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**Lessons Learned from Korean Local Government Disaster Risk Reduction (DRR)
Manuals and Capacity Building Activities**

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Natural and man-made disasters continue to occur resulting in massive fatalities and economic losses even in the fourth industrial revolution era. To minimize damages from such catastrophes, the Korean government is investing considerable time and money in developing effective manuals and training workshops.

This paper aims to identify challenges of utilizing emergency management manuals of local government that includes specific on-site action procedures for effective disaster response. It will also provide recommendations to overcome ongoing problems.

The on-site emergency response manual serves to strengthen local disaster response capacity only when specific action tasks, roles and responsibility, and inter-agency coordination mechanism are developed in consideration of local hazard types and vulnerability. But analysis of on-site emergency response manuals highlight that specific hazards types with high frequency and intensity in certain locality is not well reflected. Thus, disaster response phase is activated without clear distinct division between risk monitoring and early response.

What are the means to improve existing challenges? The paper scrutinizes the problem into four different areas. Firstly, Korea's disaster management framework needs to be enhanced. Secondly, it is critical to improve disaster response procedures and processes. Thirdly, there should be changes in action list for each disaster response phase. Lastly, disaster response coordination should be strengthened at all response stages.

How can manual problems be resolved? First, the local government is to identify main responsibilities and support functions to be carried out during an emergency. Second, action responses are to be classified by action codes. Third, individual interviews are to be conducted by responsible divisions. Finally, review major tasks and support actions by ministries, organizations and divisions based on interview results. Then the revised manuals are to be directly applied in local DRR education and training to get immediate feedback.

Keywords: local government, emergency management, disaster risk reduction, manuals, capacity building

I. Introduction

User manual and maintenance manuals are always provided when a product is purchased. For example, when the front panel lights up, the driver will look for the vehicle operational manual to resolve the problem. The manual explains the cause of such symptoms and offers tentative actions to be taken as a solution.

The German sociologist Ulrich Beck urged that risk factors increase in industrialized society along with economic growth and these risks are not “exceptional” but “daily” risks. Facing new emerging risks with technological advancements, we are living in a “risk society”. Modern society is constantly suffering from high fatality rates and physical damages due to disasters and safety-related accidents. To minimize disaster losses, many countries are developing national manuals and investing financial resources and time to improve their disaster risk reduction (DRR) effectiveness.

Disaster and crisis management manuals have been developed and implemented in the Republic of Korea (ROK) to protect lives and ensure safe and sustainable livelihood of the public from all kinds of disasters. The “Framework Act on the Management of Disasters and Safety” specifies responsible actors for developing different kinds of disaster management manuals. First, standard risk management manuals are to be developed by the head of any disaster management agency. Second, a working-level manual for risk response stipulating the measures and procedures necessary for responding to actual disasters in accordance with the functions and roles stipulated in the standard manual for risk management are to be prepared by the head of each disaster management supervision agency and the head of the related agency.

Lastly, on-site manuals stipulating detailed procedures for actions to be taken by an agency that directly performs its duties at disaster scene are to be prepared by the head of an agency designated by the head of the agency that has prepared working-level manuals for risk response, usually local government authorities.

Aftermath of the “Sewol Ferry” disaster, the Korean government has enhanced overall disaster management manuals by disaster types to ensure immediate and effective operations and coordination. Yet, there are still areas for improvement to ameliorate effective usage of these manuals on-site during severe catastrophes. The study analyzes problems of current on-site manuals to increase effectiveness of multi-stakeholder coordination for systematic disaster response. In addition, it recommends measures to strengthen institutional capacities by leveraging disaster manuals for better on-site disaster response based on local contexts.

