

Midocean University

College of Management

Master of Risk Management



**Assessing Institutional, Technological, and Operational Communication Barriers Between
Emergency Services, Government Agencies, and Private Sector Partners During Crisis**

Response

Student's Name /

Ahmad Khalid Aldrwish

supervision /

Dr. Faisal Abdul Hamid

Dr. Fayez Jarad

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Chapter One: Introduction

1.1 Background of the Study

The success of disaster response assessment is also dependent on good crisis communication and coordination of various emergency services, government departments and the player in the system that resides in an area of the disaster. In the modern world, that is highly connected and exposed to any kind of hazards, such crises like a natural disaster, pandemic, industrial incident, or a cyberattack presuppose making expeditious, efficient, and informed decisions. Nevertheless, such an approach is more likely to inhibit the timely exchange of information and collaboration of crisis management stakeholders in various countries and case studies institutional fragmentation, incompatibilities between technologies and inefficiencies of their operations are likely to impede (Abdeen et al., 2021; Gooding et al., 2022; Kapucu et al., 2022).

The response to crises Is multi-sectoral in nature. It involves the involvement of government agencies which are engaged in the command and control (disaster management authorities and local governments), emergency service providers (fire, police and ambulance service), as well as, partners of the private-sector (telecommunications, logistics and utility sector) whose resources and infrastructure would prove promotion of emergency times. However, it is the intersection of various institutional demands, culture of communication and systems of technology that is likely to result into the destruction of coordination. Using the example of Riebe, Kaufhold and Reuter (2021), research has found that disintegrated technology protocols amongst the emergency response organizations is a profile that significantly suffocates a joint decision-making. Similarly, Wang, Qi and Ran (2022) observed that involvement of the

role of the private organizations in response of COVID 19 in China played important roles that were not well organized due to lack of standardized communications structures.

Most of the developing and transitional economies are faced with the added disadvantage of translation and structural weaknesses, these become an impediment to communications. These include unclear reporting lines, red tap, weakness on training of crisis communication and interoperability of information systems. Based on the results of Abdedeen et al. (2021), disaster management services are more likely to act in solitude and have few ranks of trust or shared perception of the work, and resources would be provided gradually. According to Latonen et al. (2023), there are also no proper mechanisms of cross sector collaboration, and thus, it makes responding to crisis more timely and healthier and pharmaceutical supply chains more effective.

The increased level of sophistication of the crises based on climate change, urbanization and dependency on digital needs to be more resilient to combat the crisis through capacity to exchange information and networking to overcome the crisis. Recent research points out that communication is not only a technical process, but also an institution and a culture. Sikder and Harvey (2023) suppose that any of the technological solutions i.e. real-time data dashboards, IoT sensors and digital command platform too would only be employed with success as long as the institutional and operational barriers are also addressed simultaneously. Consequently, the focus on studying the multidimensionality of the communication barriers such as the institutional, technological and operational is crucial in improving the system of crisis response.

The organizational barriers might be occasioned by rigid organizational hierarchies, mistrusts, conflicting mandates and incompetent leadership. The technological barriers are linked to the poor digital infrastructure, the incompatibility of the system or the cybersecurity risk that determines the limits of the data exchange (Pescaroli et al. 2023). Operational obstacles on the

other hand entail the absence of training on crisis, absence of coordination procedure or absence of transparency in communication channels during the emergencies. The factors interact to either cause engagement in playing of emergency actors as one - network or as singletons case of high uncertainty.

Against this backdrop, this paper will seek to assess communication barriers that will fail to allow a coordination between the emergency services, government and players in the private sector in addressing crisis response. It is premised on the world literature although it speaks to contextual realities according to which multi agency coordination is a challenge. Such results will provide evidence based policy and capacity building strategies that can be used to improve inter-organizational communication and coordination in a crisis.

