

# Dissecting the Challenges of the Lead Responding Agency During Disaster Management Exercises

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## Abstract

**Purpose:** to identify challenges and suggest an appropriate area of improvement through evaluation of lead responding agency in Malaysia during disaster exercise

**Design/methodology/approach:** Four (4) disaster exercise at states and federal level were observed using a structured checklist. The observation was conducted at two primary locations which are primary staging area or also known as on-scene command post (OSCP), and any ad-hoc staging area by teams involved when needed. Observation data were then verified using three methods which are, lead agency officers at the site, exercise logs and final emergency exercise reports by FRDM.

**Findings:** challenges were found in each element of effective disaster management namely command structure, planning and information management, communication, situation awareness and finally resources and logistics.

**Research limitations/implications:** The collected data is based on disaster exercise which not based on real disaster events. However, collection of data during real disaster situations may cause its own problem due to the dynamic situations of disaster event. Hence researchers concluded to collect data during exercise which at the same time the decision is supported by other research as well.

**Practical implications:** The developed tools can be used as benchmark for evaluating capability and capacity of responding entities in managing emergency or disaster situations

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

**Keywords:** Disaster Management, Emergency Responder, Disaster Exercise, Exercise Evaluation, MNSC 20

## **Introduction**

Response and recovery signify a process after disasters impact. It is a time-sensitive situation and has a stringent time (Ryan, 2013). As time flows, consequences will increase in terms of the severity of victims and by reducing the time will eventually equate to the effectiveness of managing the disaster (Hussin et al., 2018; Willoughby, Chan, & Strenger, 2010). When more time was taken to provide an adequate response effort, the more loss will be incurred towards life, property and environment hence, the time taken in responding to a disaster is clearly a form of performance measurement in disaster management (Subramaniam, Ali, & Shamsudin, 2012). But time is not the only elements in measuring effective disaster management during response and recovery phases where, a study towards officer involved in responding to disaster stated that experts are needed in a different part of disaster management process (Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). Literature review made by the researchers reveals that there are five (5) elements that determine the effectiveness of disaster management during response and recovery phases (Ainul Husna, Siti Hawa, Hussin, & Khairilmizal, 2016; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). These five (5) elements are the command structure, planning and information management, communication, situation awareness and finally resources and logistics.

The Malaysia National Security Council, Directive No. 20 was established to manage disasters in Malaysia (MNSC, 2012). Although complied with the international framework (Khairilmizal, Hussin, Ainul Husna, Hussain, et al., 2016), covered every aspect of disaster management cycle and outlined a clear purpose (Khairilmizal, Hussin, Mohd Yassin, et al., 2016), implementation of the directives need to be evaluated and this can be done thru evaluation of the lead responding agency in managing disaster especially during response and early recovery phase. Hence, it is the objective of this paper to identify challenges and suggest an appropriate area of improvement thru evaluation of lead responding agency in Malaysia during disaster exercise.

## **Methodology**

Observation of domain experts which are officers from the Fire and Rescue Department Malaysia (FRDM) during disaster exercise was conducted using a structured checklist developed thru document analysis method. The Observation was made thru FRDM organized disaster exercise namely EXSTORM.

This exercise which was conducted by FRDM has also gained the cooperation of primary and secondary agencies in Malaysia (MNSC, 2012) including non-governmental organizations. The scenario which is undertaken during this exercise involves major fire, building collapse, leaks/spills of chemical substances, radiation contamination and accident involving injury and fatality. Four (4) exercises were conducted yearly and for the purpose of this case study, four (4) exercise have been observed involving four states which are:

1. An abandoned factory in Shah Alam, Selangor
2. Pergau Hydroelectric, Jeli, Kelantan
3. Abandoned commercial building in Kulim, Kedah

#### 4. Abandoned Factory in Kuching, Sarawak.

EXSTORM is a practical training of disaster management exercises which provide very good opportunities for observation because comparing to disaster, exercise can occur more frequently than real-world disasters. Adding up, emergency exercise provides the researchers with a rich data source (Militello, Patterson, Bowman, & Wears, 2006). The observation was made at the EXSTORM's exercise is due to the following reason where EXSTORM is:

- Declared as states and federal level disaster (MNSC, 2012)
- Emergency drill or exercise which provides very good opportunities for observation
- Orchestrated with multiple events and casualties so that real situation scenario and worst-case scenario can be tested
- Orchestrated to involved multi-agency as to increase the coordination and cooperation of multi-agencies in Malaysia

The observation made during EXSTORMS were aided by a structured checklist which was designed based on document review method. In analyzing printed and electronic materials in developing the checklist, document analysis method has been used to systematically review and evaluate both materials (Bowen, 2009). Document analysis methods have been used as a stand-alone method and it gave the researchers the capability to extract meaning gain understanding and develop empirical knowledge from the data that is examined and interpreted (Bowen, 2009). The method includes finding, selecting, defining, and synthesizing data contained in documents and organized into major themes, categories, and case examples specifically through content analysis (Labuschagne, 2003).

