



A STUDY ON AWARENESS LEVEL OF WIND DISASTER

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A thesis submitted in fulfilment
of the requirements for the award of the degree of
Bachelor Engineering (Hons.) Civil Engineering

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JUNE 2014

ABSTRACT

Recently the numbers of damage and injuries due to wind disaster in the past few years had increased in Malaysia. However, many people do not concern about the effect or impact that would happen if the wind disaster occurs. This is because when a situation arises, the Malaysian people are not aware of the dangers of wind. Most of possibility risk of the wind disaster potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation in Malaysia is due to a thunderstorm or windstorm. The losses caused by a typical damage value. This paper propose about the wind disaster effect among people in Malaysia and the awareness level of the wind disaster between two categories which is a public and government sector. Furthermore, public awareness and understanding about the wind disaster is very important as a precautionary measure from wind disaster occur. Demographic data can be used as an input in systematic study to know about the effect, prepared to face this situation and to know about how many people in Malaysia may concern about wind disaster if this disaster occur. From the data that has done through a review of the questionnaire, the respondents said that they are increasingly aware of the catastrophic effects of wind. So, it can be concluded that the goal of this study was to analyze the level of disaster awareness wind and wind effects disaster in Malaysia which has been achieved.

ABSTRAK

Baru-baru ini, angka kerosakan dan kecederaan akibat bencana angin dalam beberapa tahun kebelakangan ini semakin meningkat di Malaysia. Walau bagaimanapun, ramai orang tidak konsert mengenai kesan atau impak yang akan berlaku jika bencana angin berlaku. Ini adalah kerana apabila keadaan ini berlaku, rakyat Malaysia tidak mengetahui tentang bencana angin. Kebanyakan risiko kemungkinan bencana angin yang berpotensi merosakkan fizikal, fenomena atau aktiviti manusia yang boleh menyebabkan kehilangan nyawa atau kecederaan, kerosakan harta benda, sosial dan gangguan ekonomi atau kemerosotan alam sekitar di Malaysia adalah disebabkan oleh ribut petir atau ribut angin. Kajian ini mencadangkan mengenai kesan bencana angin di kalangan orang di Malaysia dan tahap kesedaran tentang bencana angin antara dua kategori yang merupakan orang awam dan orang agensi kerajaan. Tambahan pula, kesedaran awam dan pemahaman mengenai bencana angin adalah sangat penting sebagai langkah berjaga-jaga bagi mengelakkan bencana angin berlaku. Data demografi boleh digunakan sebagai input dalam kajian sistematik untuk mengetahui tentang kesan, bersedia untuk menghadapi keadaan ini dan untuk mengetahui tentang bagaimana tahap kebimbangan orang di Malaysia mengenai bahaya angin jika bencana ini berlaku lagi. Kajian ini juga membentangkan beberapa kesimpulan dan cadangan untuk Malaysia dan kerajaan Malaysia untuk meningkatkan tahap kesedaran bencana. Daripada data yang telah dilakukan melalui kajian soal selidik, responden lebih banyak menjawab bahawa mereka semakin sedar tentang kesan bencana angin. Jadi, ia boleh disimpulkan bahawa matlamat kajian ini adalah untuk mengetahui tahap kesedaran bencana angin dan kesan angin bencana di Malaysia yang telah dicapai.

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LIST OF ABBREVIATIONS

MMD	Malaysia Meteorological Department
NDMS	National Disaster Management Strategy
NWS	National Weather Service
UNDP-APDIP	United Nations Development Program – Asia-Pacific Development Information Program
APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
SPSS	Statistical Package for Social Science

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This chapter contains general ideas and information about the study on the awareness level of wind disaster. The following section is present in this chapter which are background of study, problem statements, research objective and scope of the study.

A natural disaster often thought of as “Acts of God” is the consequence of the combination of natural disaster and human activities, human vulnerability, the cause of the lack of appropriate emergency management, leads to financial, structural and human losses. Malaysia is fortunate to be freed from natural disaster such as earthquake, volcano and typhoon.

Regarding to Donald E. Geis, a natural disaster are not natural at all, but rather human-made disaster (event). The result being less of the extreme natural event itself, than that of the inappropriate way we have designed and build our communities and buildings in the hazard prone areas where they occur (Geis, 2000). The resulting loss depends on the capacity of the population to support or resist the disaster, their resilience.

