INFLUENCE OF LOGISTICS COLLABORATION ON RESILIENT DISASTER RELIEF OPERATIONS: EVIDENCE FROM DISASTER RELIEF PRACTITIONERS

Yohana Arsen RUTABA[1], **Noel Peter MROPE**[2], **Leonada Raphael MWAGIKE**[3]

[1]University of Dodoma, College of Business and Economics, Department of Business Administration and Management, P.O. Box 259, Dodoma, Tanzania
Corresponding author: E-mail: yohana.rutaba@udom.ac.tz
ORCID iD (https://orcid.org/0000-0002-7798-2976)
[2]Mzumbe University, Department of Procurement and Logistics Management, P.O. Box 9, Morogoro, Tanzania
ORCID iD (https://orcid.org/0000-0002-6550-327X)
[3]Mzumbe University, Department of Procurement and Logistics Management, P.O. Box 9, Morogoro, Tanzania
ORCID iD (https://orcid.org/0000-0003-0424-1357)

Frequent and severe disasters continue to expose weaknesses in the coordination and responsiveness of humanitarian logistics systems, particularly in developing countries such as Tanzania. Despite the growing recognition that collaboration among humanitarian actors is vital for effective relief operations, empirical evidence linking logistics collaboration to disaster resilience remains limited. This study investigates the influence of logistics collaboration on resilient disaster relief operations in Tanzania, emphasising the role of coordinated efforts among humanitarian actors. The study adopts a positivist philosophy and employs an explanatory research design. Data were collected from humanitarian practitioners across Dodoma, Dar es Salaam, and Kigoma using questionnaires and interviews. Guided by Stakeholder Theory and Resource Orchestration Theory, the study used Slovin's formula to select a sample of 192 respondents from a population of 369. Data were analysed using SPSS version 27, applying both quantitative and qualitative methods through a multiple linear regression model. Logistics collaboration positively and significantly influences resilient disaster relief operations. All six logistics collaboration variables (LOC1–LOC6) show statistically significant effects ($p = 0.000$), with an R-squared of 0.77 and an adjusted R-squared of 0.75. The strongest predictor is joint planning and coordination (LOC1, $\beta = 0.417$), followed by shared resources and mutual trust (LOC4, $\beta = 0.329$) and collaborative decision-making (LOC2, $\beta = 0.312$). Lower yet significant effects were observed for information sharing and response alignment (LOC5–LOC6). The findings provide actionable strategies for humanitarian organisations to prioritise collaboration mechanisms that enhance operational resilience during disasters. Enhanced collaboration in logistics contributes to faster and more coordinated disaster response, reducing human suffering and improving community recovery. Future studies could use broader samples and longitudinal designs. This study is among the first to apply stakeholder and RO theories in humanitarian logistics collaboration, offering robust empirical insights into resilience-building strategies.

Keywords: Logistics collaboration; Horizontal collaboration; Vertical collaboration; Disaster relief operations; Humanitarian organisations.

INTRODUCTION

In recent years, disasters—both natural and man-made have increasingly impacted human lives, often being accelerated by delayed responses and inefficiencies in disaster relief operations and the distribution of relief supplies (Anoop & Kumar, 2023; Raillani et al., 2020). These recurring challenges have drawn the attention of governments, policymakers and researchers towards developing frameworks and interventions to minimise the impact of disasters (Negi, 2022;

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Onyango et al., 2023). Governments worldwide have established agencies, disaster divisions and regulatory frameworks and structures for the purpose of coordinating rescue efforts and relief provision (Wankmüller & Reiner, 2020), while new policies continue to emerge towards supporting disaster relief and response operations (Dohale et al., 2024; Onyango et al., 2023).

Despite these notable efforts and interventions, inefficiencies persist in many disaster relief operations, mostly due to poor coordination of stakeholders and limited resource integration in disaster situations (Ardiansyah et al., 2024; Lambin et al., 2024). Globally, in this context, the complexity of humanitarian logistics referenced from disaster operations remains a major concern, particularly regarding constraining issues in financial aspects, information flow, coordination, controls and waste management during disaster response and relief operations (Firdous & Ramish, 2023; Tarei et al., 2024). Research studies from India, Pakistan, and Malaysia underline these complexities and emphasise the critical role of logistics integration in disaster relief operations (Aghsami et al., 2024; Costa et al., 2014; Argollo da Costa et al., 2015). Yet, many of these studies fall short of providing a direct linkage between humanitarian logistic collaborations and resilient disaster relief operations.

Research has also acknowledged the role of governments, non-government organisations (NGOs) and international agencies and bodies in relief efforts, with research citing growing concerns over coordination and effectiveness (Amos, 2022; Dubey et al., 2022). According to the Centre for Research on the Epidemiology of Disasters (CRED) (2020), 395 natural disasters in 2019 alone caused over 11,000 deaths and affected nearly 95 million people. These figures, according to CRED, underscore the increasing frequency of disasters, hinting from an average of 220 events annually in the mid-1990s to over 360 in recent years worldwide (Dubey et al., 2022).

In Africa, challenges in relief operations are marked by weak logistics coordination, inadequate planning in relief operations, poor and ineffective stakeholder coordination, and limited public engagement. (Baporikar & Shangheta, 2018). Studies advocate improvements in capacity building, stakeholder synergy and collaboration, funding, and information systems and information flow to reduce duplication of efforts and enhance

efficiency (Okdinawati et al., 2019). However, coordination and collaboration gaps persist. Research in Ghana links slow response times in disasters to inadequate relief supplies, coordination and collaboration lapses, and poor resource availability (Owusu-Kwateng et al., 2017), suggesting frameworks that emphasise actor-specific roles across disaster phases. In East Africa, disaster relief operations and disruptions in humanitarian supply chains demand robust and effective responses and continuity strategies. In Uganda, transport, order processing, and inventory management are seen as critical logistics components, although funding shortfalls remain a barrier (Korir et al., 2023; Orach et al., 2013). Literature from Kenya, Rwanda, and Congo highlights poor preparedness and fragmented relief coordination (Bahal'Okwibale, 2018; Komorowski & Karume, 2015).

Globally, fragmented efforts, stakeholder misalignment, and limited adaptability have proven costly (Wang et al., 2024). Climate change further complicates response systems, necessitating agile and adaptable logistics models (Shen et al., 2023). Humanitarian logistics must integrate preparedness, information flow, collaboration, and supply distribution to enhance disaster response. Therefore, this study investigates how these humanitarian logistics factors affect resilient disaster relief operations in Tanzania. Tanzania has experienced severe disasters, including floods, maritime tragedies, and storms. From 2015 to 2020, floods alone caused over 300 deaths and affected more than 300,000 people (Rudari et al., 2019). Yet, coordination and preparedness gaps remain significant. Studies in the Tanzanian context emphasize emphasise the need to strengthen logistics systems and stakeholder collaboration, but few directly link logistics practices with disaster resilience.

