EFFECT OF INTELLECTUAL CAPITAL ON DISASTER RISK REDUCTION IN NAIROBI CITY COUNTY, KENYA

BY

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MASTER OF SCIENCE IN KNOWLEDGE MANAGEMENT AND INNOVATION

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DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

Esther Njambi Muchoki 22/03081

Sign _____ Date 09/10/2025

I do hereby confirm that I have examined the master's dissertation of

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And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed.

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Dr. Onguso Asenath

Supervisor

ABSTRACT

Research on disaster management increasingly highlights the central importance of intellectual capacity in facilitating disaster risk reduction. Intellectual capacity, or knowledge, skills, expertise, and creativity, is essential to individual disaster managers as well as to the connected activities of fragmented stakeholders. Disaster management has been shown through research to depend not just on human capital but also on structural capital. This connection emphasizes leveraging intellectual capital at the local, national, and global levels in support of better disaster preparation, response, and recovery policy. In Kenya, disaster risk reduction is a major priority because of the country's susceptibility to various hazards such as droughts, floods, landslides, earthquakes, and epidemics. The Kenyan government, along with various international organizations, has been implementing measures to increase adaptability and scale down the influence of disasters on communities and the economy. This study aimed to investigate how intellectual capital impacts disaster risk reduction in Kenya. The study evaluated the impact of three main facets of intellectual capital namely, human capital, structural capital, and relational capital on disaster risk reduction in Kenya. Additionally, it explored the influence of government intervention measures on disaster risk reduction in the country. The research was based on three theoretical frameworks: intellectual capital theory, stakeholder theory, and the social-ecological systems framework. The target population consisted of 1178 employees from the Nairobi City County Government from various Department. A sample size of 299 officers was also selected using the Yamane (1967) formula and stratified random sampling technique. The study utilized structured questionnaires to gather raw data. The data then analyzed with SPSS v27 statistical software to produce both descriptive and inferential statistics. The results were displayed in tables for ease of understanding and interpretation. The results showed that human capital had a strong positive and significant effect on disaster risk reduction ($B = 0.355$, $0.000<p<0.05$). Relational capital also had a positive and significant effect ($B = 0.064$, $0.033<p<0.05$). However, structural capital had a negative insignificant effect ($B = -0.015$, $0.276>p>0.05$). Finally, government intervention measures had a positive intervening effect on disaster risk reduction ($B = 0.422$, $0.00<p< 0.05$). The study concludes that intellectual capital has a positive effect on disaster risk reduction in Nairobi city county. It also concludes that government intervention measures have an intervening effect on the relationship between intellectual capital and disaster risk reduction in Nairobi city county, Kenya. The study recommends that the county government should enhance staff skills, strengthen organizational structures, adopt modern technology, improve stakeholder and community engagement, and enforce regulations to collectively strengthen disaster risk reduction in Nairobi City County.

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DEDICATION

I dedicate this project to my children, Stacy and Mark.

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ACRONYMS AND ABBREVIATIONS

CAF	Capital Approach Framework
CB-SEM	Covariance Based Structural Equation Modeling
CCA	Climate Change Adaptation
CIDPs	County Integrated Development Plans
DRR	Disaster Risk Reduction
EDRM	Emergency and Disaster Risk Management
GIS	Geographic Information Systems
NACOSTI	National Council for Science and Technology and Innovation
NCC	Nairobi City County
NDMA	National Drought Management Authority
NDOC	National Disaster Operations Centre
PLS	Partial Least Squares
SES	Social-Ecological Systems
SPSS	Statistical Package for Social Sciences
VIF	Variance Inflation Factor

TERMS AND DEFINITIONS

Disaster Risk Reduction	Organized actions and strategies aimed at reducing the adverse impacts of natural or artificial hazards on communities and the environment**.** (Lambert & Scott, 2019).
Government Intervention Measures	The actions or strategies taken by a government or public authority to influence or regulate economic, social, or political activities within a country (Said, 2020).
Human Capital	The erudition, skills, capabilities, and years of involvement of individuals within an organization (Koyama, 2022).
Intellectual Capital	The intangible assets possessed by society, an individual or organization that contribute to its overall knowledge, innovation, and competitive advantage (Alvino et al., 2021).
Relational Capital	External relationships, networks, and collaborations that an organization has with its stakeholders (Nyamakura, 2021).
Structural Capital	Company frameworks, systems, processes, and culture which facilitate knowledge sharing, collaboration, and innovation (Parven et al., 2022).

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter starts with an overview of intellectual capital and disaster risk reduction from global, regional, and local perspectives which in this case is Kenya. It then outlines the research problem, objectives, and research questions. Finally, it addresses the significance of the study and defines its scope.

1.1 Background of the Study

Disaster risk reduction (DRR) is a crucial aspect of mitigating the impacts of both natural and human-induced disasters. It encompasses the efforts and strategies aimed at minimizing vulnerabilities and enhancing the suppleness of communities and nations to possible hazards (Omondi et al., 2019). Intellectual capital relates to cumulative information, abilities, and competence in possession by individuals, organizations, and societies (Rehman et al., 2022). It possesses a critical part in coming up with effective strategies and solutions to mitigate against disaster risks and enhance resilience. Consequently, effective DRR strategies that harness intellectual capital are essential for promoting sustainable development and safeguarding human well-being (Andrew, 2018).

In the global perspective, international countries handle matters related to disaster risks by employing diverse strategies to mitigate these risks, which mainly depend on the kind of disaster and its underlying effects (Zhou et al., 2018). These nations are mainly affected with natural disasters namely; floods, earthquakes, tsunamis, and typhoons which have resulted in considerable deaths and infrastructure damage. Thus, the need to develop effective strategies on a global scale

will greatly enhance the resilience of these nations and boost their preparedness to respond to disasters (Paton, 2019). Some of these strategies include establishing robust disaster management frameworks, policies, and institutions that prioritize risk reduction. They may also comprise of investing in research, data collection, and analysis to understand vulnerabilities and enhance preparedness (Etinay, Egbu & Murray, 2018). Examples of such countries include Japan, known for its advanced earthquake preparedness measures, and the Netherlands, which has an extensive system of flood protection (Mizutori, 2020).

African countries experience varying degrees of vulnerability and exposure to these natural hazards, leading to significant social, economic, and environmental consequences. These include recurrent natural hazards like floods, storms, droughts, and wildfires (Dodman et al., 2018). Additionally, the continent is highly vulnerable to slow-onset disasters, including desertification, land degradation, and climate change impacts like sea-level rise (Orimoloye, Belle & Ololade, 2021). To mitigate on some of these disaster risks, countries like Nigeria, Ghana and Mozambique have established early warning and monitoring systems to detect drought and flood conditions, provide timely alerts and proactive responses and resource allocation to communities at risk (Echendu, 2022). Other countries like Niger, Ethiopia and Kenya have made significant steps in incorporating resilient design principles including constructing and maintaining control structures such as dams and reservoirs. They have also enforced policies to promote sustainable land management (Kalantari et al., 2018).

Locally in Kenya, flooding, landslides, drought and food insecurity are the key disaster risks that have been a threat to the well-being of Kenyans in low-lying areas (Ward et al., 2020). According to National Disaster Operations Centre (NDOC), some of the strategies that have proved effective to a good extent include implementing early warning systems that utilize weather

forecasting, remote sensing, geographic information systems (GIS) and community engagement to provide timely disaster alerts and evacuation advisories (Njogu, 2021). The National Drought Management Authority (NDMA) have also made efforts to support and encourage communities affected to embrace economic diversification and alternative livelihoods, such as agroforestry and livestock diversification, to reduce dependence on rain-fed agriculture (Muricho et al., 2019). Moreover, strengthening technical expertise through training programs, knowledge sharing, and collaboration with research institutions have enhanced the understanding of experts on disaster risk dynamics and how to improve mitigation strategies (Parajuli,2020).

1.1.1 Intellectual capital

Intellectual capital (IC) refers to the intellectual assets that generate the prosperity of an organization. Stewart (1997) has defined it as the collection of an organization's intellectual property, connections, intellect, and human assets. Building further on this, Edvinsson and Malone (1997) categorize IC into three dimensions: human capital (experience and competencies), structural capital (organization systems and procedures), and relational capital (external relationships). Nonaka and Takeuchi (1995) define IC as the process of converting tacit knowledge to explicit knowledge and highlight how firms accumulate their intellectual capitals. Bontis (1998) is also at ease defining IC as organizational experience and knowledge used to create value, while Barney (1991) sees it as a strategic asset yielding competitive advantage.

According to Alvino et al. (2021), intellectual capital emphasizes the value of intangible assets in the contemporary economy which is heavily dependent on knowledge. It underscores the significance of utilizing these assets to build a competitive edge and create long-term values. This can be done by capturing, creating, organizing, and leveraging knowledge and expertise within the

company. The facets of intellectual capital which include human related capital, structural capital and relational capital, constituted the constructs of intellectual capital in this investigation.

Human capital is the skills, knowledge, experience, and capabilities of the employees within a company. This encompasses education, training, employee competencies, creativity, and the ability to innovate which add to the success of the organization (Deming, 2022). It does include the use of both explicit knowledge; such as technical skills and industry-specific expertise and tacit knowledge; such as critically thinking, problems-solving abilities, and innovative thinking (Sima et al., 2020). Bellucci et al. (2021) reveals that developing and nurturing this kind of knowledge among employees plays a substantial role in generation of novel knowledge and facilitating its dissemination throughout an organization. When individuals with diverse expertise collaborate and share their knowledge, it leads to increased learning, improved decision-making, and enhanced problem-solving capabilities.

Moreover, in a dynamically evolving business environment, human capital enables organizations to adapt and respond effectively to new challenges and opportunities. Employees with a strong skill set and a capacity for learning can help organizations navigate uncertain and dynamic market conditions, facilitate smooth transitions, drive change initiatives, and enhance organizational resilience (Sima et al., 2020). In addition, earlier studies like Boon et al. (2018), which have scrutinized the role of human capital in organizations concurred that firms which invest in human capital development demonstrates a commitment to employees' growth and advancement. This, in turn, enhances employee satisfaction, loyalty, and engagement, leading to higher retention rates and reduced recruitment costs. Kuzmin et al. (2020) study looked into the contribution of human capital in knowledge management processes. The study identified that

effective management of human capital promotes creation of a supportive organizational culture, promotes collaboration, and provide learning opportunities to employees.

Structural capital represents the collective knowledge embedded in an organization's systems and structures that enable it to function effectively and create value (Allameh, 2018). It encompasses organizational structures, processes, systems, databases, patents, trademarks, and other intellectual property rights. This provides the framework and infrastructure for efficient and effective operations. Well-designed processes, standardized procedures, and optimized systems contribute to streamlined workflows, reduced costs, and improved efficiency (Sardo et al., 2018).

Previous studies on intellectual capital have explored the part played by structural capital in an organizations' performance and competitive edge. A study by Santoro et al. (2018) delved into how investments in information technology systems and knowledge management practices contribute to the creation and utilization of structural capital. This study has shown that organizations with strong structural capital tend to have better innovation capabilities, improved knowledge sharing and collaboration, and higher overall performance. Another study by Cabrilo and Dahms (2018) analyzed the relationship between structural capital and knowledge management techniques. It revealed that the design and implementation of information systems, databases, and knowledge-sharing platforms can enhance knowledge creation, transfer, and utilization within organizations.

Relational capital references the intangible assets and resources that stem from an organization's relations with external stakeholders, including clients, suppliers, partners, and community (Byun, Frake & Agarwal, 2018). It encompasses the trust, goodwill, reputation, and collaborative networks that an organization develops and maintains with its external counterparts (Johnston & Lane, 2018). Ritala et al., (2021) noted that relational capital facilitates knowledge

sharing and collaboration with external entities. Organizations can tap into external expertise, industry networks, and market intelligence through these relationships. Collaboration with clients, suppliers, and partners can also contribute to co-creation, innovation, and the exchange of best practices.

Further, Kim and Hastak (2018) employed social network analytics in understanding structures and dynamics of relational capital. The study examined how an organization's network of relationships influences its access to resources, information, and opportunities and concluded that relational capital possesses key roles in promoting knowledge diffusion, innovation, and collaborative activities. Additionally, Johnston and Lane (2018) study also investigated the importance of relational capital in reputation management and stakeholder engagement. The study found that firms which build and maintain positive relationships with stakeholders are able to enhance their reputation, gain support, and foster sustainable partnerships.

This study involved all the three types of intellectual capital: human capital, structural capital, and relational capital. The study is focused not only on their comprehension but also on the mutual interaction in reducing risks connected with disasters. The relevance of all three types of IC lies in their complementary roles in improving disaster risk management. Human capital provides the necessary expertise, structural capital offers the systems and technologies to support disaster management, and relational capital fosters the collaboration required for effective action (Alnassafi, 2022). By examining these three dimensions together, this study aims to provide a comprehensive understanding of how intellectual capital influences DRR strategies and outcomes, and filling gaps in the existing literature.

The human capital, which is the information, abilities, and knowledge of bring up human beings has been a significant part since it is the most immediate impact of the prevention, recovery,

and durability of natural disasters (Andrabi, Daniels & Das, 2023). Understanding such experts who are familiar with the issues and experienced is very important because they can be immediately recognized and suitable treatments can be implemented (Naseem, Battisti, Salvi & Ahmad, 2024). Through structural capital, intellectual capitals' play is vital for the smooth functioning of disaster management by giving the systems, technologies, and organizational processes which are essential for the operation of disaster management (Koyama, 2022). The development and implementation of technological solutions like early warning systems and data analytics deliver more precise means of forecasting, communicating, and reacting to natural disasters.

Further, relational capital, which is the links and relationships among stakeholders, is the contributing element to the effectiveness of DRR (Peters, 2019). Relational capital provides the pathways to communication, resource sharing and even collaboration between the communities, governments, and organizations (Kumari & Frazier, 2021). Intellectual capital has a joint effect and the study sets out to show how they can be integrated for the improvement of DRR strategies and outcomes, in particular, the human knowledge, organizational system, and collaborative networking interconnectedness which work as a catalyst of disaster resilience (Alnassafi, 2022).

1.1.2 Disaster risk reduction

Disaster risk reduction (DRR) refers to coordinated measures and policies adopted to ameliorate the effects of calamities on societies, economies, and the environment (Paton, 2019). It encompasses the actions and measures taken to prevent, mitigate, and prepare for disasters, as well as to enhance resilience and response capabilities. Disasters can have severe setbacks on development progress in countries, particularly in low-income communities (Lambert & Scott, 2019). Developing and implementing DRR strategies promotes sustainable development by

integration of disaster risk considerations into development plans, promoting the resilience of infrastructure, livelihoods, and ecosystems. Additionally, DRR supports poverty reduction efforts and creates more resilient and sustainable communities (Ogra et al., 2021), with the Sendai Framework (2015-2030) being adopted widely as the strategic roadmap for reduction of disaster risks.

In Kenya, DRR plays a vital role due to the country's exposure to various risks like floods, famines, landslides, and epidemics (Muricho et al., 2019). According to a recent report by Kenya's National Disaster Operations Centre (NDOC), the country faces recurrent disasters that result in significant loss of lives, displacement of communities, and economic setbacks (NDOC, 2020). The government of Kenya, in collaboration with international organizations and local communities, has implemented several initiatives to address disaster risks and enhance preparedness. For instance, the National Disaster Risk Reduction and Management Policy and the National Disaster Operations Centre have been established to coordinate DRR efforts at the national level (National Disaster Management Authority, 2021). Additionally, research institutions such as the National Drought Management Authority (NDMA) and the Kenya Red Cross Society invest in their intellectual capital capacity to conduct numerous studies and develop innovative approaches to address disaster risks and provide timely response and recovery (NDMA, 2018).

Moreover, partnerships between the government, non-governmental organizations, and societies have proved instrumental in enhancing intellectual capital and improving DRR efforts (Mutunga et al., 2022). This has mainly been through collaboration and knowledge sharing between the Kenya Meteorological Department and international organizations such as the World Meteorological Organization to enhance weather prediction and alert systems, which are critical for reducing the impacts of climate-related hazards (World Meteorological Organization, 2021).

Additionally, community-based organizations take a leading role in sharing local knowledge and traditional techniques that also contributes to the intellectual capital in DRR (Andrew, 2018). Further, different researchers (Muricho et al., 2019; Namagembe, 2020 and Mutunga et al., 2022) concur that the integration of DRR and intellectual capital in Kenya is essential for building a sustainable and resilient nation. By harnessing intellectual capital, the country can leverage its knowledge and expertise to address the complex challenges posed by disasters, inform policy decisions, improve community engagement, and foster innovation in disaster management.

