UNIVERSITI PUTRA MALAYSIA

FLOOD DISASTER PREPAREDNESS OF SMALL AND MEDIUM ENTERPRISES IN SEGAMAT, JOHOR, MALAYSIA

HAJAR MARIAH BINTI HASHIM

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By

HAJAR MARIAH BINTI HASHIM

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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Chairman : Ng Yee Guan, PhD
Faculty : Medicine and Health Sciences

The role of SMEs in the contribution to economic development in any nation is acknowledged worldwide. However, due to their establishment, disaster can potentially and significantly affect SMEs sustainability in terms of performance and productivity, whether directly or indirectly. Specifically, floods disaster is one of the most common disaster which could cause various degrees of properties lost and damages of equipment, installation, building, business stock, etc. This is notwithstanding the extent of loss of businesses during closure of premise during and after the flood due to long term recovery. It has been generally attributed that most SMEs lack preparedness and were always caught unaware. On top of that, the complex nature of preparedness has also put SMEs in adverse position due to limited knowledge, resources, and workforce for proper and adequate disaster planning and preparedness. Thus, this study aims to develop a flood disaster preparedness index for SMEs in determining the flood disaster preparedness level and the factors associated with preparedness. The state of Johor was chosen for the field test in this study in light of the high distribution of SMEs wherein the district of Segamat was one of the flood-prone area. Using a questionnaire developed, validated by experts in disaster management through focus group discussion, and pre-tested, the interviewer-assisted questionnaire was conducted among the business owners and managers (n=337) of SMEs located at Segamat, Johor. Subsequently, Rasch model was used to validate the Flood Disaster Preparedness Action (FDPA) instrument. Half of the variance (50.5%) was explained based on the final validation of the FDPA from the sample population with inter-item consistency with Cronbach alpha values of 0.98. Expressed using Relative Importance Index (RII), it was found that the most significant flood impacts on SMEs (n=149) was customer and supplier supply being affected (RII = 0.739) amongst the 16 self-reported impacts of flood disaster. Subsequently, the flood preparedness data from SMEs were organized using Rasch model to create a preparedness index level. The analysis indicated that the SMEs preparedness level on flood disaster in this study can be divided into five levels: very high (10.3%), high (21 %), moderate (45.9%), low (20.3%) and very low (2.5%). The least engaged

preparedness activities by SMEs was "provision of the emergency boat" (19.37%) while the most engaged was "requesting for the immediate support" (75.1%). The information at this stage was used to develop a flood self-assessment preparedness checklist for the SMEs to evaluate the preparedness level of their own business. Factors affecting SMEs preparedness were analyzed using Multiple Logistics Regression. The significant factors reported in this study are the risk perception on flood ($p<0.001$), previous flood experience ($p<0.001$), male ownership ($p<0.05$), and retail sectors ($p<0.05$). Overall, the use of the FDPA instrument intends to assist decision makers (SMEs) in the evaluation of the relative state of preparedness level of SMEs. The score of preparedness index act as a medium of evaluation on current preparedness activities of SMEs (evaluating their resilience strengths and weaknesses), which acts as a benchmark for the SMEs to further improve their flood preparedness level.

Keywords – Flood, Index, Small and Medium Enterprise (SMEs), Impacts, Preparedness Measure, Preparedness Factors, Preparedness Level, Rasch model.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESEDIAAN BENCANA BANJIR BAGI PERUSAHAAN KECIL DAN SEDERHANA DI SEGAMAT, JOHOR, MALAYSIA

