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Disaster risks from economic perspective: Malaysian scenario

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Disaster risks from economic perspective: Malaysian scenario

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Abstract. Throughout the years, economic and mortality losses suffered as a result of intensified disaster events have been on the upward trajectory. Holistic assessment of disaster risks from economic perspective however has been partial at best. Thus, this study aims to recognize disaster risk factors in respect to economic perspective considered as crucial by construction industry stakeholders in Kelantan from an actual flood disaster scenario. It is also intended to find common aspects that the major disaster risk factors pertaining to disaster risk management may share; and to evaluate the influences of disaster management cycle posed to respective risk factors from economic perspective cited by the stakeholders. Specifically, this paper presents evidence using a quantitative analysis for identifying and ranking the disaster risk factors from economic perspective in respect to disaster management cycle via a focus group discussion consisting of key stakeholders from the construction industry. The results reflect that, in overall, damages and losses are the most recognized risk factor with 42.97% re-occurrences and this type of risk factor was also the leading risk factor cited by the participants in three of the four disaster management cycle phases discussed. Categorization and ranking of the risk factors could allow formulation of a much comprehensive disaster risk management processes and policies especially in respect to economic perspective where most damages and losses usually occur. The outcome of this study provides a basis for responsible agencies in identifying the important risk factors from the economic perspective to be considered when planning for new development or recovering from disaster events. Overall, this paper contributes to the knowledge of economic elements of a disaster risk management cycle.

1.0 Introduction

For the past 20 years period, intensity and frequency of natural disaster occurring throughout the world has been increasing and the impacts were devastating. For South East Asia region for example where flood is the most common type of natural disaster, from year 1998 to 2018, it was reported that there has been around 431 occurrences of flood hits within the region which have affected more than 100 million people and inflicting an estimated amount of USD 58.74 billion economic losses [1]. In Malaysia alone, there has been around 13 major flood events which took place within that 20 years span, and 2014 major flood event that hit East Coast region was one of the worst hydrological disaster to ever hit Malaysia. Economic losses suffered by the region was approximately RM 2.9 billion, whereas RM 800 million of government allocation was needed for repairs and reconstruction of critical infrastructure such as schools, hospitals, roads and bridges [2]. On top of that, as many as 250,000 people were affected in Kelantan with as many as more than 2,000 permanent houses were completely destroyed and in need of total reconstruction [3,4]. It is evidently clear that significant economic losses have been suffered by the South East Asia in general and Malaysia in specific in related to natural disaster events. Risks in general are unlikely to remain the same in the future [5] and the dynamic nature of hazards and exposure can only amplify the impacts of a disaster posed towards



the well-being of a society socially, environmentally and most importantly economically. According to INFORM (2018), flood hazards and exposure for Malaysia is measured at 6.5 by the INFORM Index which is considered as very high. Therefore, it is incredibly vital for relevant parties such as the government agencies along with private organizations to mitigate such risks through disaster risk reduction efforts which has received wide range of recognitions over the years on a worldwide scale [6]. Following strong advocacy of leading institutions such as the United Nations, the paradigm has now shifted [7] where people has started to realize that by effectively managing the disaster risks itself, the damaging impacts of disaster events can be significantly reduced.

