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Supply Chain Resilience in the Face of Floods: A Case Study of Humanitarian Efforts by the Social Welfare Department in Malaysia

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Abstract: The objective of this study is to outline the issue of government-provided disaster relief management (JKMM) for flood victims during a disaster. Additionally, it examines communication and the planning of goods movement as key elements in determining the efficacy of Humanitarian Supply Chain Management (HSCM). This study focuses on the staff of the Social Welfare Department (JKMM), namely those from the Disaster Management Department and other agencies. The analysis of this research relies on a distinct dataset acquired from a survey conducted among the staff members. Researchers can more easily get quantitative measurements to analyze data on respondent variables. The operational sample comprises 137 participants. The study reveals that enhancing aspects related to the movement of goods and communication is crucial for improving the efficacy of HSCM. JKKM should ensure sufficient vehicle availability while simultaneously striving to minimize communication obstacles, such as limited network coverage. This paper stands out because of its unusual approach since it examines the challenges faced by the government agency (JKMM) in managing products for flood victims. This perspective sets it apart from earlier studies, which primarily focused on the experiences of flood victims and evacuation centers in Malaysia.

Keywords: *Disaster Relief Management, Disaster Relief Management, Communication, Planning Movement of Good and Government Agency*

1. Introduction and Background

Malaysia is located in a region that is geologically stable and virtually "disaster-free" in terms of natural and man-made disasters, such as floods. Though it has occasionally been struck by the ends of tropical storms, the nation is also too far south of the main typhoon tracks, placing it in a climatologically stable area. However, Malaysia does frequently see haze, landslides, floods, droughts, and human-caused disasters. According to Musa, Weng and Shafi (2015), the largest natural catastrophe risk in Malaysia is flooding. The frequency, mortality toll, and economic damage resulting from natural catastrophes are published globally, demonstrating how susceptible Malaysia is to flooding. Floods incur unquantifiable damages every year in addition to spreading illness, damaging crops and land, and killing a large number of people. Over the past 20 years, the nation has seen severe weather and climatic phenomena, which have led to significant storms in 2006, 2007, 2010, 2011, and 2014. The majority of these were monsoonal floods, which occur annually and differ in terms of location, severity, and timing. In areas of the country vulnerable to monsoon winds, a high death toll occurs (Musa, et.al, 2015). The primary reason for this, according to the former Director-General of the Drainage and Irrigation Department (DID) Malaysia, is the country's humid tropical climate, which is occasionally impacted by storms. Nonetheless, storms have gotten harsher and more frequent during the past few decades (Musa, et.al, 2015).

In Malaysia, 4.8 million people live in places in danger of flooding, while the country's geographical area is nine percent prone to flooding. In Malaysia, flood disasters are responsible for an annual loss of major proportions due to disease outbreaks, crop and property destruction, and casualties. Six Malaysian states experienced flooding as a result of seasonal high rainfall that started on January 23, 2017 (Johor, Kelantan, Pahang, Perak, Selangor and Sabah). In addition to providing disaster relief, Malaysia's National Disaster Management Agency (NADMA), the army, the police, and other local government organizations carried out evacuations and set up emergency shelters and evacuation centers. About 25,000 people were temporarily displaced by the floods, and some villages lost access because of destroyed bridges and obstructed roadways. Schools and health institutions are flooded. Schools weren't inundated and turned into makeshift shelters. Malaysia is concentrating on the resilience of growth as it advances socioeconomically to ensure that natural

calamities do not undo its progress. As a result, it's critical to plan ahead for natural catastrophes, identify communities and areas that are at risk, and provide the necessary resources in case they arise. These priorities, which include building a thorough framework for disaster risk management (DM) and safeguarding the nation's future, were emphasized in the Eleventh Malaysia Plan. Additionally, Malaysia has seen improvements in women's health, higher levels of education attained, and a rise in the number of women pursuing higher-paying jobs (NADMA Malaysia, 2019).

