Abstract

**Purpose:** The purpose of this study is to present a plan to manage disaster situations using MORT-TAC, a factor to consider the situation evaluation of disaster sites. Despite the importance of disaster response due to the sharing of initial disaster information in disaster response, small disasters often develop into national disasters due to the lack of important information in the event of a disaster.

**Method:** In order to conduct research using MORT-TAC, a factor in evaluating disaster situations, various organizations can use MORT-TAC to distribute initial disaster information through literature research and telephone interviews due to COVID-19. In addition, a study was conducted to incorporate the researcher’s military expertise for 30 years of military service into the disaster field.

**Results:** As a result of the district, MORT-TAC was suggested to distribute initial information on disaster sites between city and county emergency control teams, integrated support headquarters, regional and central emergency control teams, and education and training programs to improve disaster-related officials’ expertise.

**Conclusion:** Disaster response and disaster situation management must be performed by professional officials. Disaster officials of all disaster response emergency organizations must have the expertise to manage disaster situations using MORT-TAC, and to this end, education and training programs must be reflected in the annual education plan. In addition, in-depth research on MORT-TAC should be continuously studied in the future.

**Keywords** Initial Disaster Information, Disaster Situation Management, MORT-TAC, Information Distribution, Professional Education

1. Introduction

In this study, MORT-TAC, a factor considering disaster site situation evaluation, was first mentioned in the doctoral thesis of Dr. Kim Sunggeun, and is the head of Mission, Object, Resources Available, Terrain and Weather, Time Available, and Civil considerations.

It is a study to find answers to how to manage disaster situations using the MORT-TAC. In order to respond to disasters, disaster management agencies, disaster management agencies, various related agencies, and emergency organizations manage disaster situations. Nevertheless, in the event of a national disaster, the efforts are seen as unprofessional, and poor disaster situation management by emergency organizations is often criticized rather than the disaster itself[1]. In consideration of this, MORT-TAC was proposed to identify and take measures essential for disaster response without panic at the disaster site[2].

Whenever a major disaster occurred, the lack of expertise of disaster response officials was exposed, and there were many reflections, but the repeated occurrence can be attributed to the lack of know-how that disaster officials can utilize[3]. In particular, since the disaster site is
complicated and uncertain, making it difficult to grasp the situation of the site, even trained disaster officials have difficulty performing their duties in the early stages[4].

In order to solve this problem, I would like to theoretically find out the characteristics of the disaster site and disaster situation management, and then suggest a plan to manage the disaster situation using MORT-TAC.

2. A Theoretical Study on Disaster Situation Management

2.1. Characteristics of disaster site

In order to properly understand disaster situation management, it is necessary to properly understand the disaster site. Disaster sites are differentiated from general sites, and the site is complicated and uncertain, making it difficult to grasp the situation, and poor disaster sites cause physical fatigue and pain, transcending human limitations[4]. These characteristics of disaster sites apply equally to disaster situation management sites. Uncertainty, fatigue, and friction, which are characteristics of disaster sites, make it difficult for officials in charge of disaster situation management to determine what to do in their positions and places.

Constraints on disaster sites include uncertainty, risk, pain, friction, relativity, liquidity, and psychological constraints include lack of leadership, lack of confidence, lack of teamwork, anxiety and fear, panic, rumors, poor perceptual ability, decline in value standards, and disaster stress[5]. As such, it is not easy to manage the disaster situation due to the specificity of the disaster site.

Poor disaster scenes cause physical fatigue and pain, which transcends human limitations. Meanwhile, field commanders and related officials are spaces for disaster response and have four characteristics: risk, friction, uncertainty, and dynamics[4]. Byun Sangho and Kim Taeyoon(2014) said, "We viewed the characteristics of disasters as cumulative, cognitive, interactive, uncertainty, and complexity, and the greater the uncertainty, the more complex and difficult the problem-solving becomes"[6].

The specificity of disaster response is urgency and speed, technical expertise, decentralized operation, and flexibility, and urgency must be dispatched quickly to minimize damage, and the technical expertise that disaster response organizations must have in preparation for field activities[7]. Despite the general argument that a disaster can predict and manage its signs, the cause, development process, and probationary response process are very complex and difficult, and this complexity can be attributed to the various external environments and limitations of human capabilities[8].

In the end, disaster sites have difficulties due to the situation of disaster itself, and difficulties arising from the limitations of human ability to respond to environmental difficulties, so even simple accidents do not end in accidents and can develop into large national disasters[4]. For this reason, disaster officials must receive professional education, a certain level of field experience is essential, and through such education and field experience, they can understand the special situation of disaster and play their role in it.