The Government of Kenya has to a great extent invested in establishing national disaster centers and implementing several initiatives to address disaster risks and enhance its preparedness. Despite the government's commitment to DRR and the availability of intellectual capital resources, there is still a lack of effective integration and application of intellectual capital in Nairobi County's disaster management strategies. Thus, this hinders their ability to maximize the potential of intellectual capital for enhancing disaster preparedness, response, and recovery. Nairobi County which is home to over 4 million people has been highly exposed to a range of risks including flooding, landslides, fire tragedies and collapsing buildings (KNBS, 2021). These risks have posed significant threats to the lives, livelihoods, and well-being of the county's residents, particularly those living in informal settlements and vulnerable communities.

Empirical studies on intellectual capital (IC) and disaster risk reduction (DRR) reveal a range of relationships, including positive, negative, and insignificant associations, which highlight the complexity of this connection. A number of studies demonstrate a positive relationship between IC and effective DRR. For instance, Aerts et al. (2018) found that human capital, particularly expertise, training, and education, plays a crucial role in enhancing disaster preparedness and response. Communities with higher levels of skilled professionals were better able to assess risks

and implement effective mitigation strategies. Similarly, Koyama (2022) found a significant positive relationship between structural capital, such as technological infrastructure and organizational systems, and improved disaster response. The use of advanced technologies, including early warning systems and data analytics, enabled more efficient disaster management. Moreover, Macnight Ngwese et al. (2018) highlighted the positive impact of relational capital, particularly community-based knowledge and collaboration. Their research indicated that strong partnerships between local communities, governments, and NGOs contributed to more resilient disaster risk management strategies, leading to better outcomes in disaster mitigation.

However, other studies have revealed a negative relationship between certain types of IC and DRR outcomes. For example, Hoffmann and Blecha (2020) reported that structural capital, specifically technological innovations, had a negative impact on DRR in low-resource settings. In areas with inadequate infrastructure, the reliance on high-tech solutions led to ineffective disaster response, suggesting that technological advancements may not always be beneficial without the proper context. Similarly, Nhemachena et al. (2020) found a negative relationship between certain forms of human capital, particularly traditional knowledge, and DRR outcomes. They observed that in some regions, traditional knowledge conflicted with modern disaster management practices, creating inefficiencies in the response efforts.

In contrast, some studies have found an insignificant relationship between IC and DRR. Clark-Ginsberg (2020), in a comparative study across developed and developing countries, discovered that in high-capacity nations, the role of intellectual capital had little additional impact on disaster management outcomes. In these countries, existing disaster management systems were already robust, meaning that the contribution of IC was less pronounced. Similarly, Peters (2019) found that relational capital had an insignificant impact on DRR in some regions. Despite strong

community networks, the study concluded that without strong governmental and organizational support, these relationships did not significantly reduce disaster risks or improve resilience.

These findings collectively demonstrate that the relationship between intellectual capital and disaster risk reduction is not straightforward. While positive relationships are observed, particularly in contexts with sufficient resources and organizational support, negative and insignificant relationships highlight the importance of considering the specific context in which IC is applied. The varying results suggest that the effectiveness of intellectual capital in DRR is influenced by factors such as the region, resource availability, and the integration of traditional and modern knowledge systems.

1.2 Statement of the Problem

The relationship between disaster risk reduction (DRR) and intellectual capital (IC) is not even. A study like Aerts et al. (2018) and Koyama (2022) indicates a positive relationship in which structural and human capital, i.e., skilled experts and technological advancements, contribute to disaster readiness and recovery. Nevertheless, Hoffmann and Blecha (2020) found that high technologies won't function in poor areas, and Nhemachena et al. (2020) found that at times local knowledge is at variance with new disaster systems. Peters (2019) also observed that relational capital played insignificantly in disaster resilience in certain environments where strong people-to-people networks was present without government support. These mixed findings confirm that the utility of IC to DRR is subject to determinants like the availability of resources and context.

According to recent statistics from the Kenya Red Cross Society (2021), Nairobi County recorded over 200 cases of floods, affecting approximately 25,000 people and resulting in several deaths and injuries annually between 2017 and 2020. The National Disaster Operations Center (NDOC) report (2021) also confirmed that there has been a substantial rise in fire outbreaks and

collapsing of buildings in Nairobi County particularly in Embakasi, Mathare and Kibra regions, where there is human congestion, densely populated informal settlements and many high buildings with weak foundations. These disasters not only cause loss of lives and property but also disrupt essential services, livelihoods, and overall socio-economic development in the county. The report also highlighted that delay and poor response rate from the response teams involved such as fire brigades are the key contributors to the adverse effects of the mentioned natural hazards. As a result, these show the urgent need for effective utilization of intellectual capital to enhance disaster readiness, alert systems, and response protocols in the county.

Furthermore, studies on intellectual capital and disaster risk reduction were quite scarce and especially in Nairobi County. Some of the studies including Njogu (2021); Mbirithi and Macmbinji (2018); Onganyaa et al (2019) and Sanni (2021) relate to the current study however, most of them only discuss the disaster risk reduction, the assessment strategies and the underlying factor, but failed to factor in or show the effect of intellectual capital on disaster risk reduction. Therefore, comprehensive research was needed to explore the effect of intellectual capital on disaster risk reduction in Nairobi County, Kenya.

1.3 Research Objective

1.3.1 General objective

The general objective of the study was to examine the effect of intellectual capital on disaster risk reduction in Nairobi County, Kenya.

1.3.2 Specific objective

i. To assess the effect of human capital on disaster risk reduction in Nairobi County, Kenya

ii. To determine the effect of structural capital on disaster risk reduction in Nairobi County, Kenya

iii. To examine the effect of relational capital on disaster risk reduction in Nairobi County, Kenya.

iv. To evaluate the intervening effect of government intervention on disaster risk reduction in Nairobi County, Kenya.

1.4 Research Questions

i. What is the effect of human capital on disaster risk reduction in Nairobi County, Kenya?

ii. How does structural capital have an effect on disaster risk reduction in Nairobi County, Kenya?

iii. What is the effect of relational capital on disaster risk reduction in Nairobi County, Kenya?

iv. What is the intervening effect of government intervention on disaster risk reduction in Nairobi County, Kenya?

1.5 Significance of the Study

The contribution of the research is enhancing the capacity to shape policy, theory, and practice in disaster risk reduction focusing on Nairobi City County, Kenya, with a direct benefit to policymakers, the local government, and the public at large. On the policy side, the research provides pertinent information on intellectual capital integration into disaster risk management frameworks. The conclusions could inform local, regional, and national policymakers to develop policy that promotes interagency collaboration between state agencies, non-state actors, academic institutions, and local communities. Such policies could result in more effective disaster

preparedness, improved resource allocation, and better interagency coordination, ultimately benefiting Nairobi residents through increased disaster resilience against future threats.

Theoretically, the research contributes to the intellectual capital and DRR literature by exploring its impact in the Nairobi context. It offers insights into deeper dimensions of understanding human, structural, and relational capital's ability to influence disaster resilience, bridging a gap in academic knowledge regarding the management of disasters in cities. The study's findings would be applicable to researchers and scholars in intellectual capital and disaster risk reduction and could possibly pave the way for subsequent research in similar urban settings or other regions of the world subject to similar conditions. The theory contribution of the study would provide a foundation for subsequent academic work and the establishment of more effective disaster management frameworks.

Practically, the study offers disaster management practitioners, local communities, and leaders in Nairobi practical insights for efficient disaster risk reduction and interventions. Through identification of potential areas of collaboration, knowledge sharing, and resource mobilization, the study can help these stakeholders formulate and implement more effective disaster risk reduction interventions and measures. Practitioners would benefit from the study in terms of knowing how intellectual capital can be utilized more efficiently to enable more effective disaster management. Besides, the study would inform the development of training programs for local professionals and community members that can enhance disaster management capacity. The ultimate beneficiaries would be Nairobi communities, which would be better prepared, better coordinated, and better equipped to respond to managing disaster risks.

1.6 Scope of the Study

This study aimed to determine the effect of intellectual capital on disaster risk reduction in Nairobi County, Kenya. The study focused on human, structural and relational capital being components of intellectual capital. It also incorporated an intervening variable; government intervention measures, to evaluate its role in disaster risk reduction within Nairobi County, Kenya. The research was conducted at Nairobi City County Government which formed the unit of analysis, while the county officials and selected employees formed the unit of observation. The research was carried out from April 2025 through September 2025.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter makes discussions on various theoretical foundations that the study was anchored on with regards to intellectual capital and disaster risk reduction. An examination of earlier research pertinent to the investigation's research goals come after this. Every of the investigation's research gaps are additionally noted and evaluated by the investigator. Also presented is the conceptual framework of the study with its variables and indicating their relationships.

2.1 Theoretical Framework

Theoretical framework acts as guides for examining and interpreting the subject matter or research objectives of a study and informs the choice in research methods and data analysis techniques. The theories that guided this study are intellectual capital theory, stakeholder theory and social-ecological systems framework.

2.1.1 Intellectual capital theory

Intellectual Capital Theory was developed by Leif Edvinsson and Mats Lindgren in the early 1990s (Helgason, 2020). It is a management theory that focuses on the value and management of intangible assets within an organization. These intangible assets include knowledge, expertise, skills, innovation, brand reputation, customer relationships, and other intellectual assets that enhance a company's competitive edge and long-term success (Crupi et al., 2021). The theory assumes that intellectual capital is a valuable asset that contributes in great proportion to an organization's competitive advantage and sustained success. The theory also assumes that intangible assets can be identified, measured, and managed effectively, just like tangible assets.

The knowledge and intellectual resources are also the primary sources of value creation within an organization (Konno & Schillaci, 2021).

The theory is based on three key principles which comprise the components of intellectual capital including human, structural and relational capital. Helgason (2020), Leif Edvinsson observe that human capital involves recognizing the value of individuals' knowledge, skills, and abilities within an organization. Structural capital focuses on the intellectual property, processes, systems, and organizational structure that support knowledge creation and transfer. Whereas, Relational capital emphasizes on the value derived from relationships with clients, suppliers, partners, and other external stakeholders. However, some scholars such as Goebel (2019) & Bamel et al. (2022) have criticized this theory over the years arguing measuring and valuing intellectual capital is subjective and lacks universally accepted standards, making it challenging to quantify its impact. They also outline that it can be challenging to uphold a direct correlation between investments in intellectual capital and performance of organizations given the subjective nature of intellectual capital measurement and management which can raise concerns about reliability and validity (Bratianu, 2018).

Further, existing studies carried out by different researchers have been bridging the research gap created by these critics, through showing its applicability in developing frameworks and models for assessing and measuring intellectual capital to understand its impact on organizational performance. The study by Pedro, Leitão and Alves (2018) revealed that it utilized the intellectual capital framework with the three key principles to explore how organizations can disclose information about their intellectual capital to stakeholders, and provide insights for them to make investment decisions based on the organization's intellectual assets. A study by Nejjari and Aamoum (2020) also used this theory to guide knowledge management initiatives, focusing

on the creation, transfer, and utilization of knowledge within organizations. It was also used to inform strategic decision-making, particularly in areas such as innovation, talent management, and building competitive advantage through intellectual resources.

De Villiers and Sharma (2020) study also showed that this theory influenced the development of methodologies for valuing intellectual capital and reporting it in financial statements. This highlights that over time researchers are continuing to identify measures of intellectual capital and quantify it in a way that it can be assessed and interpreted by organizations.

In this study, this theory lays a solid foundation in discussing and assessing the effect of human, structural and relational capitals in disaster risk reduction in Nairobi County. The study investigated the organizational structures, processes, information systems and technologies in place for disaster risk reduction. It also assessed how well these assets facilitate communication, coordination, and decision-making during emergencies. It also explored how the expertise of professionals, volunteers, and community members contributes to effective disaster response, preparedness, and recovery. In addition, it also examined the relationships and collaborations between Nairobi County and various stakeholders involved in disaster risk reduction.

Intellectual capital theory advanced the importance of human, structural, and relational capital in upholding efficient disaster risk reduction. Here, the theory in human capital embraces the value of knowledge, competencies, and know-how prior to, in reaction to, and coping with disasters, supporting objective (i) as a way to display how Nairobi County's risks associated with disasters are reduced with human competences. Further, structural capital addresses the physical and organizational infrastructure, such as early warning systems and emergency response systems and reinforces objective (ii) by illustrating that these systems are critical for mitigating disasters. For relational capital, the connections and alliances between various stakeholders is the backbone

of collective disaster management and reinforces objective (iii) by illustrating that coordination between communities, local governments, and organizations maximizes DRR.

2.1.2 Stakeholder theory

This hypothesis was proposed in 1984 by R. Edward Freeman, an American philosopher and professor (Freeman et al., 2018). It is a framework that examines the association around an organization and other participants. It emphasizes that organizations ought to make consideration of interests and needs of different participants, not just stock-holders or owners, in making decisions and taking actions (Harrison et al., 2019). The theory suggests that firms should be accountable to a broader range of persons or clusters influenced by, or being impacted on by the organization's activities. The theory also emphasizes the interdependency around companies and other interested parties, asserting that the success of an entity is closely associated with the satisfaction and support of these stakeholders (Freeman, Phillips & Sisodia, 2020).

The theory assumes that organizations are embedded within a larger social system and interact with various stakeholders. Stakeholders are also considered to have legitimate interests and claims on the organization's resources and actions. An organization's success and sustainability are also shaped by its relationships with stakeholders. Therefore, managers should act as stewards, balancing the interests of various stakeholders. (Waheed & Zhang, 2022). However, scholars like Sternberg (2019); McGahan (2021) criticized this theory by outlining that it can be challenging to reconcile the divergent interests and demands of various stakeholders. The theory does not also provide clear guidelines on how to prioritize conflicting stakeholder interests when making decisions. In addition, Barney and Harrison (2020) also claimed that determining the extent of stakeholder influence and measuring the impact of stakeholder actions can be complex to most organizations.

However, the application of this theory in existing studies has continued to demystify these critics and shows its relevance in various disciplines, including business management, organizational studies, corporate governance, and corporate social responsibility (Dmytriyev, Freeman & Hörisch, 2021). For instance, the study by Jones, Harrison and Felps (2018) revealed that stakeholder theory outlines a structure for analyzing and managing stakeholders' influence on organizational strategies and competitive advantage. It also highlights the ethical responsibilities of organizations toward their stakeholders and emphasizes the need for organizations to factor in social and environmental impacts when making decisions.

Another study by Torelli, Balluchi and Furlotti (2020) also indicated that the theory guides the development of effective stakeholder engagement strategies to foster mutually beneficial relationships. Hence, by considering the interests of multiple players, firms are able to promote long-term sustainability and effective governance.

Therefore, by applying this theory, the study can give an in-depth insight into the stakeholders involved in disaster risk reduction in Nairobi County. This would involve incorporating the perspectives and needs of different stakeholders into the designing and implementation of disaster risk reduction approaches and practices. The study can also explore how intellectual capital can be leveraged to bridge gaps between stakeholders and facilitate collaboration, knowledge sharing, and innovation in disaster risk reduction initiatives.

Stakeholder theory assumes that effective disaster risk reduction is a process of involving a wide range of stakeholders, including governments, communities, NGOs, and the private sector. The theory supports objective (iv) by indicating the necessity of government intervention to coordinate the interests of different stakeholders in building integrative DRR strategies. At the county level in Nairobi, the theory highlights that DRR's success relies on the government

participating actively with communities and organizations in dealing with their issues and enforcing policies that cushion all the players' interests in order to provide a collective response and mitigation effort to disasters.

2.1.3 Social-ecological systems framework

The social-ecological systems (SES) framework was advanced by Elinor Ostrom, Nobel laureate, along with her colleagues which gained significant recognition in 2009. It integrates societal and ecological elements to understand and analyze complex systems (Partelow, 2018). The framework emphasizes the dynamic exchange between humans and their environment, highlighting the importance of institutions, governance systems, and collective action in achieving sustainable resource management. It recognizes that human well-being and sustainable development are linked to the health and resilience of ecosystems (Nagel & Partelow, 2022).

This framework outlines those social systems which includes; human populations, institutions, organizations, governance structures, and socio-economic processes, while ecological systems refer to the natural environment including; ecosystems, landscapes, biodiversity, and ecological processes (Colding & Barthel, 2019). Under social systems, it focuses on understanding the societal factors that influence vulnerability, adaptive capacity, and disaster response. It also recognizes the role of ecosystems in rendering vital services, such as flood regulation, water purification, and coastal protection, which can contribute to reducing disaster risks (Epstein et al., 2020).

Moreover, the framework emphasizes the reiterative systems and linkages between social and ecological systems (Schluter et al., 2019). It takes into account that human activities such as changes in the uses of land, resource exploitation, and urbanization, can impact ecological systems, which, in turn, can affect human vulnerability to disasters. It also underscores the significance of

developing resilience and versatility within social and ecological systems. It emphasizes the need for integrated and adaptive approaches to disaster risk reduction that improve capability of societies and ecosystems to withstand and recover from catastrophes (Shi & Ling, 2022).

