

2013

Psycho-Cultural Analysis of Disaster Risk Attitudes in Situation Awareness



Halimahtun M. Khalid, Ph.D., CPE
Principal Investigator
Damai Sciences Sdn Bhd
Malaysia

Martin G. Helander, Ph.D., CHFP
Co-Principal Investigator
Nanyang Technological University
Singapore

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 01 APR 2014		2. REPORT TYPE Final		3. DATES COVERED 17-08-2011 to 16-06-2013	
4. TITLE AND SUBTITLE Psycho-Cultural Analysis of Disaster Risk Attitudes in Situation Awareness				5a. CONTRACT NUMBER FA23861114075	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Halimahtun Mohd Khalid; Martin Helander				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Damai Sciences Sdn Bhd,A-31-3 Suasana Sentral, ,Jalan Stesen Sentral 5,Kuala Lumpur 50470, Malaysia,NA,NA				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AOARD, UNIT 45002, APO, AP, 96338-5002				10. SPONSOR/MONITOR'S ACRONYM(S) AOARD	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) AOARD-114075	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Natural disasters and human induced disasters are common phenomena in Southeast Asia. As such, there is a need to understand people's vulnerability to disasters and their resilience, as well as their risk behavior and attitudes. Attitude is largely influenced by cultural and demographic factors; this research examined the effects in the context of psycho-cultural situation awareness. Attitude is defined as a summative of five components: risk identification, cognition, affect, trust and behavior; which were explored at three levels of situation awareness: perception, comprehension and projection. Therefore, the objectives of the study were: (1) to identify psycho-cultural similarities and/or differences in risk attitudes of communities for the purpose of disaster management; and (2) to identify group trust and information dissemination network in the face of disasters for the purpose of disaster aid planning.					
15. SUBJECT TERMS Risk Management, Attitudinal Modeling, Sociocultural Analysis, Situation Awareness					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 136	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

ACKNOWLEDGMENT

The project was partially funded by the Asian Office of Aerospace Research and Development (AOARD) under GRANT NO. FA2386-11-1-4075. We are deeply grateful for the sponsorship, cooperation and support of the AOARD office in Japan and the US Air Force Office of Scientific Research (AFOSR) in Washington that enabled the undertaking and completion of the project. In particular, we are indebted to Dr. Kenneth Goretta, Dr. Thomas Erstfeld, LtCol. Matthew Zickafoose and Ms. Chifumi Iwasawa.

We appreciate the kind support and advice of Dr. Joseph Lyons, and Ms. Stephanie Bruce of AFOSR. We are also appreciative of the approval provided by the Institutional Review Board of Nanyang Technological University, Singapore.

We thank all test subjects to the project from Malaysia and Indonesia for their helpful participation. We are grateful to Dr. Titin Usna Oesman, Umam Yahaya and Dr. Muchlis Idham of the Institute of Science & Technology AKPRIND, Yogyakarta for data gathering in Indonesia. We owe the successful completion of this project to Mardhiyah Amirudin and Lailatulain Abbas of Damai Sciences Sdn Bhd for their painstaking perserverence, hard work, and professionalism in data collection and analyses.

Finally, we assume responsibility for any ambiguities that may remain in this report. We acknowledge that the views and opinions expressed in this report are that of the authors and do not reflect that of the grantor.



Dr. Halimahtun M. Khalid
Damai Sciences Sdn Bhd
Malaysia



Prof. Martin G. Helander
Nanyang Technological University
Singapore

1 September 2013

EXECUTIVE SUMMARY

Natural disasters and human induced disasters are common phenomena in Southeast Asia. As such, there is a need to understand people's vulnerability to disasters and their resilience, as well as their risk behavior and attitudes. In this research we defined attitude as a summative of five components: risk identification, cognition, affect, trust and behavior; which were explored at three levels of situation awareness: perception, comprehension and projection.

Attitude is largely influenced by cultural and demographic factors and this research examined the effects in the context of psycho-cultural situation awareness (PSA). Understanding psycho-cultural attitudes support the kind of situation awareness required for rapid, agile planning and re-planning in disaster management. Therefore, the objectives of the study were: (1) to identify psycho-cultural similarities and/or differences in risk attitudes of communities for the purpose of disaster management; and (2) to identify group trust and information dissemination network in the face of disasters for the purpose of disaster aid planning.

We approached the investigation as follows: First, we determined the cognitive style of sociocultural groups in relation to analytic versus holistic thinking by using measures of relevancy and memory of facts. Analytics tend to rationalize behavior on the basis of relevant information while holistics are prone to intuition and feelings and may require much information to make a decision. Second, we identified the severity of risks as ranked and characterized by sociocultural groups using images of disasters. Analytics would focus on specific features, while holistics addressed generic attributes. Third, to obtain the psycho-cultural SA of groups, we assessed risk, cognition, affect, trust and behavior using videos of disasters and a 75-item attitudinal scale. Fourth, we mapped the virality of information by using scenarios of disasters to capture their trust and networks of communication in the face of disasters. Fifth, we evaluated group trust using a disaster game, where teams collaborated and assessed the trust of each other.

The survey tool in English was translated into two Malay languages: Bahasa Melayu and Bahasa Indonesia, and back-translated to the original. All versions of the tool were tested in a pilot study prior to the field study.

A representative sample of 180 participants completed the survey. They were stratified according to the independent variables: nationality (Malaysian, Indonesian), ethnicity (Malays, Chinese, Indians/Balinese), gender (male, female), and age (youth, adult, older adult). Ordinal data was analyzed using non-parametric statistics, while interval data was examined using parametric statistics. All open-ended questions were analyzed using the text mining software *Leximancer*.

The relevancy of facts results showed highly significant differences in cultural cognition between Indonesians and Malaysians, with the former being more analytic, while the latter was more holistic. Differences in cognitive style suggest that in disaster situations, the Indonesians will think and decide rationally on the basis of relevant and piecemeal information, while Malaysians would need to know the overall picture, including the reasons behind the disaster rather than the risk. Holistics tend to use their intuition or feelings rather than analyze and rationalize about a problem. The groups also differed in their assessments of risks. In the case of tsunami, Indonesians associated severity of hazards differently from Malaysians. The risk attitude scale also confirmed that Indonesians and Malaysians differed significantly in at least three components of attitude at each level of situation

awareness. At the perception level, Indonesians were more positive in their attitudes concerning risk identification, cognition and trust than Malaysians. At the comprehension and projection levels, Indonesians were likewise also more positive in risk identification, cognition and affect than Malaysians. However, Malaysians were more positive in their behavior than Indonesians. Being analytics, Indonesians would rationalize their decisions and emotions rather than their actions. Malaysians as holistics would take action on the basis of their intuitions.

Both national groups chose to contact their family members first by making phone calls using either a fixed line or hand phone. They trusted their family members to contact the authorities for support. Malaysians also believed that individuals have good intentions during a disaster situation, thereby making them more receptive to aid than Indonesians.

Further analyses of written responses to open-ended questions using text mining revealed that Malaysians identified disaster risk at all three levels of SA in the same manner for both types of disasters. This confirmed their holistic nature of thinking. Indonesians, on the other hand, detailed their risk description at each SA level, indicating their familiarity with the type of disaster apart from their analytic experience. Comparing the semantic maps between disaster types across national groups showed that psycho-cultural SA varied according to the type of cognitive style – analytic or holistic.

In sum, Malaysians differed from Indonesians in cognitive style and psycho-cultural SA. This difference in risk attitude influenced how information is perceived, interpreted, and acted upon. Familiarity with specific disaster type also influenced assessment. Indonesians on the whole are more exposed to disasters relative to Malaysians. Therefore, they are readily more prepared to cope with disasters, but their lack of openness can also pose a problem in disaster aid and management.

The implications of this research on planning and management of disasters are: (1) design of training programs for disaster preparedness should use attitudes as bottom line and fundamental first step in training; (2) the more similar the attitudes, the easier to manage people during disasters; (3) there is a difference in ABC during the time period when situation awareness is established and post-hoc analyses of ABC. This suggests that people are greatly impacted by disasters and might require counseling support; (4) group trust can inculcate positive attitudes to respond effectively when faced with disasters.

Our findings can greatly assist in efforts to reduce disaster risk through recognition of certain social vulnerability aspects such as effects of gender and nationality on risk attitudes of individuals in disasters. It also highlights the importance of promoting better resilience among individuals, especially in relation to social factors where individual's ability to understand risk and have good social support through network and connection can help communities prepare, adapt and survive through the ordeal.

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1 INTRODUCTION

Globally, an increasing number of people are living in a world of natural disasters and human induced disasters that create social and spatial disorganization of the affected countries. In 2011, developed countries were particularly hard-hit by natural disasters as evidenced by floods in Australia, earthquakes in New Zealand, an earthquake/tsunami in Japan and a series of disasters in the United States. While natural disasters result in higher economic losses in rich countries, the loss of life is less than in developing countries. Higher levels of preparedness, resilience and good governance help rich countries to recover faster than poor countries (Ferris & Petz, 2012). Disaster vulnerability is rapidly increasing particularly in Southeast Asia.

Disasters are traumatic events and are likely to affect individuals' risk attitudes in the short term and possibly the longer term. Experience with a traumatic phenomena such as a tsunami or a terrorist attack may change individuals' attitude toward the risk they face. Psychological evidence of diminishing sensitivity suggests that if the level of risk is high, people may not be particularly concerned about the addition of a small risk (Kahneman & Tversky, 1979). The risk associated with natural disasters may reduce people's propensity for risk-taking, making them vulnerable and thereby less resilient (Cameron & Shah, 2010). Theoretically, it has been hypothesized that increased background risk can either increase risk aversion or decrease it (Gollier & Pratt, 1996; Quiggin, 2003).

In this project, we investigated to what extent natural disasters and human induced disasters affect risk attitudes. We used field data from two sociocultural communities in Southeast Asia. Both communities are ethnically and culturally similar in beliefs, values and traditions, but dissimilar in social orientation and disaster experience. Their risk attitudes have important implications for understanding community disaster vulnerability and recovery.

Vulnerability is the characteristics and circumstances of a community, system or asset that makes it susceptible to the damaging effects of a hazard (United Nations of Office for Disaster Risk Reduction, UNISDR 2013). Social vulnerability is the propensity of a group of people who fail to respond and lack resilience towards a disaster. This vulnerability is affected by inequalities in social factors (e.g. ethnicity, gender) that expose them to harm (Cutter, 2005).

We define *natural disasters* as natural catastrophes attributed to uncontrollable events, i.e. Acts of God, while *human induced disasters* are catastrophes initiated by humans. They may be distinguished on the basis of their temporal characteristics, whereby natural disasters occur during a long period of time, and human-induced disasters usually happen quickly.

Attitude is a learned tendency to act in a consistent way to a particular object or situation (Fishbein & Ajzen, 1975). *Risk attitude* likewise is the response of an individual or group to perceived uncertainty. The current project analyses two types of disasters that occur in the Southeast Asian region: *tsunami* (natural disaster), and *terrorist attack* (human induced disaster). The probability of their occurrence may be low, but their outcome can be impactful. Both disasters create collective behaviors that are triggered by a specific situation and affect the whole community.

1.1 Risk

There is no consensus on the meaning of risk in the scientific literature. Some authors argue that risk is about thoughts, beliefs and construct (Sjöberg et al., 2004). The ISO 13000 defines risk as an “effect of uncertainty on objectives” and note that an “effect is a positive or negative deviation from what is expected”. Uncertainty typically involves deficiency of information and leads to inadequate or incomplete knowledge or understanding. As such, it is difficult to objectively calculate risk. Hence, people tend to use heuristics to make an estimation of the risk they are facing (van Winsen et al., 2011).

Individual perception of risk differs from one person to another due to different interpretations of reality. The brain filters incoming information, and this process is strongly affected by social and cultural background as well as personal history (Proske & Proske, 2008). This approach is based on theory that takes cultural and social aspects into account in explaining risk perception (Douglas & Wildavsky, 1982; Rippl, 2002). The perception of risk is seen as determined by the group that the individual belongs to and is socially connected to. The amount of risk perceived by an individual can be predicted only from the social and cultural contexts. Therefore risk perception is based on a socially shared worldview rather than determined by individuals (Oltedal et al., 2004).

Risk perception involves identifying dangerous or hazardous situations and trying to characterize them. We refer to this process as *risk identification*. To understand risk attitude, it is important to get an insight in the way risk is identified. If different persons can perceive the same risks differently, than it is also likely that an individual can identify a risk differently at different times.

