 2015; Whittaker, McLennan, & Handmer, 2015)This spike in communication is due to the surge in calls and messages as people seek information, assistance, and contact with loved ones (Alexander, 2014; Sutton et al., 2008). This can lead to communication failures and make it difficult for emergency responders to communicate effectively (Khaled & Mcheick, 2019).

Infrastructure Damage

According to Touili (2021) Disasters such as hurricanes, floods, earthquakes, and fires can damage telecommunication infrastructure, including cell towers, fiber optic cables, and power lines. This can lead to communication failures and make it difficult for emergency responders to coordinate their efforts (Alhaidari & Rahman, 2019; Whittaker, McLennan, & Handmer, 2015).

Power Outages

Power outages can occur during a disaster, which can impact telecommunication networks that rely on electricity to operate (Alhaidari & Rahman, 2019). Without a backup power source, communication systems may go down, making it difficult for emergency responders to communicate (Biskupovic, 2021).

2.3.2 Benefits

Rapid Communication

With a disaster response strategy in place, emergency responders can quickly and efficiently communicate with each other, enabling them to coordinate their efforts and respond to the disaster more effectively (Al-Haidari & Rahman, 2019).

Improved Coordination

By having a plan in place, emergency responders can better coordinate their efforts, ensuring that resources are distributed to where they are needed most (Liu, Kumar, Katul, & Porporato, 2018). Additionally, Marshall, Wilson, and Dale (2018) highlight that with improved communication and coordination, emergency responders can work together to ensure the safety of the public during and after a disaster.

Rapid Deployment of Resources

A disaster response strategy can help ensure that resources are quickly deployed to the affected areas, providing aid and support to those in need (Biskupovic, 2021).

In conclusion, having a disaster response strategy in place for telecommunication challenges is essential for effective disaster response and recovery efforts. Such a strategy can help emergency responders communicate, coordinate their efforts, and deploy resources quickly and efficiently, ultimately enhancing public safety and saving lives. Challenges such as network overload, infrastructure damage, and power outages must be addressed in disaster response strategies. Communication protocols, redundancy, and interoperability among different communication systems are essential components of effective disaster response.

2.4. Evolution of telecommunications disaster management

Disaster management systems have evolved significantly in recent decades, with advances in technology, communication, and collaboration leading to more effective responses to natural and man-made disasters (Bhandari, 2022). Disasters are becoming more complex and their impact on people is increasingly destructive and harmful, as noted by (Barnes, Dunn, & Wilkinson, 2019). The COVID-19 pandemic serves as a prime illustration of this trend (Sawalha, 2023; Jin, Zhou, Zhang, & Jin, 2020)

The evolution of disaster management in telecoms has been an important area of study due to the increasing frequency, Complexity and severity of disasters worldwide and with the rise of technology (AlHinai, 2020; Akter & Wamba, 2019). Telecoms have played a significant role in disaster management by providing critical communication channels during emergencies (Barnes, Dunn, & Wilkinson, 2019; Sawalha, 2023).

In this literature review, the focus lies on examining the evolution of disaster management in telecoms, encompassing the development of emergency response plans, the utilization of technology in disaster management, the intricacies of leadership and the role of telecoms in providing communication channels during disasters.

2.5. Development of Telecommunications emergency response strategies.

One of the key components of disaster management in telecoms is the development of emergency response plans (Al-Haidari & Rahman, 2019). These plans are designed to ensure that telecoms are prepared for emergencies and can respond quickly and effectively when disasters occur (Berariu, Fikar, Gronalt, & & Hirsch, 2020). Emergency response plans typically include procedures for identifying and responding to emergencies, as well as

protocols for communicating with other agencies and stakeholders during emergencies (Berariu, Fikar, Gronalt, & & Hirsch, 2020; Asghar, Alahakoon, & Churilov, 2006).

The importance of emergency response plans in disaster management has been highlighted in several studies for example, a study by Marshall, Wilson, and Dale, (2018) found that emergency response plans were critical in enabling telecoms to respond to emergencies quickly and effectively. Another study by ITU (2020) highlighted the importance of developing emergency response plans that are tailored to the specific needs of each telecom and the communities they serve.

2.6. Use of Technology in Disaster Management

Another important aspect of the evolution of disaster management in telecoms is the use of technology (Khatib, Perles Roselló, Jesús, Giralt, & Barco, 2021). Advances in technology have allowed telecoms to develop new tools and applications that can be used to support disaster management efforts (Khaled & Mcheick, 2019). For example, telecoms can use real-time data analytics to monitor network performance during disasters and identify areas that require additional support.

The use of technology in disaster management has been the focus of several studies. A study by (Ahmed et al.,2019) examined the use of social media and other digital technologies in disaster management. The study found that these technologies could be used to improve communication between stakeholders during emergencies and to provide real-time updates to the public (Khatib et al.,2019). As communication technologies continue to advance and become more accessible and affordable, the disaster management community is prompted to explore how these tools can be leveraged to enhance their response efforts (Al-Haidari & Rahman, 2019). The question that arises is how telecommunication can be utilized to create the most efficient and effective response during a disaster situation.

2.7. Role of Telecoms in Providing Communication Channels During Disasters

Perhaps the most important role of telecoms in disaster management is the provision of communication channels during emergencies (Al-Haidari & Rahman, 2019). During disasters, communication channels can be disrupted, making it difficult for emergency responders and the public to communicate (Abdeen et al.,2019). Telecoms have played a critical role in ensuring that communication channels remain open during emergencies (Akter & Wamba, 2019).

The importance of telecoms in providing communication channels during disasters has been highlighted in several studies, for example, a study by Mabuku et al., (2019) found that telecoms played a critical role in providing communication channels during the Zambian floods. Another study Jin, Zhou, Zhang, and Jin (2020) highlighted the role of telecoms in providing communication channels during the COVID-19 pandemic.

2.8. Backup Power and Redundant Networks

In the realm of disaster management, the deployment of backup power systems and redundant networks by telecommunication companies has emerged as a critical strategy to maintain uninterrupted service provision during adverse events (Al-Haidari & Rahman, 2019). This proactive approach involves the implementation of backup generators and redundant network connections for critical infrastructure components, such as cell towers and data centers (Borbor, et al.,2019). By ensuring redundancy and backup power availability, telecommunication companies aim to mitigate the impact of power outages and network failures caused by natural disasters such as hurricanes, earthquakes, and floods (Gul, et al.,2019).

2.8.1 Ensuring Network Resilience

The utilization of backup power systems and redundant networks has been widely recognized as essential for ensuring the resilience of telecommunication networks during disasters (Biskupovic, 2021). Research by Gul, Sarkar, Gutierrez, and Lai (2018) underscores the importance of redundancy in critical infrastructure to enhance network reliability and minimize service disruptions during emergencies.

2.8.2 Disaster Preparedness Strategies

Backup power systems and redundant networks are integral components of disaster preparedness strategies adopted by telecommunication companies (Gul, Sarkar, Gutierrez, & Lai, 2018). Tierney and Bruneau (2007) highlight the significance of proactive measures, such as redundancy planning, in building resilience against disruptive events and ensuring continuity of operations in the face of adversity.

2.8.3 Lessons from Past Disasters

Lessons learned from past disasters, such as the September 11, 2001 terrorist attacks and Hurricane Katrina, underscore the importance of backup power and redundant networks in maintaining communication capabilities during crises (Olson & Gawronski, 2010). These events have demonstrated the critical role of redundancy and backup systems in averting

communication breakdowns and facilitating timely response efforts (Bayazit, Hekimoglu, Kose, & Ozkan, 2020; Al-Haidari & Rahman, 2019).

The deployment of backup power systems and redundant networks represents a proactive and effective approach to disaster management in the telecommunications sector (Al-Haidari & Rahman, 2019). By ensuring the availability of backup power and redundant network connections for critical infrastructure, telecommunication companies can enhance network resilience and minimize service disruptions during emergencies (Menon, Pathrose, & Priya, 2021). Lessons drawn from past disasters emphasize the importance of incorporating redundancy planning into disaster preparedness strategies to safeguard communication capabilities and support effective response and recovery efforts (Boin & 't Hart, 2010).

2.9. Regulatory Frameworks

Finally, regulatory frameworks play a critical role in disaster management in telecommunications (GSMA, 2020). Governments around the world have established regulations and guidelines that require telecom companies to develop disaster management plans and maintain adequate levels of network resilience and cybersecurity (Kujala & Sachs, 2023). The effectiveness of these frameworks depends on their ability to incentivize companies to invest in disaster management and ensure compliance with regulations (Hao, Xiao, & Chon, 2020).

In summary, the evolution of disaster management in telecommunications has been characterized by the development of backup power and redundant networks, emergency communications centres, public-private partnerships, network resilience and cybersecurity, and regulatory frameworks. These strategies, technologies, policies, and frameworks have proven to be effective in improving disaster management and ensuring continuity of service during emergencies. However, their effectiveness depends on their ability to adapt to changing circumstances and address new challenges as they arise.

2.10. Definition of topic

Extreme weather events, such as heavy rain and flooding, have become more frequent and intense as a result of climate change, posing a substantial danger to urban security and sustainable development (Jin, Zhou, Zhang, & Jin, 2020). The risk of flooding is particularly high in city centres due to the increasing proportion of impervious areas caused by rapid urbanization (Bayazit, Hekimoglu, Kose, & Ozkan, 2020). Mohan & Mittal (2020) defines disaster as incident that takes place within a brief or extended duration, with far-reaching

effects on a whole society or community, resulting in widespread damage to people, wildlife, infrastructure, the environment, and the economy.

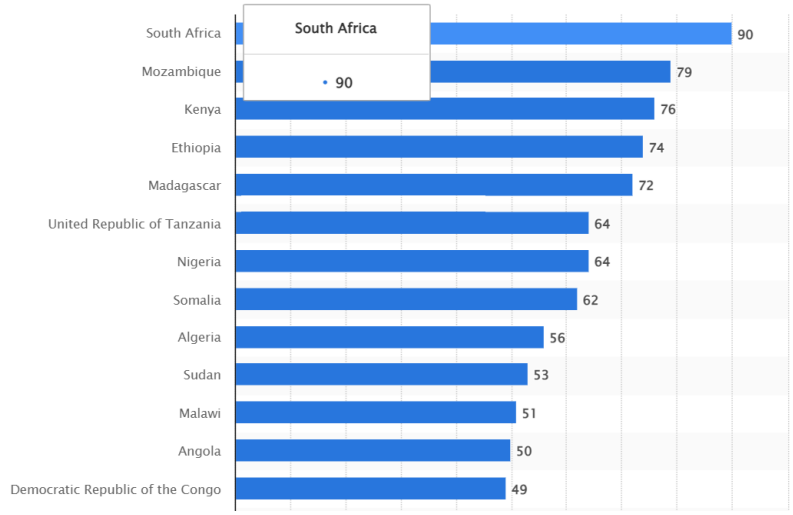

Figure 2: Natural Disaster experienced in Africa

Adapted from Statista (2023)

Statista (2023) highlights that from 1970 to 2019, Africa experienced approximately 1,700 natural disasters that were related to weather, climate, and water, such as storms, floods, and droughts. Furthermore, their website mentioned that among African countries, South Africa had the most recorded hazards during this period, with 90 incidents. Mozambique, Kenya, Ethiopia, and Madagascar were the next most affected nations, each recording over 70 climate-related disasters in the past 50 years. Concerns have arisen within the community due to the alarming statistics surrounding disasters, resulting in the need for the development of innovative solutions and the expansion of existing methods to reduce their impact in terms of disaster management and response (Berariu et al., 2020).

The focus is on proactively protecting the community from the adverse effects of disasters by using communication (Akter & Wamba, 2019). Consequently, there is a pressing need to improve urban disaster prevention and control to effectively deal with these extreme events (Comfort L. , 2007).

The KwaZulu-Natal (KZN) province of South Africa is prone to floods, which have devastating effects on the population, infrastructure, and economy (Biztech Africa, 2023). Furthermore, Biztech highlights that in 2019, the province experienced severe flooding, which led to the displacement of thousands of people, destruction of homes, and loss of lives.

In times of disaster, communication plays a crucial role in facilitating the response and recovery efforts (Aldrich & Sawada, 2015). It helps to establish a link between various stakeholders such as first responders, support systems, families, and affected individuals with the wider community (Mohan & Mittal, 2020). Effective communication is essential in ensuring that everyone involved in the situation is connected and well-informed (Comfort L. , 2007).

Telecommunications play a critical role in disaster response, providing real-time communication, information sharing, and support to affected communities (GSMA, 2020). Telecommunications refers to the technology and infrastructure used to transmit and receive information over long distances, typically using electronic means and this can include various forms of communication such as voice calls, text messages, emails, video calls, and more (Dictionary.com, 2023). The telecommunications industry is a critical part of modern society and plays an essential role in connecting people and businesses across the globe (Kang, Sun, & Xue, 2016).

In response to the disaster, various organizations, including Vodacom, implemented disaster response strategies to mitigate the impact of the floods. This literature review aims to define the topic of the effectiveness of disaster response strategies to KZN floods, focusing on the case of Vodacom. The review will explore existing literature on disaster response strategies, the impact of floods on communities, and the role of telecommunication companies in disaster response and will answer the research question “What was the effectiveness of Vodacom's disaster response strategy in response to the KZN flood?” Additionally, the review will discuss the importance of evaluating the effectiveness of disaster response strategies and the challenges involved in doing so.

Overall, the review will provide a background discussion on the topic by highlighting the need for effective disaster response strategies in KZN and the importance of studying the case of Vodacom.

2.11. Empirical Review of Literature

Disasters such as floods have significant impacts on individuals, communities, and businesses (Cheng, Han, Zhao, & Li, 2019). The effectiveness of disaster response strategies is critical to mitigating these impacts (Alcántara-Ayala, Thouret, Cui, & Geertsema, 2022). The purpose of this empirical literature review is to examine the effectiveness of disaster response strategies in the case of the KwaZulu-Natal (KZN) flood, specifically focusing on the response of Vodacom, a South African telecommunications company.

This review utilizes more than 15 articles that explore various aspects of disaster response, including the importance of preparedness, Collaboration, framework and communication, the role of technology, and the challenges of responding to floods. The selected articles provide insights into the factors that contribute to effective disaster response and highlight areas for improvement in disaster management practices.

By examining the case of Vodacom's response to the KZN flood, this review aims to identify best practices in disaster response that can be applied in future incidents. The findings of this review will be useful for emergency management professionals, telecommunications companies, and other organizations involved in disaster response efforts. Ultimately, this review aims to contribute to the development of more effective disaster response strategies that can help reduce the negative impacts of disasters on individuals and communities.

2.11.1 Disaster Management Process Redesigning

Re-engineering disaster management processes involves restructuring the current system to enhance effectiveness, efficiency, and responsiveness (Bevilacqua, Ciarapica, & Paciarotti, 2012). Furthermore, Bevilacqua, Ciarapica, and Paciarotti, (2012) indicated that re-engineering of processes includes analysing existing processes, identifying areas for improvement, adopting to new circumstances as it occurs and implementing changes. This may entail adopting new technology, coordinating stakeholders, reorganizing information flow, or developing new procedures and policies (Brown et al., 2017. Collaboration among stakeholders, encompassing all stages of disaster management, is vital for process effectiveness (Morakabati, Page, & Fletcher, 2017; Brown et al., 2017).

The aim of process redesign is to reduce disaster impact and bolster preparedness and response capabilities (qbal, Perez, & Barthelemy, 2021). Communication is pivotal during disaster recovery, yet disruptions are common, hindering relief efforts (Menon, Pathrose, & Priya, 2021). Japan's Never Die Network (NDN) addresses this challenge by providing resilient communication infrastructure tailored to the country's unique geography (Iqbal, Perez, & Barthelemy, 2021; Al-Haidari & Rahman, 2019).

Figure 3: NDM network process

Adapted from (Uchida et al. 2012)

Figure 3 depicts the operational process of the Never Die Network (NDN), showcasing its resilience and adaptability in disaster-prone regions. The diagram illustrates the flow of data-centric security measures, mobility support, and efficient content distribution, highlighting how these elements work together to ensure uninterrupted connectivity during emergencies. By presenting NDN as a dynamic process, the figure emphasizes its continuous operation and ability to respond to changing conditions, thereby enhancing disaster resilience and communication effectiveness (Uchida et al., 2012).

NDN ensures connectivity in disaster-prone regions through data-centric security, mobility support, and efficient content distribution (Uchida et al., 2012). Furthermore, Uchida et al., (2012) highlights collaboration between the NDN Consortium and stakeholders, which has been instrumental in promoting adoption and development.

Process-oriented disaster response management emphasizes stakeholder coordination, communication, and collaboration (Hofmann, Betke, & Sackmann, 2015). Moreover, Hofmann, Betke, and Sackmann, (2015) mentioned that this approach enhances effectiveness, decision-making, and resource allocation during response efforts. Additionally, Comfort, Boin, and Demchak, (2011) it allows for flexibility and adaptation to varying disaster contexts, ensuring the relevance and applicability of response strategies.

Iqbal, Perez, and Barthelemy (2021) propose a four-step process for disaster management, emphasizing contextual understanding, technological solutions, impact analysis, and effectiveness evaluation.

However, Hofmann, Betke, and Sackmann (2015) highlight the need for further research to understand process-oriented approaches better and address existing gaps in knowledge. These include defining process-oriented methods and assessing their efficacy across diverse disaster contexts. This advocates ongoing evaluation and refinement of processes to ensure efficiency and adaptability in dynamic disaster environments.

2.11.2 Best practices for effective disaster response strategies

Disaster response is a critical area of emergency management that involves the provision of immediate assistance and relief to individuals, communities, and organizations affected by disasters (Morakabati, Page, & Fletcher, 2017). The best practices of disaster response have evolved over time and are informed by experiences and lessons learned from past disasters (Berariu, Fikar, Gronalt, & & Hirsch, 2020) . In this literature review will examine some of the best practices of disaster response such as leadership, stakeholder management, based on current research and expert opinions.

2.11.3 Leadership styles and their impact on disaster response strategies

The KZN floods presented significant challenges to communities and organizations alike, demanding effective disaster response strategies. McKinsey (2020) highlights that leadership plays a pivotal role in guiding and mobilizing response teams, managing resources, and making critical decisions during times of crisis. In such crises, the role of leadership and stakeholder management becomes paramount in orchestrating cohesive and efficient responses. This literature review explores existing research on the impact of effective leadership, types of leadership styles and stakeholder management, Technology, regulatory and Network Resilience on disaster response, particularly focusing on Vodacom's strategies during the KZN floods

2.11.3.1 Impact of leadership during disaster response

The literature reviewed provides valuable insights into the critical role of leadership in crisis situations, particularly focusing on its significance in effective emergency management, decision-making, and coordination during disasters. Boin and 't Hart (2010) emphasize the indispensable nature of leadership, highlighting the need for leaders to provide direction, coordination, and motivation during crises. This underscores the fundamental role leaders play in orchestrating cohesive and efficient response efforts.

Natural disasters pose significant challenges to communities and organizations, requiring effective leadership to coordinate and execute efficient disaster response efforts (Akuoko,

Aggrey, & Amoako-Arhen, 2021). Furthermore, Comfort, Boin, and Demchak (2010) stress the importance of resilience in crisis leadership, identifying key traits such as adaptability, decisiveness, empathy, and strategic vision as crucial for navigating complex and uncertain situations. Their work emphasizes the need for leaders to develop resilient capabilities to effectively address the challenges posed by crises.

Kendra and Wachtendorf's (2016) analysis of emergency responses during the waterborne evacuation of Manhattan on 9/11 provides insights into effective decision-making and coordination processes during crises. Their study underscores the significance of communication, collaboration, and improvisation in crisis response, highlighting the essential role of leadership in facilitating these efforts.

In conclusion, the reviewed literature underscores the critical importance of leadership in disaster response, emphasizing its role in providing direction, coordination, and motivation during crises. Effective leadership is essential for orchestrating cohesive and efficient response efforts, particularly in the face of natural disasters that pose significant challenges to communities and organizations. Traits such as adaptability, decisiveness, empathy, and strategic vision are identified as key components of resilient crisis leadership, essential for navigating complex and uncertain situations.

Despite the insights provided by existing research, there are still notable gaps in the literature. One such gap is the need for further exploration into the specific leadership strategies and practices that contribute to successful disaster response outcomes in diverse contexts. Additionally, there is a lack of research examining the long-term impacts of leadership decisions and actions taken during disaster response, as well as the effectiveness of leadership development initiatives in building resilience among emergency management professionals. Addressing these gaps could provide valuable insights for enhancing leadership effectiveness and improving disaster response efforts in the future.

2.11.3.2 Leadership Styles influence during disaster response

Moreover, Yukl and Mahsud's (2010) discussion on flexible and adaptive leadership styles adds nuance to the discourse, emphasizing the importance of versatility in leading during emergencies. Their exploration of different leadership approaches, such as transformational, transactional, and servant leadership, underscores the need for leaders to tailor their strategies based on the nature and demands of the crisis at hand.