Further, a study by Aggarwal and Anderies (2023) scrutinized the role of governance structures, policies, and institutions in shaping disaster risk reduction efforts. This involved assessing the effectiveness of coordination mechanisms, multi-level governance, and community participation in building resilience and reducing vulnerabilities. Another study by Sajjad et al. (2019) looked into the contribution of ecosystems in reducing disaster risks and enhancing community resilience. This involved mapping and valuing ecosystem services, and integrating them into risk assessment and management strategies.

In this study, this framework was used to provide an understanding on the value of social systems, which refers to individuals, organizations, institutions, and governance structures in disaster risk reduction efforts in Nairobi County (Colding & Barthel, 2019). In addition, by factoring ecological systems, the study mainly sought to uncover how intellectual capital, such as understanding ecosystem services, ecological processes, and environmental risks, contribute to disaster risk reduction strategies. The framework also highlights the importance of establishing resilience and adaptive capacity within the social and environmental set-up. Thus, this enabled the study to examine how intellectual capital contributes to enhancing resilience and adaptive capacity at both social and ecological levels.

Social-ecological systems Framework highlights the dynamic relationship between human-ecological systems, which focuses on the interconnection between social and environmental factors in disaster risk reduction. It satisfies objective (i) through illustrating how adaptive knowledge and sustainable behavior as forms of human capital can mitigate both environmental

and social catastrophe risks. Regarding objective (ii), it prioritizes structural capital not only to serve human needs but also to guard ecological systems. The framework also addresses objective (iii) by making the role of relational capital paramount, wherein stakeholder collaboration produces resilience through the integration of both social and ecological considerations. Finally, for objective (iv), the framework indicates how government intervention needs to account for the long-term sustainability of human and ecological systems, guiding policies that reduce disaster risks while promoting environmental health.

2.2 Empirical Literature Review

Disaster risk reduction (DRR) is a strategic initiative aimed at mitigating the adverse impacts of natural and man-made hazards. DRR is concerned with different strategies like natural hazards mitigation, land-use planning, and infrastructure resilience, which are all central to minimizing vulnerability as well as disaster resilience. Successful DRR plays a significant role in protection of communities where climate change, environmental degradation, and rapid urbanization enhance the risk of disasters. These are both short- and long-term efforts, with the emphasis laid on preventing or minimizing disaster effects and being sufficiently prepared against potential future threats.

Intellectual capital (IC) is crucial to DRR because it is the foundation for tackling these problems in an effective manner. Human capital, in particular, contributes to DRR via tacit knowledge, expert abilities, and creativity. Tacit knowledge, which is generally acquired through experience and learning through doing, allows people to make quick, context-specific decisions during a disaster (Hoffmann & Blecha, 2020). Disaster management technical skills, engineering, and public health skills allow professionals to implement effective mitigation activities and conduct disaster response operations. Problem-solving creativity and disaster preparedness can

also create creative solutions to enhance community resilience. Human capital leads in the enhancement of disaster response by the technical capabilities and creativity of the local population in resolving issues linked to disasters (Adeagbo, Ojo & Adetoro, 2021).

Structural capital also plays an essential role in the strengthening of DRR initiatives. This comprises organizational structures, systems of information, and technology advancements that promote successful management of disasters (Nhemachena et al., 2020). Organizational structures, such as government ministries, NGOs, and disaster response organizations, provide coordination and leadership for a structured response. Information systems allow for real-time data collection, risk assessment, and communication, enabling stakeholders to make timely and informed decisions (Parven et al., 2022). Advances in technology, such as early warning systems, geographic information systems (GIS), and disaster modeling software, enhance disaster preparedness through predictive analysis and improved communication during emergencies. A country would greatly be improved by structural capital investments such as flood prediction models or adaptive infrastructure planning, to support its DRR capacity (Nordbeck, Steurer & Löschner, 2019).

Relational capital, which includes partnerships, public education, and people's activities, is critical in having a coordinated response mechanism for DRR (Clark-Ginsberg, 2020). Partnerships between government departments, NGOs, research and learning institutions, and people's organizations encourage sharing of resources, coordinated interventions, and mutual cooperation during the occurrence of a disaster. Mass mobilization campaigns play an important role in informing people on disaster hazard and preparedness so that they are empowered with proactive actions (Busayo et al., 2020). Community participations help ensure integration of local wisdom and resources to the planning for disaster and its response, thus enabling more impactful solutions specific to the community (Twerefou, Owusu & Dovie, 2023). In urban setting, it is

important to establish strong relationships between the local community, government institutions, and external agencies to enhance disaster resilience and make DRR interventions successful.

Government intervention policies, including regulatory policies, emergency relief, and infrastructure development, are critical in enhancing disaster risk reduction (DRR) programs (Maes et al., 2019). Regulatory policies establish the law governing disaster risk management, e.g., land-use plans and building codes, to enhance resilience. Emergency relief enables rapid response during and following disasters, with governments leading the effort and unifying resources to minimize damage (Quandt, 2021). The development of infrastructure also produces strong physical facilities, e.g., early warning systems and flood protections, to reduce risk and increase readiness. In urban settings, such measures by the government are essential for maintaining DRR strategies as well as for instigating resilience at the grassroots level (Peters et al., 2019).

2.2.1 Human capital and disaster risk reduction

Aerts et al., (2018) study sought to assess the effect of merging human behaviour dynamics into assessment of a flooding disaster risk in United Kingdom. The key focus was on human behaviour dynamics and how it affects risk control strategies and recovery time. The study adopted literature-based research which involved reviewing previous studies on risk-management strategies and underlying human behavioral factors during flooding. The analysis was undertaken through content analysis. The study found that relational capital led to disaster risk reduction. The study focused on flooding disaster risk other than risk reduction creating a conceptual gap. Further, the investigation was done in the United Kingdom creating a difference in context as the current is based in Kenya.

Research by Hoffmann and Blecha (2020) explored how education and experience influence disaster readiness in the Philippines and Thailand. The study utilized a literature-based

review research methods highlighting the role of well-rounded schooling and hiccups in attaining universal access to the highest quality of education. Face-to-face surveys were also conducted on 1310 participants in Thailand and 889 participants in Philippines aged 15 years and above. The findings of the study demonstrated that in both nations, education, as it occurs in various settings and with varying degrees of formalization, impacted disaster reduction both directly and indirectly. Directly, through the process of learning and gaining knowledge, individuals acquire the necessary skills, abilities, and perspectives to proficiently prepare for and handle the aftermath brought on by disasters. Indirectly, been educated provides individuals and families with access to valuable material, informational, and social resources, thereby contributing to the mitigation of their vulnerability to disasters. The study also concluded that enhanced educational levels had a positive association with diverse disaster vulnerability aspects, including preparedness levels, responses to early warnings, evacuation and resettlement choices, and adaptability to shifting weather conditions. The investigation focused on education other than intellectual capital creating a conceptual gap. The focus on Philippines and Thailand creates a contextual gap.

Koyama (2022) study sought to look into how human capital and disaster risk reduction correlate in Japan. Human capital was examined in terms of education, knowledge, skills, and expertise. The study targeted 130 residents in multiple regions across Japan who have experienced various types of disasters. It also employed a quantitative research design using survey data and secondary data sources related to previous disaster occurrences, educational attainment, and risk reduction efforts in different regions of Japan. The results revealed that higher levels of education contributed to the success in increased disaster risk reduction practices among Japanese residents. Residents with higher attainment of education are inclined to be more knowledgeable about disaster risks, preparedness measures, and response strategies. These findings however suggested

that excessive investment in human capital through education can negatively influence disaster resilience in Japan. The focus was on just one aspect of intellectual capital creating a difference in concepts as the present study focuses on human, structural and relational capital. Further, the involvement of Japanese residents created contextual gaps adding to the research gaps.

Adeagbo, Ojo and Adetoro (2021) carried out a systematic case study in Nigeria aimed to find relational factors for adjusting behaviour and intention in household-level coastal adaptation. The study employed qualitative research methods and used inductive methods and models curtailing from behavioural economics. The study used individual elements such as socioeconomic and cognitive variables, learnt and perceived tasks to explain the adaptation behaviours and intentions of vulnerable communities affected by sea-levels rising and coastal erosion. The research finding highlighted that all the discussed individual factors have a positive relationship with household-level adaptation such as relocation, insurance schemes and behavioural change strategies. The study displayed contextual gap in its focus on Nigerian disasters other than Kenyan ones. Further, the focus on relational factors created a conceptual gap.

Bang, Miles and Gordon (2019) study aimed to explore how human capital factors, such as education, training, and local expertise, influence disaster risk reduction efforts in Cameroon. The study targeted 1310 households and communities in different regions of Cameroon that are prone to various natural hazards. It also used mixed-methods research approach, combining qualitative interviews with key players in the disaster risk reduction cycle and quantitative data analysis of household surveys. The study discovered that communities with a higher attainment of education and training are given to be more proactive in disaster risk reduction. Local expertise and knowledge also played a significant role in formulating effective risk reduction strategies. Furthermore, households with better-educated members demonstrate higher levels of disaster

preparedness and resilience. The investigation was done in Cameroon creating a contextual gap. Further, the study was limited by the focus on human capital factors assuming other aspects of intellectual capital. This brings in a conceptual gap.

Githae, Ogada and Mwagandi (2020) study examined how human capital development influence the implementation of drought management plans in Taita Taveta County, Kenya. The research targeted 234 residents from Taita Taveta county. It employed a longitudinal research design, with data collected through interviews and focus group discussions. The study's findings indicated that communities with access to education and skill development programs are more likely to apply effective disaster risk reduction initiatives. Human capital development programmes positively impact disaster readiness, response, and recovery efforts in Kenya. Additionally, communities with higher levels of education exhibit greater adaptive capacity to cope with the changing disaster landscape. Consequently, the research suggested that the National Drought Management Authority (NDMA) should prioritize ongoing employee training and explore additional professional approaches beyond formal instruction to effectively implement drought management strategies in the region. The focus on drought management plans other than disaster risk reduction created a conceptual research gap. The focus on Taita Taveta County creates a different context from Nairobi city county.

The study by Muricho et al., (2019) assessed the determinants of household resilience of pastoralists in West Pokot County, Kenya. The study utilized focused group discussions and key informant interviews to comprehend community viewpoints on the past context of weather variation related shocks. Additionally, individual household surveys were conducted with 191 randomly selected households to gather information on the challenges faced by herders, their adaptive strategies, long-term survival measures, and external support employed by the

government. The probit regression results highlighted adaptive practices like utilization of agricultural crops for grazing after harvest, paddocking, keeping improved breeds, beekeeping, ethno-veterinary practices, and tree planting impacted household resilience to unexpected natural disasters in a positive way. The focus on West Pokot County other than Nairobi city county creates a contextual gap. In addition, the investigation looked into determinants of household resilience other than relating intellectual capital to DRR. This created a conceptual gap.

2.2.2 Structural capital and disaster risk reduction

Parven et al. (2022) study assessed how structural capital, including infrastructure and engineering interventions, influences disaster risk reduction in Bangladesh, a country prone to cyclones, floods, and other natural hazards. The research focused on communities residing in coastal and flood-prone regions of Bangladesh, as well as relevant state agencies and non-state organizations participating in disaster risk reduction and development of infrastructure. It also employed a case study design, and combined field observations, technical assessments, and community surveys to collect data. The results showed that well-designed and maintained infrastructure, such as cyclone shelters, raised embankments, and efficient drainage systems, significantly contribute to disaster risk reduction in Bangladesh. Communities with access to such structural capital experience fewer casualties and less property damage during disasters. However, challenges related to maintenance and equitable distribution of resources need to be addressed for sustainable disaster risk reduction. The focus on structural capital limited the conceptualization of intellectual capital. Further, Bangladesh has a different context compared to Kenya hence contextual gaps existed.

Nordbeck, Steurer and Löschner (2019) study examined the potential changes in flood risk and the advantages of non-structural coping strategies over structural adaptation strategies in Tyrol, Austria. The study employed a case study research approach evaluating flood risk projections for

the present and near future, including changes anticipated by 2030. The case study results indicated that strong urbanization accompanied with economic development leads to a significant rise in flood risk. It also demonstrated that adoption of non-structural methods such as more stringent land use regulations legislations or increased private precautionary measures could reduce flood risk by approximately 30%. The non-structural adaptation strategies were also found to be more effective in reducing flood risk regardless of changes in land use or weather conditions. Hence, the study recommended that countries should consider application of frequent land use scenarios and economic progression when evaluating for future flood risks. The study looked into structural adaptation strategies assuming other aspects of intellectual capital. This creates conceptual gaps. In addition, contextual gaps existed in that the study was based in Tyrol, Austria other than Nairobi, Kenya which may lead to difference in outcomes.

Nhemachena et al., (2020) study explored the connection between water related investments and economic growth in South Africa. The study used a dynamical system model that combined water related investments in infrastructures, human capital, and organizations required for water resources management, risk and the growth of the economy. In areas with limited water safety, the initial allocation of resources to water-related properties facilitates development. Absence of such allocation leads to setbacks caused by water-related dangers such as flooding, drought and other water-borne ailments, thus impeding economic progress and potentially establishing a cycle of impoverishment. The findings also demonstrated that exogenous adjustments in water-related risk can possibly steer development away from a growth trajectory and spiral towards poverty. The dynamical system model, nevertheless, demonstrates an inverted-U-shaped investment connection between the extent of investment in water security and the current status of water security that increases growth. The study looked at economic growth other than

DRR creating a difference in the concepts. The basing of the investigation in South Africa other than Kenya created a contextual gap.

Macnight Ngwese et al. (2018) explored the effectiveness of traditional and local knowledge practices on rural communities in Northern Ghana. The study utilized household surveys, key informant interviews, and focus group discussions and participants' observations to gather data. The results showed that although a variety of strategies were used to forecast and manage local disaster events, majority of the local's lacked confidence in the effectiveness of such practices. Local communities also had to rely on these knowledge systems and practices over and over again because there were no science-based instruments or processes for catastrophe management or prediction. To lessen the susceptibility of local communities to catastrophes, it should be encouraged to integrate indigenous and time-honored disaster risk reduction (DRR) activities into contemporary scientific knowledge with detailed efficacy evaluation methodologies. The investigation looked at knowledge practices on rural communities other than DRR which created a conceptual gap. The study was done in Northern Ghana other than Nairobi, Kenya creating a contextual gap.

Nyandiko (2020) study investigated on the magnitude devolution is intensifying DRR and its adaptation to climate change adaptation (CCA) in five arid counties in Kenya between 2014 and 2018. The study took a diagnostic research design based on panel regression analytics. The regression results showed that counties DRR policy structures are in different phases of development, where DRR is becoming more embraced and is incorporated into county integrated development plans (CIDPs). However, implementation of DRR still encounters a number of hurdles including; limited funding, ineffective coordination systems, a lack of manpower and sufficiently qualified staff, inadequate involvement of vulnerable groups and lack of a committed

policy making team. These led to insignificant relationship between structural capital and DRR. The study suggests scaling up efforts to incorporate disaster risk reduction (DRR) and adaption into all county planning initiatives and to equip the bodies to enable risk-oriented plans that are proactive in addressing the consequences of floods on infrastructure. Flooding incidents destroy road networks, electricity, constructions, and communal amenities. The study suggests that developing infrastructure resilience to manage and withstand the effects of floods necessitates common vision across many vested parties. The study related magnitude devolution other than structural capital to DRR creating a conceptual gap. Further, the involvement of five arid counties in Kenya other than Nairobi created a contextual gap.

Njogu (2021) study sought to determine the outcome of floods on infrastructure users in Kenya, based on a descriptive research design with quantitative research methods. It involved 27 counties in Kenya that are commonly affected by floods and a sample of 134 respondents attended to the administered questionnaires. It was revealed that the disaster management centers among selected counties were reactive, then proactive in handling the outcome of floods on infrastructure. The flooding incidents in Kenya interrupt infrastructural services by destroying road networks, electricity facilities, buildings, and communal facilities. The study indicates that Kenya lacks climate-sensitive programmes, legislations, and development plans that integrate resilience to safeguard infrastructure against known and anticipated climate hazards. It also suggests that enhancing infrastructure resilience to cope with and recover from floods requires a collaborative vision among various stakeholders which lacked creating negative effects. The investigation looked into flood risk outcomes on infrastructure users which created a conceptual gap. Further, involvement of other counties other than Nairobi County created contextual gap.