In the long run, flood damages can effectively be mitigated through flood-risk management [8], where identification and assessment of flood risk factors should provide the necessary foundation. Existing literatures on disaster risk management typically discusses disaster risks reduction strategies via structural and/or non-structural measures such as the Sendai Framework for Disaster Risk Reduction (2015-2030) [9]. In addition, wide range of literatures on pre-disaster and post-disaster processes are also available whilst the study on factors influencing perception of risks are not sufficiently addressed. Risk perception helps to shape an individual's decision-making processes in a way that the person must decide based on his/her best knowledge whether a certain action to manage the risk is worth pursuing and this decision is usually influenced by economic considerations. By recognizing the people's perception towards risks, it will enable formulation of suitable measures and policies to help eliminate the said risks [10]. Recent study has revealed that as much as 60% of the Malaysian population reside near or along the coastline due to their socio-economic activities [11,12] while most of small and medium enterprises (SMEs) in Asia also tend to be located in the coastal zones due to infrastructure and logistics supports [13]. It has been well established that exposure and hazards of natural disaster such as flood are typically high in this type of geography and topography. Considering these facts, along with well documented economic losses incurred because of disaster events, the authors believed that a study on perception of risk factors from the perspective of economic is a worthwhile research area to be explored. Besides, economic research on disaster management can also be deemed as limited as of today [14]. Therefore, this study aims to answer the following research question: What are the underlying risk factors in respect to economic perspective which are considered as crucial by construction industry stakeholders in Kelantan in an actual flood disaster scenario? In specific, this study has two (2) main objectives which are: 1) to identify, synthesis and categorize the major disaster risk factors from economic perspective pertaining to disaster risk management perceived as crucial by the key stakeholders within the construction industry in Kelantan; and 2) to evaluate the influences of disaster management cycle posed to respective disaster risk factors cited by the stakeholders. To achieve these objectives, focus group discussion (FGD) was selected as the preferred method to identify the disaster risk factors of a disaster event from an economic standpoint. Detailed assessment of risk factors in accordance to respective disaster management cycle was also done to provide another perspective to the research problem.

2.0 Literature Review

Prior studies on disaster management in Malaysia has been encouraging with many literatures such as [15,16] discussing flood risk and disaster risk reduction as the go-to strategy in mitigating disaster threats. On top of that, there are also specific focus such as climate change adaptation [17], community resilience towards disaster [18,19] as well as how flood management procedures are carried out in Malaysia [20,21]. These literatures focus on the non-technical risk factors of a disaster, but literature in related to addressing the disaster risk factors from the standpoint of economic perspective remain scarce at the moment. This study intended to emphasis on the economic nature of disaster risk factors in relation to flood management.



Figure 1: Disaster Management Cycle Implemented in Malaysia, Adapted from FEMA (2010).

2.1 Disaster Management in Malaysia

In May 1997, following the collapsed of Highland Tower apartment building, National Security Council (MKN) of Malaysia who is responsible in overseeing national security matters including disaster management has issued a directive order entitled Directive 20 as a mechanism and procedures for natural or man-made disaster events management in Malaysia. Recently, National Disaster Management Agency (NADMA) was founded in 2015 by the Prime Minister's Office to act as a focal point in disaster management in Malaysia resuming the roles from MKN [22]. Coordinating together with the state and other federal government agencies, NADMA generally adopt the four main phases of disaster management cycle (DMC) by FEMA (2010) as per **Figure 1**. This cycle is universally adopted and practiced across the world population according to Altay and Green (2006) in the field of disaster management. In recent years, NADMA has started to implement Sendai Framework for Disaster Risk Reduction as part of Malaysia's progressive efforts to mitigate disaster risks and impacts [23].

2.2 Disaster Risk Management

In May 1997, following the collapsed of Highland Tower apartment building, National Security Council (MKN) of Malaysia who is responsible in overseeing national security matters including disaster management has issued a directive order entitled Directive 20 as a mechanism and procedures for natural or man-made disaster events management in Malaysia. Recently, National Disaster Management Agency (NADMA) was founded in 2015 by the Prime Minister's Office to act as a focal point in disaster management in Malaysia resuming the roles from MKN. Coordinating together with the state and other federal government agencies, NADMA generally adopt the four main phases of disaster management cycle (DMC) by FEMA (2010) as per **Figure 1**. This cycle is universally adopted and practiced across the world population according to Altay and Green (2006) in the field of disaster management. In recent years, NADMA has started to implement Sendai Framework for Disaster Risk Reduction as part of Malaysia's progressive efforts to mitigate disaster risks and impacts [23].