This research explore various leadership styles, including transformational, transactional, and servant leadership, and discuss how each can be effectively deployed depending on the specific context of the crisis.

2.11.3.3 Transformational Leadership

Yukl and Mahsud's (2010) highlight the importance of transformational leadership, which focuses on inspiring and motivating followers to achieve common goals. This style encourages innovation, creativity, and a shared vision, which can be particularly valuable in navigating complex and uncertain crisis environments. In the context of disaster response, transformational leaders can promote collaboration, innovation, and commitment among response teams (Smith & Peterson, 2017; Yukl & Mahsud, 2010). Their ability to articulate a vision, empower others, and foster resilience contributes to effective disaster response (Smith & Peterson, 2017).

2.11.3.4 Transactional Leadership

While transformational leadership emphasizes long-term vision and inspiration, transactional leadership centres around task-oriented exchanges between leaders and followers. Transactional leadership is characterized by the exchange of rewards or punishments based on performance outcomes and adherence to established procedures (Bass, 1985; Greenleaf, 1977). In the context of disaster response, transactional leadership can ensure accountability and adherence to standardized procedures (Burns, 1978; McKinsey, 2020).Yukl and Mahsud (2010) discuss how transactional leadership can be useful in crises where clear directives and immediate action are required to address pressing issues and restore order.

2.11.3.5 Servant Leadership

Yukl and Mahsud (2010 explore the concept of servant leadership, characterized by a focus on serving the needs of others and empowering followers to reach their full potential. (Burns, 1978) argues that servant leaders prioritize empathy, collaboration, and servant-heartedness, qualities that can foster resilience and community cohesion during times of crisis.

A study in 2006 found that that effective crisis leadership often involves a combination of these styles, tailored to the unique challenges and opportunities presented by the situation (Spillane, 2006). (Avolio, Walumbwa and Weber (2009) underscore the importance of leaders being adaptable and responsive, able to pivot between different approaches as circumstances evolve by embracing flexibility and adaptability in their leadership practices. Leders can enhance their

effectiveness in managing crises and guiding their teams towards successful outcomes (Spears, 1995; Greenleaf, 1970).

Areas for future research in this field include further exploration of how different leadership styles interact and influence each other during disaster response. Additionally, research could investigate the effectiveness of leadership development programs tailored to emergency management professionals, aiming to enhance their ability to adapt their leadership styles to varying crisis contexts. Furthermore, longitudinal studies examining the long-term impacts of leadership decisions and actions taken during disaster response efforts could provide valuable insights into effective leadership practices and their outcomes over time. Overall, future research in this area has the potential to inform leadership training and decision-making processes, ultimately improving disaster response outcomes and community resilience.

In summary, the literature on leadership styles during disaster response highlights the importance of flexibility and adaptability in leading during emergencies. Transformational leadership emphasizes inspiring and motivating followers to achieve common goals, fostering collaboration and innovation. Transactional leadership focuses on task-oriented exchanges to ensure accountability and adherence to procedures, particularly useful in crises requiring immediate action. Servant leadership prioritizes serving the needs of others and empowering followers, fostering resilience and community cohesion.

2.11.3.6 Stakeholder management impact in disaster response

This review highlights the pivotal role of stakeholder management in effective disaster response, emphasizing its importance in mitigating the impact of disasters and enhancing overall response efforts. Community engagement and collaboration among diverse stakeholders are crucial components of successful disaster response strategies. Stakeholder management facilitates cooperation, streamlines decision-making processes, and optimizes resource utilization during disaster response operations.

Digital technologies offer new avenues for stakeholder engagement, further enhancing disaster management practices. While recognized for its importance, there is a need for established frameworks and best practices in stakeholder management for disaster response contexts. Effective stakeholder management is essential for ensuring the success of disaster response efforts by fostering collaboration, facilitating community engagement, and leveraging digital technologies.

Moreover, considering the impact of leadership styles on stakeholder engagement and collaboration is critical, as leadership influences how stakeholders are mobilized and integrated into response efforts. Transformational, transactional, and servant leadership styles can significantly impact stakeholder management strategies, ultimately shaping the effectiveness of disaster management practices.

One area for future research is the exploration of how different leadership styles impact stakeholder management strategies during disaster response. Understanding how leaders can effectively engage and coordinate diverse stakeholders in crisis situations could provide valuable insights into optimizing response efforts and enhancing community resilience.

In conclusion, this review underscores the critical interplay between leadership influence and stakeholder management in effective disaster response. By engaging stakeholders, fostering collaboration, and leveraging digital technologies, disaster response efforts can be significantly enhanced, leading to more resilient communities and infrastructure. However, there are still areas for future research and improvement in this field.

2.11.3.7 Network Resilience in Disaster Response

Network resilience plays a crucial role in disaster response, encompassing aspects such as network diversity (redundancy), robustness, infrastructure adaptation, and the resilience of municipality infrastructure like roads, bridges, and power lines. This literature review delves into the importance of these factors in ensuring effective disaster response and recovery efforts.

Network diversity, characterized by redundancy in communication systems, is essential for maintaining connectivity during disasters (Iqbal, Perez, & Barthelemy, 2021). Redundant channels, including mobile and satellite communication systems, provide backup options crucial for ensuring uninterrupted communication in disaster-affected areas (Cheng, Han, Zhao, & Li, 2019). Additionally, the integration of diverse communication technologies enhances the resilience of networks by mitigating the impact of infrastructure failures.

Robustness, referring to the strength and durability of network infrastructure, is vital for withstanding the challenges posed by disasters (Cerè, Rezgui, & Zhao, 2019). Robust communication systems are less susceptible to damage and disruption, ensuring continued functionality during adverse conditions (Brown et al., 2017). Moreover, the use of resilient materials and design principles enhances the robustness of infrastructure components such as communication towers and equipment.

Infrastructure adaptation involves the ability of network infrastructure to adjust to changing conditions and emerging threats (Norris et al., 2008). Adaptive infrastructure solutions, such as mobile communication units and temporary shelters, enable rapid response and recovery efforts in disaster-affected areas (Daramola, Oni, & Ogundele, 2016). By embracing adaptable technologies and practices, disaster response agencies can enhance their ability to address evolving challenges.

Municipality infrastructure, including roads, bridges, and power lines, forms the backbone of disaster response and recovery operations (Kunguma, 2020). Resilient municipality infrastructure ensures the timely and efficient movement of personnel, equipment, and supplies to affected areas (Jia, Zhang, Li, & Li, 2015). Strengthening and reinforcing critical infrastructure components enhance their ability to withstand the impact of disasters, minimizing disruptions and facilitating rapid recovery.

Despite advancements in network resilience, there remains a research gap in understanding the integration of emerging technologies, such as artificial intelligence and blockchain, in enhancing disaster response and recovery efforts. Future studies should explore the potential of these technologies in optimizing resource allocation, improving situational awareness, and facilitating coordination among stakeholders during disaster events. Additionally, research is needed to assess the scalability and cost-effectiveness of resilient infrastructure solutions in diverse disaster scenarios, including floods, earthquakes, and pandemics. By addressing these gaps, researchers can inform the development of more robust and adaptive disaster response strategies, ultimately enhancing the resilience of communities and infrastructure.

2.11.3.8 Utilization of technology and data in disaster response

The utilization of technology and data in disaster response has undergone significant evolution, facilitated by digital transformation. Early Warning Systems (EWS) and Geographic Information Systems (GIS) have traditionally aided disaster management, but recent advancements underscore technology's pivotal role in addressing disasters (Al-Haidari & Rahman, 2019; Sawalha, 2023). Wireless monitoring systems employing artificial intelligence and drones enable accurate damage assessment in disaster areas (Chamola et al., 2021).

Mobile devices have emerged as indispensable tools during disasters, facilitating communication with emergency services and aid organizations (Chen et al., 2017). Crowdsourcing through social media platforms provides real-time information on flood locations and severity, aiding prompt response and damage mitigation (Li et al., 2023; Jin et

al., 2020; Marshall, Wilson, & Dale, 2018). Social media platforms also serve as effective channels for disseminating essential information to affected individuals, as observed during the COVID-19 pandemic (Al-Haidari & Rahman, 2019).

The potential benefits of leveraging mobile phone data for disaster response include more effective resource allocation, targeted communication, and enhanced situational awareness (Jia, Zhang, Li, & Li, 2015). However, challenges such as privacy concerns, data quality issues, and representativeness limitations need to be addressed (Kang, Sun, & Xue, 2016).

Furthermore, the integration of IoT technology, sensor networks, and robotics has revolutionized disaster response, particularly in scenarios like tunnel fires (Martins, 2018). Space technology and Tethered Balloon Technology have also proven instrumental in disaster mitigation and communication augmentation, respectively, offering enhanced capabilities for preparedness, detection, and response (Samarajiva & Zuhyle, 2021; Lopez-Carresi et al., 2016).

In conclusion, effective disaster response necessitates a holistic approach integrating pre-disaster planning, coordination, community engagement, rapid assessment, flexibility, and technology utilization. Technology, especially advanced innovations like machine learning and artificial intelligence, holds promise in further enhancing early warning systems, thereby bolstering disaster preparedness and resilience. Understanding technology's impact on disaster preparedness can inform proactive strategies, leading to improved outcomes for communities.

2.3.11.9 Regulatory

Natural disasters like floods often disrupt telecommunication networks, impeding crucial communication channels and hindering response efforts (Al-Haidari & Rahman, 2019). To address this, regulatory and legal frameworks are established to ensure the functionality of telecommunication networks during and after disasters (Smith, 2020).

Studies investigating telecommunication regulatory frameworks in disaster management highlight their efficacy and challenges. Joshi, Dube, and Patil (2019) examined India's regulatory framework, finding it effective in ensuring service availability but citing coordination and infrastructure challenges. Similarly, Hao, Wang, and Xie (2020) studied China's framework, noting its resilience but highlighting issues with network capacity and backup power. Aziz and Mahmud (2018) focused on Bangladesh, finding effectiveness but challenges in backup power and stakeholder coordination.

In South Africa, the Independent Communications Authority regulates the sector, crucial during floods to maintain operational networks and ensure community access (ICASA, 2016).

Collaborating with the National Disaster Management Centre, guidelines mandate operators to enact business continuity plans (ICASA, 2016).

These studies underscore the importance of regulatory frameworks in bolstering telecommunication network resilience during disasters. Future research could evaluate framework effectiveness, focusing on subscriber access post-disaster and mechanisms ensuring priority service restoration. Additionally, exploring international institutions like the ITU and ICAO in coordinating telecommunication regulations during disasters would provide valuable insights.

In conclusion, regulatory frameworks play a vital role in ensuring telecommunication network resilience during natural disasters. Further research could enhance understanding and effectiveness, particularly regarding subscriber access and international coordination.

2.12. Theoretical Frameworks for Disaster Response

Disaster response strategies are complex and require a systematic approach to be effective. Several theoretical frameworks have been developed to explain disaster response strategies and their effectiveness. This literature review will discuss three critical frameworks that provide valuable insights into disaster management and response strategies, particularly in the context of evaluating Vodacom's effectiveness during the KZN floods.

2.12.1 Four Stages of Disaster Management Framework

The Four Stages of Disaster Management Framework offers a structured approach to disaster response, comprising mitigation, preparedness, response, and recovery (Burger, Kennedy, & Crooks, 2021).

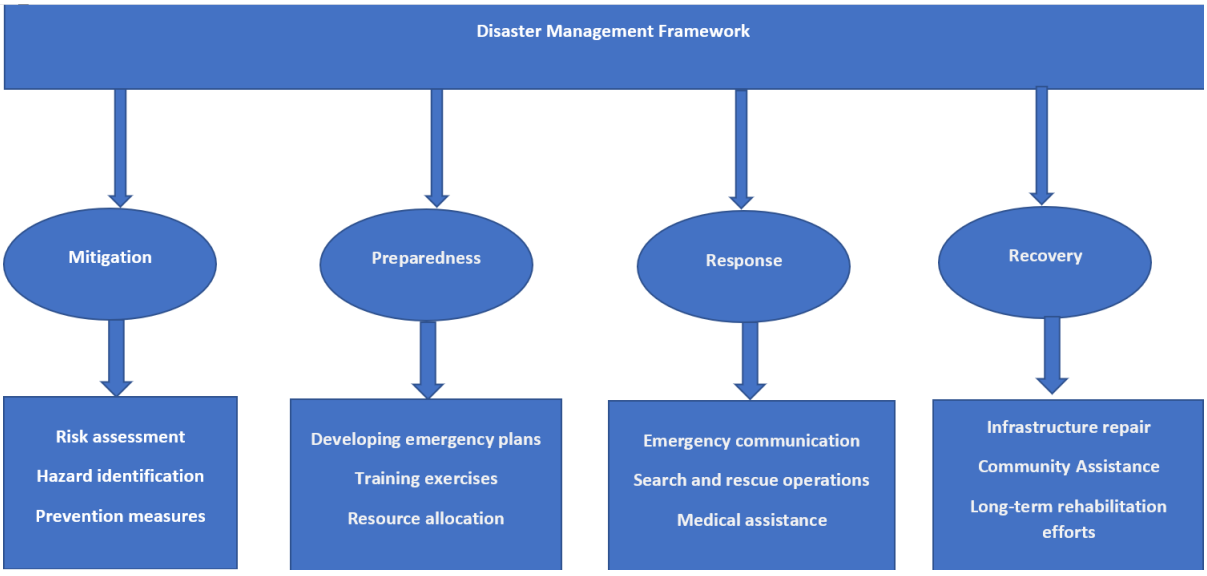

Figure 4: The Four Stages of Disaster Management Framework

Adapted from (Burger, Kennedy, & Crooks, 2021).

Figure 2 illustrates the Four Stages of Disaster Management Framework, providing a structured approach to disaster response that includes mitigation, preparedness, response, and recovery. This framework serves as a guide for understanding the sequential phases of disaster management and the coordinated actions required at each stage.

2.12.1.1. Key Components of the Four Stages of Disaster Management Framework

Mitigation: The first stage, mitigation, involves proactive measures to prevent or reduce the impact of disasters. This includes activities such as risk assessment, land-use planning, infrastructure improvements, and public awareness campaigns aimed at minimizing the likelihood and severity of disasters (Birkland, 2006).

Preparedness: Preparedness focuses on developing plans and capabilities to respond effectively to disasters (Burger, Kennedy, & Crooks, 2021). This involves activities such as training and capacity building, emergency drills and simulations, and the establishment of early warning systems to enhance the readiness of communities and response agencies (Asghar, Alahakoon, & Churilov, 2006).

Response: During the response phase, immediate actions are taken to save lives, protect property, and meet the basic needs of affected populations. This includes activities such as search and rescue operations, medical assistance, and the provision of emergency shelter and supplies to those in need (Burger, Kennedy, & Crooks, 2021).

Recovery: Recovery efforts aim to restore normalcy and rebuild affected communities in the aftermath of disasters. This involves activities such as infrastructure repair and reconstruction, livelihood restoration, psychosocial support, and long-term rehabilitation initiatives to promote the recovery and resilience of affected populations (UNDDR, 2023).

2.12.1.2. Application in Disaster Response

The Four Stages of Disaster Management Framework provides a systematic approach to disaster response, helping organizations and agencies to plan and implement coordinated efforts across all phases of the disaster management cycle (Burger, Kennedy, & Crooks, 2021). By addressing mitigation, preparedness, response, and recovery, this framework ensures a comprehensive and integrated approach to disaster management, ultimately enhancing the resilience of communities and infrastructure (Asghar, Alahakoon, & Churilov, 2006).

This framework serves as a guide for understanding the sequential phases of disaster management and the coordinated actions required at each stage. Mitigation involves proactive measures to prevent or reduce the impact of disasters, while preparedness focuses on developing plans and capabilities to respond effectively (Burger, Kennedy, & Crooks, 2021). During the response phase, immediate actions are taken to save lives and protect property, followed by recovery efforts aimed at restoring normalcy and rebuilding affected communities (Burger, Kennedy, & Crooks, 2021). By applying this framework, Vodacom's strategies can be assessed in alignment with the key stages of disaster management, from proactive risk reduction measures to post-event recovery initiatives.

2.12.2 Integrated Disaster Risk Management (IDRM) Model

The Integrated Disaster Risk Management (IDRM) Model emphasizes a holistic and coordinated approach to disaster risk reduction, preparedness, response, and recovery (Wang et al., 2021).

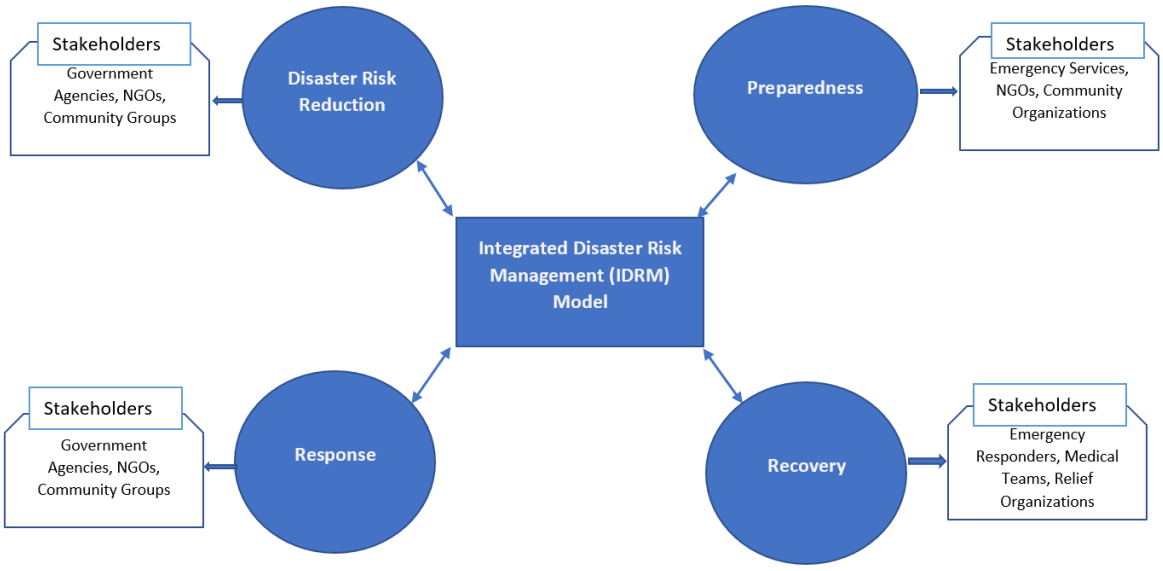

Figure 5: Integrated Disaster Risk Management (IDRM) Model

Adapted from Sandoval, Voss, Flörchinger, Lorenz, and Jafari, (2023)

Figure 5 depicts the IDRM Model, which offers a comprehensive and interconnected approach to disaster risk reduction, preparedness, response, and recovery. The IDRM model emphasizes the importance of holistic and coordinated strategies in addressing various dimensions of disaster management (Sandoval, Voss, Flörchinger, Lorenz, & Jafari, 2023).

2.12.1.3. Key Components of Integrated Disaster Risk Management (IDRM) Model

Risk Reduction: The IDRM model emphasizes proactive measures to reduce the underlying risk factors associated with disasters. This includes activities such as hazard identification, vulnerability assessment, and community-based interventions aimed at minimizing the likelihood and impact of disasters (SA National Disaster Management Framework , 2005).

Preparedness: Preparedness focuses on developing plans, capacities, and capabilities to respond effectively to disasters. This involves activities such as training and capacity building, emergency drills and simulations, and the establishment of early warning systems to enhance the readiness of communities and response agencies (Okada & Sakakibara, 2004).

Response: During the response phase, immediate actions are taken to save lives, protect property, and meet the basic needs of affected populations. The IDRM model emphasizes the importance of rapid and coordinated response efforts, including search and rescue operations, medical assistance, and the provision of emergency shelter and supplies (Sandoval, Voss, Flörchinger, Lorenz, & Jafari, 2023).

Recovery: Recovery efforts aim to restore normalcy and rebuild affected communities in the aftermath of disasters (Okada & Sakakibara, 2004). This involves activities such as infrastructure repair and reconstruction, livelihood restoration, psychosocial support, and long-term rehabilitation initiatives to promote the recovery and resilience of affected populations (Sandoval, Voss, Flörchinger, Lorenz, & Jafari, 2023).

2.12.1.4. Application in Disaster Response

The IDRM model serves as a guide for disaster response agencies and organizations, helping them to plan and implement coordinated and effective response efforts (Sandoval, Voss, Flörchinger, Lorenz, & Jafari, 2023). By addressing all stages of the disaster management cycle, the IDRM model ensures a comprehensive and integrated approach to disaster response, enhancing the resilience of communities and infrastructure.