The perception of risk of a scenario typically differs among individuals which causes them to act differently. Risk attitude is context specific (Pennings & Garcia, 2001). Under different circumstances or faced with different risks, individuals will show different risk attitudes. So, risk attitude is influenced by risk perception or identification. *Risk identification* is defined as the subjective judgment that people make about the characteristics and the severity of a risk. Hence, differences in risk taking behavior between persons and for an individual does not always reflect differences in attitude but could be induced by differences in perception or identification. Understanding the risk attitude of a population in times of crisis or disaster can improve disaster management and mitigation policy.

1.2 Attitude

Jung (1921) defined attitude as the “readiness of the psyche to act or react in a certain way.” He noted that there are two forms of attitude. The first form is rational attitude, which divides into “thinking” and “feeling” functions. The second form is irrational attitude, which divides into “sensing” and “intuition” functions. More recent studies described attitude as composed of three distinct components: *affect*, *behavior* and *cognitive* (e.g., Breckler, 1984; Solomon, 1996). However some studies noted that the three components are strongly related and they emerge in similar factors in statistical analyses (Bentler, 1980; Dillon & Kumar, 1985).

In the current research, risk attitude reflects a person’s general and consistent predisposition to a particular risk. Risk attitude is hence formed by the characteristics of the risk. This suggests that an individual who has been frequently exposed to a certain disaster (e.g., earthquake) has developed a

risk attitude based on his or her experience of that disaster. Therefore, the risk attitude of a population may be compatible only for a certain type of disaster in order for successful disaster planning to take place (Pennings & Grossman, 2008). Identification of factors that drive individuals' risk attitude during disaster can lead to the development of a comprehensive framework for disaster management.

From the foregoing, we characterize risk attitude in terms of five related components, namely: **risk identification, affect, behavior, cognition** (ABC), and **trust**.

Risk identification is the process of finding, recognizing and describing risk. This enables individuals to make informed decision by identifying the danger in a situation (Kreimer & Arnold, 2000).

Affect refers to emotions or instinct such as anger, fear, and sadness. It also represents sensory experiences (physical feelings).

Behavior refers to overt, observable responses and actions.

Cognition includes human beliefs, values, knowledge structures for decision-making process and perceptions of self, others and the world.

Trust is the willingness to accept vulnerability based upon positive expectations about behavior of others (Rousseau et al., 1998). An individual's decision making process is influenced by the trust he/she places on individuals, community and surrounding environment.

The pattern and functioning of these components depend on the risk perceived. However, people have different cognitive styles: analytic and holistic thinking. *Analytic thinking* involves understanding a system by thinking about its parts and how they assemble to produce larger-scale effects. *Holistic* thinking involves understanding a system by sensing its large-scale patterns and reacting to them (Peng & Nisbett, 2000). *Analytic* reasoning uses logic, while *holistic* reasoning uses dialectics. Holistic thinkers tend to give broad attention to context and relationships. The observed differences in cognitive style are usually produced by differences in social orientation (Varnum et al., 2010).

1.3 Situation Awareness

Situation awareness (SA) models human information processing, decision making and execution of actions (Endsley & Jones, 2012). SA has three consecutive levels or stages: Level 1. Perception of elements in the current situation; Level 2. Comprehension of the current situation; Level 3. Projection of future status. Once the future (implication) is understood, the person can make a decision, which is then followed by action. The arrival of a tsunami to the Japanese shores can serve to illustrate:

- *Level 1. Perception of elements (information) in the current situation.* One can observe the waves rolling into the beach.
- *Level 2. Comprehension of current situation.* Unless tsunamis have been observed previously, it may be difficult to understand what is going on. Many observers in the recent Japanese tsunamis failed to understand what was happening.
- *Level 3. Projection of future status.* To make reasonable decisions one must project the changes in the current situation on the future developments. For example, it is critical to estimate to what level the water will rise. Observers will base their understanding on: How quickly is the water level going up at present? Will the water level rise further or will it go down?

Although a person understands the three levels, he or she may not be ready to make a decision. This is because the goals of individuals differ. Depending on the scenario there are often several

alternatives for action. This will constrain and also complicate decision making. For example: Should I try to save the old man or focus on the young boy? Decision criteria are affected by expectations of what will happen. It could be that the old man is closer, and quicker to save. But the young, because of his age, has priority. Besides, he weighs less and is easier to save. A person who has handled catastrophic scenarios previously has an advantage. For example, a fireman has through his training and experience a large set of rules for perception and decision making in fire fighting.

Consider a less complicated scenario such as car driving. A person is driving home from work along a winding, rural road. Her decisions depend largely on what happens during driving. This refers to situation awareness Level 1. There are several requirements on perception such as estimates of how much the road is turning. Since the road is winding it is difficult to say if there are opposing cars around the corner. However, based on her previous experience she is equipped with several “decision heuristics” for this road/traffic. For example, she knows what usually happens on the other side of a curve, and she will make automatic decisions about speed and steering.

1.4 Structure of Report

This report is organized in 7 Sections as follow:

- Section 1 introduced the background to the research and the main concepts that were addressed including risk, attitude, and situation awareness;
- Section 2 outlined the theoretical and conceptual framework for the research, in particular the human factors systems approach and psycho-cultural situation awareness, as well as the research process and approach to the study;
- Section 3 specified the methodology for conducting the research, including research design, location of fieldwork, sampling of subjects, instruments used in the field survey, tasks performed, procedure for data gathering and data analysis methods;
- Section 4 presented the results of statistical analysis for each of the 7 tasks;
- Section 5 highlighted the semantic analysis of narratives generated from specific tasks, illustrating the dominant themes and concepts that were associated in the form of knowledge pathways;
- Section 6 discussed the major findings and confirmation of hypotheses; and
- Section 7 summarized the results and proposed recommendations for future work.

The next section discussed the framework for modeling risk attitudes in situation awareness.

2 MODELING RISK ATTITUDES IN PSYCHO-CULTURAL SITUATION AWARENESS

2.1 Human Factors of Sociocultural System

Figure 1 represents a framework for sociocultural systems. The framework identifies three major components of human-machine interaction: **Environment**, **People** and **Technology**. A fourth component, **Task**, is defined by the interaction between people, technology and environment. Cultural and social aspects of a community such as nationality, ethnicity, beliefs, and values influence how people perceive the environment. The physical hazards including natural and human induced disasters make up the Environment. People respond to the Environment as a function of their sociocultural background and demographic variables such as age, gender, education. A person may function as an individual or partake collectively in a group. These factors influence their attitudes,

estimates of risk, cognition, affect, trust and behavior. Depending on their assessment of the situation, people may also opt for use of technology and networks to address the emerging situation.

The attitude of people affects their situation awareness. People's interaction with technology can provide a measure of task performance, while people's interaction with the environment provides measures of agreement on perceived risk and risk taking.

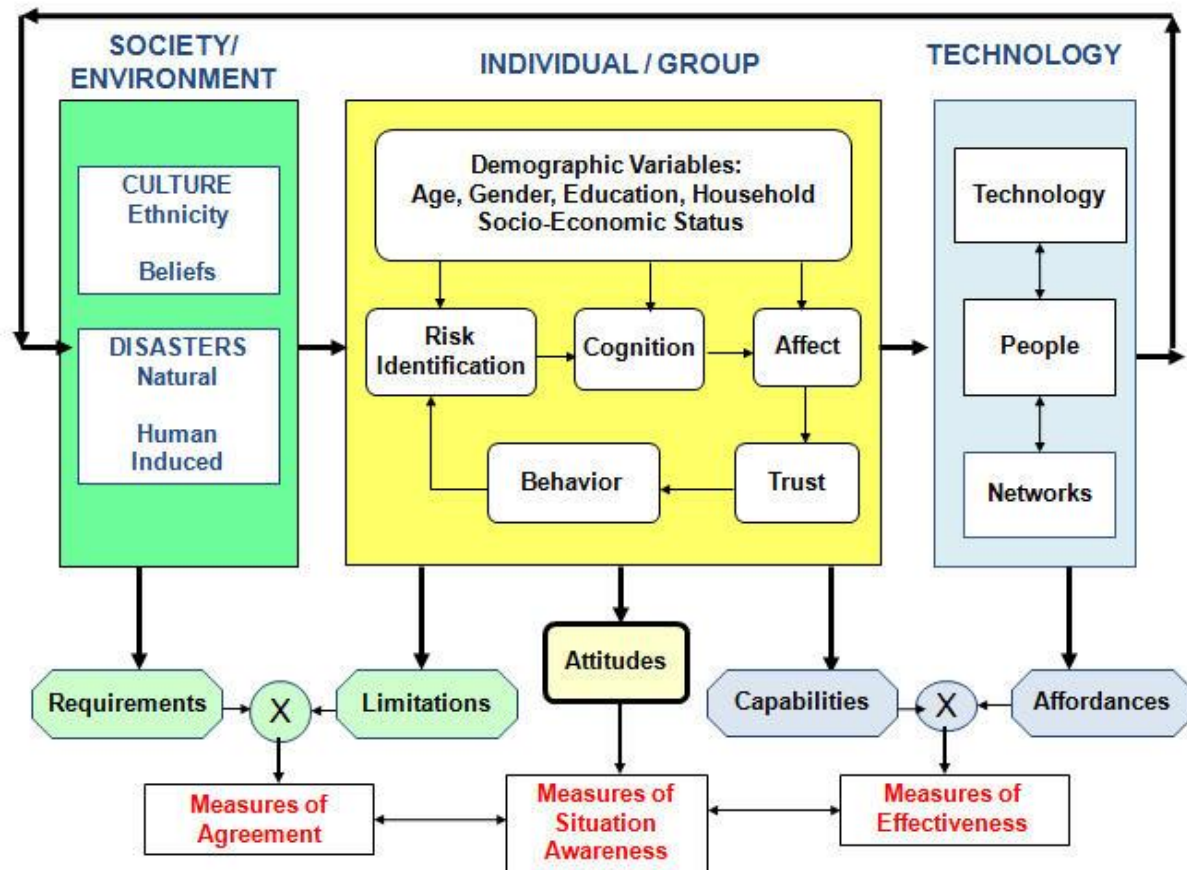


Figure 1. Human factors of disaster risk attitude

2.2 Sociocultural Analysis

Recent studies on disaster risk reduction have proven that disaster risk attitudes of individuals are embedded as day-to-day social practices in societies that are shaped, transformed and communicated through cultural influences. As such, there is an increasing interest in research on how demographic aspects, such as ethnicity, gender and poverty, influence a person during a disaster (Fothergill et al., 1999; Fothergill & Peek, 2004).

Some people are more vulnerable in their attitude towards disasters than others. Byrnes, Miller and Schafer (1999) proposed a cognitive-social learning theory of risk taking. It suggests that risk taking attitude is affected by a mix of social factors and personal characteristics. Likewise, our approach in this research is to apply a sociocultural analysis to understand how environmental factors of society and culture shape individual risk perceptions and attitudes of disasters within a Southeast Asian community. The components of the model are described in Figure 1.

Culture. The study of culture is a major challenge especially in applications related to disaster (Alexander, 2012). However, because the shared values between individuals in social setting greatly affect cognitive, emotional and social functioning, the functions of culture must be emphasized in disaster research (Cooper & Denner, 1998).

Culture is defined as the collective patterns of behaviors and interactions, cognitive constructs, and affective understanding that are learned through a process of socialization (Carla, 2013). These shared patterns identify the members of a culture group and also distinguish those belonging to other groups (Carla, 2013). In the context of disaster, Alexander (2012) explained how individual's attitudes toward disaster can be changed successfully as long as they are accepted by the targeted society. Changes that oppose one's culture can block the adaptive process, and such changes are seen as illogical. Peng, Ames and Knowles (2001) classified the research on cultural psychology according to three main traditions: (1) *norms and values* which gave rise to the theory of collectivism/individualism (Triandis, 1995), (2) *self-construals* which emerged in the 1990s such as interdependence/independence, and most recently (3) *culture and cognition theory*, which focuses on the holistic/analytic concept of thinking (Nisbett, 2003). We considered below the recent tradition of culture and cognition involving **cognitive style**.

Much literature in culture and cognition has noted variations in basic cognition between East Asians and Westerners, where the cognitive style of holistic thinking dominates in the former, and analytic thinking in the latter. Holistic thinkers require much information before making initial judgments (Klein et al., 2008). They prefer a broad scope of information, concentrating more on the context than the focal object including interrelationships among social and nonsocial objects. Holistics also provides an adaptation towards change and contradiction of information (Nisbett, 2003; Choi, Koo, & Choi, 2007). Findings from laboratory research identified four manifestations of analytic-holistic thinking: attention, causal attribution, tolerance for contradiction, and perception of change (Masuda & Nisbett, 2001; Norenzayan, Smith, Kim, & Nisbett, 2002). Each of these factors is linked to cognition in natural settings (Lin & Klein, 2008).

