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Integrated Natech Risk Management Framework for Local Stakeholders in the Context of Japan

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Introduction

Recent disaster trends show that disasters are more complex, uncertain, and unpredictable due to global environmental and climate changes [1]. Furthermore, the so-called natural hazards triggering technological accidents (Natech) have also been on the increase [2]. As a result, the need to better understand and manage Natech risks has been recognized as a challenge in disaster risk management among all stakeholders, including government, experts, industry, and citizens. Japan has experienced changing weather-related hazard patterns, which are more frequent and substantial, over the last several decades [3]. The phenomena brought Natech accidents that directly affected local communities living near industrial facilities in recent years. Some examples include an explosion caused by heavy rain and floods at an aluminum recycling factory in Soja city, Okayama prefecture in 2018; an oil spill induced by floods from an ironworks company in Omachi town, Saga prefecture in 2019; and an explosion in a carbon manufacturing factory in Ashikita district, Kumamoto Prefecture in 2020. The consequences of those events illustrated the need for a local-specific risk management system and risk governance to deal with complex scenarios at the local level.

Natech accidents, which are considered low-probability but high consequence events, occasionally overwhelm disaster preparedness and response capacity [4]. Even though expanding efforts aim to better manage Natech risks, residents living near areas subjected to the risks have little information available on how communities can better manage, prevent, and prepare for these types of risks [5]. Thus, this study proposes an integrated Natech risk management framework that enables local stakeholders to manage Natech risks and enhance community resilience for potential Natech disasters by looking at case studies and practices.

Methodology

Various research methods and tools, including a literature review, focus group discussions, in-depth interviews, and field visits, were applied for data collection. Two recent Natech events that took place in Soja city, Okayama Prefecture in 2018, and Omachi town, Saga Prefecture in 2019, in Japan, were analyzed as case studies. The first case study explored the duties, activities, and perspectives of local citizens of a community disaster prevention organization in response to floods and an explosion of an aluminum recycling factory. The second case study looked into the responsibilities and perspectives of first responders during an oil spill triggered by floods. Meanwhile, several interviews with local government officials were also conducted to understand their perspectives on chemical and Natech risk management.

An integrated Natech risk management

This study investigated the different perspectives of local stakeholders on chemical and Natech risk through empirical case studies and literature review. Also, we analyzed the current disaster risk management that chemical or Natech risks are rarely considered, and the practical activities of local

stakeholders for disaster risk management. This study identified critical elements for the practical implementation of comprehensive Natech risk management for local stakeholders. One of the most indispensable elements concerns proactive collaboration among multi-stakeholders through flexible risk management processes adaptable to both natural and technological hazard risks and credible risk communication. The proposed integrated Natech risk management framework consists of 1) a *Natech risk management platform* centered around the Natech risk identification and assessment process and risk communication; 2) *government*, which regulates convincible policy and guidelines, involving the allocation of hard/software and human resources, and gives input into the application of Natech risk management at the local level.

Moreover, it supports Natech risk management strategies focusing on the localized risks of natural hazards and chemical/Natech accidents; 3) *mutual assistance* involves local officials, NGOs, diverse experts of natural and technological hazards, and industry safety specialists as main actors. This section operates the Natech risk management platform by assessing Natech risks and potential consequences. Due to the high uncertainty of Natech disasters, productive collaboration in the risk assessment processes among individual experts of natural/technological accident hazards, and industry specialists, is indeed stressed. The mutual assistance group also encourages the local community to participate passionately in the Natech risk management platform; and 4) the *local community* which is expected to engage in the Natech risk management processes of the platform, explicitly through the hazard and risk identification processes, make contributions based on accumulated past experiences of natural disasters and chemical/Natech events. The local community also supports the risk assessment and management process using localized knowledge related to environmental risks and criteria for risk perception and acceptance. While the framework confirms the extensive knowledge base from past natural hazards research, it also presents the importance of a broader conceptualization of the disaster risk management scope to comprise technological accidents. The proposed integrated Natech risk management framework will lead to the reduction of impacts from technological accidents triggered by natural hazards while enhancing local stakeholders' coping capacity for potential Natech events.

Conclusion

This study proposed an integrated Natech risk management framework, providing the basis for collaboration among all stakeholders at the local level and delineating the essential elements. In order to implement this, strong government support and policies that favor the disclosure and sharing of risk information clearly between stakeholders living near hazardous facilities are required. The proposed framework is also expected to establish strategies for infrastructure maintenance, such as flood control systems, communications, and transportation facilities, to prepare for potential Natech events.

References

[1] EM-DAT. (2020). The international disaster database. http://www.emdat.be/result-country-profile.

[2] Luo, X., Cruz, A. M., & Tzioutzios, D. (2020). Extracting Natech reports from large databases: Development of a semi-intelligent Natech identification framework, *International Journal of Disaster Risk Science*, 11, 9.

[3] Kumasaki, M., King, M. (2020). Three cases in Japan occurred by natural hazards and lessons for Natech disaster management, *International Journal of Disaster Risk Reduction*. 51.

[4] Masys, A. J., Ray-Bennett, N., Shiroshita, H., & Jackson, P. (2014). High impact/low frequency extreme events: Enabling reflection and resilience in a hyper-connected world, *Procedia Economics and Finance*, 18, 772-779.

[5] Steinberg, L. J., Basolo, V., Burby, R., Levine, J. N., & Cruz, A. M. (2004). Joint seismic and technological disasters: Possible impacts and community preparedness in an urban setting. *Natural Hazards Review*, *5*(4), 159–169.