Oleh

HAJAR MARIAH BINTI HASHIM

Mei 2019

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Peranan PKS dalam sumbangan pembangunan ekonomi di mana-mana negara diketahui umum. Walau bagaimanapun, disebabkan pembangunannya, bencana berpotensi memberi kesan yang ketara terhadap kemampanan PKS dari segi prestasi dan produktiviti sama ada secara langsung atau tidak langsung. Secara khususnya, bencana banjir adalah salah satu bencana paling kerap berlaku dimana boleh menyebabkan pelbagai tahap kehilangan harta dan kerosakan peralatan, pemasangan, bangunan, stok perniagaan, dan lain-lain. Walaupun hakikat itu, tidak setanding kehilangan perniagaan semasa penutupan premis semasa dan selepas banjir akibat pemulihan jangka panjang. Secara umum, kebanyakan PKS kurang bersedia dan sentiasa didapati tidak sedar akan hal ini. Di samping itu, sifat kesediaan yang kompleks juga telah meletakkan PKS dalam keadaan bahaya disebabkan oleh kekurangan pengetahuan, sumber dan tenaga kerja yang terhad untuk perancangan dan persediaan yang sesuai dan memadai. Oleh itu, kajian ini bertujuan untuk membangunkan indeks kesediaan bencana banjir bagi PKS dalam menentukan tahap kesediaan bencana banjir dan faktor-faktor yang mempengaruhi kesediaan. Negeri Johor dipilih untuk ujian lapangan dalam kajian ini berdasarkan pengagihan PKS yang tinggi di sini di mana daerah Segamat merupakan salah satu kawasan cenderung kepada banjir. Menggunakan soal selidik yang dibangunkan, disahkan oleh pakar-pakar dalam pengurusan bencana melalui perbincangan kumpulan berfokus, dan kajian awalan, soal selidik yang dibantu penemubual diedarkan di kalangan pemilik perniagaan dan pengurus PKS (n = 337) yang terletak di Segamat, Johor. Seterusnya, model Rasch digunakan untuk mengesahkan instrumen Kesediaan Bencana Banjir (FDPA). Separuh daripada varians (50.5%) dijelaskan berdasarkan pengesahan akhir FDPA dari populasi sampel dengan konsistensi antara item dengan nilai alpha Cronbach 0.98. Dengan menggunakan Indeks Kepentingan Relatif (RII), didapati bahawa kesan banjir yang paling besar kepada PKS (n = 149) adalah bekalan pelanggan dan pembekal yang terjejas (RII = 0.739) daripada 16 kesan bencana banjir yang dilaporkan. Seterusnya, data kesediaan banjir dari PKS telah disusun menggunakan model Rasch untuk mewujudkan tahap indeks kesediaan. Analisis ini menunjukkan bahawa tahap kesediaan PKS terhadap bencana banjir boleh dibahagikan

kepada lima peringkat: sangat tinggi (10.3%), tinggi (21%), sederhana (45.9%), rendah (20.3%) dan sangat rendah (2.5 %). Kegiatan kesediaan yang paling kurang dijalankan oleh PKS adalah "penyediaan bot kecemasan" (19.37%) manakala yang paling banyak dijalankan adalah "meminta sokongan segera" (75.1%). Maklumat di peringkat ini digunakan untuk membangunkan senarai semak kesediaan banjir kendiri untuk PKS bagi menilai tahap kesediaan perniagaan mereka sendiri. Faktor-faktor yang mempengaruhi kesediaan PKS dianalisis menggunakan Regresi Logistik Berganda. Faktor penting yang mempengaruhi yang dilaporkan dalam kajian ini adalah persepsi risiko terhadap banjir ($p < 0.001$), pengalaman banjir sebelumnya ($p < 0.001$), pengusaha lelaki ($p < 0.05$), dan sektor runcit ($p < 0.05$). Secara keseluruhan, penggunaan instrumen FDPA berhasrat untuk membantu pembuat keputusan (PKS) dalam menilai keadaan relatif tahap kesediaan PKS. Skor indeks kesediaan bertindak sebagai medium penilaian terhadap aktiviti kesediaan semasa PKS (menilai kekuatan dan kelemahan daya tahan mereka), yang bertindak sebagai penanda aras bagi PKS untuk meningkatkan lagi tahap kesediaan banjir mereka.

Kata kunci - Banjir, Indeks, Perusahaan Kecil dan Sederhana (PKS), Impak, Pengukuran Kesediaan, Faktor Kesediaan, Tahap Kesediaan, Model Rasch.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

ADRC	Asian Disaster Reduction Center
APEC	Asia-Pacific Economic Cooperation
BERNAMA	The Malaysian National News Agency
CVI	Content Validity Index
DID	Department of Irrigation and Drainage, Malaysia
FEMA	Federal Emergency Management Agency, United States
PKINK	Perbadanan Kemajuan Iktisad Negeri Kelantan
PKS	Perusahaan Kecil dan Sederhana
RII	Relative Importance Index
SMEs	Small and Medium Enterprises
SME Corp.	SME Corporation
UNDP	United Nations Development Programme

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Small and medium enterprises (SMEs) signify the strength of the region's economy, making up 90% of all businesses operating in the Asia-Pacific (APEC, 2019). In Malaysia, 97.3% (645,136) business establishments in the country are SMEs (SME Corp., 2016). Towns and cities which arise out of rapid unplanned development are abundant with SMEs whose existence is central to the life, vitality, and survival of the communities whose living in the towns and cities, as a result of their economic contribution and ability to provide employment (Ingirige & Wedawatta, 2014).