II. Lessons Learned from DRR Manuals

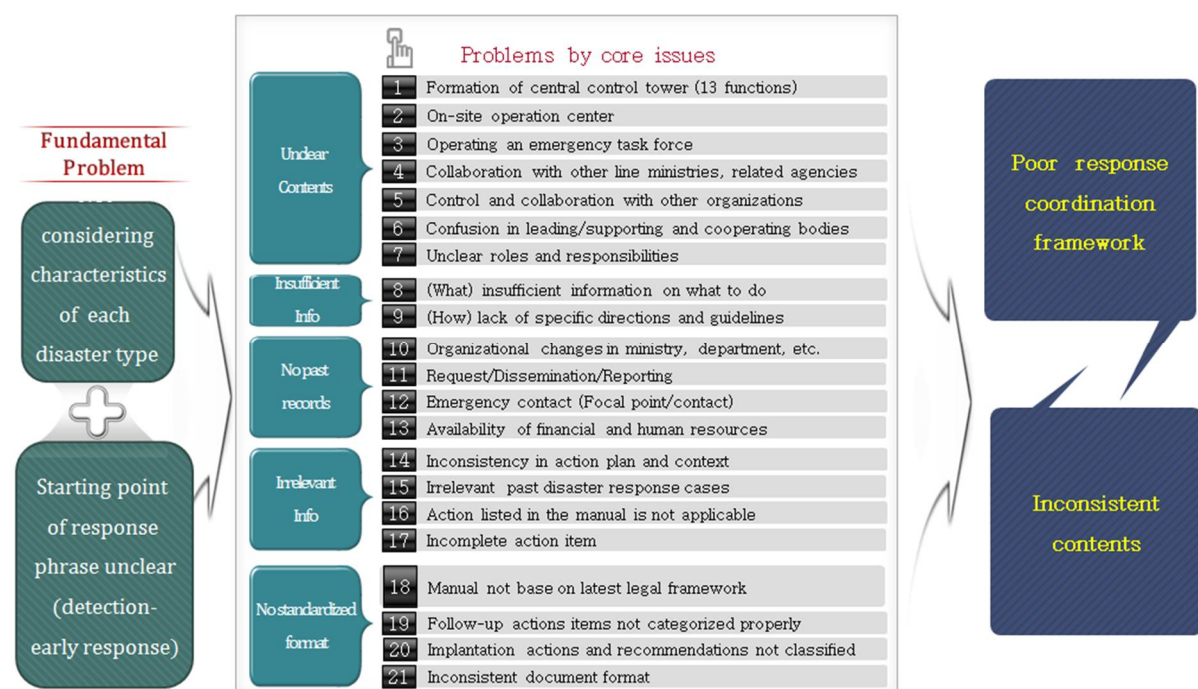
The on-site disaster response manual is comprised of six parts. Chapter 1 provides a general overview including objectives of developing and implementing the manual, scope, areas for application, disaster types, and early warning levels (alert, attention, critical). Chapter 2 describes mandate and responsibility of national disaster

management framework and disaster management organizations, related agencies and local governments along with their coordination levels. Chapter 3 and 4 illustrates specific procedures and action items by response phase (detection, early response, emergency response, recovery). Chapter 5 guides on interagency disaster response coordination and cooperation framework. The appendix includes information necessary for disaster response such as various related forms, guidelines and statistical data.

On-site disaster response manuals prepared by designated implementing organizations are very important as they specific detailed procedures and action plans in timely and effective disaster response and recovery. But often, these manuals only stipulate roles and responsibilities of assigned organizations without clear and detailed directions. As a consequence, working level actors find it difficult to carry out specific actions addressed to meet the complicated characteristics of today’s complex disasters.

To identify the key problems of on-site disaster response manual, the study has scrutinized 18 different disaster type manuals of a particular local government. Common problems appearing in manual composition (Chapter 1-5, Appendix) can be group into five different factors as shown in Figure 1.

Figure 1. Common problems of on-site disaster response manual



First, roles and responsibilities are unclear in current manuals. In particular, response mandate and responsibilities between inter-agencies are not specified resulting in confusion for proper implementation. There are no standardized operations details on setting up Disaster and safety countermeasure headquarters and the integrated support operations headquarters, arranging operation emergency task force, managing

command and coordination framework for multi-stakeholder disaster response, directing response actions to be implemented by leading, supporting and coordinating organizations. Second, manual contents are not specific enough. There is a lack of specific grounds, procedures, operating systems, and methods for what to do directly, what the respondent should do and how to do it. Third, the data is not up-to-date or there is a lot of missing information. Not only restructured institution names, emergency network and resources are outdated but also there are a lot of missing information left in blank spaces. Fourth, many contents are inappropriate. Korea's disaster and crisis manuals are coded with specific number that matched relevant action plans. But the code number and actual action items often do not match, causing confusion among leading and supporting agencies with poor response actions. In addition, the action procedure is not specified or sometimes omitted because the contents are composed only of specific 'information', 'form' and 'past response case'. Lastly, these manuals do not developed in standardized format/templates. Despite changes in manual composition, such manuals are aligned with previous reporting template resulting coordination and implementation during emergency response.

