IntechOpen

IntechOpen Series
Social Sciences, Volume 1

Crisis Management Dynamics
Strategies, Challenges, and Best Practices

Edited by Muddassar Sarfraz

Crisis Management Dynamics - Strategies, Challenges, and Best Practices

Edited by Muddassar Sarfraz

Published in London, United Kingdom

Crisis Management Dynamics - Strategies, Challenges, and Best Practices
http://dx.doi.org/10.5772/intechopen.1001736
Edited by Muddassar Sarfraz

Contributors
Bhavya Singh, Bjørn Tallak Bakken, Bradford J. Knipes, Gaborit Pascaline, Inger Lund-Kordahl, Kristoffer Lie Eide, Makhosazana Faith Vezi-Magigaba, Maureen McGuinness, Monument Thulani Bongani Makhanya, Mzamo P. Mangaliso, Parul Soni, Stephen A. Gazillo, Vusi S. Mncube

First published in London, United Kingdom, 2025 by IntechOpen
IntechOpen is the global imprint of INTECHOPEN LIMITED, registered in England and Wales, registration number: 11086078, 167-169 Great Portland Street, London, W1W 5PF, United Kingdom

For EU product safety concerns: IN TECH d.o.o., Prolaz Marije Krucifikse Kozulić 3, 51000 Rijeka, Croatia, info@intechopen.com or visit our website at intechopen.com.

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Crisis Management Dynamics - Strategies, Challenges, and Best Practices
Edited by Muddassar Sarfraz
p. cm.

This title is part of the Social Sciences Book Series, Volume 1
Series Editor: Sandro Serpa

Print ISBN 978-1-83634-308-0
Online ISBN 978-1-83634-307-3
eBook (PDF) ISBN 978-1-83634-309-7
ISSN 2977-6473

IntechOpen Book Series
Social Sciences
Volume 1

Aims and Scope of the Series

The social sciences, as a form of scientific knowledge anchored on epistemological foundations, theories, and specific methodologies, both in their fundamental and applied dimensions, are paramount for understanding and, consequently, developing instruments that contribute to improving social and environmental living conditions. This Social Sciences book series, based on the concept of the social sciences as key elements in the promotion of scientific knowledge and its inherent consequences, has as its primary goal to be a space for the dissemination of relevant information on various objects of study, aimed at specialists, students, policymakers, and others interested in the challenges facing humanity. Thus, the aim is to promote scientific progress through the sound and rigorous dissemination of studies that, from the perspective of the social sciences, either through a specialised disciplinary approach or through interdisciplinary perspectives, foster a deeper understanding of the objects under analysis, clarifying the issues addressed and their implications.

Meet the Series Editor

Dr. Sandro Serpa is an Associate Professor in the Department of Sociology at the University of the Azores (UAc), Portugal. His career in social sciences and education began at UAc in 2000. He earned his Ph.D. in Education, specializing in Sociology of Education, from UAc in 2013. He is also an integrated researcher at the Interdisciplinary Centre of Social Sciences of the Azores Centre (CICS. NOVA. UAçores). Dr. Serpa has demonstrated a strong commitment to higher education throughout his career. He has served in various positions at UAc, including Head of the Department of Sociology, Director of the Bachelor's in Social Work, Coordinator of the Scientific-Pedagogical Supervision Team for Social Work Internships, Member of the Pedagogical Council of the Faculty of Social and Human Sciences, and Member of the Quality Commission. Additionally, he held the position of Deputy Director of CICS. UAc. Currently, he serves as Senior Editor (Sociology Section) for Social Sciences & Humanities Open (Elsevier), among several other journals. He previously held the position of Senior Editor - Sociology Section for Cogent Social Sciences (Taylor & Francis) from 2020 to 2022. Dr. Serpa maintains a distinguished research profile, evidenced by over 400 publications in international journals, books, and other scientific outlets across a wide range of countries: Brazil, Canada, China, United Arab Emirates, Germany, India, Kazakhstan, the Netherlands, Pakistan, Poland, Portugal, Romania, Spain, Switzerland, Turkey, United Kingdom, United States of America. His research interests encompass Teaching Sociology, Sociology of Education, Sociology of Organisations, Organisational Culture, Scientific Communication, Digital Society, Digital Literacy, Society 5. 0 and Sociology of Artificial Intelligence. Dr. Serpa emphasizes the importance of integrating academic knowledge with service to the university and society at large.

Meet the Volume Editor

Dr. Muddassar Sarfraz is an assistant professor in the School of Management at Zhejiang Shuren University in China. He is also a Research Center for Engineering and Management member at the Politehnica University of Timisoara in Romania. Dr. Sarfraz has taught various subjects, including business research methods, business management, corporate social responsibility, business strategy, and strategic management. His reputation as a keynote speaker at national and international conferences further highlights his expertise and influence in the academic community. With an impressive publication record, Dr. Sarfraz has contributed more than 150 papers to international academic journals and conferences, showcasing his dedication to advancing knowledge in his field. In addition to his scholarly contributions, he is an associate and guest editor for numerous journals and an editorial board member for several others.

Contents

Preface

Today's organizations are facing frequent crises. These ineffective crunches leading to catastrophic losses are making global firms encounter unprecedented challenges. Crisis management has emerged as a dominant driver in dealing with natural disasters, political worries, economic recessions, cyber threats, and public health emergencies. Crisis management enables firms to identify, assess, and address unexpected events. It aids the firms to reinforce a strong commitment to resilience, continuous improvement, and innovation.

This book delves into the multifaceted world of crisis management, offering an in-depth examination of the new challenges and practices in diverse industries. It includes diverse viewpoints, theories, and principles on crisis management, shedding light on how individuals, firms, and stakeholders, such as governments, policymakers, market professionals, practitioners, etc., can combat the originated circumstances. It also emphasizes the importance of proactive planning, sustainable practices, and decision-making to mitigate the impact of emerging uncertainties. The book chapters provide a holistic understanding of the new trends and patterns and build solid foundational concepts, outlining the historical evolution of crisis management and explaining the application of practical solutions in the business world.

Key aspects covered in this book include:

- The Evolution of Crisis Management/Identifying the Potential Vulnerabilities
- The Strategic Importance of Crisis Readiness
- Navigating Complexities in Crisis Response: Challenges and Opportunities
- Role of Individuals in Crisis Management (e.g., Firms, Stakeholders, Governments, Policymakers, Market Professionals, Practitioners)
- Case Examples from Diverse Markets
- Solutions and Practices Overcoming the Challenges

Climate Change and Crisis Management: Adapting to a New Normal

Climate change- the new normal, remodelling the natural environment, has become a serious concern over the past years. From devastating the communities in Australia and California to flooding Europe and South Asia, climate change has increasingly raised the need for adaptation. Adapting to this new normal is a critical part of crisis management. This section emphasizes mitigating climate change and managing unprecedented natural calamities. It highlights building the components of effective crisis management, such as policy development, global cooperation, and leadership, thus navigating the natural challenges.

Trust and Risk Management: Understanding the Multifaceted Role of Trust in Managing Local Water Crises and Conflicts

Where water management has become increasingly challenging worldwide, emerging economies face freshwater shortages. This challenge has raised the need for water management to combat climate change. Trust is the key element in initiating an action that can lead to successful results. This piece of work highlights the parameter of trust that makes organizations move beyond crises. It enables firms to navigate conflicts in water management in a local setting.

Strategies for Responding to Organizational Crises: Empirical Insights and a Proposed Model

Effective crisis management can mitigate the pitfalls that may arise due to market changes. Addressing the market challenges requires a collaborative approach to stimulating emerging threats. This chapter proposes a new model for crisis management after the attacks on the World Trade Center Twin Towers as an example. It serves as the foundation for developing practical and adaptive crisis management.

Holacracy and Crisis Management: Leveraging Self-Organisation for Effective Crisis Response and Organisational Resilience

In today's fast-changing business environment, the organization's traditional hierarchical system has become slow and rigid, thus affecting the decision-making procedures. Holacracy has evolved as a transformational strategy prioritizing firm decision-making. Holacracy, a governing style, manages the crises in the organization by enabling the people to make independent decisions. This piece of work highlights the idea of self-management, transparency, and adaptation to enhance decision-making flexibility.

Perspective Chapter: Empowering Small and Medium-Sized (SME) Entrepreneurs with Crisis Management Capacity and Skills in Africa

In Africa, SMEs are a vehicle to enhance the country's social and economic expansion. However, in previous years, COVID-19 has made the African SMEs vulnerable to new crises. The lack of finances, managerial skills, and inadequate governmental policies have made the African SMEs bear heavy losses. This paper examines the financial crisis management of SMEs in Africa. It encourages African SMEs to manage financial crises and become more resilient. It further demonstrates the need to streamline the programs, particularly in developing the skills that have been inadequate in the past.

Perspective Chapter: How Artificial Intelligence (AI) Fundamentally Changes Crisis Management Training and Exercises

This chapter fundamentally highlights the role of Artificial intelligence, Virtual Reality, and Argument Reality in combating training limitations, making crisis management more flexible, frequent, and responsive to emerging challenges. This chapter highlights the urgent need for advanced technological solutions. AI, VR, and AR are predictive tools that effectively manage firms' decision-making and crises.

They empower the organization's system and mitigate risks, such as cyberattacks, downtime, unauthorized use, etc. This work highlights the role of emerging technologies that are cost-effective and scalable in today's era.

Overall, this book provides a holistic understanding of crisis management. Its accepted chapters are unique and capture worldwide attention. It is a valuable guide that is a must-read for individuals involved in crisis management. It offers up-to-date knowledge and concepts that answer all challenges by highlighting practical methodology. This helpful book provides readers with new concepts, themes, ideas, and solutions to crisis management, featuring new tactics and opportunities. Hopefully, this book will be a great addition to the learning experience related to similar topics. The editor would like to thank all the contributors for their efforts and time, making this book a success and guiding light for the readers.

Muddassar Sarfraz
School of Management,
Zhejiang Shuren University,
Hangzhou, PR China

Section 1

Crisis Management in a Changing World

Chapter 1

Climate Change and Crisis Management: Adapting to a New Normal

Parul Soni and Bhavya Singh

Abstract

The escalating impacts of climate change represent one of the most significant challenges of our era, affecting not only the environment but also social, economic, and political systems globally. This chapter examines the complex relationship between climate change and crisis management, focusing on how societies can adapt to the "new normal" of environmental disruptions. It explores the critical components necessary for effective climate crisis management, including policy development, global cooperation, and leadership. It aims to answer key research questions: *How can policy framework be structured to foster climate resilience, particularly in vulnerable regions?* and *What role does international collaboration play in enhancing the effectiveness of climate crisis management?* Case studies and examples such as Germany's Energiewende, the Paris Agreement, and the adaptation strategies in Kiribati provide practical insights into addressing these questions. Chapter concludes by offering specific recommendations for policymakers and areas for further research to enhance crisis management strategies for climate resilience.

Keywords: climate change, environmental crises, adaptation strategies, resilience building, disaster risk reduction, sustainable practices, climate resilient infrastructure, policy development, community engagement, global cooperation, effective leadership

1. Introduction

> *Climate change is the defining issue of our time….every day we fail to act is a day that we step a little closer towards a fate that none of us wants- a fate that will resonate through generations in the damage done to humankind and life on earth.*
>
> *—Antonio Guterres, UN Secretary General*

Climate change has emerged as the defining issue of twenty-first century, reshaping not only the natural environment but also the economic, social, and political landscapes across the globe. Rising global temperatures, unpredictable weather patterns, and shifting ecosystems are no longer theoretical concerns but present realities. From devastating wildfires in Australia and California to historic flooding in Europe and South Asia, the impacts of climate change are increasingly affecting communities, economies, and governance systems worldwide. These consequences are felt most acutely in vulnerable regions, where populations are less equipped to adapt, and where the frequency and intensity of climate-related disasters continue to escalate.

The climate crisis has spurred a global call to action, with leaders across sectors recognizing the need for coordinated strategies to mitigate and adapt to its impacts. Despite warnings and agreements, emissions continue to rise, and the window for action is closing. Adapting to the "new normal" of climate disruptions is now a critical part of crisis management.

This chapter aims to explore the multi-dimensional approach required to address the dual challenge of mitigating the climate change and managing its immediate impacts. In particular, it focuses on three key pillars essential to effective climate crisis management: policy development, global cooperation, and leadership. These pillars are not standalone components but interconnected strategies that must work in unison to build resilience in the face of an accelerating climate crisis.

Policy development is central to managing climate risks and fostering long-term sustainability. Effective climate policies must balance mitigation—efforts to reduce greenhouse gas emissions—with adaptation, the process of adjusting to the already inevitable consequences of climate change. Countries around the world have begun to implement a range of policies aimed at both mitigation and adaptation, but the scope and effectiveness of these policies vary significantly. This chapter analyzes the successful examples, such as Germany's Energiewende and California's Global Warming Solutions Act, to highlight how policy frameworks can be strengthened to support climate resilience, especially in vulnerable regions.

Global cooperation is another critical factor in managing the climate crisis. Climate change is a global problem that transcends borders, and no single nation can address it alone. International agreements, like the Paris Agreement and the Kigali Amendment, demonstrate the power of collaborative efforts in setting global goals and standards for reducing emissions and managing climate risks. However, achieving effective cooperation is fraught with challenges, including differing national interests, economic disparities, and weak enforcement mechanisms. This chapter explores these challenges and offers insights into how global cooperation can be enhanced to achieve more significant and equitable climate outcomes.

Leadership—whether political, corporate or grassroots—plays a vital role in driving the climate agenda forward. Leaders who prioritize climate action, articulate vision for a sustainable future, and mobilize resources are crucial to advancing climate crisis management. The chapter examines case studies of influential figures like Greta Thunberg, Christiana Figueres, and Paul Polman to demonstrate how leadership can shape climate policies, mobilize international cooperation, and inspire action at both the local and global levels.

In addition to these pillars, the chapter addresses the practical challenges of *adaptation strategies*, which are essential for protecting vulnerable communities and ecosystems from the most severe impacts of climate change. Adaptation involves implementing both structural measures, such as building resilient infrastructure, and non-structural measures, including education, community engagement, and policy reforms. The chapter highlights successful adaptation efforts, such as those implemented by the Pacific Island nation of Kiribati, which faces existential threats from rising sea levels. Kiribati's proactive approach to adaptation, including its "Migration with Dignity" program and investment in coastal defenses, offers a valuable case study in how vulnerable regions can manage the immediate threats posed by climate change.

Ultimately, this chapter seeks to answer the following key research questions:

1. How can policy frameworks be structured to foster climate resilience, particularly in vulnerable regions?

2. What role does international collaboration play in enhancing crisis management in the face of climate change?

3. How can leadership influence the success of climate adaptation strategies?

By addressing these questions, the chapter aims to provide a deeper understanding of the critical components necessary for managing the climate crisis and adapting to a new normal. It also offers actionable recommendations for policymakers, practitioners, and leaders to enhance their capacity to respond to the ever-growing threats posed by climate change. As the climate crisis intensifies, the need for innovative, integrated, and large-scale actions has never been more urgent. This chapter contributes to the global discourse on how to navigate the complexities of this new normal and build a more resilient future for all.

1.1 Critique of existing literature

While the existing literature on climate change and crisis management provides substantial insights into the causes and consequences of climate change, it often falls short in addressing practical implementation challenges, particularly in vulnerable regions. Numerous studies, such as those by Nicholls and Cazenave [1] and Field et al. [2], offer comprehensive assessments of sea-level rise, extreme events, and disaster risk reduction strategies. However, these analyses are predominantly focused on developed regions or larger countries. They often overlook the nuanced challenges faced by smaller, more vulnerable areas, such as the Pacific Islands or low-lying coastal regions.

For example, while the *IPCC Sixth Assessment Report* provides an overarching framework for climate resilience, the focus on policy frameworks lacks a detailed exploration of their practical applications in small island developing states (SIDS). This is a significant gap, as these regions are disproportionately affected by climate change but often lack the resources for effective adaptation and mitigation strategies.

Additionally, although research by Meehl and Tebaldi [3] highlights the increasing intensity of heatwaves, there is limited analysis on how these events exacerbate existing socioeconomic vulnerabilities, especially in developing nations. Most studies, including the work of Gleick [4], tend to focus on the broader impacts of water scarcity and conflict, without addressing the intersectionality of local governance, community adaptation, and international support systems in such regions.

This chapter seeks to fill these gaps by focusing on case studies and providing practical recommendations for climate resilience specifically tailored to vulnerable regions like the Pacific Islands and other low-lying coastal zones. It also aims to bridge the divide between high-level policy recommendations and their on-the-ground implementations, offering insights into leadership, community engagement, and global cooperation that can lead to more resilient and sustainable outcomes.

2. Understanding climate change and environmental crisis

Climate change refers to long-term shifts in temperature, precipitation, and weather patterns, mainly driven by human actions like fossil fuel use, deforestation, and industrialization. While natural climate variability exists, human influence has accelerated these changes, leading to severe environmental crises.

Adaptive crisis management is the ability of institutions and communities to modify crisis responses based on updated climate data, enabling flexible, targeted actions. For instance, flood-prone cities can adjust emergency plans and infrastructure based on evolving flood risk data.

Resilience is the capacity of social, economic, and environmental systems to endure and quickly recover from climate impacts. Resilient agricultural practices, like crop diversification, help communities maintain food security and livelihoods despite changing weather.

These concepts enable societies to address both immediate and future climate risks. Policymakers can integrate adaptive governance, invest in resilient infrastructure, and promote sustainable resource management to build robust systems that adapt to climate challenges.

2.1 Key concepts and definitions

Climate change refers to long term shifts in temperature, precipitation patterns, and weather events, primarily caused by human activities such as deforestation, fossil fuel combustion, and industrial processes. The most critical concept in understanding climate change is the greenhouse effect, where gases like carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) trap heat in the Earth's atmosphere, resulting in global warming [5].

While Earth's climate has always experienced variability due to natural factors such as volcanic eruptions, solar cycles, and ocean currents, human influence has significantly intensified the pace and scale of these changes. The result is a shift in global weather patterns, more frequent and severe extreme weather events, and widespread disruptions to ecosystems and biodiversity. Understanding this process is crucial for recognizing the urgency of the crisis and the need for comprehensive management strategies.

- *Environmental crises*: Climate change manifests in several ways, leading to crises that disrupt ecosystems, economies, and human health. These crises include:

- *Rising sea levels*: Driven by melting ice caps and the thermal expansion of seawater, this threatens coastal communities worldwide [6].

- *Extreme weather events*: Hurricanes, floods, and droughts have become more frequent and intense due to shifts in global weather patterns [1].

- *Heatwaves*: Prolonged periods of extreme heat not only cause health issues but also strain infrastructure and disrupt agriculture [2].

2.2 Types of climate-induced crises

The impact of climate change manifests in various forms, often leading to what can be described as environmental crisis. These crises affect not only the natural world but also human communities, economies, and infrastructure. The most prominent climate-induced crises include:

Floods and rising sea levels: As global temperatures rise, polar ice caps and glaciers are melting at unprecedented rates, contributing to sea-level rise. In addition, the thermal expansion of seawater (water expands as it warms) is another significant factor. Coastal regions, particularly low-lying areas, are at high risk of flooding, storm surges, and permanent land loss. Cities such as Miami, Jakarta, and Dhaka are already experiencing the effects, and millions of people living in coastal zones face potential displacement [3].

Extreme weather events: Climate change has increased the frequency, intensity, and duration of extreme weather events, such as hurricanes, floods, droughts, and heatwaves. Warmer oceans fuel stronger storms, while altered atmospheric conditions heighten drought risks. These events cause immediate loss of life and property, along with long-term social and economic instability.

Heatwaves: Prolonged periods of extreme heat are becoming more common due to climate change. Heatwaves have devastating effects on human health, particularly among vulnerable populations such as the elderly, children, and those with pre-existing health conditions. In addition to health impacts, heatwaves strain energy grids, damage infrastructure, reduce agricultural productivity, and increase the risk of wildfires.

Droughts and water scarcity: As precipitation patterns shift, some regions are experiencing more frequent and intense droughts, leading to water shortages. Agriculture, which relies heavily on predictable water supplies, is particularly vulnerable. In regions like Sub-Saharan Africa, the Middle East, and parts of South Asia, prolonged droughts threaten food security, human health, and regional stability. Water scarcity also has the potential to exacerbate conflicts over access to freshwater resources, making it not only an environmental issue but a political one [7].

Wildfires: Rising temperatures and prolonged dry conditions have led to an increase in the frequency and severity of wildfires in many parts of the world, including Australia, California, and Southern Europe. These fires devastate ecosystems, destroy homes, and contribute to their air pollution, with significant health implications for those exposed to smoke and particulate matter. Wildfires also release significant amounts of carbon dioxide into the atmosphere, creating a feedback loop that further exacerbates global warming [4].

Public health crises: Climate change is also affecting human health, with rising temperatures increasing the prevalence of heat-related illnesses, spreading diseases like malaria and dengue fever. Additionally, extreme weather events and poor air quality can exacerbate respiratory conditions, cardiovascular diseases, and mental health issues. The increasing frequency of heatwaves is linked to higher mortality rates, particularly among vulnerable populations [8].

2.3 Role of crisis management in addressing climate change

Criss management refers to the coordinated efforts undertaken to deal with an emergency or disruptive event. In the context of climate change, crisis management involves both short-term responses to climate-induced disasters and long-term strategies to mitigate and adapt to its impacts. The need for effective crisis management is becoming more critical as climate change intensifies the frequency and severity of environmental crises.

A successful climate crisis management strategy must encompass the following key components:

Disaster risk reduction (DRR): This involves reducing the exposure and vulnerability of communities to climate-induced disasters. DRR strategies include implementing early warning systems, constructing resilient infrastructure, and promoting sustainable land-use planning. Proactive risk reduction measures can significantly reduce the human, economic, and environmental costs of climate disasters.

Adaptation strategies: Adaptation is essential for managing the unavoidable impacts of climate change. It includes both *structural measures*, such as building seawalls or upgrading stormwater systems, and *non-structural measures*, such as policy reforms, community-based adaptation, and public education. Effective adaptation strategies are locally tailored and aim to increase the resilience of ecosystems, infrastructure, and societies.

Mitigation efforts: While adaptation focuses on managing the impacts of climate change, mitigation efforts aim to address the root cause by reducing GHG emissions. This includes transitioning to renewable energy, improving energy efficiency, and adopting sustainable agricultural and industrial practices. Mitigation and adaptation are two sides of the same coin—both are necessary for comprehensive climate crisis management.

Global cooperation: Climate change is a global problem that requires coordinated international responses. No single country can effectively address the issue on its own. Global cooperation through international agreements such as the *Paris Agreement* is essential to set shared goals for reducing emissions and mobilizing resources for adaptation in the most vulnerable regions.

Leadership and governance: Strong leadership at all levels—local, national, and international—is critical for effective climate crisis management. Governments, businesses, and civil society must work together to prioritize climate action, mobilize resources, and ensure that policies are implemented effectively. Governance systems need to be adaptive and flexible to respond to the evolving nature of the climate crisis.

3. Policy development for climate resilience

The climate crisis requires comprehensive policies that address the root causes—primarily greenhouse gas emissions—while preparing societies for inevitable impacts. Climate resilience policies are key to global climate action, providing frameworks to reduce emissions and promote adaptation. This section covers essential climate policy components, successful implementations, and the role of national and international frameworks in building resilience against climate challenges.

3.1 Key components of effective climate policies

The development of climate policy is a complex process that requires a holistic approach, integrating economic, social, and environmental considerations. They must be multifaceted, integrating mitigation, adaptation, financial mechanisms, regulation, and collaboration between public and private sectors. Below are the key components that make climate policies resilient and sustainable:

3.1.1 Mitigation strategies

Mitigation refers to efforts aimed at reducing or preventing the emission of GHGs into the atmosphere. The primary goal of mitigation policies is to limit the extent of global warming by addressing its underlying causes. Mitigation strategies focus on transitioning from fossil fuels to renewable energy, improving energy efficiency, and promoting sustainable land-use practices [9]. Examples of mitigation strategies include:

Promoting renewable energy: Policies that incentivize the use of clean energy sources, such as wind, solar, and hydropower, are critical to reducing reliance on carbon-intensive fossil fuels. Many countries have introduced subsidies, tax incentives, and feed-in tariffs to support the growth of the renewable energy sector. For instance, India's National Solar Mission aims to install 100 GW of solar power capacity by 2022, reducing the country's dependence on coal; Denmark generates almost 50% of its electricity from wind power, setting a global example of renewable energy integration.

Enhancing energy efficiency: Policies aimed at improving energy efficiency in buildings, transportation, and industrial processes can significantly reduce emissions. These include energy efficiency standards, building codes, and the promotion of energy-efficient technologies. For instance, the European Union Energy Efficiency Directive mandates that all new buildings meet nearly zero-energy standards, which requires significant reduction in energy consumption.

3.1.2 Adaptation measures

While mitigation addresses the causes of climate change, adaptation focuses on managing its impacts. Adaptation measures are essential for building resilience in communities and ecosystems that are already vulnerable to climate-related risks, such as sea-level rise, extreme weather events, and shifts in agricultural productivity. Adaptation strategies can be both structural and non-structural.

Structural adaptation are the physical interventions designed to protect infrastructure and communities from climate impact. Examples include building seawalls to protect coastal areas from rising sea levels, improving drainage systems to reduce flooding, and retrofitting the buildings to withstand extreme weather conditions.

On the other hand, non-structural adaptation includes policy reforms, education programs, and community-based adaptation strategies. Early warning systems for extreme weather events, capacity building for local governments, and public awareness campaigns are examples of non-structural adaptation measures that can enhance preparedness and reduce vulnerability.

3.1.3 Carbon pricing mechanism

It is a market-based tool used to incentivize the reduction of GHG emissions. There are two main types of carbon pricing: carbon taxes and cap-and-trade systems.

A carbon tax directly sets a price on carbon by defining a tax rate on GHG emissions or the carbon content of fossil fuels. This mechanism provides a clear signal to businesses and consumers to reduce their emissions by making it financially costly to pollute. In a cap-and-trade system, the government sets a cap on the total level of GHG emissions and creates permits (or allowance) for emissions. Both these mechanisms create financial incentives for reducing emissions while providing flexibility for businesses to innovate and find the most cost-effective ways to cut their carbon footprint.

3.1.4 Public-private partnerships (PPPs)

They are essential for scaling climate solutions and driving innovation. Governments provide regulatory frameworks, financial incentives, and infrastructure investments, while private sector brings innovation, technology, and financing capabilities. Successful climate policies often involve collaborations between governments, businesses, and civil society organizations.

For example, green finance, which includes sustainable bonds, green loans, and impact investing—is increasingly being used to fund climate projects such as renewable energy development, sustainable agriculture, and resilient infrastructure. Governments can foster such partnerships by creating investment-friendly policies and frameworks.

3.2 Case studies of successful climate policies

Several countries and regions have demonstrated the potential of well-structured climate policies to mitigate climate change and promote sustainable development. The following are notable examples of well-structured and effective climate policies:

Germany's Energiewende (*energy transition*): It is a comprehensive policy framework aimed at transforming the country's energy system into one that is predominantly based on renewable energy. Energiewende has set ambitious targets for reducing carbon emissions and increasing the share of renewable energy in Germany's energy mix. The policy emphasizes the phase-out of nuclear power, the expansion of wind and solar energy, and improvements in energy efficiency.

One of the critical successes of Energiewende is its focus on community engagement and decentralization. By enabling citizens and local municipalities to invest in renewable energy projects, Germany has managed to create widespread public support for the transition and a robust renewable energy sector. The policy's long-term vision and clear targets have helped Germany make significant strides toward reducing emissions and promoting a low-carbon economy.

Costa Rica's carbon neutrality commitment: Costa Rica has become a global leader in climate policy by committing to achieve *carbon neutrality by 2050*. The country has focused on expanding renewable energy, particularly hydroelectric power, which now accounts for over 98% of its electricity generation. Costa Rica has also invested heavily in *forest conservation*, recognizing the role that forests play in sequestering carbon.

The government's policy framework emphasizes sustainability across multiple sectors, including transportation, agriculture, and tourism. Costa Rica's focus on *ecosystem-based adaptation*—such as reforestation, protecting watersheds, and promoting biodiversity—provides a model for how small countries can take bold action to mitigate and adapt to climate change while enhancing economic resilience [10].

California's Global Warming Solutions Act (*AB 32*): It was passed in 2006, set ambitious climate targets to reduce the state's greenhouse gas (GHG) emissions to 1990 levels by 2020, a goal California achieved ahead of schedule. The law established a cap-and-trade system, providing economic incentives for emissions reductions, and became a model for other regions. In addition to this, the act promoted renewable energy, set vehicle emissions standards, and improved energy efficiency. *AB 32* demonstrates that strong climate policies and regulatory frameworks can lead to meaningful emissions reductions, even in heavily industrialized areas [11].

Effective climate policy requires balancing mitigation of future impacts with adaptation to current ones. National and international frameworks must align to address climate change comprehensively. Well-crafted policies can drive significant emissions reductions and build more resilient communities.

4. Global cooperation in tackling climate change

One of the defining characteristics of climate change is its global nature. While individual countries and regions can make strides in reducing emissions and adapting to climate impacts, the interconnectedness of ecosystems and economies means that global cooperation is essential. International agreements such as the *Paris Agreement* and the *Kigali Amendment* highlight the potential for coordinated efforts to limit global warming. This section explores the importance of global cooperation, highlights key international agreements, and discusses the challenges and successes in building a unified response to climate change.

4.1 The importance of global cooperation

Climate change is a global common problem, meaning that no single country can solve the crisis alone. Greenhouse gases (GHGs) emitted in one part of the world contribute to global warming everywhere. Likewise, the benefits of climate mitigation—such as a reduction in global temperature rise or improved air quality—are shared across borders. Global cooperation is important because:

Transboundary nature of climate change: Climate change does not respect national borders. Rising temperatures, shifting weather patterns, sea-level rise, and biodiversity loss have global implications, with the effects of emissions in one region spilling over into others. For example, deforestation in the Amazon affects global carbon sequestration, while melting ice in the Arctic accelerates sea-level rise across the world. No country is immune to these changes, making global cooperation imperative.

Shared responsibility and equity: While all nations impact climate change, developed countries hold most historical responsibility due to industrialization, while developing nations, though contributing less, face greater climate risks. Global cooperation should follow the principle of common but differentiated responsibilities (CBDR), with wealthier nations aiding less developed ones in climate adaptation and transition efforts. The Paris Agreement embodies this approach, with developed countries pledging financial and technical support. For instance, the Green Climate Fund (GCF) was created to mobilize $100 billion annually for developing nations, supporting projects like flood defenses and renewable energy in vulnerable countries like Bangladesh.

Technology and knowledge transfer: Many developing countries lack the technological capacity to implement effective climate solutions. Global cooperation allows for the sharing of innovations, such as renewable energy technologies, climate-smart agriculture, and disaster risk management strategies. Through international collaboration, developing countries can access the tools they need to mitigate emissions and adapt to climate impacts.

Global economic integration: Climate change poses significant risks to global economic stability, as disruptions in supply chains, food production, and infrastructure can affect markets worldwide. Global cooperation in transitioning to a low-carbon economy can create opportunities for sustainable growth, job creation, and long-term economic resilience.

4.2 Key mechanisms for global cooperation

Several international agreements and mechanisms have been established to foster global cooperation on climate change. These frameworks enable countries to align their national efforts with global goals, share resources, and hold each other accountable for progress.

Paris Agreement (2015) is the most significant international treaty addressing climate change. Adopted in 2015, the agreement brought together almost 200 nations in a collective effort to limit global warming to "well below 2°C" above pre-industrial levels, with an aspirational goal of keeping warming to 1.5°C. It is a landmark in global climate governance because it provides a flexible yet ambitious framework that encourages participation from all nations. However, challenges remain in ensuring that countries meet their financial commitments and in bridging the gap between national pledges and the emissions reductions necessary to meet the 1.5°C target.

The Kyoto Protocol (1997) was the first treaty to set legally binding emissions reduction targets for industrialized nations, recognizing their greater responsibility due to historical emissions. Unlike the Paris Agreement, it focused on developed countries, while developing nations like China and India were exempt from specific targets. The protocol introduced market-based mechanisms, such as emissions trading, the Clean Development Mechanism (CDM), and Joint Implementation (JI) to help countries meet their goals. However, the exclusion of developing countries and the withdrawal of key players like the U.S. limited its effectiveness, paving the way for the more inclusive Paris Agreement.

The Green Climate Fund (GCF) was established to support climate mitigation and adaptation in developing countries, aiming to mobilize $100 billion annually under the Paris Agreement. Though the target remains unmet, the GCF is the largest climate fund, prioritizing small island states, least developed countries, and vulnerable regions. It has funded renewable energy, disaster risk reduction, and ecosystem-based adaptation projects across Africa, Latin America, and Asia.

The United Nations Framework Convention on Climate Change (UNFCC) is the foundational international treaty on climate action, established in 1992 at the Earth Summit in Rio de Janeiro. The UNFCCC provides the overarching framework for international climate negotiations and coordination, including the organization of the annual *Conference of the Parties (COP)* meetings. It serves as the primary forum for countries to negotiate international climate agreements, such as the Kyoto Protocol and the Paris Agreement [12].

4.3 Challenges to international cooperation

While significant progress has been made through international agreements like the Paris Agreement and the establishment of the Green Climate Fund, several challenges persist in global climate cooperation:

Differing national interests: Countries vary in their economic development, industrial capacities, and vulnerabilities to climate change. Developed nations are often the largest historical contributors to carbon emissions, while developing nations are disproportionately affected. These disparities complicate negotiations, as developing countries call for greater action from wealthier nations, which may resist stringent commitments [13].

Economic dependencies: Many countries are reliant on carbon-intensive industries, such as fossil fuels or heavy manufacturing, for economic growth. Shifting away from these industries can be politically and economically challenging, especially when immediate economic gains are prioritized over long-term sustainability [14].

Lack of enforcement mechanisms: While international agreements like the Paris Agreement set ambitious goals, enforcement mechanisms remain weak. Countries are encouraged to submit nationally determined contributions (NDCs), but there is no global authority to impose penalties if they fall short [15].

4.4 Success stories of international cooperation

The Kigali Amendment to the Montreal Protocol: Building on the success of the Montreal Protocol, which phased out substances that deplete the ozone layer, the Kigali Amendment aims to phase out hydrofluorocarbons (HFCs), which are potent greenhouse gases. The amendment has the potential to prevent up to 0.5°C of global warming by the end of the century [16].

The European Union Emissions Trading System (*EU ETS*): Launched in 2005, the EU ETS is the world's largest carbon market, covering more than 11,000 power plants and factories. The system has successfully reduced emissions in the covered sectors by 21% between 2005 and 2020.

Global cooperation is essential for tackling climate change, as no nation can address the problem alone. While significant challenges remain, the success of agreements like the Paris Agreement demonstrates the potential for coordinated international action. Moving forward, strengthening global frameworks and ensuring equitable solutions for both developed and developing nations will be key to building a more resilient world.

4.5 The path forward: Strengthening global cooperation

As the climate crisis intensifies, strengthening global cooperation is more critical than ever. While significant progress has been made through international agreements like the Paris Agreement, the scale and urgency of the challenge require even more ambitious, coordinated action. To effectively combat climate change, global efforts must address several key areas where enhanced collaboration can make a substantial difference.

Increasing climate finance: One of the most pressing needs in global climate action is the provision of adequate financial resources, particularly for developing countries. While developed nations have committed to mobilizing $100 billion annually through mechanisms like the Green Climate Fund, these targets have not been fully met, and the needs continue to grow as climate impacts escalate.

- Focus on accessibility: It is crucial to ensure that climate finance is not only increased but also made more accessible to the countries that need it most. Small island developing states (SIDS) and least developed countries (LDCs) often face administrative and bureaucratic challenges in accessing funds. Streamlining the application process and providing technical assistance can help these vulnerable nations tap into critical resources for mitigation and adaptation.

- Private sector engagement: In addition to public funds, there is a need for greater engagement from the private sector in climate finance. Governments should create policies and incentives that encourage private investment in clean technologies, sustainable infrastructure, and green jobs. Blended finance models—where public funds are used to de-risk private investments—can help unlock substantial capital flows into climate projects.

Enhancing technology transfer: Technology plays a pivotal role in reducing emissions and building climate resilience. Many developing countries lack the technological capacity to implement advanced renewable energy systems, efficient agricultural practices, and disaster risk reduction measures. Strengthening international cooperation in technology transfer is essential for bridging this gap.

- *Promoting clean energy*: Developed nations and multilateral organizations should prioritize the transfer of clean energy technologies to developing countries. Programs that support the deployment of solar, wind, and other renewable energy technologies can help nations transition away from fossil fuels, reduce emissions, and meet their energy needs sustainably.

- *Capacity building*: Along with technology, countries need support in building the human capacity to manage and maintain these innovations. International cooperation should include training programs, technical expertise, and knowledge-sharing platforms to ensure that developing nations have the skills and resources necessary to adopt and scale up climate solutions effectively.

Strengthening ambition and accountability: While the Paris Agreement encourages countries to increase their climate ambitions over time, the current commitments are not sufficient to limit global warming to 1.5°C. To close the gap between national pledges and the necessary emissions reductions, global cooperation must focus on enhancing both ambition and accountability.

Building resilient supply chains and global markets: Climate change poses risks not only to individual countries but also to the global economy. As extreme weather events, rising sea levels, and resource shortages disrupt global supply chains, international cooperation is needed to build more resilient economic systems.

- *Sustainable trade practices*: Nations must collaborate to promote sustainable trade practices, reducing the environmental impact of global supply chains. This can include setting standards for sustainable sourcing, promoting circular economy models, and reducing the carbon footprint of transportation and logistics.

- *Climate-resilient infrastructure*: Investments in resilient infrastructure—such as flood defenses, drought-resistant agriculture, and climate-proof transportation systems—are essential for safeguarding economies against future climate shocks. International financing mechanisms should prioritize projects that enhance the resilience of critical infrastructure, particularly in vulnerable regions.

Expanding regional cooperation: In addition to global initiatives, regional cooperation is essential for addressing climate change at a more localized level. Regional agreements and partnerships can help countries address shared climate challenges, exchange knowledge, and pool resources.

- *Regional climate initiatives*: Organizations like the European Union, African Union, and Association of Southeast Asian Nations (ASEAN) have established regional frameworks for climate cooperation. Expanding such initiatives can help countries tackle transboundary climate impacts—such as water management, deforestation, and air pollution—and develop region-specific solutions.

- *South-south cooperation*: Developing nations, particularly those in the Global South, have much to gain from increased collaboration with one another. South-South cooperation allows countries facing similar climate challenges to share best practices, technologies, and strategies, without relying exclusively on assistance from developed countries.

5. Adaptation strategies for climate crisis management

As the impacts of climate change become increasingly evident, adaptation has emerged as a critical component of crisis management. While mitigation focuses on reducing the causes of climate change, adaptation seeks to manage the effects that are already occurring or are inevitable in the near future. Adaptation strategies are particularly crucial for communities and ecosystems that are most vulnerable to the adverse consequences of global warming.

5.1 The role of adaptation strategies in crisis management

Adaptation is essential for protecting communities, economies, and ecosystems from the adverse effects of climate change. The severity of climate impacts varies by region, and adaptation strategies must be tailored to local conditions. For example, coastal cities face threats from sea-level rise, while arid regions are more vulnerable to prolonged droughts [17].

Effective adaptation not only reduces vulnerability but also can provide economic and social co-benefits. Investments in resilient infrastructure, for instance, can boost economic development by creating jobs, improving living standards, and reducing future disaster recovery costs [18]. In agriculture, adaptation through crop diversification or adopting drought-resistant varieties can enhance food security and livelihoods [19].

5.1.1 Types of adaptation strategies

Adaptation strategies can be broadly classified into two categories: *hard (structural)* and *soft (non-structural)* measures.

Structural measures or hard adaptation: These involve physical interventions like building sea walls, resilient infrastructure, or modifying agricultural practices. While often costly, they are essential in high-risk areas, particularly coastal regions vulnerable to sea-level rise and storm surges. The *Netherlands' Delta Works*, an extensive system of dikes, levees, and storm surge barriers, protects the country from sea-level rise and catastrophic flooding, demonstrating the effectiveness of such infrastructure in mitigating extreme weather impacts.

Climate-proofing buildings, roads, and public infrastructure is an essential adaptation strategy. This may include retrofitting existing infrastructure to withstand extreme weather, using climate-resilient materials, and relocating critical facilities away from high-risk areas. In Japan, many cities have adopted earthquake- and flood-resistant building codes to protect against natural disasters, while transportation networks are designed to function during extreme weather events such as typhoons.

Non-structural measures or soft adaptation: These include policy reforms, education, and awareness-raising initiatives. For instance, early warning systems for extreme weather events and community education programs on disaster preparedness are examples of soft adaptation measures. These strategies tend to be more affordable and can be highly effective when implemented in tandem with structural measures. Community-based adaptation (CBA), which involves local communities in decision-making processes, is particularly effective in addressing localized climate impacts [20].

For example, Bangladesh's early warning system for cyclones, combined with community preparedness, has significantly reduced deaths and economic losses. Similarly, Nepal's community-based forest management has improved natural resource management and increased resilience to landslides and floods.

5.2 Case study: Effective adaptation in coastal communities

Coastal communities are particularly vulnerable to the impacts of climate change, such as sea-level rise and storm surges. One successful example of adaptation can be found in *Kiribati*, a low-lying island nation in the Pacific. Faced with the existential threat of rising sea levels, the government of Kiribati has implemented a multi-faceted adaptation strategy that includes relocating communities to higher ground, investing in coastal defenses, and pursuing land purchases in other countries as a last resort [21].

Additionally, Kiribati's *Migration with Dignity* program seeks to train citizens for skilled labor opportunities abroad, ensuring that climate-induced migration does not lead to a loss of economic or social status. This approach exemplifies how adaptation strategies can go beyond physical infrastructure and involve human capital development [22].

Faced with the existential threat of rising sea levels, Kiribati has adopted a multi-faceted adaptation approach, which includes:

- *Relocating at-risk communities*: The government has identified areas most vulnerable to flooding and erosion and is relocating communities to higher ground.

- *Coastal defenses*: Kiribati has invested in reinforcing its coastal defenses by planting mangroves and other vegetation to stabilize shorelines and reduce the impact of storm surges.

- *Migration with dignity*: As a last resort, Kiribati has developed a *Migration with Dignity* program, which aims to prepare its citizens for skilled labor opportunities abroad, ensuring that migration due to climate change is voluntary and dignified, rather than forced displacement.

Kiribati's adaptation strategies illustrate how both hard and soft measures can work together to address the immediate and long-term challenges of climate change.

5.3 Challenges in implementing adaptation strategies

While the need for adaptation is clear, several challenges hinder its implementation:

Funding and resources: Adaptation strategies, particularly structural ones, often require significant financial resources that many developing countries lack. The Green Climate Fund and other financial mechanisms aim to address this gap, but the availability of funds remains limited [18].

Institutional capacity: In some cases, the institutional capacity to design and implement effective adaptation strategies is lacking. Governments need to establish stronger governance structures and integrate adaptation planning into national development strategies.

Uncertainty in climate projections: Climate models provide estimates of future changes, but the precise impacts in specific regions remain uncertain. This uncertainty can make it difficult for policymakers to plan for future adaptation needs [23].

Social and cultural barriers: In some communities, cultural norms and resistance to change can pose barriers to adaptation. For example, relocating communities away from areas vulnerable to sea-level rise may encounter resistance due to cultural or ancestral ties to the land.

Adaptation is an essential tool in the fight against climate change, helping communities to manage and minimize the adverse effects. While adaptation measures can be costly, they are necessary to protect vulnerable populations and ensure long-term resilience. As the case of Kiribati shows, proactive adaptation can help even the most at-risk communities prepare for the future. However, more financial resources, stronger governance structures, and comprehensive planning will be required to scale these efforts effectively.

6. Leadership in climate crisis management

Leadership is crucial to addressing the global climate crisis. Whether in government, business, or civil society, leaders play a vital role in driving action, inspiring others, and fostering collaboration. Effective leadership helps shape policies, mobilize resources, and guide communities and organizations toward sustainable solutions. This section explores the characteristics of effective climate leadership and provides case studies of individuals who have made significant contributions to climate crisis management.

6.1 Characteristics of effective leadership

Leadership in crisis management is essential for setting the direction and pace of climate action. Their role is critical in mobilizing the political will, resources, and social engagement needed to confront the escalating impacts of climate change. They play a pivotal role in articulating ambitious targets, building collaboration, inspiring collective action, and ensuring climate justice. Leaders who succeed in advancing climate action share several key traits:

Visionary thinking: Climate leaders must have a clear vision of a sustainable future and the steps required to achieve it. They understand the long-term consequences of inaction and can articulate ambitious goals, such as transitioning to renewable energy or achieving carbon neutrality [24]. Leaders like *Jacinda Ardern, the former Prime Minister of New Zealand*, have set bold targets, such as committing the country to net-zero emissions by 2050, and have pushed for comprehensive environmental reforms.