There have been several disaster incidents in Tanzania that have affected the population, leading to suffering by causing deaths, injuries and displacement of people, which has exposed inefficiencies for rescue operations and relief efforts. Protection of human lives and alleviating suffering of people during disasters should remain primary concerns for governments, agencies and humanitarian organisations globally (Bizzarri, 2012; Holthus et al., 2020; Ruiter & de Vries, 2024). In Tanzania, efforts to mitigate disaster impacts have included public awareness campaigns, community engagement in rescue

operations, and the established international and local relief organisations (Majamba, 2023; Msemo et al., 2021; Rutaba, 2022; 2023). The government, through the Disaster Management Division under the Prime Minister's Office (PMO), is vested with coordination mandate of disaster relief and has enacted various policies and Acts to support Disaster Risk Management (DRM), addressing issues such as food security, environment, public health, and emergency military support (Daly et al., 2015; Majamba, 2023).

Despite these efforts and initiatives, the rising frequency and severity of disasters continue to expose significant gaps in coordination and rescue operations (Sahay et al., 2016; Salam & Khan, 2020; Zain et al., 2023). Empirical contributions on humanitarian logistics collaboration for resilient disaster relief operations in Tanzania remain limited. While studies by Masoud (2022) and Rutaba (2022, 2023) have managed to examine humanitarian logistics and disaster management challenges, the studies did not fully address the critical aspects of horizontal and vertical logistics collaboration in resilient disaster relief operations. Similarly, Koka et al. (2018) assessed hospital preparedness, and Mbura (2014) explored flood management, yet both studies lack detailed insight into logistics collaboration. To improve disaster response in Tanzania and make the operation more resilient, this study examines the contribution of horizontal and vertical collaboration among Humanitarian Organisations (HOs) to resilient disaster relief operations. The findings will support the development of comprehensive humanitarian logistics contingency plans (Apte, 2010; Kovács & Spens, 2007; Rutaba, 2022; 2023), providing practical insights to enhance disaster resilience and reduce human suffering.

LITERATURE REVIEW

Theoretical Review

Stakeholder Theory

R. Edward Freeman is widely recognized as the founder of this theory, who has fully articulated the framework in his 1984 book "Strategic Management: A Stakeholder Approach" (Kivits & Sawang, 2021). Freeman defined a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Kivits & Sawang, 2021). The theory has since gained significant traction in corporate,

governmental, and academic spheres (Kivits & Sawang, 2021). In practical premises and applications of this theory, it illustrates that the occurrence of a disaster affects all stakeholders and their activities, and generally they affect the whole business of organisational operations, disrupting the normal operations of supplies and supply chains (Freeman, 2010; Gunasekaran et al., 2018). In order to deal with the disruption and maintain order in the systems, stakeholders need to coordinate their resources and strive to maintain the resilience of the systems and ensure continuity of operations in the normal way by absorbing the shocks (Carter, 2015). Focusing on the coordination of efforts, relationships should be established between the key players or the stakeholders to ensure timely and effective efforts.

Stakeholder Theory underscores the importance of engaging all relevant parties—local authorities, relief organisations, and community groups—in disaster preparedness. By aligning the interests of these stakeholders, the theory ensures that logistics preparedness benefits everyone involved and fosters effective coordination. This approach, which emphasises value creation and stakeholder relationships, enhances resilience and ensures a timely and efficient disaster response (Freeman et al., 2004; Mitchell et al., 1997; Sachs & Rühli, 2011). Stakeholder Theory is crucial for managing disruptions in disaster relief supply chains by emphasising coordination among stakeholders, which helps streamline distribution and reduce delays. It also highlights the role of stakeholders in absorbing shocks and maintaining system resilience during disasters. Effective coordination enhances operational efficiency and optimises relief efforts, ensuring timely aid and improved effectiveness in responding to logistical challenges (Ademola, 2014; Freeman, 2010; Gunasekaran et al., 2018). Hence, in the present study, the theory is useful in explaining the first and second specific objectives, namely the influence of logistics preparedness and the influence of logistics collaboration on resilient disaster relief operations in Humanitarian Organisations in Tanzania

Resource Orchestration (RO) Theory

Resource Orchestration Theory (RO), according to Sirmon et al. (2007, 2011) is presented as a rich theoretical foundation that combines the resource-based view theory and dynamic capability view theory into one theoretical framework with the purpose of overcoming the constraints addressed

of each. Both of these theoretical views contend that resources and capabilities are difficult to duplicate and that they are valuable, rare, non-substitutable and inimitable. However, despite the identification of criteria that resources and capabilities must suffice to be considered sources of sustained competitive advantage, these theories have been criticised because none explains how organisations can strategically leverage their resources and capabilities to gain the value creation outcomes (Gligor et al., 2022; Ab Malik et al., 2021; Rutaba, 2025).

According to Malik et al., (2021), the complementarities of resources and the efficiency of a business organisation in orchestrating resources, both inside and outside of organisational boundaries determine the capability in the creation of the synergistic effect. In this study, Resource Orchestration (RO) theory is highly relevant for understanding how logistics preparedness and collaboration contribute to resilient disaster relief operations, hence complementing Stakeholder Theory with respect to the first and second objectives of the study. The theory provides a framework for strategically managing and mobilising resources such as supplies, personnel, and infrastructure under challenging disaster conditions. RO emphasises not only possessing valuable resources but also effectively deploying them through structuring, bundling, and leveraging. In vertical collaboration, organisations across different supply chain levels (e.g., suppliers, manufacturers, distributors) can align their strategies, ensuring seamless resource flow and efficient aid delivery. Structuring ensures that resources are acquired and allocated optimally, while bundling stabilises and enhances logistics capabilities. Horizontal collaboration, where organisations at the same level share resources and information, fosters flexibility and risk-sharing, allowing partners to quickly adapt to changing disaster needs. Leveraging these partnerships, whether vertical or horizontal, enables organisations to mobilise resources efficiently, overcome constraints, and ensure a more resilient and effective disaster relief operation.

In this regard, Resource Orchestration (RO) Theory, as developed by Sirmon et al. (2007, 2011), is emphasising that it is not just the possession of resources that matters, but the strategic structuring, bundling, and leveraging of those resources—both internal and external—that creates value. In this current study, humanitarian organisations are reflected orchestrating logistics capabilities and efforts by aligning relief actions or operations and resources across multiple actors for the purpose of building resilience in disaster relief operations (Amos, 2022; Ince, 2015).

Structuring is positioned as the acquisition and configuration of resources through joint planning and inter-agency coordination, which entails collaboration among humanitarian organisations and partnerships with government agencies. In addition, bundling, which entails combining and stabilising resources, is evident in emphasising collaboration with NGOs and suppliers, fostering synergies and reinforcing logistics capabilities. Leveraging entails the deployment and utilisation of these bundled resources for maximum operational impact—captured through partnerships with logistics providers and regulatory bodies to enable effective distribution and legal compliance. This study offers a clearer theoretical interpretation of how humanitarian actors can manage and coordinate their inter-organisational resources and capabilities (Baltas et al., 2022). This integration reinforces the study's conceptual foundation as it links variable position directly to theoretical constructs, enriching both the academic rigor and practical relevance of the undertaking.

Empirical Literature Review

To improve collaboration in humanitarian logistics, stakeholders must address issues related to management, training, relationships, and military involvement (Ramsden, 2015). Ramsden also emphasises the value of developing a comprehensive humanitarian supply chain model to guide future collaboration. Several studies have highlighted logistical challenges in disaster relief operations and have underscored why it is crucial to have structured partnerships among humanitarian organisations. For instance, Baporikar and Shangheta (2018) identified resource allocation, sourcing, and transportation as major issues for the Namibian Red Cross Society, but failed to explore stakeholder collaboration in depth, revealing a research gap.

