

A Deep Dive into The Challenges of Disaster Relief Operations

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Abstract

The study explores the challenges encountered by Disaster Relief Operations (DROs) in Malaysia, intending to enhance their resilience against future disasters. As climate change increases the frequency and severity of natural disasters worldwide, it poses significant challenges to communities. Rapid urbanization and population shifts have heightened vulnerabilities, placing more people at risk. Thirteen experts in disaster management and relief, all aged 30 years, were interviewed across five regions in Malaysia (Pahang, Johor, Selangor, Kelantan, and Terengganu). The interviews were thoroughly documented through written notes, video recordings, and audio files, ensuring a comprehensive record. The transcripts were analyzed using Atlas.ti software to identify recurring themes. The study reveals four key challenges that hinder effective DROs in Malaysia: manpower shortages, insufficient equipment, a lack of coordination, and communication barriers. Additionally, DROs grapple with recurring issues such as a lack of public awareness about disasters, the presence of the *Pelancong* disaster, and the exacerbation of adverse weather conditions. To address current gaps, future research should evolve a comprehensive framework for DROs, evaluate training program effectiveness for disaster relief personnel, enhance inter-agency collaboration with clear communication protocols, and leverage innovative technologies like blockchain, drones, and artificial intelligence to streamline operations and improve efficiency. This study underscores the critical need to address DROs' challenges in improving their relief efficiency. Malaysia must heed these findings and implement the recommendations to become more resilient in the face of disaster threats, safeguard its citizens, and secure a better tomorrow for all. By "building back better", the country achieves continued prosperity despite challenges.

Keywords: DROs, Natural Disaster, Disaster Management, Emergency Response

Introduction

Disasters, especially from natural phenomena, are inevitable. Traditionally, people viewed disasters as "acts of nature," suggesting there was no control over their occurrence (Quarantelli, 2000). A disaster is considered a shocking event that causes significant damage to people, economies, and the environment that is beyond the capability of local agencies to manage through standard procedures (Galindo & Batta, 2013). Various disasters occur worldwide, and flooding is the most frequent natural disaster. Similarly, several researchers asserted that floods are among the most common disastrous events that occur periodically (Muzamil et al., 2022). Storms are the second most frequent disaster type, and earthquakes are the third most frequent (Jeong, 2019). Regardless of their sizes, locations, and types, either natural (floods, droughts, earthquakes, hurricanes, tsunamis, landslides, and debris flows) or man-made (wars, acts of terrorism, and industrial accidents), disasters often happen suddenly and have had destructive impacts on communities and nations around the world in recent decades. It goes beyond the community's capability to manage the calamity by utilizing its resources (Zakaria et al., 2022).

Technology, transportation, public places, production failures, and acts of terrorism classify man-made disasters. Malaysia is no exception. In the next 50 years, Thomas & Kopczak (2005) predict an increase in natural and man-made disasters by five times and a fivefold increase in intensity. This is primarily due to climate change, population growth, and environmental degradation. Furthermore, communities are expected to become more vulnerable to disaster risks due to increasing urbanization and poverty. This issue has drawn increasing attention in recent years. The frequent occurrence of these disasters has brought to light thorny DRO challenges during emergency response. During the immediate response, Ozen (2018) notes that search and rescue efforts, relief item distribution, and medical aid are some of the most challenging aspects of relief operations. Regardless of how well-prepared a country or region is, disasters can damage lives and property. Consequently, man-made and natural disasters that cause widespread destruction highlight numerous vulnerabilities.

Indeed, managing DROs effectively and efficiently during emergency response is vital. However, DROs have enormous hurdles. Considering all these concerns, researchers should focus on addressing the challenges during the emergency response. Subsequently, this research focuses on the following questions: What are the challenges of DROs during an emergency response? To answer this research question and derive lessons, this research dives deeply into the challenges of DROs.

Literature Review

Disaster in Malaysia

Despite being geographically and tectonically outside the Pacific Rim of Fire, Malaysia was considered secure from severe hazards like tectonic shifts, low atmospheric pressure, and volcanic eruptions (Rahman, 2012). Located in Southeast Asia, Malaysia experiences yearly heavy rainfall, especially from October to February. Due to heavy rain during these months Majid et al (2020), Malaysia suffered from earthquakes, landslides, floods, and droughts across the country (Hawa et al., 2023).