Collaborative approach: Climate change is a global issue that requires cooperation across sectors and borders. Effective leaders bring together stakeholders from government, business, and civil society to create comprehensive solutions. For instance, *Christiana Figueres, former Executive Secretary of the UNFCCC*, played a pivotal role in fostering international collaboration that resulted in the successful negotiation of the Paris Agreement in 2015 [25].

Resilience and adaptability: The climate crisis is unpredictable, and leaders must be flexible and adaptive in their approach. They must be prepared to adjust strategies in response to new scientific information, shifting political landscapes, or evolving economic conditions. *Barack Obama's* Clean Power Plan is an example of how climate leaders adapt to political and legal challenges, ensuring that climate policies can evolve with changing circumstances [26].

Inspiration and advocacy: Leadership in the climate sphere requires the ability to inspire others to take action. This involves not only advocating for policy changes but also promoting sustainable practices within communities, organizations, and industries. Leaders like *Greta Thunberg* have used their platform to mobilize millions of young people around the world, sparking a global movement that pressures governments and corporations to act on climate change [27].

6.2 Case studies of prominent climate leaders

- *Greta Thunberg*: Greta Thunberg, a Swedish environmental activist, has become a leading voice in the global climate movement. Starting at 15 with a weekly school strike outside the Swedish Parliament, she inspired millions to demand stronger climate action. Her impactful speeches at the UN and other global platforms demonstrate that individuals, even without formal authority, can drive significant change [27].

- *Christiana Figueres*: Christiana Figueres, as Executive Secretary of the UNFCCC, is credited with leading the successful 2015 Paris Agreement. Following the failed Copenhagen Summit, she united nearly 200 countries with a spirit of optimism and collaboration, securing commitments to keep global warming well below 2°C [25].

- *Al Gore*: Former U.S. Vice President Al Gore has been a leading voice on climate change for decades. His 2006 documentary, *An Inconvenient Truth*, brought the issue of global warming to the forefront of public consciousness. Gore continues to advocate for climate action through his organization, The Climate Reality Project, which trains activists and leaders around the world to spread awareness and push for policy changes. Gore's advocacy has been instrumental in shaping public opinion on climate change and mobilizing global action [28].

- *Paul Polman and Corporate Climate Leadership*: Under Paul Polman's leadership, Unilever became a corporate leader in sustainability, demonstrating that businesses can play a key role in addressing climate change. Polman advocated for the integration of sustainability into business models, arguing that long-term business success depends on reducing environmental impacts. His leadership in forming partnerships with governments and NGOs has set a precedent for how the private sector can contribute to global climate goals.

6.3 Future of climate leadership

The next generation of climate leaders will need to be even more innovative, resilient, and inclusive. As climate impacts worsen, leadership will be required at every level of society—from local communities to global organizations. Empowering a diverse group of leaders, including women, youth, and marginalized communities, will be essential for advancing equitable and sustainable climate solutions.

Furthermore, as climate challenges become more complex, leadership must continue to evolve. It will need to incorporate a balance between addressing immediate climate impacts and preparing for long-term sustainability. Effective climate leaders will prioritize both mitigation and adaptation, ensuring that all regions, particularly the most vulnerable, can thrive in a changing climate.

Leadership is essential in the global effort to combat climate change. Whether through policy, advocacy, or innovation, leaders across all sectors must be resilient, collaborative, and visionary to address the scale of the climate crisis. Figures like Greta Thunberg, Christiana Figueres, and Al Gore demonstrate the power of leadership to inspire change, mobilize action, and create lasting impacts. As the climate crisis intensifies, strong leadership at all levels will be critical to driving the world toward a sustainable and resilient future.

7. Conclusion

The climate crisis represents one of the most complex and urgent challenges facing the world today. Addressing this issue requires a multifaceted approach that integrates effective policy development, global cooperation, adaptation strategies, and strong leadership. These elements work in tandem to build a more resilient, sustainable future for both current and future generations.

In this chapter, we have explored several critical elements necessary for effective climate crisis management, including policy development, global cooperation, adaptation strategies, and leadership, while addressing critical research questions that guide our understanding of how to effectively manage crisis.

7.1 Addressing the research questions

Policy frameworks for climate resilience: Effective policy frameworks are at the core of climate resilience. National policies, such as Germany's Energiewende and California's Global Warming Solutions Act, demonstrate that well-structured frameworks can drive significant reductions in greenhouse gas emissions, promote renewable energy, and enhance resilience. Policies must be tailored to the unique vulnerabilities of regions, ensuring that they address both mitigation and adaptation needs. In vulnerable regions, such as coastal areas or drought-prone zones, policies must prioritize building resilient infrastructure and ensuring food and water security to protect livelihoods.

Role of international collaboration: International collaboration is fundamental to addressing the transboundary nature of climate change. The Paris Agreement serves as a critical platform for aligning global efforts, with countries committing to nationally determined contributions (NDCs) to limit temperature rise. However, as this chapter has shown, collaboration goes beyond formal agreements—it also includes technology transfer, financial support, and knowledge sharing between developed and developing nations. Strengthening this cooperation through mechanisms like the Green Climate Fund ensures that all countries, particularly those most vulnerable, have the resources needed to mitigate and adapt to climate impacts.

Leadership in climate action: Leadership plays a pivotal role in shaping the success of climate adaptation strategies. Visionary leaders, such as Christiana Figueres and Greta Thunberg, have demonstrated how leadership can galvanize global movements and inspire collective action. Adaptation strategies require leaders who can unite stakeholders, mobilize resources, and implement long-term, resilient solutions. Whether in government, business, or civil society, leadership must focus on fostering collaboration, building trust, and ensuring that adaptation efforts are inclusive and equitable.

7.2 Recommendations for policymakers

Strengthen policy frameworks for climate resilience: While many countries have established policies aimed at reducing emissions and promoting renewable energy, there is an urgent need for more comprehensive frameworks that integrate mitigation with local adaptation strategies. Policymakers should develop tailored solutions for vulnerable regions, particularly small island developing states (SIDS) and low-lying coastal areas. For example, integrating nature-based solutions like mangrove restoration and shoreline management can help protect these regions from rising sea levels.

Increase financial commitments for climate adaptation: Despite global agreements like the Paris Agreement, financial support for vulnerable countries remains insufficient. Governments must fulfill their commitments to climate financing, particularly through mechanisms like the Green Climate Fund, to ensure that developing nations have the resources to implement adaptation and mitigation measures. Innovative financial instruments such as green bonds or blended finance models could help unlock private capital to supplement public funds.

Promote international collaboration and technology transfer: Climate change is a transboundary issue, and global cooperation is essential. Policymakers should prioritize the transfer of climate-resilient technologies to developing nations, especially in sectors like renewable energy, sustainable agriculture, and disaster risk reduction. Technology-sharing platforms and public-private partnerships can play a crucial role in ensuring that vulnerable regions can access the tools needed to build climate resilience.

Enhance community-based adaptation (CBA) strategies: Adaptation efforts must be community-driven and involve local stakeholders in decision-making processes. Policymakers should support initiatives that build local capacity, engage communities, and leverage indigenous knowledge. For example, the Kiribati government's "Migration with Dignity" program offers a valuable model for how to integrate human capital development into adaptation strategies. This ensures that climate-induced migration is voluntary and economically beneficial rather than forced and disempowering.

Develop early warning systems and disaster risk reduction plans: Given the increasing frequency and intensity of extreme weather events, governments must invest in robust early warning systems and disaster preparedness strategies. These measures should be coupled with infrastructure investments that enhance resilience to climate shocks, such as upgrading stormwater systems or retrofitting buildings to withstand extreme weather conditions.

By implementing these recommendations, policymakers and practitioners can build more adaptive and resilient systems that are better equipped to handle the accelerating impacts of climate change. Moving forward, the success of these efforts will hinge on a balance between global cooperation and localized action, ensuring that no region is left behind in the pursuit of climate resilience.

7.3 Practical implications

This chapter provides actionable strategies for enhancing adaptive crisis management and resilience to climate change. Integrating flexible, data-driven frameworks allows governments and organizations to respond effectively to evolving climate conditions.

To enhance the applicability of climate crisis management strategies, governments and organizations must adopt more targeted, actionable approaches. Cities should leverage predictive analytics to update flood-risk maps and prioritize investments in green infrastructure, such as permeable pavements and urban wetlands, to mitigate the growing risk of flooding. Policymakers need to allocate dedicated funds to empower local communities with tools and training, fostering grassroots-level adaptation and resilience. Establishing regional hubs for technology transfer can facilitate the exchange of clean energy technologies among developing nations, significantly enhancing global mitigation efforts. Additionally, scaling low-cost, accessible early warning systems for extreme weather events in vulnerable regions will play a critical role in minimizing loss and damage. By embedding these adaptive measures into broader policy frameworks, stakeholders can better address immediate and future climate impacts, ensuring a sustainable and resilient future.

7.4 Future directions

Looking ahead, several key areas need sustained focus and innovation to address climate change. First, *strengthening global commitments* is critical, as current national pledges under the Paris Agreement fall short of limiting global warming to 1.5°C. Future negotiations must prioritize raising ambitions and ensuring accountability.

Second, *expanding climate finance* is vital for both mitigation and adaptation, especially for developing nations. Developed countries must honor financial commitments, while innovative mechanisms like green bonds and public-private partnerships should be scaled to support large-scale projects.

Third, *technology transfer and innovation* will play a key role in reducing emissions and adapting to climate risks. Ensuring access to clean energy technologies and resilient infrastructure for all nations is essential for equitable progress.

Lastly, *prioritizing climate justice* must guide future action. Vulnerable populations, particularly in the Global South, are disproportionately affected by climate change. A just transition is needed to ensure that all benefit from the shift to a low-carbon economy, with special attention to those most at risk. In conclusion, bold and coordinated efforts in these areas can significantly advance global climate action and ensure a sustainable future for all.

7.5 The urgency of action

The future of the planet hinges on the decisions we make today. Each year without significant climate action brings us closer to irreversible damage. However, there is still time to prevent the worst outcomes if governments, businesses, civil society, and individuals come together to enact bold, transformative changes. Strengthening global cooperation, fostering innovative leadership, and scaling up both mitigation and adaptation efforts are essential to building a more sustainable, resilient future.

In conclusion, climate crisis management requires a holistic, integrated approach that addresses both the causes and consequences of climate change. By answering the key research questions and focusing on policy development, global cooperation, adaptation, and leadership, we can create a comprehensive framework for action. Only through collective effort can we navigate the complexities of the climate crisis and secure a safe, prosperous future for all.

Acknowledgements

The author acknowledges the use of Grammarly and QuillBot for language polishing of the manuscript.

Author details

Parul Soni* and Bhavya Singh
Thinkthrough Consulting Private Ltd., Delhi, India

*Address all correspondence to: parul.soni@ttcglocal.com

References

[1] Nicholls RJ, Cazenave A. Sea-level rise and its impact on coastal zones. Science. 2010;**328**(5985):1517-1520. DOI: 10.1126/science.1185782

[2] Field CB, Barros V, Stocker TF, Qin D, Dokken DJ, Ebi KL, et al. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press; 2012. DOI: 10.1017/CBO9781139177245

[3] Meehl GA, Tebaldi C. More intense, more frequent, and longer lasting heatwaves in the 21st century. Science. 2004;**305**(5686):994-997. DOI: 10.1126/science.1098704

[4] Gleick PH. Water, drought, climate change, and conflict in Syria. Weather, Climate, and Society. 2014;**6**(3):331-340. DOI: 10.1175/WCAS-D-13-00059.1

[5] Intergovernmental Panel on Climate Change (IPCC). Sixth Assessment Report: Climate Change 2021. Geneva, Switzerland: IPCC; 2021. Available from: https://www.ipcc.ch/report/ar6/wg1/

[6] Intergovernmental Panel on Climate Change (IPCC). Climate Change 2023: Mitigation of Climate Change. Geneva, Switzerland: IPCC; 2023. Available from: https://www.ipcc.ch/report/ar6/wg3/

[7] McGranahan G, Balk D, Anderson B. The rising tide: Assessing the risks of climate change and human settlements in low elevation coastal zones. Environment and Urbanization. 2007;**19**(1):17-37. DOI: 10.1177/0956247807076960

[8] Bowman DM, Balch JK, Artaxo P, Bond WJ, Cochrane MA, D'Antonio CM, et al. Fire in the Earth system. Science. 2020;**324**(5926):481-484. DOI: 10.1126/science.1163886

[9] Lee A, Kumar R. Innovations in resilient infrastructure for coastal communities. Environmental Management Review. 2024;**21**(4):456-470

[10] Ellerman AD, Convery FJ, De Perthuis C. Pricing Carbon: The European Union Emissions Trading Scheme. Cambridge, UK: Cambridge University Press; 2010

[11] International Renewable Energy Agency. Renewable Capacity Statistics 2019. Abu Dhabi, UAE: IRENA; 2019

[12] Morris C, Pehnt M. Energy Transition: The German Energiewende. Berlin, Germany: Heinrich-Böll-Stiftung; 2016

[13] Huq S, Roberts E. Approaches to increasing the resilience of the most vulnerable. In: Huq S, Roberts E, Fenton A, editors. Climate Change and the Vulnerable Countries. London, UK: Routledge; 2014. pp. 1-20

[14] Najam A, Huq S, Sokona Y. Climate negotiations beyond Kyoto: Developing countries concerns and interests. Climate Policy. 2003;**3**(3):221-231. DOI: 10.1016/j.clipol.2003.12.001

[15] Ivanova M. Green economy transitions: Resolving dilemmas of climate change and development. Nature Climate Change. 2016;**6**(6):533-540. DOI: 10.1038/nclimate2917

[16] Haites E. Carbon taxes and greenhouse gas emissions trading systems: What have we learned? Climate Policy. 2018;**18**(8):955-966. DOI: 10.1080/14693062.2018.1492897

[17] Velders GJ, Andersen SO, Daniel JS. The importance of the Montreal protocol in protecting climate. National Academy of Sciences of the United States of America. 2017;**114**(36):9645-9649. DOI: 10.1073/pnas.1710295114

[18] Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE, editors. Climate Change 2007: Impacts, Adaptation and Vulnerability. Cambridge, UK: Cambridge University Press; 2007

[19] Solecki W, Leichenko R, O'Brien K. Climate change adaptation strategies and disaster risk reduction in cities: Connections, contentions, and synergies. Current Opinion in Environmental Sustainability. 2011;**3**(3):135-141. DOI: 10.1016/j.cosust.2011.03.001

[20] Delta Programme. Delta Programme 2015: Working on the Delta: Keeping the Netherlands Safe and Liveable. The Hague, Netherlands: Ministry of Infrastructure and the Environment; 2015

[21] Reid H. Ecosystem- and community-based adaptation: Learning from community-based natural resource management. Climate and Development. 2016;**8**(1):4-9. DOI: 10.1080/17565529.2015.1034233

[22] Gerrard MB, Wannier GE, editors. Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate. Cambridge, UK: Cambridge University Press; 2013

[23] Solecki W, Leichenko R, O'Brien K. Climate Change Adaptation Strategies and Disaster Risk Reduction in Cities: Connections, Contentions, and Synergies. Amsterdam, Netherlands: Elsevier

[24] Adger WN, Arnell NW, Tompkins EL. Successful adaptation to climate change across scales. Global Environmental Change. 2005;**15**(2):77-86. DOI: 10.1016/j.gloenvcha.2004.12.005

[25] Figueres C, Rivett-Carnac T. The Future We Choose: Surviving the Climate Crisis. New York, USA: Knopf Publishing

[26] Obama B. The Audacity of Hope: Thoughts on Reclaiming the American Dream. New York, USA: Crown Publishing Group

[27] Gore A. An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It. Emmaus, PA, USA: Rodale Books

[28] Polman P, Winston A. Net Positive: How Courageous Companies Thrive by Giving More Than They Take. Boston, MA, USA: Harvard Business Review Press

Chapter 2

Trust and Risk Management: Understanding the Multifaceted Role of Trust in Managing Local Water Crises and Conflicts

Gaborit Pascaline

Abstract

Local and more national collective efforts to implement water management policies rely on cooperation, social networks, and a more generalized trust to be able to implement the necessary steps. Multi-level governance can be adapted with institutionalized forms of action and organizations to bring the efforts and enable multi-stakeholders' cooperation. Trust is a key element for action and for the implementation of successful policies. However, with the rise of antagonisms, conflicts or divided interests, crisis, and conflicts can emerge and jeopardize further cooperation. In this framework, the parameter of trust to understand the conflicts and move beyond potential crisis is often an underestimated factor. This chapter will analyze the question of trust as an enabling factor to move beyond conflicts, applied to the case of water management and disaster risk management in local settings.

Keywords: trust, conflicts, crisis management, water resources, dialogue, risk management

1. Introduction

Water management has become an increasing challenge worldwide because of factors related to climate change but also to growing urbanization [1]. Water demand is rising in cities, countries, and regions experiencing rapid economic development, particularly in emerging economies. Meanwhile, many areas face droughts and shortages of fresh water for consumption, irrigation, and energy production. Challenges have raised for the management of water as a resource but also to manage floods which frequency has increased due to changes in climate weather patterns. Local and more national collective efforts to implement local policies on the management of water resources rely heavily on cooperation, robust social networks, and a more generalized trust among various stakeholders to successfully implement the necessary steps. These efforts often require the participation of multiple levels of governance, which can be adapted with the institutionalized forms of action and organizations to facilitate coordination and enable multi-stakeholders' cooperation. Trust is a key element not only for initiating action but also for the implementation of successful policies. However, with the rise of antagonisms, conflicts, or divided interests, crisis and conflicts can emerge and jeopardize further cooperation both for the management of water as a resource and for the management of rivers and floods. In this complex framework, the parameter of trust becomes crucial to understanding conflicts related to water management and moving beyond potential crises. Yet, it is often an underestimated factor. This study will comprehensively consider the question of trust as an enabling factor to move beyond conflicts, specifically applied to the case of water management and flood disaster risk management in local settings. This research aims to shed light on the importance of trust and how it can be effectively harnessed to solve crisis through negotiation, dialog, and cooperation.

This chapter draws from a literature review aligned with my PhD research on post-conflict societies and trust [2, 3], as well as a qualitative and comparative secondary analyses based on primary field research from the following EU-funded projects: LIFE ADAPT Island, a project on nature-based solutions to mitigate the impacts of climate change,[1] CRIC: Climate Resilient and Inclusive Cities,[2] BRUD Building Resilient Urban Design, and the project Pilot 4 Research and Dialogue.[3]

These projects enabled the study of diverse territories impacted by water management issues—both water scarcity and flood prevention. The locations include Guadeloupe a French oversea island located in the Antilles where water is a scarce resource for more than 60% of local authorities, the Liège province in Belgium, which was affected by a devastating flood in July 2021, the cities of Banjarmasin, Mataram, Bandar Lampung, Pangkal Pinang, and Ternate in Indonesia,[4] the city of Chennai in India, and Dar es Salaam, the capital city of Tanzania. These territories face both freshwater scarcity and flooding due to their location in flood-prone areas (sea level and/or riverbanks). As part of the aforementioned projects, research teams conducted studies, interviews, and project implementations focusing on climate disaster management policies, conflicts, social impacts, resilience, and crisis management.

The projects facilitated data collection, focus groups, and interviews involving research centers, experts, and public authorities in Guadeloupe (France), Belgium, Indonesia, India, and Tanzania. This primary local analysis combined quantitative analysis and data collection with a qualitative approach, including participation in focus group discussions, review of local reports and press articles, and semi-structured interviews with local actors and decision-makers.

This research allowed me to explore trust as a concept and crucial mechanism for conflict resolution.

As a limitation, the methodology does not delve into culture and history as explanatory factors of trust—though these aspects are covered in the literature [4, 5]—it also does not provide in-depth information on each specific case study.

In a first part, this chapter analyses and goes through the question of crisis and Trust, going beyond the current literature, and highlighting the possible issues and

[1] www.cayoli.fr.

[2] www.resilient-cities.com.

[3] www.pilot4dialogue.com. This project closed in December 2021 but enabled follow up proposals and field visits.

[4] Five medium-sized local territories exposed to both drought, water-related land use conflicts, and floods.

connections of trust or distrust in the situations of water use conflicts and environmental concerns but also floods' management. In a second part, it highlights the different solutions to manage the crisis during an emergency crisis, conflict's negotiations, dialog, and multi-stakeholder's dialog. It finally analyzes further barriers to create a trust conducive environment.

As a research question, the article argues that trust is an important and often overlooked parameter in the management (and prevention) of conflicts but that it is also a necessary and key element for the management and resolution of crises. I also argue that antagonist interests, necessary tradeoffs, lack of readability, or understanding of the challenges and uncertainty are barriers to trust. Finally, negotiations, dialogue, and multi-stakeholders' cooperation will be analyzed as solutions to manage the crisis and to create a local environment conducive of Trust.

2. An analysis of trust and water management-related conflicts

In times of peace and stability, trust is a fundamental condition for a fair and cooperative society. According to the classical authors on trust [6–9], trust is a mechanism to reduce the complexity in a given society [8]. The system and institutions depend on the confidence and trust for the acceptance of regulations and justice, the implementation of social programs, and for the achievement of stability. Other authors view trust as a social connection, where the emotional attachment to the government or to the institutions becomes more important than their rational choices, or than the analysis of their performance [10, 11]. As a middle line between both theories, other authors have shown evidence that trust also plays an important part in contributing to social capital and cooperation in society. Many authors such as Robert Putnam [12], Francis Fukuyama [13], or Charles Tilly [14] have referred to trust as one component of social capital. 'Features of social organization, such as trust, norms and networks can improve the efficiency of society by facilitating coordinated action' ([12], p. 167; [15, 16]). These authors have demonstrated that trust and social capital are often correlated with economic and civic cooperation, leading to the development and progress, while the alternative is a vicious cycle of distrust, with negative consequences in terms of economy, conflicts, and failed governance (**Figure 1**).

Trust is an important parameter in both stability and peace building [2, 3, 7, 14, 17].

Several authors distinguish three paradigms of trust that will serve as the pillars of this work: instrumental or calculated trust (trust is then a choice), routine trust (the natural ability to trust in one's environment), and finally reflexive trust, which is the most complex and is built on a reciprocal basis in a relationship with an individual or an institution over the long term [15, 16]. According to this categorization, it is possible to contrast trust at the institutional level, which is mainly based on reflexive trust, where the individual only cooperates if trust leads him to do so, trust in civil society, which involves a mixture of instrumental or calculated trust and reflexive trust, and trust at the social level, which is based more on routine trust and is more of a diffuse trust. This analysis of trust also ties in with other research on trust, which distinguishes trust with weak ties (e.g., anonymous individuals: the pilot of an airplane, and trust with strong ties mainly inter-individual trust) [5, 16]. The question of trust during a crisis is a complex challenge, as the initial trust can be challenged by disruptions in the direct environment of communities.

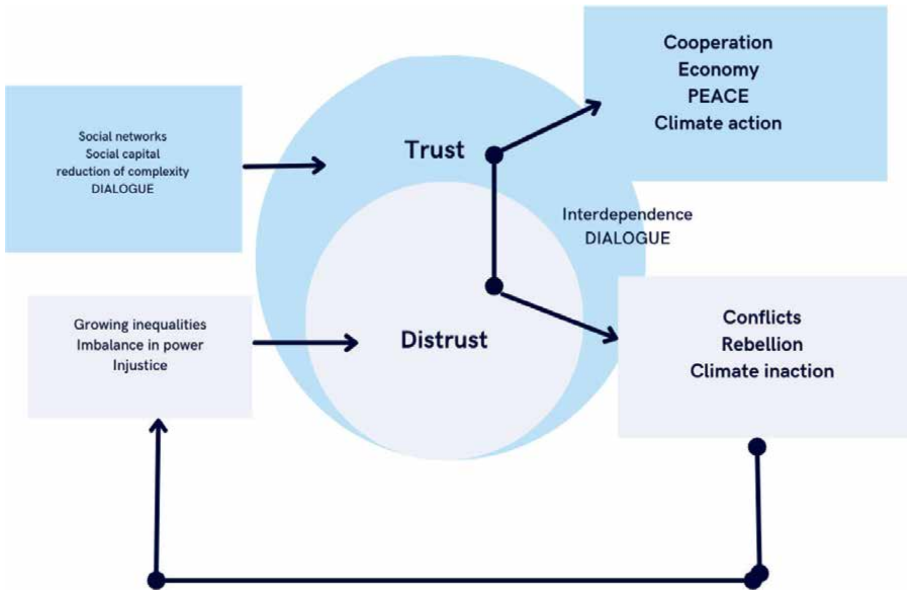

Figure 1.
The trust parameter: Author Gaborit Pascaline.

2.1 Water use conflicts and flood-related disaster risk crises

A crisis can be defined as a time of intense difficulty or danger, a time when a difficult or important decision must be made, the turning point of a situation when important changes can take place. In this chapter, the crisis will encompass two specific situations: mainly a crisis linked to conflicts referred to as social conflict, or conflict referring to the management of resources (e.g., over water management as a resource) at the local level, or the crisis related to the management of flood as a natural- or climate-related disaster events. It is based on field work and desk research in different countries including Guadeloupe (French Antilles), Belgium Indonesia, Tanzania, and India.

This chapter approaches the case of different territories, mainly cities implementing policies for both water scarcity and to manage riverbanks or sea rise level to avoid floods. The territories where field research has been implemented are detailed in (**Table 1**). The case cities are based on flood prone areas (sea level and/or riverbanks) [18–20].

The author argues that inevitable trade-offs, sacrificed areas, and conflicting interests pose barriers to trust. Additionally, the lack of understanding in complex, multi-faceted situations—where individuals lose grasp of their environment—hinders trust-building. Ultimately, the interplay between trust and multi-stakeholders' cooperation is crucial to this analysis.

2.2 Water use-related conflicts

Over the past decades, evidence has been found on increased relations between resource management and conflicts, where conflicts are fueled by stakes related to water scarcity or the management of water resources or by environmental

Location	Crisis	Crisis mitigation and solutions	Trust impact
Belgium			
Liège region	A flash flood occurred after torrential rains in July 2021, leading to 41 human casualties and large-scale damages. The local authorities appeared unprepared, and the recovery programs took unreasonable time.	After the July 2021 flash floods, the local authorities decided to increase cooperation to face future events.	High to very high
France			
Guadeloupe island	The island is exposed to cyclone regular events that are amplified by climate change. Clear Water Shortages are common in many municipalities.	There are disaster risk management plans and early warning systems. But post-disaster power shortages and road blockages are common. The question of water management is central to debates.	High
Indonesia			
Pangkal Pinang	Forty-nine reported flood events in the year 2019.	Local plan, land management and rehabilitation strategies, community engagement.	Low to medium
Bandar Lampung	Floods, landslides, droughts, high tides. Twenty-three disasters, mainly floods 2010–2019.	Master Plan of City Drainage, ongoing climate action plan.	Low to medium
Banjarmasin	Tidal waves, floods, and residential fires in the riverbank areas. Report Amri et al. 2020	Concrete embankments along the riverbank, clearance of informal areas to face floods. More rivers clean up and work across jurisdictions to solve the impacts of coal mines' waste dumping into rivers is needed.	Medium to high
Mataram	Sea level rise, extreme waves, abrasion, and droughts.	Early Warning Systems exist for earthquakes and tsunamis but are not extended to flash floods. Water Catchment Areas—their coverage is not sufficient.	Medium to high
Ternate	Floods occurred in August 2024, leading to dozens of casualties and damaged areas. The city is exposed to risks from volcanoes, sea level rise, and floods.	Local resilience strategy led by international organizations and implemented by the city.	Medium
India			
Chennai	Disaster risks: The growing urbanizations in close proximity to lakes and rivers have compromised the city's ability to meet its water needs but also exposed the residents to frequent flooding.	Development of a resilience master plan. Cleaning of rivers and smart city's program.	High
Tanzania			
Dar Es Salaam	Disaster risks: floods and droughts, especially in informal settlements, heavy rain events, and flash floods (2011 and 2020) with the risks of epidemics.	Tanzania Urban Resilience Program (TURP) National Water Policy that aims for universal access to water supply.	Medium

Table 1.
Crises and impacts on trust in the different locations studied.

degradation such as the pollution of rivers [1]. In these conditions, crisis management includes coping with a range of interrelated hazards: conflicts and violence, displacement, natural disasters, the inclusion of minorities, environmental degradation, shrinking natural resources, increased health threats, poverty, inequalities, social tensions, and waves of refugees.

At the local scale, the management of water resources, conflicts, and changes in land use appears deeply interrelated as agriculture, land exploitation, and urbanization require the use of freshwater [18, 21]. In countries like Indonesia, but also Tanzania, India, or France—Guadeloupe—the question of land use accommodating urbanization and agricultural needs leading to deforestation is generating many social conflicts. There are different variables explaining the difficulties and challenges related to these local situations. Some of these conflicts are closely tied to unsustainable planning and the rapid increase in demand for land and water by a variety of interests, particularly large-scale industrial expansion as well as growing urbanization. According to other analyses on urbanization, 'largely uncontrolled urbanization and expansion of plantations such as palm oil in Indonesia have led to higher vulnerability of the territories' [22, 23]. This is also the case in the developed countries for instance with the conflict over a water reservoir in Sainte Soline France, leading to a conflict between residents, ecologists, and farmers, followed by a police intervention in 2023.

In the local research, developed within the cooperation projects, land use was considered as a central element of conflict among different social groups including the minorities, indigenous groups, and small farmers. In some countries such as Indonesia or Tanzania, there is a gap between the demand for land due to urbanization, agriculture, and water demand. This issue is amplified by the continued uncertainty over the legal framework for land tenure and ownership [24–26]. The question of land, water use, and the repartition of population groups is also not absent from a territory like Guadeloupe. This means that conflicts occur for land tenure and the use of land and water between social groups (including minorities) to access the land for farming, as well as between small farmers and industrial groups. The local authorities can act as mediators but are also sometimes considered as stakeholders in the conflicts. This is the case, for instance when choosing to resettle communities of poor traditional areas regularly flooded to more modern centers (e.g., Banjarmasin, Dar es Salaam) in the view of growing urbanization (undertaken in the interest of better off communities). Some of the proposed solutions, for example, to restrict urbanization in certain flood-prone areas or to resettle communities even in Belgium (Liège province), often lead to social resistance.

In addition to this, some of the required land changes, for instance, the improvement of riverbanks, are impossible when the local authorities are not officially the landowners (and when the land tenure is contested). In this context, land and water use policies, which are necessary have limited actual authority, letting diverse stakeholders with possible antagonist interests get involved in the decisions.

Subsequently, local authorities cannot rely on clear coping mechanisms for water management (e.g., redesigning areas for water catchment, building dykes, designing natural buffer areas, or regenerating riverbanks). This makes it difficult to develop consistent planning, while at the same time the uncertainty and distrust are stirring local conflicts. Managing water, as a resource (freshwater needs) and as a threat (floods), is indeed the result of a myriad of multi-dimensional and multi-stakeholder issues, many of which can be perceived as conflicts or as crisis (e.g., in Guadeloupe).

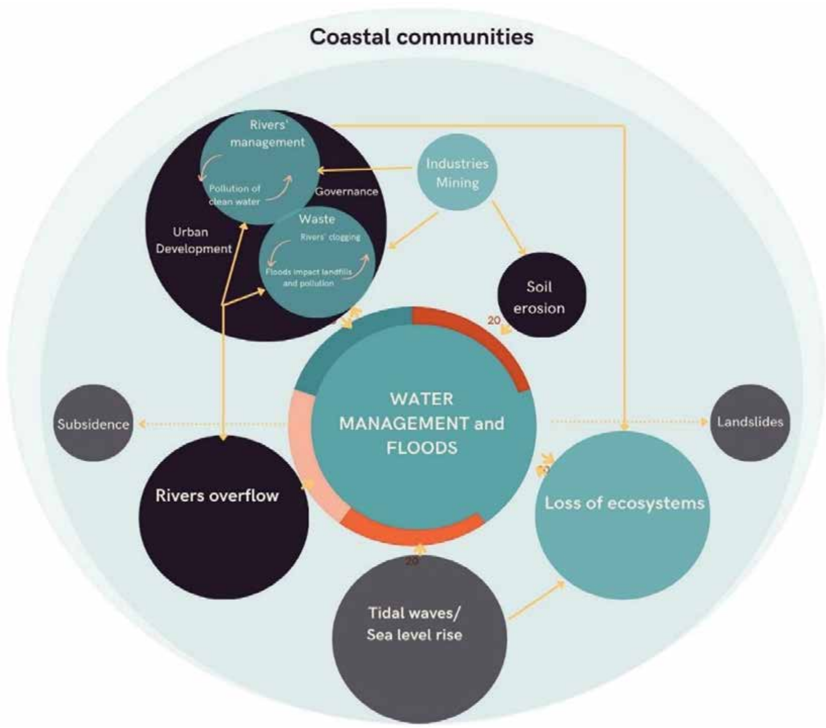

Figure 2.
Interrelations between water management and floods.

These conflicts can emerge from the tensions between growth-oriented development, social justice, and environmental considerations, or even 'conflict between the interests of the present generation and the needs of future generations' [21]. These conflicts are reflected in the questions of land use, land tenure, growing urbanization, planning policies performed at the expense of the water use for poorer groups, private interests, and deforestation, as well as in the uncertainty around resources and vulnerabilities. The recent floods in Ternate, which led to dozens of human casualties in August 2024, were largely attributed to deforestation (**Figure 2**).

2.3 Water and flood management: Emerging social conflicts

Freshwater scarcity and floods vulnerability have become key challenges in territories of densely populated areas in Indonesia, in Tanzania, or in India but also in territories such as Liège Belgium in Western Europe or in Guadeloupe a French oversea department. These questions are multi-faceted and multi-factorial (*See* **Figure 1**). Local and planning authorities are both part of the response (communication, resource management, early warning systems, land planning) and are also at the crossroads between different visions, interests, and conflicts.

Research has documented the unequal impacts of water management policies on vulnerable communities and the inequity of interventions [27–29]. In the analyzed case studies, populations in low-lying, densely populated areas are directly exposed to floods. In other territories, such as Dar es Salaam, droughts reduce available groundwater.

The analysis of the case studies' local research confirms that the poorest communities face greater exposure to regular floods and resulting damages. Exposure to floods and water scarcity generally increases with socioeconomic vulnerability. However, in Guadeloupe, some local authorities experience regular water shortages regardless of their residents' wealth. Limited water resources, combined with growing needs due to irrigation and urbanization, further exacerbate poor people's exposure to these risks.

In some territories, residents of informal settlements face increasing risks, primarily from flooding but also from polluted and salinized water after floods. Poverty remains a key determinant of vulnerability, as those below the poverty line have less access to information, knowledge, and recovery resources. Moreover, droughts, regular floods, and storms can push more people into poverty through lost livelihoods and damaged infrastructure. These events also have various repercussions on public health.

Our local research shows that city governments recognize social vulnerabilities in their territories and are investing in improvement programs and creating flood- and drought-protected areas. However, findings indicate that these local governments focus on short-term preparedness and immediate priorities, failing to integrate all socioeconomic and cross-boundary parameters for long-term policies. Issues of resource allocation, priorities, and sacrificed areas where vulnerable groups reside are fueling social tensions and resentment.

2.4 Trust and flood disaster management

Trust in a specific system would only be relevant in situations of uncertainty, because in the case of certainty, it is no longer necessary for the individual to demonstrate trust [10, 16, 30]. This is the theory developed by authors such as Luhmann [8], Sztompka [31], and Hardin [15, 32]. According to theories of trust as defined in rational choice theory, and to explain multi-stakeholders' cooperation (e.g., over water management, or for the prevention of floods), everyone must bet that the others will cooperate [10, 33].

The study of floods post-disaster situations seems to support these theories. People must invest trust to recover from the crisis and 'build back better.' This trust is a calculated choice. In a post-crisis building, trust is a long and challenging process. Local authorities do not automatically regain spontaneously the population's trust but need to communicate several aspects to the public, to increase the understanding and to reduce uncertainty. The first issue that can lead to a lack of confidence or even distrust is that these institutions, responsible for public order, failed to prevent or contain the disaster or crisis.

The second aspect institutions need to provide information about is their ability to implement new, large-scale policies (e.g., reconstruction). The post-disaster period is marked by rapidly evolving expectations and attempts to regain public legitimacy and trust for institutions and among groups.

While the crisis primarily disrupts and breaks down trust, it can also reveal individuals and groups as trust-building residents. The paradox of disruptions in a society (impacted by a flood or crisis) is that it often generates demands for solidarity and new trust networks—for example, in the case of the Liège floods or after cyclones in Guadeloupe. Individuals often band together to address multiple problems: poverty, unsanitary conditions, and support to victims. These groups can be diverse: informal groups, clubs, cooperatives, mutual societies, media associations, or neighborhood committees. These spaces create bonds of trust in various ways. They often prevent members from being marginalized and express solidarity among individuals. More broadly, gathering, discussing issues, and realizing shared concerns with others create or strengthen a sense of belonging to a collective group, forging or reinforcing a collective identity. Sharing issues also means that each member takes responsibility and manages compromises for the group's benefit.

3. How to parameter trust to move beyond the crisis

As detailed earlier in this chapter, trust is a crucial element in effectively solving a crisis, whether it emerges unexpectedly, such as in the aftermath of floods or social conflicts or arises in contexts characterized by tension and escalating narratives. Trust is not only a theoretical concept but also a practical necessity, as demonstrated by both experiential evidence and theoretical analysis. It is required throughout the entire cycle of crisis management, from the initial stages and the highest peak of the crisis to the subsequent aftermath, including phases like the 'build back better' initiative.

In the initial stages of a crisis, trust serves as a stabilizing force, helping to manage panic and coordinate effective responses among stakeholders, including government agencies, non-governmental organizations, and affected communities. As the crisis reaches its peak, maintaining trust becomes even more critical. It facilitates open communication and cooperation, enabling swift decision-making and resource allocation, which are essential for mitigating the crisis's impact.

Furthermore, during negotiations, trust is the cornerstone that underpins successful dialogue and agreements. It ensures that all parties are committed to working together toward a common goal, fostering a cooperative rather than adversarial atmosphere. This cooperative spirit is vital for reaching consensus and implementing solutions that are acceptable to all stakeholders involved (**Table 2**).

In the aftermath of a crisis, trust continues to play a pivotal role in the recovery and rebuilding process. Creating a 'trustworthy' environment is essential for the 'build back better' phase, where the focus is not only on restoring what was lost but also on enhancing resilience against future crises. A trustworthy environment encourages investment, innovation, and participation from various sectors, ensuring that recovery efforts are sustainable and inclusive.

Situation	Narrative	Feelings/emotions
Conflict	Hostility is the only option.	Hostility, contempt, provocation
Coexistence	Hostilities can be resumed if necessary.	Resentment, anger, mistrust
Collaboration	Hostilities will only take place in the event of negotiation failures.	Ambivalence
Cooperation	Hostilities represent a strategic disadvantage.	Careful empathy
Interdependence	The groups need each other.	Acceptance of the past, cautious confidence
Integration	Unity	Solidarity, friendliness, trust

Source: Gaborit [2, 3].

Table 2.
One of the few theories that addresses the issue of trust between conflict and cooperation, which is critically important in the case of conflicts.

Ultimately, trust acts as a binding agent that holds the crisis management process together, ensuring that efforts are cohesive and directed toward a successful resolution. It is a continuous thread that runs through each stage of crisis management, underscoring its importance as a fundamental component in both crisis resolution and post-crisis recovery. This section will approach the question of trust during the emergency crisis, but also during the negotiation phase. It argues that dialogue is often necessary to exist the crisis, to finally identify the main barriers to trust in multi-stakeholders' cooperation.

3.1 Trust during the emergency crisis

Local research shows that disaster risk management and emergency crisis are not always given priority in a context of floods [18, 19]. The local decision-makers and stakeholders currently lack the capacity in terms of infrastructure, funding, and information in real time to solve challenges simultaneously and to answer all the explanations (**Figure 3**) [19].

The first reason for this is the astounding number of simultaneous challenges that need to be answered by the local authorities to ensure development planning, water management as a resource, maintain the continuity of ecosystems, reduce the vulnerability of the coastal and exposed areas (and the potential economic and human losses), and develop contingency plans as well as responses [18].

Cooperation is required to reach a consensus on alert levels and the best alert system: Leaders must decide on the best communication methods, such as broadband systems, SMS, sirens, and loudspeakers. Advocating for "multi-stakeholder" cooperation is not enough and should include incentives, coordination with community representatives, information, and transparency to be effective [19, 34].

An analysis of the case studies equally highlights the lack of trust and the lack of information (or communication) as additional obstacles to emergency response. There is in particular a lack of trust of stakeholders and local population in the different organizations' capacities to implement collective action and to solve the challenges [35]. The reasons for this, as detailed in the previous paragraph about land use and

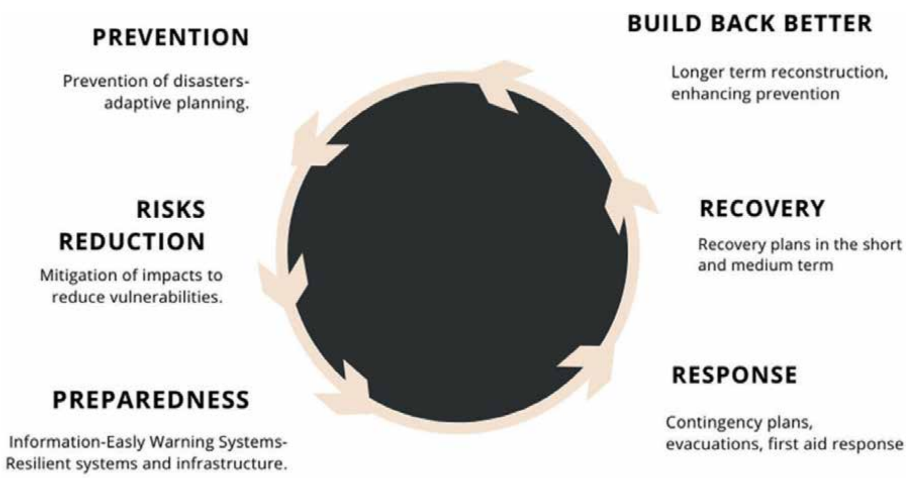

Figure 3.
The disaster's management cycle.

planning, are to be explained in the urban and social inequalities incurred by urbanization, modernization, and water policies.

In times of peace and stability, trust is a fundamental condition for a fair and cooperative society [6–8, 10, 14], and the local authorities depend on the confidence of the populations for the acceptance of regulations, the implementation of social programs, and for the achievement of stability. Trust is often correlated with cooperation, while the alternative is a vicious cycle of distrust [16]. Trust appears therefore important in the implementation of national, regional, and local programs for water management. But further interviews from the case studies show that the lack of understanding of the stakes and challenges (readability) and the uncertain context were also important factors to foster trust and cooperation. 'Trust is one aspect causing the lack of cooperation among stakeholders, but communication and transfer of information are equally important as a factor and challenge to achieving resilience' [19].

As a concrete example, the question of weather data transfer in real time and the correct anticipation of risk level by stakeholders has emerged in the local research, as an additional difficulty in the case of disaster management programs for floods and water scarcity. This difficulty is also likely to fuel distrust. In case of floods, real time information transfer is indeed needed between the meteorological agency and the first-aid responders, but also between the first-aid responders and the local population including all communities and minorities. To achieve this, the work with community representatives, and within the private sector, is also needed especially if water companies are responsible for the management of water. But at the same time, transparency and local engagement processes also confront communities with the lack of available choices. Problems continue to arise due to necessary trade-offs by the decision-makers in choosing between different priorities, different levels of alerts, and contingency plans, possible relocations, and priority infrastructure and neighborhoods to be protected [19]. This situation is likely to fuel distrust. Alerting the local population about the negative impacts of disasters is also key in building trust [36]. Finally, the spread of misinformation can also erode the trust and dilute the fact-based real information [37].

The emergency crisis is only one of the aspects of the trust cycle. This is one moment where the trust parameter is key and important in solving a crisis. But there are often situations (e.g., in water use-related conflicts) where the solution of the crisis will be in building a strong framework for negotiations.

3.2 Trust and negotiations

In the aftermath of the crisis, and sometimes long after the emergency phase, crisis actors can be confronted with an obligation to negotiate. The protagonists of a conflict situation or a situation of tensions need to manage their relations over time [38]. At a certain point in the conflict, players driven by antagonists' interests over a resource such as water share a common interest in cooperating. Sometimes, crisis conditions create an environment conducive to negotiation. Generally, when the situation is stalled and none of the actors see a winning solution as possible, conditions are ripe for negotiations to start. For negotiations to achieve the results, there must be a certain balance between the parties involved [39], as well as an interest from the various parties to negotiate. When negotiations occur, it should not be assumed that 'all parties do so in good faith and are equally trustworthy' ([40], p. 107).

All negotiations require trust [16, 38]. Indeed, any negotiation is primarily a risk-taking exercise regarding the other party, who may or may not honor commitments.