The term natural has consequently been disputed because the events simply are not hazards or disasters without human involvement. The degree of potential loss can also depend on the nature of the hazard itself, ranging from wildfires, which threaten individual buildings to impact events which have the potential to end civilization.

In addition, a natural disaster is an event that has an effect on people resulting from the natural processes in the environment. Some natural disaster is related – earthquakes can result in tsunamis, drought can lead directly to famine and disease, wind hazard may cause the damage to properties and lives and so on. Natural disasters that occurred during this time should be resolved immediately. This is due to the world situation became worse as a result of natural disasters. Destruction was everywhere. Therefore, as human beings, we should be mindful of this nature.

Normally, the natural disasters that occur as a result of human action and is the leading cause of natural disasters. Human activities are carried out for the purpose of development and modernization that very often will cause ecosystem changes. Global warming is happening is due to human activity itself. Shall be responsible human activities that can reduce the environmental destruction such as logging, industrial and deforestation for the agricultural activities. Explored the consequences of forest bare should replant vegetation that landslides do not occur. Bare forest can also cause global warming because the earth loses its natural sunscreen.

As a result of global warming, there was a haze, hurricanes, El Nino and thunderstorms. Rapid development will also result in the world suffer from an imbalance of the ecosystem. This can lead to instability in world temperatures in addition to result in disaster. Tremor due to settlement construction or excavation of raw materials will cause crust disorders causing tremors in the area.

A hazard is a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Moreover, hazards can also include latent conditions that may represent the future threats and can have different origins such as natural (geological, hydro meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity, frequency and probability. However, the most severe natural disaster experiencing in Malaysia is wind hazard.

Wind disasters which include hurricanes, tornadoes and other wind storms that causing high levels of injuries, human (people that killed and injured), business interruption, environment (uprooted tree) and property damage (roof blown off and vehicle destroys). The losses caused by a typical damages value to reach from thousands to million Ringgit Malaysia.

1.2 BACKGROUND OF STUDY

Malaysia is geographically located just outside the “Pacific Rim of Fire” and is generally free from severe natural disasters such as earthquake, volcanic eruption and typhoons. Malaysia also has always been complacent and perceived to be relatively free from major hydro meteorological and geological hazards. The last decade sees a change in the occurrence of natural disasters in the country.

With rapid development in high-rise buildings and other infrastructures, the occurrences of hydro meteorological and geological hazards have been increased. Although Malaysia is nonetheless not spread from other disasters such as flood, windstorm, man-made disaster, landslide and severe haze.

Wind disaster is conditioned with the potential to cause damage, injured, and loss. Knowing this destructive potential and understanding the possible impact is a central condition for the wind disaster preparedness. Moreover, the danger is a sudden and unexpected event which disrupts the functioning of a community or a society and causes widespread human, material, economic or environmental losses. Assistance from outside may be needed as the ability of the affected community or society to cope with may be exceeded.

Wind disasters related risk refers to the probability of harmful consequences or expected losses resulting from interactions between natural disaster and vulnerable conditions. Harmful consequences can refer to death or injuries. Losses on property or livelihoods, disruptions concerning the economic activity or environmental damages. However, it also causes property damage even loss of life. In fact, in last decades much more losses have been caused by severe wind storm if compared to other disasters.

Recently, some building in Penang and Selangor had severely damaged due to strong wind. (Meteorological, : 1965)

Wind disaster is the major disaster affecting many countries in the world year after year. It is an inevitable natural phenomenon occurring from time to time in all structures, building, bridge and others. It causes damage to lives, natural resources has been increased due to a number of factors with scale of wind speed level.

The government has taken the initiatives to implement various projects and activities towards disaster prevention and mitigation in the country. Most of these natural disaster are basically weather-driven disaster. The implementation of these projects is involving cooperation and collaboration from various agencies in the country and many of these projects are required input from the Malaysia Meteorological Department (MMD).