Flood

In Malaysia, floods are the most catastrophic natural calamities, regardless of severity Abdullah et al (2022), and become a significant problem when they exceed coping capacity and destroy both life and property Zakaria et al (2022), causing the most significant amount

of damage annually. According to Hashim et al (2023), Malaysia is prone to flood disasters due to monsoon rains. Malaysia has two monsoon seasons: the southwest (from May to September) and the northeast (from November to March). Malaysia has had a series of floods since 1920 Shah et al (2017), and these seasonal floods occur annually in Malaysia. One notable distinction between these two catastrophes, as observed from a hydrological standpoint, is the duration required for the river flow to return to its baseline level. Restoring water levels to normal after a flash flood can occur within hours, whereas monsoon floods might last up to a month (Noorazuan, 2006). In both cases, floods can cause extensive damage to infrastructure and property. The longer duration of monsoon floods means that they have more time to cause widespread damage, whereas flash floods tend to be more localized. In the aftermath, the flood victims encountered erratic communication problems and shortages of food supplies, electricity, clean water, and electricity (Aisha et al., 2015). In Malaysia, the regularity and severity of flooding have increased, especially in Kuala Lumpur and Selangor (Sapawi et al., 2023).

Floods frequently affect the east coast of Peninsular Malaysia and western Sarawak from early November to March Buslima et al (2018), triggered by heavy rainfall and high tides that flood low-lying areas. There are 189 river basins throughout Malaysia (89 in peninsula Malaysia, 78 in Sabah, and 22 in Sarawak), most of which flow directly to the South China Sea, and 85 are prone to becoming recurrently flooded (Mohd & Muhammad, 2014). A series of floods that ravaged Peninsular Malaysia in 1926 caused widespread damage to property, mental and physical health, infrastructure, and agriculture, which caused fear among the people. According to Dong et al (2023), Super Typhoon Rai struck the South Philippines and East Malaysia in December 2021, resulting in nearly 4000 deaths, displacing over half a million people, and causing an economic loss of 1 billion dollars. Furthermore, he noted that the typhoon devastated the east portion of Southeast Asia (SEA), and a "once in a lifetime" flood struck Peninsular Malaysia, leaving 51 people dead and two missing. According to the reports, Malaysia has suffered economic losses ranging from USD\$1.2 billion USD\$1.5 billion, displacing 67,576 people. From December 16, 2021, to January 19, 2022, floods lasting over a month hit Malaysia. As a result, torrential rainfall swept through Peninsular Malaysia and East Malaysia during this flooding period (Dong et al., 2023).

Floods occurred in various regions of Malaysia in the first half of 2022 and the second half of 2022; as an example, flooding occurred in the majority of Peninsular Malaysia in January, such as Kuala Lumpur, Selangor, Johor, Melaka, and others. In the meantime, floods occurred in Kelantan, Terengganu, Kuala Lumpur, and Kedah between February and July. Kelantan's 2022 flood surpassed the water levels of 1967, making it the worst in its history. Hashim et al (2023) reported that the seasonal floods of 2022 severely affected Malaysia, leading to the evacuation and sheltering of 66,718 people. Likewise, Zakaria et al (2022) said that Malaysia's floodplains covered nearly 29000 square kilometres and impacted more than 4.82 million people. The floods wreaked havoc on the infrastructure, causing chaos throughout the community and among stakeholders—the most in the history of Malaysia's flood catastrophes. Furthermore, the flood caused significant human casualties and population displacement, leading to economic devastation and service disruptions.

Landslide

A landslide, or slope failure, is one of Malaysia's most notorious and destructive natural disasters. It is a geophysical event that plays an imperative role in landscape evolution Diana et al (2021) and may lead to property damage and injuries (Hawa et al., 2023). Landslides

occur when significant rainfall or earthquakes destabilize, volcanic eruption, pollution, disturbances, groundwater changes, and slope profile changes due to construction activities (Rahman & Mapjabil, 2017). Despite this, landslide events can move faster or slower depending on their type (Selamat et al., 2022). Rahman and Mapjabil (2017) conducted a study that distinguished various types of landslides based on their materials and movement methods. The different types of landslides include falls, topples, rotational sliding, translational sliding, lateral spreading, flow, and complex landslides (Hung et al., 2014).