2.3 Disaster Risk Factors (Economic Perspective)

In business economics, disaster management is almost an alien concept to business owners where most of the existing publications tend to focus more on crisis management in general and business crisis in specific. This is due to the fact that, business crisis or crisis management is seen an expected events that will take place along the economic cycle while disaster event occurrence is unpredicted [24]. The impacts that disaster event posed towards the national and local economy in general is undeniable as documented by the short-term economic damages and losses figures posted after each disaster has subsided. On the other hand, quantification and full assessment of actual economic losses suffered by the affected location, region or nation due to disaster hit (i.e. flood) has been inaccurate and proved to

be challenging [25]. According to Kellenberg and Mobarak (2010), disaster events tend to have direct impacts (negatively or positively) on economic indicators such as Gross Domestic Products (GDP), economic growth and labour market. This is supported by Shaari et al. [26] where it was proven that as the frequency of flood event increases by 1.00%, the economic growth is likely to decline by 0.27%. On the contrary, as the total damage costs increases by 1.00%, economic growth is likely to be increased by 0.19% which is surprising in a way. From an economic point of view, disaster events can be said as to have both positive and negative impacts towards the economy, depending on what type of indicators or context that we are looking at. Although the amount of monetary losses because of disaster events are well documented, there seems to be an array of economic impacts, factors or variables that remain unexplored.

Table 1. Categorization of Type of Economic Losses

Category	Direct losses	Indirect losses
Tangible losses	e.g. building and contents, infrastructures, vehicles, crops, livestock, personal belongings & assets etc.	e.g. costs of rescue operation, aid, medical and lawsuit expenses, disruption to transport, business, commerce, employment etc.

Firstly, economic losses (i.e. tangible) as a result of disaster hit can be categorized into two main categories which are direct losses and indirect losses [27]. Description of each of these categories can be seen in **Table 1**. There are a whole spectrum of economic indicators or types of losses other than structural damages and losses when discussing disaster event. Secondly, impacts of disaster from economic perspective is not limited to household only. Small and Medium Enterprises (SMEs) in Kelantan for example suffered significant impacts to their business operations where loss of sales/production, non-attendance of employees, damage to property/business premises and damage to stocks and equipment are amongst the reported impacts due to the 2014 major flood event [13]. As business owners especially from SMEs sector tend to keep the losses suffered to themselves while trying to recover from the unfortunate event, quantification of losses incurred by business owners are often neglected when reporting the economic losses. Therefore, the application of economic concepts to disaster risk management research field is believed to be highly appropriate and long overdue considering the matters discussed above.

3. Methodology

In this study, focus group discussion (FGD) method was chosen to investigate the perception of stakeholders in regard to disaster risk factors considered as influential in impacting the local economy based on an actual disaster management scenario. This particular method was favored as it allows the ability to carry out an in-depth examination of the research topic along with proactive communication and participation from research participants which then enables generation of ample relevant data and information [28].

3.1 Conceptual Framework

To guide this research, a conceptual framework of disaster risk factors from perspective of economic was developed incorporating both the well-established disaster management cycle (DMC) and elements from the economic variables which can be seen in Figure 2. The context of disaster management cycle is adapted for its global adaptation and practice across world population [22] where the four phases are divided into two main categories, pre-disaster activities (mitigation and preparedness) and post-disaster activities (response and recovery) [9,29,30]. Integration of this cycle phases towards the context of economic perspective is an interesting area to be explored as economic impacts posed by the natural disaster such as flood are the most threatening towards the survival of a human species. Central to the disaster management cycle, is the context of the study which is the

disaster risk factors from economic perspective which have significant impacts in all the cycle phases (represented by the four outward arrows). Sub-themes comprising of investment, financial and business operations and disaster risk factor (from perspective of economic) were designed and included in the conceptual framework. These sub-themes and risk factors were drawn from the Sendai Framework for Disaster Risk Reduction 2015-2030 [9] document, by going through the elements in the guideline one by one to identify and classify the risk factors cited in the guideline in accordance to respective sustainability elements such as economic, social and environmental. This is deemed as highly necessary to ensure issues being discussed by the stakeholder remains in context and relevant to the research topic. The purpose of this framework is to answer the research question: "What are the underlying risk factors in respect to economic perspective which are considered as crucial by construction industry stakeholders in Kelantan in an actual flood disaster scenario?". The discussions therefore will be based on this framework where it shows that the economic perspective will be broken down into three main sub-themes and five associated risk factors which will be discussed in the context of individual disaster management cycle (DMC) phases which are – mitigation, preparedness, response and recovery.