However, unknown to many, flood is a great concern to the commercial and industrial area, especially small business compared to large or international companies (UNDP, 2013). The impact of natural disaster on SMEs has been highlighted following the acknowledgment of SMEs contribution to the economic development of a country (Thurasamy et al., 2009). According to a report by Asian Disaster Reduction Centre (2011), about 90% of surveyed small businesses went bankrupt due to damage to production and supply chain disruption in the earthquake and tsunami that struck Japan back in March 2011.

In Malaysia, the city such as Kota Tinggi town which has never experienced flood before had severe flooding in the years 2006 and 2007 (Figure 1.1). Figure 1.2 illustrate the condition of Segamat Town after the flood in 2007.

Figure 1.1 : Kota Tinggi town during flood 2006 that only can be accessed by using the boat
(Source: Hamid, 2017)

Figure 1.2 : After the 2007 flood in Segamat, Town.
(Source: DID, 2007)

Besides that, in 2014, floods in Kelantan which were dubbed as the worst in the state have affected about 13,337 SMEs to lose their business. Pasir Mas recorded the highest

number of SMEs affected at 3,701, followed by Kota Baharu (3,296), Tumpat (1,375), Kuala Krai (2,070), Gua Musang (1,361) and other districts and estimated about RM10 millions of fund provided by the government under the special emergency fund for SMEs to help affected entrepreneurs in starting back their business (SME Bank, 2015).

Table 1.1 : SMEs affected by districts on the 2014 floods in Kelantan

Districts affected by flood	Total affected SMEs
Pasir Mas	3,701
Kota Baharu	3,296
Tumpat	1,375
Kuala Krai	2,070
Gua Musang	1,361
Other districts	1,534
Grand Total	13,337

(Source: SME Bank, 2015).

1.2 Problem Statement

Malaysia's natural disasters such as flood disaster are becoming more prevalent and more complex in nature with severe implications for communities as well as a business organization (Gasim, Toriman, & Abdullahi, 2014; Khan et al., 2014; Chan, 2015). While various measures have been taken for household and community disaster preparedness and recovery, little research has been conducted on disaster preparedness and recovery for businesses (Center, 2012; Dahlhamer & Souza, 1995; Tierney & Webb, 2001). This is important as the impacts of disaster towards business community bring a significant and major loss, not only for the business but also for the economic growth and population that become a workforce.

A concern on the case of floods towards SMEs is raised recently as the impacts of flood cause the business failure and bankruptcy. SMEs are significantly important to the growth of any economy. In Malaysia, 98.5% (907,065) business establishments in the country were made up of SMEs (SME Corp., 2018). SMEs contributed about 36.6% to the country's gross domestic product (GDP) in the year 2016; an increase of 0.3% from the previous year. In 2017, According to Finance Minister Lim Guan Eng, SMEs was estimated to contribute about 37% of GDP and were projected to contribute 41% of Malaysia's GDP by 2020 (Tan, 2019).

Businesses with flood cases are not only directly affected such as property damage and disruption, loss of stock, damage to premises building, damage to the equipment, inability to conduct business within recovery time, and inconvenience to staff; but also indirectly such as disrupted of cash flow, loss of income, staff anxiety from flooding to business, and higher insurance premiums. The customers and business supply chains, also being disrupted (Ingirige & Wedawatta, 2014).

However, most SMEs owners lack in awareness and hence fall behind on disaster preparedness activities (Pathak & Ahmad, 2016) due to lack of resources, knowledge, and workforce. Compared to a more prominent firm, SMEs tend to operate in a sub-optimal zone that usually is smaller and associated with a weak financial activity. Many preparedness activities and disaster recovery tools, such as post-disaster recovery loans, disaster insurance are often not designed to cater to the needs of SMEs in a formal manner (UNDP, 2013).

There is also a lack of data on evaluating preparedness and risk of the business on disaster events. It is expected that the complexity of preparedness has brought confusion and difficulty in terms of assessment to the users. Most of the existing tools and measurement scale does not adequately express preparedness activities and also does not based on a holistic approach which invites intervention besides the issue of determining effectiveness. There is also non availability of validated and established tools in measuring disaster preparedness developed especially in this county. The difficulty in understanding and implement disaster preparedness are the result of the lack of tools and standards to facilitate the evaluation and intervention of the business organization on disaster preparedness.

In term of theoretical aspecst the preparedness elements is not very well explained on how the business dealing with the preparedness activities. There is a huge gaps in determining the readiness of the business in dealing with the disasters. The framework on investigating emergency awareness and preparedness by Enders (2001) is only explaining the individuals preparedness.