Ultimately, the provided study gives a contribution on the general understanding of the impact of the system of institutional design, technology adoption and practices on the efficiency of the crisis management systems. It is in the line of the trend towards more attention to the resilience, collaborative, and adaptive types of governance proposed by such researchers as Kaneberg et al. (2023) Parker (2024) and Ongensa et al. (2025). The research will contribute to the creation of the integrated crisis communication patterns that will enable the timely, credible and integrated measures of responses, in the case of emergency by determining the primary barriers to practice and their interactions.

1.2 Problem Statement

But despite all the efforts made in communication technology involving emergencies and institutional transformation, the responses of the crisis in terms of coordination failure are still many. This is mainly due to failure in the institutions, failure to have a flexible information systems as well as inefficiencies in the processes which propagate information and decision

making amongst organizations. Delay in responding, redundancy and wasting resources is not uncommon since government agencies, emergency providers and partners of separate sectors are often pre-destined by various mandates, communication systems and opportunities and consequently, lack the response in time, duplicate the efforts and waste resources.

The problems have mostly been considered by the literature at the sectoral level or between nations without giving much empirical information as to the role that the interaction between institutional, technological and operational constraints can have regarding multi-agency communication in the event of a crisis scenario. This research will attempt to address this gap by conducting a systematic research review pertaining to the extent and nature of communication barriers in these three dimensions. The research will offer feasible designs to enhance the collaborative communication system in crisis management and enhance the effectiveness of the response in general by quantifying and evaluating the interplay of the institutional culture and application of technology and coordination of the organization.

1.3 Research Questions

1. What are the main institutional, technological, and operational communication barriers among emergency services, government agencies, and private-sector partners during crisis response?
2. How do these communication barriers influence coordination effectiveness among the different actors?
3. What relationships exist between institutional structures, technology adoption, and operational coordination in determining crisis communication effectiveness?
4. How can communication and coordination be improved to enhance collective crisis response?

1.4 Research Objectives

1.4.1 Main Objective

To assess institutional, technological, and operational communication barriers affecting coordination between emergency services, government agencies, and private-sector partners during crisis response.

1.4.2 Specific Objectives:

1. To identify and categorize the institutional barriers that hinder effective communication and coordination.
2. To evaluate the technological challenges affecting information sharing among crisis response agencies.
3. To examine operational factors influencing inter-agency communication effectiveness.
4. To analyze the relationships between institutional, technological, and operational barriers and overall coordination performance.

1.5 Research Significance

The policy makers, emergency management practitioners as well as the crisis communication scholars can find the value in this study. To start with it provides empirical data on the multidimensional barriers inhibiting effective crisis co-ordination - barriers needed in the design of more resilient emergency communication systems. Second, the government and disaster management authorities will use the findings to develop integrated frameworks that would improve the level of interoperability and mutual trust between the players involved in the sector the public and the private. Communication bottlenecks awareness information can be applied in the organization of emergency services welfare in the form of training on how to achieve efficiency in response through investment in technological advancements.

Academically, the paper will have good contributions for theoretical discourse of institutional communication, crisis management and the inter-organizational cooperation. It extends or develops earlier models through quantitative interrelationship of institutional, technological and operation relationships into one model. Moreover, it formulates potentially effective recommendations that can be applied in different crisis-related situations through a cross-sectoral analysis - be it natural catastrophes, healthcare emergencies and cybercrime. Lastly, the research will get better prepared on groups and the establishment of the cooperation in the form of trust and the elicitation of the positive policy interventions to promote communication and coordination in the response mechanism in a crisis.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Another thing which is necessity in the modern crisis management is a well-organized and well-transmitted crisis management. Despite the development of technology and institutional restructuring, communication failures is a recurring trap to multi-agency response to crisis. The chapter is a review of the literature that is theoretical, empirical, and conceptual literature on institutional, technological and operational communication barriers between emergency services, government agencies and the participants in the private sector. The review summarizes the international and regional findings to place such barriers into perspective of realization the role of such barriers in decelerating the process of coordination, information exchange and decision making during crisis situations. It also provides theoretical premise about how this study was carried out, and identifies the gap in the research that would be motivating the research.