3.2 Data Collection

A Total number of 160 stakeholders from the construction industry consisting of government officials, non-government organizations (NGOs), local authorities, local businessmen, engineers, contractors, developers, manufacturers, suppliers, academicians, health officials and local community representatives were invited to participate and contribute in the focus group discussion held in February 2015. The stakeholders were divided into four main groups in accordance to the disaster management cycle phase. The main groups are then divided into another four small groups with a maximum number of 10 participants consisting of the following type of stakeholders to ensure a good blend of knowledge, experience and expertise. In each of the small groups, 1 moderator cum reportoire is assigned to facilitate the discussion process. Government officials – 2 persons; Engineer – 1 person; Contractor – 2 persons; Developer – 1 person; Manufacturer or supplier – 1 person; Local business operator – 1 person; Academician – 1 person and Local community representative – 1 person.

In each of the groups, a forum discussing multiple issues related to flood management from the social, economic and environmental perspective was held. For the purpose of this study, only economic scope of the discussion is taken into consideration. Each of the forum lasted around 60 to 90 minutes. Open-ended questions were posed to the participants in order to gauge a richer amount and nature of the responses. For economic scope, the following questions were posed: From an economic perspective, what are the risk factors you consider as critical in a flood disaster event? This question seek to explore and providing the participants with scope and context in identifying the risk factors that the participants perceived as important when facing flood disaster or in the case of future flood events in relation to economic aspect. Economic perspective referred to in this question comprise of the sub-themes: investment, financial and business operation. To probe further on the topic, the following question was then asked: How to these factors contribute to the issues that flood victims have to face during disaster?

For strategical reasons as well as convenient access to high number of local stakeholders from the construction industry, the FGD session was held in Kota Bharu, Kelantan. Kelantan is located in the East Coast region of Malaysia which has 15,105km² of land coverage and estimated population of 1.72 million as of 2014 [31]. Flood disaster takes place regularly in Kelantan in specific and in East Coast region in general due to their exposure to the North-East Monsoon from November to March and geographical positioning surrounded by the South China Sea in which heavy rainfalls are expected on an annual basis. 30 years average rainfall in Kelantan was recorded at 2,576.78 mm in a year while the annual rainfall data in 2014 was recorded at 3,117.8 mm which significantly contributed to one of the worst flood event in the history [32], with many rainfall stations in Kelantan showing record breaking rainfall events [33]. Due to the severity of the economic impacts that the state had to endure in 2014/2015 major flood, Kelantan was chosen as the location of this study.

3.3 Data Analysis

Feedback given by the respondents of the focus group discussion in all the four sessions conducted were recorded using audio recorders and were transcribed by the respective repertoires with key points were identified, summarized, and classified. In order to carry out the content analysis procedure, the data collected were entered into Microsoft Excel software, analyzed and categorized in accordance to the three sub-themes and respective disaster risk factors (economic perspective). Frequency of the response given by the participants were checked where occurrences of the respective keywords within the recorded responses are then summed and mapped in accordance to the five disaster risk factors. Frequency is computed by totalling up the total number of keywords extracted from the content analysis process with specific focus on the five disaster risk factors (economic perspective) listed as per Figure 2. This number was then converted into percentage by dividing the total of respective risk factor with overall total of the frequency ($n=263$). In the end, the frequencies are then ranked and visually represented in a hierarchical way in results analysis.

4. Results and Discussions

Discussions among the industry stakeholders were diverse in nature due to the open-ended questions posed to the participants. The keywords extracted however are found to be consistent with the five disaster risk factors and the three sub-themes (from an economic standpoint) designed for this study. Detail list of the issues cited by the respondents are given in **Table 2** which has been categorized and arranged in accordance to their respective sub-theme and risk factor. Based on the disaster risk factor conceptual framework in **Figure 2**, the measures cited in respect to economic perspective in related to actual disaster management scenario were classified into three sub-themes which are investment, financial and business operations and then into its relative disaster risk factors group. Detail list of findings are then analyzed and presented in accordance to the four disaster management cycle, namely mitigation, preparedness, response and recovery and preparedness.