Besides, several factors also hinder the SMEs from implementing preparedness activities (Sadiq & Graham, 2016). The research on the factors affecting preparedness still lacks in this country. By acknowledging the factors that influence preparedness, government and stakeholder can provide and prepared incentive to help SMEs prepared better in disaster.

In addition, safety and health issues such as electrical, chemical and biological hazards throughout the flood zone have also been highlighted in some studies during post-disaster clean-up and recovery activities (Gissing et al., 2005). The post-disaster cleanup and recovery crews, including emergency response personnel and the affected population are those who are affected with most of them unaware of the hazards they face.

1.3 Study Justification

Study of disaster preparedness requires the understanding of factors affecting the preparedness activities and its degree in order to cater not only the readiness of organization in disaster events but also any lack of elements in their preparedness.

Appropriate evaluation tools are necessary to make preparedness easy to understand, to help in solving the problem and guide on the decision-making process. Specific framework regarding disaster preparedness on SMEs need to be designed in order to capture preparedness activities and give insight into the process of developing a continuity plan.

The advantages of conceptual framework building are its flexibility, its ability for modification, and its stress on understanding the whole idea instead of prediction (Jabareen, 2009). Several studies have shown the use of the index as a simplified methodology for evaluating relative levels of some state of being, whether economic health, quality of life, or any others things that similar (Simpson & Katirai, 2006). The index score can then be manipulated in various manners to produce index score or also known as index rank (Simpson, 2008) that are easily understood (Simpson & Katirai, 2006; Esnard et al., 2011).

Flood disaster preparedness index for SMEs developed using several indicators formed from the established framework can be used to assist decision makers in the evaluation of the relative state of preparedness activities amongst SMEs. The score from the index also will provide a means of evaluation of current preparedness activities of SMEs (evaluating their resilience strengths and weaknesses), it also would be best applied across multiple SMEs sector to allow cross comparisons of industries with a similar size or in a similar sector.

A standardized preparedness measure could help fill a gap in the adoption of local hazard mitigation policies and activities, by providing information to the industries in increasing their mitigation activity. The use of flood disaster preparedness index is expected to help SMEs involved, authority as well as insurance entity to make a decision on the level of disaster resilience of the SMEs based on the index score given to improve the capabilities of SMEs dealing with disaster specifically flood cases.

Future adaptation of SMEs to the risk of flooding based on the index score will enable them to prevent and limit the adverse impacts of flooding on their business activities. The flood preparedness index is not intended to be designed as an audit tool for organizations. Its purpose is to provide information on the organization preparedness which can feed directly into the available medium of preparedness. This information could be used within an existing business continuity program to evaluate resource allocation or progress, or it could be used during the initiation of a preparedness program to guide strategy and objectives.

Segamat town is selected in this study because the high distribution of SMEs located at the high risk flood area or flood-prone area. Segamat also being selected by the other flood-related studies especially on the study involving flood hazards mapping and flood analysis (Gasim et al., 2010; Mohd, Alias, & Daud, 2006; Romali & Yusop, 2017; Romali et al., 2018; Sulaiman, Husain, Hashim, & Samad, 2012).

1.4 Objectives

1.4.1 General objectives

The primary objective of this study is to develop a flood disaster preparedness index for SMEs in determining flood disaster preparedness level based on the factors affecting preparedness.

1.4.2 Specific objectives

i. To identify the impacts of floods on SMEs,
ii. To develop and assess the reliability and validity of Flood Disaster Preparedness Actions (FDPA) scale for the SMEs,
iii. To develop flood disaster preparedness index as a benchmarking tool to determine the state of preparedness of the SMEs located at the flood-prone area,
iv. To identify the predictors (SMEs size, age, financial status, ownership of property, sector differences, previous disaster experience, hazard knowledge, and perception on risk) that affecting flood preparedness level of SMEs.

1.5 Research Question

1.5.1 Research question for objective 1

i. What is the impacts of flood disaster towards SMEs?
ii. What is the most significant impacts of flood towards SMEs?

1.5.2 Research question for objective 2

i. What is the items- instrument that measuring flood disaster preparedness constructs?
ii. How the reliability and validity of FDPA instruments being assessed?
iii. What is the Content Validity Index (CVI) of each items developed?
iv. What is the reliability and validity value of FDPA instruments?

