

# Effective Emergency Management: The Roles of Knowledge and Practice of Command Structure for Lead Responding Agencies

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## Abstract

**Purpose:** to identify the current challenges in the elements of command structure as practiced by the FRDM and suggest improvement which may benefit the overall emergency management process in the country

**Design/methodology/approach:** Through observation of Four (4) disaster exercise at states and federal level using a structured checklist and survey questionnaire towards nationwide decision makers during emergency situations. Both checklist and questionnaire is based on theory of effective disaster management.

**Findings:** three (3) challenges found and some of the knowledge is not been used in real situations. Hence, this study proposed several improvements for lead responding agencies in Malaysia in improving command structure so that the process of response and early recovery phase can be done more effectively.

**Research limitations/implications:** Data only collected from specific respondent group which is the Fire and Rescue Department Malaysia which based on the national policy is one of the lead responding agency during emergency situation in the country.

**Practical implications:** The finding can be used by responding agencies in Malaysia as it is suggested to improve command structure capabilities so that the process of response and early recovery phase can be done more effectively

**Originality/value:** The tools and collection of data is based on the theory of effective disaster management which pose as its own originality.

**Keywords:** Lead Responding Agency, MNSC 20, Effective Emergency Management, Command Structure, Disaster Exercise

## Introduction

Prevention, preparedness, response, and recovery is the essence of emergency or disaster management (S. Khairilmizal, et al., 2016). The objective of response and early recovery is to minimize the impact of the disaster and loss during disasters. Hence it is important for the response and early recovery phases to be managed effectively (Ainul Husna et al., 2016; Hussin et al., 2018). Effective emergency management during the phases mentioned is divided into five (5) main elements namely command structure, planning and information management, communication, situation awareness and finally resources and logistic (Hussin et al., 2018; Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Saadun, et al., 2016). During-disaster phase, there is extreme time pressure towards the responders and implementation of unified command has shown numerous successful (Madininos & Vassiliadis, 2011). Implementation of unified command ensures a coordinative response by the multi-agency even in a difficult situation (Eshghi & Larson, 2008; PPKKP, 2011).

Under the MNSC 20, disaster management in Malaysia, especially during the response and early recovery phases, are led by the lead responding agencies which include the Fire and Rescue Department Malaysia (FRDM) (MNSC, 2012). Earlier studies made towards FRDM personnel concluded that there are needs of experts in assisting the responding agency in managing command structure during early response and recovery phases (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Jusoh, et al., 2016). Unfortunately, to the author's discernment, no detailed studies have been made on the element of command structure for the lead responding agency in Malaysia. Hence, it is the objective of this paper to identify the current challenges in the elements of command structure as practiced by the FRDM and suggest improvement which may benefit the overall emergency management process in Malaysia.

## Method

The result of this study is part of disaster management research conducted and published in (Khairilmizal et al., 2016; Khairilmizal et al., 2017). Two methods were used where first is the observation of domain experts which are officers from the Fire and Rescue Department Malaysia during disaster exercise namely the EXSTORM. The exercise which was conducted by the Fire and Rescue Department of Malaysia (FRDM), has also gained the cooperation of primary and secondary agencies in Malaysia (MNSC, 2012). EXSTORM also provide very good opportunities for observation because comparing to disaster, exercise can occur more frequently than real-world disasters (Khairilmizal et al., 2017). Adding up, emergency exercise provides the researchers with a rich data source (Militello, Patterson, Bowman, & Wears, 2006). The observation made during EXSTORMS were aided by a structured checklist which was designed based on document review method (Khairilmizal et al., 2017). The observation was recorded using the developed checklist and results were then validated through content and face validity method (Hussin, Wang, & Hipnie, 2012). Three (3) validation approaches used are, lead agency officers at the site, exercise logs and final emergency exercise reports by

FRDM (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Saadun, et al., 2016; Khairilmizal et al., 2017).

The second method is a survey questionnaire. Domain experts were required to answer sets of structured questionnaires in order to obtain a quantitative data (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Jusoh, et al., 2016; Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Saadun, et al., 2016; Khairilmizal et al., 2017). All respondents were decision makers during disasters from districts, states and federal level as categorized in MNSC 20 (MNSC, 2012). The respondent will be accessed based on disaster management and the needs of supports during disaster management. There are an estimated number of two (2) thousand FRDM officers that have the authority to give decision during disasters. Based on the standards population sampling of 95% confidence level with 5% margin of error, it is calculated that a total number of 323 respondents are needed (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Jusoh, et al., 2016; Khairilmizal et al., 2017). With a total number of 407 respondent acquired, the survey questionnaire has acquired 26% more respondent than the required number. The survey questionnaire was developed using Google Forms, as Google Forms provide the ability to provide users with multiple question type (open-ended, close-ended, Likert, etc.), record, compile the respondent data and provide basic descriptive statistics (numbers and percentages) (Khairilmizal et al., 2017). The use of Google forms also was recognized by many types of research as survey tools (Sorensen & Dahl, 2008; Travis, 2010). In fulfilling the objectives of this study, the results related to the elements of command structure from both methods will be presented and discussed in this paper.