The risk is also taken concerning the groups, to whom the negotiators commit to improving the situation after negotiations. For Niklas Luhmann, trust implies risk-taking [8, 10]. It is also linked to cooperation and problem solving. 'Trust is a positive force from which cooperation flows' [41].

Negotiations to resolve a conflict require a positive approach and cooperation between parties to build trust. This cooperation is complex because it involves different stakes and actors, not all of whom are interested in resolving the conflict. In this way, negotiations can sometimes increase tensions or even create internal conflicts.

By initiating negotiations to reduce the losses associated with ongoing conflict, parties establish a cooperative process that builds trust. However, they also introduce the risk of trusting the opposing party. The risk that the opposing party might not honor agreements exists in any negotiation, so negotiators assume, in addition to the initial risk, the risk of being deceived, exploited, or disappointed, potentially losing credibility with the populations they represent [16, 31, 42]. This is often seen in water use-related conflicts, where local communities may feel betrayed due to prioritizing the resources for private interests [21].

The cooperation and trust process are compromised when a party is dishonest about its intentions and manipulates the negotiation process. It can also be disrupted externally when outside parties or internal groups sabotage the negotiation. This sabotage is highlighted in the theory of 'spoilers' [43, 44]. Spoilers are defined people or groups who believe negotiations threaten their power, worldview, and interests, and who will act to derail these negotiations [44].

Another strategy used by spoilers to exit a crisis is to find a 'scapegoat' or common enemy to reconnect with the other party [45–48]. In land use conflicts or disputes over water management, the scapegoat is often represented by minorities external to the conflict but blamed for creating problems. This strategy of identifying a scapegoat reinforces trust.

But to exist a crisis, third parties and especially institutions can be required to act as regulators, and to be responsible for finding a solution to the end of the crisis. In the case of land- and water use-related conflicts in Indonesia, some organizations like local authorities are often asked to negotiate. Other organizations such as the conflict resolution unit have been set up to support the management of conflicts. But this again calls for the trust in the institution in charge of the negotiations. It is facilitated if it is a known or entrusted organization or institution as trust in an institution means knowing its constituent rules, regulations, values, and standards, which are shared by all participants and are binding.

In other cases, when the stakes involve more than two or three parts, whether being a land use conflict, or a conflict over resources, dialog can be a key element to create a trustworthy environment and to solve the crisis.

3.3 Resolving a crisis through dialogue

On the contrary to negotiations, dialog can include a wider range of stakeholders. Dialog here refers to creating spaces for institutional exchanges among stakeholders within a problem-solving framework, leading to 'different ways of thinking, talking, learning, and acting' [49]. It involves learning together and identifying solutions and obstacles in a problem-solving manner, while also encouraging knowledge exchange. This dialogue can focus on environmental issues, specifically water management, acknowledging needs and recognizing possible disagreements on values, ideas, or interests. It can also incorporate different narratives, resistances, antagonisms, and demands.

Several authors emphasize the need for dialogue to resolve water use conflicts [50, 51]. Others note that constructive actions often stem from cooperation among diverse stakeholders, resulting in changes through social interactions [18].

However, solidarity may decline during disasters, like floods. This situation indicates that adequate preparedness is also needed from both institutions and communities. Preparedness also requires some level of risk acceptance and the creation of a collaborative or trust system where cooperation prevails over conflict or inaction.

In the post-crisis phase, there is an increased need for multi-stakeholders' cooperation, which is difficult to achieve as trust may have been compromised during the crisis. This is similar in a phase of reconstruction. This is for instance the case in Liège, Belgium, where victims of the 2021 floods still experience delays in reconstruction.

There is also consensus that solving local related challenges and problems require consistent cooperation among all stakeholders [18–20, 52, 53]. Coherent responses to important problems require involving a multitude of stakeholders in transformative processes, leading to the development of policy pathways [54]. However, this cooperation faces many obstacles, with trust being just one factor.

One major challenge is that several water crises linked to the management of water as a resource are crossing geographical territories, communities, and different government jurisdictions [1]. This discourages small-scale local action, as the impacts may seem insignificant locally. Another obstacle is that different organizations have varying interests, goals, and visions. This issue has been highlighted by various authors [54–56]. It seems impossible to achieve the local objectives at all scales, communities, and sectors simultaneously, such as water, energy, food, carbon, stable institutions, and peaceful societies. Local research within different projects shows that dialog among stakeholders, including official representatives, is necessary but insufficient for achieving response, adaptation, and crisis management.

3.4 Explaining the barriers to trust

If we have seen earlier that trust is necessary to solve and exit crises, it is a complex matter to facilitate and to reach trust conducive environments that would enable the exit of the crisis. The barriers to trust involving fear, suspicion, or distrust can be important parameters to consider in managing a crisis.

The creation of trust conducive environments requires consistent communication and reliability in meeting the different challenges, as well as in fulfilling expectations. According to several authors, trust is the essence of collective society [10, 57]. For Fukuyama, 'Trust is the expectation in a community that others will behave honestly and cooperatively, based on shared values' ([13], p. 27). Engaging stakeholders in the problem-solving process can also enhance mutual trust. Georg Simmel underscored that, 'Without trust, the complexity of possible futures would paralyze action.' A lack of trust in society could lead to a 'spiral of cynicism' [16, 58, 59]. Trust is essential for collective action and cooperation: 'Trust is necessary so that people can (…) offer their efforts without fear of negative repercussions' [60]. Experience indeed shows that empathy and understanding toward the concerns and emotions of others is also facilitating and enhancing trust.

Other authors also view trust as crucial for action and cooperation. However, our field research and experience show that local action is influenced by choices and priorities, leading to trade-offs and the exclusion of certain sectors or priorities [18–20]. A trade-off involves balancing between one or more desirable but sometimes conflicting plans, policies, or measures [19, 61, 62]. The issue of resettling populations in flood-prone areas can be problematic for residents, while inaction by public authorities might be seen as a failure to protect. Additionally, water scarcity can create uncertainty, which does not foster trust building.

Territories face diverse needs due to growing urbanization and the demand for infrastructure and facilities for residents. Urbanization, housing, transportation, waste management, river clean-up, and water, along with security, local economic development, social inclusion, and disaster risk prevention, are key concerns for advanced territories. This leads to difficult trade-offs, where local authorities focus on some sectors at the expense of others. Such situations can create exclusion, injustice, resentment, and distrust, while uncertainty does not facilitate trust.

Informing the population about the impacts and stakes of water scarcity of about floods as a risk is key recommendation for building trust and creating a trust conducive environment [18, 20]. Despite challenges in effectively reaching diverse communities and stakeholders, the lack of a consistent engagement process and failure to include community grassroot initiatives in local plans can lead to high costs and consequences. For instance, it can result in technically or socially unsuitable solutions. The spread of misinformation, false information, rumors, and distorted messages can also be a barrier to the creation of a trust conducive environment, especially during the time of a crisis [37].

The dynamic and variable conditions introduced by the water management challenges call for a robust stakeholders' engagement process to reach the necessary level for cooperation. This ensures that the responses are not just one-off measures but are tailored to a community's needs. Engagement also seeks legitimacy. Harris [56] notes 'As research and negotiation are conducted behind closed doors, the general public's confidence in scientific, technical and administrative expertise is destined to be low. Without more inclusive processes and lasting mechanisms of social learning and public involvement, even scientific findings, however accurate, fail to gain social legitimacy.' Local actions need to align better with local realities, values, and norms, achievable only through solid local multi-stakeholder engagement including vulnerable groups, grassroot, and women's organizations. The consultation of women is indeed often disregarded regardless of the location, whereas their engagement could lead to the adoption of more adequate measures.

Engagement with the private sector is equally important. The private sector is often involved in water pollution, especially in coastal and marine environments (e.g., plastic production), but also leads in eco-innovation. Effective communication and awareness-raising are crucial, treating beneficiaries as active participants in dialog rather than passive targets of stakeholder-driven messages.

Local solutions might lead to resistance, distrust, increased conflicts, or a lack of shared vision. The process can be disorganized as groups pursue different goals. However, a multi-stakeholder engagement process can ensure sustained, inclusive, and meaningful transformation of actions, policies, or practices.

Engagement and awareness require simple, clear, and comprehensive resources accessible to the public. Achieving clarity is challenging in complex areas such as water scarcity and water management, where uncertainties are inherent. The private sector and communities often lack clear steps for contributing to solutions. When they do contribute, their efforts are often at small scale, while effective solutions would need to be scaled up at a larger scale.

Some authors highlight pitfalls in communication, which might simplify situations and spread incorrect messages, serving some stakeholders' interests over others [63]. Other authors have highlighted the role of false information, misinformation, or distorted information in creating distrust [37, 64, 65]. However, the absence of messages at all can lead to a lack of risk awareness, especially in vulnerable groups, or justify denial. It is crucial to engage vulnerable people in decision-making for a real concern over the environment and to ensure social justice.

Consistent stakeholders' participation can resolve disagreements early, explore different scenarios, and lead to shared visions. These theories are supported by local experiences. As argued in this chapter, unpredictable conditions of water-related stakes (water scarcity and water management) require this consistent stakeholders' engagement, to ensure measures fit community needs and to have enough trust to enable cooperation. Trust is crucial in understanding a crisis, but building a trust-conducive environment is a long process with challenges, requiring stakeholders and decision-makers to manage expectations.

4. Conclusion

This chapter approaches trust as a solution to understand and resolve local conflicts and challenges related to water management, considering water both as a resource and as a threat (floods). It is approached as a key parameter. The study uses desk reviews and field research to analyze why trust is crucial throughout the problem-solving process.

It examines trust in the context of negotiations, dialog, flood-related disaster emergency phases, and stakeholders' engagement. The chapter also analyzes barriers to trust beyond differences in local settings and cultures using a comparative approach. While trust significantly impacts stakeholders' cooperation, the study shows that communication, negotiations, and dialog are equally important in building trust. Creating opportunities for dialogue and negotiations involving community representatives and the private sector is vital to facilitate understanding of the situation and crisis, thereby reducing uncertainty.

Through the chapter the factors of distrust are identified as the lack of choices, sacrificed sectors, tradeoffs, interrelated problems, and conflicting interests. These factors decrease understanding of the stakes and create more difficulties in finding opportunities for negotiations and dialog. Local stakeholders often appear unprepared and lack solutions to exit crises when faced with increasing water-related challenges. Creating a trustful environment as a preventive measure is essential for adopting the most suitable and least harmful policies and decisions, ultimately enabling positive outcomes for these local crises. While the research could not delve deeply into the multi-faceted aspects of trust for all individual stakeholders, future research could explore the impact of new technologies and social media. This research might focus on how these tools create trustworthy or untrustworthy environments during crises, and their role in fostering dialog or breeding suspicion.

Acknowledgements

I would like to thank the Board members of Pilot4dev and all the project partners and experts.

Author details

Gaborit Pascaline
Pilot4dev, Brussels, Belgium

*Address all correspondence to: pascaline.gaborit@yahoo.com

References

[1] UN. World Water Development Report Water for Prosperity and Peace. 2024. Available from: https://www.unwater.org/publications/un-world-water-development-report-2024

[2] Gaborit P. Restaurer la confiance après un conflit civil. L'Harmattan; 2009a

[3] Gaborit P. La confiance après un conflit ou la confiance désenchantée. In: Bertho A, Gaumont-Prat H, Serry H, editors. Colloque international La confiance et le conflit. Université Paris Vincennes Saint Denis; 2009b

[4] Fine GA. Rumor, trust and civil society: Collective memory and cultures of judgment. Diogenes. 2007;**54**(1):5-18. DOI: 10.1177/0392192107073432

[5] Khodyakov D. Trust as a process: A three-dimensional approach. Sociology, London. 2007;**41**:115-132

[6] Braithwaite V, Levi M. Trust and Governance. Russell Sage Foundation series on Trust; 1998

[7] Hardin R, editor. Distrust, NYC. Russell Sage Foundation; 2004. ISBN-10. 0871543508; ISBN-13.978-0871543509

[8] Luhmann N. Trust and power: Two works by Niklas Luhmann. In: Translation of German Originals Vertrauen 1968 and Macht 1975. Chichester: John Wiley; 1979

[9] Misztal BA. The notion of trust. Social Theory, Policy, Organisation and Society. 1992;**5**(1):6-15. DOI: 10.1080/10349952.1992.11876774

[10] Hamm JA, van der Werff L, Osuna AI, Blomqvist K, Blount-Hill KL, Gillespie N, et al. Capturing the conversation of trust research. Journal of Trust Research. 2024;**14**(1):1-7. DOI: 10.1080/21515581.2024.2331285

[11] Szescynski B. Risk and trust: The performative dimension. Environmental Values. 1999:239-252

[12] Putnam R. Making Democracy Work: Civic Traditions in Modern Italy. Princeton University Press; 1993

[13] Fukuyama F. Trust: The Social Virtue and the Creation of Prosperity. New York: Free Press; 1995

[14] Tilly C. Trust and Rule. Cambridge University Press; 2005

[15] Möllering G. Trust, Reason, Routine, Reflexivity. Oxford: Elsevier; 2006

[16] Six FE, Latusek D. Distrust: A critical review exploring a universal distrust sequence. Journal of Trust Research. 2024;**13**:1-23. DOI: 10.1080/21515581.2023.2184376

[17] Koivula A, Malinen S, Saarinen A. The voice of distrust? The relationship between political trust, online political participation and voting. Journal of Trust Research. 2021;**11**(1):59-74. DOI: 10.1080/21515581.2022.2026781

[18] Gaborit P. Resilience and Climate Disaster Management in Cities: Transformative Change and Conflicts. Journal of Peacebuilding and Development. 2022c;**Special issue**. DOI: 10.1177/15423166221128793

[19] Gaborit P. Climate adaptation to multi-hazard climate-related risks in ten Indonesian cities: Ambitions and challenges. Climate Disaster Risk.

2022a;**37**:100453. DOI: 10.1016/j.crm.2022.100453 2022b

[20] Gaborit P, editor. Climate Adaptation and Resilience: Challenges and Potential Solutions. Anticipatory Governance, Planning and Dialogue. Peter Lang; 2022b

[21] Wicaksono A, Moeliono I. Exploring alternatives in dealing with climate change and conflicts in Indonesia. In: Gaborit P, editor. Climate Adaptation: Challenges and Solutions. Peter Lang International; 2022

[22] Wirawan B, Utama S, Rachmawati SI, Rizal TJ, Muthadir A, Mulyana W, et al. Spatial Planning, Land Tenure and Claims and Increasing Conflicts over Land Claims in Sumatra and Kalimantan, Economic Development, Policy Dynamics and the Pace of Investment. 2019. Conflict Resolution Unit/July. Translated by Larry Fisher

[23] Wollenberg E, Campbell B, Dounias E, Gunarso P, Moeliono M, Shell D. Interactive land-use planning in Indonesian rain-forest landscapes: Reconnecting plans to practice. Ecology and Society. 2009;**14**(1):35

[24] Ardiansyah FA, Marthen A, Amalian N. Forest and Land Use Governance in a Decentralized Indonesia: A Legal and Policy Review. Occasional paper. CIFOR, PELANGI; 2015

[25] Resosudarmo B. Forest Land Use Dynamics in Indonesia. Technical Report. Australian National University; 2012

[26] Toumbourou T, Mudar M, Werner T, Bebbington A. Political ecologies of the post-mining landscape: Activism, resistance and legal struggles over Kalimantan's coal mines. Energy Research and Social Science. 2020;**65**. DOI: 10.1016/j.erss.2020.101476

[27] Baztan J, Vanderlinden JP, Jaffrès L, Jorgensen B, Zhu Z. Facing climate injustices: Community trust-building for climate services through arts and sciences narrative co-production. Climate Risk Management. 2020;**30**(1):100253. Available from: https://www.sciencedirect.com/science/article/pii/S2212096320300437

[28] Hallegatte S, Vogt-Schilb A, Rozenberg J, et al. From poverty to disaster and back: A review of the literature. Economics of Disasters and Climate Change. 2020;**4**:223-247. DOI: 10.1007/s41885-020-00060-5

[29] Marino E, Ribot J. Adding insult to injury: Climate change and the inequities of climate intervention. Global Environmental Change. 2012;**22**(2):323-328. DOI: 10.1016/j.gloenvcha.2012.03.001

[30] Livet P. Gouvernance et confiance' lecture series. Institut des nouvelles technologies de Namur. 2007;**20**

[31] Sztompka P. Trust a Sociological Theory. New York: Cambridge University Press; 2000. ISBN-10:0521591449

[32] Hardin R. Trust and Trusworthiness. Vol. 4. New York: Russel Sage foundation editions, collection on trust; 2002

[33] Orléan A. La théorie économique de la confiance et ses limites. In: Laufer R, Orillard M, editors. La confiance en questions, Paris, édition Harmattan, collection Logiques Sociales. 2000. pp. 59-79

[34] Djalante R, Garschagen M, Thomalla F, Shaw R, editors. Disaster Risk Reduction in Indonesia. Springer International publishing; 2017

[35] Mulkhan U, Mayaguezz H, Tisnanta HS, Kurniawan N. Urban Analysis Report Pangkal Pinang. 2020.

Available from: https://www.resilient-cities.com/en/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=41&id=40&Itemid=1000000000000

[36] Funtowicz S. From risk calculations to narratives of danger. Climate Risk Management. 2020;**27**:100212. Available from: https://reader.elsevier.com/reader/sd/pii/S2212096320300024?token=B6CBEA02054999EE756B04F666D4701C3905CDF460510AD1F52DF26A57DFF692EC212672A58C4D7A49A536076F984FAB&originRegion=eu-west-1&originCreation=20210808171814

[37] King K, Wang B. Diffusion of real versus misinformation during a crisis event: A big data driven approach. International Journal of Information Management. 2023;**71**. DOI: 10.1016/j.ijinfomgt.2021.102390

[38] Thuderoz C. Négociations: essai de sociologie du lien social. Paris: PUF; 2003

[39] Thuderoz C, Mangematin V, Harrisson D. La confiance: approches économiques et sociologiques. Paris: édition Gaëtan Morin; 1999

[40] Stedman SJ. Peace processes and the challenges of violence. In: Darby J, Macginty R, editors. Contemporary Peace Making: Conflict Violence and Peace Processes. London and New York: Palgrave-MacMillan; 2003

[41] Scott KD. The causal relationship between trust and the assessed value of management by objectives. Journal of Management. 1980;**6**:157-175

[42] Lazuech G. Toute confiance est d'une certaine manière confiance aveugle. Pleins Feux, Variations. 2002;**9**. Available from: https://www.librairie-sciencespo.fr/livre/9782847290004-toute-confiance-est-d-une-certaine-maniere-confiance-aveugle-gilles-lazuech/

[43] Greenhill KM, Major S. The perils of profiling: Civil war spoilers and the collapse of intra state peace accords. International Security. 2006-2007;**31**(3):7-40

[44] Stedman SJ. Spoiler problems in peace processes. International Security. 1997;**22**(2)

[45] Bauer M, Cahlíková J, Chytilová J, Roland G, Želinský T. Shifting punishment onto minorities: Experimental evidence of scapegoating. The Economic Journal. 2023;**133**(652):1626-1640. DOI: 10.1093/ej/uead005

[46] Deutsch M. Trust and suspicion. Conflict Resolution. 1958;**8**(2)

[47] Girard R. The Scapegoat. Johns Hopkins University Press; 1986

[48] Hersh MA. Barriers to ethical behaviour and stability: Stereotyping and scapegoating as pretexts for avoiding responsibility. Annual Reviews in Control. 2013;**37**(2):365-381. DOI: 10.1016/j.arcontrol.2013.09.013

[49] De Araujo Arosa Monteiro R, Ferraz de Toledo R, Roberti Jacobi R. Dialogue method: A proposal to Foster intra and inter-community dialogic engagement. Journal of Dialogue Studies, Special issue, Dialogue with and among the Existing, Transforming and Emerging Communities. 2021;**9**:165-183. DOI: 10.55207/FWCB1722

[50] Hegger DLT, Mees HLP, Driessen PJ, Runhaar AC. The roles of residents in climate adaptation: A systematic review in the case of the Netherlands. Environmental Policy and Governance. 2017. DOI: 10.1002/eet.1766

[51] Marchezini V. What is a sociologist doing here?: An unconventional people centered approach to improve warning implementation in the Sendai framework for disaster risk reduction. International Journal of Disaster Risk Science. 2020;**11**:218-229. DOI: 10.1007/s13753-020-00262-1

[52] Gaborit P. Learning from Resilience Strategies in Tanzania, an Outlook of International Development Challenges. Peter Lang International. Available from: https://www.peterlang.com/document/1152350; 2021

[53] Rosenzweig C, Solecki WP, Romero-Lankao S, Dhakal MS, Ibrahim SA. Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network. New York: Cambridge University Press; 2018

[54] Van Bruggen A, Nikolic J, Kwakkel J. Modeling with stakeholders for transformative change. Sustainability. 2019;**11**:825. DOI: 10.3390/Su11030825

[55] Burch S, Shaw A, Dale A, Robinson J. Triggering transformative change: A development path approach to climate change response in communities. Climate Policy. 2014;**4**:467-487. DOI: 10.1080/14693062.2014.876342

[56] Harris LM, Chu E, Ziervogel G. Negotiated Resilience. EDGES: Institute for Resources, Environment and Sustainability, University of British Colombia; 2017

[57] Seligman A. The Problem of Trust. Princeton University Press: Princeton; 1997

[58] Cappella JN, Jamieson KH. Spiral of Cynism. New York University Oxford Press; 1997

[59] Simmel G. The Sociology. New York: Free press; 1964

[60] Nyhan RC. Changing the paradigm trust ad its role in public sector organizations. The American Review of Public Administration. 2000;**30**:67-105

[61] Breure TS, Estrada-Carmona N, Petsakos A, et al. A systematic review of the methodology of trade-off analysis in agriculture. Nature Food. 2024;**5**:211-220. DOI: 10.1038/s43016-024-00926-x

[62] Grafakos S, Trigg K, Landaeur M, Chelleri L, Dhakal S. Analytical framework to evaluate the level of integration of climate adaptation and mitigation in cities. Climatic Change. 2019;**154**:87-106

[63] Brulle R. From environmental campaigns to advancing the public dialogue: Environmental communication for civil engagement. Environmental Communication. 2010;**4**(1):82-08

[64] Grabner-Kräuter S. Empirical research in online trust. A review and critical assessment. International Journal of Human-Computer Study. 2003. DOI: 10.1016/S1071-5819(03)00043-0

[65] Shahbazi M, Bunker D. Social media trust: Fighting misinformation in the time of crisis. Information Journal of Information Management. 2024;**77**. DOI: 10.1016/j.ijinfomgt.2024.102780

Chapter 3

Strategies for Responding to Organizational Crises: Empirical Insights and a Proposed Model

Mzamo P. Mangaliso, Bradford J. Knipes, Stephen A. Gazillo and Maureen McGuinness

Abstract

As crisis management strategies continue to evolve in the face of-more frequent and intense natural disasters, there is a growing need for proven processes to guide how organizations can more effectively respond and quickly adapt. In this chapter, we examine the real-life experiences organizations can have when managing a crisis, using an empirical investigation of crisis management in the aftermath of the attacks on the World Trade Center Twin Towers as a touchstone. This serves as a foundation for developing a practical and adaptive crisis management model. The methodology adopted for the study consisted of document analysis, autoethnography, and personal interviews. A review of the literature on organizational crises is followed by interviews conducted with six of the firms directly affected by the 9/11 attack. The interviews were supplemented with an analysis of documents published on the companies involved. We organized these experiences and insights to build the foundation for future crisis event learning. From the empirical data, we developed a novel crisis management model that integrates the essential feedback structure of decision-making and learning in every adaptive system, which distinguishes it from other models. In our findings, key crisis management themes emerged in three areas: (1) creating collaborative, multi-level teams for rapid decision-making can be highly effective, (2) demonstrating genuine, compassionate leadership is paramount to demonstrating responsiveness, and (3) the lessons learned, and insights derived from crises like the World Trade Center attack provide a foundation for firms in the future to manage crisis events. Lessons learned and implications for leadership in times of crises are discussed.

Keywords: crisis management, responsiveness, system adaptation, firm-level strategies, organizational crises

1. Introduction

International tensions are high. Looking back, more than two decades after the crisis of 9/11, we still have much learn. Learning means evolving to create better mental models. Our understanding of crises has been cluttered by inconsistent definitions based on the kind of crisis, its impact, its visibility, and the stakeholder groups affected. Management scholars generally agree that most crises represent decisive moments or significant turning points, which, if handled well, may lead to greater success, or if poorly handled, may threaten the organization's very existence [1, 2]. Researchers have underscored the importance of understanding crises because of the increased frequency of their occurrence, the extensive damage they cause, and their cost to organizations and society [3]. We believe that for organizations to be better prepared to deal with crisis situations, should begin with a clearer understanding of what a crisis is. In this chapter, we propose a new model of the crisis management process that differs from prior models in that it is more comprehensive and adaptable, as required for rapidly changing, critical circumstances. This model organizes the elements of crisis management in a way that is organic, teachable, and understandable for everyone who might have to deal with crisis. The chapter is arranged in the following manner. We begin with a brief literature review which we focus on the extant understanding of organizational crises. We will next introduce the empirical aspects of the study, which was based on document analysis as well as interviews with representative of six of the firms that were directly affected by the attacks on the New York Trade Center Twin Towers on 9/11/2001. This will be followed by the introduction and explanation of our proposed model, and a general discussion of the insights and lessons learned from the experience. We will end the chapter with a conclusion and suggestions for future research.

2. Literature review

In organization studies, earlier writers defined "crisis" as a situation characterized by surprise, high threat to important values, and a short reaction time for the organization [4]. Later, authors declared crises to be events that potentially exceed the containment capacity of even the best-prepared firms [5]. Few if any organizations can effectively prepare for the wide spectrum of potential crises that can arise in today's turbulent environments [6, 7]. Other writers have defined a crisis as a major unpredictable event that, in its aftermath, may have a severe impact on the organization as a going concern by damaging its human resources, its products or services, its market potential, and its reputation [8–10]. Others highlight the fact that a crisis represents a low probability, high impact situation that is perceived by critical stakeholders to threaten the viability of the organization [11].

The picture that seems to emerge is a lack of consensus around a clear definition of the term as well as the normative and prescriptive nature of existing definitions [12]. Part of the problem arises from the fact that the crisis field itself is still ill-defined, resembling a hodgepodge quilt of specialist academics that are scattered over many disciplines [13]. As can be seen in **Table 1**, definitions of what a crisis is have evolved over the decades.

At a system level, a crisis is an event that causes a major disturbance in the homeostatic functioning of the system [22]. We caution, however, that the homeostatic assumptions taken for granted in this description of crisis have been challenged by some from a human psychological perspective [23, 24]. Such a disturbance overwhelms the adaptive capacity mechanisms that the system would ordinarily possess. Under normal conditions, there are many adequate adaptive and re-equilibrating mechanisms in a system built to buffer it from such disturbance [25]. In a crisis,

Decade	Definition
1970s	A situation characterized by surprise, high threat to important values, and a short reaction time for the organization [4].
1980s	Prodromal (forewarning) situations that run the risk of escalating in intensity, falling under close media or government scrutiny, interfering with normal operations, jeopardizing organizational image and damaging a company's bottom line [14]. A serious threat to the basic structures or the fundamental values and norms of a social system, which under time pressure and highly uncertain circumstances necessitates making critical decisions [15]
1990s	A disruption that physically affects a system as a whole and threatens its basic assumptions, its subjective sense of self, its existential core [16]. A major, unpredictable event that has potentially negative results. The event and its aftermath may significantly damage an organization and its employees, products, services, financial condition, and reputation [8]. A low-probability, high-impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly [11]
2000s	A major unpredictable event that, in its aftermath, may have a severe impact on the organization as a going concern by damaging its human resources, its products or services, its market potential, and its reputation [10]. A disruption that undermines participants' basic assumptions about the system within which they work … in such a way that not only are operations fundamentally disrupted, but managers' and other employees' basic assumptions are challenged, [resulting in] a serious threat to the very survival of the organization [17]
2010s	A rare, significant, and public situation that creates highly undesirable outcomes for the firm and its stakeholders… and requires immediate corrective action by firm leaders … a crisis entails three key elements: ambiguity, high stakes, and perceived urgency [18]. A process of weakening or degeneration that can culminate in a disruption event to the actor's – i.e., individual, organization, and/or community – normal functioning' [12] An event perceived by managers and stakeholders to be highly salient, unexpected, and potentially disruptive [19]
2020s	A situation in which a major unexpected or unanticipated external threat is posed to an organization's survival, and which the organization has limited time and/or resources to respond to … that can occur while the environment is uncertain, turbulent and complex [20] A threat to widely shared societal values or life-sustaining systems that evolves over time and space, is foreshadowed by precursor events, subject to varying degrees of political and/or societal attention, and impartially or insufficiently addressed by authorities [21]

Table 1.
Definitions of crisis over the decades.

however, the coping capacity of these mechanisms is exceeded, leading to a rapid deterioration of the system as a whole. Some of the features of crisis events include severe threat; destructive and often life- threatening change to the target; a high degree of uncertainty; need for prompt action; and critical, potentially irreversible decisions [26, 27].

More recent literature shows that the interests in the harmful effects of crises often gloss over the concerns of multiple stakeholders. For instance, during the COVID-19 pandemic, many measures taken in lockdowns aimed at protecting human life ended up compromising the financial security as well as the physical and mental health of millions of people [28, 29]. To mitigate this, some researchers have developed a typology consisting of two dimensions, namely, *accountability* and *attention*, proffering that the typology will assist in the understanding and management of multiple stakeholder interests [28, 30].

However, the models suggested do not emphasize the interdependent decisions of diverse stakeholders that give hope for solutions to better serve all to the extent that our model does. A study by Qadri et al. [31] focuses on knowledge management practices during crises, highlighting the key role that organizational learning plays in organizational performance during of crisis. But their model lacks the essential complete structure that our proposed model offers in the way it anticipates and completely represents the nested and sequential decisions of all stakeholders. Other factors that play a prominent role in managing crises include flexibility and redundancy in resources [32], and employee resilience in managing paradoxical elements that arise [33–35]. Queiroz et al. [34] conclude that "when confronted by a disruptive crisis, managers, practitioners and policy-makers should identify the best resource configurations to create resilience and support performance." It seems resilience should be planned before a crisis. Again, the choice of a "configuration" and design of "resilience" are decisions to be made in advance of a crisis and updated regularly before and during crisis. Our proposed model details this process. Interestingly, a study by Sanders et al. [36] that took a cross-cultural perspective found that in high-uncertainty avoidance countries, where communication from management is clear, consistent, and consensual, the positive effects of crisis severity were stronger than in low-uncertainty avoidance countries. Finally, a study by Aassve et al. [37] highlighted the impact of social shocks arising from a crisis, suggesting that societies will substitute political trust with social trust by shifting their reliance on formal institutions to reliance on informal ones. This brief summation of the most recent literature on crisis management further demonstrates the universality and value of the model suggested in this chapter. Every article considered makes a contribution that can be better understood and made operational with the feedback decision process of crisis management we have here presented.

The significant impact of a crisis, which may lead to the firm's demise, makes it critical for managers to understand and effectively manage these events. Crises come in many forms, including natural disasters such as earthquakes or floods, and in the form of firm-level disruptions such as labor strikes or executive malfeasance. Our research focuses on firm-level strategies for managing crises triggered by events that have an exogenous origin. In the chapter, we will use the term "crisis" to refer to organizational crises. The organizational crisis literature focuses on myriad factors that influence strategies for crisis management, including the psyche of managers, the nature of crisis-triggering events, organizational structures and processes, and environmental variables [11, 38]. Research on the organizational response, however, has primarily focused on industrial crises [39, 40].

3. Models of crisis management systems

According to observations made by Fink [14], there may be as many as four distinct stages in the evolution of a crisis, that is, (1) the prodromal crisis or crisis warning stage, (2) the acute crisis stage—a point of no return when some irreversible damage has been done, (3) the chronic crisis stage—the clean-up phase, and (4) the crisis resolution stage—when things are being restored to normality. In his discussion of a disaster or crisis cycle, Myers [41] identifies the four phases of a crisis as (1) the normal stage that precedes the onset of a crisis, (2) the emergency response phase—the period immediately following a crisis, (3) the interim processing phase—during which temporary measures are taken to support essential functions, and (4) restoration phase—when efforts are made to bring operations back to normal. The problem with most of the extant literature in the field of crisis management is its characteristically unsubstantiated claims and anecdotal proclamations. Empirical work on crisis management has been rather sparse and uneven.

D'Aveni and MacMillan [42] studied the communication patterns among top executives in a sample of 57 bankrupt firms and 57 matched surviving firms and found that executives of failing firms denied or ignored output factors during crisis and paid more attention to the input and internal environments. Irvin and Millar [43] conducted content analysis of over 60,000 records in the Institute for Crisis Management (ICM) database. They found current beliefs about crises to be based on false stereotypes and recommended that crises need to be re-conceptualized to emphasize prevention. Lin et al. [44] studied the impact of restructuring following a crisis focusing on 80 real organizational cases matched with 80 computer-simulated organizations. They found that no design can guarantee continued high performance during a crisis and that restructuring to adapt to a crisis may offer more challenges than solutions. Using survey questionnaires to collect data from *Fortune 500* companies, Mitroff et al. [45] looked at preventative actions undertaken to blunt potential crises. They found that organizations with crisis management units fared better than those without such units. In their study of top managers, CEOs and boards of directors, Schaedler et al. [46] concluded that organizational crises have repercussions on strategic leadership, as it pertains to long-range planning. In studies of organizational crises, others focused on the creative and improvisational decision-making of executives [47–49]. It was found that creative decisions are generated when there is familiarity with solutions, high team member trust, and creative intentions. However, paradoxes have been found to exist in decision-making under crisis situations between intuitive and rational-analytical decision-making [50]. Thus, more research is needed to shed light on this area. These studies are summarized in **Table 2**.

This study is our attempt to contribute to the discourse in crisis management and to help it attain greater coherence. We focus on the empirical work we conducted following the 9/11/2001 attacks on the World Trade Center [51][1]. This work offers relevant empirical data and additional lessons in crisis management. We suggest a new model for analyzing the crisis management process. We discuss how several companies that were directly affected by the attacks responded to the challenge that confronted their businesses, and we examine how they managed one of the deadliest crises in the recent American history. Our analysis is focused on six organizations that were directly impacted by this tragic event. We used structured interviews conducted with the principals or senior managers in the organizations and written accounts obtained from the scholarly and popular press.

The study is focused primarily on the second and third phases of a crisis as defined by Myers [41], in particular, Phase 2, the emergency response phase in the first few days following the attack, and Phase 3, the interim processing phase—during which firms implemented temporary measures to keep functioning, even though in most cases their offices were obliterated. In the sections that follow we present our

[1] The original empirical research was conducted by one of the authors in the difficult months following the 2001 attacks on the World Trade Center. It was prepared as the basis for illustrating the effectiveness or ineffectiveness of handling a very difficult crisis. The author had an office with a spectacular view of the Statue of Liberty from the 91st floor of Tower Two. He was extremely fortunate to have decided to first buy himself a cup of coffee downstairs, out of harm's way, when the first plane struck Tower One.

Author(s)	Focus	Setting	Key arguments/findings
D'Aveni & MacMillan [42]	Communication among top executives	Sample of 57 bankrupt firms +57 matched surviving firms	Executives of failing firms deny or ignore output factors during the crisis and pay more attention to the input and internal environments.
Irvin & Millar [43]	Refuting four stereotypes of crises	Content analysis of 60,000+ records in Institute for Crisis Management (ICM) database.	Current beliefs about crises are false stereotypes: Business crises have not increased. Crises need to be re-conceptualized to emphasize prevention and debunk current stereotypes.
Lin et al. [44]	Impact of restructuring following a crisis	80 real organizational cases matched with 80 computer-simulated organizations	No design can guarantee continued high performance during a crisis. Restructuring to adapt to a crisis situation may offer more challenges than solutions.
Mitroff et al. [45]	Preventative actions undertaken to blunt potential crises	Questionnaire to *Fortune* 1000 corporations	Organizations with a crisis management unit (CMU) fare better than those without one.
Sommer & Pearson [48]	Creative decision-making during organizational crisis	191 individuals, 37 teams in organizational crisis simulations	Creative decisions are generated when there is familiarity with solutions, high team member trust, and creative intentions. More crisis education & training needed.
Bundy et al. [19]	Alignment of fractured findings across multiple empirical studies.	Review of 80+ empirical studies, and others.	Multilevel empirical studies, highlighting the commonalities that exist between them, revealing critical sets of conditions.
Schaedler et al. [46]	Top Management, CEOs, & BOD. Strategic Management & organizational crisis.	Multiple articles and empirical studies. 72 Core, and 377 additional articles.	Organizational crisis has repercussions on Strategic leadership, with emphasis on long-range planning.

Table 2.
Selected empirical studies of organizational crises.

proposed crisis management model and some insights from its application, present the findings from the empirical research conducted for the study, and conclude by discussing the implications and lessons learned from it.

4. The crisis management models

There has been a proliferation of crisis management models, but none is at once parsimonious and complete, with the logical feedback loop structure. The great insight of Norbert Weiner [52] in Cybernetics was that the same essential structure underlies any process that operates to accomplish a purpose, whether in the animal or the machine. Many scholars have elaborated on this basic model to represent human decisions [53–57]. **Figure 1** represents a necessarily similar, more complete, essential process of crisis management.

A crisis is a present or impending "problem" that lies outside the normal range specified by organizational "objectives," and beyond the usual control limits of the system [5, 58]. It follows an extreme disturbance from the environment, or an accumulation of stress, that impacts the system such that its outputs may be disruptive or even destructive to the organization's receiving systems. The dimensions of crises mentioned in the literature include its great magnitude, the requirement for immediate attention, the element of surprise, a pressing need to act, and the fact that it is usually beyond the control of the organization [5, 58]. These elements could be seen in the crisis that arose from the attacks on the twin towers of New York in 2001.

On September 11, 2001, the airplanes that hit the Twin Towers in New York literally impacted "the system;" the buildings and the offices they contained. Analysis of interviews illuminated the decisions during the crisis. Decision-makers, cognizant of their own "objectives" and those of stakeholders, observed changing "feedback," and accumulating "facts" about the "system" and its "outputs." Thus, they detected the actual crisis problems. The public saw the first visual feedback of the 9/11 attacks in the images from the scene. Decision-makers then considered the pattern of

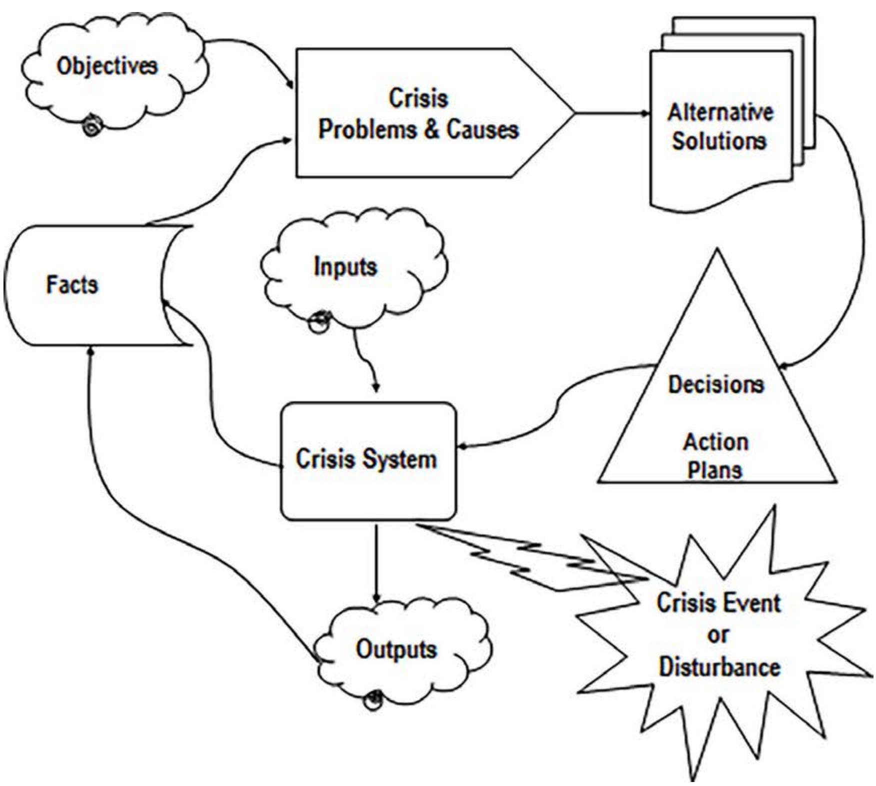

Figure 1.
Crisis management process.

"problems" and "causes" to conceive "alternative solutions." Criteria, including cost, time, feasibility, and unwanted side effects, were applied to the alternatives to select the best solutions to the crisis, the "'decisions." Detailed "action plans" were then formulated for implementing the decisions in the crisis system. As action proceeds, changing feedback indicates progress in resolving a crisis, progress in meeting "objectives" and solving "problems." Decision-making is cyclical, repeated with new objectives and feedback. The model is normative, explaining both natural human decisions and the formal processes of organizational decision-making. It is also positive, prescribing conscious, rational steps to be taken in responding to a crisis. The pressure of a crisis makes this planned, formal process essential. The many decisions required have the same structure and are both nested and sequential. Thus, the model supports collaboration and cooperation.

This model has many advantages. The feedback loop structure represents the required learning process. Without it, the model would fail to allow for the results of past decisions to inform future decisions. Feedback is the fifth of the stages that Mitroff and Pearson [5] aver nearly all crises go through. It is also emphasized by Senge [57] in his model of the learning organization. However, the feedback loop is left out in the crisis management model suggested by Pearson and Clair [11]. In their model, the process ends with success or failure and there is no representation of the system facing crisis. A "triggering" event appears like a bolt of lightning between management "preparations," "reactions," and "responses," which are directly followed by "outcomes." A more dynamic model of crisis management is needed that includes the system being threatened and the environmental influences on it, its inputs and outputs, and the plans and actions directed at it. Reactions and responses will come from those within the crisis system and from the decision-makers trying to manage the crisis systems, highlighting the need for adaptability and flexibility in crises situations.

Features emphasized by other authors may easily be incorporated into our model. For example, Pearson and Clair [11] include executive perceptions about risk. In our model, these are clearly defined as "problems," based on a comparison of perceptions of the "facts" about the system facing crisis, and the expectations of that system's performance, the "objectives." Perceptions of risk are not the only problems, of course. Rising water or falling buildings might be others. "Institutionalized practices" and "industry regulations" rather than providing vague "environmental context" are more clearly appreciated as additional "objectives," defining more potential "problems." "Crisis management preparations" are in prior action plans and have been implemented in system features.

While our model represents the ideal of rational decision-making about crises, it is also a framework for analyzing departures from rationality, as Simon [54] famously showed. Bounded rationality may lead to crises. Indeed, crises are often caused by a delay or disruption in the feedback information flow. A crisis may result from incomplete or delayed action planning. Failure to diagnose and treat underlying causes may lead to progressively worsening problems that rise to crisis levels.

In her literature review, Vašíčková [59] analyzed several of the existing models on the crisis management process with diagrams and suggested a research gap in the domain of empirical research. Comparatively, they inconsistently and incompletely reflect the fundamental process of decision-making. Decision-makers possess and share models of the crisis system that are the basis for risk assessment, problem forecasts, diagnosis of causes, generation and evaluation of alternatives, and planning.

The present crisis management model is offered in hopes that managers can better understand the 9/11 crises; learn from it and apply it to better manage future crises. Analyzing the decision-making processes makes it more likely a future crisis will be contained.

5. Methodology

For this study, we followed methodological triangulation as recommended in the research methods literature [60, 61]. The methodology comprised (a) document analysis, (b) autoethnography, and (c) interviews conducted with the principals with direct involvement in the crisis. For our document analysis, we relied on several articles in scholarly journals and popular press, as well as on books published on the subject. The autoethnographic element of our research was based on the phenomenological experiences and personal observations of one of the authors of this chapter who worked for one of the organizations impacted by the crisis. Autoethnography has the advantage of combining observed phenomena with the individual's autobiographical and personal relationships with situation being studied [62, 63]. For our interviews, we used semi-structured, face-to-face interviews conducted with the leaders or managers who had direct responsibility for their organizations' efforts to cope with human loss, business disruption, and rebuilding required to put these organizations back together. The six companies were selected based on the availability of information, access to interviews, and the overall impact the World Trade Center attacks had on each of them. A summary of the firms in the study is presented in **Table 3**.

As seen on the table, except for Gruzen Samton (LLC) Architects, all organizations experienced a loss of lives, with the greatest tragedy befalling Cantor Fitzgerald. The individuals selected for the interviews were known to one of the co-authors of this chapter, who had an office on a higher floor in Tower Two as noted in the footnote in the subtitle of this section. Most of the interviews took place in New York City a year after the attacks, while the companies were still struggling in the shadow of the crisis. Each interview lasted about an hour. Hand-written notes were taken during the interviews. The notes were analyzed and crossreferenced with relevant accounts in the public domain and with personal knowledge of one of the co-authors of this chapte.