The way emergency relief is given has several issues that indicate their HSCM should function more effectively. Aside from that, assistance is not always provided to people, and when it is, it is irregular and takes a long time. There has been conflict there as a result of difficulties. Furthermore, the findings of Terap (2013) indicated a great deal of discontent with the JKMM, MKN, and District Office's handling of matand (Shafiai & Khalid, 2016) because they weren't performing them consistently. This was due to the victims' discomfort in the evacuation center and a shortage of rescue supplies. Terap(2013) who investigated flood relief management in the District of Padang Terap, Kedah Malaysia, provided evidence for this. According to their research, there was violence in flood relief facilities because there wasn't enough food or supplies, victims couldn't understand one another, the shelters were overcrowded, and there wasn't the necessary infrastructure or equipment. Furthermore, their investigation revealed that the evacuation center's management and upkeep must be handled by the responsible agency and that the facility is not yet prepared for use in the event of floods (Jaafar, et al., 2020). Thus, the government ought to consider and incorporate the feedback from victims to devise ways to improve the HSCM going forward (Shafiai & Khalid, 2016).

Therefore, the purpose of this study is to determine the important relationship between planning the flow of commodities and communication in relation to the efficiency of the humanitarian supply chain management by the Malaysian government and non-governmental organizations.

2. Literature Review

Communication is one of the critical factors that should be considered during flood disasters. Communication is done in all phases of disaster management preparedness, which involves early warning during and after a disaster (Zakaria & Mustaffa, 2014). Communication, also known as 'the act of transmitting', is explained by Martin, Nolte, and Vitolo (2016) as a medium to distribute a message or information in an organization or between two (2) different organizations. Communication conveys information transfer instructions before a natural disaster that is not known to comply with evacuation orders when the information is obtained from reliable sources and experts (Zakaria & Mustaffa, 2014). Earlier, it was considered a necessary expense, and hence, it lacked operational knowledge and investment in communication and technology (Jaafar *et al*.,2020). During the disaster response, communications have become more sophisticated due to new information and communications technology (ICT) developments for disaster management (Mohd, *et al*.,2018). The assessment of the performance of the humanitarian supply chain management is hindered by the inadequately executed policy of communicationimplementation at all levels that impacts the flood victims negatively (Jaafar *et al*., 2020).

Planning in the movement of goods

One of the program branches in logistics that calls for preparation and response stages in disaster management is the planning of the flow of products during disaster relief programs. The efficiency and speed of implementation of disaster assistance initiatives are essential components. The logistics system has to buy, store, and move food, water, medication, and other supplies as well as people, machines, and equipment-that are required throughout the pre and post-disaster time (Shafiai, 2016). Another responsibility of humanitarian supply chain analysis is the planning of the movement of products. Moreover, logistical movement is necessary for various procedures to handle calamity. As per Directive No.20 of the National Security Council (NSC), the government designates entities to handle the duties during a flood occurrence. Goods and people are moved in logistics planning in two movements. Malaysian disasters are handled by government agencies using top-down, people- and product-centered government operations. Malaysian disasters are handled via top-down, government-centered machinery. The researcher thus looked at the logistics of the movement of the product as planned by the Disaster Management and Relief Committee (Jaafar et al., 2020). Transport is especially crucial because of flood events, which necessitate evacuation to reach, according to Tamyez et al. (2019).

Many government agencies, including JKMM, respondent one remarks, need to possess their 4x4 or 6x6 transportation. To enter the flood disaster area, 4x4 vehicles and big lorries are necessary, but more is needed to be provided for them. In the case of the JKMM, this means dependency on rental vehicles, other organizations, or private volunteers who lend their vehicles to the agency.

Humanitarian supply chain management (HSCM) effectiveness

Humanitarian supply chain management (HSCM) is about managing the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster, Thiruchelvam,Ismail, Ghazali, Mustapha, Norkhair, Yahya, & Muda, (2018). According to Shafiai and Khalid (2016) and John, Ramesh, and Sridharan (2012), humanitarian supply chain management (HSCM) effectiveness involves managing the different factors in the system to reduce the impact on the people who are affected by the disaster.The main task is to mobilize the goods, finance and administer the services to the beneficiaries. disaster relief requires activities in many dimensions, such as rescue efforts, health and medical assistance, food, shelter and long-term relief activities. The victims in the disaster supply chain HSCM are the act of providing humanitarian aidin the face of a, most often, natural disaster to the affected community. Planning the movement of goods,therefore, a mix of different kinds of operations involved in disaster relief and continuous support for developing regions. Generally, a distinction is made between continuous aid work and disaster relief, which usually entails a limited time scope. Planning movement of goods operations placed in the disaster management cycle between disaster preparedness and disaster response Khalid & Shafiai, (2015).