However, we do not understand to what extent the literature on culture and cognition can be applied in the disaster context. Although there are several studies supporting the view that East Asians and Westerners have different systems of thought, few studies have been undertaken within the same cultural group. Our present research examined the cognitive style of two Southeast Asian countries, thus allowing us to investigate them as being either culturally similar or different.

Ethnicity. Ethnicity depends on language, religion, culture, racial appearance, region and ancestry (Gupta, 2009). Ethnic groups are usually distinct from one another (Parsons, 1978). Fathergill, Maestas and Darlington (1999) suggested that there is a need to explore the link between racism, vulnerability and economic power in the context of disaster. Ives and Furseth (1983) studied differences in racial groups among flood victims and found no differences in risk perception. Elliott and Pais (2006) investigated Hurricane Katrina victims and found that African Americans in the affected area were less likely to evacuate before the storm than Caucasians. They believed that the storm would not be as destructive as it turned out to be.

Green et al. (1990) performed a follow up study on a community studied by Gleser et al. (1981) and found that 14 years after Hurricane Katrina more African Americans suffered post-traumatic stress disorder (PTSD) than Caucasians Americans. Most studies on ethnic groups have been conducted in the Western world, where segregation of ethnicity differs from Asia. We therefore examined the effect

of ethnicity on disaster risk attitude among three distinct ethnic groups in Southeast Asia, namely: Malays, Chinese and Indians.

Gender. Men and women have distinct roles in society, although the distinction is increasingly blurred in developed nations. In many parts of the world, men are seen as the protector and provider of the family, where they are referred to in making decisions for the family. Meanwhile, women carry the responsibilities of caring for family members including children and elderly.

Regarding risk perception women tend to perceive a disaster situation as serious or risky (Leik et al., 1982; Howe, 1990; Cutter et al., 1992; Flynn et al., 1994). Howe (1990) found that women were more concerned than men about the effects of chemicals on their health and the environment. In addition, Bord and O'Connor (1990) reported that if a risk would affect family members, women perceive the risk as more dangerous and threatening.

Men and women differ in their ability to cope with stressful situations (Ciampi, 2011). Carballo, Heal and Horbaty (2006) reported that in some populations, women are more likely to be affected than men even before an event happened. In several communities affected by the tsunami, the female death toll was three times higher than the male death toll (Carballo, Heal & Horbaty, 2006). There are several reasons why female have a higher death toll during a disaster. Some women are not allowed to leave the house without permission from a male, women do not have adequate survival skills such as swimming and climbing trees, women have less physical strength than men (International Federation of Red Cross and Red Crescent Societies, 2010). Men are also affected by gender-based attitudes and behaviors. One explanation for high mortality among men is that men are willing to accept a greater risk than women in order to protect people around them (International Federation of Red Cross and Red Crescent Societies, 2010).

Age. Psychological maturity (implied as a component of age) leads to proficient coping styles, which would imply a greater ability to deal with forecasts of disasters (Gatz, Kasl-Godely & Karel, 1996). According to Norris et al. (2002), there are inconsistencies in the findings of how age affects the outcome of Post Traumatic Stress Disorder (PTSD). Some disaster studies failed to find any age-related difference (e.g., Miller et al., 1981; Ollendick & Hoffman, 1982). However, some evidence suggests that middle-aged adults are more adversely affected by a disaster as compared to older and younger adults (Price, 1978; Gleser et al., 1981; Thompson et al., 1993). Green (1996) acknowledged these inconsistencies and attributed them to the lack of research in disaster-prone regions in developing and non-Western countries. The current research attempts to investigate the effects of age differences in disaster risk attitude in the Southeast Asia region.

2.3 Disaster Risk Attitude in Situation Awareness

Figure 2 summarizes disaster risk attitudes at three levels of situation awareness (SA). We assumed that an individual's experience of a disaster (natural or human induced) includes risk identification, cognition, affect, trust and behavior at each level of SA. But the frequency and pattern of occurrence may differ for each level given that the risk attitude of communities may differ due to social orientation and past exposure or non exposure to disasters. For example, at the perception level of SA, risk identification may be more critical, while at the comprehension level, trust may be the overriding factor as people try to make sense of the evolving situation.

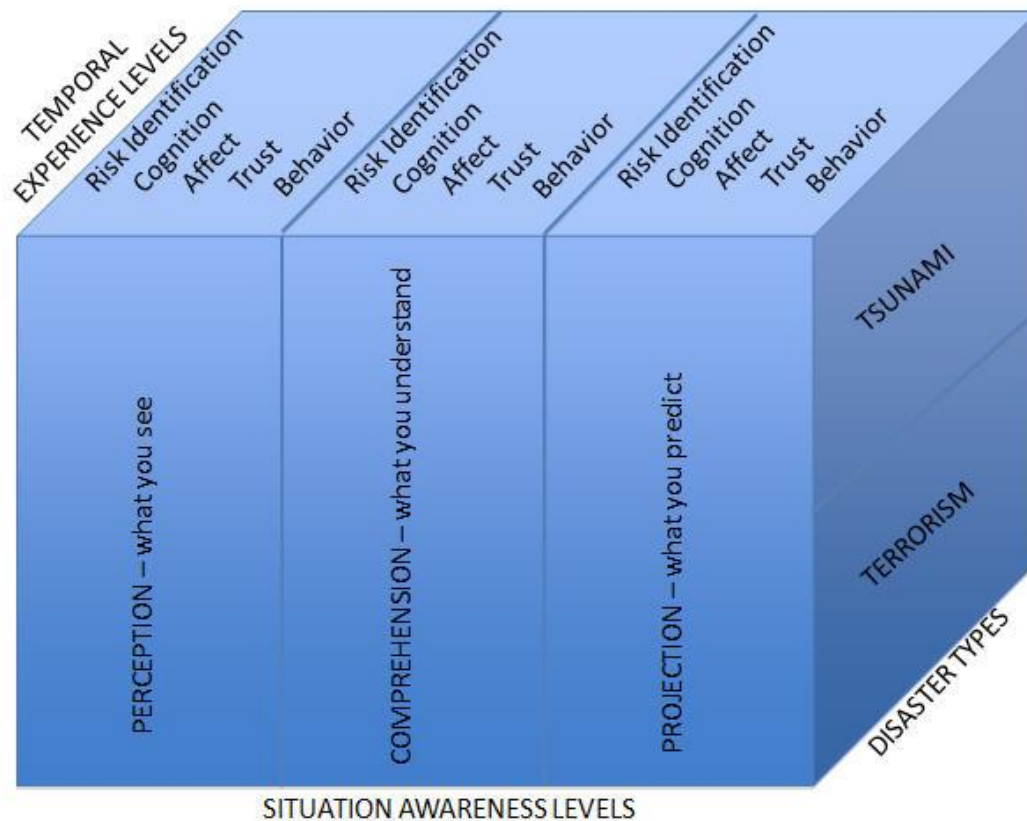


Figure 2. Model of disaster risk attitude and situation awareness

Below we define the measures identified in the model.

Risk identification is the process of finding, recognizing and describing risks. It is measured by subjective ranking of 6 disaster images according to their level of perceived risk, where Rank 1=high risk, and Rank 6=low risk.

Cognition refers to beliefs, values and thinking. It is measured by subjective ratings of risk-related vignettes. These are short impressionistic scenes that focus on one moment and provide an impression of dispositional and situational characteristics using 7-point scales. The content of vignettes describes the inherent risk and reflects on the relevance of facts for identification and recall.

Affect refers to emotions including: anger, happiness, and sadness. They are measured by subjective ratings of items that represent sensory experiences (physical feelings) using 7-point scales.

Trust is the willingness to accept vulnerability based on expectations about the behavior of others. It is measured by subjective ratings of trust-related factors of the usability of technology and access to people such as family members during a disaster. Individual's trust of group members was measured on a 7-point scale using four attributes: *competence*, *integrity*, *benevolence* and *predictability*.

Behavior refers to responses or actions of an individual or group to the environment. It was measured by subjective ratings of items to be acted upon in a disaster scenario. A 7-point scale was used.

The ABC concepts used in the research were derived from a previous study (Khalid et al., 2010). Table 1 provides some concepts produced by text mining of narratives from the literature on natural and human induced disasters.

Table 1. Attitudinal forecast as a function of disaster type, pre-warning and risk perception.

<i>Disaster type</i>	<i>Pre-warning</i>	<i>Risk Perception</i>	<i>Expected ABC of people</i>
Natural Disasters			
Tsunami	Sometimes no pre-warning	High risk	Behavior – rushed, shouting, screaming, swim, climbed, diving, crying, pulled, held, grabbed Affect – calm, lucky, loved, scared, happy Cognition – thinking, feel, decided, remember, forget
Earthquake	None – but people are used to it	High – Moderate risk	Behavior – breathing, avoidance, used, coping, planning, given Affect – relief, traumatic, fear, depression, suicidal Cognition – perceived, focus, reactions
Hurricane	Yes – through mass media	Moderate risk	Behavior – avoid, approach, seek, cope, helped, stress Affect – fear, traumatic, emotional, stress Cognition – self-efficacy, focus, perception, learn.
Flood	Yes – gradual build up	Low-moderate risk	Behavior – cope, work, provide, support, take, checking, control Affect – feel, threat, trauma, concern, depression, emotional Cognition – believe, sense, perception, adaptive
Human-induced Disasters			
Terrorism	None	High risk	Behavior – provide, responded, choose, coping, searching, making Affect – anxiety, anger, fear Cognition – attention, identify, beliefs, thoughts
Fire	None	Moderate risk	Behavior – evacuate, rescue, calling, pick, wait, drive Affect – happy, panic, fear, anxiety Cognition – decision-making, perceive, knowledge
Industrial Accidents	Immediate or gradual build up	Moderate risk	Behavior – explain, avoid, obtain, working, gathered, observed Affect – danger, lost, fatalistic Cognition – perceived, attention, decisions
Transport Accidents	None	Moderate risk	Behavior – driving, breathe, entered, looked, crying, working, ran Affect – distress, shock, fear Cognition – described, thought, realized

2.4 Disaster and Risks

Disasters are seen as extreme catastrophic events. They cause harm to people, their surroundings and the environment. A general definition by the Asian Disaster Reduction Center (2003) portrays disaster *“as a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of affected society to cope using only its own resources.”* The disasters may stem from natural causes such as tsunami, tornado and earthquake as well as human-induced disasters, such as terrorist attack, oil spillage and political violence (Zeidner et al., 2009). Examples of catastrophic events are the New York Hurricane Sandy in 2012, the Great East Japan Earthquake of 2011 that triggered a massive tsunami towards its surrounding areas, and the destruction of the twin towers of New York’s World Trade Centre on September 11, 2001. The aftermath of such calamities include countless loss of lives, vast destruction of infrastructure including homes and public buildings as well as a great disruption of a country’s socioeconomic functions.

In the present research, we focused on two disasters with different causes: Tsunami, which represents a natural disaster and Terrorist attack, which represents a human-induced disaster. These disasters share many characteristics in the sense that both have low probability of occurrence and high impact in outcome.

Quarantelli (2001) explains disasters as events that: (1) involve a mass of people, and (2) include real or perceived threat of death. But at the same time there is a (3) subjective possibility of escaping despite time constraints.

The United Nations Office for Disaster Risk Reduction (2000) describes *disaster risks* as potential losses from disasters, resulting from a combination of people’s exposure to hazards, forms of vulnerability that are present at the time and lack of resources or measures to limit the potential negative outcomes. The disaster impact model by Lindell, Prater and Perry (2006) summarizes a basic framework for understanding disaster management, see Figure 3.

From Figure 3, there are three important pre-impact conditions: hazard exposure, physical vulnerability and social vulnerability. These conditions are established at the onset and can be used to construe an event as a disaster situation. In hazard exposure, risk arises from people residing in high danger zones (Lewis, 2013). Physical vulnerability is made up of three components: human and structural vulnerabilities. Examples of risks related to this type of vulnerability include: people’s susceptibility towards extreme environmental conditions (tsunami wave, tornado), poorly constructed buildings where the design and materials will not hold up in a disaster. Finally, social vulnerability describes the risk posed to people’s physical assets (properties, financial losses) as well as psychological, social, economic and political resources. By being able to recognize disaster risks, people will be better equipped when facing disasters through their increased knowledge in hazard identification, thus lowering their vulnerabilities toward it.