### **Results and Discussion**

During the observation of the EXSTORMS, it is observed that it takes around 4 to 8 hours to set up a fully working command structure. The command structure usually set up after being ordered by a higher ranked officer (states level officer) arrived at the site. Without the direction of the states level officer, it is discerned that no such command structure existed although the situation of the incident already escalated to a states level disaster under the MNSC 20.

During the response and the early recovery phase, there are possibilities of local government which first responded to the disaster to be replaced by an improvised government emergency agency from state or federal agencies (Shughart, 2011). Compared to Malaysia, a standardized policy is already in place and running (Khairilmizal, Hussin, et al., 2016). MNSC 20 outlined that disaster which happens in any district area will be managed by the local authority having jurisdiction. However, if the local authority were unable to cope with the load and pressure of the disaster, state-level authority would be in command throughout the disaster, and the local authority will act as a support group for the state authority (MNSC, 2012). As observed, all the responding agency involved in the exercise follows this clear policy but, in terms of procedure or guidelines, it is observed during this study that most action and decision made during the exercise are based on the experience of the personnel. These findings are supported by (Khairilmizal, Hussin et al., 2016) where it is important for MNSC 20 to be supported in terms of legislation, procedures or guidelines in managing disasters. Due to the unavailability of such document supporting the MNSC 20, it is found that action and decision made during the EXSTORM have caused lack of command and control of events happening (Moynihan, 2009) especially during the training exercise.

It is also discovered that responding agencies fail to involve public, facility owner or experts in their response process. It is essential for responding agencies, during emergency situations to involves other agencies as the efficiency of response can be improved if more interaction being done (Amailef & Lu, 2011).

Observation also proved that clear roles and responsibility are not being taken by personnel within the command structure due to the unavailability of guidelines (checklist of roles and responsibility) used or referred to by the command structure personnel involved. This is supported by several studies which concluded that most studies on coordination between agencies during a disaster or emergency responses are poor (McEntire, 2015; Rahman, 2012). (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Jusoh, et al., 2016) stated that one of the factors affecting disaster management process is the organization, where when involving multi-agency response especially during a disaster, there is a lack of clear and effective leadership to guide the responders causing an unclear command and control structure. Many involved agencies are also observed fail to obtain a formal briefing or report from incident commander upon arrival. Hence, state the importance of standardized roles and responsibility (Khairilmizal, Hussin, Ainul Husna, Yassin, Wan Ahmad Syafiq, Jusoh, et al., 2016).

One of the observed exercises found that despite a clear command structure has been set up and the incident commander is micromanaging every aspect of the operations. A study shows that, in managing disaster especially managing a large-scale disaster, there are needs for delegation, workload sharing and joint problem solving (Paton & Flin, 1999). This statement is supported by (Lai, He, Tan, & Phua, 2009) which stated that, even if there are needs for international assistance during a large-scale disaster, agencies involved should be encouraged with an equal partnership and ownership.

Table 1: Challenges and Recommendation for Improvement

Challenges	Area of Improvements
<ul style="list-style-type: none"> <li>• 3 to 7 hours are taken to develop a fully working command structure</li> <li>• Command structure of each agency involved are not disseminated</li> <li>• no clear roles and responsibility including handover procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Fully working command structure should be available under 3 hour and informed to all agency involved.</li> <li>• The command structure of each agency involved should be notified to other on-site agency.</li> <li>• Roles and responsibility of each command structure officer should be clearly defined and understand, and clear handover between the chain of command should be made available</li> </ul>

Table 1 indicates three (3) challenges in the element of command structure within the effective disaster management theory. The first challenge is the time needed to set up a fully working command structure, where more than four (4) hours required. Times plays a major role in managing disaster efficiently and prolongation of time could impact the strategic management of the disaster (Subramaniam, Ali, & Shamsudin, 2012). Hence slowing the response effort can cause increasing loss and damages. Adding up to the issue is that an agency command structure is not known by other agency involved on-site causing other agency involved during the disaster may have a difficult time in identifying the person in command of the agency itself. The final issue in the element of command structure is the process of handing over from one officer to another, especially during the escalation of disaster where a higher rank officer will be taking over the operations. It is observed that handing over were only made through face to face or radio communication with no proper document handover. This practice has caused a delay for the new officer to take over, as the overall situation of the operations needs to be sized-up again. Adding to the issue, the roles and responsibility of each section on the command structure are not available and was left to the responder experience to decide.

As an area of improvement for the element of organizational structure for effective disaster management, a Fully working command structure should be available as soon as possible in order for the disaster to be managed effectively (Doyle, 1996). Adding up, when a higher authority arrived at the site, a clear handover between the chain of command should be made available with proper supporting information documented and informed to other agency involved during the operation. Officers involved in decision-making during the operations should also have clear roles and responsibility that they can refer to and their experience will eventually support the decisions on the task that they need to be made.