This model recognizes the interconnectedness of various disaster management components and the importance of engaging all stakeholders in disaster preparedness and response efforts (Sandoval, Voss, Flörchinger, Lorenz, & Jafari, 2023). It underscores the need for comprehensive risk assessments, multi-sectoral collaboration, and community engagement to enhance resilience and mitigate disaster impacts (Okada & Sakakibara, 2004). By adopting the IDRM model, Vodacom's strategies during the KZN floods can be evaluated in terms of their integration, comprehensiveness, and effectiveness in addressing multiple dimensions of disaster management.

2.12.3 Telecommunications Redundancy and Resilience Framework

The Telecommunications Redundancy and Resilience Framework focus on ensuring the availability and continuity of telecommunication services during disasters or disruptions (Gul et al., 2018; Al-Haidari & Rahman, 2019).

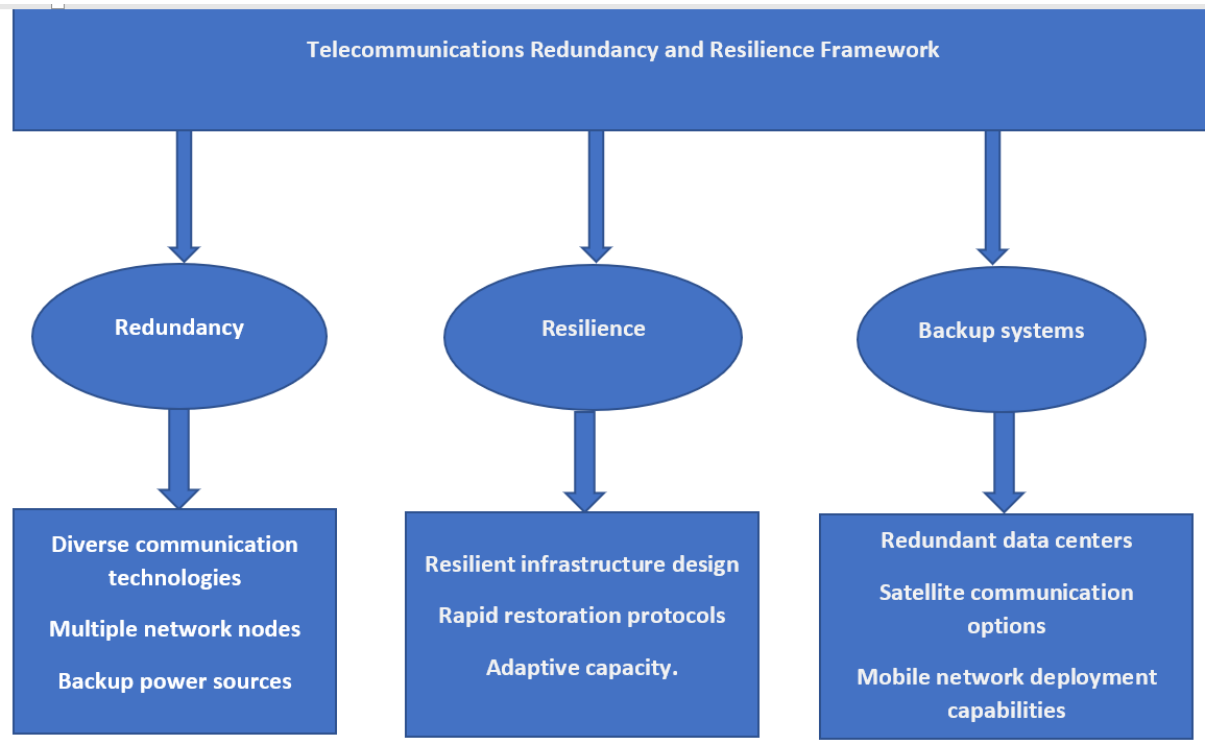

Figure 6: Telecommunications Redundancy and Resilience Framework

Adapted from Gul, Sarkar, Gutierrez, and Lai (2018)

Figure 6 illustrates the Telecommunications Redundancy and Resilience Framework, which provides a structured approach to ensuring the availability and continuity of telecommunications services during disasters or disruptions. The framework emphasizes the importance of redundancy, resilience, and backup systems in maintaining communication networks during emergencies (Zhang, et al., 2023).

2.12.1.5. Key Components of the Telecommunications Redundancy and Resilience Framework

Redundancy: The framework highlights the need for redundancy in telecommunications infrastructure, including multiple communication technologies, network paths, and backup systems (Al-Haidari & Rahman, 2019). Redundancy ensures that communication services remain available even if primary systems fail or are compromised during disasters (Medel & Kousar, 2021).

Resilience: Resilience is another critical component of the framework, focusing on the ability of telecommunications networks to withstand and recover from disruptions (Gul, Sarkar, Gutierrez, & Lai, 2018). This involves measures such as robust infrastructure, disaster-resistant equipment, and rapid restoration capabilities to minimize downtime and maintain communication services during and after disasters.

Backup Systems: The framework emphasizes the importance of backup systems and contingency plans to ensure the continuity of telecommunications services in the event of failures or outages (Gul, Sarkar, Gutierrez, & Lai, 2018). Furthermore, the author highlight that this includes backup power sources, redundant data centers, and alternative communication channels to sustain operations during emergencies.

2.12.1.6. Application in Disaster Response

During disasters such as the KZN floods, the Telecommunications Redundancy and Resilience Framework plays a crucial role in supporting emergency response and coordination efforts (Medel & Kousar, 2021). By maintaining resilient and redundant communication networks, telecommunications providers like Vodacom can ensure continuous communication between response teams, government agencies, and affected communities, facilitating the dissemination of critical information and the coordination of relief efforts.

This framework highlights the importance of redundancy, resilience, and backup systems in maintaining communication networks during emergencies. It emphasizes the need for diverse communication technologies, redundant infrastructure, and capacity building to support effective communication during crisis situations. By applying this framework, Vodacom's communication infrastructure and response mechanisms during the KZN floods can be evaluated to assess their robustness and ability to support emergency response and coordination efforts.

2.12.4 Proposed framework

In conclusion, the three theoretical frameworks discussed the Four Stages of Disaster Management, the Integrated Disaster Risk Management (IDRM) Model, and the Telecommunications Redundancy and Resilience Framework offer valuable insights into the complexities of disaster response strategies and their effectiveness.

The Four Stages framework provides a structured approach to disaster management, guiding Vodacom's strategies through mitigation, preparedness, response, and recovery phases. By

aligning with this model, Vodacom can assess its actions at each stage, from proactive risk reduction measures to post-event recovery initiatives.

The IDRM Model emphasizes a holistic and coordinated approach, urging Vodacom to engage stakeholders, conduct comprehensive risk assessments, and prioritize multi-sectoral collaboration to enhance resilience and mitigate disaster impacts effectively.

The Telecommunications Redundancy and Resilience Framework underscore the importance of maintaining communication networks during emergencies. Vodacom's communication infrastructure and response mechanisms during the KZN floods can be evaluated against this framework to ensure robustness and support for emergency response and coordination efforts.

By integrating these frameworks, Vodacom can develop a comprehensive understanding of its disaster response strategies' effectiveness during the KZN floods, identify areas for improvement, and enhance its capabilities for future disaster management endeavours. Continued application and refinement of these frameworks will be essential in ensuring Vodacom's readiness and effectiveness in addressing disaster scenarios.

2.13. Conceptual Framework

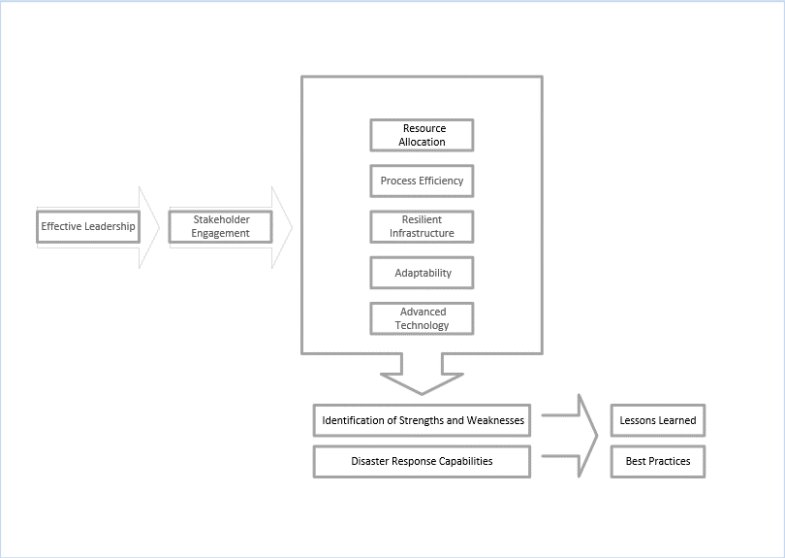

Figure 7: Conceptual Framework

Author's own work

The conceptual framework presented in Figure 7 illustrates the interconnected key components essential for effective disaster response. At the core of this framework is effective leadership, serving as a driving force for stakeholder engagement. Effective leadership entails the ability to inspire, coordinate, and make informed decisions in response to disasters.

Stakeholder engagement involves the collaboration of various individuals and groups, including Vodacom internal responders, government agencies, non-profit organizations, community members, and other relevant stakeholders. Effective stakeholder engagement is crucial for ensuring coordinated and comprehensive response efforts.

Surrounding the core elements are two branches: process efficiency and resilient infrastructure. Process efficiency emphasizes streamlining procedures and coordination mechanisms to enable timely and effective resource allocation. Resilient infrastructure encompasses physical and technological systems necessary for effective disaster response, ensuring functionality and adaptability during disasters.

At the outermost layer of the framework lies advanced technology, highlighting its critical role in strengthening disaster response capabilities. This includes the use of technological tools, data analysis, and communication systems to enhance situational awareness, decision-making, and coordination.

The framework emphasizes the complex connections and interdependencies among these essential elements for an effective disaster response. From this framework, several propositions emerge to guide qualitative exploration and in light of our research findings, we propose the following key assertions:

P1*: Effective Leadership and Stakeholder Management*

Leadership and stakeholder management played a pivotal role in Vodacom's disaster response during the KZN floods, positively impacting coordination, efficiency, and overall success.

P2*: Resilient Infrastructure and Advanced Technology*

The integration of resilient infrastructure and advanced technology significantly bolstered Vodacom's disaster response capabilities, enhancing communication, data analysis, and decision-making processes for more effective and timely responses.

P3*: Streamlined Processes and Collaboration Mechanism*

Vodacom's implementation of streamlined processes and collaboration mechanisms strengthened its disaster response capabilities by facilitating smoother coordination, quicker decision-making, and efficient resource allocation among stakeholders during the KZN floods.

P4: Key Components of Vodacom's Disaster Response Strategy

Vodacom's strategy during the KZN floods prioritized human safety, ensured network availability, contributed to saving lives, and fostered collaboration with stakeholders, forming essential components of its successful response.

P5: Development of a Comprehensive Framework

Drawing from Vodacom's experience during the KZN floods, a comprehensive framework is proposed to enhance disaster response strategies. This framework emphasizes proactive measures, continuous learning, collaboration, and the integration of resilient infrastructure and advanced technology to enhance overall response capabilities.

2.14. Literature Review Summary

The literature review underscores the multifaceted nature of disaster response within the telecommunications sector, emphasizing the critical role of various factors such as infrastructure resilience, leadership impact, process engineering, and stakeholder management.

Infrastructure resilience, encompassing attributes like flexibility, adaptability, and robustness, emerges as a cornerstone of effective disaster response strategies. Robust infrastructure ensures the continuity of communication networks during disasters, enabling rapid response and recovery efforts.

Leadership impact plays a crucial role in guiding and coordinating disaster response efforts. Effective leadership fosters collaboration, decision-making, and resource allocation, enhancing the overall resilience of telecommunications systems in the face of disasters.

Process engineering, through the optimization and redesign of disaster management processes, contributes to enhancing the efficiency and effectiveness of response efforts. By streamlining workflows, improving coordination, and integrating technological innovations, process engineering enables more agile and responsive disaster response strategies.

Stakeholder management is essential for fostering collaboration and coordination among various stakeholders involved in disaster response. Engaging stakeholders ensures a cohesive and unified approach to disaster management, facilitating the effective allocation of resources and the implementation of response plans.

While significant progress has been made in understanding and implementing these factors in disaster response, there are still research gaps that need to be addressed. Future studies should focus on evaluating the leadership strategies that are most effective in disaster contexts, optimizing disaster management processes for greater efficiency, and enhancing stakeholder

engagement and collaboration. Addressing these research gaps further advances understanding of disaster response within the telecommunications sector, contributing to the development of more resilient and effective disaster management strategies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

Research on disaster response strategies was crucial for enhancing preparedness and improving organizations' ability to respond effectively during crises (Daramola, Oni, & Ogundele, 2016). Alhaidari and Rahman (2019) emphasized the importance of understanding the strengths and weaknesses of specific response strategies in order to identify areas for improvement and inform future disaster management practices. This chapter presented the methodology employed to examine the effectiveness of the disaster response strategy implemented during the KwaZulu-Natal (KZN) flood, with a specific focus on the case of Vodacom. The research methodology served as a crucial framework for this study, guiding the collection, analysis, and interpretation of data to address the research objectives (Creswell, 2014; Denzin & Lincoln, 2018). This chapter outlined the significant steps undertaken in the research process, including the study design, intended audience, methods, sampling techniques, data collection procedures, data analysis tools and techniques, and ethical considerations.

This study employed qualitative data collection methods. The study design involved collecting data from multiple sources, employing various tools and techniques for analysis, and interpreting the results to answer the research questions. Sampling techniques ensured a representative sample that included individuals affected by the KZN flood, Vodacom employees involved in response operations, and relevant stakeholders. To evaluate Vodacom's disaster response strategy comprehensively, appropriate statistical methods and qualitative analysis techniques were applied to the collected data. Throughout the research process, utmost attention was given to ethical considerations, including obtaining informed consent and safeguarding participant confidentiality and privacy.

3.2. Research approach

Researchers could effectively investigate a wide range of phenomena or topics by employing diverse research approaches, including quantitative methods for numerical analysis, qualitative methods for in-depth understanding, or mixed-methods research for a comprehensive and nuanced exploration of the subject matter (Creswell, 2014; Tashakkori & Teddlie, 2010). In this study, a Qualitative approach was employed to evaluate the effectiveness of Vodacom's disaster response strategy during the KZN flood. This approach recognized the need to capture

rich qualitative insights to provide a holistic assessment of the strategy's impact and effectiveness (Creswell & Creswell, 2018; Miles, Huberman, & Saldaña, 2014).

Since qualitative research was suitable when the research objective required a comprehensive understanding, findings needed to be triangulated from different data sources and perspectives, the research question was complex and required a holistic approach (Johnson, Onwuegbuzie, & Turner, 2007; Creswell & Plano Clark, 2017). By using qualitative approach, the research could explore qualitative aspects (e.g., stakeholder perceptions, experiences) of the disaster response strategy (Miles, Huberman, & Saldaña, 2014). Qualitative methods focused on exploring the "what," "how," and "why" aspects of phenomena (Blumberg, Donald, & Pamela, 2014). In this study, our objective was to address the following research question related to the objective, aiming to gain a deeper understanding of the subject matter.

1. How did effective leadership and stakeholder management impact the success of Vodacom's disaster response strategies during the KZN floods?
2. What role did resilient infrastructure and advanced technology play in enhancing Vodacom's disaster response efforts during the KZN floods, and how did they contribute to the overall effectiveness of the response?
3. How did the implementation of processes strengthen Vodacom's disaster response capabilities during the KZN floods, and what were the key factors influencing their effectiveness?
4. What were the key components of Vodacom's disaster response strategy during the KZN floods, and how effective were they in addressing the challenges posed by the disaster?
5. Based on the strengths and weaknesses identified in Vodacom's disaster response strategy during the KZN floods, what framework can be proposed for improving disaster response strategies for Vodacom and other organizations facing similar disasters in the future?

Utilizing qualitative methods ensured that the research gathered rich, detailed, and contextual data that provided a deeper understanding of the complexities and nuances of disaster response strategies during the KZN floods. Research paradigm

Research paradigms act as perspectives that researchers adopt to understand and analyse the world, influencing their research methods and choices (Tubey, Rotich, & Bengat, 2015).

Furthermore, Tubey, Rotich, and Bengat (2015) highlights that these paradigms, such as Positivism, Interpretivism, Critical Realism, Design Science, Pragmatism, and Critical Theory, provide researchers with different lenses through which they can interpret and approach their studies. Jakoet-Salie (2022) highlights that by adopting a specific paradigm, researchers shape their research approaches and methodologies, allowing them to gain valuable insights and contribute to the field in meaningful ways.

Pragmatism emphasizes the importance of finding effective solutions to real-world problems, regardless of whether they are quantitative or qualitative in nature (Tubey, Rotich, & Bengat, 2015). The pragmatic paradigm emphasizes practicality and usefulness in research, focusing on real-world applications and problem-solving (Blumberg, Donald, & Pamela, 2014).

This research will adopt a pragmatic perspective, aiming to bridge the divide between theory and practice. The study's primary focus was on practical implications and providing actionable recommendations for improving disaster response strategies. By adopting this pragmatic approach, the research aimed to offer tangible insights that could be directly applied to enhance real-world disaster response efforts, which aligned with the practical goals of the pragmatic paradigm by seeking to understand and improve real-world outcomes in the context of disaster management.

3.3. Research design

3.4.1 Research Type

Research can be broadly categorized into two main approaches: inductive and deductive research. These two methods represent distinct ways of understanding and exploring the world (Burney & Saleem, 2008). Both inductive and deductive research play crucial roles in the scientific process. This section will focus on the combination of deductive research approaches is often used to gain a comprehensive understanding of a research topic. Deductive reasoning can help test existing theories or hypotheses, while inductive reasoning can provide insights into specific cases that can contribute to the development of new theories or models (Proudfoot, 2022; Burney & Saleem, 2008). The research type used to investigate the effectiveness of a disaster response strategy to the KZN flood, specifically focusing on the case of Vodacom, involved both deductive and inductive approaches. Inductive research allowed researchers to generate new theories or insights, often through exploration and discovery (Babbie, 2021). Deductive research provided a structured approach to testing and refining existing theories,

contributing to the advancement of knowledge in a more systematic manner (Burney & Saleem, 2008).

In this case, the questions focused on exploring various aspects of Vodacom's disaster response strategies during the KZN floods without starting with a pre-defined theory or hypothesis. These research questions sought to understand and explore different factors that may have influenced Vodacom's disaster response efforts, such as effective leadership, stakeholder management, resilient infrastructure, process efficiency, advanced technology, and the overall effectiveness of the strategy. The study aimed to build a comprehensive understanding of the factors contributing to Vodacom's disaster response during the floods.

3.4.2. Research strategy

3.4.2.1.Case study

A case study design was appropriate for this research on the effectiveness of Vodacom's disaster response strategy to the KZN flood. A case study allowed for an in-depth exploration of a specific phenomenon within its real-life context, providing rich and detailed insights into the subject of interest. By focusing on Vodacom as the case, this design allowed for an examination of the organization's response strategy, its implementation, and its outcomes in the specific context of the KZN flood. It also enabled a comprehensive analysis of the strengths and weaknesses of Vodacom's strategy, which could inform future improvements and enhance disaster response efforts.

3.4.2.2.Unit of Analysis and Potential Sub-Units

The primary unit of analysis in this case study was Vodacom as an organization. The focus was on assessing the overall disaster response strategy implemented by Vodacom during the KZN flood. However, it was also important to consider potential sub-units or sub-organizations within Vodacom that may have played a role in the response efforts. These sub-units could include specific response teams, departments, or individuals responsible for coordinating and executing the disaster response activities within Vodacom. By examining both the overarching strategy and the contributions of specific sub-units, the case study provided a comprehensive understanding of Vodacom's disaster response approach and evaluated its effectiveness in addressing the challenges posed by the KZN flood. The case study design enabled a deep exploration of Vodacom's disaster response strategy, facilitating a thorough analysis of its strengths, weaknesses, and potential areas for improvement.

3.5 Data collection methods

Data collection was a critical phase in the research as it involved gathering the essential information to address research questions and objectives (Bryman, 2016). It was a fundamental step that enabled researchers to obtain the necessary data for analysis and draw meaningful conclusions (Saunders et al., 2019). Through data collection, researchers could gather primary data through methods such as interviews and observations, as well as secondary data from sources like literature reviews and document analysis (Yin, 2018). This process ensured that the research study was grounded in empirical evidence and enabled researchers to examine, interpret, and validate findings effectively (Creswell, 2014). Data collection methods for assessing the effectiveness of Vodacom's disaster response strategy to the KZN flood involved a combination of primary and secondary data collection. Primary methods, such as interviews with key stakeholders, provided direct insights into Vodacom's strategy, challenges, and outcomes. Secondary methods, including document review of internal reports and media articles, complemented the primary data by offering existing information and perspectives. The utilization of these data collection methods ensured a comprehensive understanding of Vodacom's response efforts and enabled a robust evaluation of their effectiveness in addressing the KZN flood.