Munene (2019) study evaluated the effectiveness of structural capital investments in disaster risk reduction within Nairobi County, Kenya. The research targeted 267 residents, local government officials, and experts involved in urban planning. It also adopted a case study design, focusing on multiple urban centers in Nairobi County that have implemented different structural capital interventions to address disaster risks. Data was collected using questionnaires and interview guides. The study reveals that strategic investments in structural capital, such as fire-resistant infrastructure, and improved drainage systems, have positively influenced disaster risk reduction in urban areas of Kenya. These interventions have led to reduced casualties, property damage, and improved response capabilities during disasters. However, challenges related to funding, coordination among government agencies, and community awareness persist, highlighting the necessity for a detailed and inclusive approach to disaster risk reduction in urban settings. The study focused on effectiveness of structural capital investments assuming other intellectual capital aspects creating a conceptual gap.

2.2.3 Relational capital and disaster risk reduction

Busayo et al. (2020) study assessed the Sendai framework and the various features for timely stakeholder engagement in disaster risk management reduction studies since 2015. The study adopted a literature-based research method where it reviewed previous studies on stakeholder engagement and disaster risk management. The findings of the study revealed that stakeholder attributes like authority, urgency, and power are crucial in distinguishing stakeholders' proactive and reactive actions throughout the various catastrophe risk management phases. The study also revealed that proactive approaches by stakeholders have a favourable effect on disaster risk reduction. Thus, the study concluded that active involvement of stakeholders in initial stages of disaster risk management is also fundamental for an adaptable society and built environment in

facing disasters. The study also recommended that public policymakers and local government stakeholders should focus on implementing international frameworks, disseminating early warning information, and creating a localized adaptation framework. The study looked at Sendai framework and the various features for timely stakeholder engagement other than relational capital in disaster risk management reduction. This brings in a conceptual gap.

Clark-Ginsberg (2020) study sought to identify the kinds of organizations that actually participate in DRR in three countries, that is Bangladesh, Sierra Leone and Kenya. The study used the social network analysis to carry out a comparative analysis of the DRR networks in three countries. The results disclosed that the number of organizations involved in DRR at the local, national and global levels comprise of governmental, non-state and private sector organizations but they differ across the three countries. The study also found that community engagement and private sector involvement is still limited which compromises the effectiveness of implementation of some of the DRR activities. This study was an investigation of DRR but didn't relate the relational capital to DRR creating a conceptual gap. Further, the inclusion of Bangladesh and Sierra Leone in the investigation created a contextual gap.

Twerefou, Owusu and Dovie (2023) study examined the influence of social and demographic factors on household readiness for floods in Accra, Ghana. The study used quantitative research methods where the researcher carried out 203 household survey of flood experiences and analyzed the data collected using Tobit model. The results indicated that the age and income of the household head, as well as planned adaptation strategies, significantly enhanced the likelihood of households' readiness for floods. The study also revealed that participation in social support networks and the presence of social welfare and frameworks at the community level increased the possibility of household preparedness, while societal access to financial aid

decreased the possibility of household preparedness to flood risks. Therefore, the research supported the idea that improved education and understanding regarding flood hazards are key elements in reducing flood disasters risks within local communities, especially in urban planning near coastlines. The investigation was undertaken in Accra, Ghana other than Nairobi, Kenya showing a difference in the context which may lead to differing outcomes. In addition, conceptual gaps existed in that social capital was related to household readiness for floods other than DRR.

Nyamakura (2021) study assessed the influence of relational capital in fostering cross-sector collaboration among state agencies, non-state organizations, and local communities in disaster risk reduction initiatives in Harare, Zimbabwe. The target population comprised of 23 stakeholders, focusing on government officials, representatives from non-profit organizations, and community leaders from Harare. Data was collected using structured questionnaires and interview schedules. The study findings outlined that trust, communication, and mutual respect, is crucial in promoting collaboration among different sectors involved in disaster risk reduction. Effective collaboration enables better resource allocation, knowledge sharing, and coordinated efforts, leading to more efficient disaster response and recovery. However, the study also highlighted the importance of addressing power imbalances, promoting inclusivity, and fostering long-term partnerships to enhance the influence of relational capital on disaster risk reduction in Harare. The study was done in Harare, Zimbabwe indicating a contextual gap. The study related relational capital to collaboration in disaster risk reduction initiatives other than DRR indicating a conceptual gap.

Using a descriptive research design, Namagembe (2020) investigated how relational capital affects inter-cluster coordination and the delivery of services in charitable organizations in Kenya, where inter-cluster coordination serves as a mediating variable. Purposive sampling was

used to choose a sample of 60 responders. With the use of the analysis program SPSS, data obtained via the survey was examined. According to the findings, inter-cluster coordination and delivery of service in charitable organizations are positively correlated with relational capital. Inter-cluster coordination was shown to partially mediate the relationship between relational capital and service delivery in humanitarian organizations in Kenya. The study was done on inter-cluster coordination and the delivery of services other than DRR indicating difference in concepts. On the other hand, it was done on charitable organizations in Kenya indicating a contextual gap.

Ryan et al. (2020) study probed the effect of social networks, community cohesion and local governance on disaster risk reduction and the adaptability of communities to natural hazards in rural regions of Kenya. The study employed a systematic literature review-based research approach. The review results revealed that communities with strong social networks and cohesive relationships are more effective in disaster risk reduction and recovery efforts. Relational capital facilitates the exchange of information, resources and support during disasters, this leads to better disaster preparedness and response. Moreover, local governance structures and community-based organizations have a crucial role to play in coordinating disaster risk reduction initiatives thus enhancing community resilience in rural Kenya. The study looked at social networks, community cohesion and local governance other than relational capital in specific creating conceptual gap. In addition, it was done rural regions other than urban region like Nairobi in Kenya showing a contextual gap.

2.2.4 Government intervention measures and disaster risk reduction

Peters et al. (2019) study examined the participation of the government in health emergency and disaster risk management in US. The study used an exploratory research design and utilized quantitative research approaches. The results have indicated that governments have hesitated to

allocate sufficient resources to develop systems that mitigate the risks and aftermaths of emergencies and disasters. This is due to lack of reliable information regarding the expenses and relative advantages associated with health emergency and disaster risk management (EDRM). The findings also showed that implementing adaptive institution arrangements in health EDRM systems play a significant role in strengthening national health security. The study involved health emergency and disaster risk management in US indicating a contextual gap. In addition, they looked at participation of the government in disasters but failed to relate it to DRR.

Maes et al. (2019) study aimed to assess the extent to which policy initiatives for reducing the risk of landslide disaster had been executed in Uganda. The study, which dwelt on landslides in the Rwenzori Mountains region, employed a descriptive research design. Household surveys and key informant interviews were used to collect primary data, while secondary data were gathered through document reviews. Descriptive statistics and Spearman's correlation tests were employed to analyze the data from the household surveys, while content analysis was used to evaluate data from the key informant interviews. The study revealed that afforestation, suitable farming methods, and land-management practices are the landslide risk mitigation strategies currently and most frequently utilized. Conversely, gazettement of areas susceptible to landslides and forbidding settlement in such dangerous regions, resettling of those occupying landslide-prone territories, and execution of applicable regulations and laws have been least frequently employed. The results also demonstrated that community awareness is the primary element influencing the adoption of household-level policy actions for reducing the danger of landslides. The focus on landslide disaster in Uganda created a contextual gap.

Ambrosino et al. (2021) sought to determine effects of integrated disaster management practices on reducing risks and building resilience in coastal regions in Kenya. The study used a

Capital Approach Framework (CAF) consisting of human, social, financial, political and environmental capital to gauge the status of local government ability to respond to climatic change within the framework of coastal governance. Structured questionnaires were administered to 195 respondents who were selected using stratified random sampling technique in Mombasa, Kwale and Kilifi counties. The study outcome outlined that proactive or planned responses that specifically addressed the effects of climate change were given less attention. This is particularly in the case for effects with a gradual onset, like sea level rise. The results also showed that counties must move away from the prevailing fragmented and progressive activities which have been demonstrated as unsustainable during successive drought periods and toward more all-inclusive and profound adaptation efforts in high-risk sectors such as agriculture and water. Moreover, counties must give economic diversification a priority; with a focus on underutilized and less climate-sensitive sectors. This shows that government intervention led to negative effects on disaster risks. The study focused on integrated disaster management practices on reducing risks other than government intervention measures creating a conceptual gap. Further it was done in Mombasa, Kwale and Kilifi counties creating a contextual gap as the present research was done in Nairobi.

Quandt (2021) study assessed the impact of government intervention measures on drought strategies in Kenya. The research targeted 83 small-scale farmers in semi-arid areas in Kenya who were engaged in focus-group discussions and key informant interviews. The results outlined that the reported effects of drought included reduced farm productivity, livestock starvation, deaths and relocations, a shortage in waterbodies, hunger and disease, and violent conflicts. The study also found that the key strategies advocated by the government to deal with drought related to modifying farming practices, increased irrigation use, reliance on aid, burning charcoal, engaging

in casual labor, and diversifying one's source of income. However, the respondents reported that only a small proportion of households have adopted these practices. This low turnout has been attributed to inadequate financial resources to purchase the required materials for the practices and insufficient support from the government and other relevant stakeholders. The study focused on drought strategies other than DRR creating a conceptual gap. The focus on semi-arid areas in Kenya created a contextual gap as the present study was done in Nairobi.

Said (2020) study sought to explore the effectiveness of government-community collaboration in cattle rustling mitigation efforts in Turkana County, Kenya. The study used a target population of 156 residents in Loima sub-county, Turkana County. It adopted a descriptive research design and data was collected by use of key informant interviews and focus group discussions. The findings indicated that the extended and persistent conflict in Loima resulted from the proliferation and accessibility of small arms. Additionally, the residents attributed governance issues as a key factor contributing to the ongoing conflict. They also highlighted complaints of aggressive and unsystematic disarmament, a shortage of security personnel to combat cattle rustlers, and general insecurity as further causes of the prolonged conflict, along with the area's inadequate infrastructure. The study recommended that the government should adopt a more proactive approach, including comprehensive and investigative policing methods to address cattle theft reports promptly. Furthermore, it recommends the adoption of a proactive strategy by empowering security forces to respond urgently and effectively to pastoralist conflicts. The study was done in Turkana County other than Nairobi city county creating a contextual gap. Focused on cattle rustling mitigation efforts other than DRR creating a conceptual gap.

2.3 Critiques of Reviewed Literature and Research Gaps

According to the reviewed studies, it is observable that the different studies have to a fair proportion discussed on the constructs of intellectual capital and disaster risk reduction. Majority of the studies have showed disaster risk reduction is not the responsibility of the government only, rather, it's a multi-stakeholder initiative that requires combined efforts from relevant stakeholders at the local, national and global levels. Some of the studies like Busayo et al. (2020) have also emphasized on the need to embrace proactive strategies instead of solely relying on reactive strategies that often prove to be ineffective. The use and implementation of intellectual capital is a proactive strategy that has not been extensively reviewed and discussed in the available literature review.

The reviewed studies under human capital emphasized more on how human behaviour dynamics, education and experience influence disaster risk preparedness and assessment. However, the key aspects of human capital which put a focus on skills of experts in disaster management skills, creativity and use of tacit knowledge have not been explored. Studies by Aerts et al. (2018), Koyama (2022), and Hoffmann and Blecha (2020) revealed conceptual gaps that the current study addressed by investigating how the use of tacit knowledge, creativity, and expert skills impacts disaster risk reduction in Kenya.

Moreover, the study by Macnight Ngwese et al, (2018) outlined the traditional and local knowledge practices enforced in disaster risk management. Assessing from the other studies on structural capital, the aspect of technological innovation has been scarcely covered. To fill this research gap, technological innovation wasone of the sub-constructs of structural capital which was examined in this study. In addition, Nhemachena et al., (2020) study consisted of contextual gap since it discussed on how water-related investments affect economic growth instead of disaster

risk reduction. Clark-Ginsberg (2020) and Managembe (2020) study also consisted of contextual and geographical gaps since the comparative study covered a larger geographical area encompassing both developed and developing countries which have different capacities of disaster risk management, while the latter study was on service delivery of humanitarian organizations.

Further, Nyandiko (2020) study is also found to have methodological gaps as it used time series data and panel regression model while the current study analyzed the collected data with no specific timeline and use multiple linear regression analysis. Other studies that had methodological gaps include; Twerefou, Owusu and Dovie (2023) and Peters (2019) where the research methods employed relied on collecting and analyzing qualitative data while present study aims to collect quantitative data.

2.4 Conceptual Framework

Conceptual framework is a theoretical structure or model that was used in conceptualizing and comprehending the relationships among the different variables within this study (Varpio et al., 2020). The dependent variable is disaster risk reduction in Nairobi County, the independent variable was human capital, structural capital and relational capital while the intervening variable was government intervention measures.

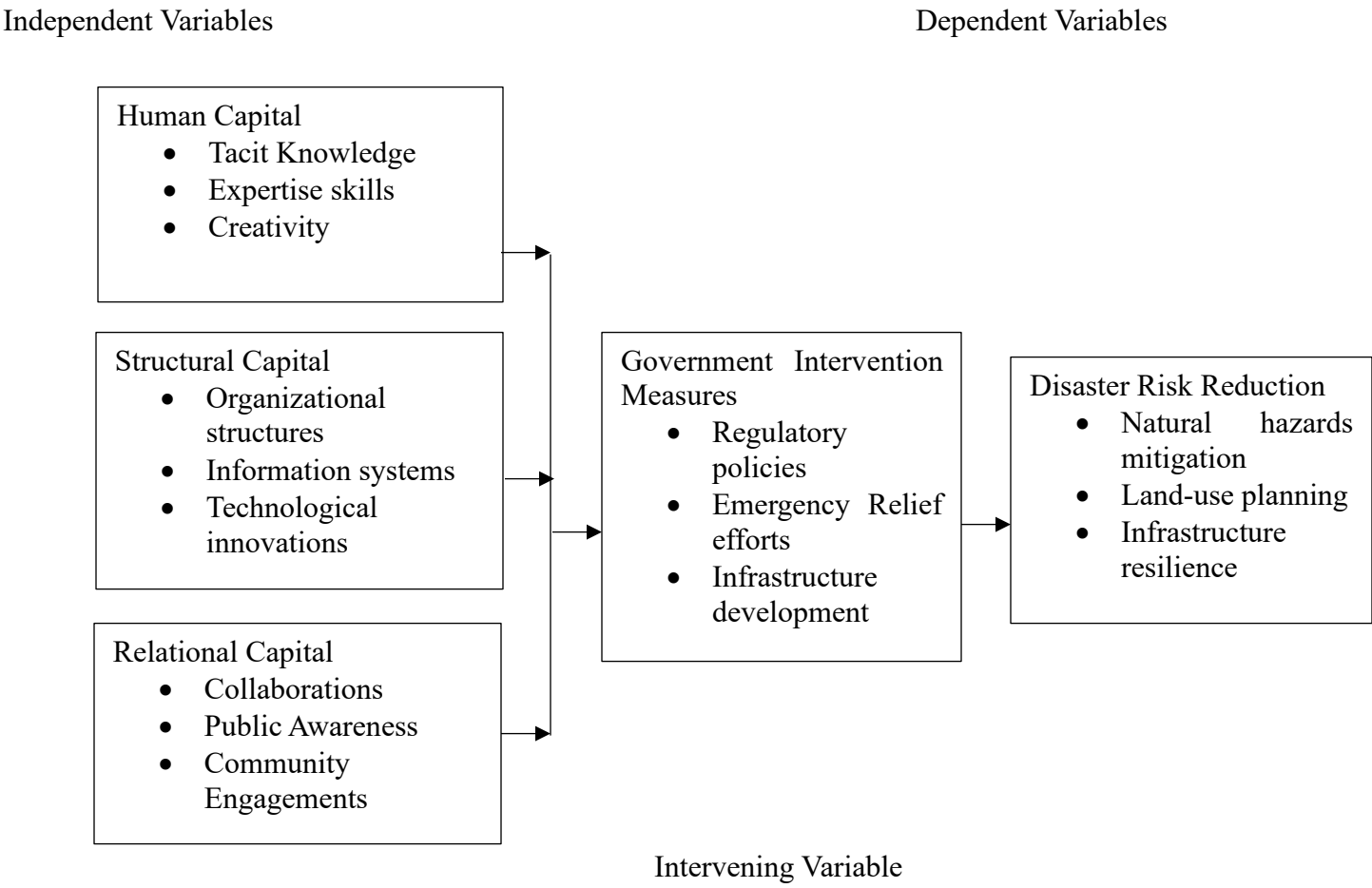

FIGURE 1

Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section describes the methodology which were employed in conducting the study, including the research design, population, sample size and sampling procedures, data collection methods, and data analysis and presentation.