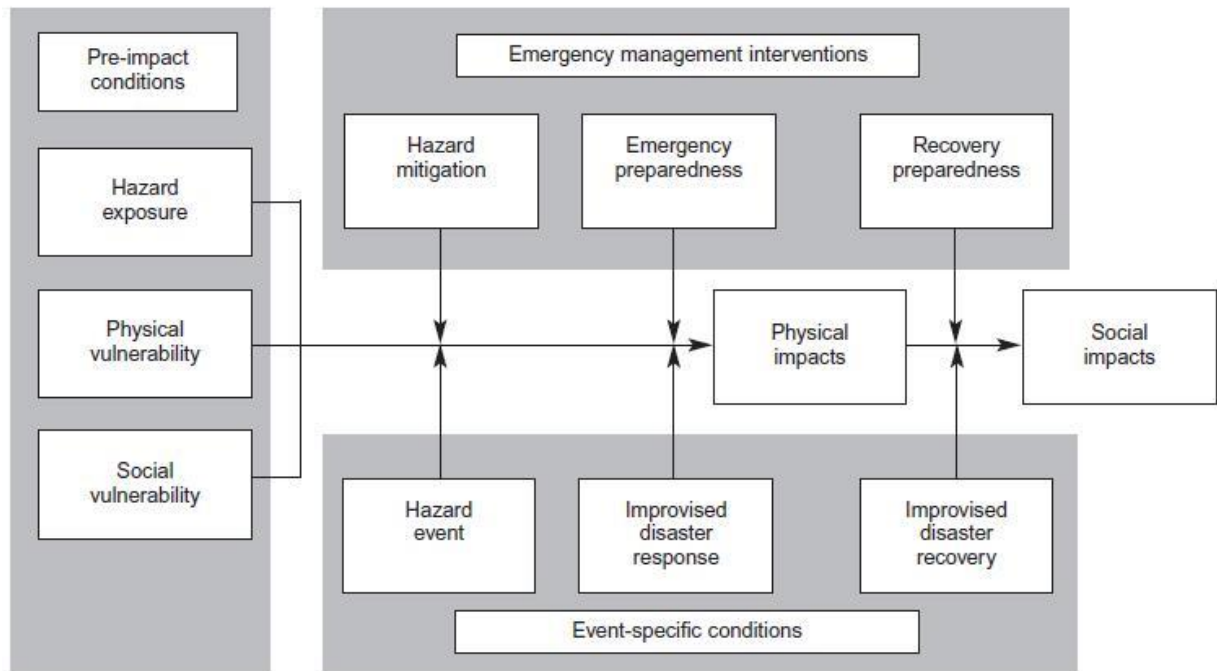


Figure 3. Disaster impact model (source: Lindell et al., 2006)

In order to aid risk identification during a disaster it is important to first ascertain how people perceive hazards. In our research, we investigated how people became risk averse to hazards. We identified the discrepancies that existed between individuals of similar cultural backgrounds, caused by external factors such as a person's social orientation to disasters and/or demographic variables such as gender and age group.

Risk perception is a mechanism that assists people in their decision making process especially in the presence of uncertain outcomes and to cope in dangerous situations. According to Slovic (2003), people perceive risk in two ways using the *experiential system* and the *logical system*: (1) The experiential system uses affect as a mode of thinking (holistic in nature), (2) The analytic system uses cognition as a basis. The experiential system is fast, instinctive and intuitive, while the analytical system is slow. It is guided by logic, reason and scientific deliberation. In the context of disaster risk, Slovic, et al. (2002) discussed the advantage of experiential system processing which enabled humankind to survive during the long periods of human evolution and remains the most natural and common way to respond to threat.

One example of utilizing risk as feeling (as termed by Slovic, 2003) was found in a study by Lerner, et al. (2003) where in light of the September 11 terrorist attack, emotions such as anger and fear played a pivotal role in the average American's future estimation of risks.

An effect of gender accounted for differences in perceived pessimistic and optimistic risk among individuals. Despite the evidence, experts on formal risk analyses tend to disagree with the use and influence of affective responses for rational decision making. However, current studies suggest that these two modes of thinking work in parallel and analytic reasoning is guided by its emotional counterpart. Several researchers have verified this approach in their studies of risk as feeling and risk as analyses (Holtgrave & Weber, 1993; Damasio, 1994; Loewenstein, et al., 2001).

In the present research, we investigated how people identify disaster risks that could mitigate them in utilizing positive attitudes towards dealing with disasters. In a recent interview, Slovic (see Lewis, 2012) explained that there is a distinct difference between risks posed by nature and risks posed by human activities, such as terrorism. According to Slovic, there are no parties that can be held responsible for when natural disaster occurs, thus people tend to see it as an uncontrolled situation. This could help explain why people still ignore warnings and evacuation messages during a hurricane, tsunami or flood causing lack of preparation and lower resilience (Carballo, et al., 2006; Lewis, 2012). However, there are other human factors involved such as decision-making, leadership and social influence, as well as post-disaster policies and practices which may influence people's interpretation of risk towards disaster events.

It is important to note that the capacity to identify different forms of risks in various disaster situations can facilitate in fostering better resilience in people. Resilience is the ability of a system or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient conduct, including through the preservation and restoration of its essential basic structures and functions (Whitney, 2013). It is a crucial element in people's response to risk disaster. Thus, it can help reduce the impact made on the affected group. In the wake of Hurricane Sandy that occurred recently in 2012, the American Geophysical Union called for greater resilience in facing such hazards which would curb damages and economic losses (Lewis, 2012). Most of all, the significance in understanding disaster risks is to bridge the gap between experts and laymen's view on risk identification so that better warning messages and cues can be relayed to the general public, thus increasing awareness and preparedness.

2.5 Research Objectives and Approach

The global objective of this project was to model disaster risk attitude in the context of sociocultural situation awareness. The specific and measured objectives were:

1. To determine sociocultural differences in disaster risk attitudes of two Southeast Asian communities on the basis of demographic variables: ethnicity, gender, and age;
2. To evaluate risk attitudes at three levels of psycho-cultural situation awareness in terms of risk identification, cognition, affect, trust and behavior;
3. To identify cognitive styles of the communities in deciding relevance of facts and recall;
4. To map virality of information on the basis of trust and sources of influence; and
5. To assess group trust in cooperative task involving a disaster game.

The approach was two-pronged: First, we used concepts derived from our previous study (Khalid et al., 2010) to develop an attitudinal survey tool to measure disaster risk attitude. This was driven by a theoretical model of situation awareness. Second, we gathered primary data in a field study which focused on natural disaster (tsunami) and human-induced disaster (terrorist attack). Both types of disasters which are characterized as having high impact and low probability of occurrence.

2.6 Research Significance

The originality of this research is the modeling of disaster risk attitudes in relation to Risk, Affect, Behavior, Cognition (ABC), and Trust within the context of psycho-cultural situation awareness. The research is focused on identifying common properties of human attitudes at the individual level. Although individual attitudes have been widely analyzed in terms of risk perception, they are rarely considered in behavioral studies of ABC, and situation awareness. Our report documents issues for understanding psycho-cultural parameters in Risk Identification, Affect, Behavior, Cognition and Trust at the three levels of SA. We also contributed information and theories that can aid in deeper understanding of networks of information dissemination in disaster situations. Such information may be used for effective planning of disaster preparedness, recovery and prevention.

3 METHODOLOGY

3.1 Research Design

The research design incorporated several methods, multiple levels of data analysis, and multi-lingual data collection. Both qualitative and quantitative data was collected. Qualitative data was gathered in field studies, structured interviews, content analyses, and text mining. Quantitative data was collected in the gaming study.

The micro level of data analysis focused on descriptive statistics such as means, standard deviation and percentages. The middle level concerned reliability testing and factor analysis. The macro level of data analysis included Spearman Rank Order Correlation, Pearson Correlation, MANOVA, and Factor Analysis. In order to ensure that the target community could respond to the survey tool, we used three languages: English, Bahasa Malaysia, or Bahasa Indonesia.

3.1.1 Research process

Table 2 outlines the research process (see next page).

3.1.2 Hypotheses

Sociocultural effects. Several studies have suggested that some people are more vulnerable than others in their attitude towards disasters. There is an increasing trend in research addressing how differences in demographic data, such as ethnicity, gender and poverty influence a person during a disaster (Fothergill, 1996; Fothergill et al., 1999; Fothergill & Peek, 2004). Given these findings, we hypothesized that:

H1 – There are significant differences in gender, age, ethnicity and nationality regarding risk identification, SA, ABC, and trust.

Table 2. Research process of the project

STEPS IN RESEARCH PROCESS	DESCRIPTION
1. PROBLEM IDENTIFICATION	The problem statement concerned the extent to which cultural (country, cognitive style) and social demographics (ethnicity, gender, age) factors influence risk attitudes of two Southeast Asian communities (Malaysia, Indonesia) in the face of natural (tsunami) and human induced (terrorist attack) disasters.
2. LITERATURE REVIEW	A review of relevant literature (psychology, disaster, human factors, and sociology) was undertaken to define the main concepts of risk, attitude, situation awareness and trust.
3. PROBLEM CLARIFICATION	The purpose of the study was to model risk attitudes of cultural groups in terms of Risk, Affect, Behavior, Cognition (ABC), and Trust. These variables were measured at 3 levels of Situation Awareness (SA): Perception, Comprehension and Projection.
4. CONCEPTS DEFINITION	The main concepts of the research were defined nominally and operationally. This included: risk, risk identification, affect, behavior, cognition, trust, cognitive style and attitude.
5. POPULATION DEFINITION	Representative subject samples were obtained from two communities in Southeast Asia, namely: Malaysia and Indonesia. Ninety Malaysian subjects were recruited from the Klang Valley and Langkawi Island, while 90 Indonesian subjects were recruited from Jogjakarta and its surrounding areas. The sample was stratified in terms of demographic factors: gender (male=90 subjects; female=90 subjects) and age groups (young adult: 18-22 years old; adult: 23-29 years old; mature adult: 30-57 years old) with approximate equal representation in each cluster.
6. RESEARCH DESIGN	The research was a field study with mixed subjects design: between subjects (comparisons across two disaster types and nationalities) and within subjects (comparison of individuals within same disaster type; and different SA levels). Assignment of subjects to disaster type was randomized. Measures were obtained using a survey tool that was translated from the original English to Malay and Indonesian languages, and back-translated. The tool was pre-tested prior to use in the field.
7. DATA COLLECTION	The field study was carried out using paper & pencil method. The survey tool included a consent form, profile form for demographics information, instructions for performing tasks as an individual (Task 1 – 6) and as a group (Task 7). All testing sessions were conducted in natural settings such as homes, cafés, and offices during office hours as well as after hours and weekends.
8. DATA ANALYSIS	The data were analyzed using Statistical Package for Social Sciences (SPSS) version 16. Subjective responses to open-ended questions were analyzed using <i>Leximancer</i> software.

Table 3 summarizes the test measures (dependent variables) and demographic factors (independent variables) for H1:

Table 3. Summary of dependent measures and independent factors

Dependent Measures using Test Scales	Demographic Factors
1. Relevance of Facts	Nationality, Gender
2. Memory of Facts	Age Group
3. Risk Identification	Nationality
4. Situation Awareness (SA)	Nationality, Gender
5. ABC assessment	Gender, Ethnic Group
6. Team Trust	Nationality, Age Group, Ethnic Group
7. Network	Nationality

From MANOVA analyses, only **gender** and **nationality** were found to be highly significant factors. Therefore, this report documents the findings on the effects of nationality and gender. The remaining findings are reported in the Appendices.

Cognitive style. Compared to Malaysians, Indonesians were found to be more analytical in cognitive style. These results are in agreement with previous studies (Khalid et al., 2008, Klein et al., 2008; Ji, 2008; Lin, 2008). Gender was also found to influence the cognitive style of individuals (c.f. Dedict et al., 2010). The difference in cognitive style influences the type of information individuals will collect in order to make decisions and assist in other cognitive processes such as attention, causal attribution and perception of change (Peng & Nisbett, 2000). However, most previous studies linked each of these differences to cognition in natural settings (Lin & Klein, 2008). We investigated if this was also true in the context of disasters. Thus, our hypotheses were as follow:

H2a - Indonesians differ significantly from Malaysians in their cognitive styles, with Indonesians being analytic, while Malaysians holistic.

H2b - There is a significant effect of gender on cognitive style of Malaysians.

H2c - There is a significant effect of gender on cognitive style of Indonesians.

Risk identification. Several risk identification studies have indicated that East Asians differ in perceived risks from Westerners (Weber & Hsee, 1999; Winerman, 2006; Gierlach, Belsher & Beutler, 2010). It was unclear if this was also true of Southeast Asians. Two hypotheses, H3a and H3b, compared Malaysians and Indonesians in their risk assessment of each type of disaster, tsunami and terrorist attack. Both types of disasters have low probability of occurrence, but their outcomes can be impactful.

H3a - In identification of tsunami risks, Indonesians differ significantly from Malaysians.

H3b - In identifying terrorist risks, Indonesians differ significantly from Malaysians.