3. Research Methodology

The study used explanatory and descriptive research design. Appropriately, in descriptive technique, thestudy concentrates on the dedication of the frequency with which an event happens and how variables are connected in a specific context. What about the explanatory strategy? The study is concerned with determining the effect and cause-and-effect relationships among variables. Hence, this analysis is undertaken with explanatory and descriptive exploration design to explain the variables sufficiently and disclose the extent to which the elements of humanitarian supply chain functionality.

For this study, the target population is the employees from selected government agencies in Putrajaya, Selangor. A data collection was used for data collection, and the research instrument was adapted from previous researchers. There are seven humanitarian supply chain management items adapted from Shafiq and Sorarana (2019). In addition, there were seven items of communication adapted from Mohd, Fathi and Harun (2019) and finally, the 7 items of planning the movement of goods adapted from Jaafar et al. (2020). All the items use a four-point Likert scale, which is most appropriate because the information obtained can give a perception of the level of perception and not burden the respondent in decision-making or choice when responding to the questionnaire (Choy, 2014). The sample of this study is from civil servants that experience distributing humanitarian aid. The convenience sampling technique was applied to get the sample and regression analysis was applied in this study.

Demographic Profile

Among the respondents of this study, 59.9% were female, and 40.1% were male. The total number of respondents, both males and females, was 137. In addition, the 31-40 and 46-50 age groups reported the highest number of respondents (19.7%), followed by the 41-45 age group (18.2%). Meanwhile, respondents in the age group 18-20 reported the lowest number, which was 4.4% percent only. Furthermore, the highest number, 29.9% of the respondents, has worked between 1 to 5 years, while the lowest is 9.5% of the respondents who already worked for more than 31 years—moreover, the respondents' years of working in the humanitarian sector or relief chain operation. Based on the figure, it can be concluded that the highest number, which is 30.7% of the respondents, has worked in this field for more than 10 years; meanwhile, 19.7% have worked there for less than two years.

Table 1: Demographic Factor Analysis

Demographic Factors		Frequency	Percent
Gender	Male	55	40.1
	Female	82	59.9
Age	18-20	6	4.4
	21-25	22	16.1
	26-30	22	16.1
	31-40	27	19.7
	41-45	25	18.2
	46-50	27	19.7
	>50	8	5.8
Years of Service	5-6 Years	41	29.9
	7-10 Years	16	11.7
	11-15 Years	23	16.8
	16-20 Years	23	16.8
	21-30 Years	21	15.3
	> 31 Years	13	9.5
Working in Humanitarian Service	Less than 2 years	27	19.7
	5-6 Years	39	28.5
	7-10 Years	29	21.2
	> 10 Years	42	30.7

4. Results

Pearson Correlation Analysis

Table 2 shows a positive and linear correlation ($r = .803$, $p < 0.01$) between communication and humanitarian supply chain management effectiveness. The result indicates a significant relationship between communication and humanitarian supply chain management effectiveness. Hence, the hypothesis that thereis a significant relationship between communication and the humanitarian supply chain management effectiveness used by flood victims means that the hypothesis developed is supported.

In addition, there was a positive and linear correlation ($r = .945$, $p < 0.01$) between planning the movement of goods and the effectiveness of humanitarian supply chain management. Hence, the hypothesis that there isa significant relationship between the planning movement of goods and the humanitarian supply chain management effectiveness used by the agency to flood victims is supported. The correlation of the variables reported based on the analysis is 0.945 and proved that planning the movement of goods is the most prominent determinant of HSCM effectiveness used by JKMM for flood victim management. The findings show that JKMM should improve their planning movement of goods to avoid unorganized circumstances duringHSCM effectiveness—a previous study by Jaafar et al. (2020). Khalid et al.,2015, and Tamyez et al. (2019)found that the speed of delivering aid such as food, beverages, and others must also be improved during flood events to ensure, at times, meet the needs of flood victims.