3.1 Research Design

Research design refers to the overall plan or strategy that outlines how a researcher intends to conduct a scientific investigation or study (Sileyew, 2019). It encompasses a systematic and strategic framework that guides researchers in collecting, analyzing, and interpreting data to address their research questions or objectives. The main types of research designs are; descriptive, explanatory, experimental and quasi-experimental research designs (Dannels, 2018). This study adopted a descriptive research design. This type of research design focuses on describing and documenting the characteristics, behaviours, or phenomena of a particular population, group, or event. It aims to gather information about a specific topic, assess prevalence, or explore the characteristics of a group without manipulating variables (Asenahabi, 2019). Data can be gathered using an array of methods namely: surveys, interviews, observations, or existing records and then analyzed to summarize and present the findings (Sileyew, 2019).

According to Andrade (2019), this research design is commonly employed as it allows researchers to integrate both quantitative and qualitative research methods to gather accurate and precise data of a particular population or group. It is also considered a more cost-effective design that requires fewer resources and can be conducted relatively quickly as compared to experimental

or quasi-experimental designs. It also involves less potential for ethical concerns or biases since it expects the researcher to gather data, analyze and interpret it without manipulating the study variables (Bloomfield & Fisher, 2019). Therefore, this design enabled the researcher to gather comprehensive and accurate data on the characteristics of the targeted population which was then analyzed to provide relevant findings or answers to the research questions.

3.2 Target Population

The target population refers to the distinct group of individuals or items that the research intends to evaluate, describe, and draw conclusions about (Stratton, 2021). For this study, it comprised of officers from the Nairobi City County Government within the departments of disaster management, urban planning, environment & natural resources, public health, infrastructure & public works, ICT and the security & compliance departments. According to the NCCG HR records (2024), there are a total of 1178 officers in Nairobi County within the departments. This implies that the total target population comprised of 1178 officers in Nairobi County.

TABLE 1

Target Population

Department	**Number of Officer**	**Proportion**
Disaster Management	129	11.0%
Urban Planning	150	12.7%
Environment and Natural Resources	115	9.8%
Public Health	400	34.0%
Infrastructure and Public Works	200	17.0%
ICT	53	4.5%
Security and Compliance	131	11.1%
Total	**1178**	

Source: Nairobi City County (2025)

3.3 Sample Size and Sampling Technique

Sample size appertains to the number of individuals or items picked from a target population which represent the entire population in a study (Stratton, 2021). On the other hand, sampling techniques are methods or approaches that provide a systematic way of choosing representative samples that can accurately depict the attributes and diverseness of the target population (Berndt, 2020). To ascertain the size of the sample, the study first utilized the simplified form of the Yamane (1967) formula, which states that;

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n= Sample size

N= Population size

e= Margin of error

Therefore, the sample size for the respondents was:

$n= 1178/1+1178(0.05)^2$

n= 299 officers

Proportionate stratified random sampling techniques was assumed in sample section based on the departments. This technique warranted that each subgroup is represented based on proportions. It also reduces the required sample size while maintaining a high level of precision, making it a cost-effective method.

TABLE 2

Distribution of the Sample Size

Department	**Population**	**Proportion**	Sample
Disaster Management	129	11.0%	33
Urban Planning	150	12.7%	38
Environment and Natural Resources	115	9.8%	29
Public Health	400	34.0%	102
Infrastructure and Public Works	200	17.0%	51
ICT	53	4.5%	13
Security and Compliance	131	11.1%	33
Total	**1178**		299

Source: Researcher (2025)

3.4 Research Instrument

Research instruments are tools, techniques, or methods used in gathering data from research participants or sources (Oben, 2021). This study utilized structured questionnaires in collecting primary data from the selected officers. The use of questionnaires were cost-effective and time saving in this study as it was relatively convenient for the researcher when distributing questionnaires to the targeted respondents that are dispersed across the 17 sub-counties in Nairobi County. In addition, the nature of its anonymity gave more confidence to the respondents when concealing such sensitive information regarding their organization (Cheung, 2021). The structured questionnaires comprised of closed-ended questions with multiple-choices and Likert rating scale.

The questionnaire was broken off into six sections where section A consisted of the demographic information where the questions had multiple choices, then section B-F consisted of statements on human capital, structural capital, relational capital, government intervention measures and disaster risk reduction in Nairobi County. The responses of these statements were rated using the Likert scale is an interval scale that used five scale with 1 being strongly disagree and 5 being strongly agree. Chen and Liu (2020) indicate that this type of rating scale is an

effective method for evaluating perceptions, attitudes, values, and behaviors, as it converts qualitative responses into quantitative measurements.

3.5 Pilot Study

It is an initial assessment carried out before the main or actual research study. It is intended to assess and refine the research methods, procedures, and instruments that was used in the main study (Lowe, 2019). This study assessed the validity and reliability of the structured questionnaires. According to Sharma (2022), a pretest sample ranges from 1% to 10% depending on the sample size. In this study, 3% of the sample size was used for the pilot test. For this paper, 3 Disaster management officers, 3 ICT officers and 3 Public health officers from Kiambu county participated.

3.5.1 Validity of research instrument

Validity refers to how well an instrument measures what it is intended to measure (Andrade, 2018). It is an essential element of research quality and ensures that the collected data provide meaningful and accurate information for addressing research questions or objectives. There are four main types of validity including, construct, content, face and criterion (Gani et al., 2020). This study used construct and content validity. Construct validity assesses whether the instrument accurately captures the abstract concept or variable of interest. Whereas, content validity involves examining whether the items or questions in the instrument adequately cover all the relevant aspects of the constructs being measured (Clark & Watson, 2019). To ensure construct validity, there was division of the questionnaire into different sections to ensure that each part evaluates information related to a specific objective and aligns closely with the conceptual framework. The surveys were carefully reviewed by the project's supervisor to verify content validity. The statements in the questionnaire were evaluated for relevancy.

3.5.2 Reliability of research instrument

Reliability refers to the extent to which an instrument produces consistent results across different situations, time points, or observers (Gani et al., 2020). This study tested for reliability using questionnaires that were filled by the randomly selected 9 officers, who represent 3% of the sample size. The study then tested for internal consistency reliability using the Cronbach's alpha formula. This is intended to evaluate how effectively the items in the questionnaire measure the same underlying construct (Hajjar, 2018). The formula states that;

$$\alpha = \frac{Nc}{v + (N-1)\,c}$$

Where;

α= Cronbach Alpha coefficient

N= number of items

c = the average inter-item covariance among the items

v= the average variance.

Cronbach's alpha determines the average correlation between all possible combinations of items in the instrument, providing an estimate of internal consistency. A higher alpha value indicates greater internal consistency (Park, 2021). This study considered the Cronbach's Alpha Coefficient of 0.7 and above of the research tool to be reliable and sufficient for further analysis.

3.6 Data Collection Procedure

The researcher started by obtaining an introduction letter from KCA University and a research permit from the National Council for Science and Technology and Innovation (NACOSTI). Both documents were presented to the Nairobi City County and Kiambu County Human Resource Department, where the researcher explained the study's purpose in detail. Additionally, the researcher sought consent from the selected officers to ensure their participation is voluntary. With the assistance of two research assistants, the researcher distributed the questionnaires to the respondents and coordinate with them to determine a suitable timeline for collecting the completed questionnaires.

3.7 Data Analysis and Presentation

The data gathered from the returned questionnaires was cleaned, edited, categorized and coded in preparation for further analysis. The study used the Statistical Package for Social Sciences (SPSS) v27 to conduct extensive statistical analysis to generate descriptive and inferential statistics. SPSS is a widely used statistical software since it provided user-friendly interface features that allow users to perform comprehensive set of statistical techniques, including descriptive statistics, inferential statistics e.g., t-tests, ANOVA, regression analysis, factor analysis etc. (Pallant, 2020). The descriptive statistics comprised of frequencies, percentages, mean and standard deviation. Whereas, the inferential statistics consisted of correlation analysis, factor analysis and regression analysis.

Multiple linear regression model was adopted for establishment of cause-effect connections. This also helped to gauge the statistical effect of intellectual capital on disaster risk reduction in Nairobi County, Kenya. The regression model was of the following form;

$Y = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3 + \beta_4X_4 + e$

Where;

Y = Disaster risk reduction in Nairobi County

X_1 = Human Capital

X_2 = Structural Capital

X_3= Relational Capital

X_4= Government Intervention Measures

β_i; (i=1,2,3,4) are the coefficients for the independent variables (X_{1-4})

β_0 is the constant term

e=error term which captures the unexplained variations in the model.

3.8 Diagnostic Tests

This study conducted three diagnostic tests which are multicollinearity test, normality test and heteroscedasticity test. This is aimed to ascertain whether the assumptions of the multiple linear regression model have been violated.

3.8.1 Multicollinearity test

Multicollinearity is a statistical issue that arises when two or more predictor variables in a regression model are strongly correlated with one another (Oke et al., 2019). It poses a challenge to estimate the individual effects of the correlated variables on the dependent variable accurately. The coefficients become unstable and may change drastically when slight changes are made to the model (Alita, Putra & Darwis, 2021). The purpose of this test is to assess the extent to which the predictor variables are interrelated and to determine if multicollinearity is likely to affect the

accuracy and reliability of the regression analysis (Alabi et al., 2020). This study used the Variance Inflation Factor (VIF) analysis to test for multicollinearity problem. VIF is a measure that quantifies the extent of multicollinearity for each independent variable. It evaluates the extent to which multicollinearity inflates the variance of the estimated regression coefficient (Oke et al., 2019). A VIF value greater than 1 suggests the presence of multicollinearity, with higher values indicating more severe multicollinearity. Conversely, a VIF of 1 signifies no multicollinearity (Ullah et al., 2019).

3.8.2 Normality test

The normality test is carried out to assess if a dataset has a normal distribution and to calculate the precise extent to which the random variable alters the data set in order for it to be effectively and regularly distributed (Mishra et al., 2019). To test for normality, this study used the Shapiro-Wilk test. It entails calculating a test statistic that is based on the relationship between the values of the ordered data and the matching expected values from a normal distribution. The test yields a p-value, which represents the likelihood that the data would have been observed if it had been sampled from a normal distribution (Schmidt & Finan, 2018). The null hypothesis for this test posits that the data is normally distributed. If the p-value associated with the test statistic exceeds the selected significance level ($p = 0.05$), the null hypothesis is not rejected, suggesting that the data conforms to a normal distribution. Conversely, if the p-value is below the chosen significance level, the null hypothesis is rejected, indicating a significant deviation from normality (Khatun, 2021).

3.8.3 Heteroscedasticity test

Heteroscedasticity is a condition in which research variables have unequal variances across several groups, causing certain levels of the independent variable to have a higher degree of accuracy in

the prediction of the dependent variable than others (Astivia & Zumbo, 2019). Presence of heteroscedasticity in a regression analysis affects the reliability and efficiency of the parameter estimates (Wilcox et al., 2018). This study used the Breusch-Pagan test to detect heteroscedasticity. It involves regressing the squared residuals (e^2) from the original regression on the independent variables then calculating a test statistic that follows a chi-square distribution (Martin, 2023). If the p-value associated with the test statistic is below significance level ($p=0.05$) then it indicates the presence of heteroscedasticity, otherwise, it indicates absence of heteroscedasticity (Martin, 2023).

3.9 Ethical Considerations

This study intends to comply with all pertinent ethical requirements to ensure successful research. To mitigate the risk of non-response bias, the study engaged departmental heads to facilitate participation, use official endorsement letters to legitimize the research, and follow up with non-respondents through reminders. Additionally, the researcher emphasized anonymity, monitor response rates, and interpret findings in light of any participation gaps. The researcher presented an introduction letter from the university and a research permit from NACOSTI when seeking permission from both Nairobi and Kiambu County departments.

The researcher sought consent from the selected participants before administering the questionnaires so as to ensure that their participation in answering the questionnaire was voluntary and without coercion. Participants were also clearly informed of their right to withdraw from the study at any time without explanation or penalty, ensuring their participation remains fully voluntary. The informed consent (see appendix II) was obtained in written form prior to data collection, ensuring participants fully understand the study's purpose, procedures, and their rights.

Signed consent forms were securely stored as documentation of ethical compliance and participant agreement.

The researcher also assured them of the confidentiality and anonymity of the questionnaire, as they were not required to disclose their names and the information they provide was used for academic purpose only. To ensure long-term data security and confidentiality, the study implemented a comprehensive data management plan that includes encryption of digital files, password-protected cloud storage, and secure physical storage for hard copies. Access to raw data was limited to the researcher, with research assistants only handling anonymized data to prevent unauthorized access or internal breaches. All data was retained for five years, after which it was permanently deleted or securely destroyed.

Further, researcher incorporated a community engagement strategy by liaising with departmental representatives in Nairobi City County to ensure relevance and transparency throughout the research process. Upon completion, the researcher shared a summary of findings with participating departments and offer feedback sessions or reports tailored to local stakeholders. Additionally, dissemination included stakeholder forums or departmental briefings to promote uptake of findings and inform disaster risk reduction efforts. In addition, the researcher would ensure that he has included the references of the work of other researchers and cite them where appropriate so as to avoid plagiarism.

CHAPTER FOUR:

4.0 DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter examines the effect of intellectual capital on disaster risk reduction in Nairobi County, Kenya. Specifically, it assesses the effect of human capital, structural capital and relational capital on disaster risk reduction in Nairobi County, Kenya. Further, it evaluates the intervening effect of government intervention on disaster risk reduction in Nairobi County, Kenya. This was done through both descriptive and regression analysis. It was based on data from officers within NCC. A discussion of findings was also done in this chapter.

4.1.1 Response rate

TABLE 3

Response Rate

Questionnaire	**Cronbach's Alpha**	N of Items
Filled and returned	207	69.2
Not returned	92	30.8
Total	**299**	**100.0**

The researcher issued 299 questionnaires to officers at NCC. From the 99 questionnaires administered 207 of them were filled and returned for analysis. This gave a return rate of 69.2%. This was sufficient as it was above 50% which was good for quantitative research. Further, the responses were more than 30 which allowed the researcher to proceed with the research.

4.1.2 Pilot study results

Piloting was done on nine officers from Kiambu county. This was done to enable the researcher check on validity and reliability of the questionnaire.

4.1.2.1 Validity of research instrument

The questionnaire was carefully reviewed by the project's supervisor among other experts in the university to verify its validity. The statements in the questionnaire were evaluated for relevancy. From the review, the experts reviewed the questionnaire and corrections were done to the satisfaction of the supervisor and the panelists. This ensured that the research instrument was valid.

4.1.2.2 Reliability of research instrument

Reliability test was done through Cronbach's alpha to check on whether the research instrument would give reliable results.

TABLE 4

Reliability Analysis

Variable	Cronbach's Alpha	N of Items	Reliability
Human capital	.899	6	reliable
Structural capital	.863	6	reliable
Relational capital	.725	6	reliable
Government intervention measures	.884	6	reliable
Disaster reduction	.807	6	reliable

A coefficient value of 0.7 or higher is generally considered acceptable in social science research, as it demonstrates that the items reliably measure the same underlying concept. This test was therefore employed to ensure that the scales used in the questionnaire were both consistent and dependable in capturing the constructs of interest. The results revealed that all the variables achieved Cronbach’s alpha values above the 0.7 threshold, confirming satisfactory levels of reliability. Human capital recorded an alpha of 0.899, structural capital 0.863, relational capital 0.725, government intervention measures 0.884, and disaster risk reduction 0.807.

These findings indicated that the six items under each variable were strongly interrelated and collectively measured their respective constructs with internal consistency. The reliability

analysis confirmed that the research instrument was robust for data collection. The high Cronbach's alpha values suggested that the scale items would consistently yield similar results under repeated measurements, thereby enhancing the credibility of the study findings. With the assurance of reliability, the instrument was deemed appropriate for subsequent statistical analyses, including regression modeling, to investigate the relationship between intellectual capital, government intervention, and disaster risk reduction.

4.2 Demographic Information

The study sought to establish the demographic information relating to officers at the NCC. The information related to gender, age, position in the institution and education level.

TABLE 5

Respondents' Distribution by Gender

Gender	Frequency	Percent
Male	117	56.5
Female	90	43.5
Total	**207**	**100.0**

The results on gender distribution revealed that 56.5 percent of the respondents were male, while 43.5 percent were female. This indicates that men constituted the majority of officers engaged in disaster risk reduction initiatives in Nairobi County. Although female representation was lower, the proportion was still substantial, reflecting growing inclusivity and participation of women in disaster management roles. The distribution suggests that the sector is not overly dominated by one gender, thereby providing a balance of perspectives that can enrich planning, coordination, and implementation of disaster risk reduction strategies. However, the slight male dominance may also point to persisting structural or occupational dynamics where men are more frequently positioned in technical or leadership roles within this field. The relatively high female representation implies that gender diversity is gradually being achieved, which has positive

implications for promoting equity, inclusiveness, and responsiveness in disaster management practices.