Public awareness and understanding of other weather related disasters need to be promoted allowing individual to react in a proper manner to the warning. Although in the past, MMD had participated in exhibitions and produced some useful pamphlets for distribution to the public probably this effort had to be intensified to promote awareness regarding the implications and impacts of extreme weather event. It is essential to work closely with the mass media. The mass media is an important channel to educate the public in understanding and raise the level of awareness to weather related disaster. (K.C.Low, 2006)

1.3 PROBLEM STATEMENT

Most probably every year in Malaysia will expected to damage caused by wind disaster. The wind disaster risk base on recent wind induced damage of building and structures. Most of failures cause by the lack of consideration due to wind effect during the design stage. Most of the damaged houses were left without roofs and several trees were uprooted and fell on some houses.

In the study area, interventions to address the problem of wind disaster over the years have produced desired results. This is partly because of the conventional conceptualization and analysis of the wind problem that has ignored local perceptions and experiences and historical processes that are the triggering factors of wind disaster causes.

A significant increase in the number of people rendered homeless as a result of wind events in South Africa if more attention is being paid to developer communities (Goliger and Retief, 2007). The consequence of flying debris also known and had been noted as most dangerous hazardous. The number of damage and injuries due to wind disaster were increased in a past few years in Malaysia. The impact of windstorm also could create a social problem such as trauma and homeless to the windstorm victims.

According to (Goliger and Retief, 2007), most of the damages houses were left without roofs and several trees were uprooted and fell on some of the houses. A significant increase in the number of people rendered homeless as a result of wind events in South Africa if more attention is being paid to underdevelopment communities and better reporting for damage in areas of mass housing and informal developments.

1.4 OBJECTIVES OF STUDY

The main objective of this research is to achieve the goal of the study on the level of awareness that related to wind disaster between the two categories in Malaysia and to know about how to prevent and avoid from this disaster.

1.4.1 Specific Objectives of study

- i. To study the effect of the wind disaster in Malaysia.
- ii. To analyze the level of public awareness regarding wind disaster.

1.5 SCOPE OF STUDY

The scope of this study is simplifying processes for gathering the information and data collection about awareness level in a wind disaster among people in Malaysia. So, the awareness of safety must be considered and it is important to reduce factored of failure and injuries due to wind disaster. This study analyzed within the appropriate time limit that is conducted under supervision from Faculty of Civil Engineering and Earth Resource of University Malaysia Pahang.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

A disaster can be defined as an event or series of events that threaten and disrupt the lives and livelihood caused by both natural factors and environmental factors or non human factors that resulted in human casualties, environmental damage, loss and psychological impact. Windstorm losses are of increasing worldwide for the insurance industry. Severe windstorm events, categorized as events which inflict a significant amount of damage as a result of wind, are difficult to both simulate and quantify with an acceptable degree of confidence. This experimental work focuses on the development of the multiple simulation framework to simulate salient features of severe wind events and to assess their load effects on prismatic scale models.

Concept of classification schemes of damages from natural disasters had been applied widely to provide beneficial information that could be used in evaluating various aspects of this event. The schemes will simplify the event's characteristics and possible damages to properties, human and environment as a reference to the user. Therefore, prediction of the damages or impacts likely to occur and at any magnitude can be made known. In relation of windstorm, a rating system is helpful from climatological perspective through the analysis of time series of particular magnitude windstorms because it may be used to evaluate long term trends or cycles (K.C.Low, 2006).

According to Dessens J and Snow J. T, the system will be made in predicting the probability of similar-magnitude events occurring in the future. The well known classification schemes for windstorm are Beaufort Scale, Fujita Scale and Torro Scale. These three scales classified into several categories which represents a range of wind speeds because of uncertainties in the determination of the maximum speed (J and J.T., 1989).

However, frontal storm form when two air masses of different temperatures meet and the warmer air mass is forced aloft which will create an abundance of moisture, lift and instability. Devastating rain, hail, damaging wind (downburst) and even tornadoes as well as lightning and thunder are severe storm by products. Storm or thunderstorm known as a global and very short lived phenomena since it can occur at and place and time in the world and its life cycle can last for a minute for a several hours.

Understanding the interaction between the built environment and these extreme events is critical to the design between the built environment and these extreme events is critical to the design of structures, ensuring their resilience to these hazards for post event functionality and safety of occupants.

2.2 TYPES OF WIND DISASTER

Damaging winds are often called “straight-line” winds to differentiate the damage they cause from tornado damage. Strong thunderstorm winds can come from a number of different processes. Most thunderstorm winds that cause damage on the ground are a result of outflow generated by thunderstorm downdraft. Damaging winds are classified as those exceeding 50mph until 50mph.