2.2 Communication and Coordination in Crisis Response

It is possible to define the crisis communication as a process that includes structured exchange of timely, accurate and practical information between the participants of emergency management (Abbas and Miller, 2025). Determining coordination, in its turn, does refer to resources, education, and activities aimed at achieving shared objectives as a reaction to a crisis (Gooding et al., 2022). The degree to which the institutions, technologies, and operation systems are integrated in order to facilitate this communication and coordination is a significant element of efficiency of crisis management.

Empirically, it is known that inter-agency co-ordination during times of crisis are often undermined by communication intercepts occasioned by bureaucratic disinteroperability, absence

of clear hierarchies, and both technological incompetence. Incidentally, Abdeen et al. (2021) have found that the information bottlenecks resulted in the destruction of the disaster management system in Sri Lanka following overlapping institutional mandates and ineffective intersectoral communication. Considering the same trends, Hamilton, Sodergard and Liverani (2022) stated that the success of the emergency medical teams that tend to be largely negative in institutional silo relies on the presence of the effective communication chain and mutual situational awareness.

The structures of Inter-organizational communication were further discovered as lacking due to the pandemic of Covid-19. Wang, Qi, and Ran (2022) observed that in China, resources and logistics to deal with the pandemic were organized by the private organizations, which lacked an organizational framework through which it could communicate with the authorities and result in inefficiencies. Latonen et al. (2023) also gave the results before and researched the pharmaceutical supply chains, and found the lack of information circulation and uneven patterns of communication were blamed for the failures of cross-sector coordination.

2.3 Institutional Communication Barriers

The institutional barriers are created on the basis of institutions structure, culture and governing system. They determine the direction of information, decision making process and the ways of collaboration. Kapucu, Dougherty and Hu (2022) are of the view that the network governance is the interaction of several organizations with different mandates that operate based on the formal and informal mechanisms of crisis management. These networks are however failing due to the rigidity of hierarchy and mutual trust. Abdeen et al., 2021, found that disaster response system in Sri Lanka was more prone to ineffective collaboration which resulted from the bureaucratic levels and conflict of responsibilities between agencies. Europe Kaneberg et al

(2023) gave an example showing that defence organizations that react to the Covid-19 had challenges when it comes to their integration with the civilians because of the variations in institutional logics and command structures. These barriers will result to gaps in the coordination, time wastages in decision making and overlaps in service.

Another important factor in inter agency communication is institutional trust. Krogh and Lo (2023) point out that trust between institutional organizations among organized volunteers and the government agencies encourage better compliance and coordination but distrust plays a role in information withholding. Likewise, Giorgii et al. (2017) also establish the link between ineffectual institutional coordination and systemic risks in the entire emergency management by insinuating that disjointed governance compromises both resilience and adaptability. Moreover, according to Parker (2024), non-governmental and third-sector organizations do not always find it easy to become a part of government-led systems of crisis management because of the absence of formal communication guidelines although they are fundamental to the management of crisis situations in the community. All together, these studies suggest how institutional barriers are manifested as manifested by misleadership, inappropriate hierarchies, untrustworthy leaders and lack of shared structures of governance-all of which block the effectiveness of communication even in times of crisis.

2.4 Technological Communication Barriers

The role of technology in crisis communication is significant, and it has enabled sharing of data in real-time, and monitoring of situations and response. However, there is also the potential that differences in technology and digital inequalities may also result in communication difficulties. Riebe, Kaufhold and Reuter (2021) established that the differences in communication technologies among computer emergency response teams (CERTs), which

resulted in their inability to share the data effectively. Fragmented communication practices caused by the differences of platform and software, data standards, reduced efficiency of collaboration. According to Sikder and Harvey (2023) even with the new opportunities that emerging technologies offered by an Internet of Things (IoT) systems, artificial intelligence (AI) and data dashboards, their impact is subject to the capacity of the institutions to integrate them practically. Poor infrastructure, poor digital literacy, lack of interoperability in systems are widespread impediments particularly in the developing environments. Likewise, influx in technological disruptions, cybersecurity risks, data handling challenges may cause compromise of the flow of information in the crisis situation, which is why the author suggests that secure and interoperable systems are very important (Dugbartey 2025).