Risk attitudes in SA. In perceiving risk, women tended to perceive a disaster situation as more serious or risky than men (Leik et al., 1982; Howe, 1990; Cutter et al., 1992; Flynn et al., 1994 in Fothergill, 1996). Elliott and Pais (2006) investigated the risk attitude of Hurricane Katrina victims, and found that African Americans differed significantly from Caucasians where the African Americans did not believe that the storm would be very destructive, and were less likely to evacuate. In our research, we explored risk attitudes at 3 levels of SA as a function of nationality and gender. The hypotheses were:

H3a - Indonesians differ significantly from Malaysians in risk attitudes toward tsunami at the perception, comprehension and projection levels of SA.

H3b - Indonesians differ significantly from Malaysians in risk attitudes toward terrorist attack at the perception, comprehension and projection levels of SA.

H3c - There is a significant effect of gender and nationality in risk attitudes toward tsunami at the perception, comprehension and projection levels of SA.

H3d - There is a significant effect of gender and nationality in risk attitudes toward terrorist attack at the perception, comprehension and projection levels of SA.

ABC assessment post-disaster. Disasters are known to cause a wide range of negative psychological reactions. In some cases, the observed effects are mild and transitory and victims can experience positive impacts such as strengthened family relationships, as well as negative ones such as strained family relationships (Gerrity & Flynn, 1997; Bourque et al., 2006). There are also psychological impacts with long-term adaptive consequences such as increased hazard intrusiveness (frequency of thought and discussion about a hazard) and changes in risk perception (Lindell et al., 2006). In our research, we hypothesized that people differed in their assessments of ABC after a disaster.

H4a - Indonesians differ significantly from Malaysians in their post-ABC disaster assessments of tsunami.

H4b - Indonesians differ significantly from Malaysians in post-ABC disaster assessments of terrorist attack.

H4c - There is a significant effect of gender and nationality on post-disaster ABC assessments.

Information dissemination and networks. People who have received warnings go through a social psychological process to form personal definitions about the risk they face and what to do before they take action. The process is divided into several phases: (1) hearing a warning, (2) forming a personal understanding of the warning, (3) developing a level of belief in the risk information conveyed in the warning, (4) personalizing the risk, and (5) deciding which actions and responses are appropriate based on the risk faced personally (Mileti, 1995). The channel of information plays an important role in warning response. Risk information may be communicated over multiple channels including printed and electronic media and/or it can be delivered personally. People call friends and relatives to get their interpretation of the event, and to find out what they are going to do. The communication has been shown to enhance hearing, understanding, belief, and response by the public at risk. This illustrates that communities function as networks of dynamic, multidirectional opinion and information (Heath 1997; Bell, Gray & Haggett, 2005). In our study, we hypothesized the following:

H5 - Indonesians differ significantly from Malaysians in information dissemination during disasters.

Team trust. The social resilience of a community relies on the trust of its members. Trust mediates acts of collaboration between groups of individuals in goal fulfillment, quality, timeliness and flexibility (Zaheer, McEvily & Perrone, 1998). Eastern cultures tend to trust an individual regarding the likelihood of sharing direct and indirect interpersonal links (Yuki, et al., 2005). Trust in Western cultures is based on the similarities of category memberships. Gender also influences trust, where females are found to be more trustworthy while males are more trusting (Buchan, et al., 2007). In our study we explored if team trust differs among Southeast Asian communities as a function of

nationality, gender and team performance in a disaster game involving tsunami only. The hypotheses were as follow:

H6a – Indonesians differ significantly from Malaysians in team trust to avert tsunami disaster.

H6b – There is a significant effect of gender on team trust to avert tsunami disaster across nationality.

H6c – There is a significant effect of team performance on team trust to avert tsunami disaster across gender groups.

3.2 Location of Study

The research was conducted in two Southeast Asian countries: Malaysia and Indonesia for several reasons:

1. Similarities:

- a. Malaysia and Indonesia share similar cultures and values within the Austronesian population;
- b. The dominant ethnic groups and religious beliefs within these countries are: Malays who are Muslims, Chinese who are Buddhist or Christian and Indians or Balinese who are Hindus.

2. Differences:

- a. Indonesia's geographic location and topography makes the country prone to natural disasters, especially seismic upheaval due to its location on the "Ring of Fire," an arc of volcanoes and fault lines encircling the Pacific Basin. Malaysia is located away from the fault lines, and does not experience earthquakes;
- b. Indonesia was colonized only by the Dutch, while Malaysia experienced several colonial and foreign rules by Portuguese, Dutch, Japanese and British that helped to foster community attitudes;
- c. Terrorist attacks have been common in Indonesia since 1960s with the most recent in November 2012 (http://en.wikipedia.org/wiki/List_of_terrorist_incidents_in_Indonesia). Malaysia was included among the 15 "terrorist-risk" countries by the US Immigration and Naturalization Service (INS) in October 2011, although terrorist attacks did not occur in the country.

In Malaysia, the research was carried out in the Klang Valley (encompassing Kuala Lumpur and Selangor), Seremban in Negeri Sembilan, and Pulau Langkawi in Kedah. In Indonesia, the research concentrated on Yogyakarta and its surrounding regions where most of the ethnic groups lived in disaster-prone areas. To enhance ecological validity, data collection was conducted in homes, offices, or public spaces such as café. To avoid unwanted interference, it was ensured that these environments were conducive to testing.

3.3 Representative Sample

Table 4 summarizes the sampling for data collection. Samples of 90 subjects were recruited from Malaysia and Indonesia using convenient and snowball non-probability sampling (see Table 4). They represented three main ethnic groups of interest in both countries (Malays, Chinese, and Indians/Balinese). Field investigators contacted participants using phone calls and email. Upon knowing the objectives of the study, they volunteered freely.

Subjects were classified randomly into two groups: Tsunami (N=91) representing a natural disaster and Terrorist attack (N=89) representing human-induced disaster. The total number of subjects (N=180) followed their ethnic distribution in the respective countries. In Malaysia there are Malays (60%), Chinese (20%) and Indians (7%). A balanced number of subjects were obtained during the data collection that enabled fair comparisons of ethnicity.

The sample was stratified on the basis of demographic factors: gender (male=90 subjects; female=90 subjects) and age groups (young adult: 18-22 years old; adult: 23-29 years old; mature adult: 30-57 years old) with approximately equal number in each cluster. During testing sessions, 2-4 individuals were grouped together. They were asked to complete a group task later in the questionnaire. There was a mix of ethnic, gender and age groups. The subject groups was categorized as: a) **peers** (friends, co-workers, housemates, and strangers), and b) **family** (couples, siblings, parents and grandparents).

Table 4. Representative data sample

Countries	MALAYSIA															INDONESIA																					
Ethnicities	Malay						Chinese						Indian						Malay						Chinese							Indian/ Balinese					
Gender	Male			Female			Male			Female			Male			Female			Male			Female			Male			Female									
Disaster Type/Age group	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M	Y	A	M		Y	A	M			
Tsunami	26						12						11						17						13							13					
Terrorist Attack	18						12						11						23						11							13					
Total	44						24						22						40						24							26					

Y=youth, A=adult, M=mature/senior adults

3.4 Survey Tool and Tasks

Two tools were used in the field survey: one for tsunami, and one for terrorist attack. There were two sections in the tool. **Section A** documented the profile of subjects in terms of age, gender, and ethnicity. This was done to meet the inclusion criteria and enable group comparisons. In addition, information on subjects' knowledge and usage of communication technology were obtained along with information regarding subjects' disaster experiences (see Appendix 1). **Section B** was made up of 7 tools for measuring disaster risk attitudes using 7 tasks, see below.

Task 1. Risk identification (Appendix 2a). First, subjects rank-ordered six disaster images according to their level of perceived risk, where 1=high risk and 6=low risk (Appendix 2b for tsunami images, Appendix 2c for terrorist attack). Second, they explained their highest ranked image at the perception,

comprehension and projection levels of SA. Third, to obtain an insight into risks identified at each level of SA, the responses were analysed using the text mining software, *Leximancer*.

Task 2. Relevance of facts (Appendix 3). First, subjects were presented with two scenarios, each comprising 14 items relating to situational facts (7 items) and dispositional facts (7 items). Second, subjects rated the facts on the basis of relevance to the corresponding scenario using a scale that ranged from 1 (strongly disagree) to 5 (strongly agree). For this task, only measures of relevant facts were used, while scores of irrelevant facts were ignored.

Task 3. Situation awareness (Appendix 4). First, subjects watched a video of a natural or human induced disaster (tsunami or terrorist attack) for about 10 minutes (Appendix 4a for tsunami, Appendix 4b for terrorist attack). This video segment showed an early stage of the disaster intended to depict the perception level of SA. Second, they rated 75 items on a 7-point bipolar attitudinal scale. The scores ranged from 1 (negative risk attitude) to 7 (positive risk attitude). Third, they answered open-ended questions about what they perceived at this perception level of SA.

The procedure was repeated for the comprehension and projection levels of SA. The video segments depicted advanced developments of the disaster to correspond to levels 2 and 3 of SA. In order to reduce response bias, some positive items were made negative for the second and third levels of SA. The items which had been reverse-phrased were reversed back during scoring.

The items associated with affect, behavior and cognition (ABC) on the attitudinal scale were based on concepts mined from narratives using text mining obtained in an earlier phase of the study (Khalid et al., 2010). The remaining items on risk and trust were obtained from the relevant literature. The items were grouped into 5 components of risk attitude: risk identification, cognition, affect, trust and behavior.

Task 4. Information network (Appendix 5). First, subjects ranked the prospective recipients of the disaster information, ranging from family members, relatives to friends and rescue organizations. Second, they selected the methods they would use in reaching the top five recipients that they ranked. The methods were: Text message using mobile phone, Phone call using land line or mobile phone, Instant messaging using smart phone, Distress signals, and Verbal message through shouts. Finally, they rated the effectiveness of those methods on a 7-point scale.

Task 5. Post-disaster ABC assessment (Appendix 6). First, subjects rated the impact of the disaster video shown in Task 3 on their feelings (anger, fear, sadness) using the Triage Assessment System for crisis assessment (Myer, 2001). Second, they selected five out of nine actions that they might take. The reactions were categorized as “Immobile” (leave it to fate, offer prayers that have no certain outcome, behave in erratic manner), “Approach” (create awareness, donate, join volunteer services), and “Avoidance” (avoid talking about it, ignore news and information, refuse to help). Third, they rated the physical, psychological, social relationship and moral/spiritual impact of the disaster using a 5-point Likert scale.

Task 6. Memory of facts (Appendix 7). The purpose of this task was to confirm the relevance of situational or dispositional attributes of facts, based on free recall. First, subjects wrote down as many facts as they could remember from the first scenario that was presented in Task 2. Second, the information was scored ‘1’ if subjects recalled important information of the original item. Third, the

Total number of Memorized Facts (TOTMF) was summed up and categorized into Total Memorized Dispositional facts (TOTMFDIS) and Total Memorized Situational facts (TOTMFSIT).

Task 7. Team trust (Appendix 8). First, subjects played a “Stop Disaster” game (Appendix 8a) which required them to engage in discussion with 2 to 4 group members. Second, they completed all objectives presented in the game involving town management and budget planning. Third, based on the group’s completion of objectives and amount of expenses used, the game was scored on team performance (pass or fail). Fourth, subjects rated 16 items on a 7-point team trust scale. The scale was broken down into four subscales representing four major dimensions of trust, namely:

- *Competence* - degree to which an individual displays a certain skill set, characteristics and competencies of which can be used in some domain;
- *Integrity* – degree to which an individual is seen as honorable and acts accordingly to what they say;
- *Benevolence* – degree to which an individual is genuinely caring and concerned towards others; and
- *Predictability* – degree to which an individual’s behavior is consistent and can be predicted.

The scores ranged from 1 (Strongly disagree) to 7 (Strongly agree).

3.5 Procedure

The testing sessions were conducted in natural environmental settings such as subjects’ home, coffee shop, office or public space. The testing took place during or after office hours as determined by the subjects. To ensure consistency in the data gathering process, field investigators were trained on testing procedures by the principal investigator (see Appendix 9a).

First, the field investigators briefed subjects in groups of 2 to 4 on the purpose of the research. Next, subjects read the general instructions of the study (Appendix 9b) and completed a consent form (Appendix 9c). Subjects then read specific instructions of the study (Appendix 9d) and completed their profile in Section A of the questionnaire. Refreshments were offered before the start of the first task in Section B. Subjects were allowed to ask questions at any point during the testing session.

Although the testing was conducted in a group, subjects completed Tasks 1 to 6 on their own and were not allowed to discuss with each other. Task 7 was a group game to stop a tsunami disaster, and subjects could discuss to accomplish the task objectives. Videos were shown only in Task 3. Upon request, it was shown again. Subjects took a short break (5-7 minutes) before continuing with the group task.