Storm is a Hydrometeorological disaster and defines as an atmospheric disturbance manifested in strong winds accompanied by rain, snow or other precipitation and capable causing significant damages along its path. There are two types of storm known as air-mass thunderstorms from as a result of

convection alone which is a process whereby a hot land surface causes parcels of warm air to rise to condensation level and not associated with a frontal system.

Thunderstorm generated gust fronts and associated downbursts, constitute various extreme wind events which cause significant damage to life and property. Particularly vulnerable are low to high rise buildings, transmission lines, industrial structures, wind turbines and possibly long span bridges. Similarly, large scale severe wind events, for example, hurricanes have a more pronounced direct impact on urban environments as well, producing damaging flow environments in special cases as a result of various situational factors.

A downburst is a result of a strong downdraft with horizontal dimensions larger than 4km (2.5 miles) resulting in an outward burst of damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorm, downbursts can occur with showers too weak to produce thunder.

A microburst is a small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally small (less than 4km across) and short lived, lasting only 5-10 minutes with maximum wind speeds up to 168mhp. There are two kinds of microburst. That is wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microburst is a common in places like the high plains and the Intermountain west occur with little or no precipitation reaching the ground.

A gust front is the leading edge of rain cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them forming the shelf cloud or detached roll cloud.

A derecho is a widespread, long-lived windstorm that is associated with the band of rapidly moving showers or thunderstorms. By definition, if the wind damage swath extends more than 240 miles (its about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length the event may be classified as a derecho. A typical derecho are consists of numerous microburst, downbursts, and downburst clusters.

Winds in a derecho must meet the National Weather Service criterion for severe wind gusts (greater than 57 mph) at most points along the derecho path. But in stronger derechos, winds may exceed 100 mph. For example, as a derecho roared through northern Wisconsin on July 4, 1977, winds of 115 mph were measured. More recently, the derecho that swept across Wisconsin and Lower Michigan during the early morning of May 31, 1998 produced a measured wind gust of 128 mph in eastern Wisconsin, and estimated gusts up to 130 mph in Lower Michigan. (Hinrichs, 1980)

2.3 CAUSES OF WIND DISASTER

The main reasons for the increase in disasters that are related dealt with in numerous publication (e.g. (Munich Re 1999, 2000), are population trends, population trends globally and in exposed regions, to increase in exposed values, an increase in the vulnerability of structures, goods and infrastructure, construction in windstorm-prone areas, failure of protection systems and changes in environmental conditions.

Extreme wind gusts are the result of intense turbulence within vigorous storm systems such as ex-tropical cyclones or mid-latitude storms. These systems contain bands of generally strong winds associated with areas of large pressure gradients and these are usually near the center of low-pressure. Organized convection, wind-shear, and steep terrain within these bands can all generate the turbulence that gives rise to the extreme wind gusts. Extreme winds can on occasion also be caused by tornadoes and convective downbursts from

isolated thunderstorms not associated with a large storm system (Nakurangi, 2005).

Hurricane-force winds can easily destroy poorly constructed buildings and mobile homes. Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes. Extensive damage to trees, towers, water and underground utility lines (from uprooted trees), and fallen poles cause considerable disruption.

High-rise buildings are also vulnerable to hurricane-force winds, particularly at the higher levels since wind speed tends to increase with height. Recent research suggests you should stay below the tenth floor, but still above any floors at risk for flooding. It is not uncommon for high-rise buildings to suffer a great deal of damage due to windows being blown out.

Consequently, the areas around these buildings can be very dangerous. The strongest winds usually occur in the right side of the eye wall of the hurricane. Wind speed usually decreases significantly within 12 hours after landfall. Nonetheless, winds can stay above hurricane strength as a storm passes over island land masses.

2.4. EFFECT OF WIND DISASTER

Successfully reducing the impact of wind hazards requires that actions be taken, directly or indirectly, to change or enhance existing building practices, infrastructure resilience, social behaviour patterns and evacuation processes. Improvements in warning systems, evacuation planning and building technology have reduced the threat of windstorms to people even while the total number of people, buildings and critical infrastructure exposed to windstorms has grown dramatically.

The result is that even while the threat of injury or death is being reduced, the total amount of damage and loss continues to rise. Many improvements have been implemented but much more needs to be done. Techniques have been developed to estimate wind effects that account realistically for wind directionality characteristics.