1.5.3 Research question for objective 3

i. What is the current flood preparedness levels of SMEs?
ii. What is the difficulty level of flood preparedness activities?

iii. What is the SMEs commitment on each of the flood disaster preparedness activities?
iv. Can the flood preparedness index develop used as benchmarking tool to determine the state of flood preparedness?

1.5.4 Research question for objective 4

i. Does the SMEs business owner's characteristics such as age, gender, and race associated with high level of flood disaster preparedness?
ii. Does the SMEs with a high-risk perception, hazard knowledge, and previous experience have a high level of flood disaster preparedness?
iii. Does the SMEs business characteristics such as (a) business size; (b) age of the company; (c) ownership status; (d) financial status; and (e) sector difference associated with high level of flood disaster preparedness?

1.6 Research Hypotheses

i. Business owners and manager characteristics with the differences in age, gender and race will be influence the level of preparedness.
ii. Business owners and managers with (a) higher levels of flood risk perception; (b) previous flood experience; and (c) well known of hazard knowledge will be more likely to have a higher level of preparedness.
iii. SMEs that adopt higher levels of flood preparedness activities will be more likely to be (a) larger business size; (b) older; (c) owner own the business properties; (d) strong financial status; and (e) in the retail and wholesale sector.

1.7 Definition of variables

1.7.1 Conceptual definition

1.7.1.1 Flood

A flood is an overflow of water, an expanse of water submerging land, and an inundation. In the sense of "flowing water," the word is applied to the inflow of the tide, as opposed to the outflow (Mohd, Alias, & Daud, 2006).

1.7.1.2 Preparedness

Disaster preparedness is "a state of readiness" to respond to a disaster, crisis, or any other type of emergency. It comprised a list of activities, programs, and systems that are developed before any emergency events to prepare, support and intensify response to an emergency or disaster (Bullock, Haddow, & Coppola, 2011).

1.7.1.3 Index

An index is a composite representation of numerical measurements, manipulated in some manner to give a single value, often called an "index score" or rank. Indexes are generally constructed by the summing or multiplying of several indicators relating to item being measured (Simpson & Katirai, 2006).

1.7.2 Operational definition

1.7.2.1 Flood

Flood in this study defined as flood cases (overflow of water) that caused by the heavy rain in monsoonal season (not coastal or flash flood) and in the flood plain areas where many rivers flow.

1.7.2.2 Preparedness

Disaster preparedness is a set of activities taken to reduce disaster effects and promote immediate response to disaster events and part of a business continuity plan. In this study disaster preparedness consist of activities planned to mitigate the risk of the hazard (flood) in consideration of hazard information, life safety, and business protection aspects. Hazard information referring to activities conducted in order to gain knowledge on the hazards. Business protection is the ability of the business owners to undertake emergency actions in order to protect property and contain disaster damage as well as engagement in early recovery activities. Employee protection is regarded as a general concept of life safety protection (protecting the employees and others to perform immediate action in preventing injury and death).

1.7.2.3 Index

The index score in this study that measuring flood preparedness is computed by the Rasch model analysis to attain the flood preparedness level by direct consideration of

the weightage and standardized value of preparedness items. In other words, the resulted weightage and standardization of preparedness measure were summed to gain a SMEs preparedness level. The construct of flood preparedness that arithmetic combine by Rash model are includes emergency communication (EC), evacuation planning (EVA), emergency provision (EP), management direction (MD), protection of information (INFO), protection of inventory (PI), information seeking (IS), early recovery (ER), appointment of consultant (AC), life safety protection (LS), structural protection (SP) and training & education (EDU).

1.8 Conceptual Framework

Disaster preparedness can be evaluated from many different perspectives according to the type of disaster, magnitude and can be applied on a different group of interests whether on individual stage, households, public, governmental agencies and also private or business organization. Therefore, there is numerous model on measuring disaster preparedness from previous research that addresses a different case of disaster on a different group of interests.

In the study on preparedness measure, scholars agreed that there is a slight variation in a way to measure preparedness for a different level of a group but still can be generalized as the concept of preparedness on disaster would have a similar characteristic (Sadiq, 2010). Thus, in this study, the framework was constructed based on the various model of disaster preparedness measure as proposed by the previous scholar. There are several studies on disaster preparedness on business intends to find the relationship between factors affecting preparedness and preparedness level of the organization.

As an example, a study conducted by Dahlhamer & D'Souza (1995) and the most recent Han & Nigg (2011) proposed several factors influence disaster preparedness on business (Figure 1.3). Factors such as organization features, risk perception, the owner's decision, demographic characteristics, and previous experience are amongst the factors that influence disaster preparedness level of business organization.