There are other technological barriers other than hardware and software incompatibility. Abdeen et al. (2021) pointed out that ineffective maintenance of communication systems and lack of digital training of the staff played a significant role in a breakdown of communication. Ongesa et al. (2025) emphasize that project management strategies of responding to health crisis must be based on the sustained digital capacity-building so that technology could be useful to the coordination, as opposed to slowing it down. In addition, according to George (2024), the overuse of digital systems that may expose underlying systemic weaknesses as demonstrated by the global discontinuation of services such as the CrowdStrike outage that exposed the vulnerability of digital communication systems. Therefore, technological resilience, such as redundancy, interoperability and cybersecurity would be in the core to maintain a continuous communication between emergency response partners.

2.5 Operational Communication Barriers

Operational barriers refer to both the procedural and practical components of communication in the process of responding to a crisis. These are poor training, poor communication procedures, absence of standardized terminologies, and lack of situational awareness. Soyege et al. (2024) assert that operational preparedness, which is characterized by a lack of drills and ineffective communication channels, as well as improvised decision making, is one of the key factors that limit health system responsiveness to pandemic and bioterrorism threats. Ongesa et al. (2025) highlight that emergency response in the area of public health should be clearly delineated in terms of roles and exercise a continuous simulation to enhance the flow of communication. Lack of uniform operational frameworks among various agencies usually results in confusion, duplication and slow response. Likewise, Cvetković (2024) critically analyzed the system of disaster management in Serbia and has found that the system had weaknesses in its operation, including the absence of clear authority lines and integrated communication tools among the responders.

Leadership and training also impact on operational efficiency. Both Hamilton et al. (2022) and Ampratwum, Tam, and Osei-Kyei (2023) believe that effective coordination relies on standard operating procedures and leadership competence that determine inter-agency communication. In their systematic review of critical infrastructure resilience, Ampratwum et al. (2023) discovered that inadequate communication planning and training based on cross-sector often delays decision-making in the context of crises related to the infrastructure. Moreover, Osegbue (2025) highlights crisis response plans and the significance of having them in institutions, particularly, educational and health institutions indicating that unless there are well-established and efficient operational communication systems, responses to such crises will be

reactive and disjointed. Thus, operational barriers are more of practical constraints that would restrict effective communication strategies implementation even in the presence of institutional and technological structures.

2.6 Interrelationship Between Institutional, Technological, and Operational Barriers

Barriers to crisis communication are seldom independent and are mutually dependent and reinforcing. As an illustration, the institutional rigidity can be a barrier to adopting interoperable technologies, and technological weakness can be a reason to increase operational inefficiencies. The authors state that network governance is only possible by ensuring the alignment of the institutional and technological structures based on coordinated policies and mutual standards (Kapucu et al., 2022). Latonen et al. (2023) show that the commitment of an institution to cross-sector collaboration can positively impact the technological investments and training that leads to the improvement of operational readiness. On the other hand, poor institutional leadership usually leads to disjointed technology acquisition and poor communication processes.

Indeed, according to Pescaroli et al. (2023), the systemic character of such relations is crucial, as to manage complex emergencies, it is necessary to focus on barriers as a whole through multi-level coordination and adaptive communication networks. On the same note, Kaneberg et al. (2023) demonstrate that in Europe, the early COVID-19 responses succeeded when the institutional collaboration, digital integration, and the operational preparedness were implemented collectively. In such a way, the literature indicates that it is necessary to treat communication barriers in a multi-faceted framework in which institutional alignment, technological integration, and operational readiness are considered to be related determinants of efficient crisis coordination.