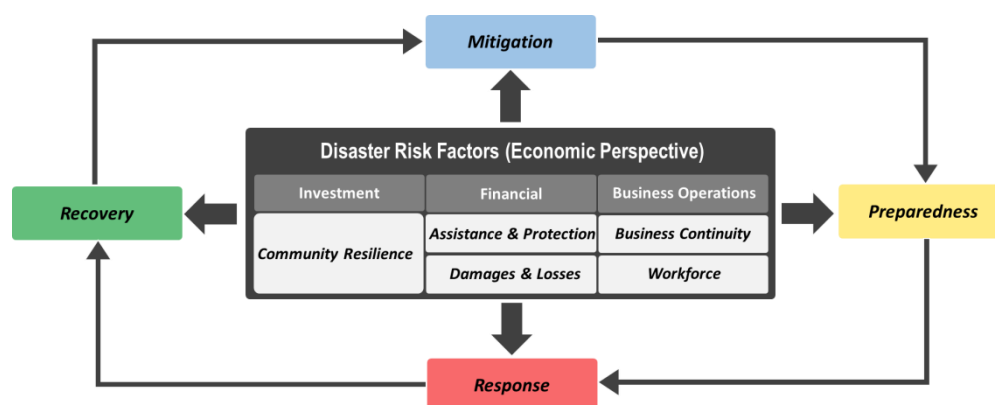


Figure 2: Conceptual Framework of Disaster Risk Factors from an Economic Perspective for Malaysian Scenario

Table 2. Categorization of Issues According to Disaster Risk Factor from Economic Perspective

Issue Description	Sub-Theme	Risk Factor
Food & Medical, Agriculture & Livestock, Budget for Critical Infrastructure, Loss of Income, Housing & Development	Investment	Community Resilience
Volunteerism, Financial Aids, Personal & Business Insurance Coverage	Financial	Assistance & Protection
Data Losses, Physical Losses, Structural Damages,		Damages & Losses

Biodiversity Losses

Asset Protection, Supply Chain Management, Logistics Business Operations Business Continuity

Productivity, Communication Issues, Psychosocial

Workforce

Issues

The occurrences distribution is presented in percentage form and in a hierarchical way, from highest to lowest. It was discovered that the overall results of this study suggested that majority of the respondents perceived that damages and losses risk factor is the most critical element when assessing disaster risk management from the economic perspective with 42.97% occurrences throughout the recorded responses. Assistance and protection risk factor received the second highest mention but well below damages and losses risk factor with a 20.53% occurrences. The rest of the distribution can be seen in **Figure 3**.

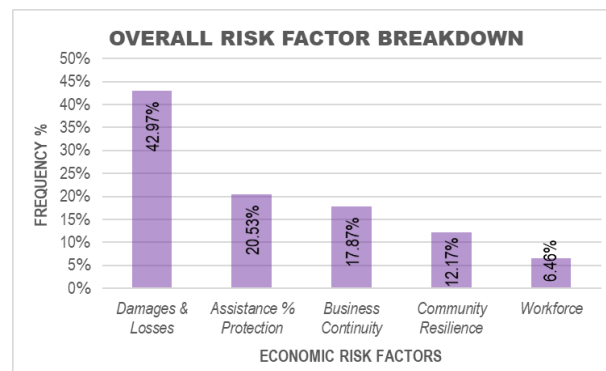


Figure 3: Percentile Ranks of Overall Risk Factors

It is understandable that most of the respondents cited damages and losses as their most concerned element when assessing economic impact of disaster event given that economic damages and losses recorded especially in the recent years are on an upward trajectory as human communities and other living organisms including animals and surrounding built and natural environment are becoming more prone and exposed to climate change and extreme weather hazards and threats. Households, local businesses as well as the government in general suffered significant economic losses during disaster hit and post-disaster hit when recovering from the tragedy itself. This situation is supported by the disaster risk factors breakdown in accordance to relative disaster management cycle as per **Figure 4** where most of the overall risk factors cited by the participants concurred that economic impacts of a disaster events mostly occurred in recovery phase followed by mitigation, preparedness and response. Distribution or breakdown of each disaster risk factors in each of the cycle phases will be discussed in depth in the following section. Results will be presented in accordance to the hierarchy in **Figure 4**.