Nairobi County, Karanja, Mairura, and Ombui (2015), in their study of humanitarian organisations including Kenya Red Cross and World Vision, found deficiencies in logistics collaboration. The authors recommended awareness campaigns, skill exchanges, and better

information sharing, but did not to deeply analyse the influence of improved coordination and collaboration on resilience in disaster response. Recent research by Ren et al. (2022) managed to affirm the role of integrated logistics systems and real-time data in improving collaboration, while also highlighting persistent collaboration challenges.

In the UK, Keshvari Fard and Papier (2023) managed to explore collaboration during the COVID-19 pandemic by using the humanitarian SCOR model. The authors stressed the importance of collective performance and structural collaboration; they urged future disaster responses to institutionalise cooperative and collaborative frameworks among stakeholders. Similarly, Bealt et al. (2016) examined the relationships between humanitarian organisations (HOs) and logistics service providers (LSPs). The authors uncovered barriers such as limited trust, cultural differences, and unclear logistics roles. Schulz and Blecken (2010) also illustrated that perceptions of logistics as a core competence hinder collaboration, despite potential benefits, especially for smaller actors. The authors also urged for deeper academic-practitioner collaboration and further research into disaster recovery operations.

Technological solutions such as Blockchain Technology (BT) are increasingly advocated for their ability to enhance transparency, swift trust, and supply chain resilience (Dubey et al., 2022). BT can facilitate real-time tracking and trust-building among actors, supporting more robust collaborative networks.

In another study in Tanzania, according to Mushi, (2025), this paper emphasised the importance of collaboration strategies in disaster management. The findings highlighted that effective cooperation, coordination, and communication among organisations can enhance logistics and resilience in disaster relief operations, ultimately improving emergency response effectiveness in Tanzania.

Coordination and communication remain central to humanitarian logistics. Sahay et al. (2016) and Mazrul Hisyam Ab Malik et al. (2022) emphasise trust, structured coordination, and clear stakeholder roles. Sopha (2022) proposes a hybrid coordination structure combining centralised

planning with vertical and horizontal collaboration. However, factors such as actor diversity, technological limitations, and uncertainty still hinder effective collaboration. Handayani and Mustikasari (2019), in a case study of the Merapi eruption, stressed the need to define stakeholder roles clearly and proposed a humanitarian logistics coordination framework in relation to relief operations. They concluded that improved collaboration can directly enhance the effectiveness of relief operations.

In this regard, research has increasingly focused on the "3Cs"—coordination, cooperation, and collaboration - in relief supply chain management (RSCM), further exploration is needed on these aspects. Wankmüller and Reiner (2020), through a review of 202 papers, provided conceptual framework on 3Cs and identified research gaps. Adsanver et al. (2023) proposed a conceptual framework using Operations Research to optimise the 3Cs, while Maheshwari et al. (2020) investigated collaborative responses to disruptions. Soosay and Hyland (2015), reviewing 207 articles, identified trends in technology and sustainability in humanitarian supply chains.

Finally, Bealt et al. (2016) categorised humanitarian logistics collaboration into horizontal and vertical dimensions, the authors emphasised the complex interdependencies between humanitarian organisations (Hos) and logistics service providers (LSPs). Their findings reinforce the need for structured, multilevel collaboration models to enhance disaster response outcomes.

Conceptual Framework

The Figure 1 above illustrates a causal relationship between two key constructs — the independent variable (on the left) and the dependent variable (on the right). The arrow indicates a direct influence from the independent variable to the dependent variable. Specifically, it shows that collaboration or coordination among humanitarian actors (horizontal logistics collaboration and vertical logistics collaboration) positively influences the achievement of Resilient Disaster Relief Operations (timely DROs, efficient DROs and agile DROs).
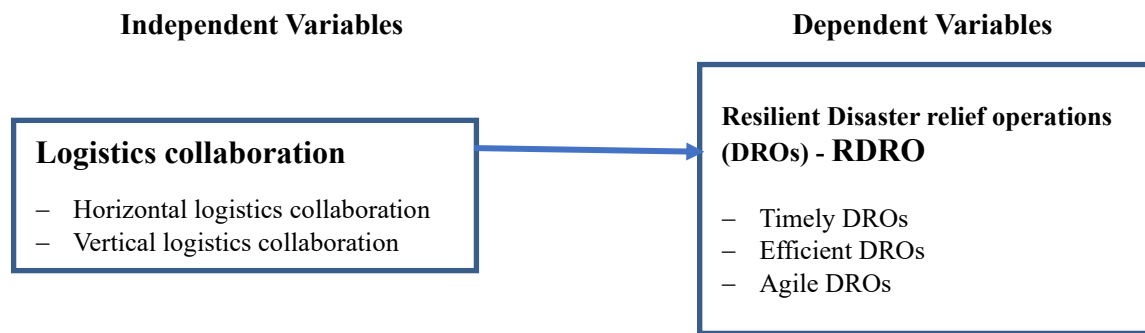
Independent Variables	**Dependent Variables**

Logistics collaboration

− Horizontal logistics collaboration
− Vertical logistics collaboration

Resilient Disaster relief operations (DROs) - RDRO

− Timely DROs
− Efficient DROs
− Agile DROs

Figure 1: Conceptual Framework
Source: Researcher's own Construction (2025)

METHODS

This specific study adopted a positivism research philosophy, which aligns well with the study's objectives due to its emphasis on observable and measurable phenomena. Positivism philosophy supports hypothesis testing and empirical observation, focusing on establishing relationships among variables rather than interpreting subjective experiences. This philosophy was particularly useful in this research since it enabled the collection of data from a large sample size, rather than just delving deeply into individual cases. As Saunders et al. (2016) argue, positivism philosophy aids objectively in the examination of the associations between two or more variables, making it an appropriate philosophical lens for this study. The study adopted an explanatory research design using a mixed mixed-methods approach integrating both quantitative and qualitative data to offer a comprehensive understanding of the problem under investigation. This specific approach allowed for concurrent collection and subsequent integration of both qualitative and quantitative data during interpretation. As Creswell (2014) illustrates, explanatory research is appropriate when the objective of the study is to explain the relationships among variables, which aligns with this study's aim-understanding the influence of logistics collaboration on resilient disaster relief operations.

This study was conducted in Tanzania, covering three regions: Dar es Salaam, Dodoma, and Kigoma. The study targeted humanitarian logistics practitioners working in Humanitarian Organisations (HOs). The three regions were selected based on the UNHCR Humanitarian Situation Report of 2022, that indicates a high concentration of humanitarian activity. The study's target population comprised 369 humanitarian practitioners who are practically engaged in logistics and disaster relief operations. These individuals considered in the study were treated as both the unit of analysis and unit of enquiry, given their practical experience and managerial responsibilities.

The sample size was determined using Slovin's formula, which is effective for achieving statistical accuracy with known confidence levels and acceptable margins of error (Creswell, 2014). A 5% margin of error was used, resulting in a sample of 192 respondents. The sample included logistics officers, procurement and supply chain specialists, rescuers, warehouse staff, and health logistics experts. These professionals were drawn from 16 identified HOs, which were treated as strata in the sampling frame. A proportional stratified sampling technique was employed to ensure that each HO was adequately represented, with a sampling ratio of 0.520 (192/369).