A landslide also struck Malaysia, as did the flood. According to Kazmi et al (2019), landslides are Malaysia's second most destructive natural disaster after floods, causing a significant number of fatalities. Though Malaysia does not have many mountains (mountain ranges and hills comprise less than 25% of its geography), it often experiences landslides (Qasim et al., 2013). Heavy rainfall, which varies according to the water level and slope geometry, often triggers landslides, a recurring and significant phenomenon in Malaysia (Sim et al., 2023). Rainfall and stormwater activities are the principal causes of slope failure in hillside developments in Malaysia Sezer et al (2011), and these events usually occur in the immediate aftermath of heavy rains. Due to tropical weather, chemical weathering and leaching exacerbate soil erosion and surface runoff. A study recorded 21,000 landslide-prone areas across Malaysia; 16,000 (or 76%) are in Peninsular Malaysia, with another 3,000 in Sabah and 2,000 in Sarawak (Rahman & Maljapil, 2017). Ligonga et al (2022) reported three significant landslide occurrences in Malaysia in Hulu Kelang, Cameron Highlands, and Genting Highland, where most cases are associated with rainfall.

Between 1960 and 1980, flow slides in tin mine excavations in Malaysia caused 246 deaths, according to (Brabb, 1991). A separate report reported 28 significant landslides in Malaysia from 1993 to 2011, leading to over 1000 deaths and significant economic losses (Rahman & Maljapil, 2017). Also, Azmani et al (2017) identified that 56 landslides occurred in Malaysia from 1989 to 2009. On the other hand, Dorairaj and Osman (2021) reported that during the seven years between 2007 and March 2016, Malaysia recorded 171 landslides, placing it in 10th place for the highest frequency of landslides based on data from the US National Aeronautics and Space Administration (NASA).

According to the National Slope Master Plan, 2009–2023 (2009), Malaysia estimated its total economic losses due to landslides from 1973 to 2007 to be US\$1 billion. Forty-eight people died in the 1993 landslide that collapsed the Highland Tower condominium in Hulu Klang, Selangor. The landslide was the most tragic ever in Malaysia and remains one of the most tragic in Malaysia's history (Dorairaj & Osman, 2021). As of December 16, 2022, the landslide at Father's Organic Farm campsite in Batang Kali was the second largest fatality incident in recent years, following the collapse of the Highland Towers Condominium, which killed 92 people, with 61 surviving after an avalanche buried the campsite (Utusan Malaysia, 2023).

Today, landslides are now recognised as natural disasters and pose a significant community risk that demands attention. It is important not to underestimate the impact of landslides in urbanised areas Okoli et al (2023) due to their adverse effects on the environment and socioeconomics, such as loss of life, damage to properties and infrastructure, psychological stress among victims, and disputes over land boundaries (Rahman & Maljapil, 2017). For this reason, designing, building, and maintaining infrastructure is critical for mitigating the impact of landslides. Implementing contingency plans and conducting public awareness and training are critical for ensuring that communities are informed and prepared to respond quickly to landslides.

Disaster Relief Operations

Disaster Relief Operations (DROs) refer to the coordinated efforts and activities undertaken to provide immediate assistance and long-term support to survivors and communities affected by natural disasters (Tomasini & Van Wassenhove, 2009). According to Kuriansky and Nemeth (2020), DROs are a critical component of disaster management, as they play a crucial role in alleviating the immediate suffering and loss caused by catastrophic events. DROs also play a vital role in restoring essential services and infrastructure and helping communities recover and rebuild after a disaster (Niyazi & Behnamian, 2023). Hence, planning and scheduling DROs effectively is critical to saving lives and reducing disaster damage. Zheng et al (2015) stated that DROs include setting up emergency facilities, searching for and rescuing survivors, providing health and medical assistance, distributing relief supplies, transferring injuries, scheduling rescue forces, and coordinating these activities across organizations.

