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Promoting Natural Hazards Triggering Technological Disasters (NATECH) in Malaysia

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Abstract

Malaysia is a fast-growing country in Southeast Asia that is experiencing rapid technological development. This increases the risk of technological disasters and occupational hazards that can be triggered by natural hazards. This paper stresses the linkage of natural hazards with technological disasters, or NATECH, that remains a rather new term within the Malaysian context. Given the lack of current information on NATECH risk nationwide, this article intends to provide Malaysia-specific cases. This paper report on some significant local NATECH cases that have not been given any public access and not published in scholarly journal. I also highlight that communication and valuable information-sharing are crucial to an effective and efficient disaster management framework. There is still gaps and missing barriers in the nation's readiness and resilience towards NATECH disasters. In Malaysia, the information regarding NATECH risks has hardly been shared outside of the industrial fence, resulting in low level of awareness on the lessons and knowledge for better future proofing.

***Keywords*— Disaster Risk Reduction, Community Preparedness, Industrial Accident, NATECH, Infrastructure Resilience.**

I. INTRODUCTION

'Natural hazards triggering technological disasters' or NATECH is a new term in the Malaysian repositories that has yet to become the center piece of many discussions revolving the technological accidents caused by extreme natural disaster. This also means that mitigation efforts are not orchestrated across sectors. The term 'NATECH' was first coined by Showalter and Myers [1] when they reviewed the causes of chemical accidents triggered by natural hazard events, a wide concern among researchers due to a climb in the number of accidents [2]. In this paper, the context of NATECH stretches beyond the chemical accidents caused by human error into natural hazards that are out of human's control (see [3]). The measures against NATECH in Malaysia are multiple, but most reside within the perimeter of an industrial facility. A broader application can only come true with knowledge sharing and learning from past experience to safeguard future operations. As emphasized by [4] historical events also contribute more reliable prediction of likelihood and frequency of NATECH events. The intention of this paper is to bring forth NATECH events that have not been widely made known to enhance the current knowledge bank so that refinement and partnership can happen in our protection for our people and assets.

II. UNDERSTANDING THE NATECH GROWING RISKS

The impact from NATECH incidents, most profoundly caused by global warming, extreme climate change and vicinity to the Pacific ring of fire is huge. In the latest update by the ASEAN Coordinating Centre for Humanitarian Assistant on Disaster Management [5] in July 2019, Malaysia, Indonesia, and the Philippines lie directly on the path of the ring of fire. According to [6], communities around the Pacific Rim typically face hazards like earthquakes, tsunamis, storms, cyclones/typhoons, floods and bushfires. However, disaster impact is different across the nations based on the risk exposure and vulnerability towards disaster.

From 1998 to 2018, Malaysia has experienced 51 natural disasters. The latest floods and debris flows in 2021 and 2022 are caused by abnormal heavy rainfall events in the central peninsular and northern peninsular. While many stakeholders have been paying attention to these disasters,

specific attention should be given to its potential to trigger technological disasters that are defined as "low frequency and high severity". These include the failure of facilities such as fuel storage plants, power plants, chemical plants due to natural disasters. In other words, if a technological disaster occurs, the death toll can become very high because of a series of technological failures occurred thereafter that affected the local community.

The scientific community has been discussing about NATECH scenarios for quite some time, [7 & 8] but discussion in the general public within the ASEAN region is still new [9]. The most well-known contextualization of a global effort in using science and technology to reduce disaster risk is perhaps the setup of the United Nations Office for Disaster Risk Reduction Asia-Pacific Scientific and Technical Advisory Group (UNDRR-AP-STAG). Through this group, the principles of NATECH risk management for the Asia-Pacific region are defined [10], Currently, most documented NATECH disasters are those in the United States[11], Turkey [12] and the Great Eastern Japan Earthquake and Tsunami (GEJET) [13]. Malaysia has less documented records of NATECH incidents in comparison, but this has to change to enhance the nation's response during a disaster [14]. A mindset shift has to occur among the people and the authorities to change for the better so that even the annual flood tragedies are no longer treated as a norm.

