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Research Article

Humanitarian Logistics Support Challenges During Flood in the Five States in Malaysia

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Abstract: The field of Humanitarian Logistics Support has gained much attention in research today. Humanitarian actors should plan their logistics requirement, strategise the supplies they receive and deliver them to the affected areas as quickly as possible without with a lead time. Furthermore, proper preparation for the transportation of the supplies is essential, and this necessitates meticulous planning. In light of the increasing number of disasters that occur each year, humanitarian logistics support should be able to deliver aid and supplies with greater efficiency. It was discovered, however, that the same issues were reported over and over again. This research identifies and analyses the issues and challenges that the Humanitarian Logistics Support faces, in order to determine their cause and consequences. This study examined the flood-related news reported in Malaysia's leading newspaper and on social media, as well as analysed articles pertaining to Humanitarian Logistics Challenges using Atlas Ti. Several Malaysian states, including Johore, Pahang, Kelantan, Terengganu, and Sabah, were reported to have experienced flooding beginning at the end of December 2020 and continuing until the middle of January 2021. The findings revealed that there were numerous logistics shortfalls in humanitarian logistics support that were not caused by inefficiency on the part of humanitarian actors, but rather by uncertainty during the flood. An emergency plan must be developed as a result in order to prevent underlying risk and disruption from occurring. Previous studies had concluded that inefficiency was the root cause of humanitarian logistics challenges; however, this study found that uncertainty issues encountered during the disaster response were the main reason of these difficulties.

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Keywords: flood; humanitarian logistics support; humanitarian aid; resource management

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1. Introduction

The field of humanitarian logistics support has gotten a lot of attention in recent years. A good logistician planner in humanitarian operation is seen in the logisticians' ability to procure, transport and receive supplies at the site of a humanitarian relief effort. Due to the rising numbers of disaster every year, humanitarian logistics must conduct more research looking into delivery aid, supplies and performance.

Humanitarian organisations are essential, especially during disaster response. Many disaster operations highly depend on logistics support (Kokaji & Kainuma, 2018). They usually provide logistics and transportation, such as moving people to a safe place, carrying wounded people, sending humanitarian aids and providing shelter (Sopha & Asih, 2018). Humanitarian supply chains have unique requirements that cannot be met by an ordinary supply chain approach (Frennesson et al., 2021).

2. Literature Review

2.1. Resource Management Challenges

Disasters often occur unexpectedly. It happens in a short period, causing logistics planning failed to be adequately implemented. Unpredicted quick-onset emergency, which usually has little or no time in between, requires a rapid response in need of supplies (Abidi et al., 2020). Since the disasters that occurred have an impact on most of the community, it can be seen that most logistics resource management is not feasible due to issues such as unidentified demand trends, inaccurate forecasting and limited logistics resources.

Demand patterns in humanitarian supply chains are typically unpredictable in terms of timing, location, type and size (Abidi et al., 2020). The preparation and response processes deal with activities and actions engaged only after a disaster occurs. According toHandayani et al., (2019), water, food such as nutritional products, shelter, medicine, sanitation and supplies related to the elderly, mother and children are among the logistics needs that are critically required. This humanitarian aid comes from the procurement of supplies and donations(R. A. Cook & Lodree, 2017). Preparing these humanitarian supplies involves many stakeholders and donors. These resources are often insufficient and sometimes oversupplied, mostly used goods (Hashemi Petrudi et al., 2020)to meet the unpredictable needs (Baharmand et al., 2020). The issues of inadequate stocks create pressure and can be overcome by pre-positioning contingency stocks, especially those essential and common.

Although the logistics needs are often a commodity that is already in high demand in every disaster, these goods are often an issue and could not fully meet. Here, the problems lie in estimating the demand quantities and understanding casualty preferences (Stallkamp et al., 2020). Therefore, determining the demand size and identifying specific areas where the logistics are critically needed is challenging, often because when a disaster occurs, information about logistical needs cannot be known immediately.Yang et al., (2020) added that before the logistics are prepared, the extent of damages, disaster scope and the number of victims are required to determine the type and quantity of logistics support material needed. Information should be collected to determine how many residents or victims are affected, the current needs and the length of time logistical assistance required until the rescue assistance operation is completed. That is why the forecasting provided on logistics needs is often inaccurate and causes difficulties in meeting disaster victim needs.