In the same vein, Owusu-Kwateng et al (2017) emphasize that DROs relate to the coordination of emergency relief efforts and the efficiency of inventory management during disasters, intending to ensure relief items are delivered promptly and effectively. Any delays can cost the lives of many people trapped in a disastrous situation. Therefore, effective disaster relief strategies are critical to ensuring disaster management's preparedness and mitigation potential. Developing long-range planning to help affected people and the leadership of civil society in disasters is essential to ensuring DROs are well coordinated and managed efficiently to save lives. This includes effective coordination, sufficient resources, and enough personnel and vehicles to transport relief items quickly.

Methodology

The research employed a qualitative methodology to collect data through in-depth interviews. By conducting the interviews, researchers can examine the nuances and complexity of humanitarian logistics challenges while understanding the informants' experiences when encountering problems during DROs and emergency response. Peninsular Malaysia's five flood-prone states, Kelantan, Terengganu, Pahang, Johor, and Selangor, are the focus of this research. Figure 1 illustrates the map of the research area.



Figure 1: Map of the research areas

Thirteen informants were interviewed using semi-structured checklist questions. As mentioned earlier, the research guided an extensive literature review that resulted in the protocol. An informant, aged 30 or above, was selected for the interview. Only the informants with knowledge of disaster management and experience in DROs were selected for this research because they could give an account of the natural disaster situation. The informants (Table 1) were stakeholders in government, non-governmental organizations (NGOs), academia, medical, relief agencies, and volunteers to gain a comprehensive overview of response performance. The interviewee selection process utilizes the snowballing technique. Snowball sampling means the researcher knows the next respondent from the previous informant (Cooper & Schindler, 1998).

In one instance, an informant suggested that other participants might contribute to the study. In order to gain the informant's trust, the team provided an introductory briefing on the study's purpose (Lambin et al., 2018). The briefing included an explanation of the research objectives, the importance of the informant's participation, and the confidentiality of the information they provided. Additionally, the team provided reassurance that the informant's participation was voluntary and would not be used against them. Interview processes were recorded in a notebook, video, or voice recording device as field notes and transcribed later. Then, the data gathered during the interviews was analyzed using thematic analysis (Boyatzis, 1998; Bryman, 2012).

The transcribed data was then analyzed and interpreted. In order to analyze the transcripts, computer-assisted qualitative data analysis (CAQDAS) software, such as Atlas.ti, was used. According to Lewins (2015), data sorting, organizing, interpreting, identifying concepts, and categorizing were made more accessible using CAQDAS software. Ultimately, the researchers were able to discover themes in the data that helped guide their research. Four main themes emerged in the data analysis process: communication, coordination, manpower, and equipment.

Table 1

Characteristics of Informants

Informants	Stakeholder	Gender	Year of Experiences	Age group	Highest level of education
Informant 1	Government	Male	>10	40-49	Degree
Informant 2	Government	Male	>20	50-59	PhD
Informant 3	Volunteer	Male	>10	30-39	Degree
Informant 4	Volunteer	Male	>3	30-39	Degree
Informant 5	Volunteer	Male	>9	30-39	Degree
Informant 6	Volunteer	Male	>20	50-59	SPM
Informant 7	Volunteer	Male	>10	50-59	Degree
Informant 8	Academia	Female	>6	30-39	PhD
Informant 9	Academia	Male	>12	40-49	PhD
Informant 10	Academia	Male	>20	50-59	PhD
Informant 11	Medical	Male	>5	30-39	Degree
Informant 12	Relief agency	Male	>7	40-49	Degree
Informant 13	Relief agency	Male	>11	50-59	Degree

Results and Discussions

This section outlines the challenges in humanitarian logistics that necessitate exceptional progress in emergency response and DROs throughout the five states of Peninsular Malaysia. The research identified and analyzed the multifaceted challenges inherent in humanitarian logistics, offering insight crucial for enhancing the preparedness and responsiveness of relief operations during critical emergency responses. The findings of this research showed that the respondents had the same thoughts about the challenges of the disaster relief operation in Malaysia, as detailed below:

Communication Barriers

Effective communication is essential in DROs, particularly during emergency response when disasters strike. Clear communication is necessary to inform people of the situation quickly, coordinate response teams, and share information between stakeholders. However, communication can also have its drawbacks. Additionally, misinterpreting communication can lead to misunderstandings and mistakes. In this research, the researcher has discovered that poor communication is a significant barrier to delivering aid.