Table 2: Pearson Correlation Analysis

Relationship	Pearson Coefficient	Sig. Value
Communication - HSCM Effectiveness	.803**	**0.00**
Planning Movement of Goods- HSCM Effectiveness	.945**	**0.00**

** Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis

The research hypothesis is tested using multiple linear regression analysis. It is the best method or technique to analyze the relationship between independent variables that acted as a predictor and dependent variables that acted as a criterion at one time. The model summary analysis shows that a set of independent variablesis

weighted to form the regression equation or model so that it may be used to explain its relative contribution toward each variable admitted.

From the findings, the R-square and adjusted R-square values are 0.893 and 0.892, respectively. The result concluded that based on the table, 89.2% of the factors contributing to the effectiveness of humanitarian supply chain management revealed by planning the movement of goods and communication. The balance of 10.7% should explained by other factors not included in this research—the planning of the movement of goods and communication. The balance of 10.7 percent is explained by other factors not included in this research. The ANOVA table shows that F values 561.251, which is significant as the significance value is greater than 0.05 (p=0.000). The result indicates that combining the independent variables was significant to HSCM effectiveness. The beta weights presented in Table 4 suggested that communication (β=0.046, p=0.371) did not statistically significantly influence HSCM Effectiveness. In contrast, planning the movement of goods (β=0.906, p=0.371 found a statistically significant influence on HSCM Effectiveness. The result shows that planning the movement of goods is a much greater factor than communication in contributing to the effectiveness of humanitarian supply chain management.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.945a	0.893	0.892	0.08199

Table 4: ANOVA Analysis

Model	Analysis	Sum of Squares	df	Mean Square	F	Sig
1	Regression	7.545	2	3.773	561.251	0.000
	Residual	0.901	134	0.007		
	Total	8.446	136			

Table 5: Coefficient Table

Model	Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
1		**B**	**Std Error**	**Beta**		
	(Constant)	0.308	0.122		2.523	0.013
	Communication Planning	0.042	0.047	0.046	0.897	0.371
	Movement of Goods	0.905	0.051	0.906	17.646	0.000

5. Managerial Implications and Recommendations

Conclusion

The study of humanitarian supply chain management in flood disasters by the Social Welfare Department Malaysia will strengthen their strategies and standard of procedure (SOP) during the natural disaster that affected the country and how to handle victims, especially in flood disasters. Moreover, the Social Welfare Department Malaysia (JKMM) is responsible for coordinating National Disaster management, establishing and ensuring all respective policies and implementing disaster management at each level. Finally, this research will add the Social Welfare Department Malaysia (JKMM) as a department of knowledge on National disaster management. It could be reference material for future researchers and academicians on flood disaster management. The findings reveal that the poor communication practices during the humanitarian aid need improvement till the present. An effective communication system to use during rescue and supply chain operations will expedite the process. JKMM has developed the application "InfoBencanaJKM", which everyone can download from the Play Store or Apple Store for free. Through these apps, people can get the latest information about flood disasters, such as info on evacuation centers, roads closed, affected areas and others. Aside from receiving information from JKMM, users can also update their details and give feedback through the applications. In addition, this app also assists JKMM in ensuring assistance can be given quickly and effectively through feedback received directly from flood victims.

On the other hand, this study is planning the movement of goods. In this study, planning the movement of goods

scored a very strong uphill linear correlation (r=0.945). Furthermore, research conducted by Jaafar et al. (2020) and Tamyez et al. (2019) proved that planning the movement of goods was the most important predictor of the HSCM's effectiveness. The finding implies that JKMM should hire enough staff to strengthen its rescue teameven though there are volunteers during any relief mission. Since the climate is changing with different patternsof flood disasters and unpredictability, adequate and well-trained staff is very important in ensuring assistance provided during HSCM effectiveness and the process of planning the movement of goods will be well managed.

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