Logistics supply should be based on disaster demand forecasting (Yang et al., 2020). Instead of forecasting the logistics requirement, often resources such as medicine, for instance, vaccines or specific drugs (Sulistyawati et al., 2021), clean water and fuel (Khaled & Mcheick, 2019) for the generator used on electricity to provide healthcare facilities and field hospitals are limited (Pescaroli & Kelman, 2017). In the case of recovering clean water supply after a natural disaster, the stakes are high. Water becomes contaminated during the outbreak due to the lack of proper infrastructure in the affected areas. Location with access to freshwater often only provides usually 15 m^3 of water per hour (Stallkamp et al., 2020). However, different places throughout the disaster face various logistical issues. For areas facing the earthquake disaster, they critically need fuel to turn on the generator due to power outage (Khaled & Mcheick, 2019). However, most importantly, they need shelter as their homes have been destroyed by the earthquake (Baxter et al., 2020).

Predicting the necessity of supplies during a disaster is not an easy task (Stallkamp et al., 2020). Sending the wrong items to a disaster area could cause congestion in the port, airport and inability to cope with the warehousing (Kovács & Falagara Sigala, 2020). According to Abidi et al., (2020); Yang et al., (2020), identifying the type and quantity of materials needed when a disaster occurs can effectively minimise the black box problem. However, often the necessities delivered do not meet the orders required. There are too few need and too many unnecessary products sent in, which causes dumping into relief supply centres. By obtaining the demand information of the disaster areas, it will help to maximise the survival rate and, on the other hand, ensure that the demand can be fulfilled Abidi et al., (2020); Yang et al., (2020). Supplies such as food, water, medicine and clothing sent to the humanitarian relief drop zone come from many sources. According toCook & Yogendran, (2020); Cook & Lodree, (2017), food and clothing supplies sometimes come from donations. Logistics planners need to isolate the necessary supplies because the goods that arrived are occasionally inappropriate, unusable and do not meet the needs (Cook & Lodree, 2017; Yang et al., 2020). Having a dynamic and flexible logistical response would allow the logistics distribution to speed up the receipt of supplies from the drop zone to the disaster areas(Wahba et al., 2020).

2.2. Route and Accessibility Challenges

The challenges in providing supplies are related to humanitarian logistics needs and humanitarian logistics preparedness (Kokaji & Kainuma, 2018). Both humanitarian aid and supply chain logistics are vital for practical humanitarian assistance. With the supply of logistics, even if it does not meet the needs of disaster victims, the next step is to ensure that the Disaster Relief Collection Centre's items should be delivered to the disaster area in the shortest time (Yang et al., 2020). The best way to distribute the logistics supply effectively is to provide accurate disaster areas rapidly. It will help solve the "last miles" problem of emergency rescue (Cook & Lodree, 2017; Mishra et al., 2020; Yang et al., 2020). However, once a disaster occurs, it creates a complete communication breakdown and overall road traffic (Yang et al., 2020). Most of the time, the failure of delivery is contributed from road network problems (Khaled & Mcheick, 2019; Kokaji & Kainuma, 2018; Rodríguez-Espíndola et al., 2018; Yang et al., 2020), unavailable routes (Kokaji & Kainuma, 2018), blockage due to earthquakes (Khaled & Mcheick, 2019) and airport control centres that could not operate (Adem et al., 2018; Khaled & Mcheick, 2019), causing the delivery of logistics supplies failed to be channeled not only from abroad but also from collection centres to disaster areas, thus causing the smoothness of delivery of humanitarian aid to be reduced (Khaled & Mcheick, 2019) and delayed (Kokaji & Kainuma, 2018).

In ensuring the delivery of supplies is carried out quickly, the critical success factors depend on the agility of the transmission, the network of connecting roads, the selection of location for the disaster warehouse relief items and the distance travelled to the disaster areas (Stallkamp et al., 2020; Yang et al., 2020). The relief items centre location affects the time of distribution and the success of the relief operations (Maharjan & Hanaoka, 2018). If it is located far away from the disaster areas, it will be time-consuming to transport the supplies (Yu et al., 2020). Baharmand et al., (2020) added that addressing these critical success factors will also create effectiveness in demand coverage and logistics cost efficiency, and proficiency in response time.