Manuals are composed of different alert levels from disaster response phase, disaster response process, step-by-step action items, and interoperability between collaboration frameworks. But in reality, manual application is weak due to problems identified above. Due to lack of consistency, linkage between each component of the manual is not ensured. This is mainly because characteristics of each disaster type are not properly reflected. The cause and development patterns disasters vary by type, so the response phase starting point varies by activating organization with different size and scale of resources, and technical expertise. But roles and responsibilities specified in the manuals do not take these traits into account weakening the multi-stakeholder coordination response framework.

In order to solve the above problems, it is necessary to revise the entire manual. It is necessary to revise the disaster management system and the disaster response process to ensure consistency of the current manual structure and contents, to re-establish the action guidelines for each stage of disaster response and the related organizations and their collaboration system.

III. Lessons Learned from DRR Capacity Building Activities

To enhance effectiveness of on-site disaster response manual and strengthened institutional disaster response capacities of relevant organizations, following three follow-up measures are recommended.

3.1 Restructure Disaster Management Framework and Process

Figure 2 illustrates methodology in restructuring disaster management framework and process. After identifying the problems of the manuals by disaster type, it is necessary to reformulate the organization's response system and processes as a direct participatory stakeholder in disaster response in order to solve them. In this process, it is essential to

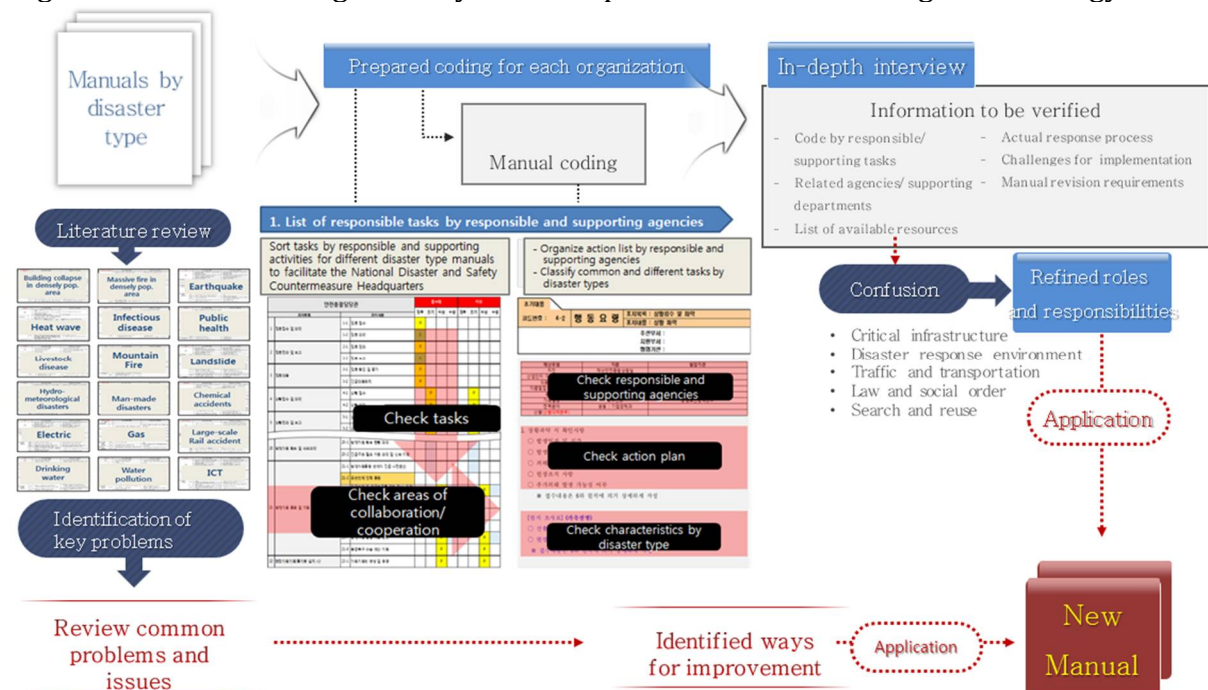
collect the opinions of the actual disaster counterparts rather than simply reorganizing them through literature review.