2.2. Disaster situation management

Disaster situation management is a task of predicting and warning disasters, receiving, reporting and disseminating disaster situations, and monitoring the development of disaster situations to recover and recover from the most anticipated and disaster response stages[4].

Choi Hojin(2011) said that the core of disaster crisis management is the spread, sharing, and
communication of information smoothly. Currently, Korea has established and operates some systems for national crisis and risk management, but Korea’s national disaster management information system has yet to be established [9].

According to the International Federation of Red Cross and Red Crescent Societies (2000), the disaster response decision-making process proceeds with situation evaluation, goal selection and alternative identification, and the starting point is to accurately evaluate the situation [10].

Endsley (1995) emphasized the importance of situational awareness in decision-making, saying that situational awareness means human awareness of surrounding situations, recognizing environmental factors of time and space, understanding their meaning, and predicting the state of the near future [11].

It is necessary to predict the future through situational awareness and situational understanding of changing situations and make timely decisions and implementations [12][13]. Since the subject of disaster situation management is a person, I would like to propose a plan to manage the disaster situation using MORT-TAC so that the expertise of disaster-related officials can be improved.

2.3. Disaster management and MORT-TAC

MORT-TAC, a factor to consider in evaluating the situation of a disaster site, is essential information for field commanders and staff to respond to disasters at the disaster site. If these information are useful for disaster response decision-making, disaster response can be successfully performed, but if information necessary for decision-making is not provided, disaster response will not be possible properly. These MORT-TAC information should be collected by on-site commanders and staff at disaster sites, but integrated support headquarters, regional and central disaster response headquarters, emergency relief headquarters, regional and central accident control headquarters, and related agencies should all cooperate to minimize common goals.

In responding to disasters, individuals or organizations dispatched to the scene need a period of adaptation to become familiar with the scene. Relationships and organizations with trained professional capabilities can become familiar and shorten their response time, while individuals and organizations with untrained unprofessionality will be embarrassed and unable to respond properly to disasters [12]. In particular, it is true that it is more difficult for various organizations to arrive and apply to disaster sites than for individuals to apply to disaster situations.

In order to overcome these difficulties, MORT-TAC, a factor to consider in evaluating the situation of the disaster site, was studied. MORT-TAC, which is essential information in the disaster site, is essential information for disaster situation management, and when this information is organically distributed between the disaster site and the situation room, it will be able to provide active on-site support through timely decision-making.

3. Disaster Situation Management Plan using MORT-TAC

3.1. Maintenance of disaster sites and disaster situation management organizations

The ICS (Incident Command System), which has been applied in the fire department since the Daegu Subway Fire Disaster (2003), is a management system designed to integrate facilities, equipment, personnel, procedures, and communication operations into a common organizational structure and is widely applied [14][15]. After Ferry Sewol disaster (2014), The basic spirit of organizing an organization in this way is to enable organic cooperation in the disaster site
through organizational maintenance. It is no exaggeration to say that the command of the military comes from the organization as shown in the following Figure 1. The army basically organizes commanders and staff to perform combat missions. The organization structure of the organization at the battle site and the organization structure of the higher unit supported later are the same[16]. So the military command system is carried out in two tracks. There is a command system between commanders and commanders by the command system of the upper and lower discharges, and there is a line between the commanders and the staff organization[17].

In the battle mission, the commander continues to report command through the command system, and the staff organization organically performs the mission by selecting staff members (operation-operation, personnel-person, county-gun) so that information can be distributed smoothly in a single command system.

After the Ferry Sewol disaster, the organization of all organizations dispatched to the disaster site was standardized as public information, contact, situation management, on-site response, resource support, and public support to ensure organic cooperation at the disaster site.

All organizations dispatched to the disaster site follow the above standard organization so that organizations can easily identify and cooperate with each other from the organization of the organization.

Figure 1. The organization of military units and the disaster command system.

### 3.2. Basic concept of using MORT-TAC between disaster situation management

The basic concept of using MORT-TAC among disaster situation management is to evaluate the situation at the disaster site using MORT-TAC, a factor to consider the situation evaluation of the disaster site, and distribute the resulting initial disaster information to properly manage the disaster situation.