2.7 Theoretical and Conceptual Framework

2.7.1 Theoretical Framework

The Network Governance Theory and Systems Theory have been the main guiding principles in conducting this study to explain the interdependence of actors and processes within complex crisis management settings. According to Network Governance Theory (Kapucu et al., 2022), contemporary governance, particularly in the time of crisis, presupposes the networks of organizations that have to coordinate each other horizontally but not vertically. Communication and sharing of information is essential in such networks in order to have collective results. The theory emphasizes the role of trust, cooperation, and shared responsibility, and it provides a model of analyzing institutional obstacles to communication and coordination issues.

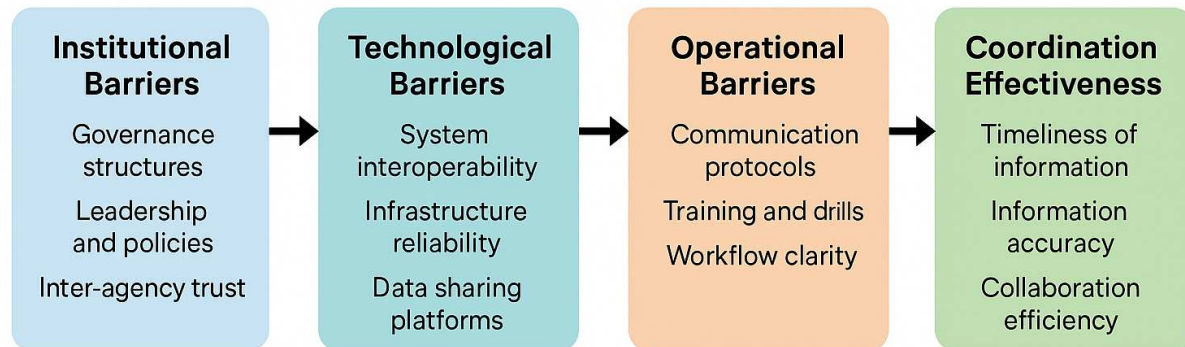
This is balanced by Systems Theory, which considers the crisis management a web of actors, technologies, and processes (Pescaroli et al., 2023). The Systems Theory suggests that failure in any of the components, that is, institutional (structure), technological (tools), or functional (processes), can cause the entire system to malfunction. It focuses on the presence of feedback loops, flexibility, and interdependence, which makes it especially valuable in investigating the multi-agency communication of crises. Collectively, the theories are a holistic way of looking at the interaction of institutional, technological, and operational variables that determine the ability to coordinate during emergency response networks.

2.7.2 Conceptual Framework

The conceptual framework (Figure 1) depicts crisis communication effectiveness as a result of interactions involving three independent variables Institutional Barriers, Technological Barriers, and Operational Barriers that interact to influence Coordination Effectiveness.

Figure 1

Conceptual framework



This model presumes that an increase in the coordination effectiveness in the process of crisis response is caused by the reduction of institutional, technological, and operational barriers to communication.

2.8 Research Gap

Despite the extensive study on crisis management and management, there are still a number of gaps. To begin with, the available literature (e.g., Abdeen et al., 2021; Wang et al., 2022; Latonen et al., 2023) is centered on particular sectors, including health, defense, or logistics, and does not involve cross-sector collaboration between the government and emergency services and private at the same time. This curbs the knowledge of the influence of multi-sectoral dynamics on barriers to communication. Second, a lot of the literature is either qualitative or conceptual, and there is still little quantitative information on the connections between the institutional, technological and operational factors. The research works such as Riebe et al. (2021) and Sikder and Harvey (2023) examine the use of technology in a descriptive manner, but they fail to statistically test its interplay with the institutional and operational level of the studies. Third, research based in developing areas has limited contextualization because

resource limitations and institutional division tend to compound the problems of communication. The generalizability of the crisis communication models would be improved by empirical observations in such environments. Finally, there are not many studies that incorporate the three dimensions of institutional, technological, and operational in one analytical framework. The paper fills these gaps by applying quantitative design to quantify and determine the relationships between them and how they combine to affect the effectiveness of coordination.