To further ensure fairness and randomisation within each stratum, a systematic random sampling method was used. Every second practitioner listed on the preparedness registers (with available phone numbers and email addresses) was selected and contacted online. For qualitative data, purposive sampling was used to select key informants, specifically heads of HOs, to obtain deeper managerial insights.

Data were collected through questionnaires, observations, and interviews. Quantitative data were analysed using descriptive statistics (frequencies, percentages) and Multiple Linear Regression Analysis to determine the relationships between dependent and independent variables, (Dupont, 2009). The variable definitions used in collecting the data are presented in Table 1. Prior to

analysis, data were coded, edited, and cleaned to ensure accuracy and reliability. For qualitative data, thematic analysis was applied to identify patterns and themes emerging from interview transcripts. As suggested by Saunders et al. (2016) and Patton (2002), this method allows researchers to uncover nuanced perceptions, emotions, and contextual understandings that quantitative data might overlook. The process involved familiarisation with data, coding, theme identification, and proposition testing.

In this study, qualitative themes derived from interview questions were triangulated with quantitative findings of the study to enhance the depth, validity, and contextual relevance of the results. The qualitative data, which captured practitioners' lived experiences and perceptions in humanitarian logistics and relief operations, aligned well with the quantitative patterns observed in the descriptive and inferential analyses. For example,

high mean scores and significant regression coefficients for LOC1, LOC2, and LOC4 were corroborated by interview narratives emphasising the importance of collaboration among humanitarian organisations, partnerships with government agencies, and effective coordination with suppliers. In this context practitioners stressed the need for standardised frameworks and joint logistics infrastructure (for example, shared warehouses and pre-disaster agreements), reflecting the same variables that emerged as statistically influential in the regression model. Furthermore, the qualitative theme on structural coordination challenges validated the neutral responses observed in the survey in this study, indicating areas where collaboration is perceived as less consistent or effective. By integrating both data sources, the study ensured that statistical results were not only robust but also aligned and grounded in practical realities.

Table 1: Assessment of Variable Measurements

Variable	Definition	Measurement	Instrument
Logistics Horizontal Collaboration	– Humanitarian Organisations collaborations – Government Agencies collaborations – Non-Governmental Organisations (NGOs) collaboration (Bealt et al, 2016; Keshvari Fard & Papier, 2023; Pomponi et al., 2015)	5-point Likert scale	Questionnaire and interview guide
Logistics Vertical Collaboration	– Suppliers' collaborations with HOs – Logistics Providers collaboration with HOs – Government Agencies and Regulatory Bodies collaborations with HOs (Pomponi et al., 2015)	5-point Likert scale	Questionnaire and interview guide
Resilient Disaster Relief Operations (RDRO)	– Timely Disaster relief operations – Efficient Disaster relief operations – Agile Disaster relief operations (Hussain et al.,2022)	5-point Likert scale	Questionnaire and interview guide

Source: Researcher's own construction (2025).

Testing Assumptions of Linear Regression

Descriptive Statistics and Normality

Descriptive statistical measures—including the mean, variance, standard deviation, skewness, and kurtosis—were employed to assess data distribution and test the normality assumption. The mean values indicate respondents' perceptions towards logistics collaboration variables, where values above the neutral midpoint suggest positive perceptions, while those below indicate negative perceptions. The standard deviation shows how closely responses

cluster around the mean, reflecting the degree of agreement among respondents.

Normality was further evaluated using skewness and kurtosis. Skewness measures the symmetry of the data distribution, whereas kurtosis indicates the sharpness or flatness of the distribution relative to normality. According to Kline (2011), acceptable skewness values range between –1 and +1, though some authors extend this to between –2 and +2. Similarly, kurtosis values between –3 and +3 are considered acceptable (Balanda & MacGillivray, 1988). In this study, all observed variables (LOC1–

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LOC6) had skewness and kurtosis values within these recommended thresholds, confirming that the dataset met the normality assumption.

Linearity

The linearity assumption posits that a proportional relationship exists between independent and dependent variables. As noted by Saunders et al. (2016), a change in an independent variable should correspond to a proportional change in the dependent variable. To verify this assumption, Pearson correlation coefficients (r) were computed. The results revealed statistically significant positive correlations among the study variables at the 0.01 level (two-tailed), confirming the presence of linear relationships suitable for regression analysis.

Outliers

Outliers are data points that deviate substantially from the rest of the dataset and can distort statistical estimates or bias analytical results (Kline, 2011). A thorough examination of the dataset revealed no extreme or influential outliers. Thus, the dataset was deemed clean, stable, and appropriate for subsequent regression analyses.

Multicollinearity

Multicollinearity occurs when two or more independent variables are highly correlated, which can lead to unstable regression coefficients and inflated standard errors (Schinka et al., 2003). To assess multicollinearity, tolerance and Variance Inflation Factor (VIF) values were analysed. Following established thresholds, tolerance values above 0.10 and VIF values below 10 indicate the absence of multicollinearity (Flynn & Davis, 2017; Saunders et al., 2016). In this study, all predictors (LOC1–LOC6) recorded VIF values well below 3.0, confirming that multicollinearity was not a concern (check Table 2).

Reliability and validity tests were performed to ensure that the measurement items for the Logistics Collaboration (LOC) construct were both consistent and theoretically sound. Following the guidelines by Hair et al. (2021), the study examined factor loadings, Variance Inflation Factor (VIF), Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha (α) to assess the psychometric robustness of the construct (see Table 2).

As presented in Table 2, all standardised factor loadings ranged from 0.78 to 0.85, surpassing the recommended threshold of 0.70, these indicate that each item made a substantial contribution to the underlying construct. The VIF values ranged between 1.76 and 2.08, well below the critical value of 3.3, these suggest the absence of multicollinearity among the indicators and support discriminant validity. Furthermore, the Average Variance Extracted (AVE) values (0.68–0.74) exceeded the minimum acceptable level of 0.50, signifying strong convergent validity. Similarly, the Composite Reliability (CR = 0.95) and Cronbach's Alpha (α = 0.90) both surpassed the 0.70 benchmark, illustrating high internal consistency and measurement reliability. Additionally, the Common Method Bias (CMB) test showed relatively low values ranging from 0.28 to 0.33, indicating that the data were not significantly influenced by single-source bias.

Table 2: Reliability and Validity

Indicator	Factor Loading	VIF	AVE	CR	Cronbach's Alpha	CMB
LOC1	0.78	1.76	0.78	0.95	0.90	0.30
LOC2	0.81	1.89	0.80	0.95	0.90	0.30
LOC3	0.84	2.02	0.82	0.95	0.90	0.31
LOC4	0.85	2.08	0.84	0.95	0.90	0.31
LOC5	0.80	1.91	0.80	0.95	0.90	0.32
LOC6	0.82	1.96	0.81	0.95	0.90	0.33

Source: Researcher's Analysis (2025)

Relative Importance Index (RII)

The findings in Table 3 indicate that all the proposed indicators of logistics collaboration were perceived as important by respondents, portraying RII values ranging from 0.788 to 0.814. This narrow range reflects a strong consensus that collaboration plays an important role in enhancing the effectiveness of disaster relief operations. The highest-ranked factor from was effective collaboration with suppliers (LOC4), with an RII of 0.814, suggesting that coordination with suppliers is often seen as the most critical component for ensuring a steady flow of relief materials and distribution. This highlights the importance of reliable supplier relationships in achieving timely and efficient delivery during emergencies.