The group task involved a set of materials and instructions: introduction, task objectives, missions, information, budget sheet, map, pen/pencil, color pencils, blank paper, and calculator. Subjects discussed and played the “Stop Disaster” game for about 10 minutes. They then rated their team performance using a team trust scale. At the end of the group session, the materials were collected by field investigators. They were checked for completeness. Subjects were thanked for their cooperation and participation in the survey.

3.6 Data Analysis

The data was analyzed using descriptive statistics, such as frequencies, means and standard deviations. To test the research hypotheses, parametric and non-parametric statistics were used, including: Pearson correlation, factor analysis, multivariate analysis of variances (MANOVA) and Kendall's W. The data was processed using Statistical Package for Social Sciences (SPSS) version 16. Subjective answers for open-ended questions were analyzed using the text mining software, *Leximancer*. Below is a summary of statistical analyses for each test measure:

- *Profile form* – descriptive statistics using means, frequencies and standard deviations.
- *Risk Identification* – Kendall's W nonparametric test and semantic analyses.
- *Relevance of Facts* – Analysis of variances (ANOVA) test, Welch's F test and Scheffe's post-hoc comparisons test.
- *Situation Awareness* – Factor analysis, MANOVA test, ANOVA test, Welch's F test, Scheffe's post-hoc comparisons test and semantic analyses.
- *Network* – descriptive statistics using means, frequencies and standard deviations as well as semantic analyses.
- *ABC Assessment* – MANOVA test, ANOVA test and Kruskal Wallis test.
- *Memory of Facts* – ANOVA and Scheffe's post-hoc comparisons test.
- *Team Trust* – Pearson-product moment correlation, Kruskal Wallis test and Mann-Whitney test.

3.6.1 Back translation

All test measures used in the survey, including instructions, consent form and other supporting materials, were developed in English. The materials were translated by two translators from English to Bahasa Malaysia and Bahasa Indonesia for use in the respective countries. The materials were then back translated to English by two other translators. An independent third person reviewed both sets of material to check for discrepancy.

Note that materials in Bahasa Malaysia were translated directly from the English language while materials in Bahasa Indonesia were translated from Bahasa Malaysia and verified through back translation. Figure 5 illustrates the translation process of the survey tool.

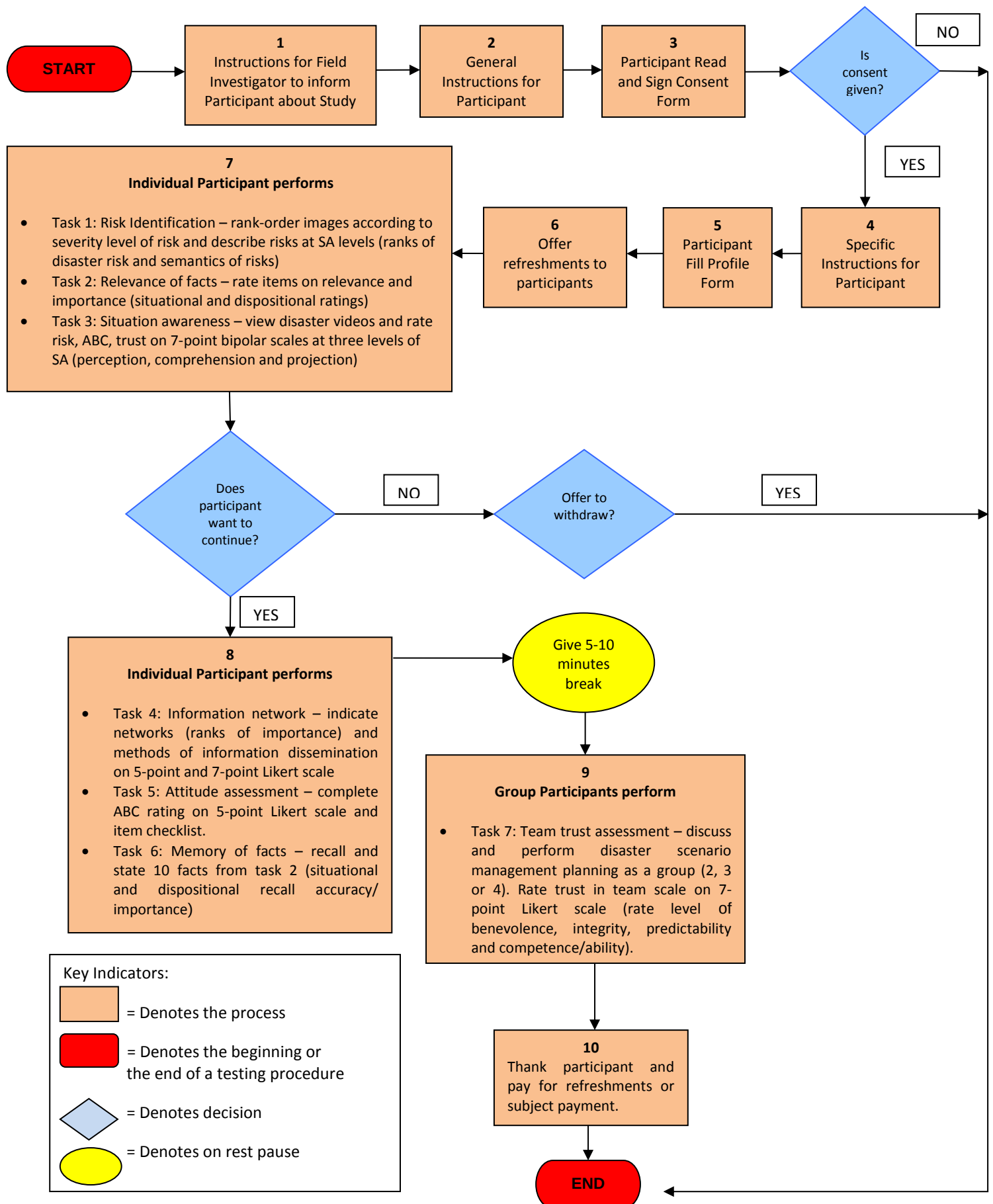


Figure 4. Flow chart for data gathering protocol

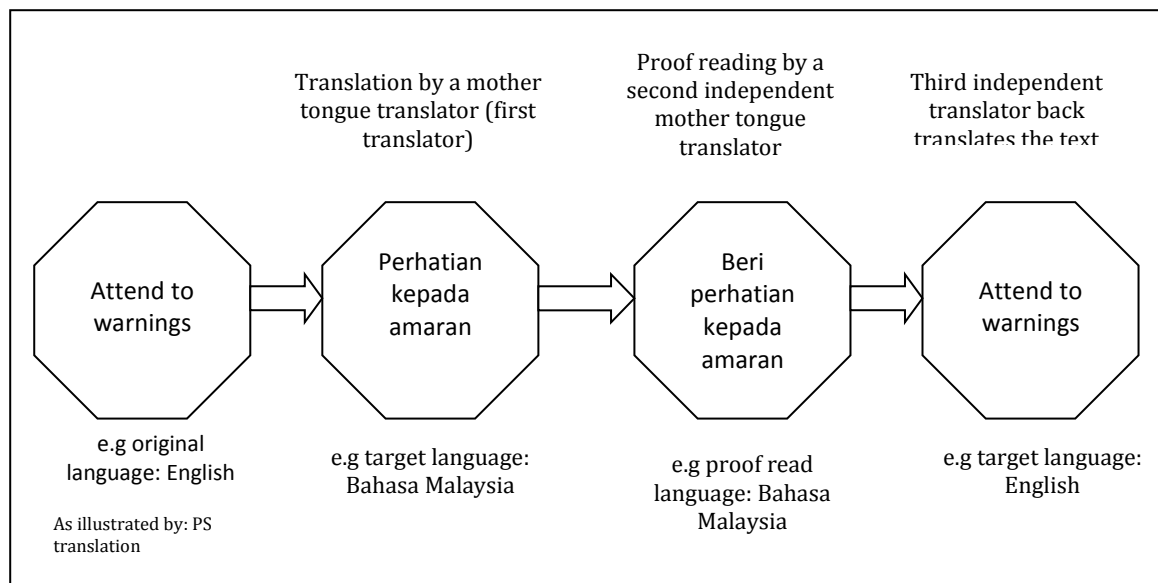


Figure 5. Translation and back translation process

3.6.2 Pilot study

A pilot study was done prior to the actual data collection. The purpose was to familiarize field investigators in the use of proper and ethical testing procedures. The translated test materials were pilot tested in order to identify any differences that could arise between test materials in the original and translated languages. Items that needed to be corrected based on the results obtained were modified accordingly.

3.6.3 Reliability and factor analysis

To test the internal consistency of items on the attitudinal scale in Task 3 for tsunami and terrorist attack condition, a reliability test was carried out (Table 5). According to Bowling (2002), an alpha of 0.5 or higher is considered a measure of acceptable internal consistency.

Table 5. Internal consistencies for attitudinal scale

Subscale	Cronbach's α (Tsunami)	Cronbach's α (Terrorist attack)	No. of items
Risk Identification	0.7	0.5	15
Cognition	0.6	0.5	15
Affect	0.8	0.8	15
Trust	0.8	0.7	15
Behavior	0.6	0.6	15

Next, a reliability analysis was used to test the internal consistency of the items on the team trust subscales (Task 7). Table 6 shows Cronbach's alpha coefficient obtained for the subscales of team trust. The range is between 0.8–0.9. Therefore, it was concluded that the items in the team trust subscales had good internal consistency.

Table 6. Internal consistencies for team trust scale

Team trust subscale	Cronbach's α	No. of items
Competence	0.8	4
Integrity	0.8	4
Benevolence	0.9	4
Predictability	0.8	4

A Principal Axis Factor (PAF) with a Varimax (orthogonal) rotation of 25 items on the attitudinal scale from each level of situation awareness was conducted using data gathered from 180 subjects. The data was split according to disaster type, with 91 subjects in the tsunami condition and 89 subjects in the terrorist attack condition.

Tsunami condition. First, it was observed that in all three levels of SA, there were at least 18 items that correlated with at least one other item which exceeded $r=0.3$. This suggested reasonable factorability (see results in Appendix 10a, Appendix 10b and Appendix 10c for perception, comprehension and projection, respectively). Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.6 for the perception level, and 0.7 for the comprehension level as well as the projection level, which were acceptable for factor analyses. Third, Bartlett's test of sphericity was significant for perception level, ($\chi^2 (300) = 656.51, p < .05$), comprehension level, ($\chi^2 (300) = 779.65, p < .05$) and projection level, ($\chi^2 (300) = 656.51, p < .05$). Fourth, the communalities were all above 0.3, further confirming that each item shared some common variance with other items.

Given these overall indicators, all 25 items in each level were seen as suitable for factor analysis. The item "Common - Unusual", "Look around – Focus on something" and "Do nothing – Do something" did not load above .5 on any factor for the varimax solution in perception level (see Table 7a). The item "Unafraid - Scared" did not load above .5 on any factor in comprehension level (see Table 7b). Finally, the item "Possible to escape - Impossible to escape", "Despair - Motivated", "Timely aid - Delayed aid" and "Help others - Help myself" did not load above .5 on any factor for the varimax solution in projection level (see Table 7c).

Terrorist attack condition. First, it was observed that in all three levels there were at least 19 items that correlated with at least one other item with an $r > 0.3$, suggesting reasonable factorability (see Appendix 11a, Appendix 11b and Appendix 11c, for perception, comprehension and projection, respectively). Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.7 for all three SA levels, which was acceptable for factor analysis. Third, Bartlett's test of sphericity was significant for perception level ($\chi^2 (300) = 677.13, p < .05$), comprehension level ($\chi^2 (300) = 735.39, p < .05$) and projection level ($\chi^2 (300) = 868.59, p < .05$). Finally, the communalities were all above 0.3 indicating that each item shared common variance with other items.

Given these overall indicators, all 25 items in each level were seen as suitable for factor analysis. Five items from the perception level did not load above .5 on any factor (see Table 8a). In the comprehension level, "Disagree to action – Agree to action" failed to load above .5 on any factor (see Table 8b). The items "Seek shelter – Remain exposed" and "Ignore help from others – Seek help from others" also failed to load above .5 at the projection level (see Table 8c).