Our research was undertaken to understand and improve decision-making in crisis management. We approached this with three basic questions. First, we wanted to find out how the organizations that suffered the immense losses of the 2001 World Trade Center attacks responded to the crisis. How did they decide what to do? For example, how did they organize, communicate, and rise to the challenge of assisting employees and victims' families in the aftermath of the attack, even while they were silently suffering from the human loss of fallen colleagues? Second, we were interested in how effectively the organizational leadership provided direction, assistance, and comfort during a crisis. What were the qualities of leadership that emerged as most valued during a time of crisis and tragedy? Third and finally, we wanted to identify the important lessons to understand and learn based on how these organizations handled the World Trade Center tragedy. We review the empirical data, incorporating the new model to share lessons firms can use to respond and recover from future management crises.

Company	Total number of employees	Total number of employees at WTC site	Location at World Trade Center	Number of employees lost
Marsh & McLennan Headquarters: Midtown Manhattan	58,000	1908 (includes visitors at time of attack)	Floors 93–100, World Trade Center One; Floors 48–54, World Trade Center Two	295
Port Authority NY & NJ Headquarters: World Trade Center One	8000	2000 (est.)	Various floors, 61–88, World Trade Center One	84
Washington Group International Headquarters: Boise, Idaho	35,000	180	91st Floor, World Trade Center Two	13
Cantor Fitzgerald Headquarters: World Trade Center One	2000	1000	Floors 101–105, World Trade Center One	658
Langan Engineering Headquarters: Elmwood Park, NJ	300	30	90 West Street, NY	1
Gruzen Samton LLP Headquarters: 90 West Street	130	130	90 West Street, NY	0

Table 3.
Organizations involved in the study.

6. Corporate leadership response and teams

September 11, 2001, was unique in American corporate history. Never have more organizations been called on to respond to a single day's tragic events. Consider the following facts, from "feedback" received since the number of persons killed on September 11, 2001, equaled or surpassed those who died during Pearl Harbor's infamous attack in 1941. Moreover, the amount of office space lost in New York that day was the approximate equivalent of the prime office space of the city of Cincinnati, Ohio. The events of 9/11 were without precedent, for this was an air attack on American soil during rush hour in the largest city in the U.S. and an assault on the Nation's Capital at the venerable heart of America's defenses, the Pentagon. How did some of corporate America's most prominent human decision-makers respond? Were they effective in solving the "problems?" Were they ill-prepared for such a disaster? Did they rise to the challenge? What did they do well? Were the necessary steps, shown by our model, successfully performed? Were the objectives of some key stakeholders neglected in defining problems? Was timely feedback incorporated? Were a range of alternatives considered? And so on, through each of the elements of the model. What can we learn from this to help us prepare to deal with tragedy in the future.

It is well-documented that most victims' families of the companies reviewed were reasonably well provided for, though there are subtle differences in benefits from one company to the next. This study examines how individuals responded and, through comparative analysis, highlights the common threads that seem to run through the responses each company elicited. Based on the results of our interviews and the literature review conducted for this study, there are several common threads in the responses of company leadership in the first few weeks following the tragic attacks. In some cases, as with Washington Group and Marsh & McLennan, other senior managers supported HR departments as part of a crisis team. A common occurrence is the formation of special teams to make decisions at times of crisis. The model in **Figure 1** represents such a team's perspective. In the case of Cantor Fitzgerald, HR had been virtually wiped out, so the crisis team, consisting of volunteers and remaining staff, performed the HR role and later designated remaining managers to deal directly with the victims' families. Below is a summary of what occurred at the companies we researched for this study.

6.1 Steps taken by crisis management teams

First, after 9/11, every firm we studied organized a crisis team and a temporary crisis center. Typically, the teams were mixed in rank and experience. In every case we reviewed, there was constant communication between company leadership and the crisis team. For example, in Washington Group International, the crisis center was established at its Princeton, NJ office, which had recently become the eastern region headquarters office, with some 1000 employees on location. This crisis communication center was established almost immediately after the attacks. In addition, the HR department's crisis team headquartered was established in Princeton. The firm's eastern region HR Lead described it as follows:

> *Immediately after the first plane hit Tower One, I tried to contact our World Trade Center office. There was no answer. I immediately went to the Group President, and we again tried to contact the office. (No answer). A few minutes later, I received a call from Peter Gyulavary (a WTC employee located on the 91st floor), who stated the office was evacuated and he was the last one on the floor, and he was leaving now (Peter was never heard from again. His body was found on November 22, 2001, one of the few bodies found relatively intact). A few minutes after that call, we got the report of a second plane crash, and we knew it was a terrorist attack. We immediately set up a crisis team to be headquartered in HR in Princeton.*

Crisis teams communicated with leadership typically twice a day, sometimes more. This represents a nested loop structure of decision-making as different levels of the organization were involved in managing the crisis system. This communication would consist primarily of feedback on the results coming from the crisis system for the leadership's decision-making process. Leadership, in turn, would respond with new decisions and action plans for the crisis team. From the perspective of leadership, the crisis team is part of the crisis system. However, from the team's viewpoint, they play a crucial role in defining problems based on objectives from leadership and making decisions and plans to achieve those objectives. The high frequency of feedback is necessitated by the rapidly changing situation and the intense efforts to achieve quick results. Communication between levels would also contribute to other elements of the process. For example, teams would suggest possible alternatives for the leadership level decisions. Communication would be more frequent, more intensive and would flow in more directions because of the crisis. Understanding the structure of the process, and knowing the receiver is making decisions within a similar structure, would greatly facilitate communication and management at every level, and the integration of levels.

Cantor Fitzgerald, operating without its headquarters office, immediately established its London office as its new headquarters of business operations and utilized its Rochelle Park, NJ office, as its disaster recovery site. Temporary space was also established at the law office of Morgan Lewis in Manhattan, and a crisis center for families and employees was established at the famous Pierre Hotel on the Upper East Side. The crisis system quickly grew in scale and complexity, enabling and requiring increased communication. In the case of Cantor Fitzgerald, only one individual from the nine-person human resource department survived. However, the return of former staffers and the volunteer activities of individuals like Howard Lutnick's spouse, Allison, made establishing a new makeshift HR department possible. One manager, who was at home in Washington, D.C., at the time of the attacks and who was also involved in working with victims' families described the time immediately after 9/11 as follows, "Howard (Lutnick) transferred leadership to the London office and he focused on helping families recover, on dealing with losing his brother and his best friends and hundreds of his workers. In the immediate aftermath, Howard took himself out of the business operations so he could focus on the crisis. It was the right decision." In other words, he created a crisis management process around the existing organization system, which evolved into the crisis management system. He necessarily, if implicitly, followed our model. Every element is indispensable. Formally incorporating and training the model would make crisis management more efficient and effective.

Marsh & McLennan utilized its headquarters office in midtown Manhattan, where they could see the smoke rising from the World Trade Center site. CEO Greenberg describes pulling together a group "mixed in rank, title and functional expertise" to form the crisis team. Again, this is part of creating a crisis management process. The diversity of the team ensures multiple points of view and creativity for dealing with the complex and rapidly changing crisis system. It benefits every step and, most obviously, helps brainstorming of alternatives. Greenberg is reported as stating that his team decided to convert part of the 35th floor of their headquarters, which holds meeting rooms and the company cafeteria, into an emergency communications center. "We ran wires into an open space, set up phone banks, and staffed them with volunteers from every part of the company – some 400 of them ultimately – 24 hours a day," he noted ([64], p. 60). Creating systems for frequent and intensive communication of all aspects of decisions within and between levels is essential.

The Port Authority of New York & New Jersey (PANY&NJ) set up a crisis and control center in its Tech Center building, just outside the Holland Tunnel in Jersey City, NJ. The Port Authority, due to its dual role as owner of the WTC complex as well as its security and transportation role, was highly visible in the media and thus a critical conduit for providing feedback information to speed up the decision-making of diverse stakeholders. The impact of 9/11 was doubly difficult for the Port Authority, since they not only had to deal with the loss of their own employees, but also had to continue to provide services to the public in connection with the recovery efforts. In addition, they were forced to close the Holland Tunnel and the Port Authority Trans-Hudson (PATH) trains to lower Manhattan due to flooding in the PATH tubes under the Hudson River and had to provide alternatives where possible. Crisis management requires considering the decisions of stakeholders, in this case, those seeking public transportation. Again, the model informs every one of the steps each decision-maker must take. Langan Engineering and Gruzen Samton similarly set up response teams and crisis centers, though on a much lesser scale.

The Internet, email, and websites played a critical role in communication and information dissemination. All companies surveyed did an excellent job communicating with employees *via* email. Unfortunately, websites were not always used to the best advantage. Our model shows the essential content and flow of such information.

Washington Group did not update its website for several days after 9/1. Since the company was in the throes of bankruptcy, its website was maintained at its headquarters in Boise, Idaho. It was nearly a week before the company finally rectified the problem, but by that time it had already caused several days of confusion for many of the families and friends of colleagues who worked in the towers. In retrospect, it is most likely that the website was simply overlooked as the company grappled with a human crisis in New York and the reality of a financial crisis in the courts. With the establishment of crisis communication centers and crisis teams, the immediate task at hand, which took days, was to account for the employees who had survived and those who were missing. In general, crisis management requires continually recycling the model of the crisis system, revisiting the steps, after it has been disturbed. Overall, organizational crises have formidable repercussions for organizations, their members, and their environment, and they consequently impose great challenges on strategic leaders [46].

6.2 Responsiveness of identifying the victims, and supporting the survivors

Each company had its share of difficulties dealing with the task of identifying who was killed and who had survived. It was a matter of days, not hours, before this was resolved. In some cases, nearly a week passed before it was firmly established who was lost. The difficulty was compounded by the fact that most bodies were not recovered, and by the fact that it was extremely difficult to account for who was in the building, who might have been away on vacation, and who had just not communicated due to a variety of reasons. Greenberg of MMC, "A number of our employees had been so shocked by their ordeal that they'd left the city or had not answered their phones. We were joyful when more than a dozen colleagues we had presumed lost showed up for work on Monday, September 17. We now know that every one of our people in Tower Two had escaped. But we were left with the devastating reality that we lost 295 members of our corporate family" ([64], p. 61). Greenberg, like so many others coping with this difficulty, made the mistake of declaring to a Wall Street Journal reporter on September 16 that his company had lost 313 people, which was wrong.

For Washington Group, it was days before the list of 13 lost was firmly established, though the head of HR for the eastern region at the time asserts that within 48 hours of the attack, they had identified the survivors. "At 12 hours, 80% of our staff verified as safe. By 4 pm on the 12th, we had 96% of our survivors confirmed. We never determined anyone was killed until Mayor Giuliani declared the efforts a salvage effort and no longer a rescue effort" (interview transcript, July 2003). Crisis management requires careful consideration of new stakeholders and their objectives and problems.

6.3 Missing bodies, misguided Hope

One of the most challenging aspects of 9/11 was the fact that bodies were missing and, in most cases, never were recovered, or if one was to be recovered, it was more likely to be a body part rather than a person's body resembling anything like what they once were. HR Departments were challenged by angry wives, mothers, fathers, and sons who wanted to know the whereabouts of their kin. It was extremely difficult to accept that their relatives had died without their bodies as evidence. For several days after 9/11, attention was turned to the hospitals, where a master list of who was being treated was circulating. Unfortunately, the list was incredibly small, and hospitals were populated by a surplus of doctors, nurses, and EMT volunteers, waiting for a massive influx of the wounded and burned that never materialized. Every crisis is unique, and 9/11 was unprecedented in U.S. history. However, there are broad principles of systems that apply to each situation and the crisis management process is necessarily the same, however implicit or imperfect. The Law of Requisite Variety asserts that the number of possible states of a process must be controlled with matching variety of actions [65]. Could the: "overwhelmed" HR departments have forwarded inquiries to the "surplus" medical staff for compassionate attention?

For several weeks, there were many families of victims who clung to the hope that missing did not mean dead. At companies like Cantor Fitzgerald and Marsh & McLennan and many others, the issue of spouses, relatives, friends, and close family members not accepting the loss of those who were missing continued for days. According to ([66], p. 76), "The Cantor families were not the only ones to think their loved ones might still turn up. There were 'missing' signs all around the city, on makeshift bulletin boards and on cement walls, on streetlamps and on news kiosks." In a way, the mass display of desperate hope fueled many to continue carrying the torch of optimism. One victim's spouse at WGI had posted her husband's picture with the words "missing" underneath on one of the large bulletin boards with hundreds of others. It was part of her way of coping. As cited in ([66], p. 76), Lutnick of Cantor Fitzgerald, however, saw it this way:

> *All these people, they kept holding on to 'missing.' 'He's missing.' They weren't missing. There was not one second, I thought my brother was missing. He was in the World Trade Center when a plane hit and took away all exits. He probably died of smoke inhalation before the building collapsed, which would have killed him anyway. The stairs ... during the bombing in '93, it took an hour and twenty minutes to get down the stairs. So even if they had a clear path down, most of them, virtually all of them, wouldn't have been able to get down in time, especially with the traffic jam on the stairs.*

It seems logical that if a floor plan is needed to help a person process a person's death, then HR should try to provide that floor plan. In the end, even Lutnick, who clearly had a practical and matter-of-fact view of his brother's demise, demonstrated that he understood this process and understood his own need to grieve. A floor plan is one of the models of a crisis system. Preparedness and management require accurate models duplicated in separate locations.

6.4 Company meetings and grief counselors

Another common thread was the hosting of company meetings of employees, families, and friends, usually the first get-together of survivors and families after the tragedy. Cantor Fitzgerald did it, as did Marsh & McLennan, Gruzen Samton, Langan, the Port Authority, and the Washington Group. Addressing stakeholders' crisis concerns are an important part of the response strategies [30], may be considered an important step in the healing process. Meetings are an important avenue for communication and during a crisis, they are essential. In addition to face- to-face meetings, there are many more opportunities and media for communication including virtual meetings, social networking, email, and text messaging. Following 9/11, and especially the COVID-19 pandemic, virtual meetings and remote learning and working have become common. Studies have shown for instance that organizations that had coordinated plans in place were better able to withstand the impact of the COVID-19 crisis [67]. The possibility of similar outbreaks or attacks in future could accelerate this evolution. There should be communication plans for a range of contingencies and messages. Studies have shown, for example, that the crisis management process is valuable in planning the channels and content of communications. Our model is a framework for remote crisis management by virtual teams with emergency succession planning.

The Port Authority, one of the larger employers in the area, held it gathering at Madison Square Garden, but not until nearly 2 months had passed. A former Port Authority Manager interviewed for this chapter, who worked on the 72nd floor of Tower One, stated the meeting was delayed a relatively long time because the executive director of the Port Authority, Neil Levin, had been killed, and it took nearly 3 weeks before a new one was named (Interview transcript, 2003). Crisis management requires organization charts and succession plans to be available at separate locations so that the nested and interrelated decisions that are required can continue.

Exactly 1 week after the tragedy, on Tuesday, September 18, The Washington Group held a meeting of its employees at Pfizer headquarters on 42 cd Street—the first gathering of employees who worked in the towers since the tragedy. Despite the good intentions of HR and the company leadership, the day brought with it some tough criticisms that reflected emotion and anger that time and good company actions eventually resolved. First, the date fell during Yom Kippur, one of the most important Jewish holidays of the year, which angered several of the NY office staff, and at least one refused to attend. Given the overwhelming need to bring people together and the generous offer from Pfizer to make their space available—it was the only day they could—perhaps this criticism was not fully justified. In retrospect, had employees known that a Jewish rabbi was also attending, it may have resolved some of the issues. The division leaders for the Infrastructure and Power groups, represented the company along with other NY office managers, representing all of the NY office functions. However, executive leadership from corporate headquarters was not physically present, but a speaker phone system was set up for the corporate chairman and the president and CEO to address employees by phone from their Boise, Idaho headquarters.

WGI's HR lead at the time explained that he had discouraged the Boise leadership from attending the meeting, recommending against it for several reasons. Upon reflection, he said it was the decision he regretted the most. He stated he should have urged them to attend, noting that, "We had gone through a merger. The company was in bankruptcy, and there had been little communication with the Office of the Chairman – during the merger, they were not visible. I thought there might be a backlash. Who is this guy, suddenly he shows up. And the fact is, no one was psyched about getting on an airplane" (Interview July 2003). To further complicate matters, the company's executive leadership was also in court proceedings regarding the bankruptcy.

After a moving ceremony where those gathered heard the words of one of the NY office employees reading from the bible, a chaplain giving a short speech, and the division president through tears expressing his feelings, the phone lines to the Boise

Corporate headquarters opened. The company president and CEO addressed the group, expressing his condolences, and then telling employees he understood they needed time. Unfortunately, a voice through a speakerphone is not the same as human presence. One key lesson learned from 9/11 is the importance of leadership being visible, available, and present. Had WGI's president and CEO been able to be face-to-face with the families and staff gathered that day in New York, he would have seen the faces of a grief-stricken and emotionally fragile group. Unlike Greenberg and Lutnick, who day in and day out were meeting with their workers and families of victims, the Boise leadership was far away; a voice through a speaker box was not the same as an eye-to-eye greeting or as powerful as a simple hug. With better availability, a video is better than a disembodied voice, but there is value in actual presence. Remote interaction is more part of our lives now. Still, the efficiency of remote crisis management should create time for personal contact.

6.5 Support for the victims' families

From the moment the tragedy struck, HR departments from all the companies we surveyed assigned individuals as liaisons to the victims' families. In the case of Washington Group, the individuals assigned were from the HR Department, and to the extent Marsh & McLennan could, they also assigned HR personnel to work closely with each family. As ([64], p. 61) of MMC notes, "Fourteen people from the human resources department of Putnam, our Boston-based investment management business, jumped into a van and drove to New York to help out. It was an extraordinary act at a time when simply getting into the city was hard, and many were afraid to be there. Retirees, directors, and many other members of the MMC community volunteered to help in any way they could."

At Cantor Fitzgerald, since the HR department had essentially been wiped out, the company fell back on its remaining employees to work with families on an individual basis. For a small firm like Langan Engineering, the task of working with the families was distributed between the firm's partners and the firm's controller. HR performed several functions, aside from assisting families with life insurance, health insurance, and salary payments and distributing special one-time payments; they also were the sounding board for any concerns families had. Sometimes, they even took a proactive role in watching out for families and protecting them from "ambulance chasers" and from those who might try to swindle families in unanticipated ways. As acting HR Manager at Cantor Fitzgerald noted in our interview, "I was responsible for the family of John W…, whom I had brought into the company (his family was in Missouri). We learned that someone was trying to defraud them using (John's) name, and we verified information that they were trying to clean out his account. We made sure that would not happen."

For the most part, the point-person approach worked well, but as noted elsewhere, some families had difficulty accepting that their loved ones were killed, and sometimes they needed to go over the head of the HR person and needed to speak to the person in higher authority. For Howard Lutnick, this was an excruciating challenge, given that there were so many victims, so many different stories, personalities, needs, and problems. For example, as Barbash [68] recounts, one Cantor Fitzgerald employee who was killed had just brought his wife over from India. He was on his way that day to Immigration and Naturalization Services with all of her identification and important papers, and all of that was destroyed in the towers where her new husband also perished. Without a husband, without any proof she was here legally, she faced not only the horrific reality of losing her husband, but also of being without any proof she was legally in the country. Human resource management volunteers within Cantor worked hard to resolve the problem.

In the case of Washington Group, the HR point of contact went to the home of each family they were responsible for, along with a NY Office representative (either the Office Manager or the Operations Manager) and, as the Eastern Region HR lead stated, "provided comfort, shared memories, delivered compassion payments, and provided benefits information." In times of crises, employees turn to their managers for information and guidance. When managers share distinctive, consistent, and consensual information also known as human resource management System strength, it is easy for employees to make sense of information [36].

A few months after 9/11 the company sponsored a luncheon attended by the company Chairman and the President and CEO, an event one described as "a tough meeting" as family members talked at length about particulars their spouses had shared with them about working at the company. This meeting was critical, as it was the first face-to-face between the company's top leadership and the families of the victims. It was this face to face that helped heal in a difficult time and erase any doubts regarding the firm's leaders' concerns and empathy. Lutnick pointed out that many family members would come to him and ask him to retell what he knew about their spouse, as they tried to gather in as many memories as they could, knowing this was all they could hold on to. "And at the center of this were the families. We were supporting each other, sharing information. Maybe I was helping them, but certainly it was helping me to talk with the families. Every time I left the crisis center, I was energized. And I would describe it at the time as physical. Hugging, holding, and crying with the families energized me. I did not need to sleep." ([68], p. 48). At MMC, a "Family Relationship Management Program" was established, where "a relationship manager has been assigned to each family who lost a loved one in the attacks to serve as its single, primary point of contact. Family relationship managers help people get answers to questions and access to resources from within MMC and through other public and private sector sources." Clearly, there is an "emergent" crisis system that cannot be planned in detail, but which can be supported with space and resources, and managers are vital in assisting employees in overcoming difficulties in a crisis [33].

6.6 Helping employees recover and move forward

While the focus of this chapter until now has been on how HR responded to families of victims, on another, important front, were those employees who remained, who had been scattered to offices hither and yon, and in one case, what was once housed in one office was now spread out to 10 different locations while the company searched for new quarters. At the Port Authority of New York and New Jersey, employees were spread to multiple offices throughout New York City and in Jersey City. Some were placed in Manhattan, in midtown offices, some at the Tech Center in Jersey City, across the Hudson River, and some out to JFK and LaGuardia airports. It was difficult to find someone at the Port Authority without making multiple calls. At Gruzen Samton, our interviewee described housing its 130-person staff in 10 different offices for nearly 2 months, with one office selected as the "home" office where all calls were screened, and callers were given the number of the person they were looking for. At Washington Group, the New York office was scattered to Princeton, and to Jersey City, and some worked within space provided by a subcontractor in midtown

Manhattan, while a few others were sent to other satellite offices in the region. Crisis management networks can be planned, but planning should also prepare for interruption of infrastructure, including internet. Cyber terrorism could wipe out the internet or the electric grid for periods of time. A future crisis could force suspension of most activity. Crisis hibernation with activity resumed in stages.

Numerous accounts from each of the companies reviewed show that many employees who became immersed in their work, drawn in with a sense of purpose, working to restore data and reassure clients who were fighting to get their companies back on track, were able to get past their grief while at work. Or in some cases, they would postpone it until a later time when they would then need the help of counselors to truly cope. Greenberg ([64], p. 62) notes about MMC, "Between caring for our people and managing the business, many of us were putting in long days. We lost our sense of time. I would not think about it until I looked at my watch at some point in the evening and realized I'd started my workday almost 18 hours earlier. I could see the profound fatigue in the faces of my colleagues, but it did not seem to matter to any of us because of all the things we needed to do." For Marsh & McLennan, the office space issue was not as problematic as it was for companies like Washington Group, Gruzen Samton, and others. MMC's headquarters was in Midtown, the corporate culture was New York-based and displaced employees could show up at the corporate office. Creating new systems drained much time and resources. Crisis management would be improved with a portfolio of models for different dimensions and levels of decision-making, all based on our model. For example, distributed HR or information systems with participation allocated by AI based on experience and availability. With a resolution of hours rather than years for assigning people to functions, a given employee could shift from one department to another. A matrix organizational structure offers the required flexibility.

Washington Group requested that many of those from the New York office report to Princeton—the closest functional office and the regional headquarters. For many, especially those living in Connecticut or Long Island, this was quite a distance—the commute alone could be as long as 2 hours or more each way. While just a temporary situation, the days quickly became weeks, and the situation was difficult. It should be noted that Washington Group had planned a substantial layoff in its New York office that was to take place at the end of September. This was a necessary part of downsizing that resulted from the merger and was to have hit the New York office particularly hard. September 11 changed everything, and any planned layoffs in New York were put on indefinite hold.

However, not all employees were able to get absorbed in their work to get past the horrific tragedy of 9/11. While an exact number is not known, many World Trade Center employees who survived simply did not want to continue to work in New York City for the near term. Some of these went out on extended disability, while others moved out of New York and into other areas of the region or country. What was noted, however, is that all of the companies reviewed here displayed a great deal of patience with and care for their employees. Crisis management requires restoring the organizational structure and then adapting it. A temporary matrix structure could deploy every existing department to every dimension of the crisis. Again, the crisis management process supports defining problems, considering alternative organization structures, and selecting among them according to the situation. Crisis management teams are created, and the process supports managing new teams, even self-organized teams as appropriate.

One of the most critical steps moving forward was restoring data and equipment required to get things done. For engineers and architects working on significant design projects, the impact of the loss of data was incalculable. In many instances, clients had previous versions of work that they provided back for copying. And little annoyances could disrupt a day, such as rudimentary office supplies, like pencils, and scissors and staplers—starting from scratch. As one representative of Gruzen Samton noted in an interview, “Suddenly, there was a huge difference. We had an empty temporary space we could use – but we had to get the office supplies, everything.”

For everyone interviewed, the most important step in the aftermath of 9/11 was establishing a new, permanent office. Washington Group, Langan Engineering, and Gruzen Samton experienced great difficulty with this, and it created considerable problems for employees who tried to continue. Working in a temporary space, uncertain where the office might end, caused many to focus inwards. One of the problems at Washington Group was the creation of impromptu “shrines” to those who were killed within the temporary space WGI was using. These shrines were not unique to WGI, as even Greenberg [64] refers to them in his *Harvard Business Review* article. “Pictures of the missing began to cover the walls. The 35th floor quickly became a living memorial – an ongoing, mass wake. It was hard to be there and harder not to be.” At Washington Group, this sense of a “mass wake” lingered past January 2002. These included photos of the victims, articles from newspapers around the region, photos of the towers being hit, and memorabilia reminding employees of their fallen colleagues. While initially this seemed a natural way of processing the loss, after several months it became morbid and seemingly unhealthy, and certainly did little for morale. The newly appointed Office Manager of WGI finally had to request that employees remove the “shrine” from its prime location. Crisis management means managing the culture of the organization that has been impacted. People in the organization likely represent diverse cultures. Again, diversity means resilience and adaptability by offering more perspectives and alternatives. Appreciation of diversity, as would be displayed by a respectful, courteous attitude toward the artifacts that made up the shrines, in this case, is an important aspect of disaster preparedness.

George Leventis of Langan Engineering agreed that delay in finding new office space was problematic, “Morale for our New York office staff that was housed in temporary offices was really low until we were able to finally identify another space. Once we had identified the space, everyone perked up and began focusing on the new office, and when we moved in, life changed. There were smiles again” (Interview, August 2003). Leventis and others described the search for space as an extremely difficult process, especially for those who had no other office space in New York in the following way, “Initially, we all thought there would be a shortage of office space due to the destruction. The New York real estate market responded by offering new space at very high prices and we simply could not afford it. One deal we thought we were going to make fell through. But as time went on, the shortage never materialized and agents who had originally shown us space we thought too expensive called us back with lower prices.” A senior manager at Washington Group’s New York office regretted the length of time it took the company to re-establish permanent space in New York. WGI and Langan, as example, did not have a new permanent office until spring, 2002, more than 6 months after 9/11. “The most egregious thing that happened (at Washington Group) after 9/11 was we did not get into new floor space soon enough – there was not enough focus on this” (Interview with senior WGI Manager August 2003).

When WGI, Langan, Gruzen Samton, and others finally dedicated new space, it felt like the weight of the world had been lifted. At the New York office Open House for WGI's new space at Two Penn Plaza, there was a palpable sense of relief. Quickly, the somber post 9/11 atmosphere was transformed—new furniture, new address, and a new start. It was a complete turnaround and a real sense of turning the page.

7. Leadership at a time of crisis and tragedy

Crisis management requires strong and decisive leadership. According to Winston & Patterson [69], a leader is a person (or people) responsible for selecting, equipping, training, and influencing their followers who possess diverse gifts, talents, and skills such that they channel their efforts into willingly expending their spiritual, emotional, and physical energy to achieve the organizational goals and objectives. This description can be easily parsed to fit our model and is thus better understood and operationalized. That exercise reveals essential elements and dimensions that are left implicit, and so may be neglected in practice. For example, what role does feedback play in leadership? Research in leadership has delved into the different types of qualities of leadership that contribute to its effectiveness [69–73]. Among these attributes are the following: active listening, a capacity for empathy, the ability to motivate and inspire others, and transformational and transcendental leadership, all crucial during a crisis situation. While the scope of this study was not intended as an in-depth review of the various qualities of leadership mentioned above, we intended to explore some of emerging trends and to lay the groundwork for future research on the leadership qualities the most useful in handling a major crisis situation. Based on our literature review and interviews and meetings with key leaders of several companies, several things emerged as most important features of leadership immediately following the 9/11 attacks. First, leadership needs to be visible, accessible, and communicative with employees and staff at all levels, including the families. Second, there was a need to push ahead in a compressed timeframe and remain focused while attempting to provide leadership during the crisis. Third, leaders must express compassion and listen to their employees and families "without prejudice." Fourth, there was a major need for adaptability—companies that fared the best were those that could meet the "needs of the moment." Fifth, leaders need to show that they put human relationships and people ahead of profits and business. There are many other qualities that could be discussed here, but these are the primary ones that surfaced during this study. All these aspects are best supported by a complete representation of the process of crisis management, provided by our model.

7.1 Leader visibility and accessibility

As noted elsewhere in this study, the leaders who chose to be in and among their personnel, and who chose to meet with families did a better job of keeping morale and avoiding resentment. Jeffrey Greenberg of Marsh & McLennan and Howard Lutnick of Cantor Fitzgerald, as example, were headquartered in New York. Greenberg was highly successful in his efforts to refocus Marsh & McLennan in the face of horrific tragedy and loss. Lutnick, while he came under substantial criticism in the press for "turning his back" on his promises, has shown through time that he was living up to his commitments. As a leader, he could be seen as monitoring and responding to the "feedback" from media. One person who did an exceptional job of maintaining visibility, accessibility, and an open door was Frank Lombardi, Chief Engineer for the Port Authority. Lombardi inspired hundreds of engineers at numerous conference meetings, breakfasts, and events in the engineering and construction community throughout the fall of 2001. When he spoke at the Society of Military Engineers, NY Chapter dinner dance in early November 2001, he inspired the entire audience to their feet as he detailed his story of survival, his efforts in the recovery, and the importance of everyone moving forward, building on the positive, and never forgetting those we lost. His personal example was a model, one among those that inform the crisis system, and everyone involved.

7.2 Staying focused in compressed timeframe

There is a difference between putting aside feelings and showing emotion. All the leaders we have observed or examined for this study showed emotion during the immediate aftermath of 9/11. If you were human, you were going to show emotion. But those who described putting aside their feelings and staying focused really were able to accomplish extremely difficult tasks. This did not just extend to the senior corporate leaders, but to key managers on the firing line, trying to get things done. Our model enables focus as each step is clearly set out.

7.3 Leaders express compassion and listen without prejudice

Perhaps no other leader in the post-9/11 crisis had done more listening than Howard Lutnick. With 658 employees dead and a company on the brink of extinction, Lutnick spent the majority of his days at Ground Zero, or at the crisis center established by Cantor Fitzgerald to "listen" to employees and their families in their hour of need. "Listening" is attending to "feedback." While he still took heat in the media for terminating paychecks only a short time after 9/11, ultimately, to save the company and share profits with victims' families in the future, his compassion and ability to listen to his employees were overlooked by the media. Perhaps his mistake was that his expression of emotion may have been too public, as Barbash notes. While many consider it a significant leadership quality to express compassion; compassion is different from showing emotion. Showing emotion can go too far for a leader, particularly if it is played out in the media: He obtained the feedback, but did not follow through the crisis management process to solve the paycheck problem.

7.4 Leadership and adaptability

The behavior of two CEOs in the aftermath of 9/11 illustrates how a leader's ability to adapt to and exhibit new behaviors is an important leadership skill in a crisis. In the case of Marsh & McLennan, CEO Jeffrey Greenberg [64] described how being able to adapt to the situation was key, from how his overall approach to leadership, such as his frequency of communication, ability to change priorities, and willingness to using different methods of communication, to simply being able to be flexible in the face of unexpected developments. For the President and CEO of Washington Group, Steve Hanks, adaptability could also be described as "transformation." He was at a distance from the physical events occurring in NY on 9/11 and described how when he first watched events on television, he did not realize the significance.

After meeting with victims' families sometime later, he began to fully comprehend the nature of what had happened. His transformation not only led him to be more compassionate in his dealings with employees but also the company's direction began to shift. Within a few years, Washington Group became a leader in employee training and a desirable place to work, captured by the motto "People, Performance, Profitability."—People first. Greenberg obtained continuous feedback and used it to generate a wide range of alternatives, implemented in adaptation that led to transformation and success.

7.5 Putting people ahead of profits

The ability to communicate and relate to the human element of a crisis resounds as a critical characteristic of leaders in a crisis. Our interviews and research clearly validated this. One leader stated that, "The crucible is a moment like September 11, when we had to make choices fast and instinctively" [64]. Decisions to work closely with families and make changes that led to both immediate and long-term assistance and benefits to victims' families demonstrated not only compassion but gave meaning to the sense of commitment to people. Our model also represents the problems and striving of human stakeholders. Understanding fosters empathy, support, and long-term success for all.

8. Lessons learned from the world trade center attacks

In the broadest sense, the most significant lesson from the World Trade Center experience is perhaps the age-old principle more recently popularized by Pfeffer [74] in the subtitle of his book, *The Human Equation*, and that is putting people before profits. This is the most obvious lesson, the easiest to understand, and yet the hardest to practice in its fullest sense. Money, profit, is a simplistic objective that often overwhelms others and hijacks the whole management process. All the subjects we interviewed agreed on this. Perhaps one of the Cantor Fitzgerald managers said it best when he stated that, "Profits needed to take a back seat to people … there's also the human side that needs to be taken into account" (Interview transcript, 2003). Some of the more practical aspects of coping with 9/11 that emerged in its aftermath include the following:

Leadership and physical presence. Leadership needs to be visible, accessible, and communicative. It is especially important that communication flow both ways. Leaders may not have all of the answers, but they must do their best to share what they can. And they need to listen, especially to those who are in their hour of need. Also, never underestimate the power of personal contact. While sometimes a phone call of even a Zoom call may be all that can be offered, there is no substitute for being able to express compassion in-person. Effective crisis leadership is characterized by rapid response offered in situations rather than from elsewhere, and intense, short-time work, in the here and now [75]. If you are the parent company, and the disaster strikes miles away at a subsidiary, assume that you cannot know all that is going on there unless you go there and take the time to find out. Media reports cannot substitute for your own fact-finding. Recognize also that there may be subtle or not so subtle cultural differences between where your headquarters are and where the tragedy has struck and adapt.

Social media. Practically speaking, utilize the strength of social media to full benefit.

Websites and social media tools (Instagram, Facebook, Twitter) have evolved significantly in the 10 years since the attacks. These are effective and practical communication tools. This is not the only way or the best way to communicate. September 11, 2001 also changed how IT departments needed to organize. For example, it demonstrated how it made little sense to have a main server with all of your important data in the same office as your headquarters; at a minimum, there needs to be a truly reliable back-up. Subsequent to the attacks, companies have heeded this lesson knowing that despite everyone's best intentions and IT plans, much data was lost and never recovered.

The human dimension. A vast array of responses and behaviors fall into the overall "human" dimension of effectively confronting a crisis. This includes everything from assistance and benefits to the families of victims, providing grief counseling, and to helping those employees who continue on by quickly finding new office space if warranted. More than one company studied here suffered longer than they should have due to the delay in getting office space. And the power of human spirit should not be overlooked. Humans can rise to the occasion. Humans are extremely resilient and, when called upon, have the ability to meet the greatest of challenges. This is the spirit that elsewhere is called *ubuntu*—the notion of caring and sharing in times of joy and in times of tribulation, that your suffering is mine, and that we are all in this together and together we can do more than each of us can individually [76, 77]. A key element of those firms that were effective in dealing with the 9/11 crisis was that teams were established from the earliest moments: crisis teams, HR teams, leadership teams, and recovery teams. The notion of working together in teams had its biggest test run ever.

9. Discussion and conclusion

We begin our conclusion first with a disclaimer about the methodology we followed in the study and then a summary of the substantial issues that came up while conducting this research. By all historical accounts, the 9/11 attack was an unprecedented event. Because of the qualitative nature of our study the perceptual assessment nature of the information gathered has sometimes been criticized since the format requires the respondent to recall complex and difficult events [78]. Some have suggested that such recall may be inaccurate [79, 80]. The main source of the inaccuracies is the cognitive limitation of people as information processors [81, 82]. Cognitive psychologists have found that people display predictable biases when responding to questions or confronting problems [83]. When dealing with complex problems, people often rely on heuristic principles and cognitive simplification processes [84, 85]. This does not mean that executives' cognitive propensities completely overwhelm reality, but does indicate that their mental representations significantly bias their interpretation of the organization and its environment [86]. One example is the over-response to vivid or dramatic information that imbues it with a larger role in influencing opinion than justified by its objective content [87]. Of course, more recently, the advent of social media in the form of YouTube, Tik-Tok, Instagram, X, etc., has introduced a new twist to how information is obtained. The relationship between the availability of social media and crisis situations has been investigated by several researchers [88, 89]. On one hand, the assessments show that social media is helpful in terms of making available lots of data for analysis. On the other, social media distrust tends to create confusion in sense-making during times of crisis whether related to man-made or natural disasters such as hurricanes and pandemics [88, 90], leading some scholars to suggest that it should be avoided [91].

As noted above, crisis management means adaptation to severe threat, destructive, and often life-threatening change, involving a high degree of uncertainty [26, 27]. Our model of the crisis management process is based on the feedback loop structure, which is essential to every process of adaption, including human learning and the process of evolution itself. In nature, the environment poses problems, and evolution selects the best solutions from those offered by random mutation. Successful crisis management means learning quickly, creatively inventing solutions, and evolving new systems to solve new problems as they arise. As seen in other crises (e.g., Covid-19), there is a strong consensus that the core strategic advantage of an organization lies in its ability to learn and respond to challenges [31], and for decision-makers to be prepared [32]. This requires a high degree of consciousness of the systems and processes involved. Using the decision process as we have described it and realizing that other decision-makers and processes have similar structures will enable more rapid learning and adaptation to future crisis situations.

An essential element of the crisis management model and of all decisions is diagnosing causes. The importance of this is evident in the medical context. Merely treating symptoms means they will recur. Similarly, crises do recur. The World Trade Center crisis was unique in some ways, but it was one among many acts of terrorism. We would do well to look beyond it—into the patterns of violence, inequality, and ignorance that motivate terrorists. We do not want to imagine there could be any justification for such acts, so we rarely inquire about the decision processes that lead to them, but we should. Across all crises, there are patterns that we recognized when examining the World Trade Center crisis. Our model supports integrating these insights into new ones for evolving improved crisis management in the future.