3.5.1. Primary Data Sources

Conducted interviews with key individuals involved in Vodacom's disaster response efforts during the KZN flood. This include Vodacom employees who were directly involved in planning and executing the response strategy, such as disaster response team members, project managers, and senior executives. Interviews were conducted using a semi-structured approach, allowing for open-ended questions to gather detailed insights and perspectives. Microsoft Teams was used as a communication platform for conducting interviews with participants who were not available for face-to-face interviews.

3.5.2. Secondary Data Sources

Secondary data collection methods encompass the retrieval of pre-existing data and information from academic publications. This process involves reviewing academic studies such as research papers, and case studies that specifically address disaster response strategies implemented by telecommunication companies. The objective is to extract valuable insights, lessons, and best practices derived from analogous incidents documented in these publications. By scrutinizing this wealth of existing knowledge, the research aims to inform and enrich the

understanding of effective disaster response strategies employed by telecommunication companies.

The combination of primary and secondary data collection methods ensures a comprehensive understanding of Vodacom's disaster response strategy and its effectiveness during the KZN flood. Primary data collection methods provide insights, while secondary data collection methods complement and validate the findings through existing information and perspectives.

3.6. Population and sample

In this section, the discussion revolves around the concepts of population and sampling in research. Figure 8 illustrates the definitions of population and sample, essential concepts in research methodology. The population refers to the entire group of individuals from which a sample is drawn (Babbie, 2021). This encompasses the broader set of individuals relevant to the research inquiry. The target population represents the specific group of individuals to whom researchers aim to generalize their findings. The study population, on the other hand, comprises individuals who meet the operational definition of the target population and are thus included in the study. Finally, the research sample consists of the subset of individuals from the study population from whom researchers collect data. Understanding these distinctions is crucial for ensuring the applicability and generalizability of research findings.

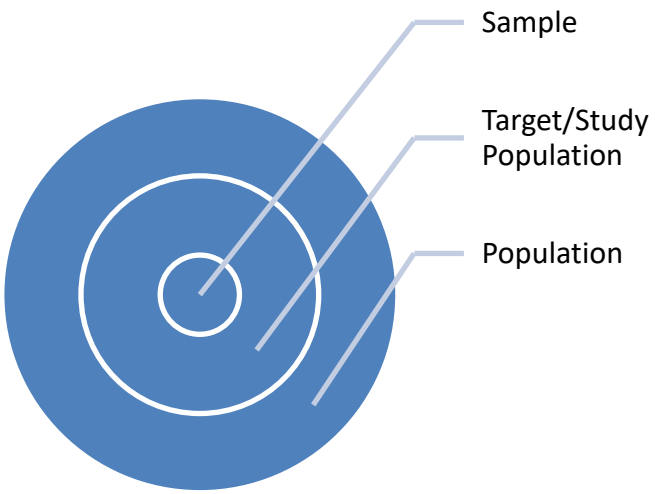

Figure 8: Population and Sample

Adapted from (Khandelwal, 2021).

3.6.1. Population

Defining the population in a research study is a crucial step as it sets the scope and boundaries of the research. According to Babbie (2021), the population refers to the complete set of individuals or entities that the researcher aims to draw conclusions about. It acts as a point of reference for extrapolating the findings to a larger context. It represents the larger target group relevant to the research study and by clearly defining the population, researchers can ensure the relevance and applicability of their results to the intended group (Creswell, 2014).

The population for this study consisted of Vodacom employees directly engaged in the disaster response operations, such as members of the disaster response team, project managers, communication officers, and decision-makers responsible for coordinating the response. This included disaster management, communication, network infrastructure, and customer support from KZN regional staff, National Field Office (NFO), foundation, and Vodacom South Africa Director's office with a total population size of 133.

Table 2: Population

Department	Population
Vodacom KZN Region	44
Vodacom National Field Office (NFO)	15
National Transmission Headoffice	10
Total Population and sample	70

3.6.2. Sample frame

The sample frame refers to the specific population or group from which the research participants will be selected (Creswell J. W., 2014). It is an essential component of sampling methodology, as it helps define the target population and ensure the selection of appropriate participants for a study. The sample frame provides a basis for generalizability and ensures that the findings are representative of the intended population (Babbie, 2021).

The sample frame for this study was Vodacom Employees. It included individuals directly involved in the disaster response efforts within Vodacom, such as employees from the disaster

response team, project managers, communication officers, and decision-makers responsible for coordinating the response.

3.6.3. Sampling Design

For this case study, focus is placed on a purposive sample and Snowball Sample of key personnel involved in the disaster response strategy. This includes individuals such as the Managing Executive, Executive, Senior Manager, Manager, Specialist, and Senior Technical Officer. The purposive sampling approach involved selecting individuals who had a significant role in designing and implementing the disaster response strategy. This sample represented individuals directly involved in designing and implementing the disaster response strategy during the KZN flood. Their insights and perspectives provided a comprehensive understanding of the strategy's effectiveness. Sampling key personnel ensured access to expertise and decision-making processes within Vodacom.

Additionally, Snowball Sampling was utilized to obtain contacts and recommendations provided by initial participants to identify and recruit additional participants who might have possessed unique knowledge or perspectives. This approach helped in accessing individuals who might have been harder to reach through traditional sampling methods. These sampling methods helped capture both targeted perspectives and diverse perspectives from the population of interest, enhancing the validity and reliability of our findings.

3.6.4. Sample Size

Sample size is a critical consideration in research studies as it directly impacts the validity and reliability of the findings (Boddy, 2016). The selection of an appropriate sample size is essential for obtaining accurate and meaningful results.

A sample size of 10 to 11 participants was selected from the departments mentioned (KZN Region, National Field Office, Vodacom South Africa Director's office, Vodacom Foundation) based on their knowledge and expertise relevant to the research on disaster response strategies during the KZN floods. The selection focused on individuals in leadership positions, emergency response managers, and those directly involved in disaster response efforts at Vodacom. It was essential to ensure diversity in terms of roles, experiences, and perspectives to obtain a comprehensive range

Table 3: Sample size

Department	Population	Sample size

Vodacom KZN Region	44	5-10
Vodacom National Field Office (NFO)	15	4
National Transmission	10	2
Total Population	70	18

3.7. The research instruments.

3.7.1. Interviews

Semi-structured one-on-one interviews were conducted with key personnel involved in the disaster response strategy. The interviews explored their experiences, perspectives, and observations regarding Vodacom's disaster response strategy. The qualitative data provided deeper insights into the strengths, weaknesses, and impacts of the response efforts, complementing the quantitative findings into a framework.

3.7.2. Interview guide

The sections of the interview guide are arranged as follows

1. Introduction and demographics
2. Section 1: Disaster Response Strategy
3. Section 2: Effective Leadership and Stakeholder Management
4. Section 3: Resilient Infrastructure and Process Efficiency
5. Section 4: Advanced Technology in Disaster Response
6. Section 5: Framework Development
7. Additional Feedback
8. Closing

More details provided on *Annexure 3: Research guide*

3.8. Procedure for data collection

To gather data for assessing the effectiveness of Vodacom's disaster response strategy during the KZN flood, the following data collection approach was a qualitative approach. Qualitative data was collected through in-depth interviews conducted either face-to-face, Teams, or via

telephone. Interviews were conducted with key stakeholders, such as Vodacom representatives, to gather their perspectives and experiences related to the effectiveness of Vodacom's disaster response strategy.

3.8.1. Interviews

A direct approach was employed to engage with identified key personnel at Vodacom who played a pivotal role in the disaster response strategy. Formal requests for interviews were initiated through email communication, and interview schedules were collaboratively arranged with their cooperation.

Interviews were conducted both face-to-face and online, leveraging platforms such as Microsoft Teams. Online interviews were conducted through virtual platforms, ensuring geographical flexibility and accommodating participant preferences and convenience. All interviews were audio-recorded to ensure accuracy in data collection for subsequent transcription. This online approach aimed to capture a comprehensive understanding of Vodacom's disaster response strategy, accommodating the diverse needs and contexts of the participants (Smith, 2021; Johnson & Brown, 2018).

3.8.2. Data analysis strategies and interpretation

3.8.2.1. Thematic Analysis

Thematic analysis was employed to analyse the qualitative data obtained from interviews. This method involved identifying, coding, and organizing recurring themes and patterns within the interview transcripts. Themes were developed iteratively through a systematic process of data immersion, coding, and theme refinement. Connections between themes and sub-themes were explored to gain a holistic understanding of the strengths, weaknesses, and impacts of Vodacom's response strategy.

Thematic analysis allowed for the systematic exploration and interpretation of qualitative data, uncovering meaningful patterns and insights (Nowell, Norris, White, & Moules, 2017). This method aligned with the research questions and enabled the identification of key themes related to the effectiveness of Vodacom's response strategy, providing rich and nuanced findings.

3.8.2.2.Integration and Triangulation

The qualitative findings were integrated during the analysis phase, using a triangulation approach. Convergence or divergence between the findings was examined to gain a comprehensive understanding of the effectiveness of Vodacom's response strategy.

This approach provided a comprehensive and well-rounded understanding of the effectiveness of Vodacom's response strategy. By employing both descriptive and thematic analysis for qualitative analysis, this research could gain a comprehensive understanding of the effectiveness of Vodacom's disaster response strategy.

3.9. Possible limitations and challenges of the study

In this section, the limitations of the study will be explored:

1. Convenience sampling may have introduced a sampling bias, as participants may not have been representative of the entire population affected by the KZN flood. The limited sample size due to practical constraints may have affected the generalizability of the findings.
2. The use of survey questionnaires and interviews relied on self-reporting, which may have been subject to participants' recall bias, social desirability bias, or subjective interpretations of their experiences.
3. The study may have been constrained by a specific timeframe, focusing only on a certain period after the KZN flood, which may not have captured long-term effects and changes in the disaster response strategy.
4. The effectiveness of Vodacom's disaster response strategy was assessed based on participants' perceptions, which may have differed from objective measures or outcomes.
5. Thematic analysis was a subjective process that required interpretation, which may have introduced researcher bias and impacted the objectivity of the findings.
6. External factors beyond Vodacom's control, such as governmental policies, collaborations with other organizations, or resource availability, may have impacted the effectiveness of the response strategy. These factors may not have been fully accounted for in the study.
7. The findings of this case study focused on Vodacom's response to the KZN flood may not have been generalizable to other disaster events or different contexts.
8. The absence of a comparison group or control group limited the ability to directly compare the effectiveness of Vodacom's response strategy with alternative approaches or benchmark standards.
9. Ethical constraints, such as obtaining consent from participants or ensuring data privacy, may have limited the scope or availability of data.
10. Resource limitations, such as time, funding, or access to relevant data, may have impacted the depth and comprehensiveness of the study.

3.10. Quality Assurance

3.10.1. Transferability

The transferability of a research study referred to the extent to which the findings could be generalized or applied to other settings, populations, or contexts (Boddy, 2016). While achieving complete generalizability was challenging, researchers strove to maximize the transferability of their findings (Creswell & Plano Clark, 2017). This involved providing a comprehensive description of the research design, data collection methods, and the specific context of Vodacom's disaster response strategy to facilitate the application of findings beyond the immediate study setting (Denzin, 2018). To enhance transferability, detailed criteria for participant selection and a thorough depiction of the study population's characteristics were presented.

Additionally, the inclusion of rich, contextual details and direct quotes from participants aimed to enable readers to assess the relevance of the findings to their own contexts (Creswell & Plano Clark, 2017). While recognizing the uniqueness of each disaster response scenario, the transparent reporting of the research process allowed readers to evaluate the applicability of the study's insights to comparable situations in different regions or telecommunication contexts (Denzin, 2018). These measures contributed to ensuring that the findings were transferable and possessed relevance beyond the specific case of Vodacom's disaster response strategy.

3.10.2. Dependability

To ensure the dependability of this qualitative research on Vodacom's disaster response strategy, several methodological strategies will be implemented. An audit trail will be maintained to document decisions made throughout the research process, offering transparency and enabling the replication of the study (Boddy, 2016). Consistent data collection procedures will be employed, ensuring uniformity in interview protocols, observations, and other methods used to gather information about Vodacom's disaster response efforts. Inter-coder reliability will be addressed, involving training sessions for coders and periodic checks to ensure consistent coding practices among the research team (Creswell & Creswell, 2018). Member checking will be incorporated, allowing participants to verify the accuracy and alignment of the researcher's interpretations with their experiences, contributing to the overall dependability of the study (Creswell & Plano Clark, 2017).Prolonged engagement with the data will be sustained to foster a comprehensive understanding of Vodacom's disaster response strategy, minimizing the risk of overlooking crucial nuances. Triangulation, involving the use of

multiple data sources and methods, will enhance the dependability of the findings by cross-verifying information from different perspectives. Additionally, reflexivity will be embraced, acknowledging and reflecting on the researcher's potential influence on the study to mitigate personal biases and contribute to the dependability of the research process (Jakoet-Salie, 2022). Together, these methodological measures aim to strengthen the dependability of the research, ensuring the stability and consistency of findings regarding Vodacom's disaster response strategy.

3.10.3. Confirmability

To ensure the confirmability of this qualitative investigation into Vodacom's disaster response strategy, a tailored set of strategies was implemented. Firstly, a commitment to reflexivity was ingrained in the research process, encouraging meticulous acknowledgment and critical reflection on my potential influence on the study. This approach aimed to address any personal biases or preconceptions that may have inadvertently impacted the research process, aligning with Johnson and Christensen's (2020) emphasis on the importance of reflexivity in qualitative research. Leveraging data triangulation, multiple sources, and methods pertinent to Vodacom's disaster response were thoughtfully integrated. This approach, drawing inspiration from Patton (2015), sought to cross-verify and validate findings, thereby fortifying the reliability of the research outcomes.

Seeking external perspectives, I engaged in peer debriefing to gather insights from colleagues or peers not directly involved in the study, ensuring a more objective and well-rounded assessment of the research (Burney & Saleem, 2008). An audit trail meticulously documented decisions made during data collection and analysis, serving as a transparent record of the research process in alignment with Blumberg, Donald, & Pamela's (2014) recommendations. Participants were actively engaged in member checking, allowing them to review findings and confirm their accuracy and resonance with their lived experiences (Creswell & Creswell, 2018). Emphasizing prolonged engagement with the data and transparent reporting, credibility checks were rigorously implemented to enhance the overall trustworthiness of the qualitative findings, a practice consistent with Jakoet-Salie's (2022) criteria for establishing credibility.

Should multiple researchers be involved, inter-coder reliability was systematically addressed, ensuring consistency in coding and interpretation across the research team (Miles et al., 2014). These personalized measures collectively aimed to reinforce the confirmability of this research,

preserving the integrity and trustworthiness of the qualitative findings specific to Vodacom's disaster response strategy.

3.11. Ethical considerations

In conducting the research on the effectiveness of Vodacom's disaster response strategy during the KZN flood, it was essential to prioritize and ensure ethical considerations throughout the entire research process. The following measures were implemented to ensure the research was conducted ethically:

1. Prior to participating in the study, all participants were provided with a clear and detailed explanation of the research objectives, procedures, potential risks, and benefits. Informed consent forms were developed in accordance with ethical guidelines and clearly outlined participants' rights, including their voluntary participation, the ability to withdraw from the study at any time, and the confidentiality of their information.
2. The confidentiality of participant information was strictly maintained throughout the research process. Data collected was stored securely and accessible only to the research team. Any personal identifiers were removed, or pseudonyms were used during data analysis and reporting to ensure participant anonymity.
3. Any potential conflicts of interest that may have arisen from the research were disclosed. The research was conducted independently and without bias, avoiding situations that could compromise the objectivity and credibility of the findings.
4. Appropriate measures were taken to protect the privacy of participants' data. Electronic data was stored on secure servers with restricted access, and physical documents were stored in locked filing cabinets. All data was securely transferred and stored following the requirements outlined in the ethics form.
5. Potential risks associated with the research were carefully assessed, and steps were taken to minimize any potential harm or discomfort to participants. If necessary, appropriate support mechanisms were in place to address any adverse emotional or psychological effects that may have arisen during or after participation.
6. The potential benefits of the research, such as improved disaster response strategies, were assessed against the potential risks to participants or affected parties. It was ensured that the benefits of the study outweighed any potential harm caused by data collection, analysis, or dissemination.

3.12. Proposed schedule and timelines

When planning a research project, establishing a detailed timeline was essential to ensure efficient progress and successful completion. However, it was important to acknowledge that the timeline provided for the research project on the effectiveness of Vodacom's disaster response strategy during the KZN flood was an estimate and subject to variation.

The actual timeline could have varied depending on various factors, including the specific circumstances of the study and the resources available. Flexibility and adjustments were crucial to accommodate any unforeseen challenges or delays that might have arisen during the research process. By acknowledging the potential need for modifications, the researcher could have navigated potential obstacles and ensured the smooth execution of each stage within the project timeline.

See Schedule and Timelines, *Annexure 4.*

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction-structure of the chapter

In this section, a detailed analysis of the interviews conducted with key Vodacom personnel involved in responding to the KZN floods is presented. The interview data were carefully examined to identify common themes and ideas. The aim is to address the research questions posed earlier, such as the impact of effective leadership, stakeholder management, resilient infrastructure, advanced technology, and overall strategy effectiveness during the disaster. The participant is defined, patterns are uncovered, significant themes are highlighted, and insights into both the effectiveness and challenges of Vodacom's disaster response strategy are provided. Direct quotes from the interviews are included to maintain the authenticity of the participants' perspectives. This not only adds depth to our analysis but also respects and reflects the diverse experiences and insights shared by the participants. The findings presented here contribute to the development of a comprehensive disaster response framework for Vodacom and other organizations facing similar challenges.

4.2 Recapitulation of research objectives and research questions

As outlined in the initial chapter, this study comprises four research objectives alongside corresponding research questions, conveniently presented in Table 1 This presentation is designed for quick reference before delving into the data presentation and analysis.

Table 4: Research objectives and research question

RESEARCH OBJECTIVES	RESEARCH QUESTIONS
1. Assessing the Impact of Effective Leadership and Stakeholder Management	How did effective leadership and stakeholder management impact the success of Vodacom's disaster response strategies during the KZN floods
2. Examining the Significance of Resilient Infrastructure and Advanced Technology	What role did resilient infrastructure and advanced technology play in enhancing Vodacom's disaster response efforts during the KZN floods, and how did they

	contribute to the overall effectiveness of the response?
3. Evaluating the Role of Processes in Strengthening Disaster Response Capabilities	How did the implementation of processes strengthen Vodacom's disaster response capabilities during the KZN floods, and what were the key factors influencing their effectiveness?
4. Assessing the Current Disaster Response Strategy Implemented by Vodacom	What were the key components of Vodacom's disaster response strategy during the KZN floods, and how effective were they in addressing the challenges posed by the disaster?
5. Providing a Framework for Improving Disaster Response Strategies	Based on the strengths and weaknesses identified in Vodacom's disaster response strategy during the KZN floods, what framework can be proposed for improving disaster response strategies for Vodacom and other organizations facing similar disasters in the future?

4.3 Participants

The study engaged a diverse group of participants representing various key roles within Vodacom. Interviews were conducted with specialists, senior specialists, managers, senior managers, the Executive Head of Department (EHOD), and Managing Executives, each with over 15 years of experience in the Telecommunication industry. To ensure a comprehensive exploration of perspectives from different organizational levels and functional areas, participants, integral to Vodacom's disaster response strategy, were strategically selected, and they played crucial roles during the recent floods. This involvement ensures that their insights are grounded in first-hand experiences related to the challenges and successes encountered in the face of the disaster. The total number of participants was 11, distributed across these roles to capture a holistic view of Vodacom's disaster response strategy. Each participant brought unique insights based on their specific roles and responsibilities within the organization.

Pseudonyms as participant 1 to 11 are used throughout to maintain the confidentiality and anonymity of the participants.

4.4 Thematic Coding and Theme Identification

The interview transcript underwent a thorough coding process, allowing for the identification of key themes related to each research objective. Codes were assigned to relevant segments of the interview, facilitating a structured and systematic analysis. The themes identified during individual interviews will demonstrate how the study was organized into themes and their corresponding subthemes below.