The research revealed a necessity for more communication platforms to disseminate disaster information. Informant 3 personally experienced these situations during relief operations and asserted that no informant could provide that information. Likewise, Informant 7 encountered communication barriers during the relief operation. Furthermore, he argued that the affected area had no information or markings relating to the zones, which were red, yellow, and green. As a result, the nearby rescue team required more information about the zones and instructions on navigating through them. The absence of information confused and exacerbated the situation, as people were unsure which areas were safe and which were not. The study also revealed the need for more details on flood-prone routes. Informant 4, who experienced disaster relief challenges, stated that their problem is that they have yet to learn whether the road is muddy, has obstacles, or has other hazards. With precise information, they can decide where to go and how to get there. This leads to them taking unnecessary risks and putting themselves in harm's way.

According to Shittu et al (2018), effective communication happens when the receiver precisely understands and receives what the sender has stated. Relief teams found themselves stranded in dangerous areas due to these challenges, and the lack of information hindered their ability to respond quickly and efficiently. Ab Malik et al (2020) emphasized that communication channel failures can seriously impair emergency response. As a result, providing more accurate information about flood-prone routes becomes increasingly critical to increase safety, prevent further disasters, and ensure disaster relief efforts are as effective as possible.

Shortage of Manpower

Due to a shortage of personnel, there was insufficient manpower to evacuate the victims during the emergency response. During the interview with Informant 7, he stated that he took the initiative to become a midwife to assist the victim in delivering her baby. This was due to the lack of medical staff on the boat. As per the interview with Informant 3, the Disaster Operations Control Center (DOCC) encounters challenges in managing humanitarian logistics due to a lack of personnel in emergency response during DROs. This suggests that Informant 7 decided to take on responsibility himself due to the lack of medical staff, likely due to limited

resources and personnel. The DOCC faced similar challenges, as emergency relief operations required more personnel and resources than were available.

Alongside the scarcity of manpower, there is also a shortage of less skilled rescuers. Informant 7 claimed to be a novice swimmer who volunteered to aid in emergency operations during times of crisis. While waiting for the search and rescue team to arrive, he had to endanger his own life to provide immediate assistance. Meanwhile, in an interview with informant 5, a celebrity representative stated they faced challenges while cleaning up the affected area. Informant 5 explained that the rescuers' lack of manpower and training caused them difficulties cleaning up the affected area. Informant 7, on the other hand, had to sacrifice his own safety to provide immediate assistance.

A manpower shortage might have a detrimental impact on DROs. To ensure the progress of humanitarian logistics and an accurate evaluation of the extent of the damage, we need more personnel. Furthermore, a lack of manpower may be required to manage the chaotic situation and assist the victims affected by the disaster. This further speaks to the importance of having sufficient resources, training, and personnel when addressing a natural disaster. For this reason, rescuers must possess the knowledge and skills to respond promptly and effectively. Thus, it is imperative to train and equip rescuers or volunteers with the correct information and training to be knowledgeable about flood disaster management and the flood Standard Operating Procedure (SOP) knowledge to handle DROs, particularly in emergency response.

Lack of Coordination

Coordination plays a crucial role in DROs. Assessing the situation and coordinating efforts quickly when disaster strikes is paramount. Coordination plays a crucial role in ensuring efficient use of resources and meeting the needs of disaster-affected individuals. Rescue teams can also coordinate interagency collaboration, community collaboration, and relief aid distribution. In DROs during emergency responses, coordination between the public and private sectors (at local, provincial, national, and even international levels) becomes increasingly imperative. Nevertheless, this study revealed challenges in coordination between relief agencies.