To this end, information sharing between the emergency rescue control team dispatched to the disaster site and the integrated support headquarters should be smooth, and information distribution between the regional and central emergency control teams and the regional and central disaster safety countermeasures headquarters should be properly responded to.
The use of MORT-TAC between disaster situation management should be made in two main aspects. As shown in the following Figure 2, each emergency organization should be assigned a mission to perform situation evaluation using MORT-TAC, the emergency rescue control team and the integrated support headquarters should use MORT-TAC to share disaster situation information.

Figure 2. Conceptual diagram of disaster situation management using MORT-TAC.

3.3. How to utilize MORT-TAC in regional and central emergency rescue control teams

The most responsible institution for saving lives at disaster sites is the firefighting sector, and the law to carry out this is the Emergency Rescue Response Activities and Field Command Rules (abbreviated: Emergency Rescue Site Command Rules, July 13, 2021)[18]. The regional emergency rescue control team is divided into the city and provincial emergency rescue control team and the city and provincial emergency rescue control team, and the city and provincial emergency rescue control team and the central emergency rescue control team will command and control the city and district. Table 1 presents a plan to manage the situation of disaster sites using MORT-TAC by the representative city, county, and district emergency rescue control team.

The regional emergency rescue control team is the most important organization in the disaster site. This is because commanders and staff organizations are properly established to take responsibility and lead in disaster response. Since the regional emergency rescue control team is usually an organization that allows firefighting staff to respond customized to disaster response, detailed organizations can identify
each of the MORT-TAC factors, take action, and report to organically carry out disaster response missions.

The city and provincial emergency rescue control team and the central emergency rescue control team are the same in organizing the organization and performing missions, but in the event of a large national disaster, it is important to play a role and perform tasks through information communication.

Table 1. Utilization of MORT-TAC by regional emergency relief control team.

<table>
<thead>
<tr>
<th>Sortation</th>
<th>The main mission</th>
<th>In charge of MORT-TAC</th>
</tr>
</thead>
</table>
| Regional Control Head | a. Command, Control.  
b. Implementation of plan. | a. M (Mission)  
b. Using MORT-TAC |
| Total Command Division | Command team | a. Decision making strategies  
b. Support control command | a. M (Mission)  
b. Using MORT-TAC |
| | Announcement | a. Promote mass media  
b. Assembly business | a. C(Media reports)  
b. C(Public opinion) |
| | Safety team | a. Safety accident prevention  
b. Safety measures | a. C(Regional stability)  
b. R(Prevention of accidents) |
| Response Planning Division | Analysis team | a. Analyzing information  
b. Response plan establishment | a. MORT-TAC Manage  
b. Using MORT-TAC |
| | Planning team | a. Response activity plan.  
b. Allocation of resources | a. Using MORT-TAC  
b. R(Allocation resources) |
| Resource Support Division | Service team | a. Support for the operation | a. R(Available resources) |
| Site Commanding Division | Rescue team | a. Saving lives and extinguishing fires | a. O(Rescue target)  
b. R(Resources.) |
| | Control team | a. Support for evacuation plans  
b. Command of field resources. | a. O(Evacuation)  
b. C(Utillizing resources) |
| | Medical team | a. Medical support  
b. Distribute casualties | a. O(Injured person)  
b. O(Transfer/Status) |
| | Flight team | a. Aircraft control  
b. Air transport for patients | a. T(Weather)  
b. O(Air transport) |
| Urgent. Recovery Division | Relief team | a. Emergency relief  
b. Helping rescuers | a. Relief resources  
b. R(Helping rescuers) |
| | Facility team | a. Facility restoration  
b. Facility command and control | a. O(Facility restoration)  
b. R(Facility resources) |
| | Pollution team | a. Command and control of pollution control resources | a. O(Contaminated area)  
b. R(pollution resources) |

3.4. Regional and central disaster and safety countermeasure headquarters' plan to utilize MORT-TAC
According to Article 16 (Local Disaster and Safety Countermeasure Headquarters) of the Framework Act on Disaster and Safety Management (December 22, 2020), the provincial governor shall have the municipal disaster and safety headquarters.  

As shown in Table 2, the Regional Disaster and Safety Countermeasure Headquarters’ plan to utilize MORT-TAC by 13 collaboration functions should basically identify real-time information on all factors considering disaster site situation evaluation and report and spread them so that decision makers can use them for decision-making.

According to Article 14 of the Framework Act on Disaster and Safety (Central Disaster and Safety Countermeasure Headquarters, etc.), the Ministry of Public Administration and Security shall establish the Central Disaster and Safety Countermeasure Headquarters. As 13 collaboration functions of the Regional Disaster Countermeasure Headquarters and 13 collaboration functions of the Central Disaster Countermeasure Headquarters are organized in the same way, identifying, reporting, and distributing information related to MORT-TAC can naturally be used when evaluating disaster situations.