2.9 Summary of Literature Review

The reviewed literature reveals that successful crisis communication relies on institutional trust and governance structures, technological interoperability and resilience and operational clarity and preparedness. Barriers on any of these domains can be a significant hurdle in coordinated crisis response. However, existing studies have hardly taken these factors into consideration together and from empirical and quantitative perspectives in multi-sectoral contexts. Building on Network Governance Theory and Systems Theory, this study is a proposal for an integrated framework in which to quantify and analyse the institutional, technological and operational barriers to communication and its impact on the effectiveness of coordination. The findings are meant to contribute to a body of knowledge in terms of both the theoretical discourse and practical strategies for improving communication networks between emergency, government and private-sector actors when responding to a crisis.

Chapter Three: Methodology

3.1 Research Design

In this research paper, we use the quantitative descriptive study design in a cross-section survey design, to objectively find out the impact of institutional, technological and operational communication barriers and effects of these on the coordination effectiveness of emergency response stakeholders. The quantitative design makes possible to measure and statistically analysis the relationship between the variables with the help of measurable data on a quantitative basis to provide empirical clues to interpretation (Creswell and Creswell, 2018). The descriptive element is concerned with the qualities and degree and the cross-sectional aspect in making possible gathering of data in various institutions at one point of time. This design is especially suitable in learning more about the patterns of communication in various agencies in the situation of managing the crisis and the coordination of its efforts (Gooding et al., 2022). Underlying the objective is the production of statistically sound results which have the potential to influence the policies and operations of the institutions based on the necessity to improve multi-agency communication during an emergency.

3.2 Target Population

This research will be directed towards the target population that consists of people in the front line of the emergency management, crisis communication and coordination in the both the public and the private sector. These population includes those employed in government disaster management agencies, police, fire service, ambulance services, public hospital and emergency health services, and private security and logistics services, telecommunication companies, utility companies as well as emergency coordination committees. Such groups reflect the high degree of diversity between the actors that should ensure that there is effective communication and

cooperation in the event of a crisis. A focus on the representatives of these sectors will also allow the study to provide representation from all the major organizations involved in emergency preparedness and response, which is consistent with the past surveys that recommend the cross-sector involvement of crisis coordination (Kapucu, Dougherty, and Hu, 2022; Wang, Qi, and Ran, 2022). This heterogeneity will make findings of the study more representativeness and generalizable.

3.3 Sampling Technique

The type of sampling strategy used will be a purposive sampling strategy that will be used to select the participants that had the first hand experience or the responsibilities pertaining to crisis management, communication, and coordination. The approach is appropriate as it ensures that the researcher identifies people with knowledge and engagement that is relevant in contrast to selecting people randomly though they may not have the necessary experience (Etikan & Bala, 2017). The sample will comprise representatives of such central operation units as communication, logistics, emergency coordination and policy management departments. The informed choice of the respondents will ensure that the data obtained will reflect an informed professional input on impediments that exist in communication and coordination among agencies. Besides, the sample size will be calculated referring to the need to achieve sufficient statistical power as well as to be represented in all the targeted sectors.

3.4 Data Collection Method

The data in this study will be gathered through the use of a structured self-directed questionnaire which will be administered physically and electronically to cover the participants because they will be in various agencies and locations. The questionnaire would be a majorly closed ended instrument with responses being provided in a five point likelihood pole (Likert

scale) between 1 (Strongly Disagree) to 5 (Strongly Agree). Such a form of data will enable the measurement of the perceptions of the respondents concerning the communication barriers and effectiveness of coordination to obtain the numbers that can be analyzed using statistical methods (Likert, 1932). Self-administered format will guarantee that there is no anonymity and that the participants will not be forced to lie but, most of all, they will be able to fill the questionnaire at their own time and place. It will also be a part of open-ended questions on the questionnaire which will give further understanding of qualitative information and suggestions on how to improve inter-agency communication and coordination practices.