The study revealed that many relief agencies need more resources to coordinate their operations effectively. Informant 8, an expert in disaster management, highlighted that the most challenging part is coordinating all these disaster management agencies. This is because local authorities have central, state, and district authorities, but only one agency, the National Disaster Management Agency (NADMA), is involved in disaster management. In an emergency response to a disaster, the state and district authorities are the only authorities. The district disaster management committee officer will handle a disaster in one district. When a disaster strikes two states, disaster management takes charge. Only the federal disaster management committee will act in the case of a catastrophe in two states. However, national levels require more resources. They will use all state resources, for example, by coordinating with Pahang, Terengganu, or Kelantan.

Furthermore, as relief volunteers, stakeholders faced challenges. According to informants 3, 5, and 7, authorities prohibit volunteers from entering disaster zones. Despite all the challenges, Informant 7 said that the government's role in DROs was the most challenging. He reported that the government itself controlled them. Furthermore, during disaster emergency response operations, there was bureaucracy. Informant 7 said NGOs wanted to avoid following the Disaster Operations Control Center (DOCC) due to the

abovementioned factors. A significant amount of bureaucracy was associated with the Disaster Operations Control Centre (DOCC), which required NGOs to go through the Department of Social Welfare before sending it. However, in the end, they still did not send it. Overall, the informants expressed their negative experiences with the DOCC bureaucracy and how it hindered the NGOs from responding quickly to disasters.

The lack of coordination vastly increases the delivery time and inventory cost, reduces the overall service level, and results in substantial economic and environmental waste (Ye et al., 2020). Thus, effective coordination is essential for successful relief operations (Altay, 2010). Effective coordination among government agencies and related stakeholders ensures a streamlined and efficient response during DROs. Despite the importance of coordination in crisis management, it may be impossible to succeed, and in reality, responding to a crisis can take time and effort (Bahadori et al., 2015). Therefore, an imperative tool or platform for coordinating disaster information is essential amidst the chaos, where the government can utilize the SOP to coordinate stakeholders' operations during disasters. As suggested by Mohd et al (2018), NADMA needs to give priority to filling this gap in its disaster management policy to adhere to Directive No. 20. Ultimately, a well-structured platform for disaster coordination is necessary to help NADMA and stakeholders collaborate efficiently in times of crisis.

Inadequate of Equipment

Research indicates that equipment is a critical challenge for DROs in emergency response. Amidst the disaster, stakeholders encountered numerous challenges, particularly needing more equipment, transportation, or machinery to facilitate DROs. Moreover, the research required additional facilities. Informant 13 says Malaysia lacks shelters or bunkers in the event of an extensive and prolonged disaster. Informant 13 argued that if there is a bunker or shelter in case of a disaster, there is already a six-month food supply with spares. If something happens, they can live for six months or three to six months; moreover, Malaysia has yet to reach that stage of having bunkers and shelters. This is likely due to a lack of resources to build and maintain them, as well as a lack of public awareness about the importance of having these facilities in place.

In addition to the lack of bunkers and shelter, this research also revealed that some temporary evacuation centers had been destroyed as a result of the war. In addition, there needs to be more electricity and water supplies in the aftermath of the disaster. An interview with informant 11 revealed that the evacuation centre was destroyed; the temporary evacuation centre was not officially designated and lacked electricity or water. Besides posing a safety hazard to the affected community, this lack of resources further complicates DROs. Besides that, the research revealed a lack of boats, which hampers DROs. In response to the emergency, informant 7 indicated that their team had acquired the boat from a third party. He clarified that they had no equipment or boats. He and his team had to rely on assistance from Angkatan Pertahanan Malaysia (APM), firefighters, cops, and other local organizations. Their lack of resources made it difficult to respond quickly to the disaster, and they needed to rely on external assistance to transport themselves to the scene. Furthermore, there is a need for more equipment to assist in cleaning, resulting in delayed cleanup and waste disposal in the affected areas. Informant 4 said the garbage collection area had become clogged or blocked due to delayed disposal. It worsens the existing shortage of conveyor machinery, such as roll-on-roll-off (Ro-Ro), but it would solve the problem.