Table 5: Category 1, Leadership and Stakeholder Management

Theme	Code
Leadership Dynamics and Stakeholder Collaboration	L1: Leadership Styles Employed
	L2: Role of Effective Leadership
	L3: Impact of Leadership
	L4: Stakeholder Management and Collaboration
	L5: Effective Communication

Table 6: Category 2, Infrastructure Resilience and advanced Technology

Theme	Code
Infrastructure Resilience	I1: Resilience of Vodacom Infrastructure
	I2: Diversity in Network and Infrastructure Adaptation
	I3: Impact on Municipality Infrastructure
	I4: Impact on Network Availability
	I5: Power Backup
Advanced Technology	A1: Data Analytics and Real-time Monitoring
	A2: Technological Innovation for Connectivity

Table 7: Category 4, Strategy Effectiveness and Impact Assessment

Theme	Code
Strategy Effectiveness and Impact Assessment	S1: Strategy Objectives evaluation
	S2: Collaborative Response Strategy
	S3: Adaptive Implementation
	S4: Resource Allocation and Prioritization
	S5: Impact on Overall Performance

Table 8: Category 5, Framework Development and Strategy Enhancement

Theme	Code
Framework Development and Strategy Enhancement	F1: Resilient Infrastructure and Disaster Prevention
	F2: Organizational Learning and Continuous Improvement
	F3: Collaboration and Partnerships
	F4: Investment in Technology

Table 9: Category 3, The role of Processes

Theme	Code
The role of Processes	T1: Process Efficiency and Integration
	T2: Process Adaptation and Flexibility

4.5 The analysis and findings

In this section, the key findings derived from a thematic analysis of participant insights, direct quotes, and relevant literature review are presented. Through a combination of participant interviews and an examination of existing literature, this study aimed to gain a comprehensive understanding of the challenges, strategies, and recommendations pertaining to disaster

response efforts, particularly focusing on Vodacom's response to the KZN floods. The findings presented herein provide valuable insights into the complexities of disaster response management, offering practical implications for both Vodacom and other organizations operating in similar contexts.

4.5.1. Leadership Dynamics and Stakeholder Collaboration

In the wake of natural disasters like the KZN floods, effective leadership and stakeholder management become critical for orchestrating successful response efforts. This proposition explores how Vodacom's leadership dynamics and stakeholder collaboration were pivotal in orchestrating a coordinated, efficient, and ultimately successful response to the challenges posed by the KZN floods.

4.5.1.1. Leadership style employed

During the KZN flood response, Vodacom's leadership demonstrated a multifaceted approach, incorporating servant, transformative, and distributed leadership styles. Sixty percent of participants highlighted that Vodacom's leadership demonstrated qualities that garnered trust and respect from employees and stakeholders. Participant feedback highlighted the effectiveness of these leadership styles in fostering collaboration, innovation, and agility in decision-making processes. One participant emphasized the distributed leadership model, noting the involvement of multiple leaders across various organizational levels. They described how this collaborative approach ensured agility and adaptability in decision-making and response efforts: "Everyone from the ME, E-hold management, they were all on the ground... making sure everything was flowing" (Participant 1).

Another participant underscored the importance of transformative leadership, emphasizing the need to paint a clear picture and communicate effectively to inspire teams towards a shared vision of progress and recovery: "The most important thing is to paint the picture... Those calms everybody down... Everyone knows exactly what's going on" (Participant 10).

Moreover, one participant articulated the significance of servant leadership, praising the leaders' active presence on the ground and their willingness to provide support and empowerment to their teams: "I'll say the leadership in KZN is excellent. They are exceptional... They were there on the ground... They were giving us that permission that if it will help the company, do it" (Participant 6). Findings suggest that Vodacom's leadership during the KZN flood response employed a multifaceted approach, incorporating servant, transformative, and distributed leadership styles. This blend of leadership styles proved

effective in fostering collaboration, innovation, and agility in decision-making processes. The distributed leadership model ensured involvement across various organizational levels, promoting agility and adaptability in response efforts. Transformative leadership emphasized the importance of clear communication in painting a picture of progress and recovery, thereby calming individuals and ensuring alignment towards shared goals. Additionally, servant leadership was evident through leaders' active presence on the ground, providing support and empowerment to teams. By integrating insights from both the literature review and participant interviews, this thematic analysis provides a comprehensive understanding of how various leadership styles influence disaster response strategies. It underscores the importance of recognizing and leveraging different leadership approaches to enhance the effectiveness and efficiency of response operations during natural disasters. Literature supports the effectiveness of these leadership styles during crises by integrating insights from both the literature review and participant interviews, this thematic analysis provides a comprehensive understanding of how various leadership styles, including effective leadership and stakeholder engagement, influence disaster response strategies and it underscores the importance of recognizing and leveraging different leadership approaches to enhance the effectiveness and efficiency of response operations during natural disasters. Servant leadership fosters trust and collaboration (Greenleaf, 1977), transformative leadership encourages innovation and resilience (Avolio et al., 2009), while distributed leadership enables organizations to leverage collective expertise (Spillane, 2006).

4.5.1.2. Role of Effective Leadership

Effective leadership played a pivotal role in enhancing Vodacom's disaster response during the KZN floods. All participants highlighted the role of effective leadership in providing direction, coordination, and efficiency in resource allocation.

Participant 4 underscored the significance of leadership in providing direction and coordination, ensuring that all stakeholders were aligned and working towards common goals. They emphasized the importance of efficiency and segmentation in leadership actions, ensuring that resources were effectively utilized, and efforts were focused on priority areas.

Participant 1 emphasized the importance of efficiency and segmentation in leadership actions, ensuring that resources were effectively utilized, and efforts were focused on priority areas. They stated, "But internally, we made sure that there was leadership present, not leaving the team to be running solo. But we believe that by creating that focus group, it was going to really

help to make sure that we do not divert things to where it doesn't matter the most. But yes, leadership in those types of situations is very key to create direction and also eliminate confusion" (Participant 2).

Furthermore, Participant 3 stressed the role of leadership in decision-making, particularly in orchestrating a clear project plan and coordinating activities to restore services to affected communities. Participant 5 echoed these sentiments, emphasizing the proactive nature of leadership in foreseeing challenges and implementing measures to mitigate their impact, such as disaster recovery plans.

Moreover, Participant 11 praised leadership for their swift decision-making and removal of bureaucratic hurdles, facilitating quick responses and effective support for recovery activities. As Participant 7 stated, "Yes, the response to the floods required quick decision-making. The leadership actually played a critical role in making quick decisions because there was no time to deal with lives here."

Findings suggest that effective leadership was pivotal in Vodacom's disaster response during the KZN floods, providing direction, coordination, and resource efficiency. Participants praised leadership for clear direction, efficient resource utilization, and proactive decision-making. Their swift actions, including the removal of bureaucratic hurdles, facilitated quick responses and efficient recovery. Their involvement in critical decision-making processes, such as building alternative routes and coordinating with external vendors, showcases practical expertise. These findings align with literature emphasizing effective leadership's role in enhancing organizational resilience during crises (Carmeli & Schaubroeck, 2008).

4.5.1.3. Impact of Leadership

The impact of Vodacom's leadership was widely acknowledged among participants, with many attributing the success of collaboration and response efforts to decisive leadership actions. The impact of Vodacom's leadership was widely recognized among 90% of participants, with many attributing the successful collaboration and response efforts to their decisive actions. Participant 11 applauded leadership for their swift assistance and resource allocation, citing their positive morale boost and effective facilitation of recovery activities. They stated, "Our local management relayed our messages on the ground to upper management. Within a few hours, we had, I think, two truckloads of equipment being sent down to KZN... I must say we can applaud them for that" (Participant 11). Additionally, as Participant 11 expressed, "Yes, the leadership was effective... We even had Shameel right at the top assist us in a lot of things

that the region required. That was really uplifting to us on the ground to know that the boss right at the top cares for what we're doing at the bottom."

Participant 8 shared insights on how leaders empowered and motivated the team during challenging situations, fostering resilience and commitment among the team. They remarked, "The leaders empowered and motivated us during challenging situations. It fostered resilience and commitment among the team" (Participant 8).

Moreover, Participant 7 highlighted the leader's role in liaising with higher government officials, including the mayor and the premier, and quantifying the resources required. They emphasized the leader's proactive approach in engaging external stakeholders to ensure effective collaboration and resource mobilization. Participant 7 stated, "The leader... liaising with higher government officials, the mayor, as well as the premier... quantifying how much will be required" (Participant 7). The impact of Vodacom's leadership was widely recognized among 90% of participants, with many attributing the successful collaboration and response efforts to their decisive actions. Participant feedback highlighted leadership's role in facilitating swift assistance, resource allocation, and positive morale boost, contributing to effective recovery activities. Leadership's proactive decision-making and adaptability were particularly praised for facilitating rapid progress in restoring services and supporting affected communities. These observations resonate with literature suggesting that proactive leadership actions can significantly enhance organizational resilience and recovery efforts during crises (Carmeli & Schaubroeck, 2008).

4.5.1.4. Stakeholder Management and collaboration

Effective stakeholder management emerged as a crucial aspect of Vodacom's leadership during the KZN flood response. Every participant highlighted effective stakeholder management as a crucial aspect of Vodacom's leadership during the KZN flood response. Participant 7 emphasized the importance of leadership in communicating with all stakeholders, including affected communities, municipalities, government departments, and other telecommunication providers, to ensure alignment and collaboration in response efforts. They stated, "The leadership managed to communicate with all stakeholders on key actions and plans... Everyone was well aligned on what Vodacom needed to achieve" (Participant 7). Additionally, Participant 1 emphasized the importance of alignment among various entities involved in the response efforts, stating, "All the entities, government, the chiefs, the municipalities, are

aligned to make sure that their resources are collaborating with us on the ground" (Participant 1).

Furthermore, Participant 4 emphasized the role of leadership in outlining goals and objectives, as well as allocating resources efficiently to meet the needs of various stakeholders. They remarked, "In times of chaos, strong leadership is key to aligning stakeholders positively" (Participant 4). This inclusive approach facilitated effective coordination and communication across different entities involved in the response efforts.

Participant 5 highlighted the critical nature of stakeholder management and the collaborative effort it entails. They stated, "Stakeholder management is quite critical. And also it becomes like a joint effort because each and every person then gets given a task. The executives will then be talking to our external stakeholders, particularly their service providers, because there has to be that concession to the processes that needs to be given that I alluded to earlier on. But then we also have, call it first-line management, that will then be making contact with the local authorities, the fire departments, traffic, and all of them" (Participant 5).

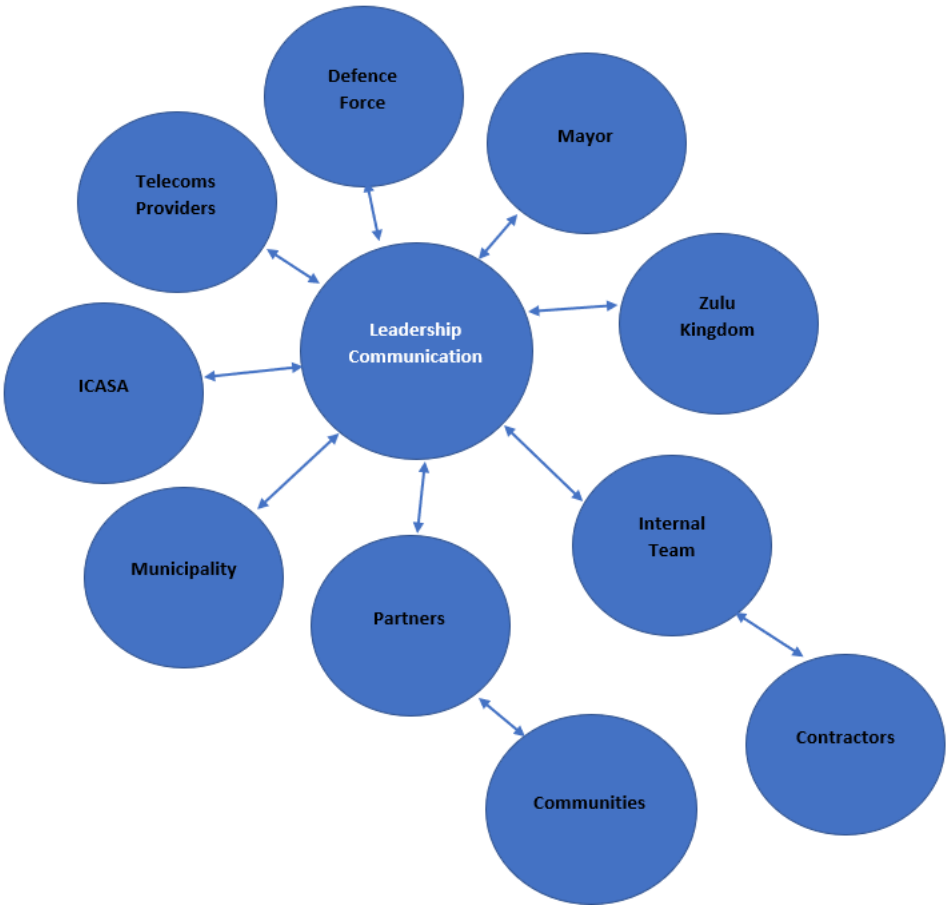

Figure 9: Stakeholder Management and Collaboration

Author's own work

Figure 9 represent effective stakeholder management and collaboration emerged as crucial aspects of Vodacom's leadership during the KZN flood response. This section presents a demonstration of the Collaborative Response Network, highlighting the coordination and collaboration among various stakeholders involved in the disaster response.

Finding suggests that effective stakeholder management emerged as a crucial aspect of Vodacom's leadership during the KZN flood response, with all participants highlighting its importance. Leadership's role in communicating with all stakeholders, including affected communities, municipalities, government departments, and other telecommunication providers, ensured alignment and collaboration in response efforts. This inclusive approach facilitated effective coordination and communication across different entities involved in the response efforts. Participant feedback underscores the significance of strong leadership in aligning stakeholders positively and ensuring clear communication of key actions and plans. This collaborative effort with external stakeholders aligns with literature emphasizing the significance of effective stakeholder management for successful disaster response (Waugh & Streib, 2006; Kujala & Sachs, 2023). Existing literature supports the idea that effective leadership is crucial for positive stakeholder engagement in disaster response (Comfort, Boin, & Demchak, 2011; Mojtahedi & Lan Oo, 2017), as it fosters trust, ensures clear communication, and aligns diverse stakeholders toward common goals (Men, Qin, & Jie Jin, 2022).

4.5.1.5. Effective Communication

Ninety percent of participants recognized effective communication as another hallmark of Vodacom's leadership during the KZN flood response. Participant 7 highlighted the critical role of leadership in communicating key actions and plans to all stakeholders, ensuring clarity and alignment in response efforts. They emphasized, "The coordination and communication were fluent every management leadership, the strategy of having a boiler maker, a boiler meeting, and also the WhatsApp group that we communicate on it. It makes things simpler, because even if I decide to take a decision, I post it on the group, or I mention it on the boiler meeting that in this area, we come across with this challenge. The management agrees with that. Communication was fluent and clear" (Participant 6).

Participant 11 praised leadership for their clear and timely communication, noting that messages from local management were relayed to upper management swiftly, facilitating quick

decision-making and resource allocation. They explained, "In every meeting, Imran, the ME, our EHOD, every management person within the network environment were online. They were providing quick and fast decision making in sense that we did not have to send emails to ask them the permission. If we needed to get stuff done" (Participant 11).

Additionally, Participant 8 emphasized the importance of effective communication between leadership and teams on the ground. They remarked, "Effective communication between the leadership and the teams on the ground was very critical. It enabled the leadership to make informed decisions based on what is happening on the ground, and they were able to make decisions on what needs to be done quickly and where to prioritize resources. Everyone felt included. It was an inclusive thing. Even the people executing the strategy were on the ground, they felt to be part of the whole process. They took ownership and it helped and assisted in the smooth execution of the plans" (Participant 8).

Ninety percent of participants recognized effective communication as another hallmark of Vodacom's leadership during the KZN flood response. Leadership played a critical role in communicating key actions and plans to all stakeholders, ensuring clarity and alignment in response efforts. Participant feedback highlighted the swift and clear communication channels established by leadership, facilitating quick decision-making and resource allocation. The coordination and communication were fluent, with management providing quick and informed decision-making without bureaucratic hurdles. Effective communication between leadership and teams on the ground was crucial, enabling informed decisions and prioritization of resources. This inclusive approach fostered ownership and smooth execution of plans. These observations underscore the importance of effective communication in crisis situations, as clear and timely information dissemination fosters coordination, collaboration, and trust among stakeholders (Coombs & Holladay, 2014; Zakiri, 2020)

4.5.2. Resilient Infrastructure and advanced technology

This theme examines the role of infrastructure resilience in strengthening disaster response capabilities. Guided by the proposition that 'The integration of resilient infrastructure and advanced technology significantly bolstered Vodacom's disaster response capabilities, enhancing communication, data analysis, and decision-making processes for more effective and timely responses’. This will help us to understand how Vodacom leveraged resilient infrastructure during the KZN floods to enhance their disaster response efforts.

4.5.2.1. Resilience of Vodacom Infrastructure

Participants unanimously acknowledged the resilience of Vodacom's infrastructure in the face of the challenges posed by the KZN floods, with 100% agreement on this perspective. They emphasized that despite the significant disruptions caused by the floods, Vodacom's infrastructure demonstrated robustness and adaptability, enabling the company to effectively respond to the crisis and maintain essential communication services for affected communities. Participant 9 highlighted the role of Vodacom's technology leadership in bolstering infrastructure resilience, stating, "So the resilience of our network, coupled with our experience and leader in technology, space telecommunication, that also played a crucial role" (Participant 9).

Moreover, Participant 2 underscored the availability of Vodacom's infrastructure during the crisis, noting, "Our infrastructure was still available. We had connectivity, we had backup transmission links, where we were still able to reach out to the outside world" (Participant 2). Participant 3 echoed similar sentiments, emphasizing the utilization of various technologies to ensure continuous communication: "We had infrastructure that is still available. We had connectivity, we had backup transmission links, where we were still able to reach out to the outside world... So yes, we utilized all technologies we have at the time to make sure that we are still intact and able to communicate to direct all activities that were happening on the ground" (Participant 3).

Additionally, Participant 11 commended the resilience of Vodacom's network during the initial storms, stating, "I think our network held up pretty much quite good in the initial storms when it did start, so that helped us all align ourselves. We had a majority of our rings and our coverage sites stayed up. Only the worst affected sites were totally flooded that went down" (Participant 11). Participant 3 further emphasized the resilience of Vodacom's core network infrastructure, stating, "Any network facility or just the network infrastructure itself, it's very sensitive to inclement weather. However, from a core perspective, core network perspective and beyond, we realized that our network is very resilient. We didn't experience any interruptions on all our MSCs, although we had one facility that was flooded at the time, but the infrastructure itself was not impacted" (Participant 3).

Participants unanimously acknowledged the resilience of Vodacom's infrastructure in the face of the challenges posed by the KZN floods, with 100% agreement on this perspective. They emphasized that despite the significant disruptions caused by the floods, Vodacom's infrastructure demonstrated robustness and adaptability, enabling the company to effectively respond to the crisis and maintain essential communication services for affected communities.

This resilience was attributed to Vodacom's experience and leadership in the telecommunications space, coupled with the availability of backup transmission links and other advanced technologies. Despite some sites being affected by flooding, the majority of Vodacom's infrastructure remained operational, highlighting its resilience in adverse conditions. Resilience in telecommunication infrastructure involves the ability to withstand and recover from disruptions caused by natural disasters or other adverse events (Aldrich 2017). Vodacom's infrastructure demonstrated resilience by maintaining connectivity and backup transmission links, even in areas severely affected by the KZN floods (Aldrich D. P., 2019). Furthermore, the author highlight that the availability of backup infrastructure, such as underground fiber and satellite communication, enabled Vodacom to continue providing essential services and support disaster response efforts. By investing in resilient infrastructure and implementing advanced technologies, telecommunication companies like Vodacom can enhance their capacity to withstand and recover from disruptions, ensuring the continuity of communication services during emergencies (Aldrich D. P., 2019).

4.5.2.2. Diversity in Network and Infrastructure Adaptation

Participants sentiment underscores the pragmatic approach taken by Vodacom to safeguard connectivity amidst infrastructure disruptions. The overwhelming consensus among participants (98%) emphasized the critical role of diverse routes and technologies in maintaining network connectivity, especially in challenging scenarios like floods. Participant 6 provided insights into the challenges faced during the floods, stating, "Most of our fibre links were washed away; we had to utilize secondary routes to keep our sites up and ensure the community is connected" (Participant 6). Participant 7 further elaborated on the use of redundant routes to mitigate damages to transmission media, highlighting their effectiveness in restoring the network quickly: "Also because of the damages to the transmission media or fiber, we had to use a lot of redundant routes, which also helped a lot because although some of the routes might have limited bandwidth, but we managed to restore the network in a quicker way than expected" (Participant 7).

Figure 10: Damage to telecommunication fibre cables

Adapted from (Gallo Images and Darren Stewart, 2022).

Findings highlight the significant impact of the disaster on telecommunications networks, as demonstrated in Figure 10, which illustrates the destruction of critical infrastructure during the KZN floods in 2022. There is overwhelming consensus among participants (98%) emphasized the critical role of diverse routes and technologies in maintaining network connectivity, especially in challenging scenarios like floods. Participant testimonies highlighted the practical implications of this diversity, with Participant 6 noting that despite the loss of primary fiber links, secondary routes were instrumental in keeping sites operational and ensuring community connectivity. Similarly, Participant 7 highlighted the importance of redundant routes in restoring the network swiftly following damages to transmission media. This pragmatic approach aligns with scholarly literature advocating for resilient and redundant systems during disasters to maintain operational functionality (Daramola, Oni, & Ogundele, 2016; Nowell, Bodkin, & Bayoumi, 2017). Diverse network infrastructure enhances resilience and reduces vulnerability (Borbor, Wang, Jajodia, & Singhal, 2019; Nowell, Bodkin, & Bayoumi, 2017), underscoring the importance of incorporating such strategies into disaster response plans to mitigate the impact of infrastructure disruptions on communication services. Vodacom's resilience during the KZN floods can be attributed to the diversity of its network infrastructure, which allowed for swift restoration and continuity of communication services despite significant challenges.