Author details

Mzamo P. Mangaliso[1]*, Bradford J. Knipes[2], Stephen A. Gazillo[3] and Maureen McGuinness[1]

1 Isenberg School, University of Massachusetts, Amherst, MA, USA

2 Westfield State University, Westfield, MA, USA

3 AECOM Technical Services, Rocky Hill, CT, USA

*Address all correspondence to: mangaliso@isenberg.umass.edu

References

[1] Brockner J, James EH. Toward an understanding of when executives see crisis as opportunity. Journal of Applied Behavioral Science. 2008;**44**(1):94-115

[2] Penrose JM. The role of perception in crisis planning. Public Relations Review. 2000;**26**(2):155-171

[3] Shrivastata P, Mitroff II, Miller D, Miglani A. Understanding industrial crises. Journal of Management Studies. 1988;**25**(4):287-303

[4] Holsti OR. Limitations of cognitive abilities in the face of crisis. In: Smart CF, Stanbury WT, editors. Studies in Crisis Management. Toronto, Canada: Butterworth & Company; 1978

[5] Mitroff II, Pearson CM. Crisis Management. San Francisco, CA: Jossey-Bass; 1993

[6] Lerbinger O. The Crisis Manager: Facing Risk and Responsibility. Mahwah, NJ: Laurence Erlbaum; 1997

[7] Silva M, McGann T. Overdrive: Managing in Crisis-Filled Times. New York: John Wiley & Sons; 1995

[8] Barton L. Crisis in Organizations: Managing and Communicating in the Heat of Chaos. Cincinnati, OH: South-Western Publishing Company; 1993

[9] Campbell R. Crisis Control: Preventing and Managing Corporate Crises. Englewood Cliffs, NJ: Prentice Hall; 1999

[10] Mitroff II, Anagros G. Managing Crises before they Happen: What every Executive and Manager Needs to Know about Crisis Management. New York: AMACOM; 2001

[11] Pearson CM, Claire JA. Reframing crisis management. Academy of Management Review. 1998;**23**(1):59-76

[12] Williams TA, Gruber DA, Sutcliffe KM, Shepherd DA, Zhao EY. Organizational response to adversity: Fusing crisis management and resilience research streams. Academy of Management Annals. 2017;**11**(2):733-769

[13] Dayton BW. Managing crises in the twenty-first century. International Studies Review. 2004;**6**(1):165-194

[14] Fink S. Crisis Management: Planning for the Inevitable. New York: AMACOM; 1986

[15] Rosenthal U, Charles MT, Hart PT, editors. Coping With Crises: The Management of Disasters, Riots, and Terrorism. Springfield, IL: Charles C Thomas Publications Limited; 1989

[16] Pauchant TC, Mitroff II. Transforming the Crisis-Prone Organization. San Francisco, CA: Jossey-Bass Publishers; 1992

[17] Carmeli A, Schaubroeck J. Organizational crisis-preparedness: The importance of learning from failures. Long Range Planning. 2008;**41**(2):177-196

[18] James EH, Wooten LP, Dushek K. Crisis management: Informing a new leadership research agenda. Academy of Management Annals. 2011;**5**(1):455-493

[19] Bundy J, Pfarrer MD, Short CE, Coombs WT. Crises and crisis management: Integration, interpretation, and research development. Journal of Management. 2017;**43**(6):1661-1692

[20] Zafari K, Biggemann S, Garry T. Mindful management of relationships

during periods of crises: A model of trust, doubt and relational adjustments. Industrial Marketing Management. 2020;**88**(7):278-286

[21] Boin A, Ekengren M, Rhinard M. Hiding in plain sight: Conceptualizing the creeping crisis. Risk, Hazards & Crisis in Public Policy. 2020;**11**(2):116-138

[22] Katz D, Kahn RL. The Social Psychology of Organizing. New York: Wiley; 1966

[23] Taplin. Crisis theory: Critique and reformulation. Community Mental Health Journal. 1971;**7**(1):13-23

[24] Von Bertalanffy L. General System Theory. New York, NY: George Braziller; 1968

[25] Thompson JD. Organizations in Action. New York, NY: McGraw-Hill; 1967

[26] Breecher M. State behavior in international crisis. Journal of Conflict Resolution. 1979;**23**:446-480

[27] Kouzmin A, Jarman AMG. Policy advice as crisis: A political redefinition of crisis management. In: Dayton BW, editor. The Forum on Managing Crises in the Twenty-First Century. Vol. 6. New York: Oxford Academic, International Studies Review; 2004. pp. 182-194

[28] Leoni G, Lai A, Stacchezzini R, Steccolini I, Brammer S, Linnenluecke M, et al. Accounting, management and accountability in times of crisis: Lessons from the COVID-19 pandemic. Accounting, Auditing & Accountability Journal. 2021;**34**(6):1305-1319

[29] Schippers MC. For the greater good? The devastating ripple effects of the Covid-19 crisis. Frontiers in Psychology. 2020;**11**:577740

[30] Iqbal F, Pfarrer MD, Bundy J. How crisis management strategies address stakeholders' sociocognitive concerns and organizations' social evaluations. Academy of Management Review. 2024;**49**(2):299-321

[31] Qadri UA, Ghani MB, Bibi S, Tahir AH, Farooq MI, Kashif AR. The learning effect on organizational performance during a crisis: A serial mediation analysis with knowledge creation, storage and sharing. European Journal of Management and Business Economics. 2024;**33**(1):37-53

[32] Mayberry R, Boles JS, Donthu N, Lucke JT. Crisis response in an era of Knightian uncertainty. Journal of Business Research. 2024;**170**:114288

[33] Genqiang L, Yueying T, Yong M, Min L. Change or paradox: The double-edged sword effect of organizational crisis on employee behavior. Journal of Organizational Change Management. 2024;**37**(2):439-462

[34] Queiroz MM, Wamba SF, Raut RD, Pappas IO. Does resilience matter for supply chain performance in disruptive crises with scarce resources? British Journal of Management. 2024;**35**(2):974-991

[35] Tekletsion BF, Gomes JF, Tefera B. Organizational resilience as paradox management: A systematic review of the literature. Journal of Contingencies and Crisis Management. 2024;**32**(1):e12495

[36] Sanders K, Nguyen PT, Bouckenooghe D, Rafferty AE, Schwarz G. Human resource management system strength in times of crisis. Journal of Business Research. 2024;**171**:l114365

[37] Aassve A, Capezzone T, Cavalli N, Conzo P, Peng C. Social and political

trust diverge during a crisis. Scientific Reports. 2024;**14**(1):331

[38] Wu YL, Shao B, Newman A, Schwarz G. Crisis leadership: A review and future research agenda. The Leadership Quarterly. 2021;**32**(6):101518

[39] Sharma S. The challenge of predicting economic crisis. Finance & Development. 1999;**36**(June):40-42

[40] Smith D. Beyond contingency planning: Towards a model of crisis management. Industrial Crisis Quarterly. 1990;**4**(4):640-657

[41] Myers KN. Total Contingency Planning for Disasters. New York: John Wiley & Sons; 1993

[42] D'Aveni RA, MacMillan IC. Crisis and the content of managerial communications: A study of the focus of attention of top managers in surviving and failing firms. Administrative Science Quarterly. 1990;**35**(4):634-657

[43] Irvine RB, Millar, DP. Debunking the stereotypes of crisis management: The nature of business crises in the 1990's. In: Barton L, editor. New Avenues in Risk and Crisis Management. Vol. 5. Las Vegas, NE: UNLV Small Business Development Center; 1996. pp. 51-63

[44] Lin Z, Zhao X, Ismail KM, Carley KM. Organizational design and restructuring in response to crises: Lessons from computational modeling and real-world cases. Organization Science. 2006;**17**(5):598

[45] Mitroff II, Pauchant TC, Shrivastava P. The structure of man-made organizational crises: Conceptual and empirical issues in the development of a general theory of crisis management. Technological Forecasting and Social Change. 1988;**33**(2):83-107

[46] Schaedler L, Graf-Vlachy L, König A. Strategic leadership in organizational crises: A review and research agenda. Long Range Planning. 2022;**55**(2):102156

[47] Pearson CM, Sommer SA. Infusing creativity into crisis management. Organizational Dynamics. 2011;**40**(1):27-33

[48] Sommer A, Pearson CM. Antecedents of creative decision making in organizational crisis: A team-based simulation. Technological Forecasting and Social Change. 2007;**74**(8):1234-1251

[49] Tabesh P, Vera DM. Top managers' improvisational decision-making in crisis: A paradox perspective. Management Decision. 2020;**58**(10):2235-2256

[50] Bonelli MI, Liu J. Rational strategic decision-making during crises: A process approach. International Journal of Management and Decision Making. 2023;**22**(4):388-411

[51] Gazillo SA, Mangaliso MP. The Crisis of 9/11: Organizational Responses to the Attacks on the World Trade Center. Working Papers. Amherst, MA: Isenberg School of Management. University of Massachusetts; 2005

[52] Weiner N. Cybernetics or Control and Communication in the Animal and the Machine. Cambridge, MA: MIT Press; 1948

[53] Odiorne GS. Four magic moments in changing behavior. Training. 1991;**28**(6):43-51

[54] Simon HA. Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations. New York: Simon & Schuster; 1958

[55] Mangaliso MP, Mir RA, Knipes BJ. Towards a framework of firm responsiveness to turbulent environments. Southern African Business Review. 1998;**2**(2):25-37

[56] Senge PM. Learning to Alter mental models. Executive Excellence. 1994;**11**(3):16-17

[57] Senge PM. The Fifth Discipline: The Art and Practice of the Learning Organization. New York: Currency Doubleday; 1990

[58] Reilly AH. Are organizations ready for crisis? A managerial scorecard. Columbia Journal of World Business. 1987;**22**(1):79-88

[59] Vašíčková V. Crisis management process-a literature review and a conceptual integration. Acta Oeconomica Pragensia. 2019;**27**(3-4):61-77

[60] Denzin NK, Lincoln YS. The SAGE Handbook of Qualitative Research. Vol. 3. Thousand Oaks, CA: Sage Publishers; 2005

[61] Lagunas RM. Doing ethnographic research as an insider-outsider: Reflections on building relationships and doing reciprocity. In: Warriner DS, Bigelow M, editors. Critical Reflections on Research Methods: Power and Equity in Complex Multilingual Contexts. Salisbury, UK: Riverside Publishing Solutions; 2019. pp. 71-84

[62] Rice BM. Changing knowledge and cultures in teacher education: Autoethnography for critical reflection. In: Tierney RJ, Rizvi F, Ercikan K, editors. International Encyclopedia of Education. 4th ed. Elsevier; 2023. pp. 136-142

[63] Spry T. Bodies of/as evidence in autoethnography. International Review of Qualitative Research. 2009;**1**(4):603-610

[64] Greenberg JW. September 11, 2001: A CEO's story. Harvard Business Review. 2002;**80**(10):58-64

[65] Ashby WR. An Introduction to Cybernetics. London, UK: Chapman & Hall; 1956

[66] Barbash T. On Top of the World. New York, NY: HarperCollins Publishers; 2003

[67] Mattei P, Vigevano L. Contingency planning and early crisis management: Italy and the COVID-19 pandemic. Public Organization Review. 2021;**21**(4):647-663

[68] Barbash T. On Top of The World: Cantor Fitzgerald, Howard Lutnick, and 9/11 - A Story of Loss and Renewal. New York, NY: Harper Paperbacks; 2002

[69] Winston BE, Patterson K. An integrative definition of leadership. International Journal of Leadership Studies. 2006;**1**(2):6-66

[70] Walumbwa FO, Avolio BJ, Gardner WL, Wernsing TS, Peterson SJ. Authentic leadership: Development and validation of a theory-based measure. Journal of Management. 2008;**31**(4):89-126

[71] Avolio BJ, Gardner WL. Authentic leadership development: Getting to the root of positive forms of leadership. Leadership Quarterly. 2005;**16**(3):315-358

[72] Bass BM, Avolio BJ, Jung DI, Berson Y. Predicting unit performance by assessing transformational and transactional leadership. Journal of Applied Psychology. 2003;**88**(2):207-218

[73] Luthans F, Avolio BJ. Authentic leadership development. In: Cameron KS, Dutton JE, Quinn RE, editors. Positive Organizational Scholarship: Foundations of a New Discipline. Vol. 241. Oakland, CA: Berrett-Koehler; 2003. pp. 241-258

[74] Pfeffer J. The Human Equation: Building Profits by Putting People First. Cambridge, MA: Harvard University Press; 1998

[75] Waldron J. Crisis intervention. British Journal of Hospital Medicine. 1984;**31**:4283-4287

[76] Mangaliso MP. Building competitive advantage from Ubuntu: Management lessons from South Africa. Academy of Management Executive. 2001;**15**(3):23-33

[77] Tutu D. No Future without Forgiveness. London: Rider Books; 1999

[78] Phillips LW. Assessing measurement error in key informant reports: A methodological note on organizational analysis in marketing. Journal of Marketing. 1981;**5**:395-414

[79] Hoffman P. The paramorphic representation of clinical judgment. Psychological Bulletin. 1960;**47**:116-131

[80] Slovic P. Analyzing the expert judge: A descriptive study of stockbrokers' decision processes. Journal of Applied Psychology. 1969;**53**:255-263

[81] Griffiths TL. Understanding human intelligence through human limitations. Trends in Cognitive Sciences. 2020;**24**(11):873-883

[82] March JG, Simon MA. Organizations. New York: Wiley; 1958

[83] Tversky A, Kahnemann D. Judgment under uncertainty: Heuristics and biases. Science. 1974;**185**(4157):1124-1131

[84] Duhaime IM, Schwenk CR. Conjectures on cognitive simplification in acquisition and divestment decision making. Academy of Management Review. 1985;**10**(2):287-295

[85] Schwenk C. Cognitive simplification processes in strategic decision-making. Strategic Management Journal. 1984;**5**(2):111-128

[86] Ireland RD, Hitt M, Bettis R, De Porras DA. Strategy formulation process: Weaknesses indicators and environmental uncertainty by managerial level. Strategic Management Journal. 1987;**8**(5):469-485

[87] Nisbett R, Ross L. Human Interference: Strategies and Shortcomings of Social Judgment. Englewood Cliffs, NJ: Prentice-Hall; 1980

[88] Mirbabaie M, Bunker D, Stieglitz S, Marx J, Ehnis C. Social media in times of crisis: Learning from hurricane Harvey for the coronavirus disease 2019 pandemic response. Journal of Information Technology. 2020;**35**(3):195-213

[89] Saroj A, Sukomal P. Use of social media in crisis management: A survey. International Journal of Disaster Risk Reduction. 2020;**48**:101584

[90] Sadiq MT, Mathew SK. The disaster of misinformation: A review of research in social media. International Journal of Data Science and Analytics. 2022;**13**(4):271-285

[91] Kaufhold M-A, Gizikis A, Reuter C, Habdank M, Grinko M. Avoiding chaotic use of social media before, during, and after emergencies: Design and evaluation of citizens' guidelines. Journal of Contingencies & Crisis Management. 2019;**27**(3):198-213

Section 2

Innovations and Perspectives in Crisis Management

Chapter 4

Holacracy and Crisis Management: Leveraging Self-Organisation for Effective Crisis Response and Organisational Resilience

Monument Thulani Bongani Makhanya and Makhosazana Faith Vezi-Magigaba

Abstract

Traditional hierarchical systems in organisations frequently impede successful crisis management by reducing agility, decision-making flexibility, and employee empowerment. In contrast, Holacracy provides a solution by supporting self-organisation, distributed decision-making, and a resilient organisational culture. This chapter explores ways of equipping organisations to respond effectively to emergencies by using self-organising principles. This chapter used bibliometric methods as a methodology. The use of bibliometric methods was beneficial in understanding the current research landscape, in identifying important trends, and in guiding evidence-based decision-making strategies in crisis management and organisational resilience applied in this chapter. The robustness and effectiveness of the approach was increased by utilising the bibliometrix VOSviewer tool. This chapter concludes that Holacracy provides an effective framework for organisations to overcome crises by encouraging self-organisation and distributed decision-making. Organisations can improve agility, innovation, and collaboration by applying these concepts to increase resilience in the face of adversities.

Keywords: Holacracy, crisis management, organisations, decision-making, agility, responsiveness

1. Introduction

In today's fast changing and unpredictable business world, organisations are continually confronted with new difficulties and crises that jeopardise their operations and existence. The ability to effectively manage crises and develop resilience has become an essential component of organisational success [1]. Traditional top-down hierarchical systems frequently struggle to respond swiftly and adaptively to crises because decision-making procedures are slow and rigid. In this setting, Holacracy has evolved as a novel and revolutionary management strategy that prioritises self-organisation and distributed decision-making within organisations [2]. Mosamim and Ningrum [3] assert that Holacracy is a style of organisational governance that seeks to decentralise authority and enable people to make independent decisions within clearly defined roles and responsibilities. This Holacracy, an agile organisational management, was developed by Brian J. Robertson [4], and it provides a framework for dynamic and flexible organisational structures capable of adapting to changing situations and responding to difficulties more quickly.

Holacracy is founded on the ideas of self-management, transparency, and adaptation. Unlike typical hierarchical arrangements, in which authority is concentrated at the top and decisions are passed down through several layers of management, Holacracy distributes decision-making power throughout the organisation [5]. Mosamim and Ningrum [3] add that this decentralised approach seeks to increase employee autonomy, accountability, and creativity, resulting in more innovative and responsive organisations. In the context of crisis management, Holacracy principles can help organisations create a framework for effective decision-making and coordination during times of uncertainty and upheaval.

Crisis management plays a crucial role that helps organisations foresee, prevent, respond to, and recover from crises that threaten their operations, reputation, and stakeholder relationships [6]. World Economic Forum [7] adds that natural disasters, cybersecurity breaches, financial downturns, and public relations scandals are all possible types of crises. Effective crisis management requires pre-emptive planning, quick response, clear communication, and the ability to adjust to changing conditions.

Holacracy's emphasis on distributed decision-making and explicit roles and accountability might be especially useful in times of crisis. During emergencies, organisations frequently confront the problem of making quick and informed decisions while under pressure. In typical hierarchical arrangements, decision-making may be bottlenecked at the top, resulting in delays and inefficiencies [8]. In contrast, Holacracy empowers employees to make decisions within their specified responsibilities, allowing them to respond quickly and decisively to crisis occurrences. This dispersed decision-making technique can assist organisations in more successfully adapting to fast changing conditions and making decisions that are consistent with their strategic goals [9]. Furthermore, the flexibility and adaptability inherent in Holacratic structures allow organisations to respond to crises more quickly and dynamically. Traditional organisational structures may struggle to pivot and adapt to unanticipated problems, but Holacracy's emphasis on self-organisation promotes better flexibility and reactivity [10]. During a crisis, the capacity to quickly reorganise roles, responsibilities, and processes can be critical to preserving operations and effectively handling the situation. Organisations that use Holacracy in crisis management can improve their agility, resilience, and ability to traverse challenging times [11].

In addition to improving crisis response, Holacracy can help to improve long-term organisational resilience. Resilience is an organisation's ability to foresee, adapt to, and recover from crises while retaining essential functions and strategic goals [12]. Holacracy promotes resilience by fostering an environment of continual development, learning, and adaptability [13]. Self-organisation's iterative nature enables organisations to continuously examine and improve their processes, procedures, and structures in response to feedback and changing situations. This continual improvement approach generates a sense of adaptability and inventiveness, allowing organisations to better prepare for future disasters [14].

Holacracy also encourages transparency, communication, and collaboration within organisations, which fosters a feeling of shared purpose and collective resilience [15]. Bushuyev et al. [15] add that during a crisis, good communication and collaboration are essential for coordinating actions, exchanging information, and mobilising resources. Holacracy can help to improve organisational resilience and crisis management techniques by fostering an open and collaborative culture. Employees who are enabled to make autonomous decisions within their responsibilities are more likely to take responsibility for their actions and contribute to collective crisis response activities [15]. This chapter addresses agility and responsiveness as one of the fundamental tenets of crisis management and Holacracy. Agility in a holacratic organisation is the capacity to act fast and effectively in response to changing conditions, whereas responsiveness is the ability to act quickly in response to new opportunities and problems [16]. These fundamental ideas underpin Holacracy's approach to operational procedures and organisational design, helping businesses to better traverse complexity, make decisions more quickly, and perform better overall in a setting that is changing quickly [3]. It is against this background that this article explores the effectiveness of Holacracy to improve crisis management practices and organisational resilience by using self-organisation for effective crisis response. It further looks at agility and responsiveness as fundamental tenants of Holacracy.

2. Methodology

This chapter used bibliometric methods as a methodology. The use of bibliometric methods was beneficial in understanding the current research landscape, in identifying important trends, and in guiding evidence-based decision-making strategies in crisis management and organisational resilience applied in this chapter. The robustness and effectiveness of the approach was increased by utilising the bibliometrix R tool, which is made especially for bibliometric analysis in VOSviewer software [17]. The capacity to methodically explore and review a sizable body of scholarly literature on Holacracy, crisis management, self-organisation, and organisational resilience was one of the main benefits of using bibliometric methods in this work. The researchers were able to find and assess the most prominent papers in these fields by using the bibliometrix VOSviewer package to perform thorough searches across several databases, including Scopus, Web of Science, and Google Scholar [18]. Relevant keywords and phrases were used in these searches. Bibliometrix streamlined the process of reviewing and analysing literature by enabling effective data gathering, citation analysis, and visualisation of bibliometric indicators [19].

The researchers found important authors, research teams, and organisations that have significantly advanced the fields of Holacracy and crisis management by using bibliometric analysis to look at citation patterns, co-citation networks, and collaboration structures. Researchers were able to find underlying themes, emerging research trends, and interdisciplinary connections that guided future research directions and collaborations in crisis response and organisational resilience efforts by using the bibliometrix functionalities for co-citation analysis and network mapping. Additionally, bibliometric techniques were used to measure the visibility and impact of research outputs pertaining to crisis management and Holacracy, offering insights into the publications' scholarly significance and relevance [20]. Researchers evaluated the effect of their work on dissemination and citation, tracking publication trends over time, and identifying high-impact journals and research outlets that made a significant contribution to the field's body of knowledge by using bibliometrix tools for citation analysis and bibliometric performance evaluation. Researchers discovered that

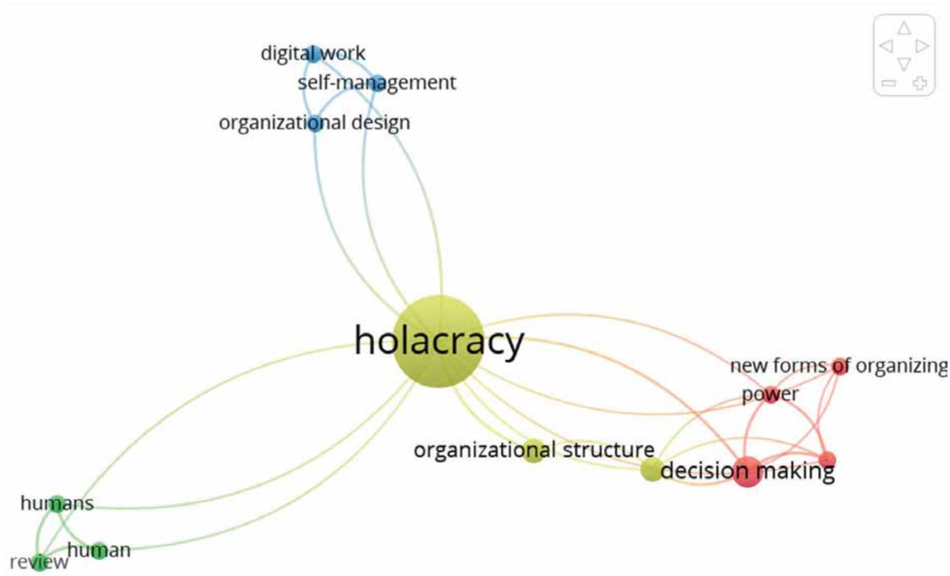

Figure 1.
Concepts related to Holacracy emanating from VOSviewer software.

the review covers 27 international publications on Holacracy, emphasising the paucity of scientific studies in this field. Scholarly interest began in 2010 when the first publication was added to the Scopus database. There is a notable research gap because the majority of documents are focused on Western contexts and no publications from Africa were found. Twenty-five of the documents under analysis are in English, and one each in French and German. The dominance of English-language research in Holacracy is highlighted by this linguistic distribution, which further restricts accessibility and engagement in non-Western locations, especially Africa, where such creative organisational systems are still little understood. Additionally, using VOSviewer, the research found three core clusters connected to Holacracy, containing 13 keywords, which are humans, human, review, digital work, self-management, organisational design, new forms of organising, power, organisational structure, and decision-making. **Figure 1** shows the concepts related to Holacracy emanating from VOSviewer software.

3. The meaning and fundamentals of Holacracy

Holacracy is a decentralised management approach that distributes authority and decision-making throughout the organisation. This concept was developed because traditional hierarchical systems can be inefficient and sluggish to respond to change, but organisations can be more agile and effective when authority is dispersed more equitably [3]. It was developed by Brian J. Robertson in the early 2000s, to provide a framework for dynamic and flexible organisational structures capable of adapting to changing situations and responding to difficulties more quickly [4].

It is based on the notion that, rather than focusing on job titles and hierarchies, Holacracy emphasises the precise functions that individuals within organisations can perform. Each role has certain obligations, expectations, and authority [21].

Furthermore, authority is spread across the organisation rather than concentrated at the top. Individuals at all levels have autonomy and authority to make decisions within their respective roles [22]. According to Yew et al. [2], Holacracy functions through a set of transparent and unambiguous procedures and guidelines that direct governance and decision-making within organisations. Ensuring that everyone is aware of the decision-making process and authority distribution is facilitated by doing this. Furthermore, organisations can quickly react to shifting market conditions and possibilities because of its flexibility and adaptability. The primary purpose of routine meetings and processes is to identify and resolve internal issues within the organisation. Individuals are empowered to adjust enhancements to their positions and the organisation, due to Holacracy culture, which promotes continual improvement. As a result, the organisation becomes more flexible and adaptable [23].

4. The concept of crisis management and organisational resilience

According to Nizamidou [24], crisis management and resilience are critical components in the successful operation of any organisation. In today's fast-paced and unpredictable business world, organisations are continuously confronted with unanticipated obstacles, such as natural disasters, financial crises, cyber-attacks, and public relations issues. Organisations must be prepared to manage these crises successfully, as well as be resilient enough to recover and continue operations in the face of adversity. The process of recognising, evaluating, and acting swiftly and effectively responding to such risks is known as crisis management. It necessitates proactive risk mitigation and backup preparation, as well as the capacity to quickly gather information, make split second decisions, and mobilise resources quickly. Communicating with stakeholders, including as staff members, clients, investors, and the media, is another aspect of crisis management that helps to maintain openness and foster confidence in the face of uncertainty [25].

Conversely, resilience describes an organisation's capacity to adjust to and bounce back from setbacks and emergencies. Organisations that possess resilience can foresee possible dangers, react promptly to emergencies, and bounce back from setbacks, with little to no long-term effects on their business operations. Resilience is the ability to thrive in the face of adversity and obtain a competitive advantage as a result of the experience, not just getting through crises [26]. The concept of crisis management and resilience is founded on the recognition that crises are unavoidable in today's complex and interconnected environment. Organisations that are unprepared to handle and respond to crises face severe financial, reputational, and operational consequences. Organisations with excellent crisis management capabilities and resilience, on the other hand, are better able to not just withstand crises but also turn them into opportunities for growth and innovation [27].

There are several fundamental ideas that organisations can use to improve their crisis management and resilience capacities. First and foremost, organisations should create a thorough crisis management strategy that defines roles, duties, and procedures for dealing with various sorts of crises. This strategy should be evaluated, updated, and distributed to all staff on a regular basis to ensure a coordinated response in crisis situations [28]. Second, organisations should invest in training and development programmes to help staff improve their crisis management and resilience abilities. This includes giving leadership training, running simulation exercises, and cultivating a culture of transparency, collaboration, and accountability inside the organisation

[29]. Third, organisations should build good relationships with important stakeholders, such as government agencies, industry partners, and community organisations, to improve their ability to obtain resources and help during a crisis. Collaboration and communication with external partners are critical for effective crisis management response and recovery [30]. Finally, organisations should regularly monitor and evaluate their crisis management and resilience capacities to identify areas for improvement and adapt to evolving threats and challenges. Organisations that adopt a proactive and strategic approach to crisis management and resilience can improve their ability to overcome volatility and succeed in today's changing business climate [31].

5. Theoretical views on the links between self-organisation and crisis response

Understanding how organisations can adapt and respond to unforeseen disruptions and challenges requires a theoretical viewpoint on the link between self-organisation and crisis response. The process through which systems naturally arrange themselves without requiring guidance or control from outside sources is known as self-organisation [32]. Contrarily, crisis response refers to the steps and approaches that organisations use to deal with and handle crises when they arise. The dynamic interplay between self-organisation and crisis response is intricate and multifaceted, and it can be better understood from a variety of theoretical angles [33].

According to Turner and Baker [34], complexity theory is one theoretical stance that is especially pertinent to the connection between crisis response and self-organisation. According to complexity theory, organisations are dynamic, adaptive systems that are always changing and adapting to their changing surroundings. Complex systems are naturally able to self-organise, which allows them to change and adapt to their environment, according to complexity theory. Complex systems can use their capacity for self-organisation to mobilise resources, plan actions, and make quick judgements in the face of uncertainty and ambiguity when responding to a crisis [35].

Resilience theory is another theoretical stance according to Duchek [26] that can help us comprehend how self-organisation and crisis response are related. Building adaptive ability and robustness in organisations is crucial for withstanding and recovering from crises, according to resilience theory. Organisations that exhibit resilience possess the ability to self-organise, gather resources, sustain operations during times of crisis, and apply lessons learned from previous events to enhance their crisis response proficiencies [36]. Organisations may effectively navigate and overcome crises and develop long-term capability to prosper in the face of future challenges by cultivating a culture of resilience and adaptation [37].

From a sociological standpoint, network theory can be used to examine the concept of self-organisation. According to network theory, organisations are embedded in wider social networks of relationships and interactions, which impact their behaviour and decision-making [38]. In the context of crisis response, self-organised stakeholder networks, such as employees, consumers, suppliers, and community members, can work together to address disasters. Organisations may improve their crisis response capabilities and reduce the impact of crises on their operations and reputation by using the power of social networks and tapping into the collective knowledge of various stakeholders [39].

A psychological viewpoint on the connection between crisis response and self-organisation can emphasise how both individual and group decision-making influence

DOI: http://dx.doi.org/10.5772/intechopen.1008282

how organisations respond to crises. Theories in cognitive psychology, such as sense making and decision-making under uncertainty, highlight the role that cognitive processes, heuristics, and biases have in determining how people perceive and react to crises, both individually and in groups. Organisations can design tactics to encourage efficient decision-making, communication, and teamwork among employees during crises by knowing the psychological elements that impact crisis response [40].

6. Quick reaction times and decentralised decision-making Holacracy

In today's fast-paced and dynamic corporate world, distributed decision-making and short response times are critical components of organisational agility and effectiveness [41]. A framework that can assist organisations in achieving these objectives is Holacracy suggested by Bushuyev [15], which is a decentralised management philosophy that places an emphasis on distributed decision-making and self-organisation. Because Holacracy empowers workers at all levels to take initiative and act fast in response to changing conditions, it helps organisations adapt, innovate, and prosper in the face of complexity and unpredictability [15].

Holacracy is a management style that substitutes self-organising roles and teams for conventional hierarchical systems. Authority is shared among teams and individuals in a holacratic organisation, allowing choices to be made closest to the source of knowledge and information [15]. Organisations can leverage the combined knowledge and experience of their workforce through this decentralised decision-making process, foster creativity and innovation, and react quickly to new possibilities and threats [42].

Accelerating response times is one of the main advantages of dispersed decision-making in a holacratic organisation. Holacracy reduces the bottlenecks and delays that are frequently connected to traditional top-down decision-making procedures by giving employees the autonomy and local decision-making capacity. This gives businesses a competitive edge in the quickly evolving business environment of today by enabling them to react swiftly to changes in the market, client demands, and competitive challenges [2].

Moreover, a Holarctic organisation's distributed decision-making process promotes an agile, flexible, and resilient culture. Employees are more likely to be proactive, inventive, and sensitive to difficulties when they are given the freedom to make decisions and accept responsibility for their job. This can result in more creative and quick fixes for problems as well as improved flexibility and adaptability in the face of unforeseen setbacks or emergencies [43].

The distinct roles, responsibilities, and procedures that drive decision-making and action in a Holarctic organisation enable fast response times [44]. A framework for defining and making clear roles, duties, and decision-making authority is provided by Holacracy, ensuring that decisions are made successfully [3]. Mosamim and Ningrum [3] add that since they have the freedom and resources to make choices that are in line with the goals and mission of the company, employees may act decisively and confidently that is provided by the clarity and transparency of the organisation.

Furthermore, the distributed decision-making that is emphasised by Holacracy may result in higher employee engagement, motivation, and satisfaction [20]. Weirauch et al. [20] continue and add that employees feel respected, empowered, and invested in the success of the company when they are given the chance to add their ideas, insights, and skills to decision-making processes. In addition to increasing employee dedication and engagement, this sense of agency and ownership can promote a culture of accountability, trust, and cooperation, all of which are critical for accomplishing organisational goals and objectives [45].

7. The need for defined roles and accountability in crisis situations

Clear roles and accountabilities clarify who has the authority and duty for making decisions in specific areas of the organisation. In a crisis, this clarity aids decision-making by allowing individuals to act quickly and decisively within their assigned duties [46]. According to Brugh et al. [47], when roles and accountability are clearly defined, personnel understand what is expected of them during a crisis and can respond quickly to growing concerns. This allows organisations to efficiently mobilise resources, assign tasks, and coordinate response efforts during a crisis. Furthermore, during a crisis, clear roles and accountability help team members, departments, and stakeholders coordinate and collaborate more effectively.

Organisations may ensure that everyone understands their duties and how they contribute to the overall response effort by clearly outlining responsibilities and expectations. Additionally, clear roles and responsibilities keep people accountable for their decisions and actions. Leaders may accept responsibility for their roles, communicate effectively with team members, and confidently manage the organisation through a crisis [48].

While clear roles and responsibilities give structure, they also enable flexibility and adaptability in the face of changing circumstances during a crisis. Organisations can alter responsibilities, reallocate resources, and make strategic decisions in response to changing demands, all while keeping a clear picture of who is responsible for what. In addition, clear roles and accountability enable effective communication and transparency inside the organisation. Knowing who is in charge of crucial activities and choices allows team members to communicate more effectively, share information effectively, and keep on tracking their response efforts [49].

8. Fostering an adaptive and resilient culture in holacratic organisations

Employees are encouraged to take calculated chances, experiment, and learn from their experiences. Give them the ability to make decisions within the parameters of their positions. This will help them develop a sense of trust and autonomy. Encouraging self-reliance among staff members promotes a culture of responsibility and pride [50].

According to Dwivedi et al. [51], a culture of ongoing education and development is fostered by motivating staff members to ask for feedback, think back on their experiences, and adopt a growth attitude. Promote a readiness to grow from setbacks, adjust to change, and view obstacles as chances for development. Improve internal communication and transparency to make sure that ideas are discussed candidly, information is shared freely, and feedback is actively sought out and provided. Employee cooperation, creativity, and a feeling of purpose are all facilitated by open communication.

Kruger [52] asserts that flexible decision-making procedure development is a priority because it enables prompt reactions to evolving situations and new obstacles. Motivate people to take initiative, act decisively, and modify their strategies as necessary to promptly handle changing circumstances. Kruger [52] continues and adds that, an encouragement of the organisation's systems, procedures, and structures should be made flexible and adaptable so that quick changes may be made in response to both internal and external disruptions. Encourage staff members to be adaptable, creative, and receptive to trying out novel ideas and strategies.

The provision of opportunities for resilience-building activities should be a priority, such as crisis simulations, team-building events, and training courses, to assist staff in acquiring the abilities and frame of mind required to overcome obstacles and overcome setbacks [32]. Acknowledge and commemorate accomplishments, landmarks, and successes inside the company, as well as admit mistakes and losses and draw lessons from them. Promote an environment that values introspection, experimentation, and ongoing development based on both satisfying and disappointing experiences [8].

9. Constant development and lessons from emergency situations

After a crisis suggests Jonker [53] that a thorough assessment or debriefing procedure should be carried out to ascertain what went wrong, pinpoint the underlying reasons, assess the success of the reaction, and comprehend the effects on the organisation. All pertinent parties should be involved in this post-crisis evaluation, which should promote candid and open communication and concentrate on finding lessons learned. Furthermore, organisations should acknowledge accomplishments and qualities of the organisation's crisis management strategy, in addition to any shortcomings that were apparent throughout the crisis. Thus, helping the organisation recognise what went well and what could have been done better so that planning and decision-making in the future is informed [54].

Application of modifications, upgrades, and enhancements to the organisation's procedures, systems, and practices is implemented using the knowledge gathered from the post-crisis study. To remedy any shortcomings found during the crisis, modify roles, responsibilities, communication procedures, and crisis response plans [55]. Furthermore, staff members could be given resources, information, and training to help them become better prepared and capable of handling emergencies in the future [56]. Fischer et al. [56] continue and add that to evaluate the organisation's crisis response strategies, organisations are encouraged to develop skills and replicate real-life crisis scenarios for practice and learning, conduct drills, simulations, or tabletop exercises. Sharma et al. [57] suggest that organisations should establish a culture that encourages experimentation, creativity, and ingenuity in handling problems and emergencies as well as the encouragement of staff members to provide fresh concepts, methods, and ideas based on their knowledge and understanding of previous crises. Sharma et al. [57] continue and add that encouragement and recognition of actions that promote learning and ongoing progress should be made a priority including encouraging staff members to collaborate and share expertise to spread the organisation's lessons learnt during crisis circumstances.

The establishment of channels, forums, or other platforms where staff members can discuss their views, experiences, and best practices for handling emergencies should be encouraged by employers [57]. To know whether crisis management was done effectively, following up on the organisation's implementation of improvements and modifications should be prioritised, monitoring important performance metrics, assessment of results for fresh projects, including assessment of the organisation's preparedness for handling emergencies on a regular basis. Finally, modifying tactics would be necessary to guarantee continuing learning and development [58].

10. Using self-organisation to enhance long-term organisational resilience

Organisations can improve their ability to respond to changes, uncertainties, and disruptions by leveraging self-organisation within a Holacratic structure, while also cultivating a culture of innovation, learning, and adaptability that will ensure their long-term resilience and competitiveness in an increasingly complex and volatile business environment [59].

Self-organisation encourages distributed decision-making, empowering personnel at all levels of the organisation to make autonomous decisions within their positions. By delegating decision-making authority, organisations can respond more rapidly and effectively to changes, uncertainties, and challenges, improving their ability to adapt and survive disruptions [60]. Additionally, self-organisation allows organisations to be more agile and adaptable to change by empowering individuals to take the initiative, modify priorities, and pivot strategies in real time. This agility in decision-making and action can assist organisations in navigating uncertainties, seizing opportunities, and mitigating risks, eventually strengthening their resilience in the face of dynamic and changing circumstances [61].

Moreover, Duchek [26] suggests that self-organisation promotes the constant evolution and adaption of roles, responsibilities, and processes to reflect changing conditions and organisational demands. Organisations can improve their long-term resilience and sustainability by examining and changing governance structures on a regular basis using transparent and collaborative methods. Volery and Tarabashnika [62] add and assert that self-organisation encourages an innovative, creative, and experimental culture by allowing individuals to experiment with new ideas, solutions, and ways of working. Organisations that encourage innovation at all levels can generate adaptive reactions, find development possibilities, and develop creative solutions to address obstacles, thereby enhancing their ability to thrive and expand in the face of adversity. Additionally, Halawi [63] suggests that it promotes a culture of continual learning and progress, encouraging employees to reflect on their experiences, exchange insights, and collaborate on issue solving. Organisations can harness their workforce's collective intelligence by creating a learning attitude and facilitating information exchange to uncover lessons gained from previous experiences, drive continuing improvements, and improve their resilience and flexibility in the long run.

11. Agility and responsiveness in Holacracy

This chapter addresses agility and responsiveness as one of the fundamental tenets of crisis management and Holacracy. Agility in a holacratic organisation is the capacity to act fast and effectively in response to changing conditions, whereas responsiveness is the ability to act quickly in response to new opportunities and problems [16]. These fundamental ideas underpin Holacracy's approach to operational procedures and organisational design, helping businesses to better traverse complexity, make decisions more quickly, and perform better overall in a setting that is changing quickly [3]. The decentralised structure of Holacracy, which consists of self-organising teams or circles, is one of its main features that promote agility and reactivity [3]. Holarchy allows for quick reactions to changing circumstances by dispersing decision-making authority throughout the organisation and enabling teams to make independent decisions within their designated domains [64]. By reducing bureaucratic bottlenecks, streamlining communication channels, and enabling real-time adjustments to plans and tactics, this decentralised decision-making process improves the organisation's capacity to respond quickly and decisively in the face of changing priorities or unforeseen events [10]. Furthermore, Holacracy's focus on duties, responsibilities, and open communication encourages team members' alignment and coordination, which makes it easier to react quickly and effectively to changing circumstances [3]. Within self-managing teams, Holacracy guarantees that everyone understands their tasks, expectations, and decision-making authority by clearly outlining roles and responsibilities. This allows individuals to act quickly and decisively in pursuit of common goals. Teams are better able to coordinate their activities, cooperate easily, and use their collective experience to solve problems quickly and effectively when there is clarity and transparency [65].

Organisations can repeatedly modify their structures and procedures in response to feedback, learning, and experimentation due to Holacracy's adaptive governance approach. Continuous improvement is made possible by this iterative approach to organisational development, which also promotes a culture of responsiveness to input and shifting market conditions [16]. Holacratic organisations can remain flexible and responsive, always changing to satisfy the changing needs of their stakeholders and surroundings, by routinely evaluating and modifying their roles, procedures, and governance principles [66]. Moreover, Holacracy promotes a fast-paced learning and experimentation mindset, enabling groups to test novel concepts, refine existing ones, and come up with creative solutions to problems. This experimentation-driven strategy helps teams become more adaptive and resilient within the company by giving them the resources and mentality they need to deal with complexity and ambiguity. Holacratic organisations can improve their ability to navigate quickly changing surroundings, predict future trends, and actively shape their own destinies by adopting a culture of constant learning and adaptation [67].

12. Strategies for overcoming obstacles and optimising the advantages of Holacracy in crisis management

Organisations should ascertain that all members of the organisation are aware of and have a clear understanding of roles and responsibilities. Additionally, to enable prompt and efficient responses to emergencies, a clear indication of who has decision-making authority, what their roles are, and what is expected of them should be explicit [13]. To keep all stakeholders informed and that they are on the same page during a crisis, establish clear lines of communication, regular updates, and transparent information exchange. To help everyone comprehend the problem and to make coordinated actions easier, encourage candid communication, attentive listening, and teamwork [68]. Staff to be given the authority to decide quickly within their spheres of influence and roles considering the most recent facts and priorities. Encourage a culture of flexibility, reactivity, and agility so that in times of crisis, swift course corrections and adaptations are possible [69]. Accept a culture of ongoing education, introspection, and development to draw insightful conclusions and important lessons from crisis circumstances. To improve crisis management skills over time, teams should be encouraged to investigate the underlying causes of problems, spot areas for improvement, and make necessary adjustments [70].

To foresee future difficulties and be ready for a variety of crisis scenarios, conduct scenario planning exercises, risk assessments, and crisis simulations. Create reaction plans, communication strategies, and contingency plans to improve preparedness and resilience in the face of unforeseen circumstances [55]. During times of crisis, provide help, materials, and training to employees to help them manage tension, ambiguity, and shifting expectations. Building community, trust, and a common goal will help people and organisations become more resilient in the face of difficulty [71]. Solicit feedback, analyse performance, and assess crisis management effectiveness to discover strengths, areas for improvement, and potential for innovation. Use feedback loops and data-driven insights to help you make better decisions, optimise your response methods, and prepare for future crises [72].

13. Recommendations

Using self-organisation for successful crisis response and organisational resilience within a Holacratic structure necessitates a deliberate and proactive approach. The section below provides recommendations for businesses and organisations aiming to increase their crisis management capacities through self-organisation.

14. Proactive preparation for crises

Create thorough crisis management plans that specify roles and duties, communication guidelines, and procedures for handling different kinds of emergencies. Establish explicit protocols for decision-making, escalation, and contingency planning to guarantee a well-coordinated and efficient reaction during emergencies.

15. Self-determination and independence

Give people in the organisation the freedom to decide for themselves within the parameters of their positions and responsibilities. Giving staff members the tools, resources, and assistance they need to respond swiftly and forcefully in an emergency will enable an organisational structure that is more adaptable and flexible.

16. Ongoing instruction and readiness

To prepare staff for crisis scenarios and familiarise them with response protocols, conduct frequent training sessions, drills, and simulations. To improve the organisation's capacity to handle obstacles and interruptions, foster a culture of readiness, learning, and adaptation.

17. Open lines of connection

Create unambiguous and accessible channels of communication to enable prompt sharing of information, updates, and instructions in times of emergency. To make sure that all parties involved in the crisis response process are aware, on the same page, and actively participating, cultivate a culture of openness, confidence, and cooperation.

18. Feedback and contemplations

Motivate people and groups to consider their past experiences, get input, and pinpoint the lessons they have learnt from crisis circumstances. Utilise review meetings, feedback methods, and post-crisis debriefings to assess performance, identify areas for development, and promote ongoing learning.

19. Flexibility in roles and governance

Review and modify organisational roles, responsibilities, and governance frameworks on a regular basis to ensure they remain in line with shifting demands and objectives. Encourage a dynamic and flexible approach to governance so that the company can react quickly and efficiently to new possibilities and challenges as they arise.

20. Strategies for enhancing resilience

Encourage staff members to accept change, bounce back from setbacks, and look for ways to improve to cultivate a culture of resilience, adaptability, and creativity. Encourage people to cultivate healthy coping strategies, stress reduction techniques, and an optimistic outlook to increase their own and their organisation's resilience in the face of hardship.

21. Use of Holacracy in different contexts

To improve organisational effectiveness, more research on Holacracy in various contexts is recommended. Organisations should consider cultural differences while applying holacratic practices in order to emphasise their adaptability. The impact of Holacracy on team dynamics, decision-making processes, and employee engagement should be studied in a variety of cultural settings. Organisations may build a more inclusive workplace by adjusting holacratic principles to local practices and values, using varied perspectives and eventually fostering innovation and resilience across industries and geographies.

22. Conclusion

This chapter concludes that, organisations have a rare chance to improve organisational resilience, strengthen crisis management skills, and advance efficient crisis response tactics by utilising self-organisation inside a Holacratic structure. Organisations can create a solid foundation for navigating obstacles, uncertainties, and disruptions with confidence and agility by empowering people to make decisions independently within their roles, encouraging transparency, communication, and collaboration, and cultivating a culture of continuous learning and adaptation. In addition to fostering innovation, creativity, and resilience in the face of difficulty, Holacracy offers a framework for distributed decision-making, flexible governance, and adaptable structures that help organisations react to crises swiftly and effectively. Organisations may position themselves to weather crises, learn from setbacks, and emerge stronger and more resilient in the long run by creating a culture of resilience and adaptation, empowering people, having clear communication lines, and proactively planning for crises. Organisational success in today's fast-paced and uncertain corporate world depends on its members' capacity to react to crises quickly, adaptably, and cooperatively. Utilising self-organisation concepts within a Holacratic framework can give organisations the tools, perspective, and capacities required to successfully manage crises, adjust to change, and prosper in demanding and dynamic environments. Organisations may create a culture of creativity, collaboration, and resilience by adopting self-organisation for crisis management. This will set them up for long-term success and growth, even in the face of disruption and uncertainty. With its emphasis on decentralised decision-making, distinct roles and responsibilities, and flexible governance procedures, Holacracy offers a distinctive paradigm change in organisational administration. The concepts of Holacracy, which are rooted in self-organisation, can help organisations respond to unforeseen occurrences in a dynamic manner, harness the collective intellect of their workforce, and forge resilience via ongoing learning and development when used effectively in crisis management. Through the utilisation of self-organisation in crisis management, companies may leverage the many skills and viewpoints of their workforce, cultivate a culture of creativity and flexibility, and improve their capacity to promptly tackle obstacles and seize new chances. Holacracy's distributed decision-making approach encourages employees to take initiative and solve problems on their own when faced with a crisis. It also gives employees the freedom to operate independently within their roles. Additionally, real-time information sharing, alignment, and coordination are made possible by the transparent communication and collaboration mechanisms found in a Holacratic structure. This helps organisations mobilise resources, make wise decisions, and carry out crisis response plans quickly and effectively. To keep the organisation responsive, flexible, and robust in the face of uncertainty, the Holacracy's adaptive governance procedures offer a framework for continuously assessing and modifying roles, responsibilities, and procedures in response to changing conditions.

23. Limitations and future research

The potential for ambiguity and overlap in duties and accountabilities within self-organising teams is one of the main drawbacks that Holacracy in crisis management may pose. Uncertainty over roles and decision-making power during emergencies can cause confusion, hold up response efforts, and result in inefficiency. To mitigate this constraint and maximise the efficacy of holacratic organisations in crisis situations, it is imperative to guarantee that responsibilities and accountabilities are precisely defined, periodically evaluated, and in line with crisis response protocols. Furthermore, it may be difficult to maintain general coordination and coherence across multiple teams during a crisis due to the decentralised nature of Holacracy and the rapid pace of decision-making. Ensuring constant communication, information exchange, and effort alignment can be essential to a successful crisis response in intricate and high-stakes scenarios. In high-pressure crisis situations, in particular, the autonomy and distributed decision-making authority inherent in Holacracy can result in heightened individual accountability, stress, and fatigue. It is crucial to address the psychosocial components of crisis response within a holacratic framework to boost staff resilience and maintain organisational performance in trying times. These components include stress management, emotional support, and well-being programmes.

Future studies could explore Holacracy's scalability and adaptation in various organisational contexts and crisis situations is necessary. Comprehending the ways in which Holacracy can be customised and executed to accommodate disparate organisational sizes, sectors, and cultural contexts can yield significant understanding on its suitability and efficacy in a range of circumstances. The durability and long-term advantages of implementing self-organisation principles in crisis management methods can also be clarified by looking into the long-term effects of Holacracy on organisational resilience, crisis preparedness, and adaptive capability. Further studies may examine how data analytics, artificial intelligence, and technology might be combined to improve crisis management in hierarchical organisations. Self-organising teams can become more agile and responsive by using digital tools and predictive analytics to support decision-making, risk assessment, and resource allocation during crises. This will help the teams make well-informed decisions and effectively optimise their crisis response strategies. Additionally, future studies should focus on examining the efficacy and suitability of Holacracy in a variety of cultural contexts, especially in developing nations. This will contribute to the scholarly conversation while also offering useful advice to companies aiming to implement holacratic values around the world.