Table 2. Utilization of MORT-TAC by regional disaster countermeasure headquarters.

<table>
<thead>
<tr>
<th>Sortation</th>
<th>The main mission</th>
<th>In charge of MORT-TAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>a. Response, probation, command, and support &lt;br&gt;b. Problem solving and decision making</td>
<td>a. M(Mission) &lt;br&gt;b. Using MORT-TAC</td>
</tr>
<tr>
<td>Controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Manager of Situation Management</td>
<td>a. analyzing, predicting the situation. &lt;br&gt;b. Response plan established &lt;br&gt;c. Write and report on Situation &lt;br&gt;d. Securing and executing budgets</td>
<td>a. MORT-TAC total management &lt;br&gt;b. Using MORT-TAC</td>
</tr>
<tr>
<td>Emergency life stabilization support</td>
<td>a. Supporting the victims. &lt;br&gt;b. Relief work for victims</td>
<td>a. O(Identifying victims) &lt;br&gt;b. R(Relief work for victims)</td>
</tr>
<tr>
<td>Environmental maintenance at the disaster site</td>
<td>a. Trash disposal activities &lt;br&gt;b. Hygiene management continues</td>
<td>a. T(Terrain) &lt;br&gt;b. R(Hygiene management resource support)</td>
</tr>
<tr>
<td>Emergency communication support</td>
<td>a. Emergency communication system operation at disaster sites &lt;br&gt;b. Communication-related situation management</td>
<td>a. O(Identifying damage to communication facilities) &lt;br&gt;b. R(Communication damage recovery support)</td>
</tr>
<tr>
<td>Emergency recovery of facility damage</td>
<td>a. Identifying the damage and recovering from the emergency &lt;br&gt;b. Support for manpower and equipment for recovery</td>
<td>a. O(Facility damage status) &lt;br&gt;b. R(Facility restoration resources)</td>
</tr>
<tr>
<td>Restoration of energy facilities</td>
<td>a. Identifying damage caused by gas and electricity damage &lt;br&gt;b. Energy support</td>
<td>a. O(Identifying energy damage) &lt;br&gt;b. C(Energy recovery, support)</td>
</tr>
<tr>
<td>Disaster Management Promotion</td>
<td>a. Promote through mass media &lt;br&gt;b. Press briefing, etc.</td>
<td>a. C(Media reports) &lt;br&gt;b. C(Public opinion)</td>
</tr>
<tr>
<td>Disaster management resource support</td>
<td>a. Human resources, equipment, supplies</td>
<td>a. R(Available resource support) &lt;br&gt;b. R(Mobilize available resources)</td>
</tr>
</tbody>
</table>
| Traffic measures | a. Traffic control around disaster sites  
| | b. Preparation of traffic detour measures, etc.  
| | a. T(Traffic conditions in the surrounding area)  
| | b. R(Preparation of a traffic detour)  
| Medical quarantine support | a. Emergency medical and resource support activities  
| | b. Distributed transfer of casualties  
| | Comprehensive status  
| | a. Q(Rescue target)  
| | b. Q(Transfer/Status of casualties)  
| Volunteer support management | a. Recruitment of volunteers, on-site placement  
| | b. Establishment and operation of a volunteer center  
| | a. R(Recruitment of volunteers)  
| | b. R(Volunteer management)  
| Social order Maintenance | a. Measures to alleviate traffic congestion  
| | b. Guiding and evacuating residents  
| | c. Traffic control and on-site control  
| | a. M(Resolving the traffic jam)  
| | b. C(Resident evacuation, guidance)  
| | c. C(Safety around disaster site)  
| Search and rescue, First aid | a. Emergency rescue and emergency medical care  
| | b. Rescue and first aid activities at disaster sites  
| | a. O(Activities to identify the requester)  
| | b. R(Rescue and emergency resource support)  

### 4. Policy Suggestions: Reflecting the Use of MORT-TAC in Education and Training for Disaster-related Officials

The results obtained in this study can achieve their effects when reflected in education and training programs to improve the expertise of disaster-related officials (fields, situation rooms). Professional education on disaster situation management shall be provided to disaster-related officials dispatched to the disaster site and all related officials in charge of disaster situation management[20]. There are five major needs for policy reflection of MORT-TAC in education and training for disaster-related officials.