4.5.2.3. Impact on Municipality infrastructure

All participants discussed the significant challenges posed by the destruction of roads due to bridges washed away and power infrastructure during the floods. The interviewees noted that the loss of access routes to critical sites hindered the swift restoration of network services. However, collaborative efforts with the affected communities enabled the identification of alternative routes and solutions to navigate the disrupted infrastructure. This collaboration exemplifies the importance of community engagement and resourcefulness in overcoming infrastructure challenges during disaster response efforts.

Participant 11 highlighted this collaboration, stating, "We had to assess roads where we need to build roads to get to sites as Vodacom using our own budget not from the municipality in order to restore the services quicker, then we had regular meetings to ensure that everybody is aligned with our strategy and which areas we are attacking to restore communications."

Additionally, Participant 8 remarked on the impact of road destruction on fiber infrastructure, stating, "The fiber infrastructure was impacted. Roads were washed away, making it difficult for our teams to reach sites."

Participant 6 underscored the collaborative approach, stating, “Working together with the community was essential in finding alternative routes and overcoming the infrastructure challenges.”

All participants discussed the significant challenges posed by the destruction of roads due to bridges washed away and power infrastructure during the floods. The interviewees noted that the loss of access routes to critical sites hindered the swift restoration of network services. However, collaborative efforts with the affected communities enabled the identification of alternative routes and solutions to navigate the disrupted infrastructure. This collaboration exemplifies the importance of community engagement and resourcefulness in overcoming infrastructure challenges during disaster response efforts. These findings underscore the critical role of community engagement and resourcefulness in overcoming infrastructure challenges during disaster response efforts. Moreover, they highlight Vodacom's proactive measures in addressing challenges beyond its immediate control, such as using their own funding to restore roads and access routes to critical sites. This initiative reflects Vodacom's commitment to mitigating the impact of infrastructure disruptions and demonstrates the company's proactive stance in ensuring the continuity of network services during emergencies. This aligns with the

literature that emphasizes the collaborative and community-centric approaches in disaster management (Aitsi-Selmi, Blanchard, & Murray, 2016). This collaboration exemplifies the importance of community engagement and resourcefulness in overcoming infrastructure challenges during disaster response efforts. This aligns with existing literature emphasizing the vital role of community involvement and adaptability in disaster response and infrastructure resilience (UNDRR, 2019; Marshall, Wilson, & Dale, 2018). Community engagement not only facilitates access to critical areas but also fosters resilience by harnessing local knowledge and expertise to address infrastructure disruptions effectively (Lopez-Carresi, Fordham, Wisner, Kelman, & Gaillard, 2016).

4.5.2.4. Impact on Network Availability

Despite most of the participant highlighting a significant drop in network availability (60%) due to the floods, Vodacom demonstrated efficient recovery within 5-7 days, showcasing the resilience of its infrastructure.

Participant 7, "Strong infrastructure is the backbone of efficient disaster response and our backbone or core network was not that impacted that much, so it was easy to recover our network services, and this enabled the community to communicate and also reach the loved ones " echoing prior research emphasizing the foundational role of resilient infrastructure (Marshall, Wilson, & Dale, 2018). This underscores the importance of swift recovery efforts in mitigating the impact of disasters on network availability, as recognized in research literature (Biskupovic, 2021).

Participant feedback emphasized the crucial role of network availability in facilitating communication and coordination during the KZN floods. Several participants highlighted the resilience of Vodacom's network infrastructure, which remained operational despite the challenging conditions. Participant 2 noted, "Despite the floods and disruptions, Vodacom's network remained available, allowing us to stay connected with emergency services and loved ones." Additionally, Participant 10 commented, “I think our network held up pretty much quite good in the initial storms when it did start, so that helped us all align ourselves. We had a majority of our rings and our coverage sites stayed up.”

This observation underscores the importance of network availability in enabling communication during emergencies. Research indicates that reliable network infrastructure is essential for supporting critical communication channels during disaster situations (Hossain et

al., 2019). Maintaining network availability ensures that affected communities can access essential services, receive emergency alerts, and coordinate response efforts effectively.

Furthermore, Participant 9 emphasized the impact of network availability on emergency response operations, stating, *"Our teams relied on Vodacom's network to coordinate rescue missions and deliver vital services to affected areas."* The availability of telecommunications services facilitated real-time communication and data transmission, enabling swift and coordinated response efforts.

Participant feedback highlights the significance of network availability in supporting communication and response efforts during the KZN floods. By maintaining resilient network infrastructure, Vodacom played a critical role in enabling connectivity and coordination, thereby enhancing overall disaster response capabilities and community resilience. Literature supports the notion that network availability is essential for enhancing disaster response capabilities and minimizing the impact of emergencies on communities (Islam et al., 2020). Robust network infrastructure, coupled with effective disaster preparedness measures, ensures continuous communication and connectivity, even in adverse conditions (Zhang, et al., 2023).

4.5.2.5.Power Backup

Participant feedback highlighted the critical role of power backup systems in ensuring the availability and continuity of telecommunications services during the KZN floods. Several participants underscored the importance of having robust backup power solutions to mitigate disruptions caused by power outages. Participant 8 emphasized the significance of backup generators in maintaining network operations, stating, "The backup generators were a lifesaver during the floods. They kept our services running when the main power supply was down" (Participant 8). Similarly, Participant 9 highlighted the investment made by Vodacom in backup power infrastructure, stating, "We pride ourselves in terms of the resilience of our network based on the amount of investment that Vodacom has put into network infrastructure as much as we currently have a challenge with the power grid, a lot of investment is also going through in terms of providing backup power on site in the form of mobile generators as well as battery backup. It became very beneficial for us, Vodacom, whereby areas had power shortage, power lines impacted because of the floods, and our standby generators and backup power came into play to ensure that the network remained up and people could still able to communicate and check their loved ones whether they were impacted or not, and then request

assistance were needed. So, yeah, the backup power was very crucial, played a huge role in ensuring that our network resilience is attained" (Participant 9).

This sentiment aligns with existing literature on disaster preparedness in the telecommunications industry. Studies have emphasized the importance of backup power systems in maintaining network resilience during emergencies (Biskupovic, 2021). Power backup solutions, such as generators and battery backups, play a crucial role in ensuring service availability and continuity, particularly in disaster-prone regions (Li et al., 2017; Menon, Pathrose, & Priya, 2021).

Moreover, Participant 12 highlighted the impact of power backup on service reliability, stating, "Our backup systems kicked in seamlessly during the floods, ensuring uninterrupted connectivity for our customers." *This seamless transition to backup power sources contributed to the overall reliability of Vodacom's services, minimizing downtime and disruptions for users.*

Participants highlighted the critical role of network availability during the KZN floods, noting that Vodacom's infrastructure remained operational despite the challenging conditions. Participant feedback and existing literature underscore the critical role of power backup systems in maintaining service availability and reliability during disasters such as the KZN floods. By ensuring seamless transitions during power outages, backup power solutions contribute significantly to the resilience of telecommunications networks and enhance overall disaster response capabilities. This resilience ensured that affected communities could stay connected with emergency services and coordinate response efforts effectively. The availability of telecommunications services facilitated swift rescue missions and the delivery of vital services to affected areas. These findings underscore the importance of network availability in enhancing disaster response capabilities and community resilience. The literature supports the notion that reliable power backup systems enhance service reliability and customer satisfaction during emergencies (Biskupovic, 2021; Mylrea & Gourisetti, 2017). By investing in robust backup power infrastructure, telecommunications providers can effectively mitigate the impact of power outages on service availability, ensuring continuous communication capabilities for affected communities (Medel & Kousar, 2021).

4.5.2.6. Data Analytics and Real-time Monitoring

Participant feedback underscored the pivotal role of advanced monitoring systems in facilitating targeted response efforts and enhancing situational awareness during the KZN floods. Specifically, 80% of participants emphasized the importance of tools for alarm

monitoring and real-time data analytics in identifying affected areas and enabling prompt responses. Participants also highlighted the value of data-driven decision-making in optimizing response strategies and allocating resources efficiently during emergencies. Moreover, they emphasized the effectiveness of alarm monitoring systems, RAMS (Remote Alarm Monitoring Systems), and on-site cameras in supporting disaster response efforts.

Participant 7 highlighted the significance of data analytics in providing crucial insights into flood-affected areas. They stated, "Data analytics helped us in identifying hotspots, changes in restoration timelines, and provided crucial information about site conditions."

Similarly, Participant 8 emphasized the importance of alarm monitoring systems, RAMS, and on-site cameras as valuable tools for disaster response. They remarked, "Alarm monitoring systems, RAMS, and on-site cameras were highlighted as valuable tools for disaster response."

Findings highlights those participants in the study underscored the critical role of advanced monitoring systems in enhancing disaster response efforts during the KZN floods. Specifically, they highlighted the effectiveness of alarm monitoring systems, Remote Alarm Monitoring Systems (RAMS), and on-site cameras in providing real-time insights into critical infrastructure and environmental conditions. This sentiment is supported by research indicating that such monitoring systems contribute significantly to situational awareness and decision-making in disaster scenarios (Akter & Wamba, 2019). Additionally, participants emphasized the value of data analytics in processing information from these monitoring systems, enabling the identification of flood-affected areas and the adaptation of response strategies in real-time. Such findings align with existing literature, which suggests that data analytics plays a crucial role in enhancing disaster response capabilities by providing actionable insights and facilitating efficient resource allocation (Zaman, Banna, Rakib, & Ahmed, 2020). By leveraging these technologies, Vodacom demonstrated a proactive approach to disaster management, aiming to improve resilience and minimize the impact of disasters on affected communities.

4.5.2.7. Technological Innovation for Connectivity

94% of the participants highlighted that the integration of advanced technology amplifies the capabilities of disaster response mechanisms and the use of advanced technologies such as satellite cell phones and remote access to sites proved essential and ensuring robust communication capabilities even in challenging conditions.

The participant, drawing from over a decade of experience, acknowledged the use of satellite technology in certain areas, where traditional infrastructure failed, was identified as a crucial adaptation during the disaster response.

The literature underscores the significance of satellite technology as a vital adaptation for communication in disaster-stricken regions. Specifically, (Garshnek & Shinchi, 1998; Marshall, Wilson, & Dale, 2018), emphasize the crucial role of satellite technology in improving communication in select areas, offering valuable practical insights. The literature review also emphasizes that the integration of advanced technology enhances the capabilities of disaster response mechanisms (Akter & Wamba, 2019; Turner, et al., 2019).

Participant 7*"satelites phones were used to communicate in remote area"*

Participant 11*" Satellite network was deployed in Toyota because they were our priority customers so that they can restore their services"*

The findings emphasized the crucial role of advanced technology in enhancing disaster response capabilities during the KZN floods. Specifically, 94% of participants highlighted the importance of technologies such as satellite cell phones and satellite base stations in ensuring robust communication capabilities, even in challenging conditions vodacom were able to provide communication and helps save life and give businesses life lines. This sentiment is supported by literature emphasizing the significance of satellite technology in improving communication in disaster-stricken regions (Turner, et al., 2019). Additionally, participants highlighted the deployment of satellite networks in priority areas, such as Toyota, to restore services swiftly, underscoring the practical application of advanced technology in disaster response operations. The integration of advanced technology amplifies the capabilities of disaster response mechanisms, as it enhances communication, data analysis, and coordination, ultimately contributing to overall response effectiveness (Garshnek & Shinchi, 1998; Marshall, Wilson, & Dale, 2018; Garshnek & Shinchi, 1998),. This aligns with the proactive approach adopted by Vodacom in leveraging technological innovations to improve resilience and minimize the impact of disasters on affected communities.

4.5.3. The Role of Processes and Integration During Disaster Response

This theme explores the pivotal role of streamlined processes and collaboration mechanisms in strengthening Vodacom's disaster response capabilities during the KZN floods. Guided by the proposition that 'Streamlined Processes and Collaboration Mechanisms: Vodacom's implementation of streamlined processes and collaboration mechanisms strengthened its

disaster response capabilities by facilitating smoother coordination, quicker decision-making, and efficient resource allocation among stakeholders during the KZN floods,' delving into how Vodacom leveraged these strategies to enhance their disaster response efforts. This theme examines how efficient processes and seamless integration between teams, departments, and external stakeholders contributed to a swift and coordinated response to the disaster.

4.5.3.1. Process Efficiency and integration

Participants emphasized the importance of efficient processes and seamless integration between teams, departments, and external stakeholders to ensure a swift and coordinated response to the disaster. They highlighted the necessity of clear procedures and collaboration mechanisms to streamline operations and minimize restoration timelines. Most of the participants mentioned that efficient processes facilitated smoother coordination among various stakeholders, allowing for quicker decision-making and resource allocation. Additionally, streamlined operations enabled teams to respond promptly to challenges, reducing restoration timelines and minimizing service disruptions.

Participant 10 emphasized the impact of collaboration, stating, "The collaboration between all the teams... that was key." Participant 8 highlighted the role of cross-functional collaboration in enhancing efficiency, stating, "Cross-functional play... assisted with the speed of restoration." Participant 6 noted the contribution of stakeholders in improving efficiency, stating, "Everyone was on board, giving good ideas to make collaboration run smooth."

Finding suggests that participants in the study emphasized the importance of efficient processes and seamless integration between teams, departments, and external stakeholders to ensure a swift and coordinated response to the disaster. They highlighted the necessity of clear procedures and collaboration mechanisms to streamline operations and minimize restoration timelines. This sentiment was echoed by most participants, who noted that efficient processes facilitated smoother coordination among various stakeholders, allowing for quicker decision-making and resource allocation. Moreover, streamlined operations enabled teams to respond promptly to challenges, reducing restoration timelines and minimizing service disruptions. Cross-functional collaboration, where teams from different departments or functions work together towards a common goal, has been shown to improve efficiency and performance in various contexts. For example, a study by qbal, Perez, & Barthelemy, (2021) found that cross-functional collaboration enhances the quality and speed of decision-making processes within organizations.

4.5.3.2 Process Adaptation and flexibility

Participants recognized the need for adaptability and flexibility in response to the unique challenges posed by the disaster. They emphasized the importance of modifying processes, protocols, and decision-making approaches to address emerging needs promptly and effectively. Adaptive processes allowed teams to respond swiftly to changing circumstances, enabling them to overcome obstacles and maintain service levels. Most participants also highlighted that flexibility in decision-making and process modification facilitated innovative solutions to complex challenges, leading to more effective outcomes.

Participant 5 discussed the necessity of adapting processes to expedite recovery efforts, stating, "One of the processes is, like I said earlier, we don't have any suppliers or vendors working without a PO in Vodacom. That is an SCM policy that is endorsed by the organization, but we needed to give verbal approval for vendors or for fiber infrastructures to control new cables that are going to cost more than what is allocated for maintenance just to try and recover the traffic quicker."

Participant 10 emphasized the importance of adaptability, stating, "You have to adapt... as the situation requires it because of the adversity we were facing it requires something different and also we had to rewire our thinking."

Similarly, Participant 2 discussed the need for flexibility, stating, "We had to fast track a certain process... for it to happen within few hours such as power restoration, we did have to log the ticket with the municipality it happened so quick."

Participant 7 highlighted the expedited processes during the disaster, stating, "Remember the normal process when there's power failure and we need to ask a municipality, can they give you a ref? Those processes for power, for application to restore power were actually very quick. I think we are suspended; I would say these were all processes of getting a reference and whatever. The municipality and the outcome were very quick to respond whenever we needed power. ”We could actually restore services quickly."

Finding suggests the crucial role of adaptability and flexibility in response to disaster challenges. Participants emphasized the need to modify processes and decision-making approaches promptly to overcome obstacles and maintain service levels. Adaptive processes enabled swift responses to changing circumstances, fostering innovative solutions and effective outcomes. For instance, procurement procedures were adjusted to expedite resource acquisition, while power restoration processes were fast-tracked to meet urgent needs.

Collaboration with external entities, like municipalities, also played a key role in facilitating rapid response efforts. Overall, adaptability proved essential in navigating disaster challenges and maintaining operational continuity. Research indicates that organizational flexibility and adaptability are critical for effectively responding to unexpected events and changing environments. According to an article by (Bevilacqua, Ciarapica, & Paciarotti, 2012; Hofmann, Betke, & Sackmann, 2015)organizations that demonstrate agility and flexibility in adapting their processes and strategies are better equipped to thrive in turbulent environments.

4.5.4. Strategy Effectiveness and Impact Assessment

Vodacom's strategy during the KZN floods prioritized human safety, ensured network availability, contributed to saving lives, and fostered collaboration with stakeholders, forming essential components of its successful response.

4.5.4.1. Strategy Objectives evaluation

All participants highlighted three main objectives of Vodacom's strategy during the KZN floods. First, ensuring the safety of employees, emphasizing the importance of human safety in disaster response. Second, ensuring network availability in affected areas to facilitate communication and coordination. Third, contributing to saving lives by providing communication channels for affected communities. They recognized the interconnectedness of these objectives and the imperative of aligning response efforts to address both immediate technical challenges and broader humanitarian needs.

Participant 9 highlighted the primary goals of Vodacom's strategy, stating, “I'll say, firstly, it was to save life, that was the primary goal. And then secondly, provide communication. Ensure that communication is always rather the network availability is always at its highest availability to ensure communication from the affected areas, call for help where is required. So for me, the passion to save life and also to ensure resilience and highest network availability, those are the critical component.”

Similarly, Participant 8 reiterated the three main objectives, emphasizing their significance in disaster response. They stated, “First, ensuring the safety of employees, emphasizing the importance of human safety in disaster response. Second, ensuring network availability in affected areas to facilitate communication and coordination. Third, contributing to saving lives by providing communication channels for affected communities.”

Participant 11 discussed objectives related to community support, stating, "Ensuring... food parcels were provisioned... was also made provision for." Meanwhile, Participant 1 emphasized

the overarching objective of saving lives, stating, "One of the key objectives was to save lives... We needed delivery of equipment... to respond to what I've indicated earlier."

Table 10: Summary of Strategy Objectives during KZN Flood Response

Strategy Objectives	Successful Communication	Lives Saved	Infrastructure Restored
Prioritizing Human Safety	High	High	Medium
Ensuring Network Availability	High	High	High
Contributing to Saving Lives	Medium	High	Medium

Findings suggest that the strategy during the KZN floods prioritized ensuring human safety, network availability, and saving lives. To visually represent the alignment between Vodacom's strategy objectives and their impact on response effectiveness, a Strategy Effectiveness and Impact Assessment Matrix was created. Table 10 matrix illustrates how each strategy objective, such as prioritizing human safety, ensuring network availability, and contributing to saving lives, contributes to successful communication, lives saved, and infrastructure restored during the disaster response. Ratings within the matrix cells indicate the degree of contribution, providing a comprehensive assessment of the effectiveness of Vodacom's response strategy in addressing the needs of affected communities and restoring critical infrastructure. Furthermore, participants emphasized the interconnectedness of these objectives, aligning with the principles outlined in disaster management literature.

Jia, Zhang, Li, and Li, (2015) highlight the importance of prioritizing human safety and well-being in disaster response, suggesting that effective strategies should focus on preventing loss of life. Research suggests that effective disaster management strategies should not only focus on restoring infrastructure but also on providing essential services and support to vulnerable populations to prevent loss of life (Carmeli & Schaubroeck, 2008; Avolio, Walumbwa, & Weber, 2009; Sawalha, 2023). by incorporating "saving lives" as a strategic objective, Vodacom's response aligns with these best practices, demonstrating a commitment to humanitarian values and community resilience.

4.5.4.2. Collaborative Response Strategy

Participants expressed a collective understanding of the critical role that collaboration played in the success of the response efforts. They acknowledged the importance of collaboration

among various stakeholders, including internal teams, government agencies, and external partners, in effectively responding to the disaster.

Participant 10 highlighted the integral role of contractors and suppliers, stating, "Our contractors slash business partners slash suppliers... were integral to our success." Participant 2 emphasized the significance of collaboration with provincial and municipal stakeholders, stating, "Collaborating with all stakeholders... really helped us to get through to some of those areas." Participant 11 underscored the all-hands-on-deck approach, stating, "We needed everybody on deck... The entire team brought in resources... from other counties to assist."