3.5 Data Collection Instrument

The major research tool will be the form of a questionnaire, which will help obtain the information about the barriers to institutional, technological, and operational communication, and the overall effectiveness of coordination. The tool will be based on five major parts. Section B will deal with the barriers to institutional communication including leadership transparency, hierarchical organizational structure, policy direction, and inter-organizational trust. In section C, evaluation will be made of barriers of technology communication which will include infrastructure communication compatibility, interoperability, system reliability and digital integration challenges. In section D, evaluation of the operational barriers will be executed such as the sufficiency of the training, the clarity of communication roles, and the developed operational procedures, in such cases. In section E, the effectiveness of coordination will be measured in which the level of perception of timeliness, collaboration and information sharing between organizations are evaluated. Lastly, Section F will contain open-ended questions which can allow the respondent to make suggestions as to how crisis communication can be improved or also suggest the tools of information. The instrument will be developed based on previous

studies in the field of emergency management and the inter-organizational coordination (Abdeen et al., 2021; Riebe, Kaufhold, and Reuter, 2021; Sikder and Harvey, 2023) which will ensure the content validity and the theoretical basis.

3.6 Data Analysis

Statistical analysis of the data will be done using Statistical Package of the Social Sciences (SPSS). The analysis will take the form of descriptive as well as inferential statistical analysis which will be in accordance to each of the research objectives. The demographics characteristics of the respondents and the patterns that are prevalent in the communication barriers will be summarised using descriptive statistics which will involve the means, standard deviations and frequency distributions. The inferential statistics will be used to test the relationship, association and predictive effects of variables to each other.

To accommodate the first objective, which is aimed at the identification of the main institutional communication obstacles in crisis coordination, descriptive statistics would be used for generalization of the level of institutional challenges. The correlation analysis will then be exploited by Pearson in establishing the relationship of institutional barriers as well as effectiveness of coordination (Abbas and Miller, 2025). To address the second objective which aims at evaluating technological communication barriers, chi-square tests will be applied, to establish if there are major associations between technological constraints and coordination effectiveness (Sikder and Harvey, 2023).

The third goal is aimed at studying the operational communication obstacles and the impact of the same on the coordination. To achieve this goal, Pearson correlation will once again be employed to check the correlation between operation communication practices and performance in coordination (Abdeen et al., 2021). To answer the fourth objective that will

attempt to find the synergy effect of institutional, technological and operational barriers in terms of coordination effectiveness, multiple linear regression analysis will be used. The method will set variables with the most significant and predictive capability of coordination performance between agencies (Kapucu et al., 2022; Pescaroli et al., 2023).

3.7 Validity and Reliability

Content validity will be ensured in the research by reviewing the questionnaire by experts, pilot test. The instrument will be tested by the experts in the field of emergency communication and disaster management to ensure that it is relevant, clear and achieve the research goals. A pilot test will be conducted for a small sample group of 10- 15 respondents in order to make improvements on the instrument and make it understandable. In order to measure the reliability Cronbachs alpha will be used and will scale the internal consistency of the Likert-Scale items. Cronbach alpha coefficient of 0.70 and above will be taken to indicate the acceptability of the constructs on the determining the reliability (Tavakol and Dennick, 2011). The process is such that the questionnaire delivers stable and consistent results which can be subjected to quantitative analysis.

3.8 Ethical Considerations

The research will follow ethical integrity within the research required standards of human subject research. The study will tell the participants about the goals and methods of the study thoroughly and give them the rights of the study including the right to withdraw with no penalty during the study. All the participants would be informed for consenting before the data is collected. The considerations of confidentiality and anonymity will be highly adhered to the removal of personal details and physical and digital contents as well as the safety. All the data will be coded and not shared to any outside parties. The research will comply with ethical

requirements of respect of persons, beneficence, and justice as suggested by research ethics standards as well (Resnik, 2020)