Checklist were designed based on existing standard operating procedure and guidelines regarding to disaster management by lead responding agency in Malaysia and related article in identifying problems in disaster management (Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016; Kusumasari, Alam, & Siddiqui, 2010; Salmon, Stanton, Jenkins, & Walker, 2011). The checklist was then validated thru content validity method (Hussin, Wang, & Hipnie, 2012) with MNSC 20 and existing standard operating procedure and guidelines regarding disaster management from FRDM in order to suit the checklist with current disaster management practice in Malaysia. The checklist was divided into eight sections, where each section contains some or each of the elements of effective disaster management (Ainul Husna et al., 2016; Hussin et al., 2018; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016) which is command structure, planning and information management, communication, situation awareness and finally, resource and logistics.

The checklist was used to collect data from the targeted respondents in the field and to observe the use of standard operating procedure and guidelines by FRDM with real current practice done. The observation was conducted at two primary locations which are primary staging area or also known as on-scene command post (OSCP) (MNSC, 2012), and any ad-hoc staging area by teams involved if needed. The reason for selecting the location is due to all disaster management process are conducted from the location and adding up the location has a clear view of the disaster area as illustrated in Figure 1.

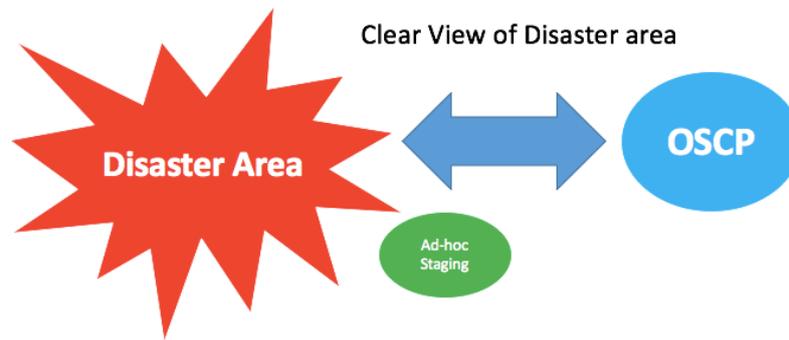


Figure 1: Observation Strategy for EXSTORM from designated on-scene command post (OSCP)

The observation that was conducted at the two-primary location gives researchers the advantage to observe the disaster management process in two (2) ways, which is from the:

- FRDM action log, communication log, documentation, and record including actual action
- EXSTORM exercise controller action log and communication log

The observation was recorded using the developed checklist and results were then verified by three methods which are, lead agency officers at the site, exercise logs and final emergency exercise reports by FRDM.

### Results and Discussion

The evaluation of lead responding agency in Malaysia during disaster exercise with the help of a structured checklist as discussed earlier, have highlighted several challenges in relation to effective disaster management elements (Ainul Husna et al., 2016; Hussin et al., 2018; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). Initially, it is observed thru the four (4) EXSTORM exercise that challenges were found in each element of effective disaster management, namely command structure, information management, communication, situation awareness and resources, and logistics. Summary of these challenges and recommendations for improvement based on the five (5) elements of effective disaster management can be found as follows.

Table 1: EXSTORM's Command Structure Challenges and Recommendation for Improvement

	CHALLENGES	AREA OF IMPROVEMENTS
Command Structure	<ul style="list-style-type: none"> <li>• 3 to 7 hours are taken to develop a fully working command structure</li> <li>• The 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>

The element of command structure within the effective disaster management indicates three (3) challenges (Table 1). The first challenge is the time needed to set up a fully working command structure, where more than four (4) hours needed. Times plays an important role in managing disaster effectively and prolongation of time could impact the strategic management of the disaster, hence slow the response effort can cause increasing loss and damages (Willoughby et al., 2010). 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 handover procedures were only made thru 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 up, 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 (Hussin et al., 2018). 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.