Table 7a. Factor loadings for 25 items from the perception level of situation awareness in tsunami condition

Items	Factor(s)								Perceived Trust on Information
	Emotional Experience	Environment Assessment	External Interaction	Preliminary Action	Situation Assessment	Hazard Appraisal	Warning	Safety	
A2 Calm - Distressed	.846								
A1 Hysterical - In control	.755								
A4 Strong - Weak	.670								
C4 Peaceful - Chaotic		.787							
C5 Noisy - Quiet		.652							
A3 Inquisitive - Cannot care less		-.544							
B3 Look around - Focus on something									
T1 Distrust warning siren - Trust warning siren			.763						
T2 Listen to people shouting - Do not listen to people shouting			.736						
B5 Ignore information - Seek information			.595						
B2 Warn people - Remain silent				.741					
B1 Attend warnings - Ignore warning				.719					
A5 Worried - Cheerful				-.692					
B4 Do nothing - Do something									
C3 Active - Passive					-.757				
RI5 Constant - Varies					.659				
RI2 Fast development - Slow development					.585				
RI1 Low hazard - High hazard						.877			
RI4 Unstable - Stable						.516			
RI3 Much warning - No warning							-.860		
T4 Trust there is a safe place - Do not trust there is a safe place								.721	
C1 Human is angry - God is angry								.604	
T3 Doubt I can escape - Confident I can escape								.521	
T5 Do not trust information from others - Trust information from others									.754
C2 Common - Unusual									

Table 7b. Factor loadings for 25 items from the comprehension level of situation awareness in tsunami condition

Items	Factor(s)							
	Early Decision Making	Self-Vulnerability	Situational Trust	Situation Understanding	Reaction towards Understanding of Risk	Escape Assessment	Confidence on Survival	Risk Prediction
B8 Shout - Be quiet	-.775							
C9 Stagnant - Evolving	-.757							
C8 Turbulent - Calm	.711							
RI10 Impactful - Inconsequential	.705							
B9 Do not call out to anyone - Call out to someone	-.678							
C6 Safe - Dangerous		.822						
RI9 Not exposed to harm - Exposed to harm		.688						
A10 Vulnerable - Guarded		.636						
A9 Patient - Restless		.533						
A7 Threatening - Non threatening		.517						
T8 People can hear me - People cannot hear me			.823					
T6 Can make decision - Cannot make decision			.636					
B6 Take the lead - Follow others			.565					
T9 Able to contact people - Unable to contact people			.525					
T10 Understand type of danger - Cannot understand type of danger				.715				
C7 Easy to understand - Difficult to understand				.601				
A6 Unafraid - Scared								
B10 Freeze - Run					.796			
T7 Disagree to action - Agree to action					.702			
C10 Dynamic - Static						.775		
B7 Stay put - Get away						.700		
RI8 Many obstacles hinder action - No obstacles hinder action						-.529		
RI7 Acceptable risk - Too much risk							.773	
A8 Hopeful - Hopeless							.612	
RI6 Cannot foresee risk - Foresee risk								.822

Table 7c. Factor loadings for 25 items from the projection level of situation awareness in tsunami condition

Items	Factor(s)						
	Emotional Experience	Survival Assessment	Trust on Surrounding	Aid Dependency	Predicted Impact	Security	Potential Self-Risk
A11 Fearless - Fearful	.807						
A14 Relief - Traumatic	.749						
A13 Trapped - Freed	.718						
A12 Panic - Secure	.700						
RI15 Dead - Alive	.560						
B13 Ignore help from other - Seek help from others	-.555						
C11 Possible to escape - Impossible to escape							
RI11 Potential health risk - No health risk		.786					
B12 Seek shelter - Remain exposed		-.778					
B11 Act now, confront danger - Act later, stay away from danger		-.657					
C15 High fatality - Low fatality		.604					
T11 Believe situation will stabilize - Do not believe situation will stabilize			.784				
T12 Do not believe there will be shelter - Believe there will be shelter			.776				
B15 Use device to make contact - Do not use device to make contact			.649				
A15 Despair - Motivated							
T15 Believe device will work - Do not believe device will work				.733			
T13 Trust in help by authorities - Distrust in help by authorities				.679			
T14 No confidence in rescue team - Confidence in rescue team				.625			
C14 Opportunity for help - No opportunity for help				.595			
C12 Low destruction - High destruction					.845		
RI13 Threat to life - No threat to life						.785	
C13 Sustain injury - No injury						.539	
RI14 Timely aid - Delayed aid							
RI12 No safety risk - Safety risk							.666
B14 Help others - Help myself							

Table 8a. Factor loadings for 25 items from the perception level of situation awareness in terrorist attack condition

Items	Factor (s)							
	Situation Assessment	Hazard Assessment	Emotional Experience	Surrounding Condition	Trust in Safety	Warning	Survival Behavior	Risk Development
T1 Distrust warning siren - Trust warning siren	.714							
B5 Ignore information - Seek information	.697							
B1 Attend warnings - Ignore warning	.638							
C2 Common - Unusual	-.599							
B2 Warn people - Remain silent	.566							
T2 Listen to people shouting - Do not listen to people shouting	.559					.507		
T5 Do not trust information from others - Trust information from others								
B3 Look around - Focus on something								
R11 Low hazard - High hazard		.831						
C4 Peaceful - Chaotic		.804						
A5 Worried - Cheerful			.796					
A2 Calm - Distressed			.707					
A1 Hysterical - In control			.681					
R14 Unstable - Stable				.812				
C5 Noisy - Quiet				.708				
T3 Doubt I can escape - Confident I can escape					.800			
T4 Trust there is a safe place - Do not trust there is a safe place					.724			
C1 Human is angry - God is angry								
R15 Constant - Varies								
R13 Much warning - No warning						.834		
B4 Do nothing - Do something							.693	
A4 Strong - Weak							.557	
A3 Inquisitive - Cannot care less							.535	
C3 Active - Passive								-.803
R12 Fast development - Slow development								

Table 8b. Factor loadings for 25 items from the comprehension level of situation awareness in terrorist attack condition

Items		Factor(s)								
		Emotion experience	Survival Behavior	Trustability	Hazard Assessment	Escape Assessment	Risk Prediction	Decision Making	Escape Assessment	Risk Development
A9	Patient - Restless	.825								
A6	Unafraid - Scared	.710								
C6	Safe - Dangerous	.661								
B10	Freeze - Run	.813								
B9	Do not call out to anyone - Call out to someone	.799								
B8	Shout - Be quiet	.532								
T6	Can make decision - Cannot make decision			.785						
T9	Able to contact people - Unable to contact people			.759						
T8	People can hear me - People cannot hear me			.671						
A8	Hopeful - Hopeless			.559						
C8	Turbulent - Calm				.829					
A7	Threatening - Non threatening				.678					
A10	Vulnerable - Guarded				.546					
RI7	Acceptable risk - Too much risk					.720				
B7	Stay put - Get away		.565			-.627				
C7	Easy to understand - Difficult to understand					.604				
RI6	Cannot foresee risk - Foresee risk						.820			
RI9	Not exposed to harm - Exposed to harm						.586			
T10	Understand type of danger - Cannot understand type of danger							.772		
B6	Take the lead - Follow others							.676		
RI10	Impactful - Inconsequential								.633	
RI8	Many obstacles hinder action - No obstacles hinder action								.620	
C10	Dynamic - Static								-.548	
C9	Stagnant - Evolving									.875
T7	Disagree to action - Agree to action									

Table 8c. Factor loadings for 25 items from the projection level of situation awareness in terrorist attack condition

Items		Factor(s)							
		Trust on Survivability	Vulnerability	Survivability Assessment	Predicted Impact	Projected Safety	Contact with Surrounding	Aid Dependability	Survival Behavior
T14	No confidence in rescue team - Confidence in rescue team	.834							
T15	Believe device will work - Do not believe device will work	.759							
T13	Trust in help by authorities - Distrust in help by authorities	.728							
T12	Do not believe there will be shelter - Believe there will be shelter	.669							
T11	Believe situation will stabilize - Do not believe situation will stabilize	.655							
A15	Despair - Motivated		.742						
A13	Trapped - Freed		.741						
A12	Panic - Secure		.649						
C15	High fatality - Low fatality			.765					
C13	Sustain injury - No injury			.687					
RI15	Dead - Alive			.624					
RI13	Threat to life - No threat to life			.602					
C14	Opportunity for help - No opportunity for help			.511					
A11	Fearless - Fearful				.765				
C12	Low destruction - High destruction				.725				
A14	Relief - Traumatic				.669				
RI11	Potential health risk - No health risk					.844			
C11	Possible to escape - Impossible to escape					-.706			
B15	Use device to make contact - Do not use device to make contact						.810		
B14	Help others - Help myself						-.547		
B12	Seek shelter - Remain exposed								
RI14	Timely aid - Delayed aid							.767	
RI12	No safety risk - Safety risk							-.659	
B13	Ignore help from other - Seek help from others								
B11	Act now, confront danger - Act later, stay away from danger								-.857

4 RESULTS

The results are reported in two sections. This Section 4 presents quantitative analyses using statistics including ANOVA, Pearson Correlation, Kendall's W, Welch's Test and Kruskal Wallis to test the hypotheses based on the given tasks 1-7 at the 5% significance level. The next Section 5 presents a semantic analysis of narratives using text mining of responses given by subjects for the risk identification and SA attitudinal tasks. Descriptive information of the subjects are given in Appendix 12.

4.1 Cultural Cognition of Communities

4.1.1 Relevance of Facts

The relevance of facts test was used to measure subject's assessments of situational versus dispositional facts of disaster-related scenarios. One-way analysis of variance (ANOVA) was performed on the relevance of facts data (see Task 2) to understand the cultural cognition of the Southeast Asian communities (Malaysians, Indonesians) and to test the effects of sociocultural factors (i.e. ethnicity, gender, age groups) using the relevance of facts subscales. In the case of violations of the homogeneity of variance assumption, the Welch's *F* test (nonparametric statistics) was carried out. All analyses were tested at the 5% significance level.

4.1.1.1 Regional group data

Table 9 presents the results of relevance of facts data for the two communities summed across all sociocultural variables. The results show significant differences for the subscales: TOTDIS, MRELDIS and MRELSIT, whereby Malaysians differed significantly from Indonesians on mean relevancy of dispositional items, $F(1, 178) = 10.45$, $p = 0.001$, and situational items, $F(1, 178) = 9.81$, $p = 0.002$. The Indonesians were only different in total dispositional items, $F(1, 178) = 3.91$, $p = 0.05$. This implies that Malaysians required both situational and dispositional facts in their decision making, while Indonesians relied on facts associated with disposition only to make a decision.

Table 9. Effect of community group on relevance of facts measures

		Sum of Squares	df	Mean Square	F	Sign.
TOTDIS	Between Groups	32.09	1	32.09	3.91	0.05*
	Within Groups	1462.36	178	8.22		
	Total	1494.44	179			
MRELDIS	Between Groups	5.44	1	5.44	10.45	0.001***
	Within Groups	92.73	178	0.52		
	Total	98.18	179			
MRELSIT	Between Groups	5.64	1	5.64	9.81	0.002**
	Within Groups	102.40	178	0.58		
	Total	108.05	179			

Table 10 shows the Welch's test performed on the regional group data. There were no significant differences between means scores of both groups in TOTSIT and TOTREL. Similarly, there were no significant differences between genders in any of the five measured variables of relevance of facts.

Table 10. Welch's F test for relevance of facts measures

	Statistic ^a	df1	df2	Sig.
TOTSIT	0.83	1	160.73	0.36
TOTRELV	2.58	1	161.42	0.11

4.1.1.2 National group data

a. Malaysian

To analyze further the differences at national level, the dataset was split into two groups: Malaysian and Indonesian, and ANOVA tests were performed on the data. Table 11 presents the results of gender. Clearly, Malaysian males and females differed significantly on total situational (TOTSIT) items, $F(1, 88)=5.03$, $p<0.03$, where Malaysian females ($\bar{X}=6.76$) made more situational attributions compared to Malaysian males ($\bar{X}=5.63$). But there were no significant differences between the genders on TOTDIS, MRELDIS, MRELSIT and TOTRELV.

Table 11. Effect of gender on Malaysian relevance of facts measures

		Sum of Squares	df	Mean Square	F	Sig.
TOTDIS	Between Groups	0.67	1	0.68	0.10	0.75
	Within Groups	587.72	88	6.68		
	Total	588.40	89			
TOTSIT	Between Groups	26.50	1	26.50	5.03	0.03*
	Within Groups	464.12	88	5.27		
	Total	490.62	89			
MRELDIS	Between Groups	0.78	1	0.78	2.41	0.12
	Within Groups	28.66	88	0.33		
	Total	29.44	89			
MRELSIT	Between Groups	0.00	1	0.00	0.00	0.97
	Within Groups	46.70	88	0.53		
	Total	46.70	89			
TOTRELV	Between Groups	18.71	1	18.71	1.04	0.31
	Within Groups	1585.78	88	18.02		
	Total	1604.49	89			

b. Indonesian

The Indonesian males and females, however, were similar in their assessments of relevance of facts on all five measures.

4.1.2 Memory of Facts

The memory of facts (MoF) test measured the recall of situational versus dispositional facts relevant to the presented scenarios. Pearson correlation was performed to map the relationships between relevance of facts (Task 2) and memory of facts (Task 5).