Findings indicates that collaboration among various stakeholders, including internal teams, government agencies, and external partners, played a critical role in the success of the response efforts. Research supports collaborative approaches in disaster response, emphasizing coordination among diverse stakeholders to optimize resource utilization and enhance response capabilities (Kapucu, Arslan, & Demiroz, 2010; Medel & Kousar, 2021; Waugh & Streib, 2006). The importance of collaboration in disaster response is underscored by its ability to foster effective communication, resource sharing, and coordination, as demonstrated by Vodacom's engagement with contractors, suppliers, and provincial/municipal stakeholders.

4.5.4.3.Adaptive Implementation

Participants underscored the need for adaptability and innovation in response to unexpected challenges, such as infrastructure damage and resource limitations. They emphasized the importance of agility in decision-making, flexibility in resource utilization, and creativity in problem-solving to overcome obstacles and achieve objectives.

Participant 6 highlighted adaptive measures taken to overcome road damage: *"We tried to work with the municipality to give us authorities to... build another road."*

Participant 5 described improvisational tactics employed by suppliers: *"They were running cables and using trees... just so that they can reconnect the services."*

Findings highlight that the Participants emphasized adaptability, agility, and innovation in response to unexpected challenges such as infrastructure damage and resource limitations. This aligns with existing literature highlighting the importance of flexibility and innovation in disaster response (Daramola, Oni, & Ogundele, 2016). Furthermore, (McKinsey, 2020) highlights that adaptive measures, such as agility in decision-making and creativity in problem-

solving, are essential for overcoming obstacles and achieving objectives in dynamic and complex disaster environments. Vodacom's adaptive approach, as described by participants, reflects the principles of resilience and responsiveness advocated in disaster management research.

4.5.4.4.Resource Allocation and Prioritization

Participants discussed the strategic allocation of resources based on the severity of impact and criticality of infrastructure, emphasizing the importance of prioritizing key areas and infrastructure components. Participant 3 noted logistical challenges and the need for adaptation, stating, "Logistical issues, especially transportation, were significant hurdles. We had to adapt and find alternative solutions." Participant 7 discussed prioritization based on impact, explaining, "We would prioritize those areas... where we didn't have communication at all." Participant 3 further highlighted the challenges of mobilizing resources and the need for efficient allocation, stating, "Mobilizing resources was challenging. Scarcity forced us to improvise, ensuring efficient resource allocation." Participant 1 emphasized the redirection of resources to the disaster area, stating, "We redirected a number of resources... from other regions." Participant 8 echoed the sentiment of allocating resources based on need, focusing on highly affected areas, particularly the eThekwini County.

Strategic allocation of resources based on impact severity and criticality of infrastructure was emphasized. Effective resource allocation involves prioritizing critical assets and infrastructure components to maximize response impact and efficiency (Oloruntoba & Gray, 2006). Vodacom's approach to resource allocation, as described by participants, aligns with this principle, highlighting the importance of prioritization in optimizing response efforts. Despite logistical challenges and scarcity of resources, Vodacom's adaptive resource management strategies demonstrate resilience and effectiveness in addressing the needs of affected communities.

4.5.4.5. Impact on Overall Performance

Participants reflected on the overall impact of the response strategy, acknowledging both successes and challenges in restoring services and meeting objectives.

Participant 3 described successes in network restoration: *"Seeing the network availability improve... was one of the successes."*

Participant 8 discussed challenges in meeting restoration timelines: "*We underestimated the time... to restore power in areas."*

Participants reflected on both successes and challenges in restoring services and meeting objectives. Evaluation of performance outcomes is essential for informing future response planning and enhancing disaster resilience (Birkland, 2006). Vodacom's response, as assessed by participants, exemplifies the iterative nature of disaster management, wherein successes and challenges provide valuable insights for improving future response efforts. The acknowledgment of underestimation of restoration timelines underscores the importance of continuous learning and adaptation in disaster response, contributing to the organization's overall performance and resilience.

4.5.5. Framework Development and Strategy Enhancement

Drawing from Vodacom's experience during the KZN floods, the proposal is to develop a comprehensive framework for improving disaster response strategies. This framework emphasizes proactive measures, continuous learning, collaboration, and the integration of resilient infrastructure and advanced technology to enhance overall response capabilities.

4.5.5.1. Resilient Infrastructure and Disaster Prevention

Participants emphasized the importance of resilient infrastructure and proactive measures to prevent or mitigate the impact of disasters, particularly in coastal regions like KZN. They highlighted the need for collaboration between telecommunications companies and government entities to ensure infrastructure durability against natural disasters.

Participant 1 emphasized the necessity of infrastructure resilience, stating, "When we build our infrastructure... people need to be cognizant of the multitude of water... When the rain reach[es]... out to the coast, the infrastructure... needs to withstand the damage." Participant 8 discussed the importance of adaptable solutions based on the type and magnitude of the disaster, stating, "A solution will be based on the type of disaster... the basics... should remain the same... but flexible in terms of... the volume of the disaster."

Participants stressed the significance of incorporating flood-resistant designs into infrastructure development to withstand disasters. Proactive collaboration between telecommunications companies and government entities is essential to ensure infrastructure resilience against natural disasters. Resilient infrastructure can significantly reduce the impact of disasters on telecommunications networks and facilitate faster recovery efforts. Research by (Liu, Kumar, Katul, & Porporato, 2018) emphasizes the importance of resilient infrastructure in disaster management, highlighting strategies such as incorporating disaster-resistant designs and implementing early warning systems. Additionally, studies by (Al-Haidari & Rahman, 2019;

GSMA, 2020; Kunguma, 2020) emphasize the role of collaboration between telecommunications companies and government agencies in enhancing infrastructure resilience and disaster preparedness.

4.5.5.2. Flexibility and Adaptability in Disaster Response

Participants emphasized the need for flexibility in disaster response strategies, recognizing that the approach may vary depending on the type and severity of the disaster. They underscored the importance of maintaining consistent principles while tailoring response strategies to specific disaster scenarios.

Participant 8 highlighted the necessity of adaptable solutions, stating, "A solution will be based on the type of disaster... the basics... should remain the same... but flexible in terms of... the volume of the disaster." Participant 2 emphasized the significance of engaging and motivating people during disaster response efforts, stating, "The people... must be motivated... and in the state of mind of understanding... the impact... The people... is very, very, very key when you're dealing with a disaster."

Findings suggest that flexibility in disaster response strategies allows organizations to adapt to evolving circumstances and effectively manage various types of disasters. While maintaining consistent principles, organizations should tailor their response strategies to specific disaster scenarios, considering factors such as severity and volume of the disaster. Human-centric approaches, such as ensuring the well-being and motivation of personnel involved in disaster response, are critical for the effectiveness of response efforts. Research by (Daramola, Oni, & Ogundele, 2016) highlights the importance of flexibility and adaptability in disaster response, emphasizing the need for organizations to adjust their strategies based on the unique characteristics of each disaster. Additionally, studies by (Asghar, Alahakoon, & Churilov, 2006; Burger, Kennedy, & Crooks, 2021) underscore the significance of human factors in disaster response, suggesting that motivated and well-supported personnel are essential for successful response efforts.

4.5.5.3. Organizational Learning and Continuous Improvement

Participants shared insights into post-disaster practices adopted by Vodacom, emphasizing the importance of organizational learning and continuous improvement. They highlighted the establishment of dedicated war rooms and ongoing monitoring as key practices for enhancing disaster response capabilities.

Participant 3 emphasized the active involvement of Field Force Operations (FFOs) in ensuring quick restoration, stating, "Our FFOs are fully involved... ensuring that quick restoration happens on a daily basis... Our guys are really fully involved in terms of making sure... quick restoration happens on a daily basis." Participant 1 highlighted the importance of collaborative drills for preparedness, stating, "Maybe there's a need for those to be written and be shared or collaborated with the other stakeholders, the same way we did during the disaster."

Findings indicates that organizational learning and continuous improvement practices, such as ongoing monitoring and the establishment of dedicated war rooms, are essential for enhancing disaster response capabilities. Post-disaster reflections and evaluations enable organizations to identify strengths and weaknesses in their response strategies and implement necessary improvements. Integration of real-time monitoring and decision-making structures within regions can facilitate quicker restoration efforts and improve network customer experience. Research by Birkland (2006) emphasizes the importance of organizational learning in disaster management, highlighting the role of post-disaster evaluations in identifying areas for improvement. Additionally, studies by (Berariu, Fikar, Gronalt, & & Hirsch, 2020; Haddow & Haddow, 2014)suggest that real-time monitoring and decision-making structures contribute to more effective disaster response efforts.

4.5.5.4. Collaboration and Partnerships

ICASA and Telecommunication Operators

Participants highlighted the importance of collaboration between ICASA (the regulatory authority) and telecommunication operators to establish roaming agreements during disasters. This collaboration ensures seamless connectivity, allowing users to switch between networks, thereby maintaining continuous communication in affected communities.

Participant 7 emphasized this, stating: *"Roaming among operators is critical. If we can establish comprehensive frameworks where users can seamlessly switch between networks during a disaster, it ensures continuous communication in communities without interruptions."*

The findings suggest that collaboration between regulatory bodies like ICASA and telecommunication operators is essential for effective disaster response by introducing roaming agreements among telecommunication operators aligns with best practices in disaster response. Literature indicates that such collaboration enhances communication resilience and facilitates efficient resource allocation during emergencies (GSMA, 2020; Medel & Kousar, 2021; Waugh & Streib, 2006). Research underscores the importance of collaboration between

regulatory authorities and service providers in disaster response. Studies have shown that coordinated efforts between regulatory bodies and telecommunication operators are vital for maintaining communication resilience during disasters (Zakiri, 2020; Skinner & Rampersad, 2015). This collaboration ensures seamless connectivity and uninterrupted communication options for individuals during crises.

4.5.5.5. Strengthening Municipal Infrastructure Resilience

Participants emphasized the critical role of municipalities in strengthening infrastructure resilience, particularly in power supply and building quality infrastructure. Ensuring effective drainage systems and regular maintenance emerged as key factors in preventing damage to critical infrastructure during disasters.

Participant 2 remarked, *"Ensuring infrastructure resilience, including power supply and effective drainage systems, is essential to minimize the impact of disasters on critical infrastructure. Proactive investments in resilient technologies are crucial to enhancing disaster preparedness."*

The findings suggest that municipalities play a crucial role in disaster preparedness and response by ensuring the resilience of infrastructure. Literature supports this, indicating collaborative initiatives like roaming agreements have been found to increase the resilience of telecommunications networks by providing redundancy and alternative communication pathways, thus enabling more efficient and reliable communication services during disasters ((Aldrich & Sawada, 2015; Comfort L. , 2007).

Research underscores the importance of municipalities in disaster preparedness and response. Research also supports that proactive investments in infrastructure improvements and resilient technologies can minimize the impact of disasters on critical infrastructure (Aldrich & Sawada, 2015; Comfort L. , 2007). Additionally, effective drainage systems and regular maintenance are essential for preventing damage to infrastructure during floods.

4.5.5.6. Investment in Technology

Investment in technology emerged as a crucial aspect of disaster response strategies, enabling organizations like Vodacom to leverage innovative tools and solutions to mitigate the impact of crises and facilitate rapid recovery. Participants emphasized the significance of integrating advanced technologies into disaster preparedness and response frameworks to enhance situational awareness, communication, and decision-making processes. In the same breath participants recognized the transformative potential of technology in bolstering disaster

resilience, citing examples such as early warning systems, predictive analytics, and remote monitoring capabilities. They underscored the need for continuous investment in technological solutions to stay ahead of evolving threats and challenges.

Participant 5 emphasized the role of technology in disaster response, stating, "Technology is our greatest ally in disaster response. With the right tools and systems in place, we can anticipate, mitigate, and respond to crises more effectively." Participant 12 highlighted the importance of investing in cutting-edge technology for safeguarding lives and livelihoods, stating, "Investing in cutting-edge technology isn't just about staying competitive; it's about safeguarding lives and livelihoods. We need to embrace innovation to build a more resilient future."

The findings highlighted the diverse applications of technology in disaster response, ranging from the use of satellite imagery for assessing damage to the deployment of drones for aerial surveys. Participants emphasized the need for real-time data analytics platforms to inform decision-making and resource allocation during crises. Existing literature corroborates the importance of technology in disaster management, emphasizing its role in improving situational awareness, enhancing communication networks, and facilitating coordination among response agencies (Martins, 2018; Mohan & Mittal, 2020). Studies have shown that investments in technological infrastructure, such as robust communication systems and sensor networks, can significantly enhance the resilience of critical infrastructure during disasters (Mottahedi, Sereshki, Ataei, & Nouri, 2021; Khaled & Mcheick, 2019)

4.6. Unexpected findings

4.6.1. Addressing Network Congestion

During the KZN floods, network congestion emerged as a significant challenge, threatening to disrupt communication services. However, Vodacom demonstrated remarkable resilience by implementing effective strategies to manage network congestion and ensure uninterrupted connectivity for users.

Despite the threat of network congestion, Vodacom successfully maintained network availability above 60% through the implementation of dynamic spectrum sharing techniques and proactive measures. These strategies allowed Vodacom to prioritize technology in areas experiencing high demand, ensuring that users in critical areas received uninterrupted service.

Utilizing 4G technology, Vodacom employed dynamic spectrum sharing techniques, prioritizing technology in areas experiencing high demand. Participants emphasized this

approach, stating, "During the peak of the disaster, network congestion became a major concern. However, Vodacom efficiently managed the situation by utilizing dynamic spectrum sharing techniques, ensuring that users in high-demand areas received uninterrupted service.

Furthermore, Vodacom adopted a proactive approach to alleviate congestion by diverting traffic to neighbouring sites in instances where sites were inaccessible. This strategic site diversification further bolstered Vodacom's ability to maintain connectivity and provide essential services to affected communities.

The successful management of network congestion underscores Vodacom's commitment to providing reliable communication services, even in the face of unprecedented challenges. By employing innovative strategies and proactive measures, Vodacom demonstrated its resilience and adaptability during the KZN floods.

4.6.2. Economic Challenges in Disaster Response

Despite the recognition of economic challenges in disaster response, few participants highlighted the practical implications of these constraints. The current economic conditions may limit the organization's ability to fully implement comprehensive disaster response strategies. This underscores the importance of prioritizing resource allocation and budget planning to address critical needs while operating within financial constraints. This was also echoed in the literature review that economic constraints often hinder the implementation of effective disaster response strategies (Abdeen, Fernando, Kulatunga, Hettige, & Arjuna, 2021; Finucane, Acosta, Wicker, & Whipkey, 2020)

Recognizing the economic consequences of network outages, future disaster response plans should prioritize preparedness for rapid network restoration. This may involve developing strategies to expedite recovery processes, ensuring minimal economic losses due to disruptions.

4.6.3. Longer Power Outages from Municipality

Unexpectedly, the participant highlighted the impact of political dynamics in stakeholder engagement, emphasizing the need for understanding o political intricacies during disaster response. This unexpected finding suggests that political factors may significantly influence the duration and effectiveness of power restoration efforts, highlighting the importance of proactive stakeholder management strategies. Moreover, the prolonged power outages resulted in increased reliance on backup generators provided by Vodacom. This extended usage not only strained the backup power supply but also incurred additional operational costs for the company due to the increased consumption of fuel needed to refill the backup generators.

This comprehensive understanding of the impact of longer power outages from the municipality sheds light on the challenges faced by Vodacom during the disaster response, emphasizing the importance of considering external factors such as political dynamics and their implications on operational efficiency and cost management.

4.6.4. Balancing Speed and Testing in Equipment Replacements

Unexpectedly, the participant revealed that the rush to respond to the disaster led to equipment replacements without thorough testing, potentially contributing to long-term challenges. This underscores the importance of balancing speed with comprehensive testing in disaster response. While rapid deployment is essential for mitigating immediate risks, thorough testing is necessary to ensure the reliability and effectiveness of equipment in the long

4.7. Summary of findings

4.7.1. Objective 1: Assessing the Impact of Effective Leadership and Stakeholder Management

Vodacom demonstrated a multifaceted leadership approach, including servant, transformative, and distributed styles. Leadership effectiveness was evident in fostering collaboration, innovation, and agility in decision-making processes. Literature supports the effectiveness of these leadership styles in enhancing disaster response strategies. Effective leadership played a pivotal role in providing direction, coordination, and efficiency in resource allocation during the KZN floods. Leadership actions facilitated swift decision-making, removal of bureaucratic hurdles, and empowerment of response teams. Vodacom's leadership had a significant impact on collaboration, resource allocation, and morale during the response. Swift assistance, resource allocation, and support from leadership positively influenced response efforts and morale among response teams. Effective stakeholder management and collaboration were essential for Vodacom's response. Clear communication, alignment of goals, and coordination with stakeholders facilitated response efforts and resource allocation. Effective communication, both internal and external, played a crucial role in facilitating coordination, decision-making, and resource allocation during the floods. Real-time communication enabled rapid response efforts and coordination among response teams.

4.7.2. Objective 2: Examining the Significance of Resilient Infrastructure and Advanced Technology

Vodacom's infrastructure demonstrated resilience, maintaining connectivity despite challenges posed by the floods. Backup infrastructure and diverse routes contributed to maintaining

operational functionality and supporting response efforts. Diverse routes and technologies were crucial for maintaining network connectivity, especially in flood-affected areas. The integration of advanced technology, such as satellite cell phones, enhanced communication capabilities in challenging conditions. Destruction of roads, bridges, and power infrastructure posed significant challenges to response efforts. Collaborative efforts with affected communities and stakeholders facilitated identification of alternative routes and solutions, overcoming infrastructure challenges. Network availability was crucial for communication and coordination during the floods. Despite challenges, Vodacom's network remained operational, enabling communication with emergency services and facilitating response efforts. Advanced monitoring systems and data analytics provided valuable insights into flood-affected areas, enabling proactive response efforts and resource allocation. Integration of these technologies enhanced situational awareness and decision-making capabilities. Advanced technologies, such as satellite cell phones, played a crucial role in maintaining communication capabilities during the floods. Integration of these technologies enhanced disaster response mechanisms and communication resilience.

4.7.3. Objective 3: Evaluating the Role of Processes in Strengthening Disaster Response Capabilities

The seamless integration of efficient processes among teams and stakeholders proved indispensable for ensuring swift and coordinated response efforts. Moreover, the flexibility in decision-making and the ability to modify processes enabled the emergence of innovative solutions, resulting in highly effective outcomes. This adaptability allowed for the timely alteration of existing processes to meet the evolving needs of the situation, ultimately contributing to the success of the disaster response efforts.

4.7.4. Objective 4: Assessing the Current Disaster Response Strategy Implemented by Vodacom

In evaluating Vodacom's response strategy during the KZN floods, key findings emerged. Firstly, the strategy prioritized human safety, network availability, and saving lives, aligning with established disaster management principles. Secondly, collaborative engagement with stakeholders played a crucial role, optimizing resource utilization and fostering effective communication. Thirdly, adaptability and innovation were highlighted as essential in overcoming challenges, reflecting resilience and responsiveness in dynamic disaster environments. Fourthly, strategic resource allocation, despite logistical challenges,

demonstrated effectiveness in addressing community needs. Lastly, the response's impact on overall performance emphasized the iterative nature of disaster management, with successes and challenges informing future planning and underscoring the importance of continuous learning and adaptation. These findings collectively underscore the effectiveness and alignment of Vodacom's response strategy with established disaster management principles.

4.7.5. Objective 5: Providing a Framework for Improving Disaster Response Strategies

Participants emphasized the importance of resilient infrastructure and proactive disaster prevention measures in coastal regions like KZN. Collaboration between telecommunications companies and government entities is crucial for infrastructure resilience, focusing on flood-resistant designs and early warning systems. Flexible disaster response strategies, tailored to the severity of disasters, prioritize human-centric approaches and ongoing monitoring. Organizational learning through evaluations drives continuous improvement in response strategies. Collaboration between regulatory bodies and telecom operators enhances communication resilience, vital during crises. Municipalities play a crucial role in infrastructure resilience through proactive investments and maintenance. Integration of innovative tools like early warning systems and predictive analytics is essential for disaster response. Continuous investment in technology enhances disaster resilience by improving situational awareness and coordination among response agencies.

CHAPTER FIVE

CONCLUSIONS, LIMITATIONS & RECOMMENDATIONS

5.1 Introduction

This section concludes the comprehensive investigation into Vodacom's disaster response strategies, particularly in light of their response to the KZN floods. Throughout the inquiry, various facets of Vodacom's approach were explored, aiming to understand their leadership practices, stakeholder engagement, infrastructure resilience, technological utilization, process implementation, and overall efficacy in dealing with the challenges posed by natural disasters.