Author details

Monument Thulani Bongani Makhanya* and Makhosazana Faith Vezi-Magigaba
University of Zululand, Empangeni, KwaZulu-Natal, South Africa

*Address all correspondence to: makhanyamt@unizulu.ac.za

References

[1] Pinkwart A, Schingen G, Pannes A-T, Schlotböller D. Improving resilience in times of multiple crisis. Schmalenbach Journal of Business Research. 2022;**74**:763-786. DOI: 10.1007/s41471-022-00150-y

[2] Yew Saw Yen. Holacracy in action: Zappos experience. Master's degree in business administration. Universita Ca'Foscari Venezia; 2020

[3] Mosamim P, Ningrum S. Holacracy and hierarchy concepts: Which one is more effective in an organizational leadership and management system? Malaysian Journal of Social Sciences and Humanities (MJSSH). 2020;**5**(12):257-271. DOI: 10.47405/mjssh.v5i12.600

[4] Robertson BJ. Holacracy: A complete system for agile organizational governance and steering. Cutter Consortium. 2006;**7**(7):1-21

[5] Romme GL. Climbing up and down the hierarchy of accountability: Implications for organization design. Journal of Organization Design. 2019;**8**(20):1-14. DOI: 10.1186/s41469-019-0060-y

[6] Bundy J, Pfarrer MD, Short CE, Coombs T. Crises and crisis management: Integration, interpretation, and research development. Journal of Management. 2017;**43**(6):1661-1692. DOI: 10.1177/0149206316680030

[7] World Economic Forum. Global Risks 2033: Tomorrow's Catastrophes. 2023. Available from: https://www.weforum.org/publications/global-risks-report-2023/in-full/2-global-risks-2033-tomorrow-s-catastrophes/ [Accessed: 23 March 2024]

[8] Serrat Olivier. An exploratory study toward a leadership management framework: fusing metagovernance, complexity leadership, and sense-making. Thesis for: Doctor of Philosophy in Organizational LeadershipAdvisor: Margo Bailey, Renee Roman; 2023

[9] Bernhard Resch. UNBOSS! On paradox, passion, and power in decentralized work. [PhD-thesis]. Research and graduation external, University of St. Gallen Journal; 2019

[10] Monteiro P, Adler PS. Bureaucracy for the 21st century: Clarifying and expanding our view of bureaucratic organization. The Academy of Management Annals. 2021;**16**(2):427-475. DOI: 10.5465/annals.2019.0059

[11] Leso BH, Cortimiglia MN, Ghezzi A. The contribution of organizational culture, structure, and leadership factors in the digital transformation of SMEs: A mixed-methods approach. Cognitive Technology Work. 2023;**25**(1):151-179. DOI: 10.1007/s10111-022-00714-2

[12] Andersson T, Cäker M, Tengblad S, Wickelgren M. Building traits for organizational resilience through balancing organizational structures. Scandinavian Journal of Management. 2019;**35**(1):36-45. DOI: 10.1016/j.scaman.2019.01.001

[13] Fésüs Lilla. Critical Success Factors for Implementing Self-Organization [Master of Science Dissertation]. Alpen-Adria-Unfiversität Klagenfurt; 2022

[14] Carvalho AM, Rebentisch E, Carvalho JÁ, Sampaio P. The influence of operational excellence on the culture and agility of organizations: Evidence from industry. International Journal of Quality & Reliability Management. 2022;**38**(7):1520-1549. DOI: 10.1108/IJQRM-07-2020-0248

[15] Bushuyev S, Sukach S, Kontsevyi V, Piliuhina K, Achkasov I, Murovanskiy G. Inspirational project governance into the holacracy environment. IT Project Management. 2023:1-12

[16] Pacheco-Cubillos DB, Boria-Reverter J, Gil-Lafuente J. Transitioning to agile organizational structures: A contingency theory approach in the financial sector. Systems. 2024;**12**(4):142. DOI: 10.3390/systems12040142

[17] Aria M. Bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of Informetrics. 2017;**11**:959-975. DOI: 10.1016/j.joi.2017.08.007

[18] Rashid A, Fakruhayat M. How to conduct a bibliometric analysis using R packages: A comprehensive guidelines. Journal of Tourism, Hospitality & Culinary Arts (JTHCA). 2023;**15**(1):24-39

[19] Kyriyaki T. Exploring the contributions to mathematical economics: A bibliometric analysis using bibliometrix and VOSviewer. Mathematics. 2023;**11**(22):4703. DOI: 10.3390/math11224703

[20] Tomaszewski R. Visibility, impact, and applications of bibliometric software tools through citation analysis. Scientometrics. 2023;**128**:4007-4028. DOI: 10.1007/s11192-023-04725-2

[21] van den Berg J, Alblas A, Le Blanc P, Romme GL. How structural empowerment boosts organizational resilience: A case study in the Dutch home care industry. Organization Studies. 2021;**43**(9):1425-1451. DOI: 10.1177/01708406211030659

[22] Weirauch L, Galliker S, Elfering A. Holacracy, a modern form of organizational governance predictors for person-organization-fit and job satisfaction. Frontious in Psychology. 2023;**13**(1021545):1-14. DOI: 10.3389/fpsyg.2022.1021545

[23] Scarffe AD, Coates A, Evans JM, Grudniewicz A. Centralization and innovation: Competing priorities for health systems? International Journal of Health Planning Management. 2022;**37**(5):2534-2541. DOI: 10.1002/hpm.3531

[24] Marchese S, Gastaldi L, Corso M. Thriving in turbulent environments through adaptive forms of organizing. Management Decision. 2023:1-23. DOI: 10.1108/MD-05-2022-0655

[25] Nizamidou C. Resilience, crisis management and continuous improvement against the impact of COVID-19 on employees' engagement and emotions. Insights from a cypriot SME. Cogent Economics & Finance. 2023;**11**(2)1-21. DOI: 10.1080/23322039.2023.2282867

[26] Fraser JR, Simkins BJ. Enterprise risk management: An introduction and overview. In: Fraser JRS, Simkins BJ, editors. Enterprise Risk Management: Today's Leading Research and Best Practices for Tomorrow's Executives. Canada: John Wiley & Sons, Inc; 2024. pp. 3-16

[27] Duchek S. Organizational resilience: A capability-based conceptualization. Business Research. 2020;**13**:215-246. DOI: 10.1007/s40685-019-0085-7

[28] Mafimisebi OP, Obembe D, Ogunsade AI. Planned, improvised or resilience: Small business owner-managers' perception and response to crises in crisis-prone environments. Journal of General Management. 2023;**2023**:1661-1692. DOI: 10.1177/03063070231159568

[29] Grosse-Kozlowski L, Vösgen N. Risk and crisis management for SAIs:

Heightened resilience for increased performance. Disaster and Crisis Management. 2021;**21**(3):122-125

[30] Alshayhan Norah Abdullah. Collaborative leadership skills and competencies in emergency management and resilience: Lessons and implications from the response to the covid-19 pandemic [PhD dissertation]. School of Public Service, Old Dominion University; 2023. DOI: 10.25777/gwqzg388

[31] Bundy J, Pfarrer MD, Short CE, Coombs T. Crises and crisis management: Integration, interpretation, and research development. Journal of Management. 2016;**43**(6):315-349. DOI: 10.1177/01492063166800

[32] Makhanya Monument Thulani Bongani. Leading effectively during the COVID 19 pandemic: An assessment within the Zululand District Municipality [MBA dissertation]. Management College of Southern Africa; 2022

[33] Williams TA, Gruber DA, Shepherd DA, Sutcliffe KM. Organizational response to adversity: Fusing crisis management and resilience research streams. The Academy of Management Annals. 2017;**11**(2)1-15. DOI: 10.5465/annals.2015.0134

[34] Tong X, Zhang H. A comprehensive analytical framework for risks, disasters and crises. China's Emergency Management. 2020:3-40. DOI: 10.1007/978-981-13-9140-8_1

[35] Turner JR, Baker R. Complexity theory: An overview with potential applications for the social sciences. Systems. 2019;**7**(1):4. DOI: 10.3390/systems7010004

[36] Ruijer E, Dingelstad J, Meijer A. Studying complex systems through design interventions probing open government data ecosystems in the Netherlands. Public Management Review. 2023;**25**(1):129-149. DOI: 10.1080/14719037.2021.1942533

[37] Hermelin J, Bengtsson K, Woltjer R, Trnka J, Thorstensson M, Pettersson J, et al. Operationalising resilience for disaster medicine practitioners: Capability development through training, simulation and reflection. Cognitive Technology Work. 2020;**22**(3):667-683. DOI: 10.1007/s10111-019-00587-y

[38] Hillmann J, Guenther E. Organizational resilience: A valuable construct for management research? International Journal of Management Reviews. 2021;**23**(1):7-44. DOI: 10.1111/ijmr.12239

[39] Gamper M. Social network theories: An overview. Social Networks and Health Inequalities. 2022:35-48. DOI: 10.1007/978-3-030-97722-1_3

[40] Haupt B. The use of crisis communication strategies in emergency management. Journal of Homeland Security and Emergency Management. 2021;**18**(2):125-150. DOI: 10.1515/jhsem-2020-0039

[41] Paulus D, de Vrie G, Janssen M, Van de Walle B. The influence of cognitive bias on crisis decision-making: Experimental evidence on the comparison of bias effects between crisis decision-maker groups. International Journal of Disaster Risk Reduction. 2022;**82**(103379):1784-1810. DOI: 10.1016/j.ijdrr.2022.103379

[42] Walter A-T. Organizational agility: Ill-defined and somewhat confusing? A systematic literature review and conceptualization. Management Review Quarterly. 2021;**71**:343-391. DOI: 10.1007/s11301-020-00186-6

[43] AM, Elrehail H, Alatailat MA, Elçi A. Knowledge management, decision-making style and organizational performance. Journal of Innovation & Knowledge. 2019;**4**(2):104-114. DOI: 10.1016/j.jik.2017.07.003

[44] Goncalves D, Bergquist M, Bunk R, Alänge S. Cultural aspects of organizational agility affecting digital innovation. Journal of Entrepreneurship, Management and Innovation. 2022;**16**(4):13-46. DOI: 10.7341/20201641

[45] Beerbaum D. Agile Strategy in Non-Holacracy Organisations-the Future Strategic Model?2024. pp. 1-29. Available at SSRN: https://ssrn.com/abstract=4752638. DOI: 10.2139/ssrn.47526381-29

[46] Gupta A, Jena LK. Respect my authority: Spiritual self-managed teams and holacracy. Management Research. 2023;**22**(1):1-7. DOI: 10.1108/MRJIAM-11-2022-1360

[47] Hyatt J, Gruenglas J. Ethical Considerations in Organizational Conflict. London, UK: IntechOpen; 2023. DOI: 10.5772/intechopen.1002645

[48] Brugh W, Sorokin G, Scott GR. Combining formal and informal structures in crisis response. In: Frontiers of Engineering: Reports on Leading-Edge Engineering from the 2018 Symposium. Washington DC: National Academic Press; 2019

[49] Schnackenberg AK, Tomlinson EC. Organizational transparency: A new perspective on managing Trust in Organization-Stakeholder Relationships. Journal of Management. 2014;**42**(7):1-37. DOI: 10.1177/0149206314525202

[50] Slemp GR, Kern ML, Patrick KJ, Ryan RM. Leader autonomy support in the workplace: A meta-analytic review. Motivation and Emotion. 2018;**42**:706-724. DOI: 10.1007/s11031-018-9698-y

[51] Dwivedi YK, Ismagilova E, Hughes L, Carlson J, Filieri R, Jacobsen J, et al. Setting the future of digital and social media marketing research: Perspectives and research propositions. International Journal of Information Management. 2021;**59**(102168):1-42. DOI: 10.1016/j.ijinfomgt.2020.102168

[52] Kruger Jean-Pierre. A strategic thinking approach to delivery of a creative and adaptive strategy. PhD Thesis in Business Management, University of Pretoria; 2017

[53] Jonker Jakobus. Effective crisis communication management: Perspectives from public relations and communications practitioners [MBA dissertation]. Gordons Institute of Business Science, University of Pretoria; 2018

[54] Johansson Linus, Lukas Pihl. Crisis management in theory and practice: how and why organizations work the way they do. Masters Dissertation in Management, Jonkoping University; 2023

[55] Buljac-Samardzic M, Doekhie KD, Van Wijngaarden JDH. Interventions to improve team effectiveness within health care: A systematic review of the past decade. Human Resources for Health. 2020;**18**(2):1-15. DOI: 10.1186/s12960-019-0411-3

[56] Fischer RJ, Halibozek EP, Walters DC. Contingency planning emergency response and safety. Introduction to Security. 2019;**10**(1016):249-268. DOI: 10.1016/B978-0-12-805310-2.00011-1

[57] Sharma GD, Kraus S, Srivastava M, Chopra R, Kallmuenzer A. The changing role of innovation for crisis management

in times of COVID-19: An integrative literature review. The Changing Role of Innovation for Crisis Management in Times of Covid-19: An Integrative Literature Review. 2022;**7**(4):100281. DOI: 10.1016/j.jik.2022.100281

[58] Abbas T. Essential KPIs for effective crisis management. Change Management Insight. 2023. Available from: https://changemanagementinsight.com/crisis-management-kpis/ [Accessed: 26 March 2024]

[59] Savage G, Franz A, Wasek JS. Holacratic engineering management and innovation. Engineering Management Journal. 2019;**31**(1):8-21. DOI: 10.1080/10429247.2019.1565467

[60] Ye P, Liu L, Tan J. Influence of leadership empowering behavior on employee innovation behavior: The moderating effect of personal development support. Frontiers in Psychology. 2022;**13**(1022377):733-769. DOI: 10.3389/fpsyg.2022.1022377

[61] Radu C. Fostering a Positive Workplace Culture: Impacts on Performance and Agility: Human Resource Management - An Update. London, UK: IntechOpen; 2023. DOI: 10.5772/intechopen.1003259

[62] Volery T, Tarabashkina L. The impact of organisational support, employee creativity and work centrality on innovative work behaviour. Journal of Business Research. 2021;**129**(3):295-303. DOI: 10.1016/j.jbusres.2021.02.049

[63] Halawi L. Harnessing the power of culture and cultural intelligence within knowledge management. In: Theory of Knowledge Management to Practice. London, UK: IntechOpen; 2023. DOI: 10.5772/intechopen.1002304

[64] Reber M. Holarchical innovation teams: Principles -part II. Economia Aziendale online—Business and management sciences international. Quarterly Review. 2023;**14**(3):599-609. DOI: 10.13132/2038-5498/14.3.569-595

[65] Bernstein E, Bunch J, Canner N, Lee M. Beyond the holacracy hype: The overwrought claims—And actual promise—Of the next generation of self-managed teams. Harvard Business Review. 2016;**94**:38-49

[66] Rebecca H, Shantz A. A theory of HR co-creation. Human Resource Management Review. 2021;**31**(4):100823. ISSN 1053-4822. DOI: 10.1016/j.hrmr.2021.100823

[67] Petermann M, Zacher H. Agility in the workplace: Conceptual analysis, contributing factors, and practical examples. Industrial and Organizational Psychology. 2020;**13**:1-15. DOI: 10.1017/iop.2020.106

[68] Markopoulos E, Jordanou A, Vanharanta H. Merging the Holacracy and the company democracy models into a new disruptive and intellectual capital driven human resource management methodology. AHFE International. 2023;**92**:39-48

[69] Zhao J. Reimagining corporate social responsibility in the era of COVID-19: Embedding resilience and promoting corporate social competence. Economic and Business Aspects of Sustainability. 2021;**13**(12):6548. DOI: 10.3390/su13126548

[70] Chatzipanagiotou P, Katsarou E. Crisis management, school leadership in disruptive times and the recovery of schools in the post COVID-19 era: A systematic literature review. Education Science. 2023;**13**(2):118. DOI: 10.3390/educsci13020118

[71] Hartwig A, Clarke S, Johnson S, Willis S. Workplace team resilience:

A systematic review and conceptual development. Organizational Psychology Review. 2020;**10**(3-4):169-200. DOI: 10.1177/2041386620919476

[72] Arji G, Ahmadi H, Avazpoor P, Hemmat M. Identifying resilience strategies for disruption management in the healthcare supply chain during COVID-19 by digital innovations: A systematic literature review. Informatics in Medicine Unlocked. 2023;**38**(101199):1-15. DOI: 10.1016/j.imu.2023.101199

Chapter 5

Perspective Chapter: Empowering Small and Medium-Sized (SME) Entrepreneurs with Crisis Management Capacity and Skills in Africa

Vusi S. Mncube

Abstract

Crisis situations in the global and competitive business environment of today have become the new normal. The advent of Covid-19 has shown that African small and medium-sized (SME) businesses are vulnerable to crisis situations, sparking recent interest among scholars to investigate this phenomenon, given that there is limited previous research in this regard, especially in developing countries. This gap has necessitated this systematic review study which examined a number of sources based on peer-reviewed journals and reports regarding crisis management as it relates to African SMEs. The data collected were appraised according to their relevance to the study topic under investigation and analyzed thematically. The results highlighted that crisis situations are inevitable and a permanent feature in today's business environment, and that businesses, irrespective of their size, are impacted by crisis situations, including SMEs. Additionally, the study discovered that African SMEs have long been suffering from crisis situations even before the Covid-19 crisis, which was evident from their high failure rates over the years, as reported in various previous studies. The study also determined that African SMEs are not resilient enough to survive and manage crisis situations particularly due to their lack of finance, managerial skills, and inadequate government support. The author notes that this study's findings have implications for African policymakers who need to streamline their SME intervention programs, particularly with regard to funding and skills development, which have not been effective in the past as determined by various studies.

Keywords: small and medium-sized enterprises (SMEs), Africa, crisis management, skills development, entrepreneurship and government interventions

1. Introduction

This review study examined financial crisis management as it relates to small and medium-sized enterprises (SMEs) in Africa and how their skills can be enhanced to make them resilient to crisis situations. There is a global appreciation that small and medium-sized enterprises (SMEs) play a key role in employment, economic growth, and contribution to GDP, as supported by various studies such as Refs. [1–5]. This is even more critical in the context of Africa, which experiences high rates of unemployment, poverty, inflation, and significantly lower economic growth. In this context, SMEs are seen as the vehicle through which Africa can enhance socioeconomic development and alleviate poverty, resulting in the full economic emancipation of the masses of African people. According to the World Bank [6], African SMEs make up a larger portion of businesses and are the highest employer of the population. African governments, realizing the critical role of SMEs in their economies, have created institutions to drive the development and sustainability of SMEs. However, despite their critical economic role and government support initiatives, SMEs have had to deal with a number of challenges resulting in many of their businesses closing down before realizing their anticipated boost to economic growth and employment, especially within African countries. This has been discovered in a number of studies. For example, in the South African context, even though government interventions are in place, between 57 and 80% of SMEs never survive to reach a level where they contribute significantly to employment and economic growth [7–11].

One of the major weaknesses identified in relation to SMEs in Africa is their inability to effectively manage and survive crisis situations, which has been mostly exposed after the Covid-19 crisis. While a number of studies in the African context have discovered the exodus of SME business failures in Africa despite their important role in terms of economic growth, there has undoubtedly been limited research focus in relation to crisis management as it relates to SMEs. In fact, as indicated by Nyakato and Alasan [12], studies on SME crisis management have only recently begun, with Covid-19 serving as the catalyst. Adikaram and Surangi [13] argue that although crisis management studies have received significant attention in academic research, the focus on SMEs in this area was inadequate compared to larger organizations. It therefore appears that the impact of crisis management on SMEs was underestimated based on their size and possibly their flexibility to make decisions and take action. For instance, in terms of previous studies disregarding the importance of SME crisis management, Branicki et al. [14] assume that this could have been caused by SME traits such as adaptability and the ability to make decisions quickly, which reduced the effects of a crisis as far as research is concerned. However, it became clear with the Covid-19 crisis that SMEs in Africa lack the relevant skills and capacity to manage and survive crisis situations, which are a reality in the turbulent business environment of today. Additionally, the significant failures by SMEs in Africa, as unpacked in a number of studies, also create a crisis situation that undoubtedly needs attention. This creates a gap for this study to examine the impact and capacity of SMEs in Africa to manage financial crisis situations and to suggest interventions necessary to enhance SMEs' crisis management skills and capacity.

This study aimed to identify the impact and capacity of African SMEs in relation to financial crisis management and to recommend appropriate interventions to enhance SMEs' crisis management ability and resilience. The study contributes to the available knowledge by highlighting the weaknesses of African SMEs that make them vulnerable when it comes to crisis management and how they can be empowered with the required capacity to withstand the inevitable impact of crises in the business environment and be sustainable. The next section discusses the literature review as it relates to the nature of crises, crisis management, and the role of skills development to enhance crisis management skills.

2. Literature review

The purpose of this literature review is to evaluate how crisis management relates to African SMEs, with specific reference to their financial and skills capacity necessary for them to effectively respond to crisis situations. This section begins by providing an introductory context of crises in business after which further analysis is provided on issues relating to crisis management, financial resource availability, skills profile of African SMEs, and digital infrastructure issues with a view to compile adequate information on the subject under study.

2.1 Nature of crisis conditions in business

The term crisis originates from the Greek word "krisis," which means choice, decision, or judgment [15]. The meaning of this term, however, seems to assume that crisis situations mainly emanate from choices, decisions, or judgments made by people, which disregards the fact that some crises emanate from factors outside the control of people or management in the case of the business environment. Most business scholars and experts generally agree that organizations are not immune to possible crisis events, which can occur in an unforeseen manner or sometimes due to management negligence but may have a significant impact on the operations of the business. The question becomes whether the organization has been exposed to a crisis event by choice or beyond their control. However, as pointed out by Buyukbese and Tasdemir [16], a common definition of crisis and crisis management does not seem to exist, as various experts tend to provide different definitions of these concepts. For instance, Doern [17] defines a crisis as an unforeseen event that causes distress and requires intervention as well as proper planning to ensure business survival and sustainability. On the other hand, Selbst [18] defines this term as any action or failure to act that negatively affects the business functioning, including the achievement of its objectives or its survival, or that is perceived as having personal detriment by the organization's stakeholders such as employees, clients, and shareholders. While both definitions highlight that a crisis event results in a negative impact, Doern [17] emphasizes the unforeseen nature of crises and ignores the possibility of a crisis situation being inflicted by poor management on the part of the organization. Selbst's definition seems to attribute the crisis situation to internal failures within the organization but ignores the possibility of a crisis caused by an unforeseen event outside of the organization's control. It does appear that the key themes in any attempt to define a crisis should include the fact that it can be caused by external event/s outside of the organization's control or internal event/s within the organization, and that the impact is negative and requires immediate response. Failing to respond promptly can affect the survival of the organization. The main difference between internal and external triggers of a crisis is that the former can be avoided with prudent management of organizational affairs, while the latter cannot but requires management. Pedersen et al. [19], considering the importance of conceiving a sequence of small events over time leading to a crisis, define this term as a sequence of events that can have a devastating impact if not managed properly. It is evident that there are a number of different perspectives in the literature, all attempting to provide a definition of the term "crisis" with some emphasizing one trigger over another.

Pedersen et al. [19], however, observe that the use of the term crisis differs by context and discipline. Muşetescu and Shayb [20], though they also note that there has been no agreement among experts and scholars on the common definition of the term crisis, highlight that the key elements that must encompass the definition of a crisis include uncertainty, ambiguity, and risk. These elements may not be enough for crisis definition if the external unforeseen event and/or internal poor management actions that cause it in the first place result in uncertainty, ambiguity, and risk. These elements also ignore the imperative to promptly take action to reduce the impact or eradicate the crisis situation. Pedersen et al. [19] highlight that crisis can be either internally or self-inflicted (i.e., corruption, tax evasion, environmental damage, misconduct) or caused by external factors (i.e., Covid-19, hurricane ruins production facility). Regardless of the source of the crisis, organizations need to act swiftly due to the devastating impact of crises. Pedersen et al. [19] point out that crises can have substantial negative consequences for the organization, such as significant financial losses, interruptions of operations, or even bankruptcy. The process of making business decisions and acting in the middle of a crisis can be very complex, yet it has to be done quickly for the organization to survive. Decision-making in this context of a crisis situation often involves paradoxes and difficulties such as the need to act swiftly but carefully, while balancing short-term with long-term outcomes [21]. This is when the astuteness of organizational management tends to be tested, resulting in some organizations being able to successfully manage a crisis while others fail. Furthermore, Nyakato and Alasan [12] maintain that the level of an organization's response to the crisis may determine its ability to manage the problem or not, regardless of its size and financial resources. This undoubtedly indicates that even SMEs are not an exception to a crisis situation. The term "crisis" is sometimes used haphazardly to describe changes that may be negative but are not actually a crisis. This point is also highlighted in Ref. [22] insisting that when a company's performance is only slightly reduced and can be easily rectified without causing significant loss to the company, this should be considered normal changes in the company's life cycle rather than a crisis. In contrast, a crisis situation is characterized by a state of total instability within the company, where normal operations and performance are severely impacted. Lachhab et al. [23] identify two main types of crises, which comprise external crises such as economic, political, technological, ecological, and social crises; and internal crises such as changes in management, strikes, or production issues.

2.2 Crisis management and SMEs in Africa

It has been noted above that crisis in the business environment requires response by management to alleviate its potential detrimental effect. This gives rise to the concept of crisis management which is defined by Vargo and Seville [21] as the discipline of preparing resources to effectively respond in the event of the occurrence of a crisis and to effectively recover in the aftermath. Jaques [24] notes that crisis management emerged after World War II, gaining further prominence during the Cuban Missile Crisis, but was formalized into a management discipline after the 1982 Tylenol poisoning scandal and the 1986 Chernobyl disaster. Vasickova [25] observes that crisis management has received significant attention from managers of organizations, especially in the current business environment influenced by the impact of globalization and high market dynamics. Due to its importance for organizational survival, Fener and Cevik [26] note that crisis management is a key aspect of strategic management planning. The key to crisis management, as argued by Mitroff and Anagnos [27], is the imperative to vary between crisis leadership as a prevention intervention and management at the time of crisis. However, in reality, organizations in Africa tend to put in place their crisis prevention plans as a tick box exercise, and such plans are never effectively communicated to the rest of the organization during normal times. This makes crisis management more of a reactionary exercise in reality than preventative, albeit larger organizations are likely to survive it compared to SMEs due to their financial resources and management skills. The SME sector in Africa has clearly shown vulnerability when it comes to crisis management, despite its empirically proven important role and potential in the economic activities of the continent. Muriithi [28] argues that SMEs are the engine that drives world economies, for both developed and developing economies. Furthermore, they are significantly important, especially for underdeveloped countries, accounting for 99% of all businesses [29]. In terms of the African context, the main engine of promising Africa's economic growth is based on SMEs, which Hatega [30] observes that in the sub-Saharan African region alone, SMEs account for more than 95% of all businesses. Other scholars have argued though that there is no empirical evidence of SMEs' contribution to economic growth. It remains to be seen how this anticipated contribution to economic growth will manifest in the future. The researcher argues that in the African continent, unless policymakers become serious about eliminating the weaknesses and challenges that have been empirically attributed to SMEs, including their vulnerability to crisis management, Africa is far from realizing the envisaged economic growth as a result of SMEs' contribution. At this stage, SMEs undoubtedly contribute significantly to employment given their large numbers compared to larger organizations as evident from various studies.

Coombs and Laufer [31] identify three phases of crisis management: pre-crisis, crisis, and post-crisis. Pre-crisis management focuses on prevention and preparing the organization with the capacity to minimize the adverse effects of a crisis, while post-crisis management involves response, organizational recovery, and learning from the crisis [13]. On the other hand, Pedersen et al. [19] indicate that the management of a crisis entails the intentional handling of a crisis in five phases, which include: pre-crisis management, crisis emergence management, crisis occurrence management, crisis aftermath management, and post-crisis management. However, the tendency is to focus on the response phase rather than effectively maneuvering the pre-crisis management and post-crisis learnings. For instance, during Covid-19, both larger organizations and governments provided a rigorous response during the crisis stage. However, it remains to be seen if any post-Covid-19 activities are taking place. It is sufficient to note that governments and other organizations have moved on after the crisis.

2.3 Impact of crisis situations to SMEs in Africa

The issue of crisis management is undoubtedly important to consider, given the critical role and potential that has been identified in the SME sector in terms of their contribution to employment, economic growth, and GDP. Meanwhile, it has been observed that SMEs tend to be more vulnerable to crises than their larger counterparts. Therefore, as maintained by Bansal [32] crises like Covid-19 tend to have far-reaching implications for SMEs, which include declining demand, an increase in costs, liquidity, and supply challenges. As noted earlier in this paper, SMEs in Africa have faced crises long before well-known crises like Covid-19. Adcorp [33] asserts that the mortality rate of SMEs in Africa is high, with five out of seven new businesses failing in their first year of operations. A number of studies have also uncovered the increasing failure rate of SMEs in various African countries over the years. However, despite much research on SMEs, fewer studies have paid attention to the challenges faced by SMEs [28]. This is also supported by EZE and LOSE [34], who maintain that there has been little research on the challenges and reasons for small business failures in developing nations. Contrary to these views, there have been a number of studies, at least in the South African context, that have identified various challenges and causes of SME failures. The main issue is more about what policymakers in the African continent have done with the challenges unpacked in various studies, rather than a lack of such research. It appears that Africa has accepted business failure as one of the characteristics of SMEs, and hence, such failures have been tolerated and not eradicated to truly realize the anticipated economic growth. It is only after Covid-19 that attention has been given to the issue of crisis as it relates to SMEs. Some studies have discovered that its effect has been more severe for SMEs than their larger counterparts. Despite African researchers starting to take interest in investigating issues of crises and resilience related to SMEs, it remains to be seen if policymakers will make effective use of these study outcomes to inform their SME support initiatives. The recent studies conducted related to crisis in African SMEs triggered by Covid-19 have discovered various reasons in an attempt to explain the basis why SMEs have proven to be vulnerable to crisis situations. For example, Bansal [32] discovered in the study that SMEs were the most vulnerable to Covid-19 due to their size, scale of operation, limited financial management, and lack of capacity to deal with crises. Muriithi [35] also asserts that the Covid-19 pandemic had an even more severe impact on SMEs in Africa due to challenges such as inadequate financial support, uncertainty, and lack of government support. The key theme of these findings is that SMEs in Africa have already been facing a financial crisis that has not been adequately addressed for a long time, making them more vulnerable to other crisis situations like Covid-19. Other studies such as Refs. [21, 36, 37], among others, attribute SME vulnerability to crisis situations due to their lack of skills and capacity. SMEs will therefore need to be empowered with the relevant skills to effectively navigate this complex phenomenon of managing in a crisis. Notably, there has been limited research in Africa to test if there is a significant relationship between skills development, adequate financing, and SME success, other than the assumption by many that skills and finance are necessary for the sustainability of SMEs in Africa. It must be noted, though, that the impact of crisis situations has generally proven to be detrimental for SMEs already under financial distress, leading to a large number of them not surviving to see the light of day, notwithstanding their economic value potential. Muriithi [28] argues that through the positive role of SMEs, Africa can transform its economic position and become a competitive giant for the rest of the world to reckon with. Therefore, governments in Africa will have to effectively create and implement programs and environments that support the resilience and sustainability of SMEs, thus eradicating their vulnerability to the negative impact brought about by crisis situations.

2.4 Skills development interventions necessary for African SMEs' crisis management

While there is still room to adequately explore the significance of enhancing skills for African SME entrepreneurial success, some studies have emphasized its importance in alleviating their vulnerability to crisis situations. At the heart of this is enhancing their ability and capacity to effectively manage crisis situations. While entrepreneurial activities in developing countries like Africa rely on SMEs and their entrepreneurial drive, there are a number of other competencies that are critical for running their ventures smoothly. According to Hidayah and Rodiah [38], these competencies are essential for the success of entrepreneurial ventures in developing countries and include innovation, leadership, social networks, and business continuity. These competencies are generally part of the managerial skills discipline necessary for the sustainable operation of businesses, including SMEs. However, studies on SME failures in Africa have identified that the key cause of SME failure is due to their lack of competencies/skills to effectively and professionally run their businesses. The main skills that have generally been identified in various studies as critical to enhance the resilience of SMEs include managerial, technological, as well as having skilled employees. The managerial skills are seen as critical to capacitate SME owners/managers with the ability to effectively manage crisis situations given that crisis management has been integrated as part of strategic management planning over the past years. Various studies have confirmed the positive impact of managerial skills in enhancing the performance of SMEs or managing crisis situations. For example, Refs. [39–41] and others have all highlighted the importance of managerial skills in these contexts. Furthermore, the incapacity of African SMEs to manage and recover from crisis situations has been attributed to their lack of managerial and business skills, as noted in Refs. [28, 42, 43]. Therefore, as noted in Ref. [43], the challenge to alleviate these issues is to improve the skills and capabilities of SMEs to ensure their success as they play a critical role in economic development. Van Scheers [40] maintains that capable managers achieve goals and targets successfully with a minimum waste of resources due to their managerial skills, which can be enhanced through natural aptitude, self-motivation, and ambition. While most studies recognize the importance of enhancing managerial skills for SMEs, it is not clear how these skills can be provided in an effective manner given the challenges and weaknesses faced by African SMEs. Additionally, governments on the continent have not paid attention to these issues. It is assumed that training must cover all the key disciplines of general management training required for SME businesses to be sustainable even in the face of crisis situations. Mamabolo et al. [41] discovered in their study that SME entrepreneurs in Africa lack and therefore require financial management, human resource management, business start-up, social and interpersonal, leadership, personality, marketing, technological/digital, and business management skills. Mamabolo et al. [41] identified that these skills will be instrumental in training SME entrepreneurs and can serve as a tool to measure SME entrepreneurial skills and competencies in future studies. Africa, however, comprises a number of SMEs whose owners may not be literate enough to grasp management training. There has been no research addressing how to equip this segment of SMEs with the skills to run their businesses or whether there is an alternative method to empower them in terms of running their businesses.

In addition to providing general managerial skills to African SMEs, it might also be appropriate to put in place interventions that will enhance their motivation and resilience. Ladzani and van Vuuren [44] indicate that motivation translates to the individual entrepreneur's need for achievement, while entrepreneurial skills include creativity, innovation, risk-taking, and the ability to interpret successful entrepreneurs and identify opportunities. These traits seem to be driven to a large extent by the personality of the individual SME, and so it needs to be determined if training can in any way shape these entrepreneurial characteristics. Further research is needed to determine whether entrepreneurial qualities can be learned or if they are intrinsically linked to an individual's personality traits. Regarding the managerial and business skills necessary to enhance African SMEs' resilience, Ladzani and van Vuuren [44] contend that these skills include the ability to formulate business plans, financial, marketing, operational, human resources, legal, communication, and management skills. They argue that these competencies are undoubtedly crucial for developing resilient SMEs in Africa.

The training and skills development for the sustainability of SMEs to withstand challenges and crises is not only critical for their owners/managers but also for their employees who are responsible for executing various business processes and tasks. Rajam [45] points out that training and skills development can have an influential impact on SME sustainability, given that such learning can produce skilled employees who are proficient in their jobs. Rabie et al. [46] assert that in today's business environment, which is subject to excessive competition, the capabilities and skills of employees form a critical condition for SME productivity, innovation, and business success. Furthermore, according to Rabie et al. [46] training can be defined as a planned effort by the employer to enable employees to acquire job-related knowledge, skills, or behaviors crucial for positive job performance. When it comes to SME training, it has been suggested that owners tend to not pay attention to ensuring that their employees are adequately trained for various reasons. Antonioli and Della-Torre [47] highlight that SME owners tend to be often busy with their operational matters or do not have the leadership skills to encourage employee training. This assertion, though, ignores other key challenges beyond the control of SME owners that could be hindering them from embarking on employee training, such as finance, operational pressures [48] present the reasons for lower demand for staff training by SME employers as follows: firstly, uncertainty about the future of their business; secondly, costs of training may be too high for SMEs; thirdly, SME owners often feel that skills training is too general and not suited to their needs; fourthly, the absence of any demonstrated link between training and performance may deter some SME employers from embarking on staff training. The study by Bélanger and Hart [49] identifies challenges relating to SME training as follows: the lack of concerted efforts by SME owners, the importance of customized training approaches applicable to the operations of SMEs, the need for communication and information about available training programs, and the structural limitations faced by SMEs due to their size. Damoah and Akwei [50] study results reveal that out of eight barriers for Ghana SMEs to engage in formal staff training, lack of accessibility to training, lack of finance to fund training, and skepticism of SME owner managers about the value of training were the three most important barriers. This is why, according to Damoah and Akwei [50], SMEs in Ghana have difficulty participating in formal training, resulting in their inefficiency and ineffectiveness compared to larger firms. While formal training has proven to be valuable, so has informal on-the-job training, which tends to be practical for SMEs who not only face training budgetary constraints but also may have people capacity issues, making it difficult for them to have employees off-site for formal training. In addition, there may be no empirical evidence that only formal training results in efficiencies.

The SME barrier to formal training participation, as it relates to their skepticism about the demonstrated relationship between formal training and performance, has triggered different views among scholars. While some studies confirm a positive relationship between formal training and SME performance, others have argued that there is limited empirical evidence in this regard. For example, Surya et al. [2] found in their study that on-the-job or off-the-job training is significantly positively related to SME performance, and when these types of training are received simultaneously, the combined impact is stronger than the individual one. On the other hand, studies such as Refs. [51, 52], among others, reject the notion of a relationship between formal training and SME performance based on the lack of empirical evidence. These studies seem to be in agreement with SME owners who perceive formal training as irrelevant and of little value to their businesses. It may well be noted that the experiential on-the-job learning approach that has been used by SMEs in Africa for a while has proven to be effective. In the South African context, various Sector Education and Training Authority agencies structure skills development and training interventions so that learners spend at least 70% of the learnership time in experiential learning in an on-the-job setting. This is based on research showing that experiential learning is more effective than formal classroom training.

The content of the employee training has been identified in various studies. Beber et al. [53] indicate that training at the employee level can include programs such as literacy and business writing skills, basic financial management, specialized knowledge like training on the production process, etc., and softer skills mainly relating to how the employee relates and communicates with others in the team. It must be noted, though, that training for individual African SMEs needs to be informed by their specific skills gaps and needs.

In addition to their skepticism about the value of training, the main stumbling block of SMEs in Africa regarding training stems from their lack of finance to fund the training programs. Therefore, given the importance of training and skills development for the sustainability of SMEs and their significant role in the economies of the African continent as established in various studies, governments are obliged to incorporate this support as part of their SME development programs. Van Scheers [40] calls for the government in the context of South Africa to address the challenge of managerial skills shortages for SMEs through training, as skills are specific abilities that result from knowledge, information, practices, and aptitude. Mashavira and Chipunza [39] call on the government ministries and agencies responsible for SME development to provide more funding to offer mentorship and training for SME owners/managers. This is confirmed by other studies, such as Fatoki [54], who argues that government agencies should arrange training for new SMEs on business plan preparation and business management, and also facilitates mentorship programs for them. This empirically identified skills gap for African SMEs can provide a significant input to the curriculum of the African SMEs' Managerial Skills Development Program, which is expected to be funded by various governments in the African continent. Governments can also help SMEs not only with managerial training for their owners/managers but also with funding and incentives to train their operational staff. The challenge for Africa in this regard is that little effort has been made by various government institutions to effectively enhance the skills level of their SMEs. However, in certain countries like South Africa, research has determined the need for SME skills development programs, but implementation has been dismal.

2.5 Enhancing African SME digital transformation

The focus on enhancing digital transformation and skills for SMEs globally, particularly, within Africa, has been influenced by the advent of the Covid-19 crisis. This crisis drastically changed the way business is conducted; the business model for large and small businesses had to shift from physical to online due to the social distancing requirements to mitigate the spread of the virus. This shift made digital platforms the primary enabler of business processes. Nachmias and Hubschmid-Vierheilig [55] point out that the Covid-19 pandemic's reliance on technology to execute daily organizational tasks raised questions about how tasks were to be designed and the definition of the modalities of people's contribution to their tasks. This also resulted in SMEs having to grapple with the challenge of accessing digital platforms and skills. Bai et al. [56] attribute the closure of SMEs during the Covid-19 crisis to their lack of access and limited use of digital infrastructure, especially in developing countries like Africa. They argue that only SMEs who leverage digital platforms will survive post-Covid-19. Gqoboka et al. [57] observe that more than 60% of SMEs in South Africa closed down during Covid-19 due to their inability to migrate from physical business operations to online. Fitriasari [58] proposes that business resilience models related to digital transformation can only exist when new digital skills emerge and digital tools are adopted. However, both digital skills and access to digital tools have been identified by various studies as challenges for SMEs in African countries, making them less resilient to crises like Covid-19. The study by Gqoboka et al. [57] on the Covid-19 crisis identified the lack of digital skills/literacy among SMEs as one of the barriers to their digital transformation, in addition to limited digital infrastructure and a lack of funds for digital investments. Several other studies have identified a lack of digital platforms and skills as a challenge in the digitization of SMEs.

Moreover, as pointed out in Augustine Ebuka et al. [59], the possession of digital platforms and skills by SME owners/managers and their employees can differentiate competitive from non-competitive SMEs. Therefore, in addition to the Covid-19 wake-up call regarding the importance of leveraging digital platforms for SMEs in Africa, globalization has created a highly competitive business environment with constant technological advancement serving as the key driver of innovation. Cariolle and Carroll [60] contend that the future of African economic emancipation and growth will probably depend on the pace of digital technological adoption and diffusion, which is expected to open new perspectives for private sector expansion and job creation, particularly for SMEs. Furthermore, as noted in Lukonga [61], digital technologies, which are rapidly advancing, have the potential to enhance SME productivity and growth, as well as position SMEs in developing economies to compete and survive.

Achieng and Malatji [62] assert that while SMEs in sub-Saharan Africa (SSA) play an important role in economic growth and development, they tend to fail in their first 2 years of operation compared to larger organizations primarily due to their lack of digital transformation, which hinders their resilience. In general, while technology plays a critical role in making organizations competitive for various reasons, it may not be practical in the context of African SMEs to maintain digital platforms as the main source of resilience. Most research into the causes of SME failure has emphasized funding as the primary challenge. Therefore, in order of priority, Africa may need to first address funding issues and business management skills before delving into digital transformation. It must also be noted that some of the businesses operated by SMEs in Africa and their context may not be technologically intensive, making it less of a priority in terms of their main triggers of resilience, for example, plumbing, catering, construction. In these operations, owners use their mobile phones to communicate with clients, which is fairly established in Africa.

A number of studies who lament this digital vulnerability of African SMEs have called for policymakers to play their support role in assisting SMEs with digital transformation such as Refs. [57, 62–65]. Lukonga [61] argues that with digital technologies on the table and SMEs being the effective engines of inclusive economic growth, policymakers will have to rethink their SME development strategy. Business sustainability will be difficult for SMEs post-Covid-19 unless they invest in digital skills development to overcome future challenges [66]. Cariolle and Carroll [60] contend that the adoption and diffusion of digital platforms in Africa are likely to enhance growth as it relates to the inner functioning of the organization, addressing market and government failures, but will benefit, mostly, firms endowed with a skilled labor force. Drydakis [67] laments that SMEs seem to ignore integrating digital platforms into their business operations simply because they do not have the relevant digital skills and are therefore running a risk of not attaining the state of competitiveness, growth, and profitability.

There have also been a number of initiatives and frameworks to enable digital transformation at government levels within Africa and also at the African Union level under the umbrella of the Digital Transformation Strategy for Africa. These include the Policy and Regulatory Initiative for Digital Africa (PRIDA), the Programme for Infrastructure Development in Africa (PIDA), the African Continental Free Trade Area (AfCFTA), etc. However, it appears that their implementations, if any, have not yet impacted the various SMEs, as evident from the challenges that most African SMEs experienced with the overnight digitalization of business activities brought about by Covid-19, as unpacked in various studies. The digital transformation of SMEs in Africa undoubtedly requires the intervention of various African countries' governments working with private sector information technology stakeholders and their SMEs as part of the post-Covid-19 crisis intervention.

3. Research design and methodology

This study is a systematic review primarily relying on secondary sources for data collection. A systematic synthesis of published articles was conducted to determine issues related to crisis management and skills development interventions in SMEs with a specific focus on the African context. Munn et al. [68] explain that a systematic review is a method of gathering and synthesizing data from a collection of related studies focusing on a particular phenomenon. This approach is used to synthesize and evaluate data by identifying and retrieving information relevant to specific research questions that can inform policies, practices, and future studies [68]. This study involved desktop research mostly of the relevant published academic journals, conference proceedings, and reports. To find information, Google and Google Scholar engines were searched. Additionally, the researcher searched the ScienceDirect and ResearchGate databases. The researcher reviewed both African and international articles focusing on SMEs, crisis management, skills development, and government SME development interventions for inclusion. Despite the study's focus on the African context, some international journals with relevant information were also reviewed due to the lack of pertinent publications in Africa. In line with Ref. [69] the researcher mostly identified peer-reviewed journals and specific keywords to decide on the inclusion criteria, which were identified and duly applied. The criteria included, firstly, the reputation of the journal; secondly, whether the focus was on African SMEs, crisis management, SMEs' crisis management capacity, and skills, as well as interventions to develop the resilience of SMEs in Africa. The last criterion was to ensure that the selected articles were published after the year 2000. The collected data were appraised according to its relevance to the study topic under investigation and analyzed thematically.