There are many standard requirements across disaster response, such as transport and accessible routes to meet the response time (Shittu et al., 2018). Transportation is vital for the evacuation process and sending supplies to the relief centre. The most significant success factor in humanitarian logistics support is the delivery of aid to reach the destination according to the required time. Nevertheless, humanitarian assistance was delayed in many cases due to unreliable routes, limited access, and low traffic flow, which always happen when a disaster such as an earthquake and flood strikes. This challenge could not be avoided; however, good transportation planning such as pre-planning the alternatives route or choosing suitable transportation in a limited-access route will avoid indirect losses and, most importantly, save lives and prevent damages. The Humanitarian Logistics challenges as in Figure 1.

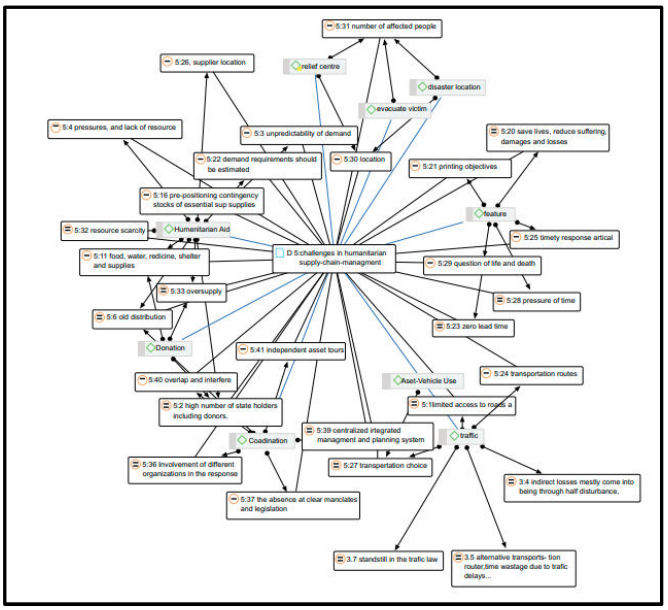

Fig. 1 Humanitarian Logistics Challenges (Source: Author)

Nonetheless, not all of the Humanitarian Logistics issues discussed above occur in every disaster. The following section will discuss the flood disaster that occurred in five Malaysian states. Due to the restrictions on collecting data in the field while Malaysia still under Movement Control Order (MCO) caused by the Pandemic COVID-19, the authors have chosen to collect data through articles in newspapers as well as from social media. Therefore, to identify the problems faced during floods, information from prime newspapers and social media were collected to explore the challenges and effects caused by the floods. The author uses the floods that occurred in five states as a case study.

3. Methodology

This study is based on content analysis from secondary sources to explore the humanitarian logistics support challenges. Firstly, the data collected through the news reported in the Malaysia prime newspaper and social media related to the flood in five states in Malaysia, namely, Johore, Pahang, Kelantan, Terengganu and Sabah. The floods were reported to have started at the end of December 2020 until middle of January 2021. The floods occurred in 4 states and then extended to 1 more states involving 16,560 victims who were evacuated. Secondly, data were collected by reviewing literature where the author looked for studies pertaining to Humanitarian Logistics challenges, focusing on humanitarian aid distribution' and 'transportation limitation'. The articles were categorised based on the research objectives investigated.

Using the inductive approach based on the articles' content has helped derive codes from the articles. The data analysis was conducted using Atlas Ti, a computer-assisted qualitative data analysis program, to organise and manage the articles. A combination of open coding and predefined codes was used to conduct content analysis to identify the themes (Yin, 2013) related to Humanitarian Logistics Support challenges. According to Kunz, (Kunz, 2019), content analysis has been used mainly in humanitarian logistics research. The coding of the theme was identified in each article. After coding the materials, a critical interpretative synthesis was used in analysing each theme. The themes and codes were continuously reviewed to ensure alignment with the research objectives. Results were discussed with coded excerpts of the original studies to simulate the scenario in identifying the challenges by exploring the humanitarian logistics risk and performance.