The study restructured the problems in the existing manuals in order to collect opinions from the actual working -level disaster management officers. For each disaster type manual, the tasks and roles of the performing organization (department) were identified and the inconsistencies of the supervisory, support, and collaboration issues and the action lists sorted by the existing manuals were collected and compared.

Based on the collected data, in-depth interviews with the responsible personnel were conducted to re-establish the confusion-related tasks and roles, and to supplement the disaster response process. Also, in order to prepare the procedure according to the characteristics of disaster type, possibility of the fire department (Emergency Rescue Control Unit) corresponding to the emergency rescue organization and operating the disaster site integration support center are reviewed from the initial response stage to the corresponding organization's work procedures related to the disaster. Through the confirmation of the actual disaster response process in this field, it was possible to reflect on-site situation that was not known in the existing literature study, and it is possible to supplement the composition of the manual by further finding the missing action code.

Finally, identified duplication or omission by the corresponding organizations was redefined through the workshop of the correspondent organization staff. Reconciling duties and roles between responding organizations is a fundamental factor that hinders rapid response to disasters. It is a very important improvement to reconfirm the duties and roles themselves with mutual consultation.

Figure 2. Disaster management system and procedure restructuring methodology



3.2 Action point for disaster response and restructuring response coordination system

Figure 3 show methodology to restructure response action plans and coordination framework for effective response. Disaster response steps and collaborative framework should be organized in accordance with each other and consistently linked to the restructured disaster response process. For response action, coding property table was utilized to review the identified problems. The code property table is based on the actions that have been corrected and supplemented based on the disaster response process redefined above. This template is formed by analyzing the attributes described in the action point guideline to improve the action items and coordination framework of the disaster response and plays an important role in securing the concrete and suitability of the contents of the manual.

Figure 3: Methodology on enhancing disaster response and collaboration framework

- Create a code property sheet for action statements in accordance with the disaster response process [standard code]
- **Code Attributes Table:** A table composed of analysis of the attributes listed in the action point map to improve action points and collaboration system for each stage of disaster response

Code no.	Countermeasure details	Reference manuals				Final contents(Table of contents)	Required info	Reflect disaster characteristics	Step changes	Updated/ new info			format	case/info/ guide	Coordinating agencies
		Manual 1	Manual 2	Manual 3	Manual 4					Department/ Division	Emergency/ Focal point	Report quant.			
		Refer to other local governments and institutions' manuals to identify the common contents and draw additional notes				Conduct interviews and literature studies to determine the essential components of action tips	Reviewing the necessary data for reinforcement	Check if specific disaster type traits have been incorporated	Modified response steps	Review and modify the additional needed in the current contents		Check if the code includes forms, cases, info. & instructions		Identify supporting agencies	
7-5	Convene Situational analysis meeting	Hydro met disasters 57p	Seoul Drinking water 78p	Seoul Toxic chemical 52p	(Summary) 1.Call for situational analysis meeting 2.Convene situational analysis meeting 3.Report and disseminate meeting outcomes	- Standard on EOC - Standard on Emergency alert level - Criteria for public Evacuation and situational analysis		Meeting						X	