On the other hand, collaboration with government agencies and regulatory bodies (LOC6) was ranked second (RII = 0.814), this emphasizing the indispensable role of government support in facilitating smooth logistics operations.

Partnerships with government agencies (LOC2) followed closely (RII = 0.805), this reinforces that strong institutional linkages and regulatory cooperation are fundamental for effective coordination in humanitarian logistics. These findings suggest that policy alignment and joint planning with government institutions significantly contribute to resilience in disaster relief operations.

Additionally, collaboration among humanitarian organisations (LOC1) and partnerships with logistics providers (LOC5) were ranked fourth and fifth, respectively, both with RII values of 0.795 (check Table 3). Though slightly lower, these results still portray a high level of importance, showing that information sharing and operational partnerships remain essential for efficiency. The lowest-ranked factor, collaboration with NGOs (LOC3), recorded a medium importance level (RII = 0.788), suggesting that NGOs, while valuable actors in humanitarian efforts and operations, are perceived as supporting rather than leading partners in logistics collaboration and disaster relief operations. Overall, the results affirm that multi-stakeholder collaboration—especially with suppliers and government entities—is central to achieving resilient disaster relief operations.

Table 3: Relative Importance Index (RII)

Logistics Collaboration (LOC)	RII	Rank	Importance Level
Effective collaboration with suppliers (LOC4)	0.814	1	High
Collaboration with government agencies	0.814	2	High
Partnerships with government agencies (LOC2)	0.805	3	High
Collaboration among humanitarian organisations (LOC1)	0.795	4	High
Partnerships with logistics providers (LOC5)	0.795	5	High
Collaboration with NGOs (LOC3)	0.788	6	Medium

RESULTS

Demographics of the respondent

As presented in Table 4. below, the demographics of respondents were assessed based on region,

organisation category, location, age group, experience, and specialisation in disaster relief operations. As Saunders et al. (2016) note, demographic data help explain differences in opinions and behaviours and evaluate how well the sample represents the population. Practitioners from humanitarian organisations in Dodoma, Kigoma, and Dar es Salaam completed the questionnaires. Both technical and support staff were represented, with specialisations in relief procurement, humanitarian supply chains, operations, and disaster management.

Results showed that most respondents (39.6%) were from organisations based in Dar es Salaam, followed by Dodoma (32.3%) and Kigoma (28.1%). Dar es Salaam led due to the concentration of head offices there. In terms of organisation category, 41.1% were from Local NGOs, 35.9% from International NGOs, and 22.9% from government institutions (refers to Table 4).

Age-wise, the respondents were fairly distributed: 9.9% were aged 18–27, 53.1% aged 28–37, 29.2% aged 38–47, 7.8% aged 48–57, and none were above 57. This suggests that the majority were middle-aged, which, according to Kiage (2013), correlates with having adequate work experience.

Experience in disaster relief and humanitarian logistics was also evaluated. About 24.0% had more than 10 years' experience, 46.4% had 5–10 years, 28.1% had 3–5 years, and only 1.6% had less than 3 years. These findings suggest that most respondents were knowledgeable and had practical exposure to the issues studied, confirming their suitability for the research. This aligns with Vereb et al. (2024) and Mohanraj et al. (2024), who stress the link between experience and informed insights into organisational performance.

Descriptive statistics: mean. Standard deviation, skewness and kurtosis

Descriptive statistical measures were employed to detect the data and to test the normality. In this regard, the preliminary tools used for this purpose were the mean, variance, standard deviation, kurtosis, and skewness – as presented in Table 6. The standard deviation depicts the extent to which the scores in a dataset cluster around the mean. In this case, when the value of the mean is above neutral midpoint, it indicates the positive perception of respondents on the variable.

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Conversely, when the value of the mean is below the neutral, it suggests the negative perception of respondents on the variable. Likewise, skewness is defined as a measure of symmetry (in other words the lack of symmetry). Asymmetric in the data set occurs when most of the scores are below or above the mean. Skewness appears in three forms (left: skew < 0, normal: skew ~ 0, and right: skew > 0). According to Kline (2011), an acceptable range for normality is the value between -1 to 1. However,

normality is not only tested by skewness alone but also by kurtosis. Kurtosis is defined as a measure of whether the data are flat relative to a normal distribution. Similarly, the acceptable range for normality is the value between -1 to 1 (Kline, 2011). However, some studies accept kurtosis and skewness values between -2 and +2 (Kline, 2011) and -3 and +3 for kurtosis (Balanda & MacGillivray, 1988).

Table 4: Demographic Characteristics of Respondents (N = 192)

Variable	Category	Frequency	Percent	Cumulative Percent
Age Group	18 – 27 Years	19	9.9%	9.9%
	28 – 37 Years	102	53.1%	63.0%
	38 – 47 Years	56	29.2%	92.2%
	48 – 57 Years	15	7.8%	100.0%
	Total	**192**	**100.0%**	
Work Experience	0 – 3 Years	3	1.6%	1.6%
	3 – 5 Years	54	28.1%	29.7%
	5 – 10 Years	89	46.4%	76.0%
	More than 10 Years	46	24.0%	100.0%
	Total	**192**	**100.0%**	
Type of Organisation	Government	44	22.9%	22.9%
	Non-Government (Local)	79	41.1%	64.1%
	Non-Government (International)	69	35.9%	100.0%
	Total	**192**	**100.0%**	
Organisation Location	Dodoma	62	32.3%	32.3%
	Dar es Salaam	76	39.6%	71.9%
	Kigoma	54	28.1%	100.0%
	Total	**192**	**100.0%**	
Practitioner Specialisation	Rescuer	16	8.3%	8.3%
	Supply Chain	40	20.8%	29.2%
	Logistics Officer	24	12.5%	41.7%
	Relief Officer	31	16.1%	57.8%
	Relief Operations Coordinator	30	15.6%	73.4%
	Medical Supply Specialist	18	9.4%	82.8%
	Distribution Officer	33	17.2%	100.0%
	Total	**192**	**100.0%**	

Source: Researcher's own Construction (2025)

The findings in Table 5 reveal that respondents hold a strongly positive perception of collaboration and partnerships in enhancing humanitarian logistics operations. Across all six indicators (LOC1–LOC6), the majority of participants agreed or strongly agreed that collaboration improves efficiency, coordination, and resource utilisation, with overall agreement levels ranging between approximately 67% and 74%. Specifically, 70.9% agreed that collaboration among humanitarian organisations optimises resource sharing and coordination, while 74% affirmed that partnerships with government agencies ensure regulatory support

and facilitate resource mobilisation. Similarly, 66.7% believed that collaboration with NGOs leverages local expertise and networks, and 72.8% agreed that partnerships with suppliers enable timely access to essential resources. Furthermore, 67.3% acknowledged that collaboration with logistics providers enhances transport and distribution capacity, and 72.5% agreed that partnerships with government and regulatory bodies streamline logistics operations through legal compliance and institutional support. Very few respondents disagreed with the statements (mostly below 5%), while neutral responses remained moderate (11–18%),

suggesting a general consensus on the benefits of collaboration. The results in Table 5 indicate that effective partnerships across organisations, governments, NGOs, suppliers, and logistics providers are widely perceived as key enablers of efficient, coordinated, and responsive humanitarian logistics systems.