3.1 Findings

The review of various sources in this study has unpacked key issues relating to crisis management in the business environment and its implications for SMEs in Africa. A number of issues/themes were identified from the literature review that need attention and may require further research in the future.

4. Crises in today's business environment are a permanent feature

In today's complex business environment, it has become apparent that crisis situations are forcing businesses to be forever prepared for their inevitable eventuality. Mitroff and Anagnos [27] assert that crises are an inevitable and permanent feature of today's societies. Moreover, with globalization, the likelihood of a business crisis and its impact on the organization is too great to be ignored [70]. Therefore, as highlighted in Ref. [71], they present organizational management with situations that require a swift response, either planned or improvised.

In fact, Ouedraogo [72] argues that given the impact of globalization on African firms, crisis management logic dictates that preparing for potential crisis situations should be a critical part of organizational strategy. Moreover, Vasickova [25] asserts that there are common features between crisis management and strategy, which include consistent environmental analysis, cooperation with stakeholders, and top management activities. The proactive assessment and handling of possible future crises are imperative more than ever before for organizational survival in today's turbulent environment. This is critical to ensure business continuity going forward, as noted in Ref. [73], who argue that the importance of business continuity management for the company's internal and external environments cannot be overstated.

4.1 SMEs not immune to crisis situations

The inevitable occurrence of crisis situations and their impact on businesses do not exclude SMEs. Therefore, for their survival, they are also forced to consider strategies related to crisis management, especially since most studies have shown that they are globally recognized as key to economic growth and employment. Although there has been limited research on crisis management as it applies to SMEs in developing economies like Africa as noted in Ref. [13], its importance has been emphasized by the advent of Covid-19. Other African countries saw larger numbers of SMMEs closing down, which translated into loss of employment and economic growth given their role in the economies of Africa. Moreover, Ref. [74] points out that Covid-19 added another burden to African SMEs who already experience significant failures.

4.2 SMEs in Africa have long been suffering from various crisis situations

In general, besides the Covid-19 crisis, SMEs in Africa have been subject to high failure rates despite their importance to economic growth and employment, as noted in various studies such as Refs. [10, 11, 28, 75–77], and others. Researchtech Global [78] has reported that between 2010 and 2018, businesses started in Africa had a 54% chance of failing, which is worryingly high. Furthermore, among the African countries with the highest start-up business failure rates, as indicated by Researchtech Global [78], were Ethiopia at 75%, Rwanda at 75%, Ghana at 73.91%, Zimbabwe at

66.7%, Congo at 66.7%, Tanzania at 62.50%, Nigeria at 61.05%, Senegal at 58.3%, Somalia at 60.0%, and Kenya at 58.7%. Various studies have attempted to identify the reasons for such failures in Africa, as noted in Ref. [35], who highlights that despite their critical role, many SMEs in Africa face several challenges including power shortages, lack of capital, poor management skills and competencies, and inadequate information and corruption. Researchtech Global [78] also identifies a number of SME failure reasons in Africa, including failure to conduct conclusive market research, lack of capital, political instability, cashflow problems, unfavorable government policies, inadequate business management and entrepreneurial skills, poor marketing, lack of planning, lack of business knowledge, and unavailability of a market. Other African SME failure reasons as identified by Eze and Lose [34] include deteriorating infrastructure, inadequate funding, high crime rate, cumbersome government regulatory framework, epileptic power supply, lack of record-keeping, and lack of access to technology. This indicates that even though the Covid-19 crisis has become the catalyst of interest in crisis management research for SMEs, Africa should have paid attention to crisis management for SMEs prior to Covid-19, given the significant failures reported from previous studies on SME development and sustainability. It goes without saying that the African SME sector was already in crisis long before the advent of Covid-19.

4.3 African SMEs do not have capacity to manage crisis situations

SMEs in Africa have shown significant vulnerability in handling crisis situations, which became evident during the Covid-19 crisis. Muriithi [35] argues that the Covid-19 pandemic had an even larger impact in Africa, with 87% of SMEs employing between 70% and 90% of the population uncertain about the future of their businesses. In South Africa alone, Gqoboka et al. [57] indicate that Covid-19 restrictions resulted in the closure of over 60% of SMEs mainly because of their inability to change their business model from physical to online. Nyakato and Alasan [12] assert that SMEs are easy victims of any sudden, unexpected catastrophe because of their size features, especially with regard to financial resources. Adikaram and Surangi [13] found in their study that SMEs are more vulnerable to crises compared to larger organizations. Furthermore, the study by Asgary et al. [36] discovered that 90% of SMEs operate at a loss after experiencing a disastrous crisis situation. There is no doubt that as part of the post-crisis related to Covid-19, the biggest learning concerning African SMEs is that they do not have the capacity to manage crisis situations. Hence, the importance of crisis management for SMEs has started to dominate academic literature. Therefore, given that experience has shown that SMEs are vulnerable to the impact of crisis situations, they need to be empowered to embark on the appropriate crisis management steps like any other organization. The following findings contribute to the lack of capacity of African SMEs in crisis management:

4.3.1 SMEs in Africa lacks management skills necessary to manage crisis situations

African SMEs lack the managerial skills required to effectively manage crisis situations. This has been identified in previous studies as one of the challenges contributing to the high rate of SME failures in Africa. For instance, Muriithi [28] highlights poor management skills and competencies as one of the major reasons for SME failures in Africa. On the other hand, Mhlongo and Daya [75] in their study identified, among other factors, a lack of entrepreneurial leadership skills, financial education, and training as causes of SME failures in South Africa. A number of other studies in the African context have lamented the lack of skills and competences as the challenges resulting in the low success rate of SMEs on the continent.

Kindström et al. [79] observe that SMEs are generally led by driven entrepreneurs with limited formal managerial and organizational training but high contextual knowledge and experience, which results in an emphasis on operational aspects of the business and neglect of managerial and strategic aspects. This makes it difficult for SMEs to be sustainable in Africa, especially in the face of unforeseen crises. Furthermore, since they focus solely on operations without strategic planning and decision-making, they not only struggle with external unforeseen crises but also unknowingly create self-inflicted internal crises. Bodziany et al. [80] argue that SMEs must not only embrace operational knowledge but also managerial competencies, which can arm them with the capacity to be resilient in complex situations and crises. It is clear that for survival, SMEs cannot afford to remain complacent in the face of unavoidable risk situations and crises characterizing the business environment of today. Asgary et al. [36] argue that SMEs, like large corporations, also face a significant number of risks, and therefore, their survival and resilience are equally important for local and global economies as that of their larger counterparts. Furthermore, as noted in some studies [81, 82], SMEs, especially in developing economies including Africa, do not have the capacity and systems for risk management, business continuity, and crisis management. It goes without saying that interventions must be identified and put in place, especially in developing economies like Africa, to enhance the ability of SME owners/managers and employees with the relevant resources and skills to sustain their businesses in the face of constant crises. Moreover, Gumel and Bin Bardai [83] identify in their study the lack of information that can be used by policymakers and SME owners/managers to develop SME policies and best practices to eliminate the crisis of frequent business failure. Wiid and Cant [84], in their study relating to skills requirements in South Africa, established that the majority, over 63% of the participants, indicated they required marketing skills, followed by 58.5% for financial skills, then 53.6% for management skills, 35.3% for administration, 29.3% for purchasing management, and 9% for other skills. This study shows that the biggest skills gap is in managerial discipline (i.e., marketing, financial management, and business management). Therefore, this is further evidence that highlights the importance of providing managerial training for SMEs. The key general managerial skills that must be included in management training programs for African SMEs as consolidated from various studies such as Refs. [39–41, 43, 85, 86], and others, include finance, marketing, strategic management, business planning, business management, business analytics, human resources management, supply chain management, crisis management, business continuity, and innovation. The other important aspect of training SMEs owners/managers in Africa, which is a fairly new concept from a training and research perspective in Africa, is entrepreneurial training. Entrepreneurship in Africa can be defined in the context of the SME sector. The model of entrepreneurial performance combines motivation, entrepreneurial skills, and business skills [44]. Information on business failures is also important in determining successful interventions, as this serves as lessons learned and hands-on experience necessary for aspiring SMEs to venture into their businesses without making serious trial-and-error mistakes [85]. Additionally, Bodziany et al. [80] call for the promotion and creation of a "learning organization" culture among SMEs so that they remain agile to adapt and handle marketplace turbulences beyond Covid-19. Crisis learning is crucial to reduce the vulnerability of SMEs to future crises [13].

Due to their poor management skills, SMEs in Africa do not engage in the process of crisis planning as described in Ref. [13], which involves the pre-crisis phase focusing on crisis prevention and preparation to reduce its impact. In fact, Herbane [71] asserts that a literature review of crisis management studies highlighted the reactive nature of SMEs to crisis situations. This reactive approach contributes to SMEs in Africa being vulnerable and susceptible to crisis situations, as they are caught off guard and unprepared. Moreover, with poor managerial orientation SMEs in Africa do not engage in Business Continuity Management (BCM) to enhance their preparedness for unforeseen crisis events. Vargo and Seville [21] contend that the strategic approach and management ability for strategic decision-making position for a business long-term survival and resilience. Adikaram and Surangi [13] indicate that the majority of studies consider business continuity planning as part of strategic planning.

4.3.2 Government interventions not adequately addressing SME crisis situations

Previous studies in the African context have established that African governments have created programs for SME development, given the general appreciation of their important role in economic growth and employment. It is expected that these programs will empower the SMEs in Africa to be resilient to crisis situations and sustainable. However, these government support programs have not yet yielded the required results, as SMEs still fail despite government interventions, as noted in studies such as Refs. [87–90], and others. In the context of South Africa, despite government support interventions, between 57% and 80% of SMEs never survive from their early years of operation to the level where they significantly contribute to employment and economic growth [7–10]. Bushe [11] indicates that whether the government of South Africa has truly committed to the development of SMEs remains an unanswered question. Muriithi [28] laments the lack of government support in Africa for distressed SMEs, which is contrary to developed countries where assistance for their SMEs is readily available. This shows that government interventions in Africa are far from having a significant impact on SME development and sustainability.

Scholars have provided different opinions on the reasons for the ineffectiveness of government SME interventions in Africa. For instance, the study by Kelly et al. [89] revealed that although several government SME interventions are in place, there is a need to increase awareness about these interventions and to address the effectiveness by which they are implemented. Other studies, such as Refs. [11, 90], have attributed barriers to success of government SME interventions in Africa to corruption by some government officials. Wiid and Cant [84] cite various studies that discuss the challenges they have referred to as "inefficient government bureaucracy" and its impact on SME entrepreneurs' experience with government services in South Africa. The core issue cited by Wiid and Cant [84] in relation to SMEs is the overlap of SME programs in South Africa, which is attributed to poor government interdepartmental integration in the planning and implementation of SME programs as well as cumbersome policies that do little to promote entrepreneurship. It has also been determined in some studies that some of the reasons why most African SMEs fail to access funding are a lack of awareness about government funding support schemes and their inability to prepare professional and convincing business plans. These and other business failure factors, therefore, point to the lack of African SME management training and mentorship as a major stumbling block to their sustainability. It has also been suggested that some African states, while they may have great development programs, are poor at implementation. To address this, the study by Aluko et al. [87], concludes that the efficacy of government SME support programs can be enhanced by clearly defining the goals and objectives of each program using empirical data to inform the program design and implementation, as well as regularly evaluating and adjusting the program where required to ensure that it meets the needs of the serviced SMEs.

4.3.3 Lack of financial resources by African SMEs

Lack of financial resources remains a major challenge facing SMEs in Africa, as identified by various studies on SME failure. Adikaram and Surangi [13] in their study found that financial resource management for crisis resilience received considerable attention in crisis management literature, given that finance is one of the limited primary resources affecting SME survival. Furthermore, financial crisis management is crucial in the overall crisis management strategy of SMEs [13]. It has been suggested in some studies that, in addition to poor management skills, a lack of finance is a major aspect that makes SMEs in Africa vulnerable and unsustainable. Yaghoubi Farani et al. [37] contend that such vulnerability is generally caused by a lower scale of performance and limited financial resources, making SMEs have lower recovery rates from crisis situations. Muriithi [35] asserts that, contrary to developed countries where measures and crisis funds are in place, African governments have not made much effort to support SMEs. In certain African countries, this could be caused by lack of adequate financial resources at the government level. The study by Allen and Giovannetti [91] showed that many African countries facing financial fragility had low resilience and capacity to cope with crises and shocks, leading to limited room for policymakers to maneuver during crises due to restricted fiscal space and institutional capacity. This state of affairs makes SMEs in Africa more vulnerable in the event of a crisis situation. Moreover, as determined in the study by Adian et al. [92], if any unforeseen event occurs causing the sales of SMEs in Africa to shrink, their cash drains faster than larger firms in the same sector and country, which then creates a financial crisis for them. A BFA Global [93] study involving over 1000 SME firms in African countries such as Kenya, Nigeria, and South Africa discovered that their cash reserves were only able to last for 4 to 6 months. Therefore, the survival of such SMEs is unlikely to exceed 6 months in the event of crises. This is also complicated by the fact, as noted in Adian et al.'s [92] study, that in many African countries, banking systems struggle to approve loans to SMEs even during normal times. This is attributed to the banking risk models, which are not sensitive and adaptable to the context of SMEs. Other studies, for example [94], discovered that the major global recession in the past, which led to some banks in other economies, including the developed ones, being bailed out by their respective governments, resulted in banks becoming more risk-averse. As a result, SMEs found it difficult to obtain loans due to insufficient collateral or none at all. International Finance Corporation (IFC) [95] also reported that this global economic crisis resulted in financial institutions becoming risk-averse and tightening credit-granting conditions. At the same time, SMEs' profitability was drastically reduced due to crises (such as reduced output, sales, exports), negatively affecting their credit worthiness. The study by Owualah and Ohazebere [96] on financial crises of SMEs in Nigeria confirmed the lack of access to bank credit as one of the factors contributing to SMEs' financial crisis. Dalberg [97] study recorded a number of findings related to banking finance barriers in developing countries related to SMEs. These findings include: (i) Banks are not adequately providing SMEs with working capital in developing countries, with almost 60% of SMEs in these countries not having a loan overdraft when they need one; (ii) banks tend to earn high returns from their core market because of the lack of competition in developing countries, giving them no incentive to finance SMEs; (iii) banks incur high costs in processing SME lending while the sizes of loans are small; and (iv) banks have limited information, skills, and regulatory support to process loans for SMEs who more often do not have past financial statements, and credit scores. Owualah and Ohazebere [96] recommended that the government formulate economic policies that would create flexible credit facilities favorable to SMEs and improve commercial banks lending capacity to enhance the resilience of SMEs so that they contribute to economic growth. Simba et al. [98] found that SMEs struggle to obtain credit due to banks demanding collateral and using stringent credit ratings to assess credit applications which reduce SMEs' confidence to make funding applications leading to involuntary exclusion syndrome. Despite the value that SMEs bring to Africans and their countries, this situation has implications for policymakers in Africa who must reconcile SMEs' needs with available financial services to alleviate involuntary financial exclusion and enhance community development [98]. Various studies in the South African context have discovered that despite government guarantees to commercial banks on behalf of SMEs, the approval rates are still significantly lower due to credit assessment policies that have not been adequately adapted to qualify SMEs. It has also been observed that even South African government SME funding agencies have not significantly improved the plight of SMEs as their credit assessment models are still based on the banking model. Furthermore, corruption has also been a hindrance in this regard. Many SMEs in the African context tend to suffer from financial crises, which is the main reason why a large percentage of start-ups in Africa do not last to make the intended contribution to economic growth. Olarewaju and Msomi [99] in their study have attributed the dwindling growth and failure of SMEs to poor financing. In fact, a number of studies in the African context agree that the major reason for the failure and unsustainability of African SMEs is related to their lack of finance and poor funding infrastructure in various countries. Runde et al. [100] found that African SMEs face two main financing challenges: accessibility and affordability. They further contend that, given the importance of SMEs as a critical source of mass employment in Africa, barriers to funding access become barriers to poverty alleviation and economic growth.

Another finding of this study in relation to financial challenges faced by African SMEs is attributed to financial illiteracy among SME owners/managers. Various studies have urged African governments to include relevant training in their SME development interventions to enhance financial management skills. However, the evidence in the study by Atiase et al. [101] shows that SME-tailored training is statistically insignificant in improving their financial resilience. Instead, this study found that effective public and tax policies, R&D, and accounting and assessment services largely enhance the financial resilience of African SMEs. Furthermore, they have called on African governments to augment training and capacity programs to create sustainable SMEs that are financially fragile due to weak institutional and technological environments in which they operate.

Other studies in Africa have unpacked that some SMEs lack information about the funding support schemes provided by their various governments and hence rely on their internal financial resources, which are not adequate to make them resilient and sustainable.

4.4 African SMEs digital transformation challenges

It has been established in the literature review that African SMEs struggle with access to digital infrastructure and related skills, which resulted in major challenges for them during the lockdowns of Covid-19. Gqoboka et al. [57] observed that more than 60% of SMEs in South Africa closed down during Covid-19 due to their inability to migrate from physical business operations to online. This has been confirmed in a number of Covid-19 studies. Other studies have also determined that digital platforms are critical not only for the competitive position of SMEs but also for their resilience. The primary limitation for SMEs accessing digital platforms has emerged in various studies as their lack of finance to invest in these platforms. Some studies have suggested that SMEs do not have information about available technological platforms, calling on governments and the private sector to intervene.

5. Discussion and conclusion

This study focused on a literature review of various studies relating to crisis management as it pertains to SMEs in Africa. The study analyzed crisis management literature to determine the state of African SMEs' ability and capacity to cope for their survival. It was established that SMEs in Africa are vulnerable to crisis situations which are inevitable in today's global and competitive business environments. Key to the issue of crisis situations was the financial crisis in which SMEs in Africa have been suffering for a long time even when the business environment was normal. Covid-19 was noted as the main catalyst that has sparked interest among researchers in studying crisis management related to SMEs, as it exposed their lack of resilience to survive in crisis situations. Some studies had assumed that crisis management was not a significant issue for SMEs due to their size and flexibility to adapt to changes during crises. However, these studies overlooked the fact that most SMEs, especially in Africa, lack the necessary skills and resources to survive and adapt to crises.

This study's synthetic review of various sources resulted in key themes from which its findings were determined, and its limitations and gaps for future research were identified. The findings show that crisis situations impact businesses irrespective of size and capacity, and they have become a permanent aspect of business in the global, competitive, and turbulent business environment of today. Contrary to the lack of focus on crisis management studies related to SMEs in Africa prior to Covid-19, this should become a key focus going forward if African economies are serious about leveraging the socioeconomic development potential from the significant role of SMEs. It is clear from this study's findings that at the heart of African SMEs' vulnerability to survive crisis situations is their lack of skills and financial resources. The implications thereof are that policymakers in various African countries will need to prioritize their SME development and support efforts to ensure that they become resilient in today's turbulent business environment where crisis situations have become an inevitable aspect of business. Furthermore, the researcher argues that the lack of focus by African governments over the years on effectively supporting and developing their SMEs has probably resulted in a major loss of potentially significant contribution to employment, economic growth, and socioeconomic development of the African community, considering that there is a global agreement among scholars and governments on the important role of SMEs. The study therefore recommends the following to address the African SMEs' weaknesses that are the main source of vulnerability:

i. The African governments need to establish programs in collaboration with commercial banks to create flexible financing products that address the needs and context of SMEs. These programs should involve a total overhaul of credit assessment policies and practices, informed by research into the context and limitations of SMEs, to ensure that issues of funding exclusions and affordability are adequately addressed. The lack of financing collateral by SMEs can be addressed by governments providing guarantees to commercial banks, as seen in the South African context during Covid-19. Credit bureaus could also be engaged to create a database and credit scoring models customized for the SME context.

ii. Governments must also establish skills development programs informed by research on the skills gap of SME owners/managers to create relevant programs that can capacitate SMEs. This can be achieved through collaboration with the higher education sector in various African countries, which has proven experience and capacity in research, curriculum design, and training.

iii. Technical assistance through local intermediaries could also be set up as part of government SME incubation efforts to ensure ongoing mentorship and on-the-ground support for SMEs until they are able to survive on their own.

iv. Policymakers must provide incentives to the private sector to play a significant role in the development of SMEs through procurement, supplier development initiatives, mentorship, etc. This is based on the fact that private sector big businesses also stand to benefit from the potential economic growth that can be unlocked through SME engagement if any country is serious.

v. Governments must also collaborate with the private sector to create schemes that would enable SMEs access digital platforms including the related training.

vi. Policymakers must also address and streamline their current SME development and support programs, which have been proven in various studies to not have made a significant improvement to SMEs in Africa.

This review study was limited to the articles searched due to time and resource constraints related to the study. Furthermore, the review identified gaps in the literature that call for further exploratory studies. Future research could explore whether training and skills development result in African SMEs' resilience to crisis situations, the impact of providing flexible finance on SME resilience, sustainability, and economic growth, and the reasons why African SMEs fail despite government support interventions.

Author details

Vusi S. Mncube
UBS Consulting, Johannesburg, South Africa

*Address all correspondence to: vmncube@ubsconsulting.co.za

References

[1] Pulka BM, Gawuna MS. Contributions of SMEs to employment, gross domestic product, economic growth and development. Jalingo Journal of Social and Management Sciences. 2022;**4**(1):1-18

[2] Surya B, Menne F, Sabhan H, Suriani S, Abubakar H, Idris M. Economic growth, increasing productivity of SMEs, and open innovation. Journal of Open Innovation: Technology, Market, and Complexity. 2021;**7**(1):20

[3] Enaifoghe A, Ramsuraj T. Examining the function and contribution of entrepreneurship through small and medium enterprises as drivers of local economic growth in South Africa. African Journal of Inter/Multidisciplinary Studies. 2023;**5**(1):1-11

[4] Amoah J, Belas J, Dziwornu R, Khan KA. Enhancing SME contribution to economic development: A perspective from an emerging economy. Journal of International Studies. 2022;**15**(2):63-76

[5] Rotar LJ, Pamić RK, Bojnec Š. Contributions of small and medium enterprises to employment in the European Union countries. Economic Research-Ekonomska Istraživanja. 2019;**32**(1):3302-3314

[6] The World Bank. Human Rights Indicators in Development: An Introduction. Washington D.C., USA: World Bank; 2010

[7] Barnard S, Kritzinger B, Kruger J. Location decision strategies for improving SMME business performance. Acta Commercii. 2011;**11**(1):111128

[8] Fin24. 63% of Small Businesses Fail. Johannesburg, South Africa: I-Net Bridge; 2010

[9] Global Entrepreneurship Monitor (GEM). Tracking Entrepreneurship in South Africa: A Gem Perspective. London, UK: GEM, London Business School; 2009

[10] Ngcobo S, Sukdeo R. Challenges facing SMMEs during their first two years of operation in South Africa. Corporate Ownership & Control. 2015;**12**(3-5):505-512

[11] Bushe B. The causes and impact of business failure among small to micro and medium enterprises in South Africa. Africa's Public Service Delivery and Performance Review. 2019;**7**(1):1-26

[12] Nyakato E, Alasan II. A mixed-methods approach to leadership styles in small and medium sized businesses in Uganda. Eximia. 2022;**5**(1):433-456

[13] Adikaram KKNB, Surangi HAKNS. Crisis management in small and medium scale enterprises: A systematic literature review. Journal of Business Studies. 2020;**7**(2):19-41

[14] Branicki LJ, Sullivan-Taylor B, Livschitz SR. How entrepreneurial resilience generates resilient SMEs. International Journal of Entrepreneurial Behavior & Research. 2018;**24**(7):1244-1263

[15] Paraskevas A. Crisis management or crisis response system? Management Decision. 2006;**44**(7):892-907

[16] Buyukbese T, Tasdemir A. Crisis and crisis management practices in small and medium sized enterprises based in the City of Gaziantep. Global Journal of Management and Business Research. 2014;**14**:35

[17] Doern R. Entrepreneurship and crisis management: The experiences of small businesses during the London 2011 riots. International Small Business Journal: Researching Entrepreneurship. 2016;**34**(3):276-302

[18] Selbst P. Crisis Management Strategy: Competition and Change in Modern Enterprises. London: Routledge; 1978

[19] Pedersen CL, Ritter T, Di Benedetto CA. Managing through a crisis: Managerial implications for business-to-business firms. Industrial Marketing Management. 2020;**2020**(88):314

[20] Muşetescu RC, Shayb HA. Exploring the concept of crisis in businesses: A critical step in the formulation and implementation of crisis management. In: Proceedings of the International Conference on Business Excellence. Sciendo, vol. 13, No. 1. 2019. pp. 962-968. Handle: RePEc:vrs:poicbe:v:13:y:2019:i:1:p:962-968:n:84. DOI: 10.2478/picbe-2019-0084

[21] Vargo J, Seville E. Crisis strategic planning for SMEs: Finding the silver lining. International Journal of Production Research. 2011;**49**:5619-5635

[22] Valackienė A, Virbickaitė R. Conceptualization of crisis situation in a company/įmonės krizinės situacijos konceptualizacija. Journal of Business Economics and Management. 2011;**12**(2):317-331

[23] Lachhab S, Šegota T, Morrison AM, Coca-Stefaniak JA. Crisis management and resilience – The case of small businesses in tourism. In: Korstanje ME, Seraphin H, Maingi SW, editors. Tourism Through Troubled Times: Challenges and Opportunities of the Tourism Industry in 21st Century. Bingley: Emerald; 2023

[24] Jaques T. Issue and crisis management: Quicksand in the definitional landscape. Public Relations Review. 2009;**35**:280-286

[25] Vasickova V. Crisis management process - A literature review and a conceptual integration. Acta Oeconomica Pragensia. 2020;**27**:61-77

[26] Fener T, Cevik T. Leadership in crisis management: Separation of leadership and executive concepts. Procedia Economics and Finance. 2015;**26**:695-701

[27] Mitroff II, Anagnos G. Managing Crises before they Happen: What every Executive and Manager Needs to Know about Crisis Management. New York: American Management Association (AMACOM); 2001

[28] Muriithi S. African Small and Medium Enterprises (SMES) Contributions, Challenges and Solutions. London, UK: Progressive Academic Publishing; 2017

[29] Fjose S, Grunfeld LA, Green C. SMEs and growth in sub-Sahara Africa: Identifying SME role and obstacles to SME growth. MENON-Publication. 2010;**14**:1-28

[30] Hatega, G. SME development in Uganda. Workshop on SMEs. Kampala, Uganda. 2007;**24**(3):198-200

[31] Coombs WT, Laufer D. Global crisis management – Current research and future directions. Journal of International Management. 2018;**24**(3):199-203

[32] Bansal P. Government strategies to minimize the COVID-19 fallout on MSMEs in India. In: Baporikar N, editor. Handbook of Research on Sustaining SMEs and Entrepreneurial Innovation in

the Post-COVID-19 Era. New York, USA: IGI Global; 2021

[33] Adcorp. New Business Start-Ups Slump to all Time Low. Cape Town, South Africa: Business News; 2014

[34] Eze I, Lose T. Consequences of failure and challenges of small business in South Africa: A theoretical review. Business Excellence and Management. 2023;**13**(3):18-32

[35] Muriithi S. The impact of COVID-19 on African SMES, possible remedies and source of funding. European Journal of Research and Reflection in Management Sciences. 2021;**9**(11):5-12

[36] Asgary A, Ozdemir AI, Özyürek H. Small and medium enterprises and global risks: Evidence from manufacturing SMEs in Turkey. International Journal of Disaster Risk Science. 2020;**11**(1):59-73

[37] Yaghoubi Farani A, Sepahvand F, Gholamrezai S, Azadi H, Nazemi N. Impacts of COVID-19 pandemic on micro and small enterprises: Evidence from rural areas of Iran. Frontiers in Public Health. 2022;**10**:1-9

[38] Hidayah N, Rodiah R. The effect of entrepreneurship competency on the sustainability of small and medium enterprises (SMEs). Budapest International Research and Critics Institute-Journal (BIRCI-Journal). 2022;**5**(2):16534-16544

[39] Mashavira N, Chipunza C. Managerial conceptual competencies and the performance of small and medium-sized enterprises in Zimbabwe. The southern African journal of entrepreneurship and small. Business Management. 2021;**13**(1):1-14

[40] van Scheers L. SMEs and social media opportunities: An organizational outlook. Corporate Ownership & Control. 2016;**13**(4-4):640-648

[41] Mamabolo MA, Kerrin M, Kele T. Entrepreneurship management skills requirements in an emerging economy: A south African outlook. The Southern African Journal of Entrepreneurship and Small Business Management. 2017;**9**(1):10

[42] Skouloudis A, Tsalis T, Nikolaou I, Evangelinos K, Leal FW. Small & medium-sized enterprises, organizational resilience capacity and flash floods: Insights from a literature review. Sustainability. 2020;**12**(18):7437

[43] Cant MC, Wiid JA. Establishing the challenges affecting south African SMEs. International Business & Economics Research Journal (IBER). 2013;**12**(6):707

[44] Ladzani WM, van Vuuren JJ. Entrepreneurship training for emerging SMEs in South Africa. Journal of Small Business Management. 2002;**40**(2):154-161

[45] Rajam SD. Unlocking Training and Skills Development for Sustainability in Small and Medium Size Enterprises (SMEs): An Explorative South African Study. Pretoria, South Africa: University of South Africa; 2017

[46] Rabie C, Cant MC, Wiid JA. Training and development In SMEs: South Africa's key to survival and success? The Journal of Applied Business Research. 2016;**32**(4):1009-1024

[47] Antonioli D, Della-Torre E. Innovation adoption and training activities in SMEs. International Journal of Human Resource Management. 2016;**27**(3):331-337

[48] Kitching J, Blackburn R. The Nature of Training and Motivation to Train

in Small Firms. Kingston, UK: DFES, HMSO; 2002. p. 330

[49] Bélanger P, Hart S. Leveraging Training and Skills Development in SMEs: An Analysis of Two Canadian Urban Regions - Montreal and Winnipeg. Paris, France: OECD; 2012

[50] Damoah I, Akwei C, Mouzughi Y. Causes of government project failure in developing countries – Focus on Ghana. In: British Academy of Management (BAM) Conference. UK: Portsmouth University; 2015

[51] Panagiotakopoulos A. Barriers to employee training and learning in small and medium-sized enterprises (SMEs). Development and Learning in Organizations. 2011;**25**:15-18

[52] Johnson EB. Contextual Teaching and Learning: What it Is and Why it Is Here to Stay. Thousands Oaks: Corwin Press, Inc; 2002

[53] Beber CL, Langer G, Meyer J. Strategic actions for a sustainable internationalization of Agri-food supply chains: The case of the dairy industries from Brazil and Germany. Sustainability. 2021;**13**(19):10873

[54] Fatoki O. The causes of the failure of new small and medium enterprises in South Africa. Mediterranean Journal of Social Sciences. 2014;**5**(20): 922-927

[55] Nachmias S, Hubschmid-Vierheilig E. We need to learn how to love digital learning 'again': European SMEs response to COVID-19 digital learning needs. Human Resource Development International. 2021;**24**(2):123-132

[56] Bai X, Eyob E, Ola A, Reese S. Factors affecting students' satisfaction with synchronous online instruction during the COVID-19 pandemic. Journal of International Technology and Information Management. 2021;**30**(3):78-107

[57] Gqoboka H, Anakpo G, Mishi S. Challenges facing ICT use during COVID-19 pandemic: The case of small, medium and micro Enterprises in South Africa. American Journal of Industrial and Business Management. 2022;**12**(09):1395-1401

[58] Fitriasari F. How do small and medium enterprises (SMEs) survive the COVID-19 outbreak? Special issue of economic challenges in COVID-19 outbreak. 2020;**05**(02):53-62

[59] Augustine Ebuka A, Ngozi Nzewi H, Gerald E, Mary EK. Digital literacy in a post coronavirus era: A management perspective for small businesses in Africa. Annals of Management and Organization Research. 2020;**1**(3):203-212

[60] Cariolle J, Carroll D. Digital Technologies for Small and Medium Enterprises and Job Creation in Sub-Saharan Africa. Clermont-Ferrand, France: Ferdi; 2020

[61] Lukonga I. Harnessing Digital Technologies to Promote SMEs in the MENAP Region. Washington D.C., USA: IMF Publications; 2020

[62] Achieng MS, Malatji M. Digital transformation of small and medium enterprises in sub-Saharan Africa: A scoping review. The Journal for Transdisciplinary Research in Southern Africa. 2022;**18**(1):1-13

[63] Harel R. The impact of COVID-19 on small businesses' performance and innovation. Global Business Review. 2021. DOI: 10.1177/09721509211039145

[64] Gougou SAM, Paschal MJ. Digital communication and small and medium enterprises sustainable development in Africa. ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS). 2024;**II**(II):66-75. DOI: 10.5281/zenodo.10802883

[65] Willie MM, Mbongwe NA. Assessing the impact of digitalisation on SME policy: A comparative analysis of approaches to support the manufacturing. Journal of Public Administration. 2023;**58**(2):337-350

[66] International Labour Organization. COVID-19 and the World of Work. Geneva, Swirtzerland: ILO; 2020

[67] Drydakis N. Artificial intelligence and reduced SMEs' business risks. A dynamic capabilities analysis during the Covid-19 pandemic. Information Systems Frontiers. 2022;**24**(4):1223-1247. DOI: 10.1007/s10796-022-10249-6. Epub 2022 Mar 4

[68] Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Medical Research Methodology. 2018;**18**(1):143

[69] Laufs K, Schwens C. Foreign market entry mode choice of small and medium-sized enterprises: A systematic review and future research agenda. International Business Review. 2014;**23**(6):1109-1126

[70] Albright KS. Environmental scanning: Radar for success. Information Management Journal. 2004;**38**(3):38-45

[71] Herbane B. Information value distance and crisis management planning. SAGE Open. 2014;**4**(2):215824401453292

[72] Ouedraogo A. Crisis management and corporate strategy in African firms: Towards a contingency approach. Journal of Contingencies and Crisis Management. 2007;**15**(4):220-231

[73] Musyoka J, Ouma C. Effect of strategic leadership on performance of SMEs during Covid-19 pandemic in Nairobi County, Kenya. Kabarak Journal of Research & Innovation. 2024;**14**(01):26-43

[74] Catalyst for Growth. The Impact of Covid-19 on African SMMES Operations: Insights from Entrepreneurs d Business Development Service (BDS) Providers. Johannesburg, South Africa: Catalyst for Growth (C4G)

[75] Mhlongo T, Daya P. Challenges faced by small, medium and micro enterprises in Gauteng: A case for entrepreneurial leadership as an essential tool for success. The Southern African Journal of Entrepreneurship and Small Business Management. 2023;**15**(1):1-12

[76] Telukdarie A, Philbin S, Mwanza BG, Munsamy M. Digital platforms for SMME enablement. Procedia Computer Science. 2022;**200**:811-819

[77] Van Niekerk D. A comprehensive framework for multi-sphere disaster risk reduction in South Africa. In: Disaster Management Institute of Southern Africa. Annual Conference 2004; Midrand, South Africa. 2005

[78] Researchtech Global. Researchtech Global. In: Top 10 Reasons Why Businesses Fail in Africa. Kampala, Uganda: Research Tech

[79] Kindström D, Carlborg P, Nord T. Challenges for growing SMEs: A managerial perspective. Journal of Small Business Management. 2022;**62**(3):1-24

[80] Bodziany M, Ścibiorek Z, Zamiar Z, Visvizi A. Managerial competencies & polish SMEs' response to the COVID-19 pandemic: An insight. Sustainability. 2021;**13**(21):11864

[81] Yuwen H, He X, Qian X, Yuan M. Controlling town industry explosion hazard in China. International Journal of Disaster Risk Science. 2016;**7**(4):440-444

[82] Kaya HP, Uzay S. The risks that will threaten going concern and control recommendations: Case study on SMEs. The Journal of Accounting and Finance. 2017:46-64

[83] Gumel BI, Bin BB. A review of critical success factors influencing the success of SMEs. SEISENSE Business Review. 2023;**3**(1):37-61

[84] Wiid J, Cant M. Major training challenges for small businesses in the Tshwane area: Is there Hope? Acta Universitatis Danubius OEconomica, Danubius University of Galati. 2018;**14**(7):207-226

[85] Ng HS, Kee D. The issues and development of critical success factors for the SME success in a developing country. International Business Management. 2012;**6**(6):680-691

[86] Ogujiuba KK, Olamide E, Boshoff E, Agholor I, Ogujiuba C. SMEs, success, and capital startups: Evidence from the service sector in South Africa. AdmSci. 2023;**13**(5):127

[87] Aluko T, Bayai I, Enwereji P. Effects of government intervention on SMMEs: A review of empirical evidence. Oeconomica. 2023;**19**(5):264-289

[88] Sibiya NP, Das DK, Vogel C, Mazinyo SP, Zhou L, Kalumba MA, et al. Overcoming bureaucratic resistance: An analysis of barriers to climate change adaptation in South Africa. Climate. 2023;**11**(7):147

[89] Kelly F, Uys M, Bezuidenhout D, Mullane SL, Bristol C. Improving healthcare worker resilience and well-being during COVID-19 using a self-directed e-learning intervention. Frontiers in Psychology. 2021;**12**:1-9

[90] Douglas KM, Sutton RM, Cichocka A. The psychology of conspiracy theories. Current Directions in Psychological Science. 2017;**26**(6):538-542

[91] Allen F, Giovannetti G. The effects of the financial crisis on sub-Saharan Africa. Review of Development Finance. 2011;**1**(1):1-27

[92] Adian I, Doumbia D, Gregory N, Ragoussis A, Reddy A, Timmis J. Small and Medium Enterprises in the Pandemic: Impact, Responses and the Role of Development Finance. Washington D.C., USA: World Bank Group; 2020

[93] BFA Global. COVID-19 and your Finances Seven-Country Survey. Boston, USA: BFA Global; 2020

[94] Fraser S. The Impact of the Financial Crisis on Bank Lending to SMEs. Colchester, Essex, England: Economic and Social Research Council; 2012

[95] International Finance Corporation (IFC). Scaling-up SME Access to Financial Services in the Developing World. Washingotn D.C., USA: World Bank Group; 2010

[96] Owualah SI, Ohazebere E. The impact of financial crisis on small and medium scale enterprises access to credit in Nigeria. Research Journal of Finance and Accounting. 2019;**10**(1):35-45

[97] Dalberg. Report on Support to SMEs in Developing Countries through Financial Intermediaries. Geneva, Swirtzerland: Dalberg; 2011

[98] Simba A, Tajeddin M, Dana LP, Ribeiro Soriano DE. Deconstructing involuntary financial exclusion: A focus on African SMEs. Small Business Economics. 2024;**62**(1):285-305

[99] Olarewaju O, Msomi T. Factors affecting small and medium enterprises' financial sustainability in South Africa. African Journal of Inter/Multidisciplinary Studies. 2021;**3**(1):103-117

[100] Runde DF, Savoy CM, Staguhn J. Supporting Small and Medium Enterprises in sub-Saharan Africa through Blended Finance. Washington D.C., USA: Center for Strategic and International Studies; 2021

[101] Atiase V, Agbanyo S, Ganza P, Sambian R, Ameh JK. Investigating financial resilience and survivability of SMEs in Africa: A panel study. In: ISBE 2022: New Approaches to Raising Entrepreneurial Opportunity: Reshaping inclusive Enterprise, Policy, and Practice Post-Pandemic; York, England. York, England: ISEB; 2022. pp. 1-29

Chapter 6

Perspective Chapter: How Artificial Intelligence (AI) Fundamentally Changes Crisis Management Training and Exercises

Kristoffer Lie Eide, Inger Lund-Kordahl and Bjørn Tallak Bakken

Abstract

Crisis management is an evolving field that requires adaptive training methods to prepare organizations for increasingly complex emergencies and crises. Traditional approaches, such as tabletop exercises and full-scale simulations, often face challenges, including high resource demands, lack of realism, and infrequent practice sessions. Emerging technologies, particularly Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR), offer transformative solutions by creating cost-effective, scalable, and highly immersive training environments. The aim of this chapter is twofold: First, we investigate the apparent gap between scientifically proven crisis management training methods and established practice in organizations that engage in such training. Second, we explore how emergent technologies (such as AI, VR, and AR) can aid in bridging that gap. In doing this, we propose how these technologies can alleviate key training limitations, making crisis management training and exercises less costly, more flexible, frequent, and responsive to real-world challenges. As crises tend to grow more frequent and complex, the integration of AI, VR, and AR into training programs will be essential for building resilience and effective response capabilities.

Keywords: artificial intelligence, crisis management, training and exercises, dynamic decision-making, virtual and augmented reality

1. Introduction

Crisis management is an essential discipline that requires rapid, high-stakes decision-making in environments where every choice carries significant consequences [1–4]. Traditional crisis management training has primarily relied on manual simulations, tabletop exercises, and role-playing scenarios designed to test decision-makers' abilities in volatile, uncertain, complex, and ambiguous (VUCA) situations. While these methods have been helpful in preparing for emergencies, they often fall short in replicating the full complexity and dynamic nature of real-world crises. This has left many organizations underprepared when real crises strike, revealing critical gaps in both preparedness and response capabilities [5].

The increasing frequency and intensity of global crises—from natural disasters like earthquakes and wildfires to human-made threats such as cyberattacks, terrorism, and geopolitical conflicts—highlight the urgent need for more advanced training solutions. Crises tend to develop rapidly, with cascading effects and delayed feedback loops that complicate decision-making. In such scenarios, it is often difficult for crisis managers to fully grasp the situation or predict the long-term impacts of their decisions, especially as the potential outcomes become more varied and unpredictable [6].

Incorporating Artificial Intelligence (AI) into crisis management introduces a revolutionary tool for decision support, fundamentally changing how organizations approach both crisis preparedness and response. AI-powered systems can analyze vast datasets in real time, providing predictive insights and recommendations within seconds. These systems are capable of simulating multiple crisis scenarios, evaluating potential outcomes, and identifying the most effective strategies for mitigating risks. AI also enhances situational awareness (SA) by processing and integrating diverse information streams—from social media feeds to sensor networks—giving crisis managers a comprehensive, up-to-the-minute view of the evolving situation. This capability reduces cognitive load and enables more agile, informed decision-making under pressure [7].

Additionally, the convergence of AI with Virtual Reality (VR) and Augmented Reality (AR) offers an entirely new dimension in crisis management training. These technologies do more than merely enhance traditional methods; they represent a paradigm shift in how crisis training is conducted. AI provides the data-driven backbone for scenario modeling and real-time decision support, while VR and AR immerse trainees in hyper-realistic environments that simulate crisis conditions. These immersive experiences allow crisis managers to train in environments that closely mimic real-world situations, thereby improving their ability to respond effectively when crises arise [8].

The aim and intended contribution of this chapter are twofold: First, we investigate the apparent gap between scientifically proven crisis management training methods and established practice in organizations that engage in such training. Second, we explore how emergent technologies (such as AI, VR and AR) can aid in bridging that gap. In doing this, we propose how these technologies can alleviate key training limitations, making crisis management training and exercises less costly, more flexible, frequent, and responsive to real-world challenges. As crises tend to grow more frequent and complex, the integration of AI, VR, and AR into training programs will be essential for building resilience and effective response capabilities [9, 10].

2. Theory

2.1 The nature of crises and crisis management

The ability to manage crises is essential to upholding societal safety, security, and resilience. With an increase of natural disasters due to climate change and a world facing threats from geopolitical instability and conflict, there is a corresponding demand for crisis management competence at all managerial levels [11]. In short, crisis management entails making critical decisions during times of high uncertainty and under high time pressure [12]. Crisis management generally involves coordinating and prioritizing among scarce but vital resources, and the decision-making context is fraught with VUCA [13]. An area of crisis management where VUCA is omnipresent is crisis communication. Badu et al. [14] find that trust and trustworthiness among collaborating services can be a critical factor for successful crisis management communication. Valaker et al. [15] have investigated how the choice of communication medium (distributed or co-located) can have an impact on decision-makers' SA [16] and team performance.

A definition of crisis is "A serious threat to the basic structures or the fundamental values and norms of a social system, which—under time pressure and highly uncertain circumstances—necessitates making critical decisions" ([17], p. 10, cited in [18]). Crises can be classified based on how they initiate, develop, and terminate, as proposed by 't Hart and Boin ([19], cited in [18]):

- Fast burning crisis: These crises are brief, intense, and decisive. They can be smaller in scale, such as a road traffic accident, or larger, affecting many victims in densely populated areas. Examples include terrorist attacks or avalanches.

- Cathartic crisis: These crises have a rapid impact point but a longer buildup and resolution. They often involve conflicts that escalate into violent occurrences.

- Long shadow crisis: These crises occur relatively quickly, but their termination is gradual. They typically relate to political or institutional issues.

- Slow burning crisis: These crises take a very long time to develop. Due to gradual changes, it becomes challenging for humans to fully comprehend the potential outcomes. Uncertainty about the situation makes handling these crises difficult. This could, for instance, be the climate crisis.