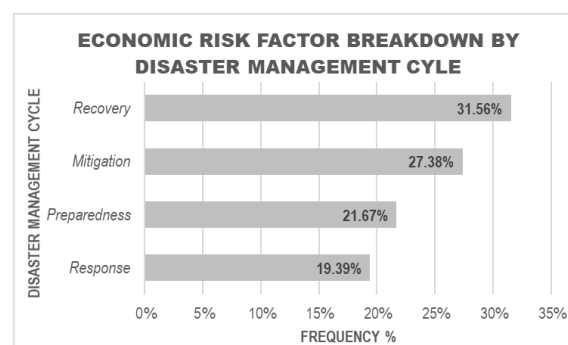


Figure 4: Disaster Risk Factors Breakdown (Economic Perspective) by Disaster Management Cycle

4.1 Recovery

In respect to recovery phase of the disaster management cycle, the distribution of the re-occurrences of the concerns expressed by the respondents too was presented in a hierarchical way. The results as shown in **Figure 5** reflected that damages and losses is the most dominant risk factor considered by the focus group participants with 53.10% re-occurrences across the entire group sample, which is consistent with the overall scenario presented previously. Again, assistance and protection risk factor followed in the second spot with 22.89% re-occurrences.

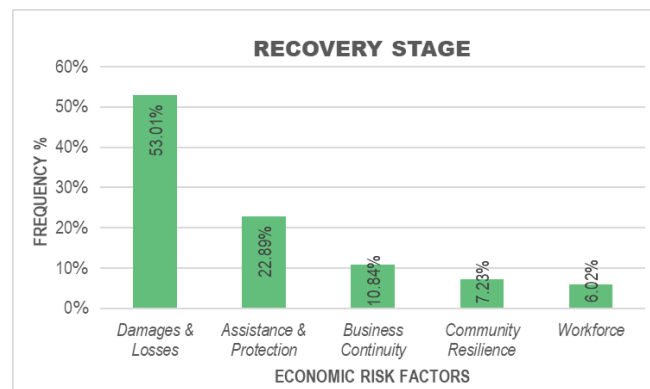


Figure 5: Disaster Risk Factors Distribution at Recovery Phase (Economic Perspective).

It is believed that the distribution of the risk factors shown as per **Figure 5** could be caused by the tendency of the stakeholders to perceive damages and losses assessment as the most critical element to be considered in dealing with post-disaster recovery activities. In order to quantify and understand the magnitude of the economic losses and damages suffered, detailed damage assessment exercises are usually conducted especially by the government agencies. Once that is done, financial assistance will be handed-out to the victims as well as to the relevant agencies to facilitate the recovery processes to bring things back to the way they were before the disaster hit. Restoration of basic services and critical infrastructures as soon as possible will require a big chunk of the budget to help the affected communities recover from the unfortunate event. Considering these facts, it is logical for the stakeholders to view damages and losses as the dominant risk factor to be considered. On the other hand, business operations themed risk factors like business continuity and workforce did not received much attention or considered as of high importance by the stakeholders whilst in an actual scenario these elements too are equally important especially in the context of local economy. Also, due to nature of the cycle phase, concerns towards enhancing community resilience too did not received much recognition from the stakeholders. This may be due to the fact that participants believed that it is too late already to improve the community resilience as the disaster hit already took place. In an ideal situation, recovery phase should be viewed as the perfect opportunity for the stakeholders or the victims themselves, to seek through measures on how their resiliency level could be elevated. By building back better, whether in the form of residential houses or critical infrastructures, the community will be better-equipped to mitigate the threats and impacts of disaster likely to take place in foreseeable future.

4.2 Mitigation

Moving on the mitigation phase of the disaster management cycle, the results obtained for this particular phase revealed that the FGD participants agreed damages and losses is still the most dominant disaster risk factor to be considered from an economic perspective in respect to disaster risk management with a 45.83% re-occurrences throughout the entire group sample. However, business continuity risk factor emerged as the second highest re-occurrences mentioned by the participants with a 23.61% followed by the remaining risk factors which can be seen as per **Figure 6**.

In Mitigation phase, measures are carried out to lessen or eradicate long-term risks towards human population and assets from threatening hazards and their impacts [34] in which the aims are to break the cycle of disaster-induced damages, massive costs of reconstruction and recurring damages in the future [29]. By this definitions, assistance and protection as well as community resilience risk factors should be regarded as highly important by the stakeholders. However, damages and losses are still considered the most vital risk factor as stakeholders may have perceived mitigation measures is closely connected to recovery activities because of disaster aftermath.