Table 5: Descriptive Statistics on level of agreement of respondents (N=192)

Variable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Collaboration among humanitarian organisations optimises resource sharing and enhances coordination (LOC1)	0 (0%)	10 (4.6%)	29 (13.4%)	109 (50.5%)	44 (20.4%)
Partnerships with government agencies ensure regulatory support and facilitate resource mobilisation, significantly strengthening humanitarian logistics efforts (LOC2)	0 (0%)	9 (4.2%)	24 (11.2%)	112 (52.1%)	47 (21.9%)
Collaboration with NGOs leverages local expertise and networks, expanding the reach and adaptability of humanitarian logistics in crisis-affected areas (LOC3)	0 (0%)	7 (3.2%)	40 (18.4%)	103 (47.4%)	42 (19.3%)
Effective collaboration with suppliers enables humanitarian organisations to secure timely access to essential resources (LOC4)	0 (0%)	6 (2.7%)	28 (12.9%)	105 (48.4%)	53 (24.4%)
Partnerships with logistics providers enhance the capacity of humanitarian organisations to transport and distribute goods quickly and reliably in disaster situations (LOC5)	0 (0%)	9 (4.1%)	35 (15.9%)	100 (45.5%)	48 (21.8%)
Collaboration with government agencies and regulatory bodies helps humanitarian organisations navigate legal requirements and receive support for streamlined logistics operations (LOC6)	0 (0%)	2 (0.9%)	32 (14.7%)	109 (50.0%)	49 (22.5%)

Source: Researcher's own Construction (2025)

Table 6: Descriptive Statistics, Normality Testing, and Influence of Logistics Collaboration on Resilient Disaster Relief Operation (N = 192)

Item	Mean	SD	Variance	Skewness	Kurtosis	Coef.	SE Coef.	T	P
LOC1	4.28	0.81	0.656	-1.10	1.58	0.417	0.062	6.73	0.000
LOC2	4.15	0.87	0.757	-1.02	1.36	0.312	0.053	5.88	0.000
LOC3	4.07	0.90	0.810	-0.95	1.21	0.255	0.048	5.31	0.000
LOC4	4.12	0.83	0.689	-1.06	1.32	0.329	0.065	5.05	0.000
LOC5	4.08	0.92	0.846	-0.91	1.18	0.273	0.058	4.71	0.000
LOC6	3.94	0.96	0.922	-0.87	1.05	0.241	0.055	4.39	0.000

$R^2 = 0.77$, Adjusted $R^2 = 0.75$

Source: Data from Survey (2025)

The findings in Table 6 also indicate a strong and statistically significant influence of logistics collaboration on resilient disaster relief operations, structured with six observed variables (LOC1–LOC6). The observed factors exhibit positive and highly significant coefficients (p = 0.000). As for R-squared, the R-squared (0.77) and Adjusted R-squared (0.75) suggest that 75%–77% of the variation in resilient disaster relief operations is explained by logistics collaboration. Aforementioned highlights the critical role of logistics collaboration in disaster response effectiveness. Among the predictors, LOC1 (β = 0.417, p = 0.000) has the strongest effect, followed by LOC4 (β = 0.329, p = 0.000) and LOC2 (β = 0.312, p = 0.000), suggesting that certain aspects of logistics collaboration—potentially related to information sharing, coordination mechanisms, or joint resource utilisation—are particularly influential in enhancing resilience. The relatively lower coefficients for LOC6 (β = 0.241) and LOC5 (β = 0.273) indicate that while all collaboration factors contribute to resilience, their impact varies in magnitude. The practical implication is that organisations engaged in disaster relief should

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prioritise the most impactful collaborative strategies to improve response efficiency and effectiveness.

DISCUSSION

Table 4. underscores the importance of well-established logistics collaboration mechanisms to ensure seamless coordination among stakeholders in humanitarian operations. The overall mean values (3.94 to 4.28) suggest that respondents view logistics collaboration favourably, with LOC1 (4.28) rated highest and LOC6 (3.94) still reflecting a positive perception. Standard deviation values (0.81–0.96) indicate moderate response variation, suggesting general agreement with some differing views on collaboration effectiveness. Negative skewness (-1.10 to -0.87) and moderately peaked kurtosis (1.05 to 1.58) reinforce that most responses cluster at the high end of the scale, pointing to positive stakeholder perceptions of logistics collaboration. For LOC1 (Collaboration among Humanitarian Organisations), 50.5% agree and 20.4% strongly agree that such collaboration enhances resource sharing and coordination. Only 4.6% disagree, indicating broad consensus on its importance. This implies that a coordinated inter-organised approach improves logistics performance during crises. LOC2 (Partnerships with Government Agencies) is also strongly supported—52.1% agree and 21.9% strongly agree these partnerships aid in resource mobilisation and regulatory compliance. This highlights the essential role of public institutions in ensuring effective, legally compliant humanitarian operations.

LOC3 (Collaboration with NGOs) garnered 47.4% agreement and 19.3% strong agreement, recognising NGOs' local expertise and networks. Although 18.4% were neutral, only 3.2% disagreed, confirming NGOs' importance in extending humanitarian reach and cultural relevance. LOC4 (Supplier Collaboration) received 48.4% agreement and 24.4% strong agreement. With only 2.7% in disagreement, the response confirms that supplier relationships are critical for timely access to essential goods under pressure. For LOC5 (Partnerships with Logistics Providers), 45.5% agree and 21.8% strongly agree on the role of these providers in enhancing transport and distribution capacity. This supports the reliance on specialised third-party logistics expertise for efficient operations. LOC6 (Collaboration with Government and Regulatory Bodies) had 50% agreement and 22.5% strong agreement. Only 0.9% disagreed, showing a strong consensus that regulatory partnerships help navigate legal barriers and streamline logistics operations.

Furthermore, the results presented in Table 5, the overall strength of the model further emphasises that logistics collaboration should be positioned as a key driver of resilience in disaster relief operations. The statistical significance of all predictors in this model suggests that a multi-dimensional approach to collaboration, encompassing stakeholder coordination, joint decision-making and shared infrastructure, is critical and essential for enhancing disaster response capabilities. The consistently high T-values (≥ 4.39) reinforce the robustness of these findings, indicating that logistics collaboration plays a decisive role in improving disaster operational resilience. Given the high explanatory power of the model, future research should explore additional factors that may moderate or mediate this relationship, such as technological integration, policy frameworks, and cross-sector partnerships. Additionally, further analysis here could investigate the specific contexts in which different collaboration dimensions have the most explained effects, providing more tailored recommendations for disaster response organisations.