Therefore, addressing the challenges of a lack of equipment in DROs is necessary to support relief efforts. Yazid et al (2017) asserted that lacking assets like boats and helicopters

caused delayed mobilization. These challenges lead to insufficient food supplies Yazid et al (2017) and a scarcity of immediate supplies of essential needs for the victims (Khuzzan et al., 2017). Enough equipment, transportation, and machinery reduce the impact of a current disaster and can help prevent future disasters. It is, in fact, essential to have adequate resources to respond to natural disasters effectively and promptly.

Other Challenges

Another challenge the stakeholders faced during DROs in Malaysia was the presence of the local community, typically called the "Pelancong" disaster, which made the disaster area a tourist destination. As reported by Informant 11, Several individuals visited and contributed to the "Pelancong" disaster. Occasionally, they do not realize that their actions interfered with the military or the NGO's ability to relieve. However, sometimes, they take pictures or videos instead of helping. Similarly, Informant 1 highlighted how civilian actions during a "Pelancong" disaster hindered the relief effort. He stated that these disruptions are one of the challenges to relief operations.

The presence of disaster tourists in the disaster-affected area disrupts the authority's and rescue teams' ability to carry out DROs, obstructing the adequate supply of humanitarian logistics to the victims. Informant 1 argued that a lack of awareness of disaster operations was the cause of the uncontrolled incident during this relief operation. Raising public awareness about disasters is crucial, especially during DROs. Ideally, this would prevent rescue difficulties and delays in humanitarian logistics supply chains. In addition, informant 2 emphasized that a lack of knowledge of disasters also leads to disruption during the relief operation as the local development plan has already been implemented; the local authorities' understanding of implementing it may also be a barrier. Last but not least, this study also discovered that stakeholders faced weather challenges. Due to their extensive preparations, informant 12 claimed they encountered no difficulties during the relief operation. However, the weather and chaotic conditions did not spare them during the rescue operations.

As mentioned above, DROs in Malaysia encountered numerous challenges (Figure 2), mainly four primary challenges (communication, coordination, manpower, and equipment) and others categorized into subthemes. Disaster-related information scarcity creates communication challenges. The paucity of disaster information challenges relief organizations to assess the disaster scope accurately and plan their operations accordingly. On the other hand, the coordination challenge was due to the complexity of coordinating the various stakeholders involved, such as the government, NGOs, and humanitarian organizations. The need for more personnel and equipment than what was available led to a shortage of manpower and equipment. The fact that the affected areas are remote and challenging to reach only worsens this situation. Thus, these challenges present an enormous barrier to DROs evacuating affected victims. This hinders the efficient delivery of essential goods and services to those in need.