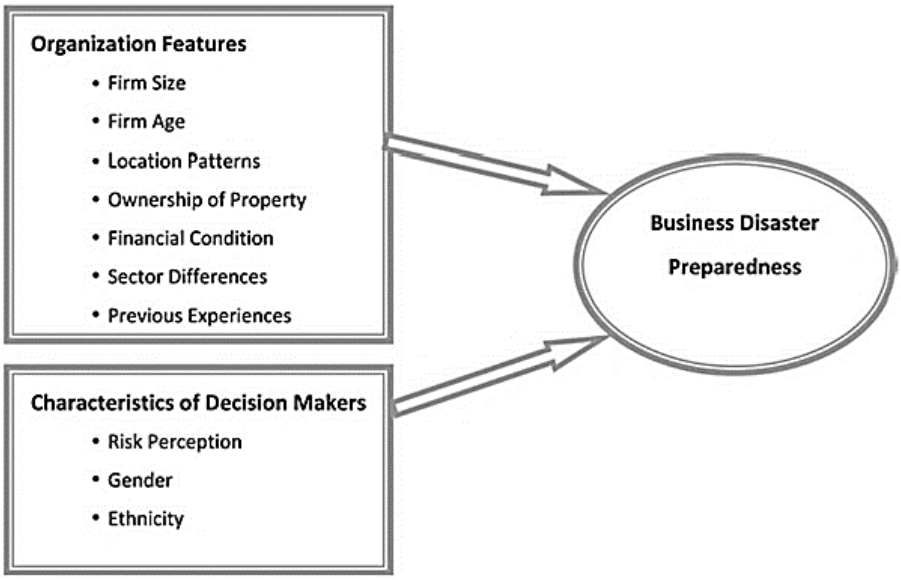

Figure 1.3 : Framework: factors influencing business disaster preparedness
(Source: Han & Nigg, 2011)

The framework proposed by Enders (2001) explains the individual's preparedness. Enders (2001) categorized the elements of preparedness as factors that lead to behaviour that trigger preparedness activities, which include:

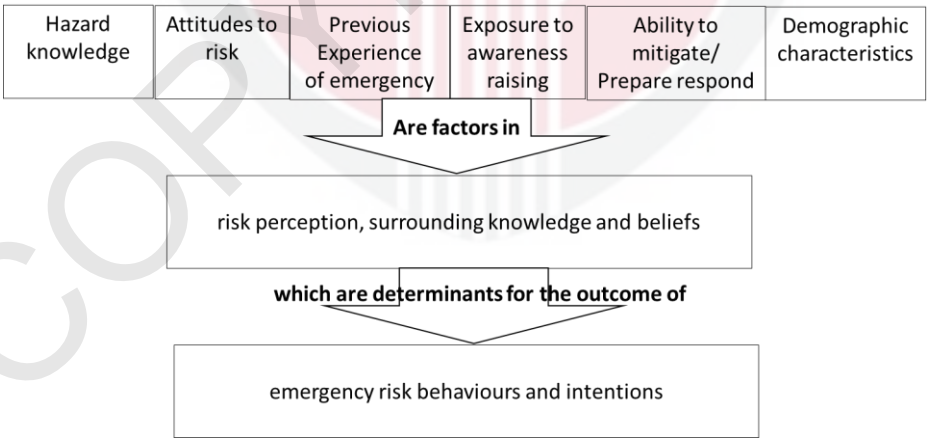

Figure 1.4 : A framework investigating emergency awareness and preparedness
(Source: Enders, 2001)

i) Knowledge of hazard and attitude to risk,
As illustrated in the frameworks (Figure 1.4), Enders (2001) claimed that hazard knowledge is referring to awareness and assumption on the existence of the two-way relationship between hazard knowledge to risk attitudes. This means that hazard knowledge can give effect on attitude to risk and attitude to risk can impact on hazard knowledge.

ii) Previous experience
Previous experience refers to past disaster experience on how the past emergencies influence the individual on preparedness.

iii) Exposure to awareness raising
Exposure to awareness raising encapsulates whether the individual receives any information or exposed on awareness raising effort about the emergencies such as public education program.

iv) Ability to mitigate a response
The ability to mitigate and response more on the actual ability to respond during the emergencies such as the availability of the resource.

v) Demographic characteristics
Finally, demographic characteristics associated with preparedness such as age, gender, location, employment status, and mobility.