TABLE 6

Distribution of Respondents in Terms of Age

Age Bracket	Frequency	Percent
25-34 years	97	46.9
35-44 years	74	35.7
45-54 years	22	10.6
55 years and above	14	6.8
Total	**207**	**100.0**

Respondents were requested to indicate their age bracket. The findings demonstrated that the majority fell within the 25 to 34 years category, accounting for 46.9 percent of the total sample. This finding indicates that nearly half of the participants were young professionals, likely at the early or mid-level stages of their careers, and actively engaged in operational roles within their institutions. The second largest group was those aged between 35 and 44 years, who represented 35.7 percent of the respondents, suggesting a strong presence of more experienced officers who combine both operational knowledge and emerging leadership responsibilities. In contrast, only 10.6 percent of respondents were between 45 and 54 years, while those aged 55 years and above accounted for just 6.8 percent. This comparatively lower representation of older age brackets indicates that the institutional workforce in disaster risk reduction in Nairobi County is predominantly youthful. The implication of these results is that younger professionals play a critical role in shaping and implementing disaster risk management strategies, which may enhance innovation, adaptability, and long-term sustainability. However, the limited proportion of older officers highlights the need to ensure mechanisms for knowledge transfer and mentorship to preserve institutional memory and policy continuity.

TABLE 7

Respondents' Position in The Organization

Level	Frequency	Percent
Senior Officer	55	26.6
Middle level Officer	72	34.8
Junior Officer	80	38.6
Total	**207**	**100.0**

The analysis of respondents' positions within their respective institutions in Nairobi County revealed that junior officers constituted the largest proportion of the sample at 38.6 percent. Middle-level officers followed closely, representing 34.8 percent of the respondents, while senior officers comprised the smallest category at 26.6 percent. These results indicate that the study captured a wide representation across institutional hierarchies, with a notable dominance of perspectives from junior and middle-level officers who together accounted for nearly three-quarters of the participants.

This distribution suggests that the majority of responses were drawn from individuals actively involved in day-to-day operations and program implementation, thereby enriching the study with practical and ground-level insights. The lower representation of senior officers, although significant, reflects the comparatively smaller proportion of top decision-makers in institutional settings. Nonetheless, their inclusion ensured that the study also captured strategic perspectives necessary for policy-level analysis. Overall, the findings highlight a balanced yet operationally grounded dataset, which is crucial for understanding the dynamics of disaster risk reduction in Nairobi County.

TABLE 8

Distribution of Respondents in Terms of Academic Qualifications

Level	Frequency	Percent
Diploma	67	32.4
Bachelor's degree	64	30.9
Master's degree	62	30.0
Doctorate	14	6.8
Total	**207**	**100.0**

The study targeted officers in Nairobi County with diverse academic qualifications. The results showed that diploma holders formed the largest group at 32.4 percent, followed closely by bachelor's degree holders at 30.9 percent and master's degree holders at 30.0 percent. Doctorate holders were the least represented at 6.8 percent, indicating that only a small fraction of the respondents had attained the highest level of academic training. Although diploma holders were slightly more, the cumulative proportion of respondents with at least a bachelor's degree stood at 67.7 percent, meaning that the majority of participants had attained higher education beyond diploma level. This distribution demonstrates that the study engaged a relatively well-educated sample of officers, most of whom possessed the necessary academic background to understand, analyse, and contribute meaningfully to issues surrounding disaster risk reduction. The implication of this finding is that the responses collected were informed by individuals with strong academic preparation, thereby enhancing the reliability and validity of the data used in the study.

4.3 Intellectual Capital

The study sought to establish the level of intellectual capital within NCC. This was done through agreement on statements relating to intellectual capital in the county. The intellectual capital was looked at in terms of human, structural and relational capital. Researcher used the mean and standard deviation to describe the intellectual capital.

4.3.1 Human capital

TABLE 9

Human Capital

Human Capital	Mean	Std. Deviation
Individuals leverage their personal experiences and intuition to identify and respond to potential disaster risks.	2.2947	1.34205
The department has comprehensive mechanisms to capture and document tacit knowledge of experienced personnel.	2.7295	1.17591
The department identify and recruit individuals with the necessary expertise and skills to strengthen its capacity in disaster risk management.	2.3092	1.19101
The department ensure continuous professional development and training to enhance the expertise and skills of its staff members	2.4058	1.38633
The department fosters a culture of creativity among its staff members in order to develop innovative disaster risk strategies.	2.0435	1.46249
The department has adopted effective mechanisms that encourage employees to contribute their creative ideas in their disaster risk reduction efforts.	2.2560	1.22955

Results in Table 9 showed that the respondents disagreed that individuals leveraged their personal experiences and intuition to identify and respond to potential disaster risks (Mean = 2.2947). In addition, the respondents disagreed that it identified and recruited individuals with the necessary expertise and skills to strengthen its capacity in disaster risk management (Mean = 2.3092). Further, the respondents disagreed that the department ensured continuous professional development and training to enhance the expertise and skills of its staff members (Mean = 2.4058) and that it fostered a culture of creativity among staff to develop innovative disaster risk strategies (Mean = 2.0435). Moreover, the respondents also disagreed that the department had adopted effective mechanisms to encourage employees to contribute creative ideas in disaster risk reduction efforts (Mean = 2.2560).

On the other hand, the respondents moderately agreed that the department had comprehensive mechanisms to capture and document tacit knowledge of experienced personnel

(Mean = 2.7295). The standard deviations were less than 2 indicating that the responses were relatively consistent and support the reported mean values. This finding suggests that while some structures for preserving institutional memory and knowledge existed, other critical aspects of human capital development such as training, expertise recruitment, creativity, and innovation, were largely underdeveloped. The results therefore imply that the department's human capital efforts were perceived as weak, with limited capacity to build resilience through knowledge, skills, and staff empowerment, thereby constraining the effectiveness of disaster risk reduction in Nairobi County.

4.3.2 Structural capital

TABLE 10

Structural Capital

Structural Capital	**Mean**	**Std. Deviation**
The department has well-organized structures to effectively coordinate and integrate disaster risk efforts across different stakeholders.	2.1884	.93386
Organizational structures have clearly defined roles and responsibilities for all its task forces in disaster risk efforts.	2.0193	1.11024
The department has up-to-date information systems to collect, store, and analyse data related to disaster risks.	2.1836	1.05440
The information systems ensure accuracy, reliability, and accessibility of all information on disaster risks.	2.1304	1.20573
The department leverage technological innovations, such as remote sensing or geographic information systems on its disaster risk efforts.	1.7295	.94728
The department encourage its staff to stay updated on emerging technologies and innovative solutions on evolving disaster risks.	2.1981	1.24026

Results in Table 10 show that the respondents disagreed that the department had well-organized structures to effectively coordinate and integrate disaster risk efforts across different stakeholders (Mean = 2.1884). In addition, the respondents disagreed that organizational structures had clearly defined roles and responsibilities for all its task forces in disaster risk efforts (Mean = 2.0193). The respondents also disagreed that the department had up-to-date information systems

to collect, store, and analyze data related to disaster risks (Mean = 2.1836). Further, they disagreed that the information systems ensured accuracy, reliability, and accessibility of all information on disaster risks (Mean = 2.1304).

Moreover, the respondents disagreed that the department leveraged technological innovations, such as remote sensing or geographic information systems, in its disaster risk efforts (Mean = 1.7295). They also disagreed that the department encouraged its staff to stay updated on emerging technologies and innovative solutions for evolving disaster risks (Mean = 2.1981). The standard deviations were less than 2 indicating that the responses were relatively consistent and support the reported mean values. The findings imply that structural capital in the department was largely perceived as weak, with inadequate coordination structures, unclear roles, insufficient information systems, and minimal adoption of technological innovations, which could hinder the effectiveness of disaster risk reduction initiatives in Nairobi County.

4.3.3 Relational capital

TABLE 11

Relational Capital

Relational Capital	**Mean**	**Std. Deviation**
The department has reliable platforms to facilitate knowledge exchange and collaboration with external stakeholders.	2.3623	1.16550
The department employ effective collaborative initiatives to develop and implement appropriate disaster risk strategies.	2.3043	1.21044
The department engage with the public to raise awareness about potential disaster risks and the respective prevention measures.	2.3768	1.03953
The department participates in frequent campaigns to ensure affected communities are well-informed about disaster risks and equipped to respond effectively.	2.1304	1.11364
The department ensure that community perspectives and ideas are considered and integrated into the department's decision-making processes.	3.7101	0.94367

The department has implemented community-led programs that enhance community resilience and preparedness.	2.3188	1.08600

Results in Table 11 show that the respondents disagreed that the department had reliable platforms to facilitate knowledge exchange and collaboration with external stakeholders (Mean = 2.3623). In addition, the respondents disagreed that the department employed effective collaborative initiatives to develop and implement appropriate disaster risk strategies (Mean = 2.3043). The respondents also disagreed that the department engaged with the public to raise awareness about potential disaster risks and the respective prevention measures (Mean = 2.3768). Further, they disagreed that the department participated in frequent campaigns to ensure affected communities were well-informed about disaster risks and equipped to respond effectively (Mean = 2.1304).

However, the respondents agreed that the department ensured community perspectives and ideas were considered and integrated into its decision-making processes (Mean = 3.7101). Despite this, the respondents disagreed that the department had implemented community-led programs that enhance community resilience and preparedness (Mean = 2.3188). The standard deviations for all items were below 2, which indicates that the responses were relatively consistent and support the reported mean values. The findings imply that while some efforts existed to incorporate community perspectives into decision-making, overall relational capital was perceived as weak, with limited collaboration platforms, ineffective stakeholder engagement, and insufficient community-led initiatives, which could affect the department's capacity to strengthen disaster risk reduction in Nairobi County.

4.4 Government Intervention Measures

TABLE 12

Government Intervention Measures

Government Intervention Measures	Mean	Std. Deviation
The department has put in place regulatory policies to ensure compliance with safety standards and guidelines on disaster risks.	2.0386	.71628
The department monitor and enforce regulatory policies ensure that DRR measures are integrated into its development projects	2.0483	.88547
The department has put in place formal mechanisms to ensure that emergency relief efforts reach the most vulnerable communities in a fair and equitable manner.	2.1981	1.00696
The department has strategies in place to effectively coordinate emergency relief efforts during and after disasters.	2.2899	1.04883
The department prioritize and promote the development of resilient infrastructure that can withstand natural hazards.	1.8792	.99995
The department has enforced strict guidelines on infrastructure projects to undergo rigorous risk assessments and adhere to resilient design standards.	1.9614	.90760

The analysis in Table 12 indicates that respondents perceived significant gaps in government intervention measures for disaster risk reduction. Specifically, they disagreed that the department had put in place regulatory policies to ensure compliance with safety standards and guidelines (Mean = 2.0386) and that monitoring and enforcement mechanisms were effectively applied to integrate disaster risk reduction into development projects (Mean = 2.0483). Similarly, the respondents disagreed that formal mechanisms were in place to guarantee that emergency relief efforts reached the most vulnerable communities fairly and equitably (Mean = 2.1981), and that strategies existed to coordinate emergency relief efficiently during and after disasters (Mean = 2.2899).

In addition, respondents noted gaps in infrastructure resilience, disagreeing that the department prioritized the development of hazard-resistant infrastructure (Mean = 1.8792) or enforced rigorous risk assessment and resilient design standards in its projects (Mean = 1.9614).

The standard deviations for all items remained below 2, suggesting consistency in the respondents' views and reinforcing the means. The results showed that respondents generally perceived government intervention measures in disaster risk reduction as inadequate. They revealed a pattern of limited regulatory oversight, weak emergency coordination, and insufficient focus on resilient infrastructure.

4.5 Disaster Risk Reduction

TABLE 13

Disaster Risk Reduction

Disaster Risk Reduction	Mean	Std. Deviation
Natural hazard mitigation initiatives has increased in the last five years.	2.1498	.86563
Successful natural hazard mitigation initiatives have reduced disaster risks in the last five years.	2.1932	.89299
Land-use planning interventions has increased in the last five years.	2.2126	1.06271
Successful land-use planning interventions have enhanced community resilience in the last five years.	1.9420	.92249
Use of infrastructure resilience approaches has increased in the last five years.	2.4348	1.17595
Successful infrastructure resilience approaches have reduced disaster risks in the last five years.	2.3961	1.23759

The findings in Table 13 indicate that respondents largely disagreed that natural hazard mitigation initiatives had increased over the last five years (Mean = 2.1498). They also disagreed that these initiatives had successfully reduced disaster risks (Mean = 2.1932). Respondents disagreed that land-use planning interventions had increased during this period (Mean = 2.2126) and similarly disagreed that successful land-use planning had enhanced community resilience (Mean = 1.9420). These results suggest that natural hazard mitigation and land-use planning efforts were perceived as insufficient. The findings highlight gaps in both strategic implementation and impact measurement of disaster risk reduction initiatives.

Infrastructure resilience approaches were also assessed, with respondents disagreeing that their use had increased in the last five years (Mean = 2.4348) and that successful implementation had reduced disaster risks (Mean = 2.3961). Although these means are slightly higher than other items, they still indicate disagreement when rounded, showing that infrastructure-focused measures are also perceived as insufficient. The responses demonstrate that all key areas of disaster risk reduction, including hazard mitigation, land-use planning, and infrastructure resilience, require significant strengthening. The consistency in responses, as indicated by standard deviations below 2, reinforces the reliability of these perceptions. Collectively, these results reveal that disaster risk reduction initiatives in Nairobi County over the past five years are largely inadequate in scope and effectiveness.

4.6 Diagnostic Tests

Diagnostic tests were done to check on whether the data met the assumptions of regression modeling. These related to multicollinearity, heteroskedasticity and normality.

TABLE 14

Multicollinearity Test

Variable	Tolerance	VIF
Government Intervention Measures	.750	1.334
Human Capital	.719	1.390
Structural Capital	.931	1.074
Relational Capital	.798	1.253

Multicollinearity was assessed using the VIF, with values below 2 considered to indicate the absence of any multicollinearity concerns. The results revealed that government intervention measures had a VIF of 1.334, human capital 1.390, structural capital 1.074, and relational capital 1.253. Since all the values were well below the conservative cutoff of 2, the findings confirmed that the independent variables were not highly correlated with each other. This implies that each

predictor contributed independently and meaningfully to the regression model without inflating the standard errors of the coefficients. The low VIF values also demonstrated the stability and reliability of the regression estimates. Therefore, the assumption of no multicollinearity was fully satisfied, validating the inclusion of human capital, structural capital, relational capital, and government intervention measures in the analysis of disaster risk reduction in Nairobi County.

TABLE 15

Tests for Heteroskedasticity

Chi-Square	df	Sig.
1.484	1	.223

The Breusch-Pagan test was used to assess whether heteroskedasticity was present in the regression model. The results yielded a chi-square statistic of 1.484 with a significance value of 0.223. Since the p-value was greater than the 0.05 threshold, the null hypothesis of homoskedasticity was not rejected. This implied that the variance of the error terms was constant across the independent variables, meaning that heteroskedasticity was not a problem in the model. Therefore, the assumption of homoskedasticity was met, confirming that the regression estimates were efficient and reliable for explaining disaster risk reduction in Nairobi County.

TABLE 16

Tests of Normality

Variable	Statistic	df	Sig.
Disaster Risk Reduction	.991	207	.369
Human Capital	.981	207	.128
Structural Capital	.996	207	.788
Relational Capital	.983	207	.172
Government Intervention Measures	.974	207	.086

The Shapiro-Wilk test was conducted to assess the normality of the study variables, which is an important assumption in regression analysis. The results revealed that disaster risk reduction in Nairobi County had a p value of 0.369, while human capital recorded 0.128. Structural capital

had a p value of 0.788, relational capital 0.172, and government intervention measures 0.086. All the values were above the 0.05 significance level, indicating that none of the variables violated the assumption of normality. Consequently, the null hypothesis of normality was not rejected. This confirmed that the data for all the study variables were normally distributed, thereby validating the use of parametric statistical techniques. Meeting this assumption further enhanced the credibility and robustness of the regression results obtained in the study.

4.7 Regression Analysis

Multiple regression analysis was done to check on the effect of intellectual capital on disaster risk reduction in Nairobi city county.

TABLE 17

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964[a]	.930	.929	1.18267

a. Predictors: (Constant), Government Intervention Measures, Relational Capital, Human Capital, Structural Capital

The model summary results revealed a correlation coefficient (R = 0.964) which indicated a strong positive relationship between the predictors (human capital, structural capital, relational capital, and government intervention) and disaster risk reduction in Nairobi County. The coefficient of determination (R^2 = 0.930) showed that approximately 93% of the variation in disaster risk reduction was explained by the combined effect of the predictors. This finding suggests that intellectual capital components played a critical role in shaping disaster risk reduction outcomes within the county. The adjusted R^2 (0.929) further confirmed the robustness of the model, indicating that after accounting for the number of predictors, the model still explained about 92.9% of the variance in disaster risk reduction.