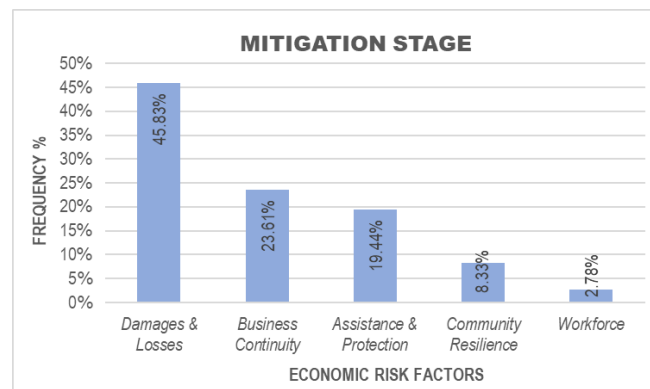


Figure 6: Disaster Risk Factors Distribution at Mitigation Phase (Economic Perspective).

On the other hand, it is motivating to see business continuity being considered as among the second most important risk factor when assessing economic perspective of disaster risk management by the stakeholders. This is seen as positive as stakeholders acknowledged the importance of having necessary mitigating measures taken by business operators to effectively reduce the loss of life and properties through managing the disaster impacts. By doing so, future occurrence of such damaging flood disaster is likely to cause lesser impacts towards the business operations especially to its profitable assets and supply chain network.

4.3 Preparedness

In the preparedness phase of the disaster management cycle, community resilience together with damages and losses posted the joint highest re-occurrences of risk factors given by the participants from an economic perspective with 28.07% followed by assistance and protection with 19.30% re-occurrences making up the top three hierarchy order. Unlike two of the previous cycle phases discussed, the distribution of the risk factors in preparedness this is somehow fairly distributed with none of the risk factors quoted emerged as dominant. This scenario is presented in **Figure 7**. In the context of disaster management, preparedness procedures are carried out to prevent economic and mortality losses via implementation of soft measures such as planning, training and exercising for future disaster events [29]. By conducting these soft measures, capabilities of local communities can be built up and strengthen for that community to become disaster resilient community. By continuously educating the public on the severity of hazards and impacts that disaster event such as flood could pose especially towards economic and mortality aspects, the level of awareness that the public possessed in related to disaster management could be elevated. Capacity building measures to improve community resilience can be effectively implemented when communities working together with government agencies to carry out such measures [35]. As shown in **Figure 7**, the stakeholders acknowledged that community resilience is highly important risk factor in preparedness phase of disaster management along with damages and losses. Assistance and protection risk factor is deemed as important where participants are mostly concerned with financial protection such as personal and/or disaster-related insurance and financial assistance such as disaster risk reduction fund.

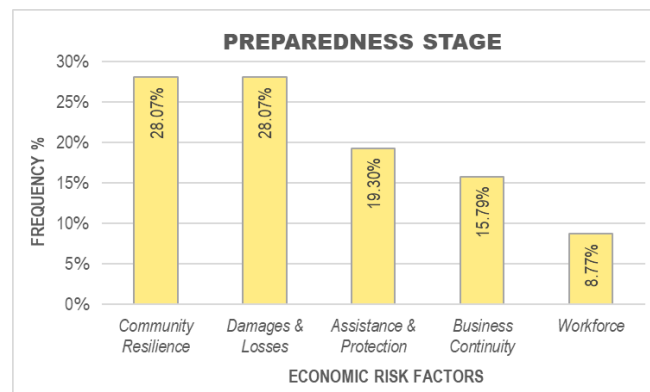


Figure 7: Disaster Risk Factors Distribution at Preparedness Phase (Economic Perspective).