3.1 Study Areas

Malaysia is situated near to the equator which experienced two major monsoon seasons in November until March and May until September. This monsoon season has brought heavy rainfall that may reach multi days that causes flood. With large flood conditions that often occur resulted in significant property damage and human injury. The major effects of flooding are machineries, equipment, inventories and physical infrastructures damage as a result of direct contact with water. Other unintended consequences include an inaccessible transportation network and a communication loss.

East Cost of Peninsular Malaysia has experienced a major flood in 1971, and it happened again 2014 (Elfithri et al., 2017). Since the end of December 2020, heavy rainfall has continued to cause widespread flooding in Peninsular Malaysia and Sabah. In January 2021, the states of Johore, Pahang, Kelantan, Terengganu and Sabah continue affected by flooding caused by heavy rainfall. Seasonal monsoon rain has brought heavy rain and flooding. Due to the natural disasters strike in Malaysia especially flood, the governments has developed many initiatives to minimise loss of life and property. Therefore, this section explored on challenges faced during flood that took place in five states in Malaysia in the early January 2021.

A. *Johore*

State of Johore is situated in South-East Peninsular Malaysia. There are two rivers from Gunung Belumut and Bukit Gemuruh discharge into Johore Straits. The catchment area is in Kota Tinggi. This area went under water in December 2006 and January 2007 which during the major flood there were many other areas has also severely affected. 110,000 people were evacuated and estimated USD 0.5 billion loss due to the loss of property(Romali & Yusop, 2021).

The tide collision, coupled with the unusual rainfall causing Kota Tinggi, Mersing, Kulai, Segamat and Johore Baharu in Johore, was hit by floods. On 2nd January 2021, flood struck the state forcing 5,818 victims were moved to 38 temporary evacuation centres that were opened after heavy rains. A bridge collapsed and the main roads were flooded, causing humanitarian aid to delivered delay. The state government has sought information on flood victims and has taken various efforts to provide food aid and daily necessities. Apart from that, the air monitoring unit also conducted patrols to get a real picture of the floods that occurred in the state. At the same time, the electricity supply was cut off, affecting 1,343 residents. Mobile power generators have been used to address this issue.

B. *Pahang*

Pahang is a state that located within East Coast of Peninsular Malaysia. Pahang is subjected to the seasonal flood almost yearly which caused by varies flood magnitude. In 1971, Pahang has experienced the worst flood which took 24 lives and has affected the Pahang economic losses (Elfithri et al., 2017). Once again in 2014, Pahang has experienced a big flood which caused almost all district being swept away by flood. Recently, Pahang was hit by floods again which only took place in Raub district. It is all started on 1st January 2021 when it rained non-stop, causing floods in the Felda Kota Gelanggi Jerantut. On 4th January 2021, the flood situation worsened when 10,467 flood victims evacuated to TEC increased dramatically to 17,734. All the victims have placed in 198 temporary evacuation centre involving nine districts in Pahang. The Public Works Department has declared that nine roads had to be closed due to rising water. Construction of compact bailey bridge with the coordination of National Disaster Agency Malaysia, Malaysian Armed Forces, and the district office has successfully connected 2600 people from 3 villages affected and has a cut-off for five days. Humanitarian aid missions have therefore been channelled using boats in the affected areas. Food and rice distributed by the government agencies and NGO to the families of flood victims in the state are expected to last two to three months. Clean water supply has also been channelled to residents using temporary tanks.

C. *Kelantan*

Kelantan situated in North-East of Peninsular Malaysia. When heavy rainfall, the water level of the Kelantan River overflows, causing flood in several villages. Kelantan river basin receive rainfall throughout the year especially during the monsoon season. In 1967, Kelantan has faced major flood which 70% of the population were affected(Sathiamurthy et al., 2019). In 2014, flood that occurs in Kelantan was the worst recorded in history where more than 40,000 populations being evacuated (Alias et al., 2020). On 8th January 2020, four of the five major rivers in the state pass danger levels showing an increasing trend. Some district closed due to part of the road being flooded. Floods occurred in 6 districts involving 6,371 victims and the opening of 76 temporary evacuation centres. Some parts of the Tumpat district have lost communication and food supplies were insufficient. Food supplies such as rice, canned food and other necessities, for instance, urgently required.