TABLE 18

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3765.123	4	941.281	672.965	.000[b]
	Residual	282.539	202	1.399		
	Total	4047.662	206			

a. Dependent Variable: Disaster risk reduction in Nairobi County
b. Predictors: (Constant), Government Intervention Measures, Relational Capital, Human Capital, Structural Capital

The ANOVA results showed that the regression model was statistically significant (F = 53.892, p = 0.000). This indicated that the combined effect of the predictors (human capital, structural capital, relational capital, and government intervention) contributed meaningfully to explaining variations in disaster risk reduction in Nairobi County. The significance level of 0.000 ($p < 0.05$) confirmed that the predictors, when taken together, significantly improved the ability of the model to predict disaster risk reduction outcomes.

TABLE 19

Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.795	.279		2.850	.005
	Human Capital	.355	.034	.429	10.418	.000
	Structural Capital	-.015	.013	-.024	-1.092	.276
	Relational Capital	.064	.030	.064	2.143	.033
	Government Intervention Measures	.422	.034	.523	12.485	.000

a. Dependent Variable: Disaster risk reduction in Nairobi County

$Y = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3 + \beta_4X_4 + e$

was fitted into

$Y = 0.795+0.355X_1-0.015X_2 +0.064X_3 + 0.422X_4$

The fitted model showed that human capital had a positive and significant effect on disaster risk reduction ($B = 0.355$, $0.000<p<0.05$) indicating that improved knowledge, skills, and expertise enhanced disaster preparedness and response. Structural capital, however, had negative but insignificant effect on disaster risk reduction ($B = -0.015$, $0.276>p>0.05$). This demonstrates that systems, processes, infrastructure, and organizational frameworks negatively influenced disaster risk reduction, though insignificantly. Nevertheless, relational capital had a negative and significant effect on disaster risk reduction ($B = 0.064$, $0.033<p<0.05$) suggesting that networks, partnerships, and stakeholder collaborations improved the effectiveness of disaster management. Finally, government intervention measures had a positive intervening effect on disaster risk reduction ($B = 0.422$, $0.00<p< 0.05$), confirming that government policy enhanced the contribution of intellectual capital and strengthened resilience outcomes in disaster risk reduction.

4.8 Discussion of the Findings

The study found that human capital had a positive and significant effect on disaster risk reduction ($p < 0.05$). The findings are similar to those of Aerts et al. (2018), Hoffmann and Blecha (2020), Bang, Miles, and Gordon (2019), and Githae, Ogada, and Mwagandi (2020), all of which reported that knowledge, skills, and education positively influence disaster preparedness and resilience. Similarly, Muricho et al. (2019) and Adeagbo, Ojo, and Adetoro (2021) found that human and relational factors positively contributed to adaptation and disaster response. In contrast, Koyama (2022) reported that excessive investment in human capital negatively affected disaster resilience in Japan, highlighting that the impact of human capital may vary depending on context and intensity of investment.

Further, the findings showed that structural capital had a negative insignificant effect on disaster risk reduction ($p>0.05$). The findings were same as those of Nyandiko (2020) who found

that implementation challenges led to insignificant relationship between structural capital and DRR. This differed with the findings of the present study. However, they were different with those of Parven et al. (2022 who found that structural capital drove DRR. Also different from those of Munene (2019); Nordbeck et al. (2019); Nhemachena et al., (2020) and Macnight Ngwese et al. (2018) who found that structural capital positively influenced disaster risk reduction.

Relational capital further showed a positive and significant effect on disaster risk reduction ($p< 0.05$). The findings aligned to those of Nyamakura (2021), Ryan et al. (2020), and Namagembe (2020), who reported positive effects of trust, communication, and stakeholder collaboration on disaster preparedness and risk reduction. Twerefou, Owusu, and Dovie (2023) similarly found positive effects of social networks on household readiness for hazards. Busayo et al. (2020) and Clark-Ginsberg (2020), however, found insignificant effects of relational capital in relation to DRR.

The study also found that government intervention measures had a positive intervening effect on disaster risk reduction ($p < 0.05$). This finding is consistent with Quandt (2021) and Peters et al. (2019) who found positive effects of government policies on disaster preparedness. In addition, Maes et al. (2019) also observed positive outcomes from policy and regulatory interventions on DRR. Said (2020) demonstrated positive effects of government engagement in mitigating conflict-related risks. However, Ambrosino et al. (2021) produced differing findings where government intervention measures hindered disaster risks reduction efforts.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

Here, the researcher summarizes the findings on intellectual capital and DRR in Nairobi city county. The conclusions based on the findings are also done. The chapter close with recommendations for policy and practice.

5.2 Summary of Findings

The findings showed that disaster risk reduction initiatives in Nairobi County were generally inadequate across natural hazard mitigation, land-use planning, and infrastructure resilience. Strategic planning and implementation of disaster risk reduction measures were weak, and the impact on community resilience was limited. All areas of disaster management revealed gaps in coordination, resources, and integration into broader development processes. Nevertheless, human, structural, and relational capital, along with government intervention measures, positively influenced disaster risk reduction outcomes. These findings highlighted that enhancing these elements could significantly strengthen preparedness, response, and overall resilience.

5.2.1 Human capital and disaster risk reduction

The findings showed that human capital within the department was generally weak, with significant gaps in expertise, professional development, and innovative capacity. Recruitment of skilled personnel and continuous training were found to be inadequate, limiting the department's ability to respond effectively to disaster risks. While mechanisms for capturing and documenting tacit knowledge existed, they were limited in scope, indicating partial preservation of institutional memory. The department also lacked initiatives to foster creativity and innovation among staff,

which constrained adaptive disaster management strategies. Despite these gaps, human capital positively influenced disaster risk reduction, suggesting that knowledge, skills, and expertise contributed to improved preparedness and response. Strengthening human capital through targeted training and capacity development was identified as critical for enhancing disaster resilience.

5.2.2 Structural capital and disaster risk reduction

The findings revealed that structural capital in Nairobi City County's disaster management was inadequate, characterized by poorly organized systems, unclear role allocations, and limited integration of information management tools. Technological innovations such as remote sensing and GIS were underutilized, and staff were not consistently exposed to emerging solutions that address evolving disaster risks. These weaknesses undermined coordination, data management, and the overall efficiency of disaster management processes. Despite these limitations, the study established that structural capital had a negative but insignificant influence on disaster risk reduction, suggesting that existing organizational frameworks and infrastructure made no meaningful contribution to resilience outcomes. In particular, investments in structures and technological tools were found to insignificantly affect preparedness and response capacity. Nonetheless, the results highlight that strengthening structural capital remains essential, as improved systems, infrastructure, and technological adoption could eventually enhance the effectiveness of disaster risk management.

5.2.3 Relational capital and disaster risk reduction

The findings showed that relational capital was generally weak, with limited stakeholder engagement, collaboration platforms, and community-led initiatives. While some mechanisms ensured that community perspectives were considered in decision-making, these were not consistently applied to strengthen disaster preparedness. The lack of strong networks and

partnerships reduced the department's ability to implement coordinated disaster risk reduction strategies. Nonetheless, relational capital positively contributed to disaster risk reduction, suggesting that stronger collaboration and stakeholder engagement improved the effectiveness of interventions. Enhancing partnerships, promoting multi-sector collaboration, and implementing community-driven programs were found to be essential for improving disaster resilience. The findings highlighted the importance of relational capital in supporting effective and adaptive disaster management strategies.

5.2.4 Government intervention and disaster risk reduction

The findings indicated that government intervention measures were largely inadequate, with gaps in regulatory policies, enforcement mechanisms, and emergency coordination strategies. Hazard-resistant infrastructure and integration of disaster risk reduction into development projects were insufficient, limiting institutional support for resilience. Despite these weaknesses, government intervention measures positively influenced disaster risk reduction by reinforcing the contribution of human, structural, and relational capital. Effective policies and strategic coordination were found to enhance disaster preparedness and resilience outcomes. The findings suggested that proactive government engagement was crucial for strengthening regulatory oversight, ensuring compliance, and supporting sustainable disaster risk reduction initiatives. Improving government intervention measures was identified as key to achieving more effective disaster management through intellectual capital.

5.3 Conclusions

The study concludes that human capital in Nairobi City County's disaster management department remains underdeveloped, with notable gaps in expertise, professional training, and innovation capacity. While mechanisms exist to document tacit knowledge, these are limited and do not fully

leverage staff experience for effective disaster preparedness. Human capital currently contributes positively to disaster risk reduction, but without systematic capacity building, recruitment of skilled personnel, and promotion of creativity and innovation, the department's ability to respond effectively to disasters is constrained. Strengthening these aspects is therefore essential to enhance overall resilience in the county.

Structural capital was found to be an insignificant factor in influencing disaster risk reduction within Nairobi City County. Weaknesses in organizational structures, coordination mechanisms, and information systems limited the extent to which functional infrastructure and operational frameworks could enhance preparedness and response. While investments in technological innovations, role clarification, and integrated systems are important for strengthening structural capital, the study revealed that such improvements did not translate into significant outcomes in disaster management. As a result, inefficiencies and delays continued to undermine disaster preparedness and response efforts. This finding suggests that prioritizing structural capacity alone may not guarantee the county's ability to effectively manage hazards or minimize potential losses, unless complemented by other dimensions of intellectual capital.

Relational capital was found to contribute positively to disaster risk reduction, yet it remains underutilized in Nairobi City County. The study revealed that limited stakeholder engagement, weak external collaborations, and insufficient community-led initiatives significantly reduced the effectiveness of disaster management strategies. Strong networks, strategic partnerships, and the active incorporation of community perspectives were identified as crucial in strengthening both response capacity and disaster preparedness. Enhancing multi-sector collaboration and supporting community-driven initiatives would therefore improve the relevance and sustainability of disaster management interventions. Greater investment in relational capital

has the potential to foster improved coordination, effective knowledge sharing, and mobilization of resources across key stakeholders. Ultimately, leveraging relational capital can enhance resilience and ensure that disaster risk reduction efforts are more inclusive, participatory, and impactful.

Government intervention measures were found to be inadequate, yet they remain a critical component in supporting disaster risk reduction. The study highlighted regulatory policies, enforcement mechanisms, and the promotion of hazard-resistant infrastructure were limited, thereby weakening institutional support for effective disaster management. Despite these shortcomings, government engagement continues to play an essential role in positively influencing human, structural, and relational capital, underscoring its importance in building resilience. Proactive policy implementation, combined with robust regulatory frameworks, is necessary to strengthen disaster preparedness and ensure timely, equitable, and effective response mechanisms. Increased investment in government-led initiatives can reinforce other forms of capital, particularly by improving coordination, capacity building, and community participation. Ultimately, government intervention provides the institutional backbone through which disaster risk reduction efforts in Nairobi City County can be scaled, sustained, and integrated into broader development priorities.

5.4 Limitations of the Study

The study was conceptually limited to human, structural, and relational capital, excluding other forms of intellectual or financial capital that may also influence disaster risk reduction. Contextually, the research focused solely on Nairobi City County, which may limit the applicability of the findings to counties with different demographic, infrastructural, and disaster risk profiles. Data collection relied primarily on primary data from departmental sources and

structured assessments, which may not fully capture informal or community-driven disaster management practices.

Cross-sectional data was used, restricting the ability to examine long-term trends or changes in disaster preparedness and response. Some responses from primary sources may have been subject to biases or inconsistencies, which could affect the generalizability of the findings. Despite these conceptual, contextual, and data limitations, the study provides valuable insights into factors shaping disaster risk reduction in Nairobi City County.

5.5 Recommendations

The study revealed that human capital in Nairobi City County's disaster management sector was underdeveloped, with major gaps in staff training, expertise recruitment, and the fostering of innovation. Many personnel lacked adequate technical knowledge and exposure to modern disaster management practices, which weakened their capacity to respond effectively during emergencies. The absence of structured professional development programs further limited opportunities for continuous learning and specialization in critical areas such as risk modeling and emergency logistics. To address these gaps, the county government should implement policies that promote ongoing training, recruit personnel with specialized disaster management skills, and establish institutional mechanisms that encourage innovation. Platforms for idea-sharing and creative problem-solving would enhance staff contributions and promote adaptive strategies in disaster risk reduction. Strengthening human capital in this way would significantly improve preparedness, response, and recovery capacity across the county.

Structural capital was found to have a negative but insignificant influence on disaster risk reduction, indicating that weaknesses in organizational systems and processes limited their contribution to resilience outcomes. The findings suggest that inadequate coordination, lack of role

clarity, and underutilization of technology may have constrained effective disaster management. Without strong structures, disaster preparedness and response remain fragmented and inefficient. The county should therefore strengthen its organizational frameworks by defining clear roles and responsibilities across disaster management units. In addition, modern information systems and technologies such as GIS, early warning systems, and remote sensing should be adopted to support data-driven decisions. Addressing these gaps in structural capital would transform current weaknesses into enablers of coordinated and efficient disaster risk reduction.

Relational capital was observed to be limited, as evidenced by weak networks, fragile collaboration platforms, and insufficient community-led initiatives in disaster risk reduction. Such weaknesses undermined the ability of various actors to share information, mobilize resources, and coordinate responses during emergencies. In contexts where disasters are unpredictable and complex, the absence of trust-based relationships and effective collaboration can lead to delayed responses and reduced efficiency. Policies should therefore focus on enhancing partnerships with diverse actors, including non-governmental and private sector organizations as well as local communities. Strengthening stakeholder engagement will not only improve coordination but also ensure that disaster reduction strategies are inclusive and responsive to the needs of vulnerable populations. Incorporating community perspectives into disaster risk planning is particularly important, as it increases the relevance, acceptance, and sustainability of disaster risk reduction initiatives. A more collaborative and participatory framework would enable Nairobi City County to tap into collective knowledge, resources, and innovation in managing disaster risks effectively.

Government intervention measures were perceived as inadequate, especially in enforcing regulatory compliance, coordinating emergency responses, and promoting resilient infrastructure. Limited regulatory oversight often resulted in weak enforcement of safety standards, leaving

critical infrastructure vulnerable to hazards. Similarly, emergency response efforts were sometimes delayed or poorly coordinated, undermining the efficiency of disaster management systems. These gaps highlighted the need for the county government to strengthen regulatory frameworks by establishing clear guidelines for hazard-resistant infrastructure and ensuring adherence to disaster safety codes. Furthermore, the creation of formal mechanisms for timely, equitable, and effective emergency relief would significantly improve public trust and disaster resilience. Greater investment in resilient infrastructure such as flood control systems, fire safety mechanisms, and health facilities would further reduce risks associated with disasters. Importantly, integrating government intervention with intellectual capital would create a holistic system for disaster risk reduction. By embedding disaster resilience into policy and practice, Nairobi City County can ensure that interventions are both sustainable and impactful in protecting its communities from future risks.

5.6 Recommendations for Further Research

Future research should examine additional factors influencing disaster risk reduction beyond human, structural, and relational capital, such as financial resources, technological adoption, and organizational culture. Studies could target other organizations involved in disaster management, including non-governmental organizations, community-based organizations, and private sector actors, to understand how different institutional settings influence DRR outcomes. Researchers should consider using mixed data sources, combining primary data from surveys and interviews with secondary data from government reports, disaster databases, and institutional records, to provide a more holistic understanding.

There is also scope for applying simple regression analysis or other statistical models to quantify the relationship between these factors and DRR, enabling easier comparison across

studies. Additionally, cross-county or national-level studies could help identify patterns and variations in DRR practices across different contexts in Kenya. Finally, longitudinal research could assess the long-term effectiveness of DRR interventions and the role of organizational and contextual factors in enhancing resilience over time.

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APPENDICES

Appendix I: Introduction Letter

KCA UNIVERSITY

SCHOOL OF BUSINESS AND COMMERCE

TO WHOM IT MAY CONCERN

Dear sir/Madam

RE: ESTHER NJAMBI REG. NO. 22/03081

This is to confirm that the above named is a bonafide student in the MSC Knowledge Management and Innovation in KCA university. The student has successfully completed part 1(course work) of his degree studies and will be embarking on part 2 (research project). The student is required to submit a research project report in her area of specialization which involves going out in the field to collect data from various organizations.

Any assistance accorded her will be highly appreciated

DEPARTMENT HEAD

SCHOOL OF BUSINESS AND COMMERCE

Appendix II: Consent Form

Dear Participant,

You are invited to take part in a research study conducted in partial fulfillment of the requirements for the Master of Science in Knowledge Management and Innovation at KCA University. The purpose of this study is to collect data on the **Effects of intellectual capital on disaster risk reduction in Kenya.**

Your participation is entirely voluntary and free to withdraw from the study at any point without penalty or consequence. In addition, your responses will be kept strictly confidential, and the information you provide will be used solely for academic purposes.