Table 2: EXSTORM's Planning and Information Management Challenges and Recommendation for Improvement

	<b>CHALLENGES</b>	<b>AREA OF IMPROVEMENTS</b>
Planning and Information Management	<ul style="list-style-type: none"> <li>• Information management is based on experience</li> <li>• Dissemination of information done upon request</li> <li>• The incident action plan is not developed</li> <li>• Information is identified based on current needs</li> <li>• Media are managed based on officer experience</li> </ul>	<ul style="list-style-type: none"> <li>• A written incident action plan should be developed for each minor incident</li> <li>• Pertinent past, current and future information relating to each incident should be identified, recorded, managed and properly disseminated.</li> <li>• Media management guide should be made available and easily accessible</li> </ul>

For an effective disaster management during response and early recovery phase, the element of planning and information management is crucial (Ainul Husna et al., 2016; Hussin et al., 2018; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016) and a total number of four (4) challenges were identified (Table 2). Challenges observed during observation of EXSTORM's exercises include non-standardized forms used by the responding agencies where all planning and information management are based on the responder's experience. Strategic planning and abundance of information coming thru the command post also are found without any assistance by expertise. It is also observed that all the information gained by each agency is manually recorded by another agency without proper dissemination platform's and record are only kept

at the operation site before discarding it after operations. It is important that during disasters, pertinent current and future information relating to each incident to be identified and managed (Ainul Husna et al., 2016; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016) before disseminated. Media management is also challenges found in planning and information management elements where most media management was found to be managed based on the officer experience rather than using a written guide which should be made available and easily accessible all the time.

Improvement of the element of planning and information management can further be exercised. With additional efforts in standardizing of forms by the lead responding agencies, will eventually assist in managing the pertinent past, current and future information relating to each incident during the disaster operations. This includes written incident action plan which plays an important role in recording the strategic path of the disaster operations as it will eventually strategize the whole operations and be a pertinent record (Hamzah, 2006; Hussin et al., 2018) for lesson learn (research and development) and training exercise for new responders. Media also should be properly managed during disasters as wrong information could create misinterpretation of information. This issue was found during the fire tragedy at Hospital Sultanah Aminah on 25<sup>th</sup> of October 2016. During this tragedy, a snapshot of lead responding agency information board was disseminated by media and thru social media. The snapshot contains victims information recorded during the tragedy and for the intention of other responding agency records only. Unfortunately, the information was misinterpreted by the media and public where they understand that nine (9) people died, but in reality, only six (6) died during the tragedy.

Table 3: EXSTORM's Communication Challenges and Recommendation for Improvement

	CHALLENGES	AREA OF IMPROVEMENTS
Communication	<ul style="list-style-type: none"> <li>• 3 to 6 hours are needed to set up a multi-agency communication matrix</li> <li>• Not all agency used the same communication equipment</li> <li>• Alternative communication medium not identified</li> </ul>	<ul style="list-style-type: none"> <li>• Multi-agency communication matrix should be readily available at all time</li> <li>• All agency should use the same communication devices</li> <li>• Alternative communication should be readily made available all the time</li> </ul>

Communication plays an important aspect during disaster response and observation of EXSTORM's reveals three (3) major challenges (Table 3). The first major challenges in terms of communication are that some agencies involved in the exercise are not connected to the same communication matrix used by the majority of agencies. In other words, incompatible communication equipment issues were observed between responding agencies. A standardized communication system was outlined by MNSC 20 (Khairilmizal, Hussin, Mohd Yassin, et al., 2016) but in reality, not every agency in Malaysia are using the same system as indicated which observed during the EXSTORM's. Due to these challenges, most of the communication is conducted thru face-to-face causing delays in action need to be taken. Adding up, the current system used by the lead responding agency needs an additional mobile unit to maximize its capability of multi-agency communication matrix, but additional 3-6 hours were needed just to mobilize the unit itself. MNSC 20 also states the importance of having alternative communication systems (Khairilmizal, Hussin, Ainul Husna, Hussain, et al., 2016;

Khairilmizal, Hussin, Mohd Yassin, et al., 2016) but all EXSTORM observation reveals that alternative communication remains to be unimportant.

For effective disaster management during response and early recovery phase, it is crucial that the element of communication be prioritized where the system to be made available and reliable (Ainul Husna et al., 2016). Improvement from the challenges stated earlier is that primary multi-agency communication matrix should be available all the time with the backup of a secondary communication system to be mobilized at any time needed whenever the primary deem to be unreliable (Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). It is also crucial for all responding agency in Malaysia to use the same primary or secondary communication system as it will overcome the possibility of entities to be left behind during disaster management operations.