During a crisis, the local response capacity may become insufficient, leading to the need for collaborative efforts across different community sectors and levels. In crisis management, effective collaboration, integration, and synchronization across various actors, organizations, and agencies at different management levels become crucial. Well-conducted crisis management is of vital importance when hazardous situations strike to return operations to normal functioning. With the increasing harsh weather and natural hazards due to climate change, this will be increasingly important in the years to come. As we will argue, crisis management as a process aligns well with fundamental system dynamics principles when one attempts to understand the intricate, dynamic, and complex relations between events, actions & decisions, and their outcomes in terms of either escalation, de-escalation, or status quo of the crisis [9, 13, 20–22].

2.2 Crisis management training

There is a lack of systematic approaches to training crisis management, and a variation of the focus on outcomes of what to train, and the process of how to train in the existing literature [18]. There is further little differentiation between the concept of learning outcomes and the learning process. Learning outcome is viewed as a measurable outcome of what should be known, understood, or able to do. The learning process, on the other hand, is the process of how this is learned and the factors influencing learning [23]. A recent systematic literature review of training for strategic crisis management shows there is little to no focus in scientific literature on pedagogy and learning process perspectives [18]. This does not mean that there are no sound pedagogical practices established within the field of crisis management training today, but rather that thorough research and documentation of such are lacking. This knowledge gap is troublesome. Thus, there is a need to bridge this gap between scientifically proven pedagogical training methods and established practice. This will contribute to the efficiency and effectiveness of crisis management training. Because high-hazard incidents are rare in most organizations, people in crisis management teams have little experience in handling these, especially at the strategic level. Thus, there is a need for research to pinpoint the skills needed for the different levels and how to optimally train for this. According to Fellnhofer et al. ([24], p. 61), "there is a consensus that expert intuition can be enhanced over time with sufficient high-quality practice, which develops the ability to identify meaningful patterns [25, 26], enabling decision-makers to match cues to specific outcomes [27], and use knowledge of results and feedback to improve intuitive judgments [25]."

Bjurström and Bakken [28] present two example cases of crisis situations that possess delayed non-linear feedback dynamics [22, 29]. Each case presents the crisis manager with dynamic, complex decision-making challenges within the frame of an open system. The underlying mechanisms are constituted by positive (reinforcing) and negative (balancing) causal feedback loops. Within an open system, once a positive feedback loop takes dominance over a negative feedback loop, the situation potentially escalates out of control, as perceived by the decision-maker [30, 31]. From that point in time, and until balancing feedback once again dominates—control is regained—we effectively have a crisis on our hands. Simply put—in a system dynamics perspective—a crisis is nothing more than a critical situation that has spun out of control and in a bad way.

The examples in Bjurström and Bakken [28] illustrate the profound challenges that organizations may face in times of crisis, especially when the VUCA characteristics of the situation are salient [32], and the appropriate level of training has not yet been achieved. Gonzalez et al. [33] referred to results from laboratory experiments using complex dynamic decision-making (DDM) tasks as well as cognitive models, proposing the following training recommendations ([28], p. 67):

1. Trainees should be allowed to learn at a slow pace to help them adapt successfully to more significant time constraints.

2. Trainees should be faced with a diverse set of experiences to increase the possibilities of effective adaptation to novel situations.

3. Trainees should reflect on an expert's performance during training to reinforce instances of high quality instead of mere reflection on self-performance based on outcome feedback.

In the following, we will present and discuss core areas of competence pertaining to crisis management and suggest how these competencies can be developed through different kinds of training and exercise methodologies. As we have argued, particular emphasis should be put on incorporating delayed non-linear feedback in the crisis scenarios that form the basis of the training sessions. Following a critical review of how traditional crisis management training methods and approaches often fall short in achieving the desired pedagogical objectives, we will further elaborate on how the integration of AI, VR, and AR is reshaping crisis management training. Novel technology—when used to convey and support crisis management training and exercises—offers a toolkit that enhances decision-making, SA, and organizational resilience in the face of increasingly complex and unpredictable global challenges.

3. The evolution of crisis management training and exercises

Traditionally, crisis management training has utilized various methods, such as classroom-based learning, seminars, and large-scale emergency simulations involving multiple organizations. These approaches have been essential in establishing foundational knowledge of crisis management. However, they often lack the realism and unpredictability of actual crises. Many exercises are highly scripted, relying on static scenarios that do not reflect the dynamic feedback loops and cascading effects inherent in real-world emergencies, limiting decision-makers' ability to develop adaptive skills [34].

A significant challenge in crisis management training is the strategic design of exercises. The Norwegian Directorate for Civil Protection (DSB) recommends a structured approach to exercise planning, which involves addressing four critical questions: Why? What? How? and Which Scenario? This ensures exercises are tailored to organizational needs and objectives [35]. Despite the effectiveness of this framework, many organizations struggle with its practical implementation. Studies, including the CriseIT2 project, have shown that exercises are often conducted too infrequently or without adequate focus on defining essential competencies [36, 37].

Moreover, traditional methods often emphasize testing rather than training, placing participants in predefined situations aimed at measuring performance rather than teaching adaptive strategies. This approach creates a gap between the controlled training environment and the real-world complexities of crisis management, where unexpected events and cascading consequences are common [38]. The need for more flexible, adaptive training methods is evident—methods capable of simulating the chaotic and unpredictable nature of real-world crises [13].

By integrating more dynamic and realistic training environments, organizations can better equip decision-makers with the skills needed to handle crises effectively. This shift in crisis management training reflects an increased recognition of adaptability, SA, and real-time decision-making as critical elements of effective crisis response.

3.1 Key competence areas for effective crisis management

Successful crisis management relies on a comprehensive set of competencies that prepare decision-makers and responders to navigate high-pressure, complex environments. While traditional training methods tend to emphasize general preparedness, modern approaches target specific competencies essential for managing crises effectively. These core competencies form the basis for adaptive, realistic, and dynamic training exercises that simulate the unpredictable nature of real crises. According to Bakken et al. [39], the following areas of competence are vital for individuals, teams, and organizations engaged in crisis management:

3.1.1 Situational awareness

SA is the cornerstone of effective crisis management, as it involves the continuous perception of environmental elements within a volume of time and space, the comprehension of their meaning, and the projection of their future status [16]. In a crisis, the ability to monitor and interpret rapidly changing information is crucial for understanding both the present situation and how it may evolve. SA enables decision-makers to assess risks, anticipate potential outcomes, and make informed choices under time pressure.

Training for SA often involves complex, high-fidelity simulations where participants must integrate various sources of data—ranging from social media feeds to sensor inputs—to form a comprehensive picture of the crisis. These exercises improve cognitive processing under pressure and help decision-makers recognize critical patterns that may otherwise be overlooked. Studies suggest that improving SA through immersive and scenario-based training significantly enhances a crisis manager's ability to anticipate potential consequences and make proactive decisions [16]. Ultimately, SA ensures that responders can act quickly and effectively in environments characterized by uncertainty and fluidity.

3.1.2 Organization and leadership

Leadership in crisis management extends beyond directing operations; it involves the coordination of teams, distribution of responsibilities, and the preservation of organizational structure under stress [38]. Effective crisis leadership must function at multiple levels—strategic, operational, and tactical—ensuring that decisions made at higher levels are executed properly by those on the ground [11, 40]. Leaders must exhibit both transformational leadership, which inspires and motivates teams to adapt and innovate in response to emerging threats, and transactional leadership, which maintains clear roles, accountability, and adherence to established procedures [11, 41].

A key aspect of leadership in crises is the ability to maintain focus and composure in high-stakes, high-stress environments [38]. Crisis leaders are often required to make decisions with incomplete information and under rapidly evolving circumstances. Effective leaders are able to delegate appropriately, trust their teams, and remain flexible, all while maintaining control over the situation. Crisis management training should therefore prioritize the development of leadership skills that emphasize both flexibility and decisiveness, enabling leaders to adapt to unforeseen challenges while maintaining a coherent response strategy [38]. Research shows that leadership development through scenario-based training fosters the ability to remain calm, delegate effectively, and inspire confidence during real-world crises [41].

3.1.3 Collaboration and team processes

Crisis management is inherently collaborative, requiring coordinated efforts from various organizations, agencies, and disciplines. Successful collaboration hinges on effective communication, trust, and the ability to work seamlessly with others in high-pressure environments. In many crises, the ability of different teams to work together efficiently determines the success or failure of the overall response effort. Teams that function cohesively are able to share information rapidly, align their actions with overarching strategies, and minimize miscommunications that can lead to operational inefficiencies.

Training exercises should focus on realistic teamwork dynamics, replicating the complexity of multi-agency responses where individuals from diverse professional backgrounds must work together. These exercises help develop the interpersonal skills necessary for collaboration, including conflict resolution, communication, and trust-building. By simulating realistic scenarios, crisis management training can expose participants to the challenges of coordinating efforts across different agencies, each with its own priorities and protocols. Collaborative exercises also enhance participants' ability to share responsibilities effectively, fostering an integrated approach to crisis response [38]. Research underscores the importance of these exercises in breaking down silos between agencies and promoting a unified response, particularly in large-scale or cross-border crises [36, 37].

3.1.4 Decision-making

Effective decision-making under pressure is one of the most challenging aspects of crisis management. Crises are characterized by uncertainty, incomplete information, and rapidly changing conditions, all of which complicate the decision-making process. Decision-makers must often act swiftly to minimize harm, even when they lack a full understanding of the situation. This requires not only quick thinking but also the ability to prioritize actions, weigh potential outcomes, and anticipate long-term consequences [41].

Training programs designed to enhance decision-making skills typically immerse participants in high-stress scenarios that simulate real-world crises. These scenarios force decision-makers to confront difficult choices in uncertain conditions, sharpening their ability to assess risks, prioritize tasks, and make decisions with limited information. Research on decision-making under pressure, such as Klein's [42] *recognition-primed decision model*, highlights the importance of intuition and pattern recognition in effective crisis management. By repeatedly exposing decision-makers to simulated crisis environments, training programs can help improve their ability to make sound, timely decisions that reduce the impact of the crisis.

3.1.5 Communication

Effective communication is critical during crises, both for internal coordination among response teams and for external messaging to the public. Internally, clear and rapid communication ensures that all team members are informed about evolving situations and can adjust their actions accordingly. Externally, crisis communication involves managing public relations, delivering accurate information to the media, and addressing public concerns to maintain trust and prevent panic [43].

Training for crisis communication must address both the medium and the message. Internally, teams must practice communicating across various platforms—such as radios, digital systems, and face-to-face briefings—under time constraints and stressful conditions. Externally, responders must be trained to handle media interactions and public briefings, ensuring that their messaging is clear, accurate, and sensitive to public concerns. Effective communication during a crisis can mitigate confusion, reduce public anxiety, and improve the overall crisis response [43]. By simulating high-pressure communication scenarios, training programs prepare crisis managers to convey essential information both within their organizations and to the public.

3.1.6 Competencies specific to service or profession

In addition to the general competencies required for crisis management, many situations demand specialized skills depending on the nature of the crisis and the roles of the responders. For example, emergency medical teams must be proficient in lifesaving techniques, while cybersecurity professionals need expertise in managing digital threats. Each professional group must be trained to apply their skills effectively under crisis conditions, which often means practicing in high-fidelity simulations that mirror the specific challenges they will face in the field [37].

Profession-specific competencies are best developed through hands-on training exercises that provide responders with direct experience using the tools and technologies relevant to their roles. For example, medical teams may conduct simulations involving mass casualty scenarios, while cybersecurity experts might participate in simulated cyberattack responses. These targeted training sessions allow professionals to refine their technical skills while practicing under the time constraints and stress conditions typical of a crisis. By incorporating profession-specific competencies into crisis management training, organizations can ensure that every team member, regardless of their specialization, is prepared to perform effectively when it matters most [37].

3.2 Crisis management training methods

Crisis management exercises are crucial for preparing organizations to respond effectively to emergencies, yet different types of exercises are suited to distinct goals depending on an organization's needs and the specific competencies they wish to develop. These training methods are broadly divided into two categories: *discussion-based exercises* and *operations-based exercises*. Both play a critical role in ensuring that individuals, teams, and organizations are well-prepared for crises, each contributing in unique ways to developing effective crisis response capabilities.

The following sections outline specific types of exercises within each category, highlighting their purposes and how they enhance preparedness.

3.2.1 Discussion-based exercises

Discussion-based exercises focus on enhancing understanding, exploring decision-making processes, and fostering communication in a low-stress, collaborative environment. These exercises are particularly effective when organizations need to review or develop their crisis management plans, policies, and procedures. Compared to operations-based exercises, these are less intensive, making them ideal for introducing new strategies and evaluating how theoretical concepts might work in practice without the pressure of real-time execution [44].

3.2.2 Seminars

Seminars are the most straightforward form of discussion-based exercises, involving informal presentations and discussions designed to orient participants to new or existing plans and procedures. Subject matter experts provide insights, and participants can ask questions and engage in dialog. Seminars are particularly useful at the early stages of planning or when new crisis response concepts are introduced. For example, during pandemic preparedness, public health organizations may hold seminars to explain new protocols for managing viral outbreaks. Seminars provide a low-pressure environment for sharing knowledge and building foundational understanding [45].

3.2.3 Workshops

Workshops are more interactive than seminars, requiring participants to engage actively in problem-solving, brainstorming, and developing specific outputs. These might include drafting new crisis plans, creating interagency agreements, or developing communication strategies. Workshops are essential for refining policies and ensuring alignment between different organizations involved in crisis management. By actively participating in scenario planning and policy development, attendees can identify gaps in existing plans and collaborate on solutions, leading to more robust preparedness [46]. For instance, disaster response organizations may host workshops to design cross-border aid agreements, as seen in regional emergency management settings.

3.2.4 Tabletop exercises

Tabletop exercises are the most common type of discussion-based exercise. These involve participants engaging in guided discussions around a hypothetical crisis scenario, assessing their roles, decision-making processes, and the effectiveness of current plans. These exercises help participants test their strategies in a controlled, low-pressure environment, which can reveal potential gaps in response efforts. For example, a tabletop exercise might involve a simulated cyberattack, where IT and security teams discuss how they would respond, coordinate, and mitigate the attack in real time [47]. Tabletop exercises also foster a deeper understanding of individual and team responsibilities during a crisis, making them an invaluable tool for improving preparedness.

3.2.5 Games

Games are a more dynamic form of discussion-based exercise, using structured rules, data, and scenarios to simulate decision-making processes. Participants are tasked with navigating "what-if" scenarios exploring various outcomes in a competitive or problem-solving environment. These exercises are particularly useful for stress-testing strategies and fostering creative thinking. For example, during a climate-related crisis exercise, participants might engage in a game to simulate decision-making over resource allocation, helping them understand the long-term implications of their choices [48]. Games can simulate cascading effects over time, providing insights into how decisions made in the early stages of a crisis can influence long-term outcomes.

3.2.6 Operations-based exercises

Operations-based exercises are designed to simulate real-world crisis scenarios, requiring the physical deployment of personnel, equipment, and resources. These exercises provide an immersive, high-pressure training experience, making them essential for validating response capabilities, enhancing coordination, and identifying practical challenges that may not be apparent in discussion-based exercises [46].

3.2.7 Drills

Drills are narrow, focused exercises that test specific functions or capabilities, such as emergency evacuation procedures, communication systems, or the use of specialized equipment. Repetitive practice helps participants refine their technical skills and increase their proficiency. For example, fire drills conducted in office buildings train employees to evacuate quickly and safely during emergencies. Drills are particularly valuable because they reinforce procedural knowledge through repetition, ensuring that individuals are prepared to execute critical tasks effectively during a crisis [49].

3.2.8 Functional exercises

Functional exercises are more complex than drills, simulating multiple aspects of a crisis response without fully deploying all field resources. These exercises focus on testing command and control, decision-making processes, and coordination across teams. Functional exercises are often used to evaluate how well organizations manage crises internally, coordinating efforts across different departments or agencies. For instance, during a functional exercise simulating a natural disaster, participants might test how well local emergency response teams coordinate with federal agencies, focusing on communication and resource management [50]. These exercises push participants to apply their skills in a controlled, but high-pressure environment, without the full logistics of a field response.

3.2.9 Full-scale exercises

Full-scale exercises are the most realistic and comprehensive type of operations-based exercise involving the real-time deployment of personnel, equipment, and resources. These exercises simulate actual crisis scenarios as closely as possible, providing participants with a highly immersive experience. Full-scale exercises are invaluable for testing the complete integration of crisis management plans, inter-agency cooperation, and logistical coordination under stress. For example, a full-scale exercise might involve simulating an earthquake, with emergency services, medical teams, and government agencies responding in real time to the evolving situation [44]. These exercises provide critical insights into how prepared an organization is to manage large-scale, complex crises, and identify areas for improvement that may not be evident in less immersive exercises [51].

4. Discussion

4.1 Shortcomings with traditional approaches to crisis management training

Traditional crisis management training methods have been widely used to prepare decision-makers for emergency response, but they often fall short in several key areas. While these exercises can help familiarize staff with protocols and response procedures, they are frequently constrained by limitations such as time, resources, and a lack of realism. These constraints result in narrow, infrequent training sessions that fail to capture the full complexity of potential crises. To improve crisis management training, it is crucial to address the challenges that prevent these exercises from being both effective and reflective of real-world situations.

A primary challenge in crisis management training is resource constraints. Full-scale exercises are often the most effective way to simulate real crises, providing participants with immersive, hands-on experience. However, they are highly resource intensive. Coordinating personnel, equipment, and facilities, especially across multiple organizations or departments, can be prohibitively expensive and logistically complex. For smaller organizations, or those operating under tight budgets, the cost of conducting large-scale exercises can be overwhelming. Even simpler exercises, such as drills or functional exercises, require significant time and personnel investment, which can be difficult to justify amidst the everyday operational demands of an organization [52]. As a result, many organizations opt for smaller, less immersive exercises that, while cost-effective, may not provide the full breadth of experience needed to prepare for real-world crises.

AI offers a potential solution to these resource constraints. AI-powered simulation platforms can significantly reduce the cost and complexity of running crisis management exercises by automating key processes, generating realistic crisis scenarios, and managing data collection in real time. AI systems can simulate multiple crisis scenarios across various scales, from small drills to complex, multi-agency responses, all within a controlled environment. These systems can also adjust the difficulty level of exercises in real time, providing tailored feedback to participants and allowing organizations to conduct more frequent training sessions at a lower cost [53]. AI's ability to generate adaptive and scalable scenarios makes it an invaluable tool for overcoming resource limitations while maintaining high-quality training.

Another key issue is the lack of realism in traditional crisis exercises. Many crisis management drills are heavily scripted, relying on predetermined scenarios that fail to capture the unpredictable, dynamic nature of real emergencies. These scripted exercises limit participants' ability to practice adaptive decision-making in response to unexpected developments, which is critical in real crises. In reality, crises rarely follow linear paths—events can escalate rapidly, new threats can emerge, and cascading failures can occur. Yet, in traditional training environments, participants are often shielded from these complexities. As a result, they are not adequately trained to think critically or act flexibly in the face of rapidly evolving situations [54].

AI-driven training environments can address the issue of realism by creating dynamic, unscripted crisis scenarios. AI systems can simulate unpredictable events, changing variables based on real-time participant actions, thus forcing trainees to adapt to evolving circumstances. For example, an AI-powered platform might simulate a natural disaster where a response team's actions trigger cascading consequences, such as infrastructure failures or public unrest. This ability to introduce unexpected developments into exercises fosters critical thinking and flexibility, helping participants build the skills necessary to manage real-world crises [55]. Furthermore, AI can incorporate vast datasets from previous crisis events, providing highly realistic and data-driven simulations that closely mirror potential future crises.

The infrequency of training is another significant challenge. Due to the time and cost involved in organizing crisis management exercises, they are often conducted only sporadically. Infrequent training can result in the degradation of essential crisis management skills over time. When staff members do not regularly practice their roles in a crisis, they are less likely to be prepared when an actual emergency occurs. Frequent, diverse, and adaptive training sessions are needed to maintain a high level of preparedness, but traditional methods rarely allow for this due to their high demands on time and resources [56].

AI technologies offer a solution to the challenge of infrequent training by enabling continuous, on-demand training environments. With AI, organizations can set up training simulations that can be accessed at any time, allowing staff to practice whenever their schedules permit. AI systems can generate new scenarios for each session, ensuring that no two exercises are exactly the same, thus preventing participants from becoming overly familiar with specific scenarios. This continuous training approach helps organizations keep their teams engaged in regular practice, ensuring skill retention and improving overall readiness [57].

Additionally, traditional crisis management exercises tend to focus more on performance evaluation than on learning and development. In many cases, these exercises are designed to test participants' existing skills rather than to help them develop new competencies. As a result, participants may feel pressured to perform well under observation, which can detract from their ability to engage in meaningful learning. This focus on evaluation over education can limit the potential for growth, as participants may be more concerned with demonstrating competence than with improving their skills. Moreover, it can create a false sense of preparedness if participants pass the evaluation but have not genuinely learned to adapt to new challenges or improve their decision-making processes [58].

AI systems can transform this evaluative focus by offering real-time feedback and adaptive learning experiences. AI-driven training platforms can track participants' actions, decisions, and performance metrics throughout an exercise, providing instant feedback on what went well and what needs improvement. This allows participants to learn from their mistakes in real time rather than waiting for a post-exercise evaluation. AI can also adapt the difficulty of exercises based on participant performance, creating a learning environment that continuously challenges individuals to improve their crisis management skills [53].

4.2 The potential of novel technologies for crisis management training

With the limitations of traditional crisis management training becoming increasingly evident, organizations are turning to AI, VR, and AR to enhance their preparedness. These technologies offer innovative solutions that can significantly improve the realism, frequency, and effectiveness of crisis management exercises while addressing many of the challenges posed by resource constraints and logistical complexity.

4.2.1 Virtual reality (VR) and augmented reality (AR)

VR provides an immersive training environment where participants can experience crisis scenarios in a fully simulated world. In VR simulations, trainees are placed in high-fidelity virtual environments that replicate real-life crises, allowing them to practice decision-making, coordination, and response activities in real time. Unlike traditional exercises, which are limited by physical resources and logistics, VR can recreate any number of scenarios—from natural disasters like hurricanes and earthquakes to cyberattacks and industrial accidents. This allows organizations to train staff for a wide variety of potential crises without the need for costly or logistically complex setups [59]. For example, emergency medical teams can practice responding to mass casualty incidents, while cybersecurity professionals can simulate responses to large-scale data breaches, all within the safety and control of a virtual environment.

One of the primary advantages of VR in crisis management training is its cost-effectiveness and scalability. Once a virtual environment is created, it can be used repeatedly, allowing organizations to conduct frequent training sessions without the need for significant additional resources. This makes VR particularly valuable for organizations with limited budgets, as it enables them to provide high-quality, immersive training experiences at a fraction of the cost of full-scale exercises [60]. Additionally, VR simulations can be adjusted to different levels of difficulty, ensuring that both novice and experienced participants are adequately challenged.

AR, on the other hand, enhances real-world training exercises by overlaying digital information onto the physical environment. AR allows participants to interact with both the real world and digital elements simultaneously, providing real-time data and feedback during exercises. For example, in a live drill, AR can display critical information such as maps, alerts, or crisis response protocols directly in the field of vision of participants through wearable devices [60]. This technology can simulate the stress and complexity of an actual crisis by providing dynamic, real-time updates that participants must respond to, enhancing the realism and intensity of the exercise.

*Video 1 (*VR demo https://www.youtube.com/watch?v=myt7wzTeDrY*) shows the possibilities of how VR can be used for crisis management training and exercises.*

4.2.2 The role of AI in crisis management training

In addition to VR and AR, AI plays a transformative role in enhancing crisis management training. AI can create dynamic, evolving simulations that respond to participant actions in real time, creating an interactive training environment. For example, an AI-driven system can simulate a cyberattack where each decision made by the team affects the progression of the crisis. If the team fails to contain the attack, the AI can escalate the scenario by introducing new challenges, such as infrastructure failures or data breaches, providing a more realistic and adaptive training experience [53].

AI also provides the ability to analyze vast amounts of data during training exercises, enabling organizations to gather insights that were previously unavailable. Through machine learning algorithms, AI can assess participant performance, identify areas for improvement, and predict how participants would likely perform in actual crisis scenarios. This data-driven approach to crisis management training ensures that training programs are continuously refined and optimized based on real-world performance metrics [57].

*Video 2 (*AI demo https://www.youtube.com/watch?v=Gu6wjFSmni0*) shows the possibilities of how AI can be used for crisis management training.*

By integrating AI with VR and AR, organizations can create highly realistic, adaptive, and resource-efficient training environments that ensure participants are better equipped to handle the unpredictability and complexity of real-world emergencies.

5. Conclusion

Our aim with this chapter was twofold: First, we investigated the gap between scientifically proven crisis management training methods and established practice in organizations that engage in such training. Second, we explored how emergent technologies (such as AI, VR, and AR) can potentially aid in bridging that gap. Our contribution has been a range of propositions as well as practical guidelines on how these technologies can alleviate key training limitations, making crisis management training and exercises less costly, more flexible, frequent, and responsive to real-world challenges.

In conclusion, the integration of AI, VR, and AR into crisis management training presents an exciting opportunity to overcome the limitations of traditional methods. These technologies enable more frequent, realistic, and adaptive training environments, ensuring that crisis management teams are better equipped to handle the unpredictability and complexity of real-world emergencies. As organizations continue to face increasingly complex crises, embracing these innovative tools will be crucial for maintaining a high level of preparedness.

While our findings may paint a rosy picture of the future with technology-supported training and exercises, there are also evident limitations, many stemming from the traditional approach to training and exercises, and the lack of adaptability to both advanced technology on one hand, and the complex challenges that lie ahead when it comes to the global threat picture. The emergence of hybrid threats on a worldwide scale is just one example [13]. The following section will point to apparent limitations inherent in using novel technology for crisis management training and practice.

5.1 Limitations

Crisis management is a field that demands adaptability, critical thinking, and rapid decision-making in the face of unpredictable and often catastrophic events. Traditional training methods, including drills, tabletop exercises, and full-scale simulations, have long been the cornerstone of preparing organizations for emergencies. However, these methods face significant limitations, particularly in terms of resource constraints, lack of realism, infrequent training sessions, and a focus on performance evaluation rather than learning. As crises become more frequent and complex, there is a growing recognition of the need to transform crisis management training through innovative approaches.

One of the most persistent challenges in crisis management training is the resource constraints associated with full-scale exercises. These large, immersive simulations, while highly effective in replicating real-world crises, are expensive and logistically challenging to organize. For many organizations, particularly smaller ones, the cost and complexity of conducting these exercises on a regular basis can be prohibitive. Even simpler exercises like drills and functional simulations require significant time and personnel investment, often making it difficult to prioritize training alongside daily operational demands [52].

In response to these limitations, AI offers a transformative solution. AI-powered platforms can simulate realistic crisis scenarios in a more cost-effective and scalable manner. These systems can generate complex, adaptive simulations without the need for physical resources, enabling organizations to run frequent, high-quality training exercises. AI-driven simulations can adjust to the participants' actions in real time, introducing unexpected developments that mirror the unpredictability of real-world crises. This dynamic aspect of AI-based training is crucial in fostering adaptability and critical thinking, skills that are often underdeveloped in traditional, scripted exercises [53]. Bakken et al. [61] discuss several pitfalls, shortcomings, and dilemmas when it comes to making AI technology more autonomous and relying less on human intervention when it comes to making life-and-death decisions in real-world situations. These concerns may apply equally well to training and exercise situations.

Another key issue with traditional training methods is their lack of realism. Many crisis exercises follow pre-planned scenarios that do not capture the chaotic and rapidly evolving nature of real emergencies. This lack of realism can limit participants' ability to practice adaptive decision-making in the face of unforeseen challenges [54]. AI, VR, and AR technologies can address this issue by creating immersive, dynamic environments where participants must respond to realistic, evolving crises. VR offers a fully simulated environment, allowing participants to practice responding to crises like natural disasters or cyberattacks in a safe, controlled setting. AR enhances real-world exercises by overlaying digital information, such as maps or alerts, onto the physical environment, providing real-time data during training [60]. While generative AI technology, and in concert with VR/AR, can make scenarios more creative and vivid, it is also advisable to exercise caution and be critical, as these AI-generated scenarios may reflect realism to a lesser degree than one might expect [13, 61].

Finally, the infrequency of training due to the high cost and complexity of traditional methods can result in skill degradation over time. AI, VR, and AR enable more frequent and on-demand training by reducing the logistical and financial burdens of crisis simulations. AI systems can generate new scenarios for each session, ensuring that participants are continuously challenged and engaged while also providing real-time feedback to facilitate learning and improvement [57]. Although using generative AI to provide swift, specific, and detailed feedback to exercise participants may seem like a great idea, it would be wise not to exclude the human involvement in such activities entirely, without further research on the pedagogical effects of replacing human instructors with machines.

5.2 Further research[1]

It is apparent that the process of crisis management is governed by the same complex dynamic mechanisms that are characteristics of the training itself: delayed non-linear feedback. Learning is accumulated, often with significant delays, through feedback loops with intricate non-linear relations between decisions and their outcomes, which in turn form the basis of competence gained from such training [20–22, 24, 62].

To explore and examine the potential of using novel technology (AI, VR, AR) to support and facilitate crisis management training and exercises under these conditions of complexity and uncertainty, we propose an interdisciplinary research program adopting a mixed methods approach. The underlying hypothesis is that established practices for training and exercises will have to be "redesigned" in line with DDM theory, with an emphasis on delayed non-linear feedback relations, that will be incorporated in the training and exercise scenarios. Furthermore, we propose that such "redesigned" training and exercises will benefit greatly from the support of novel technology when it comes to achieving more effective crisis management training.

[1] Parts of this chapter is based on the "CrisisLead" research project application to the Norwegian Research Council (2024). The authors have received financial support from Interreg Sweden – Norway, the European Union, European Regional Development Fund. SWE: 20363842; NOR: IRSN2023-0026. A shorter "work in progress" version of the chapter was presented at the 2024 International System Dynamics Conference in Bergen, Norway. Paper title: "Towards a Framework for Crisis Management Training Grounded in System Dynamics – an Interdisciplinary Research Program"

Currently, as of 2024, the research program is in the planning and proposal writing phase. The possibility of developing new knowledge of crisis management training with this program will reach far beyond the current state of the art. The mixed method approach of the program will provide methodological and empirical advancements to the field. By bridging the gap in knowledge between the practice of the field and scientifically validating and testing pedagogy-based training and utilizing the possibilities that lie in the use of top modern technology (simulations supported by VR, AR, and AI), the program will develop a framework for improved crisis management training. With a focus on both learning outcomes and learning processes, the results will bring forward a comprehensive learning cycle grounded in system dynamics principles.

Author details

Kristoffer Lie Eide*, Inger Lund-Kordahl and Bjørn Tallak Bakken
University of Inland Norway, Rena, Norway

*Address all correspondence to: Kristoffer.eide@inn.no

References

[1] Cohen-Hatton S. The heat of the moment. In: A firefigheter's Stories of Life and Death Decisions. London, UK: Transworld Publishers; 2019

[2] Klein G. Sources of power. In: How People Make Decisions. Cambridge, Massachusetts (MA): The MIT Press; 1999

[3] Okoli JO, Weller G, Watt J. Information processing and intuitive decision-making on the fireground: Towards a model of expert intuition. Cognition, Technology & Work. 2016;**18**:89-103

[4] Steigenberger N, Lübcke T, Fiala HM, Riebschläger A. Decision Modes in Complex Task Environments. Boca Raton, Florida (FL): The CRC Press; 2017

[5] Bakken B, Lund-Kordahl I, Eide K. Loyal servant or loose Cannon? Capabilities and concerns with autonomous AI for C2 and crisis management. In: International Command and Control Institute 29th Conference; 24-26. London: International Command and Control Institute (IC2I); September 2024

[6] Eide K. Core Decision Support System – Fremtidens verktøy for beredskapsøvelser? [Master thesis]. Stavanger: University of Stavanger; 2024. Available from: https://uis.brage.unit.no/uis-xmlui/bitstream/handle/11250/3151516/no.uis%3ainspera%3a243210422%3a243733322.pdf?sequence=1&isAllowed=y

[7] Lee C-C, Comes T, Finn M, Mostafavi A. Roadmap Towards Responsible AI in Crisis Resilience Management; 2022. DOI: 10.48550/arxiv.2207.09648

[8] Choudhury P, Crowston K, Dahlander L, Minervini MS, Raghuram S. Working (from home) during a crisis: Online social contributions by workers during the coronavirus shock. Journal of Organization Design. 2020;**9**:1-17

[9] Bakken BT, Lund-Kordahl I, Sandberg I. Augmented and virtual reality (AR/VR) and artificial intelligence (AI) Technology in Systematic Inter-Professional Crisis Management Training. In: International Command and Control Research and Technology Symposium (ICCRTS) Proceedings 2022. Washington, DC: International Command and Control Institute (IC2I); 2022

[10] Garcia Estrada J, Prasolova-Førland E, Kjeksrud S, et al. Military education in extended reality (XR): Learning troublesome knowledge through immersive experiential application. The Visual Computer. 2024;**40**:7249-7278. DOI: 10.1007/s00371-024-03339-w

[11] Larsson G, Alvinius A, Bakken B, Haerem T. Social psychological aspects of inter-organizational collaboration in a total defense context: A literature review. International Journal of Organizational Analysis. 2023;**31**(3):693-709. DOI: 10.1108/IJOA-02-2021-2626

[12] Kruke B. Planning for crisis response: The case of the population contribution. In: Podofillini L, Sudret B, Stojadinović B, Zio E, Kröger W, editors. Safety and Reliability of Complex Engineered Systems. Boca Raton, Florida (FL): CRC Press; 2015. pp. 177-185

[13] Bakken BT, Hærem T, Lund-Kordahl I. Building competence against hybrid threats: Training

and exercising hybrid command organizations. In: Borch OJ, Heier T, editors. Preparing for Hybrid Threats to Security. Collaborative Preparedness and Response. London, New York: Routledge; 2024b. pp. 234-250

[14] Badu J, Kruke BI, Sætren GB. Crisis communication and trustworthiness among crisis actors: Towards a typology of crisis management difficulties. Safety in Extreme Environments. 2023;**5**:119-130. DOI: 10.1007/s42797-023-00074-8

[15] Valaker S, Hærem T, Bakken BT. Connecting the dots in counterterrorism: The consequences of communication setting for shared situation awareness and team performance. Journal of Contingencies and Crisis Management. 2018;**26**(4):425-439. DOI: 10.1111/1468-5973.12217

[16] Endsley MR. Toward a theory of situation awareness in dynamic systems. Human Factors. 1995;**37**(1):32-64

[17] Rosenthal U, ‘t Hart P, Charles MT. The world of crises and crisis management. In: Rosenthal U, Charles MT, t’Hart P, editors. Coping with Crises: The Management of Disasters, Riots and Terrorism. Springfield: Charles C. Thomas; 1989

[18] Sætren GB, Vaag JR, Lund MS. What and how to train for strategic crisis management: A systematic literature review. Journal of Contingencies and Crisis Management. 2024;**32**(2):e12568. DOI: 10.1111/1468-5973.12568

[19] ‘t Hart P, Boin A. Between crisis and normalcy: The long shadow of post-crisis politics. In: Rosenthal ABU, editor. Managing Crises: Threats, Dilemmas, Opportunities. Charles C: Thomas; 2001

[20] Moxnes E. Challenges for sustainability: Misperceptions and misleading advice. System Dynamics Review. 2023;**39**(3):185-206. DOI: 10.1002/sdr.1733

[21] Sterman J. Learning in and about complex systems. System Dynamics Review. 1994;**10**(2-3):291-330

[22] Sterman J. Business Dynamics. System Thinking and Modeling for a Complex World: McGraw-Hill; 2000

[23] Sætren GB, Stenhammer HC, Andreassen N, Borch OJ. Computer-assisted management training for emergency response professionals in challenging environments. Safety in Extreme Environments. 2022;**4**:277-290. DOI: 10.1007/s42797-022-00066-0

[24] Fellnhofer K, Sadler-Smith E, Sinclair M, Liu K. Shaping novel paths for future management research and practice in enhancing intuition. Academy of Management Collections. 2024;**3**(4):57-75. DOI: 10.5465/amc.2022.0004

[25] Hogarth RM. Educating Intuition. Chicago: University of Chicago Press; 2001

[26] Kahneman D. A perspective on judgment and choice: Mapping bounded rationality. American Psychologist. 2003;**58**:697-720. DOI: 10.1037/0003-066X.58.9.697

[27] Kahneman D, Klein G. Conditions for intuitive expertise: A failure to disagree. American Psychologist. 2009;**64**:515-526. DOI: 10.1037/a0016755

[28] Bjurström E, Bakken BT. Dynamic decision making under uncertainty: A Brehmerian approach. Journal of Behavioural Economics and Social Systems (BESS). 2022;**4**(2):55-70. DOI: 10.54337/ojs.bess.v4i2.7749

[29] Brehmer B. Dynamic decision making: Human control of complex

systems. Acta Psychologica. 1992;**81**(3):211-241

[30] Moxnes E, Naumov S. Analysis of dynamic models by optimization. System Dynamics Review. 2023;**40**(1):e1747. DOI: 10.1002/sdr.1747

[31] Schoenberg W, Davidsen P, Eberlein R. Understanding model behavior using the loops that matter method. System Dynamics Review. 2020;**36**:158-190

[32] Bakken BT, Hansson M, Hærem T. Challenging the doctrine of "non-discerning" decision-making: Investigating the interaction effects of cognitive styles. Journal of Occupational and Organizational Psychology. 2024a;**97**:209-232. DOI: 10.1111/joop.12467

[33] Gonzalez C, Fakhari P, Busemeyer J. Dynamic decision making: Learning processes and new research directions. Human Factors. 2017;**59**(5):713-721. DOI: 10.1177/0018720817710347

[34] Boin A. The new world of crises and crisis management: Implications for policymaking and research. Review of Policy Research. 2009;**26**(4):367-377. DOI: 10.1111/j.1541-1338.2009.00389.x

[35] Direktoratet for samfunnssikkerhet og beredskap (DSB). Veiledning i planlegging, gjennomføring og evaluering av øvelser. Tønsberg, Norway: Direktoratet for samfunnssikkerhet og beredskap (DSB); 2020. Available from: https://www.dsbinfo.no/DSBno/2016/Tema/grunnbokoving/

[36] Venemyr GO. Towards proactive crisis management innovation: A meta-narrative literature review of drivers and barriers. Nordic Journal of Innovation in the Public Sector. 2024;**3**(1):1-24. DOI: 10.18261/njips.3.1.4

[37] Magnusson M, Persson E, Pettersson JS, Bellström P, Venemyr GO, Bakken BT, et al. Digitalisering av krisövning: Erfarenheter från CriseIT-projekten 2021. Sweden: CriseIT; 2021. Available from: https://www.criseit.org/wp-content/uploads/2022/02/digitalisering-av-krisovning-erfarenheter-fran-criseit-projekten-2021.pdf

[38] Paton D, Flin R. Disaster stress: An emergency management perspective. Disaster Prevention and Management: An International Journal. 1999;**8**(4):261-267. DOI: 10.1108/09653569910283897

[39] Bakken BT, Valaker S, Hærem T. Trening og øving av krisehåndtering – en metodisk tilnærming. In: Hafting T, editor. Krisehåndtering. Oslo: Cappelen Damm Akademisk; 2017. pp. 377-394

[40] Flin R, Arbuthnot K. Incident Command: Tales from the Hot Seat. Aldershot. London, New York: Routledge; 2002

[41] Bass BM. From transactional to transformational leadership: Learning to share the vision. Organizational Dynamics. 1990;**18**(3):19-31

[42] Klein G. A recognition-primed decision (RPD) model of rapid decision making. In: Klein G, Orasanu J, Calderwood R, Zsambok C, editors. Decision Making in Action: Models and Methods. Norwood, New Jersey (NJ): Ablex Publishing; 1993. pp. 138-147

[43] Coombs WT. Ongoing Crisis Communication: Planning, Managing, and Responding. Los Angeles, California (CA): SAGE Publications; 2007

[44] Harrald JR. Agility and discipline: Critical success factors for disaster response. The Annals of the American Academy of Political and Social Science. 2006;**604**(1):256-272

[45] Haddow G, Bullock J. Introduction to Emergency Management. Oxford, UK: Butterworth-Heinemann; 2021

[46] Federal Emergency Management Agency (FEMA). Homeland Security Exercise and Evaluation Program (HSEEP) Doctrine 2020 Revision 2.2. Washington, D.C.: U.S. Department of Homeland Security; 2020. Available from: https://www.fema.gov/sites/default/files/2020-04/Homeland-Security-Exercise-and-Evaluation-Program-Doctrine-2020-Revision-2-2-25.pdf

[47] Fagel MJ. Principles of Emergency Management and Emergency Operations Centers (EOC). Boca Raton, Florida (FL): CRC Press; 2018

[48] Kobes M, Helsloot I, de Vries B, Post JG. Building safety and human behaviour in fire: A literature review. Fire Safety Journal. 2010;**45**(1):1-11

[49] Alexander DE. Principles of Emergency Planning and Management. Oxford, UK: Oxford University Press; 2002

[50] Crichton MT, Ramsay CG, Kelly T. Enhancing organizational resilience through emergency planning: Learnings from cross-sectoral lessons. Journal of Contingencies and Crisis Management. 2000;**8**(3):129-139

[51] Perry RW. Disaster exercise outcomes for professional emergency personnel and citizen volunteers. Journal of Contingencies and Crisis Management. 2004;**12**(2):64-75

[52] Bacon C, Hobson S, Beattie J. Crisis management simulation and its use in crisis training. Journal of Emergency Management. 2013;**11**(3):178-185

[53] Wang S, Wang P, Liu H. Artificial intelligence in crisis management training: Applications, challenges, and future directions. Journal of Crisis Management Technology. 2020;**12**(3):221-236

[54] Lalonde C, Roux-Dufort C. Crisis Management: From Theory to Practice. Pearson Education; 2013

[55] Berg BL, Karwowski W. Simulation training in crisis management: The role of adaptive learning technologies. International Journal of Crisis Management. 2019;**9**(4):89-104

[56] Tena-Chollet F, Tixier J, Dandrieux A, Slangen P. Training decision-makers: Existing strategies for natural and technological crisis management and specifications of a new dynamic simulation-based tool. Safety Science. 2017;**97**:144-153

[57] Gaggioli A, Morganti L, Villani D, Riva G. Virtual reality and AI for crisis management training: Enhancing situational awareness and decision-making skills. Journal of Cyberpsychology. 2021;**15**(2):56-67

[58] Lapierre L, Parent R, Gouin C. Learning through failure: The importance of performance feedback in crisis management training. Journal of Contingencies and Crisis Management. 2015;**23**(2):91-101

[59] Hsu EB, Li Y, Bayram JD, Levinson D, Yang S, Monahan C. Virtual training in disaster medicine: The future role of VR in crisis response training. Journal of Medical Internet Research. 2013;**15**(1):e133

[60] Chirico F, Heponiemi T, Pavlova M, Zaffina S, Magnavita N. Virtual reality for enhancing emergency preparedness training. Journal of Occupational and Environmental Medicine. 2019;**61**(8):e314-e315

[61] Bakken BT, Lund-Kordahl I, Bjurström E. AI in future C2 – Who's in command when AI takes control? In: International Command and Control Research and Technology Symposium (ICCRTS) Proceedings. 2023. Washington, DC: International Command and Control Institute (IC2I); 2023

[62] Brekke KA, Moxnes E. Do numerical simulation and optimization results improve management? Experimental evidence. Journal of Economic Behavior & Organization. 2003;**50**:117-131

Edited by Muddassar Sarfraz

Crisis management is a hot topic that occupies a dominant space in the minds of individuals. Where and when the problem arises, this book serves as an essential guide to the multifaceted aspects of crisis management. It provides readers with a theoretical and practical guide towards navigating the conflicts of today's world. This book investigates various crises, from natural disasters to human-made threats, and raises the importance of managing these risks and gaining resilience. It offers insight into principles, strategies, and challenges and highlights real-world cases, empirical research, and emerging trends. Highlighting the necessity for crisis management and immediate recovery, this book provides a global perspective, including Asia, Africa, Europe, and the Americas. Each chapter enriches the understanding of unique challenges in a different context and shares a lesson that can bridge the gap in local and global settings. It is a valuable resource for organizations, scholars, government, industrial professionals, policymakers, and practitioners, emphasizing the need to adapt to the new normal and its opportunities and learning. It empowers individuals with confidence and highlights the importance of innovative approaches to tackling crises effectively. This book leads individuals to think differently and extends heartfelt gratitude to all the contributors who added value through their expertise, time, and energy, thus making this endeavor a collaborative and enriched achievement.

Sandro Serpa, Social Sciences Series Editor

ISSN 2977-6473
ISBN 978-1-83634-309-7
9 781836 343097

Published in London, UK

IntechOpen