Further, estimation methods have been developed to help assure higher safety levels for tall buildings that experience dynamic effects. The continuing improvement of the Nation's model building codes and standards with respect to improved design and construction provisions for wind resistance have had a significant impact on building and infrastructure performance. (NSTC, 2013)

Every year a large number of people suffer the consequences of disasters. The South Africa government has developed policies and planning documents in order to reduce the problems with reoccurring disasters in informal settlements. However, the problem with disasters remains and it is the poor people living in informal settlements that bear the biggest consequences. (DiMP, 2008)

High levels of property and high urbanization, as well a massive housing backlog, have left many people without formal permanent housing (Turok, 2012). As a consequence a large number of people live in so called informal settlements, often lacking basic services and infrastructure and located in high risk areas unsuitable for residential purposes. (Turok, 2012) (Napier, 2002)

2.5 PREPAREDENESS OF WIND DISASTER

As Malaysia develops, the citizen government As Malaysia develops, the citizen, government and business entities must keep pace with changes and disasters that are occurring as it affects business continuity. Wind disaster preparedness is an initiative that is intended to increase readiness and knowledge among the various stakeholders regarding the risks, related agencies, preventive measures and other disaster related information. It seeks to improve the overall

preparedness towards a disaster or at least the type of disasters that is likely to happen in a particular locality.

Disaster preparedness is important to develop a disaster prevention or risk reduction measures in parallel with emergency preparedness and response capabilities. Natural sudden or rapid-onset disasters include extreme weather conditions (floods and high winds), earthquakes, landslide, volcanic eruption, tsunamis and wildfires and their impacts have much in common. Regarding to Baxter and Peter J, the disaster preparedness is following four phases are the components of a comprehensive hazard management plan which can be applied to all natural disasters. That is pre-disaster planning, emergency preparedness, emergency response and post-impact recovery and reconstruction (Baxter and J, 2011).

Regarding to National Disaster Management Strategy (NDMS) of Malaysia is the backbone strategy to advance effective coordination and integrated approach in the building of a culture of prevention, protection/public safety in the community. Its vision is to create a safe environment for the community through disaster management and sustainable development in the 21st century. ADRC country reports that one of NDMS' main components is a Community Awareness (Retrieved, 2008).

The goal of this research is to support 'community continuity', in other words to help communities remain resilient in the face of disaster events. FEMA recommends individual preparedness for up to 72 hours. Sustaining a community for at least 72 hours, often falls to those who live or work in the community (Programe, 2007).

Table 2.1 : Source: United Nations Development Program – Asia-Pacific Development Information Program (UNDP-APDIP) and Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) – 2007 (Wattegama, 2007).

Pre- Disaster Stage	Mitigation	Any action that reduces the chance of a hazard taking place or a hazard turning into disaster
	Risk reduction	Anticipatory measures and actions that seek to avoid future risks as a result of a disaster.
	Prevention	Avoiding a disaster even at the eleventh hour
	Preparedness	Plans or preparations made to save lives or property, and help the response and rescue service operations. This phase covers implementation/operation, early warning systems and capacity building the population will react appropriately when an early warning is issued.
During disaster stage	Response	Includes actions taken to save lives and prevent property damage and to preserve the environment during Emergencies or disasters. The response phase is the implementation of action plans.
Post disaster stage	Recovery	Includes actions that assist a community to return to a sense of normalcy after a disaster.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter elaborates the procedures to further achieve the objectives of this Final Year Project, where the fundamental function of this methodology is to outline the collection of data and analysis.

In order to achieve this research aim and objectives, there are two methods are going to be conducted. The first method was through the literature review to gather information about the study topic and the provision of acts and regulation as imposed by the public and government department. By using this method, we can obtain secondary data for this research.

The second method is by using a survey questionnaire by sending a structured questionnaire to target respondents, especially from a consultant or government companies in order to obtain feedback from the construction industry. Primary data are obtained using this method conducted as it is for those who experiencing in wind disaster and knows about how to prevent and avoid the wind disaster.

Secondary data also can be obtained from the printed journal, references, book and online databases that are related to wind disasters or wind hazard. Any relevant and connecting data which the topic of study can be used as the secondary data collecting resources.