### Knowledge on Command Structure

Table 2 indicates the importance of command structure where 84% of respondent states the importance (scale 4, important and scale 5, very important) of having a multiagency command structure. The multiagency command structure as outlined in MNSC 20 is supported by a single agency command structure where 85% of respondent states as important (scale 4) and very important (scale 5). Other respondents (below 20%) indicated either the importance of having a command structure for single and multi-agency as may be important (scale 3) to not important (scale 1). The importance of having a multiagency command structure is supported by descriptive statistics indicating the mean at 4.38 and standard deviation of 0.81, while the importance of having a single agency command structure means at 4.38 and standard deviation of 0.86.

Table 2: Survey on the importance of having a command structure for both single and multi-agency

Importance of Having Command Structure	Single agency (%)	Multi-agency (%)
Very Important and Important	85	84
Maybe Important	11	14
Rarely Important	3	2
Not Important	1	0

In terms of time taken to develop a fully working command structure, cumulatively a total of 84.9% respondent stated that it takes from 50 minutes to 12 hours to fully develop a single agency command structure. While for a multiagency command structure will take between one (1) hour to 24 hours based on 69.9% cumulative respondent. The time given by respondent is considered accurate as evaluation of EXSTORM's shows that a fully working command structure is developed between three (3) to seven (7) hours as discussed earlier.

Roles and responsibility of each agency involved in managing disasters on site are backed up by the survey results where 82.5% of respondents agree that the agencies roles and responsibility outlined in MNSC 20 is comprehensive and 84.1% of respondents agreed that other agency roles and responsibility are known to them. Unfortunately, respondent agreed that some of these agencies roles and responsibility seem to be overlapping with other agencies (54.1%). This has caused some agencies to act individually (43.6%) during the activation of MNSC 20. Table 3 shows the result of surveys on command and control in MNSC 20.

Table 3: Survey on Command and Control in MNSC 20

Command and Control in MNSC 20	Yes (%)	No (%)	Not sure (%)
Comprehensive Roles and Responsibility	82.5	8.8	8.7
Roles Known by Other Agency	84.1	4.7	11.2
Overlapping Roles and Responsibility	54.1	34.1	1.8
Causing Individualism	43.6	38.9	17.5

Incident Command System (ICS) is a management concept used especially in managing disasters or managing an incident (Khairilmizal & Hussain, 2016; NFPA, 2000). Although MNSC 20 are not structured based on ICS, the FRDM have been using ICS in managing disaster as internal command and control (FRDM, 2008; Hamzah, 2006). The use of ICS has been proven in surveys where 94% of responders agreed that FRDM uses ICS as an alternative command structure apart from MNSC 20. Although only 72.1% respondents agree that there is an alternative command structure used aside from MNSC 20, the researchers found that some respondent understands the Incident Management System (IMS) rather than ICS itself, but both based on the same concept and structure (FRDM, 2008; Khairilmizal & Hussain, 2016). This difference in understanding is supported by a survey question comparing IMS and ICS where only 31% of respondents agree that ICS and IMS are based on the same concept.

The ICS have provided clear roles and responsibility of each section in managing disaster where 81.9% of respondents agree to the survey question. Respondent stated that periodic training is given on ICS (82.2%), but unfortunately, during the observation of EXSTORM's, it is observed that most of the responders perform their roles and responsibility based on experience rather than referring to any supporting document or guidelines. Table 4 shows the survey result regarding alternative command structure during disasters.

Table 4: Survey on Alternative Command Structure

<b>Alternative Command Structure</b>	<b>Yes (%)</b>	<b>No, and not sure (%)</b>
Other structure used	72.1	27.9
Using ICS	94	6
Provided with periodic training	82.2	17.8
Clear roles and responsibility	81.9	18.1

Survey then look at the practicality of the alternative command structure used. Positively, 77% of respondents agree that the alternative command structure will result in easy accessibility of information during disasters, 73.8% agree that the use of alternative command structure will assist in information dissemination within other agencies involved, 83.2% respondent confirmed that action taken by personnel in command structure would be recorded and finally all information within the command structure is readily available after disasters as indicated in table 5. Unfortunately, challenges observed during EXSTORM's shows that none of the above are true demonstrating that respondent answer based on theory rather than real practice. Aforementioned is proven true when 94% of respondents agreed that the command structure needs to be supported by a computerized system.

Table 5: Survey on Practicality of Alternative Command Structure

<b>The practicality of Alternative Command Structure</b>	<b>Yes (%)</b>	<b>No, and not sure (%)</b>
Information easily accessible	77	23
Information Disseminated	73.8	26.2
Action Recorded	83.2	16.8
Information easily accessible after disasters	68.7	31.3
Need support of computerized system	94	6

## **Conclusion**

The overall study indicates that in achieving effective emergency management for lead responding agencies in Malaysia, challenges are found in the elements of command structure. Based on the study, improvement can be made in ensuring effective disaster management during the response and the recovery phase. Firstly, Written roles and responsibility should be

made available and easy to be referred to during a single or multi-agency response. Secondly, it is important that standardized forms and record be made readily available during pre-disaster and easily accessible during disasters so that all agencies utilize that same format. Finally, outsiders or experts should be identified especially to assist in managing disaster as related expertise may not be available within responding agencies. Alternatively, it is recommended that the command and control in MNSC 20 be supported by alternative organizational structure concept such as ICS.

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