Guided by five pivotal questions, the exploration sought to uncover insights into Vodacom's strategies and their impact on the outcomes witnessed during the KZN floods. These questions acted as guiding lights, shedding clarity on our journey and imparting invaluable lessons for navigating future disaster scenarios. They formed the cornerstone of our study, directing our exploration into essential areas. The research questions guiding the study were;

1. How did effective leadership and stakeholder management influence the success of Vodacom's disaster response strategies during the KZN floods?
2. What role did resilient infrastructure and advanced technology play in bolstering Vodacom's disaster response efforts during the KZN floods, and how did they contribute to overall effectiveness?
3. How did the implementation of processes fortify Vodacom's disaster response capabilities during the KZN floods, and what were the key factors influencing their effectiveness?
4. What were the key components of Vodacom's disaster response strategy during the KZN floods, and how effective were they in addressing the challenges posed by the disaster?
5. Drawing from the identified strengths and weaknesses in Vodacom's disaster response strategy during the KZN floods, what framework can be proposed to enhance disaster response strategies for Vodacom and other organizations confronting similar disasters in the future?

5.2 Conclusions for each Research Question

5.2.1 Conclusion regarding research on the main Question 1

The research question aims to investigate how effective leadership and stakeholder management significantly impacted the success of Vodacom's disaster response strategies

during the KZN floods. Based on the literature review and participants' findings, it is confirmed that effective leadership and stakeholder management played a critical role in shaping Vodacom's disaster response strategies during the KZN floods. The involvement of key stakeholders facilitated coordination, communication, and decision-making processes, contributing to the overall effectiveness of the response efforts. Leadership's ability to provide direction, allocate resources efficiently, and foster collaboration among diverse stakeholders proved essential in navigating the challenges posed by the disaster. Thus, the research question underscores the importance of strong leadership and stakeholder engagement in enhancing disaster response capabilities and resilience.

5.2.2 Conclusion regarding research on the main Question 2

The research question aimed to investigate the role of resilient infrastructure and advanced technology in Vodacom's disaster response efforts during the KZN floods. These findings confirm the assumptions that investments in flood-resistant designs and the integration of innovative tools and solutions, such as dynamic spectrum sharing techniques and real-time monitoring systems, played a pivotal role in enhancing the overall effectiveness of the response. Resilient infrastructure and advanced technology played a pivotal role in enhancing Vodacom's disaster response efforts during the KZN floods. Investments in flood-resistant designs and the integration of innovative tools and solutions, such as dynamic spectrum sharing techniques and real-time monitoring systems, contributed to the overall effectiveness of the response.

5.2.3 Conclusion regarding research on the main Question 3

The research question aimed to investigate the implementation of processes in strengthening Vodacom's disaster response capabilities during the KZN floods. These findings confirm the assumptions that the implementation of processes, including adaptive measures, resource allocation strategies, and continuous learning practices, indeed contributed to enhancing Vodacom's disaster response capabilities. Flexibility in decision-making, prioritization based on impact severity, and ongoing monitoring emerged as key factors influencing the effectiveness of these processes. The implementation of processes, including adaptive measures, resource allocation strategies, and continuous learning practices, strengthened Vodacom's disaster response capabilities during the KZN floods. Flexibility in decision-making, prioritization based on impact severity, and ongoing monitoring were key factors influencing the effectiveness of these processes.

5.2.4 Conclusion regarding research on the main Question 4

The research question aimed to investigate the effectiveness of Vodacom's disaster response strategy during the KZN floods. These findings confirm the assumptions that Vodacom's disaster response strategy comprised collaborative response strategies, adaptive implementation, strategic resource allocation, and continuous performance evaluation. Despite challenges such as network congestion and economic constraints, Vodacom demonstrated resilience and adaptability in addressing the disaster's impact. Vodacom's disaster response strategy during the KZN floods comprised collaborative response strategies, adaptive implementation, strategic resource allocation, and continuous performance evaluation. Despite challenges such as network congestion and economic constraints, Vodacom demonstrated resilience and adaptability in addressing the disaster's impact.

5.2.5 Conclusion regarding Research Question 5

The research question aimed to investigate the strengths and weaknesses in Vodacom's disaster response strategy during the KZN floods. These findings confirm the assumptions that Vodacom's disaster response strategy exhibited notable strengths in collaborative response strategies, adaptive implementation, strategic resource allocation, and continuous performance evaluation. However, weaknesses were identified in areas such as network congestion management and economic constraints. Furthermore, this research question aims to assess the framework for enhancing disaster response strategies for Vodacom and other organizations facing similar disasters in the future. Drawing from the identified strengths and weaknesses in Vodacom's disaster response strategy during the KZN floods, recommendations can be formulated to improve disaster response strategies. These may include enhancing network capacity, improving coordination with government agencies and other stakeholders, investing in resilient infrastructure, and leveraging advanced technology for real-time monitoring and communication. Additionally, conducting regular exercises and simulations to test response plans and fostering partnerships with local communities can further enhance preparedness and response capabilities.

5.3 Limitations

5.3.1 Sample Size and Scope

One limitation of this study is the relatively small sample size of participants from Vodacom. While efforts were made to select a diverse range of participants representing different roles within the organization, the findings may not fully capture the perspectives of all stakeholders

involved in the disaster response efforts. Additionally, the study focused specifically on Vodacom's response to the KZN floods, which may limit the generalizability of the findings to other types of disasters or organizations.

5.3.2 Data Collection Methods

Another limitation pertains to the data collection methods utilized in this study. While interviews provided valuable insights into participants' experiences and perceptions, reliance on self-reported data may introduce bias or subjectivity into the findings. Future research could employ complementary methods, such as observational studies or document analysis, to corroborate and enhance the credibility of the findings.

5.3.3 Time Constraints

The timeframe within which this study was conducted may have constrained the depth and breadth of the analysis. Due to time limitations, it was not feasible to engage in prolonged fieldwork or longitudinal studies to capture the evolution of Vodacom's response efforts over time. Consequently, the study may not fully capture the dynamic nature of disaster response strategies and their effectiveness in the long term.

5.3.4 Resource Constraints

Resource constraints, including limited access to proprietary data and financial resources, may have impacted the comprehensiveness of the study. While efforts were made to leverage available resources effectively, constraints on time, budget, and access to key stakeholders may have restricted the depth of analysis and the ability to explore certain research avenues in greater detail.

5.3.5 External Factors and Contextual Specificity

The effectiveness of disaster response strategies is influenced by a multitude of external factors, including socio-political dynamics, economic conditions, and geographic features. While this study aimed to explore Vodacom's response efforts within the context of the KZN floods, it may not fully account for the unique contextual factors shaping disaster response in other regions or settings. Future research could benefit from examining how different contextual factors influence the implementation and outcomes of disaster response strategies.

5.4.Recommendations

To advance disaster response strategies, a comprehensive framework has been developed, drawing upon existing principles and integrating new elements to address emerging challenges.

This framework encompasses various key components essential for effective disaster response and resilience-building.

5.4.1. Comprehensive Framework for Disaster Response Strategy Enhancement

Effective Leadership and Stakeholder Engagement

Effective leadership is important for directing and coordinating disaster response efforts, ensuring clear guidance and optimal resource utilization. Prioritizing strong leadership facilitates collaboration with stakeholders, including internal teams, government agencies, contractors, and suppliers, fostering resource optimization. Collaboration with municipalities is essential to align strategies with local governance structures and meet community needs effectively. Emphasizing leadership's role in driving innovation and fostering collaboration across sectors ensures effective direction and coordination of disaster response efforts. Leveraging emerging technologies and digital platforms further enhances stakeholder engagement and community empowerment.

Resilient Infrastructure and Advanced Technology Integration

Investing in flood-resistant infrastructure designs is crucial to minimize damage during disasters. Integrating advanced technology solutions like AI, IoT, and predictive analytics enhances disaster response effectiveness. Partnering with municipalities to assess and upgrade critical infrastructure resilience, including drainage systems and communication networks, strengthens preparedness. Nature-based solutions and green infrastructure are highlighted for their innovative approaches to enhancing resilience and promoting sustainability.

Additionally, incorporating emerging technologies like the Nanobot Swarm for Disaster Recovery represents a ground-breaking advancement in disaster response and infrastructure resilience. Nanobots, equipped with advanced sensors and AI algorithms, autonomously assess, repair, and rebuild infrastructure in disaster-affected areas. These nanobots operate collectively as a swarm, enabling rapid and precise reconstruction of critical infrastructure elements such as bridges, roads, and buildings. Therefore, by leveraging nanotechnology and swarm robotics, the Nanobot Swarm enhances disaster response effectiveness and accelerates the reconstruction process, minimizing downtime and restoring essential services swiftly. Integrating the Nanobot Swarm into disaster response strategies requires collaboration with technological experts and regulatory authorities to ensure safe and effective deployment.

Adaptive Processes Implementation

Adaptive processes implementation is important for flexibility in decision-making and resource allocation during dynamic disaster situations. Prioritizing continuous learning practices enhances organizational agility and responsiveness. Collaboration with municipalities streamlines administrative processes, and the use of data-driven decision-making ensures adaptability to evolving disaster scenarios. Inclusive and culturally relevant approaches are emphasized to address diverse community needs.

Collaboration with Municipalities for Infrastructure Maintenance

Collaborative partnerships with municipalities ensure the maintenance of critical infrastructure, such as drainage systems, facilitating rapid water drainage and mitigating damage during disasters. Joint infrastructure assessments and planning exercises help identify vulnerabilities and prioritize maintenance activities, enhancing overall resilience. Cross-sectoral partnerships and innovation hubs are highlighted for collaborating with municipalities in implementing resilient infrastructure maintenance strategies, prioritizing climate change adaptation and mitigation measures.

Key Components of Disaster Response Strategy

Key components include community-based disaster risk reduction (CBDRR) strategies, empowering local communities. Integrating environmental sustainability and ecosystem-based approaches fosters resilience. Robust crisis communication systems and psychosocial support services address emotional, mental, and social well-being. Climate change adaptation and mitigation strategies are crucial for building resilience and enhancing response effectiveness.

Additional Elements for Enhancing Disaster Response Strategies

Promoting interdisciplinary research and innovation, integrating resilient urban planning and design principles, strengthening education and capacity-building initiatives, and developing innovative financial mechanisms are essential for enhancing disaster response strategies. Collaboration with municipalities is integral across all these elements to ensure effective implementation and integration into local contexts. The value of data-driven decision-making, climate-smart infrastructure, and inclusive approaches is emphasized. Examples of innovative partnerships, technologies, and community-driven initiatives showcase forward-thinking solutions to complex disaster challenges, fostering resilience and adaptation.

5.4 Recommendations for Future Research

Future research could focus on investigating how regulatory frameworks and policy interventions contribute to communication resilience during disasters. By examining the impact of regulations and policies on telecommunications infrastructure and emergency communication systems, researchers can inform the development of effective regulatory strategies to bolster communication resilience and mitigate the impact of disasters.

Comparative studies could be undertaken to compare the effectiveness of disaster response strategies across different organizations, sectors, or geographic regions. By examining variations in approaches, outcomes, and contextual factors, researchers can identify best practices, lessons learned, and opportunities for cross-sectoral collaboration in disaster management.

Investigate the potential benefits of cross-sectoral collaborations between telecommunications companies, government agencies, academic institutions, and non-profit organizations in enhancing disaster preparedness and response capabilities.

Explore the impact of human-centric approaches, such as psychological support programs for employees and community resilience-building initiatives, on the overall effectiveness of disaster response efforts.

5.5 Conclusion

In conclusion, the investigation into Vodacom's disaster response strategies during the KZN floods has provided valuable insights into the complexities and challenges of managing natural disasters. Guided by five main research questions, exploring various aspects of Vodacom's approach, including leadership, stakeholder management, infrastructure resilience, technological integration, process implementation, and overall strategy effectiveness. Through a synthesis of literature review findings and participant insights, several key conclusions were:

Effective Leadership and Stakeholder Management

Vodacom's success in responding to the KZN floods was significantly influenced by strong leadership and effective stakeholder engagement. Collaborative efforts among internal teams, government agencies, and external partners played a crucial role in optimizing resource utilization and enhancing response capabilities.

Resilient Infrastructure and Advanced Technology

The integration of resilient infrastructure and advanced technology was instrumental in enhancing Vodacom's disaster response efforts. Flood-resistant designs, early warning systems, and real-time monitoring platforms contributed to improved situational awareness, communication resilience, and decision-making processes during the crisis.

Process Implementation and Continuous Improvement

Vodacom's proactive approach to process implementation and continuous improvement strengthened its disaster response capabilities. Ongoing monitoring, dedicated war rooms, and collaborative drills facilitated rapid decision-making, resource allocation, and restoration efforts, despite logistical challenges and resource limitations.

Strategic Response Framework

Vodacom's disaster response strategy during the KZN floods was characterized by adaptive implementation, resource allocation prioritization, and impact-focused performance evaluation. While successes were evident in network restoration and community support initiatives, challenges such as network congestion and economic constraints highlighted areas for improvement.

Recommendations for Future Strategies

Based on our findings, the proposed comprehensive framework for enhancing disaster response strategies, emphasizing proactive measures, continuous learning, collaboration, and technology integration. Key recommendations include investing in resilient infrastructure, fostering cross-sectoral partnerships, leveraging emerging technologies, and prioritizing capacity building and knowledge sharing initiatives.

In closing, our study underscores the importance of resilient, adaptive, and collaborative approaches to disaster management. By learning from past experiences, embracing innovation, and working together across sectors and disciplines, organizations like Vodacom can better prepare for and respond to future disasters, ultimately safeguarding lives, livelihoods, and communities in times of crisis.

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Annexure 1: Organisational Problem and Research Gap

Author (Year)	Organisational Problem	Research Problem	Conceptual Frame Used	Population & Sample	Research Gap
Govender, K., & Hansraj, R. (2018).)	The article focuses on the need for effective communication strategies for disaster risk reduction in the South Durban Basin, a highly industrialized and densely populated	The research problem is to identify the existing communication strategies used for disaster risk reduction in the South Durban Basin and propose revised strategies	The authors use the Social Amplification of Risk Framework (SARF) to analyze the communication strategies used for disaster risk	The population in this study is the residents and stakeholders in the South Durban Basin. The authors used a purposive sampling technique to select 50	The research identifies a gap in the current communication strategies used for disaster risk reduction in the South Durban Basin. The authors argue that the existing strategies are inadequate and ineffective due to a lack of coordination, trust, and inclusivity among

	area in South Africa.	for more effective communication.	reduction in the South Durban Basin. SARF is a theoretical framework that explains how risks are amplified or attenuated by social, psychological, and cultural factors.	participants, including government officials, emergency services personnel, community leaders, and representatives from industry and civil society organizations.	stakeholders. The study proposes revised communication strategies that emphasize collaboration, transparency, and the active involvement of all stakeholders to improve disaster risk reduction in the South Durban Basin.
UNDRR. (2020)	Enhancing disaster management using mobile technology. Conceptual Frame: Technology acceptance and use	Technology acceptance and use	To explore the potential of mobile technology in disaster management	Disaster management professionals and researchers	Further research is needed to identify the most effective mobile technology solutions for disaster management.
Alexander, D. (Ed.). (2011)	Disaster management practices and strategies across different countries.	Analyse worldwide catastrophe risk reduction, response, and recovery lessons	Comparative analysis	Literature and case studies from various countries	The need to identify and share best practices across countries and regions in disaster management.
(Al-Haidari & Rahman, 2019)	: Disaster management in the context of telecommunication networks	The research problem addressed in this article is the effectiveness of telecommunication networks in disaster	The conceptual framework for this review article is based on the Disaster	The authors review and analyse various studies and reports related to the use of	This article emphasizes the importance of additional study into disaster management's potential benefits from including telecommunications

		management. Specifically, the authors explore the challenges and opportunities associated with the use of telecommunication networks in disaster management	Management Cycle, which includes four stages: mitigation, preparedness, response, and recovery. The authors also consider the role of telecommunication networks in each stage of the cycle.	telecommunication networks in disaster management. The population includes academic literature, government reports, and case studies from different countries and regions.	networks. The authors recommend that future research concentrate on improving the efficiency of communication networks during emergency situations by creating new technologies and methods. The authors also recommend investigating the difficulties of putting these strategies and tools into practice in future studies.

Annexure 3: Interview guide

Interview Guide: Assessing Vodacom's Disaster Response Strategy

Introduction

1. Welcome and thank the participant for their time and willingness to share their insights.
2. Explain the purpose of the interview: to evaluate the effectiveness of Vodacom's disaster response strategy during the KZN flood.
3. your feedback is crucial in identifying strengths, weaknesses, and the impact of Vodacom's response strategy on the affected communities.
4. Request for consent and ensure confidentiality.

What is your role _

Which department do you work for? – KZN Technology : Radio Planning and Optimization

How many years of experience do you have in the telecommunication?

Session 1: Assess the current disaster response strategy implemented

1. What were the main components and goals of Vodacom's strategy for responding to the KZN floods?
2. How was the disaster response strategy executed in practice? Were there significant deviations from the plan, and if so, what were they?
3. How well did Vodacom's disaster response strategy perform in terms of tangible results, and did it successfully achieve its intended goals?
4. Were there unexpected challenges or notable successes during the strategy implementation, and how were they addressed or leveraged?
5. How were resources allocated and prioritized to match the goals of the disaster response strategy? Can you share insights into the decision-making process?

Section 2: Effective Leadership and Stakeholder Management

1. Describe Vodacom's leadership role in the KZN flood response, highlighting key decisions and actions.
2. How did effective leadership enhance Vodacom's overall disaster response in the KZN floods?
3. Provide examples of stakeholder management in the disaster response and how it contributed to effectiveness.
4. Please assist with insight in terms of challenges and lessons learned in leadership and stakeholder management during the disaster response.
5. How did communication between leaders and response teams influence decision-making and coordination in responding to the disaster?
6. Can you please assist with insight instances where conflicting stakeholder interests posed challenges and how they were resolved.

Section 3: Resilient Infrastructure and Advanced Technology

1. How did robust infrastructure, like communication systems (RAN and transmission) and power supply, help Vodacom's disaster response during the KZN floods?
2. In your view, how did the availability of Vodacom's network affect the overall effectiveness of the disaster response strategy?
3. How did infrastructure challenges affect Vodacom's response during the KZN floods, and can you provide specific examples of these challenges?
4. How did advanced technologies enhance Vodacom's flood response strategy?

Section 4: The role of processes and Integration

1. Outline Vodacom's disaster response processes, from preparation to action execution.
2. How did these processes enhance the overall effectiveness and efficiency of Vodacom's response efforts?
3. Were challenges or bottlenecks identified in the processes, and how were they addressed?
4. Can please Share examples of successful coordination and integration of processes during the disaster response.
5. How did cross-functional collaboration contribute to aligning processes with response objectives?
6. Were there adaptations or modifications to processes based on unique challenges posed by floods, please share your insights?

Section 5: Framework Development and Practical implementation

1. Considering the strengths and weaknesses identified in Vodacom's disaster response strategy, what key principles or components should be integrated into a comprehensive framework to significantly enhance disaster response capabilities?
2. In implementing the disaster response framework, how would you recommend organizations prioritize the adoption of specific components based on their unique strengths and vulnerabilities in the realm of disaster response?

Additional Feedback

1. Is there any additional information or insights you would like to share regarding Vodacom's disaster response strategy during the KZN flood?

Closing

1. Offer any further clarification if needed.
2. Thank the participants for their time and valuable contributions to the interview.
3. Assure them that their feedback will contribute to improving future disaster response strategies.
4. Close the interview.

Annexure 4: Proposed Schedule and Timelines

Stage	**Timeframe**	
Research Proposal and Ethics Approval Develop the research proposal outlining the research objectives, methodology, and timeline. Prepare the ethics application, including informed consent forms and data protection measures. • Submit the research proposal and ethics application to the relevant institutional review board for approval.	12	
Literature Review Conduct a comprehensive review of relevant literature on disaster response strategies, specifically focusing on the KZN flood and related case studies. Identify key theories, concepts, and gaps in the existing literature. Analyse and synthesize the literature to inform the research questions and theoretical framework.	4 weeks	
Research Design and Instrument Development Determine the appropriate research design, considering the mixed methods approach. Develop data collection instruments, including questionnaires, interview guides, and observation protocols. Pilot test the instruments and make necessary revisions based on feedback.	3 weeks	
Data Collection	4 weeks	

Identify and recruit participants, considering key stakeholders involved in Vodacom's disaster response during the KZN flood. Conduct surveys, interviews, and observations according to the approved research protocol. Ensure proper documentation and organization of collected data.		
Data Analysis Clean and organize the collected data to prepare for analysis. Analyse quantitative data using statistical techniques such as descriptive statistics and regression analysis. Analyse qualitative data using thematic analysis to identify patterns and themes. Interpret and synthesize the findings to answer the research questions.	6 weeks	
Results and Discussion Present the research findings in a clear and concise manner. Compare and contrast the results with existing literature. Discuss the implications of the findings for Vodacom's disaster response strategy and make recommendations for improvement.	4 weeks	
Report Writing and Finalization Write the research report, adhering to the appropriate formatting and structure. Revise and edit the report based on feedback from supervisors or peers.	4 weeks	

Finalize the research report and prepare it for submission.		
Presentation and Dissemination Prepare a presentation summarizing the research findings. Present the findings to relevant stakeholders, such as Vodacom representatives Disseminate the research findings through publications or online platforms.	week	