By signing below, you acknowledge that

i. You have been informed about the nature and purpose of the study.
ii. You voluntarily agree to participate in the study.
iii. You understand that your identity remains anonymous and your responses confidential.
iv. You understand that you can refuse to answer any question or withdraw at any time.
v. You give permission for the data collected to be used for academic research only.

I agree to participate in this research

Participant's Signature: _____

Date: _____

Signature: _____

Date: _____

Esther Njambi (22/03081)

Researcher, KCA University

Appendix III: Research Questionnaire

This questionnaire is meant to collect data on **Effects of Intellectual Capital on Disaster Risk Reduction in Kenya.** Kindly respond to all the listed items accurately and honestly to the best of your ability. Please mark the item that matches your opinion with a tick (√).

Section A: Demographic Information

1. Kindly indicate your gender

Male ☐

Female ☐

2. Kindly indicate your age bracket

25-34 years ☐

35-44 years ☐

45-54 years ☐

55 years and above ☐

3. What is your position in the institution?

Senior Officer ☐

Middle level Officer ☐

Junior Officer ☐

4. Kindly indicate your highest academic qualifications

Diploma ☐

Bachelor's degree ☐

Master's degree ☐

Doctorate ☐

5. For how long have you been working with the institution?

1-5 years ☐

6-10 years ☐

11-15 years ☐

15-20 years ☐

Over 20 years ☐

Section B: Human Capital

This section consists of statements on effects of human capital on disaster risk reduction in Kenya. Use the scale of 1-5. Where 1=Strongly Disagree, 2= Disagree, 3= Moderately agree, 4= Agree and 5= Strongly Agree

Statements	1	2	3	4	5
Individuals leverage their personal experiences and intuition to identify and respond to potential disaster risks.					
The department has comprehensive mechanisms to capture and document tacit knowledge of experienced personnel.					
The department identify and recruit individuals with the necessary expertise and skills to strengthen its capacity in disaster risk management.					
The department ensure continuous professional development and training to enhance the expertise and skills of its staff members					
The department fosters a culture of creativity among its staff members in order to develop innovative disaster risk strategies.					

The department has adopted effective mechanisms that encourage employees to contribute their creative ideas in their disaster risk reduction efforts.					

Section C: Structural Capital

This section consists of statements on effects of structural capital on disaster risk reduction in Kenya. Use the scale of 1-5. Where 1=Strongly Disagree, 2= Disagree, 3= Moderately agree, 4= Agree and 5= Strongly Agree

Statements	1	2	3	4	5
The department has well-organized structures to effectively coordinate and integrate disaster risk efforts across different stakeholders.					
Organizational structures have clearly defined roles and responsibilities for all its task forces in disaster risk efforts.					
The department has up-to-date information systems to collect, store, and analyze data related to disaster risks.					
The information systems ensure accuracy, reliability, and accessibility of all information on disaster risks.					
The department leverage technological innovations, such as remote sensing or geographic information systems on its disaster risk efforts.					
The department encourage its staff to stay updated on emerging technologies and innovative solutions on evolving disaster risks.					

Section D: Relational Capital

This section consists of statements on effects of relational capital on disaster risk reduction in Kenya. Use the scale of 1-5. Where 1=Strongly Disagree, 2= Disagree, 3= Moderately agree, 4= Agree and 5= Strongly Agree

Statements	1	2	3	4	5
The department has reliable platforms to facilitate knowledge exchange and collaboration with external stakeholders.					
The department employ effective collaborative initiatives to develop and implement appropriate disaster risk strategies.					
The department engage with the public to raise awareness about potential disaster risks and the respective prevention measures.					
The department participates in frequent campaigns to ensure affected communities are well-informed about disaster risks and equipped to respond effectively.					
The department ensure that community perspectives and ideas are considered and integrated into the department's decision-making processes.					
The department has implemented community-led programs that enhance community resilience and preparedness.					

Section E: Government Intervention Measures

This section consists of statements regarding effects of government intervention on disaster risk reduction in Kenya. Use the scale of 1-5. Where 1=Strongly Disagree, 2= Disagree, 3= Moderately agree, 4= Agree and 5= Strongly Agree

Statements	1	2	3	4	5
The department has put in place regulatory policies to ensure compliance with safety standards and guidelines on disaster risks.					
The department monitor and enforce regulatory policies ensure that DRR measures are integrated into its development projects					
The department has put in place formal mechanisms to ensure that emergency relief efforts reach the most vulnerable communities in a fair and equitable manner.					
The department has strategies in place to effectively coordinate emergency relief efforts during and after disasters.					
The department prioritize and promote the development of resilient infrastructure that can withstand natural hazards.					
The department has enforced strict guidelines on infrastructure projects to undergo rigorous risk assessments and adhere to resilient design standards.					

Section F: Disaster Risk Reduction in Kenya

This section consists of statements on disaster risk reduction in Kenya. Use the scale of 1-5. Where 1=Strongly Disagree, 2= Disagree, 3= Moderately agree, 4= Agree and 5= Strongly Agree

Statements	1	2	3	4	5
Natural hazard mitigation initiatives has increased in the last five years.					
Successful natural hazard mitigation initiatives have reduced disaster risks in the last five years.					

Land-use planning interventions has increased in the last five years.					
Successful land-use planning interventions have enhanced community resilience in the last five years.					
Use of infrastructure resilience approaches has increased in the last five years.					
Successful infrastructure resilience approaches have reduced disaster risks in the last five years.					

Thank you for your participation

Appendix IV: Ethical Request Form

RESEARCH, INNOVATION, AND OUTREACH DIVISION

KCA UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

REQUEST FOR ETHICAL REVIEW FORM

The request must include the following information for the research to be considered for approval:

Name, institution, and contact details (email and phone number) of the principal/lead investigator/researcher:	Esther Njambi Muchoki Nairobi County Government Njambiesther.m@gmail.com, 0708050425
If it is a thesis, include also the name(s), institution(s), and contact details (emails and phone numbers) of the supervisor(s):	Dr. Asenath Onguso 0720562097 asenathonguso@yahoo.com
Date of request:	11/07/2025
Title of the Research:	Effect of Intellectual Capital on Disaster Risk Reduction In Nairobi City County, Kenya
Planned or confirmed source of funding:	Personal/ Individual
Members of the research group and their roles in the implementation of the study, as well as possible cooperation with other universities, research institutes, or similar organizations:	Adow Mohammed- Research assistant Rechol Kibebe- Research assistant
What is the level of risk presented by your research?	Please indicate whether the research risk assessment (Check risk document) stated on the application is: ☒ **Low risk** (*Research has no foreseeable risk of harm, discomfort, or inconvenience to respondents*) ☐ **Medium risk** (*Research has potential risk of unexpected negative consequences, harm or discomfort, but where appropriate steps can be taken to mitigate the risk*) ☐ **High risk** (*Research with real and foreseeable risk of harm and discomfort to participants and or the research team, and which may lead to serious adverse consequences if these risks are not managed in a responsible manner. It involves highly sensitive topics and/or the participation of*

1

	very vulnerable and marginalized individual:/groups)
Would you like to bring any aspects of the applications to the Ethics Review Committee's attention?	**Please indicate them here** **None**
What research data will be collected?	Statements on human capital, relational capital, structural capital and government intervention measures in disaster risk reduction
What personal data and confidential information will be processed?	Participant's demographics which will be anonymous.
Specify any special category or sensitive data that will be collected (tick all that apply)	☐ Ethnicity ☐ Mental Health (status, medical records conditions, to include disability) ☐ Physical Health (status, medical records conditions, to include disability) ☐ Sexual Orientation/Sexual life ☐ Genetic Data (to include DNA data) ☐ Biometric data (such as facial scan, iris scan, or fingerprint data used to identify a participant) ☐ Political opinions ☐ Trade Union membership ☐ Religious or philosophical beliefs ☐ Criminal Convictions and offences (to include alleged offences and convictions) ☐ None ☐ Other – Please specify below
How will data be stored and transferred during the research?	Personal computer and password protected
Specify who will be able to access the identifying information and how you will ensure they process the information securely	Research assistants. Information will be in a password protected folder in secured computer
How will research data be preserved and shared on completion of the project? (NB: *Enter N/A in this section unless results will be published*)	Preserved in limited access folder Shared via secured email
Describe the measures that will be taken to ensure data are suitable for sharing, e.g., securing consent, anonymizing data prior to deposit/sharing, and sharing confidential or high-risk information using a controlled access repository.	Securing consent from participants

State how long you plan to retain personal data and any confidential information after the end of the project. Indicate also how the data will be disposed	A few months. Erase the data using secure software

As the Principal Investigator of this study, I declare that I take full responsibility for the proposed study and will conduct it according to the documented proposal and in line with KCAUSERC ethical guidelines.

By signing this document, I agree that:

a) All documents submitted with this application are true representations of the study and have not been falsified.

b) This study will not commence in any way, and no participant will be recruited until final official approval is received from KCAUSERC

c) The study will be conducted according to the protocol submitted. All participants will be recruited and consented to according to the protocol.

d) Any protocol deviations or protocol violations to the submitted study must be reported to KCAU in writing by email to KCAUSERC immediately. Within five (5) business days of the deviation or violation, the Deviation/Violation Must be reported to the ISERC office.

e) Any study-related unexpected or serious adverse event must be reported to the ISERC Office by email within twenty-four (24) hours after the PI becomes aware of the event.

Principal Investigator's Signature **Date**

16/07/2025

INFORMED CONSENT FOR RESEARCH PARTICIPATION

Introduction

You are invited to participate in a research study. This document provides information about the study so that you can make an informed decision about your participation. Please take the time to read the information below. If you have any questions, feel free to ask the researcher. **(PI to Fill in the sections Italicized)**

Purpose of the Study

The purpose of this study is to [*.....briefly describe the purpose of the study*]. The research is being conducted to [*..... explain why the research is being conducted and what the researcher hopes to learn*].

Study Procedures

If you agree to participate, you will be asked to [*.....briefly describe the procedures, tasks, or activities the participant will engage in during the study, including the study duration and the number of sessions, if applicable*].

Potential Risks and Discomforts

There may be some risks associated with participation in this study. These risks may include *[list any potential risks, discomforts, or side effects- Indicate if there are no risks]*. Every effort will be made to minimize these risks, and you can withdraw from the study at any time without penalty.

Potential Benefits
While participating may not directly benefit you, the results of this study may contribute to *[explain any potential broader benefits, such as new knowledge or advancements in the field].*

Confidentiality
Your participation will be kept confidential. Any data collected will be stored securely and only accessible to the research team. Your identity will not be revealed in any publication or presentation resulting from this research.

Voluntary Participation
Participation in this study is completely voluntary. You have the right to withdraw from the study at any time without any negative consequences or loss of benefits to which you are otherwise entitled.

Questions
If you have any questions about this study, your participation, or your rights as a participant, please contact the principal investigator at [*insert contact information*].

Consent
By signing below, you indicate that you have read the information provided above, understand the purpose and procedures of the study, and voluntarily agree to participate. You can withdraw from the study at any time without penalty.

Participant Statement:

I, the undersigned, consent to participate in this study.
Name of Participant: _____
Signature of Participant: _____
Date: _____

Researcher (Principal Investigator –PI) Statement:

I, the undersigned, confirm that I have explained the nature of this study to the participants, answered all questions, and ensured that they understand the information provided.
Name of Researcher: _____
Signature of Researcher: _____
Date: _____

Appendix V: Ethics Clearance Certificate

Thika Road, Ruaraka
P.O. Box 56808-00200 Nairobi Kenya
Pilot Line: +254 20 8070408/9

Tel: +254 20 3537842
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KCA UNIVERSITY SCIENTIFIC & ETHICS REVIEW COMMITTEE

REF: **KCAU/SERC/ SOB0216** **Date: 21st JULY 2025**

TO: **ESTHER NJAMBI (22/03/081)**

Dear Sir/Madam,

RE: EFFECT OF INTELLECTUAL CAPITAL ON DISASTER RISK REDUCTION IN NAIROBI CITY COUNTY, KENYA

This is to inform you that KCA University Scientific Ethics Review Committee (KCAUSERC) has reviewed and approved your above research proposal. Your application approval number is ***KCAUSERC/SOB0216.*** The approval period is ***21st July 2025 – 21st July, 2026.***
This approval is subject to compliance with the following requirements;

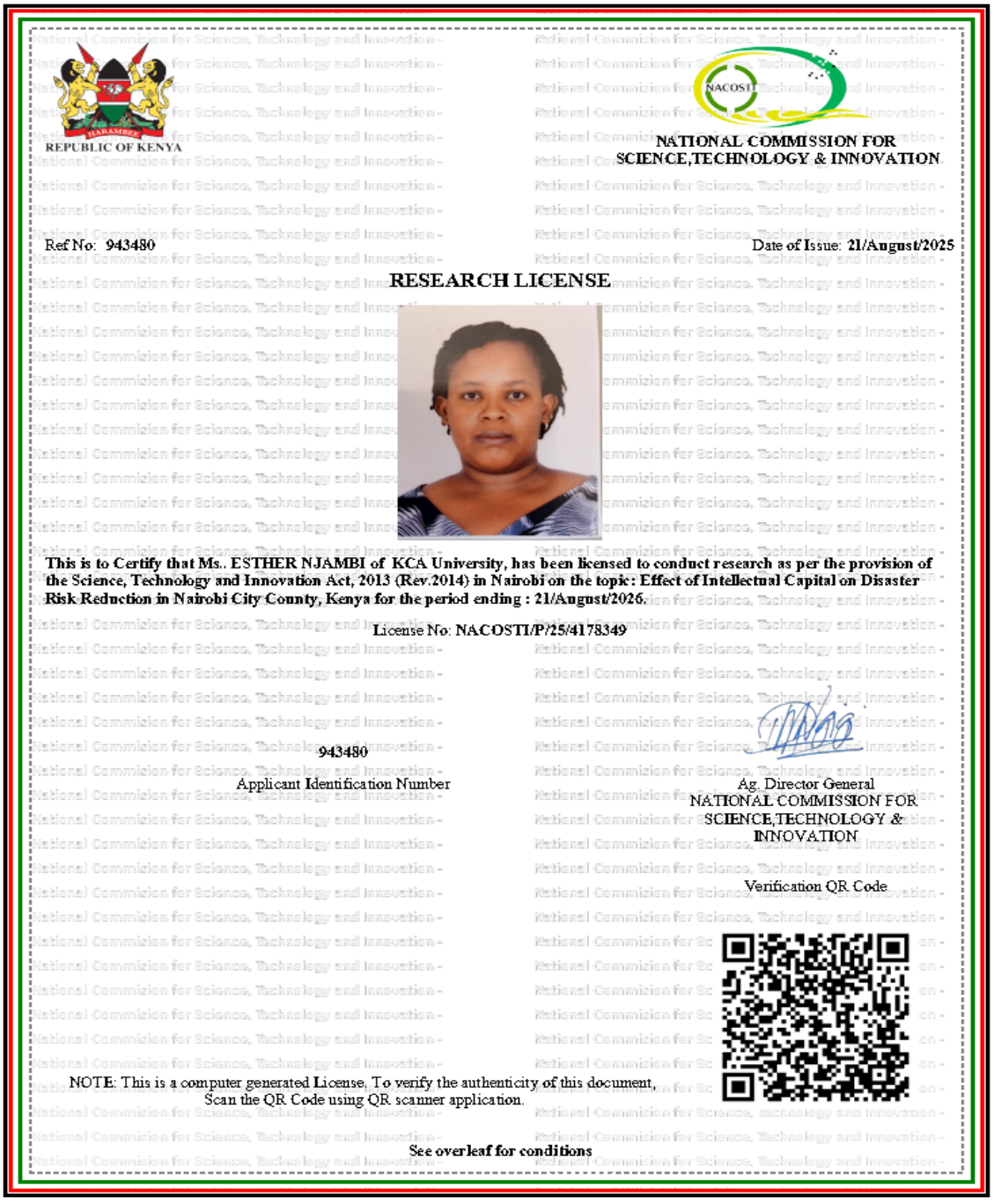
i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KCAUSERC.***
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KCAUSERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KCAUSERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***KCAUSERC.***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr. Caroline Ntara
Chairperson
KCA University Scientific & Ethics Review Committee

Appendix VI: Research Permit



REPUBLIC OF KENYA

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Ref No: 943480

Date of Issue: 21/August/2025

RESEARCH LICENSE

This is to Certify that Ms.. ESTHER NJAMBI of KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: Effect of Intellectual Capital on Disaster Risk Reduction in Nairobi City County, Kenya for the period ending : 21/August/2026.

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