4.4 Response

Lastly, in the response phase of the disaster management cycle, damages and losses again emerged as the highest risk factor quoted by the participants with a 39.22% re-occurrences, followed by business continuity with 23.53% re-occurrences and assistance and protection with 19.61% re-occurrences across the group sample. The distribution of the remaining risk factors can be viewed in **Figure 8**. In general, the response actions in disaster management cycle concerns with coordination and dispatchment of health, search and rescue assets and services to save life and assets [29]. As this exercise often means relevant parties such as government officials, local authorities and volunteers encountering first hand disaster impacts at ground zero, damages and losses once again emerged as the leading risk factor from an economic perspective in the response phase considered by the respondents. This situation could be explained in a way that although assessment of such damages and losses is normally carried out in recovery phase, recognition of physical losses and damages are often realized in response phase. As for the victims, once they are safely rescued and placed in secured locations, realization of the extent of economic damages and losses that they are likely to suffer might be another contributing factor.

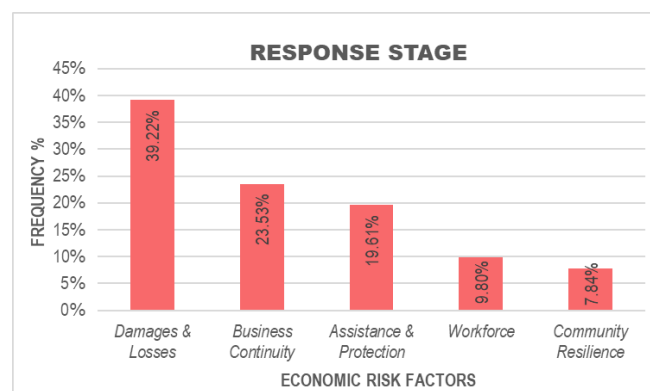


Figure 8: Disaster Risk Factors Distribution at Response Phase (Economic Perspective).

Analysis of the results obtained in respect to disaster risk factors from the economic perspective in which classification and categorization of the risk factors was done in accordance to the disaster management cycle phases namely mitigation, preparedness, response and recovery have provided some insights on how people perceived the risk factors especially in an actual disaster event. The inputs gained from this study intended to emphasize the relevant disaster risk factors especially in the context of economic to the extent of when discussing about the economics of a disaster event, the subject of the discussion should not be limited to economic losses and damages only. While quantification of the amount of damages and losses is important in order to estimate total economic

impact and to facilitate the recovery efforts, more often than not, other factors did not receive the same level of recognition as shown in the study conducted. Other notable areas or types of risk factors such as financial assistance in the form of monetary aids to the victims, financial protection (i.e. life insurance, disaster specific insurance) and stakeholder's investment to enhance community resilience should not be disregarded. In addition, the ability of business operators to continue serving the community even after suffering significant disaster impact as well as the ability of the workforce to continue working while maintaining the same level of productivity post-disaster hit event are also equally important risk factors to be considered.

5. Conclusion

The understanding of disaster risk factors from an economic perspective are highly valuable to formulate proactive policies, strategies and measures to effectively manage and mitigate disaster risk. Building on the existing literatures and research findings on risk factors from an economic stance in disaster risk management considered as vital by the stakeholders especially from an actual disaster event, this research paper has managed to provide an ideal platform for identification and classification of major risk factors related to economic perspective. Consideration of economic element has provided an added-value to the research outcome where most disaster related researches usually focused on the technicality of the disaster events such as structural design and causes of natural disaster. There have not been many literatures focusing on the economics of a disaster event holistically, while in the case of any, most of the limited resources tend to focus on the financial side of the disaster risk management without considering the whole spectrum of economic elements highlighted in this research paper. The method designed for this study was meant to promote proactive engagement by the stakeholders involved to gauge their perceptions and opinions which was crucial in answering the research question. Findings indicated that in general, the stakeholders perceived damages and losses as the most dominant and critical risk factor when assessing disaster risk management from economic perspective, followed by financial assistance and protection as well as business continuity making up the top three positions. Although it is understandable that these factors are highly recognized by the stakeholders due to their pure economic nature, factor such as community resilience should not be disregarded as well. In addition, it was evident that the nature of the disaster management cycle phases does have substantial influences in how participants perceived the cruciality of respective disaster risk factors from an economic stance as shown by the results obtained. Overall, this study has developed a conceptual framework of disaster risk factors from an economic perspective for Malaysian scenario with integration of disaster management cycle which was presented in the Methodology section to guide the study processes and outcomes. The research outcomes could provide a basis for formulation of mathematical model to calculate disaster risk factors from an economic stance which can be utilized to conduct economic vulnerability assessment in the future.

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