Collaboration and Partnerships between humanitarian organisations and logistics service providers can optimise resource sharing and enhance coordination (Bealt et al, 2016). Collaboration between humanitarian organisation can improve efficiency and resilience in disaster relief operations (Prakash et al., 2022). Humanitarian-business partnerships in logistics management can improve efficiency and effectiveness, but more empirical research is needed to measure outcomes and contributions to performance (Nurmala et al., 2017). Horizontal cooperation between humanitarian organisations can produce synergies and benefits in disaster relief operations, particularly in supply chain infrastructure and consolidation. Other authors discussed the need for integrated decision-making and partnerships among humanitarian organisations, government agencies, and suppliers, safe in the knowledge that it can enhance the resiliency of disaster relief operations. According to Moonesar (2025), the paper emphasises the importance of public-private partnerships in humanitarian logistics, which can enhance resource allocation and response times during occurrence of a disaster. This also is supported by Aghsami et al., (2024) and Khalili-Fard et al., (2024), highlighting

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that effective partnerships and collaborations can significantly strengthen disaster relief operations, and this can be aided by ensuring regulatory support, leveraging local expertise, and facilitating timely access to essential resources.

Based on the quantitative and qualitative evidence, LOC1 (Collaboration among Humanitarian Organisations), LOC4 (Supplier Collaboration), and LOC2 (Partnerships with Government Agencies) emerged as the most influential dimensions of logistics collaboration in enhancing resilient disaster relief operations. The prominence of LOC1 (β = 0.417) reflects the critical role of inter-agency coordination in overcoming resource constraints and avoiding redundancy. The high agreement levels from respondents, coupled with qualitative insights, suggest that shared logistics infrastructure, like joint warehouses and pooled transport systems, significantly enhance response speed and resource utilisation. This influence likely points to structural gaps in centralised command and coordination among humanitarian actors in Tanzania. LOC4 (β = 0.329) underscores the operational importance of collaborating with suppliers to ensure timely access to essential goods,

especially under uncertain and urgent conditions. Interviewees highlighted the need for pre-disaster supplier agreements and local sourcing strategies to overcome bottlenecks during crises. This reveals a pragmatic reliance on suppliers as frontline enablers of logistics continuity.

LOC2 (β = 0.312) highlights the strategic necessity of engaging with government agencies for regulatory compliance and resource mobilisation. However, the data and narratives suggest that while partnerships exist, there is a lack of formal frameworks or clearly defined first-responder roles, which can compromise coordination efficiency. Thus, these high coefficients could be a response to structural and cultural fragmentation in Tanzanian relief systems. Conversely, the lower influence of LOC5 (Logistics Providers, β = 0.273) and LOC6 (Regulatory Bodies, β = 0.241) may reflect limited integration or reactive engagement rather than proactive partnerships. Their practical relevance should not be dismissed; rather, these findings suggest untapped potential in industrialising broader logistics partnerships and regulatory alignment to enhance disaster readiness.

Table 7: Analysis of Variance (ANOVA) Table:

Source	DF	SS	MS	F	P
Regression	6	24.536299	4.0893832	95.46	0.0000
Residual Error	185	2.6786617	0.0145		
Total	**191**	**27.2149607**			

Source: Data from Survey (2025)

The ANOVA results presented in Table 7 provide strong statistical support for the regression model examining the influence of logistics collaboration on resilient disaster relief operations. The Regression sum of squares (SS) = 24.5363 out of the Total SS = 27.2150, indicating that a substantial proportion of the variability in disaster relief resilience is explained by logistics collaboration. The Mean Square (MS) for Regression = 4.0894, compared to the Residual MS = 0.0145, demonstrates a significant difference between the explained and unexplained variance, reinforcing the model's predictive strength.

The F-statistic (F = 95.46, p = 0.0000) confirms the overall statistical significance of the model, meaning that at least one of the logistics collaboration factors (LOC1–LOC6) has a meaningful effect on resilient disaster relief operations. The extremely low p-value (0.0000) provides strong evidence to reject the null

hypothesis, supporting the conclusion that logistics collaboration significantly enhances disaster response resilience. Additionally, the relatively low residual error suggests minimal unexplained variance, indicating a well-fitted model.

CONCLUSION AND IMPLICATIONS

Conclusion

The study findings revealed that logistics collaboration is significantly related to resilient disaster relief operations in Tanzania. In other words, logistics collaboration is a significant determinant of resilient disaster relief operations. Humanitarian logistics collaboration may be strengthened by instituting collaboration among humanitarian organisations (to optimise resource sharing and enhances coordination), organisations instituting partnerships with government agencies (to ensure regulatory support and facilitate resource

mobilisation, significantly strengthening humanitarian logistics efforts), government agencies collaboration with NGOs (to leverage local expertise and networks, expanding the reach and adaptability of humanitarian logistics in crisis-affected areas) and organisations effective collaboration with suppliers (to enable humanitarian organisations to secure timely access to essential resources). Also, enhancing partnerships with logistics providers (to enhance the capacity of humanitarian organisations to transport and distribute goods quickly and reliably in disaster situations) and lastly humanitarian organisations collaborate with government agencies and regulatory bodies (to help humanitarian organisations navigate legal requirements and receive support for streamlined logistics operations).

Based on the study findings, several actionable recommendations are proposed to strengthen logistics collaboration and enhance the resilience of disaster relief operations in Tanzania. The government, through the Prime Minister's Office Disaster Management Division (PMO-DMD), should develop and industrialise a national logistics collaboration framework. This framework should define clear roles, responsibilities, and coordination protocols among humanitarian organisations, NGOs, government agencies, suppliers, logistics providers, and regulatory bodies. Such a structure would minimise coordination gaps and improve response efficiency during emergencies.

Humanitarian organisations are encouraged to promote formal inter-agency agreements, such as Memoranda of Understanding (MoUs), joint contingency plans, and shared logistics platforms. These agreements need to incorporate pre-disaster resource mapping, shared warehousing, and transport arrangements in order to streamline and accelerate response operations. Additionally, public-private partnerships (PPPs) should be enhanced by providing incentives—including tax benefits and policy support, recognition programmes, and participation in emergency preparedness simulations— which will aid in ensuring private sector engagement and access to critical infrastructure in disaster response.

To further improve responsiveness in disasters and emergencies, especially in remote or high-risk regions, decision-making should be decentralised through the empowering local and regional actors with logistical autonomy and clear mandates.

Finally, all stakeholders should be urged to invest in joint simulation exercises, capacity-building initiatives, and robust logistics information systems that enable communication, real-time data sharing, and performance tracking.

Theoretical Implications

This specific study extends stakeholder theory and RO into humanitarian logistics; this study validates their applicability beyond corporate contexts. It demonstrates that multi-stakeholder collaboration—both horizontal and vertical—can enhance agility, coordination, and resilience in disaster relief. Through empirical distinction between types of collaboration and linking them to operational outcomes, this research provides a nuanced understanding of how theory translates into practice. On the other hand, this study advances RO Theory by illustrating that resource deployment, not just availability, is key in crisis environments.

Knowledge Implications

This research deepens academic understanding of how logistics collaboration drives resilience in humanitarian settings. The study managed to introduce a differentiated approach by measuring the individual contributions of six collaboration types, identifying inter-agency collaboration as most impactful. The study also managed to combine quantitative modelling with qualitative interviews to capture both statistical trends and practitioner perspectives. By emphasising collaboration in both preparedness and response phases, this study contributes to proactive disaster management literature. The findings of this study contextualise global frameworks within developing economies; this offers transferable insights.