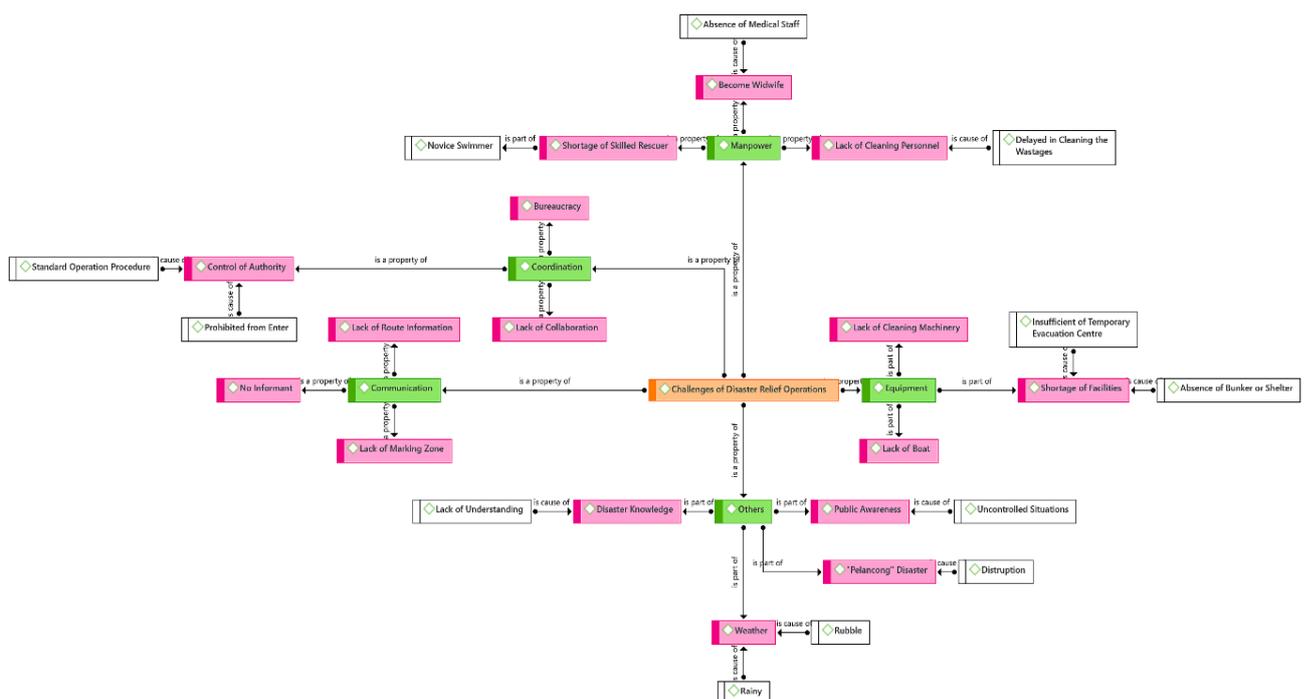
Conclusion and Recommendation

This research's identification of every hurdle leads to the conclusion that all stakeholders should pay attention to Malaysia's disaster relief and emergency response operations. The challenges (communication barriers, inadequate equipment, manpower shortage, lack of coordination between stakeholders, lack of awareness, Pelancong disaster, and weather) have worsened, and the adverse effects of the catastrophe have remained unchanged for the past six years, hindering Malaysian DROs' effectiveness. Consequently, DROs can be chaotic,

wasteful, and unproductive if misaligned (regarding relief products, quantity, recipients, etc.), even with well-planned and well-equipped operations. Unless addressed, these challenges will continue to hinder relief efforts and cause further suffering. During emergency response, one should be aware of the challenges of relief operations. These operations were crucial, and a swift or effective solution was required to address these challenges. Hence, the disaster management team should remain vigilant to prevent obstacles that may adversely affect relief operations for disaster victims during the emergency response. Minimizing response time and providing sufficient supplies during the emergency response may help mitigate the disaster's severity, notwithstanding that natural disasters are inescapable.

To tackle these challenges, this research recommends sufficient transportation, increased training, communication enhancements, and strengthening coordination among all stakeholders. Governments should also provide adequate resources and support to ensure disaster response and relief operations succeed. It is crucial to reduce communication barriers, mainly when multiple stakeholders are involved and face communication barriers with each other. It also highlights the need for more DRO research to improve existing circumstances. In addition, boosting the community's knowledge of disaster preparedness and response strategies prepares them for natural disasters better. This will mitigate the effects of natural disasters and avoid disruption during relief operations. Finally, national, provincial, regional, and local stakeholders should design and implement a comprehensive legislative disaster relief supply chain framework to mitigate the adverse effects of DROs, particularly emergency response.

This research makes a significant contribution. The findings can offer invaluable advice for DROs across a wide range of sectors and the mitigation of disaster risks. This research can further provide insights to identify potential solutions to mitigate disaster impact and provide insight into disaster response best practices. Furthermore, relief agencies and other stakeholders may use the abovementioned data to improve their coordination and relief delivery systems. The research will also lay the groundwork for several stakeholders to develop and suggest improvements and possible solutions for DROs that align with the advancements in the artificial intelligence (AI) era. With any luck, this study will help to lessen



the obstacles during DROs and support governments, non-governmental organizations, and other stakeholders better in understanding the complexity of DROs during emergency response. It is also indispensable to a "build-back recovery" plan for the government and stakeholders to prepare themselves for future disasters, as highlighted in the Sendai Framework. In this way, this study is an invaluable contribution to disaster risk reduction efforts and will help ensure a better future for all.

Figure 2: Theme map of the challenges of DROs

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