D. *Terengganu*

Terengganu situated in east coast Peninsular Malaysia. This state is categorised as low lying area in the coastal which is vulnerable to flash flood. The flash floods that hit Terengganu on 6th January 2021 has affected the four districts, and 12,048 victims were located in 14 temporary evacuation centre. The ruptured riverbanks caused the area along the banks to flooded by up to one meter due to overflow of water from upstream. The road at Chukai, which connects the small town, was closed due to floods. Distribution of the basic necessities and clothing donated by NGOs, private companies and individuals to flood victims was sufficient. The Social Welfare Department guarantees adequate food supply in Terengganu, which will last up to a month. The Social Welfare Department had made initial preparations by providing food supplies at the front base and food supply depot that had been set before the incident happened.

E. *Sabah*

The worst flood has taken place in Sabah in December 1996 where RM130 millions loses and 200 people reported death. Next in 2014 there are about 40,000 populations from 70 villages were evacuated. In recent times, 16 January 2021, Sabah suffered floods due to continuous heavy rains in the districts on the west coast, inland and north of Sabah. Several major routes were affected by the floods damage as a result of road wall retaining failure. The affected section of the road is estimated to be 50 meters long by four meters wide, and the depth of the rubble is between two and three meters. The situation makes it impassable for all types of vehicles. On the other hand, the Sabah General Welfare Services Department and the National Disaster Management Agency have distributed cooked food assistance to all 1,765 victims evacuated at temporary evacuation centres. The service provided is based on the report received.

4. Results and Discussion

Data collection was carried out using prime Malaysian newspapers and other sources such as information from social media such as Facebook and Twitter. The time period for collecting information from both mediums is from the date the floods are declared in the five states until the floods recede. As a result of the data analysis, there were 414 posts related to flood during the period. From the total posting, the authors review the content and indicate post that are related to theme. The summary of the posts obtained are as in Table 1. Reviewing the data collected it was found that, the five states mostly faced the same issues, especially limitation of routes and accessibilities.

Table 1. Number of Social Media Posting Related to Flood

Theme	**Number of Posting in Social Media**				
	Johore	***Pahang***	***Kelantan***	***Terengganu***	***Sabah***
Flooded road	27	36	19	17	28
Road closure	6	29	11	16	23
Limited access	5	8	1	7	11
Low traffic flow	1	8	1	12	5
Overcrowded evacuation centre	1	1	1	3	2
Asset and	5	9	3	1	12

property loss		
Power failure	2	2

Humanitarian logistics during flood is always facing uncertainty and give big impact and consequences. Table 2 present the summary of challenges and consequences found during flood in the five states.

Table 2. Summary of Challenges and Consequences

Theme	**Number of Posting in Social Media**				
	Johore	***Pahang***	***Kelantan***	***Terengganu***	***Sabah***
Flooded road	27	36	19	17	28
Road closure	6	29	11	16	23
Limited access	5	8	1	7	11
Low traffic flow	1	8	1	12	5
Overcrowded evacuation centre	1	1	1	3	2
Asset and property loss	5	9	3	1	12
Power failure		2			2

5. Conclusion

Although logistical planning has been well implemented since the mitigation phase has identified impending problems and obstacles based on previous flood experience. Through proactive measures, mitigation has been used to eliminate or significantly reduce the impacts and risks associated with hazards. However, natural hazards cannot be anticipated and create uncertainty. As a result, the logistics planning process has become less efficient and causes unavoidable challenges, most notably route accessibility challenges. Hence, this study has attempted to identify the issues and challenges faced in Humanitarian Logistics Support during flood. It offers various perspectives on humanitarian logistics challenges. This study has provided the humanitarian logistics support challenges and explored their cause and effect, which could help the humanitarian actors be more ready and should expect much more uncertainty when involving humanitarian logistics operations. In conclusion, there are many logistics shortfalls in humanitarian logistics support which caused by unavoidable factors and the other hand it implies underlying risk and disruption. Therefore, it is suggested that humanitarian actors should find the best solution in solving these issues by reviewing each humanitarian actor involved in humanitarian logistics operations.

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