Key action points contents	1. 상황판단의 중요성	2. 상황판단의 방법	3. 상황판단의 결과
Basic info -Steps -Code number -Countermeasure list -Countermeasure details - Leading/supporting / coordinating organization info	1. 상황판단의 중요성 ○ 중요성 - 재난 발생으로 인한 피해는 재산상의 피해가 발생한 경우 - 재난 발생 초기에 발동되는 1차·2차 재난 발생 시 피해 규모가 커질 수 있으므로 초기에 대응하는 것이 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 ○ 중요성 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다	2. 상황판단의 방법 ○ 방법 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다	3. 상황판단의 결과 ○ 결과 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다
Action items procedure And details - Structure contents and process (disaster traits) - Required info and items (contact info, etc.) - Roles and responsibilities of coordinating organizations	○ 중요성 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다	○ 방법 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다	○ 결과 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다 - 재난발생 초기에 신속하게 대응하는 것이 피해를 최소화하는 데 중요하다
Reference - format/layout - case/info/guideline			

In addition to the existing manuals, refer to other manuals to reaffirm common items that need to be additionally described, and draw out the final composition table. Then collect additional data required to create a specific action statement and check whether the action is applicable to a common disaster type and whether additional characteristics need to be reflected according to the type of disaster. If the action of the same code is to be corrected, it should be edited according to the type of disaster, and additional data should be obtained and constructed. In addition to reflecting the disaster characteristics, it is also important to identify possible changes to some of the

action points depending on disaster response phase such as detection of signs, early response, emergency response, etc. Furthermore, it is critical to review whether the contents for updating the data are included in the renewed contents and whether a separate recording form, case, information, and instructions are included.

If the contents are revised and supplemented according to the code-specific attributes as described above, determining the possible role of a related organization is important to assign additional tasks and role accordingly. In the case of existing manuals, the coordination framework between the disaster management organization and related response institutions is poor. On the other hand, according to the code attribution of the disaster response management organization, coordination and cooperation consistency among all related organizations can be secured.

3.3 Strengthening DRR capacity: Enhanced institutional capacity of disaster response organization by utilizing improved manual

In order to minimize the disaster damages and losses through DRR means, it is necessary to clearly understand the duties and roles of the responding organization by using the improved manuals and to organically collaborate with each other in the disaster response site. It is important to quickly and accurately carry out a given task in order to minimize disaster damages and losses, which can be prepared through regular DRR education and training.

At the same time, responding to disasters through rapid decision-making and immediate allocation of response resources according to nature, society, economy, demographic characteristics of disaster area is a core measure. For example, the types and severity of disasters that can occur in rural areas and cities are different, and the method and scale to respond depends on the degree of vulnerability exposure of industrial facilities and infrastructure. This implies that for effective response not only duties and roles stipulated in the manual are to be fulfilled, but also characteristics of the region and the disasters must be taken into account for regular management.