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Appendices

A. Questionnaire

Section A: Respondent Information

1. Organization type:
 - ☐ Government Agency
 - ☐ Emergency Services (Police, Fire, Ambulance)
 - ☐ Health Sector (Hospitals, Public Health Units)
 - ☐ Private Sector (Security, Logistics, Utilities, Telecommunications)
 - ☐ NGO / Third Sector
2. Position / Role: _____
3. Years of experience in crisis response:
 - ☐ <1 year
 - ☐ 1–3 years
 - ☐ 4–6 years
 - ☐ 7–10 years
 - ☐ >10 years
4. Have you participated in coordinated multi-agency crisis responses?
 - ☐ Yes
 - ☐ No

Section B: Institutional Communication Barriers

Objective: Identify organizational, leadership, and policy-related barriers.

Statement	1	2	3	4	5
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My organization has clear policies that define communication responsibilities during crises.	☐	☐	☐	☐	☐
There is effective leadership guiding multi-agency coordination during crisis response.	☐	☐	☐	☐	☐
Institutional hierarchies hinder timely information sharing with other agencies.	☐	☐	☐	☐	☐
There is trust between my organization and other emergency response or private-sector partners.	☐	☐	☐	☐	☐
Conflicting mandates between agencies negatively affect communication and coordination.	☐	☐	☐	☐	☐
My organization participates in regular joint planning or coordination exercises with other agencies.	☐	☐	☐	☐	☐

Section C: Technological Communication Barriers

Objective: Assess challenges related to technology use, infrastructure, and digital integration.

Statement	1	2	3	4	5
Communication technologies in my organization are compatible with those of other agencies.	☐	☐	☐	☐	☐
Technological systems are reliable and available during crisis situations.	☐	☐	☐	☐	☐
Lack of standardized digital tools hinders effective information sharing with partners.	☐	☐	☐	☐	☐
My organization has sufficient training to use technology for multi-agency coordination.	☐	☐	☐	☐	☐

Cybersecurity or privacy concerns limit the exchange of information during crises.	☐	☐	☐	☐	☐
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Section D: Operational Communication Barriers

Objective: Examine practical, procedural, and workflow-related communication challenges.

Statement	1	2	3	4	5
There are clear operational protocols for sharing information during crises.	☐	☐	☐	☐	☐
Roles and responsibilities for crisis communication are well-defined in my organization.	☐	☐	☐	☐	☐
In emergencies, information is communicated quickly and accurately to relevant partners.	☐	☐	☐	☐	☐
Lack of training or drills reduces the effectiveness of communication during crisis response.	☐	☐	☐	☐	☐
Operational challenges (e.g., workload, resource constraints) limit collaboration with other agencies.	☐	☐	☐	☐	☐

Section E: Coordination Effectiveness

Objective: Measure perceived effectiveness of multi-agency coordination.

Statement	1	2	3	4	5
Inter-agency coordination during crises is generally effective.	☐	☐	☐	☐	☐
Information received from partner organizations is timely and actionable.	☐	☐	☐	☐	☐

My organization is able to respond effectively due to shared communication systems with partners.	☐	☐	☐	☐	☐
Collaboration between public, private, and emergency organizations improves crisis outcomes.	☐	☐	☐	☐	☐
Overall, communication barriers significantly affect coordination during crises.	☐	☐	☐	☐	☐

Section F: Open-Ended Questions

26. In your opinion, what are the main factors that improve communication and coordination during crisis response?

27. What strategies or tools would you recommend to overcome communication barriers in multi-agency crises?

B. Workplan

Activity	Duration	Timeline
Proposal development and approval	1 month	Month 1
Instrument design and pilot test	1 month	Month 2
Data collection	2 months	Months 3–4
Data analysis	1 month	Month 5
Report writing and review	2 months	Months 6–7

C. Budget

Item	Unit Cost (USD)	Quantity	Total (USD)
Questionnaire printing & distribution	1.5	200	300
Data collection assistants	50	4	200

Data analysis (SPSS)	-	-	100
Stationery & logistics	-	-	150
Miscellaneous	-	-	50
Total			800 USD