III. NATECH CASE IN MALAYSIA AND OTHER NATIONS

A relatively significant NATECH disaster in Malaysia is the fire at the PETRONAS buck storage tank in Johor Port caused by lightning strike. Based on an internal industrial investigation report in 2006, the event had caused wide-spread panic and a massive uncontrolled evacuation during midnight. Detailed information is hardly seen beyond the industrial fence [15], making it difficult for stakeholders to learn from the lesson for better safety enforcement at other premises. In February 2013, a similar NATECH incident occurred at the Terengganu Crude Oil Terminal (TCOT) in Kertih, Terengganu, where the T444 tank caught on fire because of lightning strike. Information of this event was again, contained inside the industry and not released to the general public.

The most recent event took place in Port Dickson in 2020. A refinery caught fire after being stroke by lightning according to a report from the Fire and Rescue Department. Lighting is a typical natural occurrence in Malaysia that is commonly mitigated by installing lighting arrestors at significant hazardous installation or hazardous material (HAZMAT) facilities. Some additional fire mitigation devices are also installed in chemical storage or facilities to allow immediate intervention in the event of a lightning strike and ignition spark.

Although NATECH incident may triggered by any kind of natural hazards [16], lightning strike has caused the highest number of life-losses in Egypt in 1994 [17]. Indonesia also has a high record of NATECH caused by lightning in 1995 [18]. However, Malaysia has not disclosed its extensive list of lightning-related NATECH occurrences in a scholarly journal. The time is perfect for the government to conduct an extensive research on risk exposure and assessment for NATECH.

IV. RECOMMENDATION

Many parties have agreed that a lack of disaster preparedness within the community is catastrophic to the disaster response phase [19, 20 & 21]. Communities are the first to be hit by disaster and thus, their involvement and readiness are important in disaster management [22 & 23], The right knowledge and competency training have to be brought to them to build a resilient nation. The community must be informed about the risks in the area, including ecological risks, technological risks, and NATECH risks, especially for the community that is located next to an industrial sector. Information is essential, regardless of how sensitive it may be (certain industries may not disclose the quantity of hazardous materials they own owing to tight business policy, or to prevent panic, etc.). The planning and construction of the required infrastructure, including coastal embankments, as well as the required non-structural measures will be of the biggest benefit to the development of resilience. Design regulations and standards; chemical process safeguards; combined natural hazard and chemical process safeguards; land-use planning and disaster mitigation; and response planning can all help to reduce the danger of NATECH accidents to industrial or communities.

In this paper, I propose a partnership program that involve multiple critical stakeholders, which include the representative of the public or community leader, a representative of the public sector, the local government, the surrounding industrial players, and the subject-matter-experts from learning institutions to form the Consortium for Disaster Risk Reduction. An effective and efficient disaster risk management needs frictionless coordination among stakeholders that cannot be driven alone by a single entity. The public-private-academia partnership (PPAP) is the approach to an effective mutual strategy. Sharing all the technical, crucial and readiness information and resources from all stakeholders can upscale the entire district's strength to respond to any disasters. The member of this team requires thinking, pondering, digesting,

information, analysis and wisdom. These three primary PPAP committees shall drive a comprehensive program.

The 1996-enacted Occupational Safety and Health (Control of Industrial Major Accident Hazard) (CIMAH) Regulations in Malaysia requires substantial improvement on the clauses that call for industry players to inform the surrounding community of the 'process hazards that can be accidentally released'. Clearer and more concise legal explanations need to be given to clauses such as the "Information to Public (ITP) programme shall be implemented on an annual basis to the majority neighbouring population." The 1996 CIMAH Regulation also did not specify the risk that NATECH may expose to Malaysian heavy industry, not to mention little has been mentioned on the legislation on the risk of chemical accident caused by NATECH incident [13].

V. CONCLUSION

Malaysia has a long journey ahead towards understanding and achieving the readiness to manage the emerging risk linked to NATECH. This paper intends to bring awareness towards NATECH disasters. Stakeholders need to be open on communicating the hazards, including the amount of HAZMAT storage to the local community within vicinity. This forms the first level of knowledge sharing and introduction to any design for risk mitigation. The establishment of PPAP takes this further, combining the knowledge of multiple parties to identify the local needs with the right expertise. This collaboration model may become handy in drafting and implementing disaster risk reduction policy to spearhead the nation's better response to NATECH-related disaster.

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