Table 4: EXSTORM's Situation Awareness Challenges and Recommendation for Improvement

	<b>CHALLENGES</b>	<b>AREA OF IMPROVEMENTS</b>
Situation Awareness	<ul style="list-style-type: none"> <li>• Situation size-up is done based on experiences</li> <li>• Dissemination of situation awareness is done upon request</li> <li>• Agency act individually without proper support</li> </ul>	<ul style="list-style-type: none"> <li>• Pertinent current and future situation development relating to each incident should be identified and managed</li> <li>• Centralized and continuous situation update should be made available and easily accessible by all agencies involved.</li> </ul>

Situation awareness acts as latest current information recorded during disasters which include the first size-up of disasters by the first responders that need to be disseminated immediately (Ainul Husna et al., 2016; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). Observation of situation awareness elements during the EXSTORM's shows three (3) major challenges (Table 4). Issue's includes standardization on situation reporting. This includes the reliance of the officers towards their experience in sizing up without referring to any guides causing some pertinent information such as magnitude or severity of the incident, the need for expertise and assistance, expected operation time or the needs of other specifics unit (Hussin et al., 2018) are late to be notified or informed. Some critical information also is found to be kept within the agency and not disseminated to other agencies unless requested. The tactical response also was done without proper support from other agency on-site due to the lack of dissemination of current situation awareness information towards other agencies.

In managing disasters effectively during response and early recovery, current information needs to be identified, acquired and disseminated accordingly. Hence, situation awareness plays an important role in effective disaster management. Pertinent current and future situation development relating to each incident should be identified and managed carefully by each agency involved as it may contain information which can affect overall response effort activity such as changes in strategic objectives, changes in operation personnel, appearance of new hazards, changes on meteorological data, action that will be taken by agencies, changes in victims status and more. At the same time, a centralized and continuous situation update should be made available and easily accessible by all agencies involved.

Table 5: EXSTORM's Resources and Logistic Challenges and Recommendation for Improvement

	<b>CHALLENGES</b>	<b>AREA OF IMPROVEMENTS</b>
Resource and Logistic	<ul style="list-style-type: none"> <li>• 3 to 8 hours taken to develop a fully working command post</li> <li>• Lack of information technology usage</li> <li>• Resources and logistics are identified as needed</li> </ul>	<ul style="list-style-type: none"> <li>• Fully working command post should be made available as soon as command structure is set up.</li> <li>• All resources and logistics should be fully utilized in managing disaster effectively</li> <li>• Pertinent current and future logistic should be identified and managed</li> </ul>

A study by (Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016) stated the importance of experts in assisting responders in managing resources and logistics. Resources and logistics need to be exhaustively identified, acquired and utilized (Ainul Husna et al., 2016; Khairilmizal, Hussin, Ainul Husna, Yassin, et al., 2016). During the observation of EXSTORM's, it is found that there are three (3) major challenges in elements of resources and logistics (Table 5). The command post, which is the heart of the on-site operations takes a long to be fully set up. Regrettably, the full setup command post is not fully utilized by the responders. This includes the use of currently available information technology in assisting the responders in managing the whole operation. Most of the resources and logistics used during the exercise are identified as needed, when needed, rather than planning for the future need of resources and logistics itself.

In managing disaster effectively during response and recovery phases, identifying current and future resources and logistical needs is crucial. This includes the full utilization of acquired resources and logistics. It is important that a fully working command post should be made available as soon as the command structure is set up so that disaster can be managed effectively. Resources and logistics, should not be identified as needed, but should always be anticipated accordingly based on the current information and situation awareness of the disasters.

Table 6: EXSTORM's Overall Challenges and Recommendation for Improvement

	<b>CHALLENGES</b>	<b>AREA OF IMPROVEMENTS</b>
Overall	<ul style="list-style-type: none"> <li>• Roles and responsibility availability</li> <li>• Forms and record are developed on-site</li> <li>• Related outsiders or experts are not involved</li> </ul>	<ul style="list-style-type: none"> <li>• Written roles and responsibility should be made available and easy to be referred to in a single or multi-agency response</li> <li>• Standardized forms and record should be made readily available during pre-disaster and easily accessible during disasters</li> <li>• Related outsiders or experts should be identified to assists in managing disaster</li> </ul>

Overall observation (Table 6) of the EXSTROMS indicates that challenges are found in terms of how the officers implement their roles and responsibility in managing disasters, the non-availability of standardized forms in recording, managing and disseminating information and the absence of experts in assisting responders in managing disaster effectively. Hence, improvement can be made in ensuring the effective disaster management during the response and the recovery phase where written roles and responsibility should be made available and easy to be referred to during 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, related outsiders or experts should be identified especially to assist in managing disaster as related expertise may not be available within responding agencies.

### **Conclusion**

Managing Emergency effectively needs collaborative effort and details need to be given at each element of effective emergency management. The challenges identified and improvement discussed if implemented can significantly improve the capability and the capacity of agencies in managing disasters in Malaysia. However in implementing the above, the responsibility of improving the efficiency in managing the emergency not just falls under the responding agency alone, the authors believed that the federal government and states government needs to play their roles in supporting the responding agencies itself. This includes the governance of disaster management in Malaysia and the importance of recognition given to the Fire and Rescue Department Malaysia as the country lead responding agency for managing disasters.

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