The conceptual framework (Figure 1.5) developed from the concept of disaster management consists of hazard risk (disaster), preparedness, response, and recovery. Only preparedness activities focus in this framework. Preparedness factors of the framework developed based on the previous study by Hann & Nigg (2011) and Enders (2001) model. Hann & Nigg (2011) proposed several factors which influence business disaster preparedness based on organization features and characteristics of a decision maker. Factors such as firm size, firm age, location pattern, risk perception, owner's decision, demographic characteristics, and previous disaster experience are amongst the factors that influence disaster preparedness level of business organization. Enders (2001) model, on the other hand, was based on the individual's preparedness, which leads to emergency risk behaviour and intention.

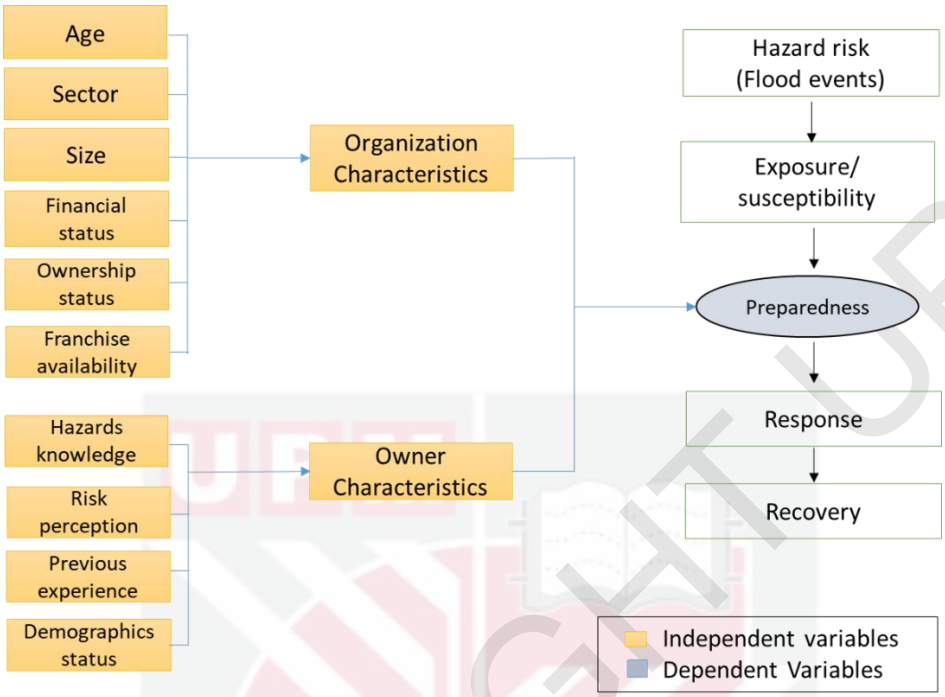

Figure 1.5 : Conceptual framework on preparedness factors and preparedness measure in the phase of disaster management.

1.9 Linkages of research chapter

This section describes the relationship between each chapter presented in this thesis. This thesis consists of nine chapters. Each chapter was segmented to achieve each of the specific objectives outlined in this study. Except for Chapter 1, 2, 3 and 9, the rest of the other chapters were presented in a structure akin to a research paper which contains the standalone introduction, methodology, results, discussion, and conclusion.

The first chapter is an introductory section and describing the research area and outlines the background and rationale of this study. This chapter includes the development of the conceptual framework based on the selected model in the previous study. The finalized framework was used as the guide to the entire process integrated into this research study.

The second chapter reports the information established in the literature related to the disaster preparedness. This chapter elaborates extensively on the conceptual model and framework significant to this study. The methodologies and approach adopted in this study described in detail with regards to the past study.

The third chapter describes the methodology part and research design that implemented in this study. It also includes the sampling procedure, sample size calculation, phase of the study, data collection procedure, and the process of data analysis.

The fourth chapter reports the impacts of flood disaster to SMEs. Flood disaster events contribute to direct and indirect impacts on the community as well as small and medium business enterprise. This chapter examines the impact of the flood disaster on 143 SMEs located at Segamat Town of Johor. The objective of this chapter to identify the impacts of floods on SMEs.

The fifth chapter was based on the findings from the pilot study conducted in Temerloh province. The instrument used in this study was developed through a thorough literature review and adapted for this study. This chapter specifically explained the process of development of Flood Disaster Preparedness Action (FDPA) items, its construct validity as well as the strength and gaps for further improvement. The objective of this chapter is to develop and assess the reliability and validity of the FDPA scale for the SMEs.