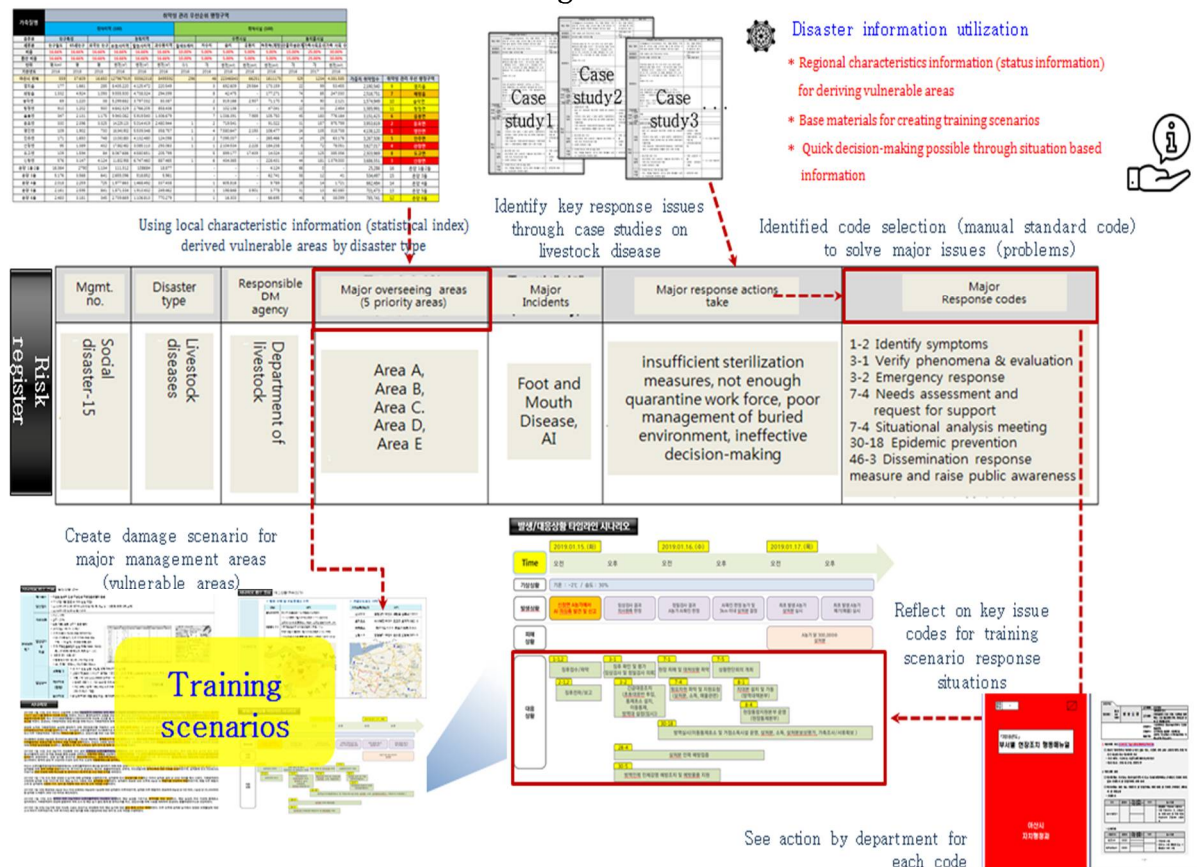
For this purpose, the study recommends that strengthening the institutional capability of disaster response organizations can be achieved by linking the information management and utilization according to the disaster information classification system, the risk management through the risk register, and the customized training scenarios.

Disaster information classification system refers to disaster characteristics information, functional information for disaster response, and common information that can be used regardless of disaster type. It is important to collect information according to the regional characteristics and categorize them making it available for effective and timely decision-making and disaster response measures. The collected information can be used not only for making decisions at the disaster site but also for the preparation of the disaster at the time of the disaster. Based on the collected information, a risk register that reflects regional characteristics can be created to identify vulnerable areas and prioritize their management. Simulation trainings for vulnerable areas by customized

scenarios can be conducted as table top exercises. These activities could result in developing necessary response plans by using local information and to improve decision-making and institutional response capability.

In the case of the risk register, it is critical to document and summarize major issues that occurred in the response process through countermeasure case studies by disaster type rather than simply based on the regional characteristic information or the history of the past disasters. When a major countermeasure issue is identified, a management ledger is created to manage it, and a management code for solving the problem can be provided based on a 'manual standard code' and utilized for education and training. In the case of the manual, since the action point to be taken is based on 'code', the corresponding issue to be managed should be linked with the manual standard code so that the manual can be used. In this process, naturally, each response organization can master the assigned tasks and roles, and all situations can be tailored to the region and disaster characteristics, thus enhancing customized disaster response capabilities (Refer to Figure 4).

Figure 4: Disaster information classification: linkage between risk register, training scenarios and on-site action manuals usage



IV. Conclusion

Disasters should be managed through rapid response and systematic education and training mechanism in advance, rather than being subject to follow-up response and management after occurrence. The study has analyzed the problems of the current on-site disaster response action manuals for the purpose of strengthening disaster response capacity to reduce disaster losses and damages. Furthermore, it recommended means to customize the regular education and training programs using the manual reflecting the regional characteristics to strengthen institutional capacities.

Most of all, it is important to continuously review and revise the manuals, and provide feedback on the shortfalls or changes that need to be made through regular and customized training activities. According to the in-depth interviews of the disaster response personnel, there should be no gap between the actual implementing procedure and the manual guideline in order to operate effectively on-site, and the actual function can be performed considering disaster characteristics, available resources and technologies.

Unrealistic theories cannot be the basis for strengthening disaster response capabilities. Therefore, disaster risk reduction can be realized only by continuously managing the safety of the community through the customized disaster management frame reflecting the changes in the community and disaster type characteristics.

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