Social Implications

Socially, this current study promotes community safety and well-being through enhanced disaster responsiveness. By fostering effective logistics collaboration, humanitarian actors can strive to reduce human suffering, displacement, and loss during emergencies. The industrialisation of joint efforts among HOs and logistics providers can ensure that aid reaches vulnerable populations faster and more reliably. On the other hand, the findings support inclusive, community-centred disaster risk reduction strategies. In contexts like Tanzania, where resources are constrained, such collaborative approaches and strategies can play a transformative

role in protecting lives and promoting societal resilience.

Policy Implications

The findings of this study show the need for deliberate policy interventions that should be aimed at institutionalising logistics collaboration to enhance disaster resilience in Tanzania. Policymakers, particularly within the Prime Minister's Office in Tanzania – Disaster Management Division (PMO-DMD), should structure and prepare a National Humanitarian Logistics Collaboration Policy Framework. This specific framework should clearly describe coordination mechanisms, information-sharing protocols and mechanisms, and accountability structures among HOs, NGOs, suppliers, government agencies, and logistics service providers. Such a policy would help to minimise duplication, ensure efficient resource utilisation, and enhance the overall efficiency and effectiveness of disaster response. Government policies should further promote public–private partnerships (PPPs) that offer incentives such as tax relief, policy support, and recognition awards to encourage private sector participation in emergency preparedness and relief logistics. Furthermore, policy reforms should support decentralised decision-making for relief operations, empowering regional and local authorities with the autonomy

and resources needed to coordinate logistics operations during emergencies. This will ensure timely response in remote or hard-to-reach areas.

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDIES

Research Limitations

Despite its benefits, implications and contributions, this study has limitations. This study was conducted in only three regions (Dodoma, Dar es Salaam, and Kigoma), which may somewhat limit generalisability to other regions or countries. Since the study also used a cross-sectional design, this restricts the ability to capture dynamic changes over time. The complexity of logistics collaboration may involve unmeasured contextual variables such as political interference or cultural dynamics. Ultimately, these factors warrant caution in extrapolating findings universally and suggest areas for further exploration.

Policy-Oriented Recommendations

To enhance the practical relevance of this study, the following recommendations in Table 8 are provided for policymakers, humanitarian organisations, and other stakeholders involved in disaster relief logistics in Tanzania and similar contexts:

Table 8: Policy-Oriented Recommendations

Policy Area	Recommendation
– **Standardised Collaboration Protocols**	Develop national frameworks and joint operational standards for inter-agency collaboration.
– **Government-Agency Coordination**	Define clear roles and responsibilities for government bodies in disaster logistics.
– **Supplier Pre-Agreements**	Establish pre-disaster contracts with local and international suppliers to ensure timely access to critical supplies.
– **Joint Infrastructure Development**	Promote shared warehouses, transport assets, and distribution centers to minimise redundancy.
– **Capacity Building and Training**	Offer cross-sectoral training programmes on collaborative logistics and regulatory compliance.
– **Integrated Information Systems**	Implement centralised platforms for data and information sharing among key actors.

Cross-Regional Comparison of Collaboration Dynamics

Although the overall patterns of collaboration were positive across all regions, notable differences emerged between Dar es Salaam and Kigoma. In Dar es Salaam—where 39.6% of respondents were located and many head offices are based—

collaboration appeared more structured, with higher reported agreement levels for LOC1 and LOC2. This suggests a more formalised network of inter-agency coordination, possibly due to proximity to national institutions and better access to infrastructure.

Conversely, in Kigoma (28.1%), responses indicated greater reliance on local NGOs and informal networks, which may reflect geographical remoteness and limited institutional presence. Respondents from Kigoma emphasised challenges in accessing centralised resources and the need for more government support, particularly for regulatory clearance and logistics coordination.

These regional differences underscore the importance of context-sensitive policy approaches, where collaboration mechanisms are adapted to local capacities and needs. Tailoring coordination strategies by region could significantly enhance the effectiveness of disaster relief operations across Tanzania.

Suggestions for Future Studies

Future research is suggested to adopt a longitudinal design to capture the evolution of logistics collaboration and its long-term effects on disaster resilience. Comparative studies across different countries or regions could also reveal contextual nuances, and this can enhance generalisability of findings. Moreover, future work could also try to explore the impact of collaboration during various disaster phases—preparedness, response, recovery, and mitigation.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used ChatGPT in order to strengthen grammar and clarity of sentences. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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UTICAJ LOGISTIČKE SARADNJE NA ORGANIZACIONO OTPORNE, PRILAGODLJIVE I ODRŽIVE OPERACIJE HUMANITARNE POMOĆI U VANREDNIM SITUACIJAMA: EMPIRIJSKI DOKAZI IZ PRAKSE HUMANITARNIH RADNIKA

Česte i ozbiljne katastrofe i dalje otkrivaju slabosti u koordinaciji i odgovoru humanitarnih logističkih sistema, posebno u zemljama u razvoju kao što je Tanzanija. Uprkos rastućem priznanju da je saradnja među humanitarnim akterima od vitalnog značaja za efikasne operacije pomoći, empirijski dokazi koji povezuju logističku saradnju sa otpornošću na katastrofe ostaju ograničeni. Ova studija istražuje uticaj logističke saradnje na otporne operacije pomoći u katastrofama u Tanzaniji, naglašavajući ulogu koordinisanih napora među humanitarnim akterima. Studija usvaja pozitivističku filozofiju i primenjuje objašnjavajući istraživački dizajn. Podaci su prikupljeni od humanitarnih praktičara širom Dodome, Dar es Salama i Kigome korišćenjem upitnika i intervjua. Vođena teorijom zainteresovanih strana i teorijom orkestracije resursa, studija je koristila Slovinovu formulu za izbor uzorka od 192 ispitanika iz populacije od 369. Podaci su analizirani korišćenjem SPSS verzije 27, primenom i kvantitativnih i kvalitativnih metoda kroz višestruki linearni regresioni model. Logistička saradnja pozitivno i značajno utiče na otporne operacije pomoći u katastrofama. Svih šest varijabli logističke saradnje (LOC1–LOC6) pokazuje statistički značajne efekte (p = 0.000), sa R-kvadratom od 0.77 i korigovanim R-kvadratom od 0.75. Najjači prediktor je zajedničko planiranje i koordinacija (LOC1, β = 0.417), zatim zajednički resursi i međusobno poverenje (LOC4, β = 0.329) i zajedničko donošenje odluka (LOC2, β = 0.312). Niži, ali značajni efekti primećeni su za razmenu informacija i usklađivanje odgovora (LOC5–LOC6). Nalazi pružaju primenljive strategije za humanitarne organizacije da daju prioritet mehanizmima saradnje koji poboljšavaju operativnu otpornost tokom katastrofa. Povećana saradnja u logistici doprinosi bržem, koordinisanijem odgovoru na katastrofe, smanjujući ljudsku patnju i poboljšavajući oporavak zajednice. Buduće studije bi mogle koristiti šire uzorke i longitudinalne dizajne. Ova studija je među prvima koje primenjuju teoriju zainteresovanih strana i teoriju orkestracije resursa u humanitarnoj logističkoj saradnji, nudeći snažne empirijske uvide u strategije izgradnje otpornosti.

Ključne reči: Logistička saradnja; Horizontalna saradnja; Vertikalna saradnja; Operacije pomoći u katastrofama; Humanitarne organizacije.