Utilizing the results from Chapter 5, the sixth chapter report on the content validation assessment of the instrument. This chapter presented the process of conceptualization and content validation of FDPA items in order to improve the content validity further. Items with low score values for relevancy and clarity were subject to modification and finalized for field data collection. The objective of this chapter is to develop and assess the reliability and validity of the FDPA scale for the SMEs.

The seventh chapter reports on the validation of the FDPA instrument developed upon modification and finalized from the previous chapter. The instruments which consist of 13-construct with 37-items were used in a field data collection which involved 380 SMEs in Segamat Town, Johor. The objective of this chapter is to develop and assess the reliability and validity of the FDPA scale for the SMEs.

The eighth chapter describes the process of index computation. The index computation in this chapter based on the Rasch model analysis, as described in Chapter 7. The index was further used to classify the SMEs flood preparedness level and items difficulty level. The objective of this chapter is to develop flood disaster preparedness index as a benchmarking tool to determine the state of preparedness of the SMEs located at the flood-prone area.

The ninth chapter described the procedure for data analyses and results to determine factors associated with flood disaster preparedness level. The preparedness level (based on the preparedness index in Chapter 8) was set as the dependent variable to the several variables that influences preparedness. The objective of this chapter is to identify the predictors (SMEs size, age, financial status, ownership of property, sector differences,

previous disaster experience, hazard knowledge and perception on risk) that affecting flood preparedness level of SMEs.

The tenth chapter covers the summary of this thesis, conclusion, and the recommendation of future study. The summary of the thesis was outlined based on the objective that set out during this study. Figure 1.6 below briefly outlined the chapter arrangement in this thesis and the related objective of each chapter.

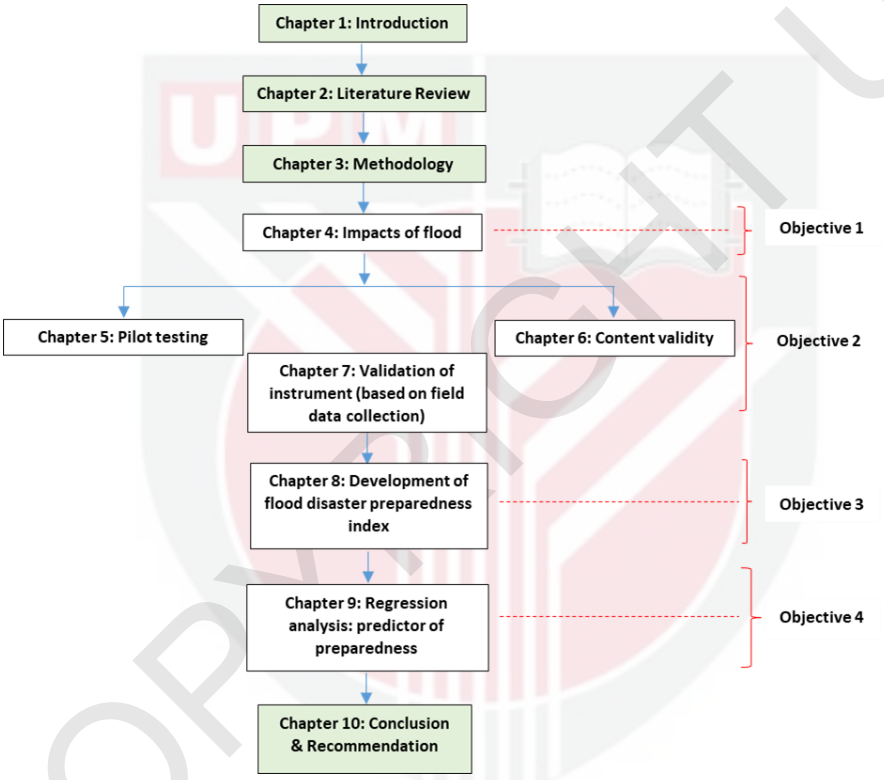

Figure 1.6 : Flowchart of chapter association in this study

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LIST OF PUBLICATIONS

Hashim, H. M., Ng, Y. G., Talib, O., & Md Tamrin, S. B. (2019). Content validation of flood disaster preparedness action (FDPA) items among small and medium enterprises (SME) business. International Journal of Disaster Resilience in the Built Environment.

Hashim, H. M., Ng, Y. G., Talib, O., & Md Tamrin, S. B. (in press). Development of Flood Disaster Preparedness Activity (FDPA) Items on SMEs: A Rasch Analysis Application. Accepted for publication at Malaysian Journal of Medicine and Health Science.

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