First, it is a need from the concept of disaster. According to the definition of a disaster by the U.S. Federal Disaster Management Agency (FEMA), a disaster is "a serious and large event that brings death, plaque, and property damage and cannot be managed by routine procedures or government resources[21][22]. It should be a special measure because it cannot be handled by ordinary procedures or resources[23][24], and it is possible when officials arriving at the disaster site are aware of their role in accordance with the concept of such a disaster in order to play a role in the field. In particular, the fact that the factors considering the situation evaluation of the disaster site are specified in two letters in MORT-TAC is not forgotten[25] to be used at the disaster site.

Second, it is a need from the specificity of the disaster site. Disaster sites are "differentiated from general sites, and the site is complicated and uncertain, making it difficult to grasp the situation, and poor disaster sites cause physical fatigue and pain, transcending human limitations[4]" Since humans cannot normally judge the situation, disaster officials in the field and situation room will be able to respond to disasters in a timely manner by distributing key information on the disaster site through MORT-TAC education.

Third, it is the need from human cognitive ability in disaster sites. When humans are usually calm, they can recognize the situation normally and make appropriate situational judgments. However, in a situation under psychological pressure in an urgent situation, not only is it embarrassing to grasp the situation properly, but it also makes it difficult to judge the situation[26]. Therefore, MORT-TAC education is needed to overcome these difficulties.
Fourth, it is a need from disaster cooperative responses from various organizations. An educated individual may be good at judging the situation at the disaster site. However, various organizations will be dispatched to the disaster site, and if members of each organization fail to systematically respond to disasters, it will be difficult to respond to disasters [27][28]. Synergy may occur between disaster response organizations [29] when disaster officials working at disaster sites or situation rooms perform their duties and field information related to the mission is distributed. Therefore, disaster-related officials need MORT-TAC education even in terms of basic literacy.

Finally, it is necessary from the absence of programs in the current education and training system. Currently, the core educational institutions for education and training in the field of disaster safety are the National Civil Defense Disaster and Safety Education Center and the Central Fire School. The educational programs of these educational institutions do not reflect the educational concept of similar educational programs such as MORT-TAC, which must be considered by officials in disaster sites or situation rooms to perform their duties. In this situation, officials dispatched to the disaster site or those who manage the disaster situation in the situation room will not be able to respond to disasters and manage the situation based on common awareness [30][31]. Therefore, it is necessary to quickly reflect MORT-TAC, a factor to consider in evaluating the situation of the disaster site, in the education and training programs of the National Civil Defense Disaster and Safety Education Center and the Central Fire School.

5. Conclusion

In the above, a plan to manage a disaster situation using MORT-TAC, a factor to consider the situation evaluation of a disaster site, was studied. Early information on disaster sites is important information for disaster response decisions, and the city, county, district emergency control and integrated support headquarters use MORT-TAC to evaluate disaster situations and various information related to disaster situations.

The results of this study can be applied mutatis mutandis to disaster situation management by disaster officials using MORT-TAC. In addition, it can be used in education and training programs to improve the expertise of disaster-related officials in normal times. Since disaster response is not done individually, but various organizations and personnel must perform tasks simultaneously, improving the expertise of disaster-related officials is the most important policy task.

Despite the results of the above research results, there are limitations. Qualitative and quantitative development of research is required through in-depth research on each MORT-TAC, which is a factor to consider in evaluating the situation of the disaster site. It is hoped that the extension of this study will be expanded as more research on the younger generation will be conducted in the future.

6. References

6.1. Journal articles


6.2. Thesis degree


6.3. Books


6.4. Additional references


7. Appendix

7.1. Authors contribution

<table>
<thead>
<tr>
<th>Initial name</th>
<th>Contribution</th>
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<tbody>
<tr>
<td>Lead Author</td>
<td>Set of concepts ☑</td>
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<tr>
<td>SK</td>
<td>Design ☑</td>
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<td>Getting results ☑</td>
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<td>Analysis ☑</td>
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<td>Make a significant contribution to collection ☑</td>
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<td>Final approval of the paper ☑</td>
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<td>Corresponding ☑</td>
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<tr>
<td>Corresponding Author*</td>
<td>Play a decisive role in modification ☑</td>
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<tr>
<td>CC</td>
<td>Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑</td>
</tr>
<tr>
<td></td>
<td>Participants in Drafting and Revising Papers ☑</td>
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<td></td>
<td>Someone who can explain all aspects of the paper ☑</td>
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7.2. Funding agency

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