4.1.2.1 Regional group data

ANOVA tests on the MoF data for the three measured variables: TOTMF, TOTMFSIT and TOTMFDIS, revealed no significant differences between communities and genders at 5% probability level. In other words, both communities were similar in their recall of facts. However, the results of Pearson correlation showed a low positive correlation between TOTDIS and TOTMFDIS ($r=0.16$), see Table 12.

This means that subjects who made dispositional attributions in the RoF task were able to recall more dispositional facts in the MoF task.

Table 12. Relationship between memory of facts (MoF) and relevance of facts (RoF)

		TOTMFSIT	TOTMFDIS	TOTDIS	TOTSIT
TOTMFSIT	Pearson Correlation	1			
	Sig. (2-tailed)				
TOTMFDIS	N	180			
	Pearson Correlation	0.37**	1		
TOTDIS	Sig. (2-tailed)	.0001			
	N	180	180		
TOTSIT	Pearson Correlation	0.05	0.16*	1	
	Sig. (2-tailed)	0.51	0.03		
	N	180	180	180	
	Pearson Correlation	0.07	0.03	0.62**	1
	Sig. (2-tailed)	0.39	0.73	0.0001	
	N	180	180	180	180

From Table 12, it was apparent that there was highly significant correlation between total situational facts and total dispositional facts in the MoF task, $r=0.37$, $p<0.0001$. Similarly, a highly significant correlation was found between total dispositional and total situational in the RoF task, $r=0.62$, $p<0.0001$. This implies that subjects identified and recalled the relevant facts differently in both tasks.

4.2 Risk Identification

4.2.1 Regional group data

The severity of risk hazards was ranked by the communities based on photographs that were presented to them. The results are presented below for each type of disaster.

4.2.1.1 Tsunami

Table 13 shows subjective rankings of images according to the severity level of risks as perceived by subjects. Malaysians and Indonesians differed in perceived risk, where Malaysians ranked image 5 and Indonesians ranked image 6 as having the most severe risk (Appendix 13a for tsunami). However, both communities ranked Image 4 as depicting lowest risk (see Appendix 2a).

Table 13. Mean rank in risk identification of tsunami images by communities

Communities	Risk severity level	Image number	Mean rank
Malaysia (n=45)	Rank 1	5	2.82
	Rank 2	6	3.21
	Rank 3	2	3.24
	Rank 4	1	3.26
	Rank 5	3	3.78
	Rank 6	4	4.69
Indonesia (n=46)	Rank 1	6	2.93
	Rank 2	2	3.11
	Rank 3	1	3.30
	Rank 4	5	3.33
	Rank 5	3	3.65
	Rank 6	4	4.67

To test the level of agreement, we used Kendall's W, as summarized in Table 14. Despite low agreement among the subjects, the agreement was highly significant, with the coefficient of concordance, $W=0.12$, $p<0.001$ for Malaysians, and $W=0.11$, $p<0.001$ for Indonesians. It can be concluded that significant agreement existed between communities in identifying risks associated with natural disasters such as a tsunami.

Table 14. Measure of agreement between communities in identification of tsunami risks

National group	N	Kendall's W	df	Sig.
Malaysia	45	0.12	5	0.001
Indonesia	46	0.11	5	0.001

4.2.1.2 Terrorist attack

Table 15 presents the rankings of terrorist attack images with respect to severity of risk as perceived by both communities. Clearly, both nationalities ranked image 5 as portraying high risk (Appendix 13b), while image 6 had the lowest risk (Appendix 2b).

Table 15. Mean rank in risk identification of terrorist attack images by communities

National group	Risk severity level	Image number	Mean rank
Malaysia (n=45)	Rank 1	5	2.56
	Rank 2	2/3	2.98
	Rank 3	3/2	2.98
	Rank 4	4	3.73
	Rank 5	1	4.07
	Rank 6	6	4.69
Indonesia (n=44)	Rank 1	5	2.58
	Rank 2	2	2.98
	Rank 3	1	3.20
	Rank 4	3	3.47
	Rank 5	4	3.64
	Rank 6	6	5.14

There was low agreement among Malaysians in identifying the risks; the coefficient of concordance achieved was $W=0.18$, $p<0.001$, see Table 16. However, the agreement was statistically significant. On the other hand, the Indonesians achieved a higher agreement among themselves in identifying risks, $W=0.22$, $p<0.001$, which was also statistically significant at $p<0.001$. Therefore, it can be concluded that significant agreement existed between individuals in risk identification for human-induced disasters such as a terrorist attack.

Table 16. Measure of agreement between communities in identification of terrorist attack risks

National Group	N	Kendall's W	df	Sig.
Malaysia	45	.18	5	0.001
Indonesia	44	.22	5	0.001

4.3 Situation Awareness

Task 3 measured five risk attitudinal components at three levels of SA and tested the effects of nationality and gender on these measures. One-way ANOVA was performed on the data which was split according to disaster type: tsunami and terrorist attack.

4.3.1 Regional group data

4.3.1.1 Tsunami

One-way ANOVA test revealed significant effects of nationality on all three levels of SA (see Table 17). At the perception level, there were significant differences in risk identification, $F(1,89) = 8.93$, $p < 0.01$; cognition, $F(1,89) = 6.26$, $p < 0.01$; and trust, $F(1,89) = 10.77$, $p < 0.001$. At the comprehension level, there were highly significant differences in risk identification, $F(1,89) = 38.47$, $p < 0.001$; cognition, $F(1,89) = 4.00$, $p < 0.05$; affect, $F(1,89) = 16.73$, $p < 0.001$, and behavior $F(1,89) = 4.52$, $p < 0.05$. Lastly, at the projection level, there were significant differences in risk identification, $F(1,89) = 4.12$, $p < 0.05$; cognition, $F(1,89) = 15.68$, $p < 0.001$; affect, $F(1,89) = 7.95$, $p < 0.01$, and behavior, $F(1,89) = 5.05$, $p < 0.03$.

Table 17. Effects of nationality on risk attitude towards tsunami at 3 SA levels

SA Level	Process Variables	Mean and Std. Deviation (bracket)		Sig.
		Malaysian	Indonesian	
Perception	Risk identification	11.91 (5.16)	14.96 (4.55)	0.004*
	Cognition	13.38 (4.33)	15.57 (4.00)	0.01*
	Affect	15.49 (5.04)	15.87 (6.42)	0.75
	Trust	22.78 (7.65)	26.91 (3.76)	0.001*
	Behavior	30.76 (3.69)	30.04 (4.27)	0.40
Comprehension	Risk identification	10.67 (4.59)	16.24 (3.96)	0.0001*
	Cognition	16.80 (3.47)	18.24 (3.39)	0.05*
	Affect	10.44 (5.14)	15.04 (5.57)	0.0001*
	Trust	19.76 (6.62)	22.07 (4.99)	0.06
	Behavior	28.78 (3.75)	27.02 (4.11)	0.04*
Projection	Risk identification	10.02 (4.45)	11.93 (4.54)	0.05*
	Cognition	12.38 (5.16)	16.54 (4.87)	0.0001*
	Affect	10.02 (4.75)	13.23 (6.04)	0.01*
	Trust	22.56 (7.82)	24.96 (5.75)	0.10
	Behavior	27.44 (4.23)	25.43 (4.30)	0.03*

From Table 17, it can be concluded that Indonesian situation awareness was greater than Malaysians on all 3 levels of SA. In particular, they perceived risks and were able to trust what they saw at the perception level. They continued to identify risks at the comprehension level which affected their emotions. At the projection level, they are aware of the risks and relied on cognitive skills to make decisions, while they continue to be affected emotionally. Malaysians, on the other hand, lacked experience with disasters and perhaps for this reason were less influenced by the disaster situation. The data was split again according to national groups to test any differential effect of gender on risk attitudes of Malaysians and Indonesians.

a. Malaysian

There were significant gender differences in perception, comprehension and projection among Malaysians (Table 18). At the perception level, there was a significant difference between males and females in behavior, $F(1,43) = 6.50$, $p < 0.01$. At the comprehension level, there were significant differences between genders in affect, $F(1,43) = 4.16$, $p < 0.05$, and trust, $F(1,43) = 9.77$, $p < 0.005$. At the projection level, there was a significant difference of gender on affect, $F(1,43) = 4.64$, $p < 0.05$.

Table 18. Effect of gender on risk attitude of Malaysians towards tsunami at 3 SA levels

SA Level	Process Variables	Mean and Std. Deviation (bracket)		Sig.
		Male	Female	
Perception	Risk identification	11.84 (6.09)	11.96 (4.48)	0.94
	Cognition	13.36 (4.33)	13.38 (4.41)	0.99
	Affect	17.10 (3.74)	14.30 (5.58)	0.07
	Trust	23.42 (8.56)	22.30 (7.04)	0.64
	Behavior	29.21 (3.82)	31.88 (3.20)	0.01*
Comprehension	Risk identification	10.26 (4.59)	10.96 (4.66)	0.62
	Cognition	16.57 (4.10)	16.96 (3.01)	0.72
	Affect	12.21 (5.94)	9.15 (4.11)	0.05*
	Trust	23.05 (5.34)	17.34 (6.50)	0.003*
	Behavior	29.42 (4.40)	28.30 (3.20)	0.33
Projection	Risk identification	10.89 (4.68)	9.38 (4.25)	0.27
	Cognition	13.36 (4.83)	11.65 (5.36)	0.28
	Affect	11.73 (4.44)	8.76 (4.65)	0.04*
	Trust	24.42 (8.34)	21.19 (7.26)	0.17
	Behavior	27.68 (4.04)	27.26 (4.44)	0.75

From Table 18, Malaysian females were less affected emotionally at the comprehension level than males, but they also had less trust than males. At the projection level, males again were influenced emotionally by the disaster.

b. Indonesian

With Indonesians, the males differed significantly from the females at the perception level and projection levels (Table 19). At the perception level, there was a significant difference in affect, $F(1,44) = 5.89$, $p < 0.02$. At the projection level, there were highly significant differences in risk identification, $F(1,44) = 8.54$, $p < 0.01$, and affect, $F(1,44) = 14.17$, $p < 0.001$.

Table 19. Effect of gender on risk attitude of Indonesians toward tsunami at 3 SA levels

SA Level	Process Variables	Mean and Std. Deviation (bracket)		Sig.
		Male	Female	
Perception	Risk identification	15.00 (4.37)	14.86 (5.04)	0.93
	Cognition	15.61 (4.12)	15.46 (3.88)	0.91
	Affect	17.38 (6.07)	12.73 (6.15)	0.02*
	Trust	26.83 (4.21)	27.06 (2.71)	0.85
	Behavior	29.22 (4.18)	31.73 (4.07)	0.06
Comprehension	Risk identification	16.74 (3.83)	15.20 (4.14)	0.22
	Cognition	17.93 (3.43)	18.86 (3.31)	0.39
	Affect	15.61 (5.93)	13.86 (4.68)	0.32

Projection	Trust	22.22 (4.43)	21.73 (6.13)	0.76
	Behavior	26.45 (4.48)	28.20 (3.00)	0.18
	Risk identification	13.19 (4.71)	9.33 (2.79)	0.005*
	Cognition	17.00 (4.53)	15.60 (5.53)	0.37
	Affect	15.29 (5.67)	9.00 (4.44)	0.0001*
	Trust	24.67 (5.16)	25.53 (6.96)	0.64
	Behavior	24.74 (4.19)	26.86 (4.29)	0.12

From Table 19, it can be concluded that, from an emotional perspective, Indonesian males were more affected than females when they identified the risks at the perception and projection levels.

4.3.1.2 Terrorist attack

Unlike the tsunami condition, the effects of nationality on risk attitudes in terrorist attack condition were found only in one component at each SA level (Table 20). At the perception level, there was a significant difference between Malaysians and Indonesians in trust, $F(1,87) = 5.53$, $p < 0.03$. At the comprehension level, there was a highly significant effect of nationality on affect, $F(1,87) = 16.20$, $p < 0.0001$. At the projection level, there was a significant difference between the national groups in cognition, $F(1,87) = 8.00$, $p < 0.01$.

Table 20. Effect of nationality on risk attitude towards terrorist attack at 3 SA levels

SA Level	Process Variables	Mean and Std. Deviation (bracket)		Sig.
		Malaysian	Indonesian	
Perception	Risk identification	12.53 (4.60)	13.27 (4.29)	0.44
	Cognition	11.93 (3.76)	12.93 (3.10)	0.18
	Affect	14.80 (4.70)	16.05 (5.43)	0.25
	Trust	23.89 (5.78)	26.50 (4.62)	0.02*
	Behavior	29.87 (4.94)	29.95 (4.21)	0.93
Comprehension	Risk identification	12.84 (5.04)	14.55 (4.35)	0.09
	Cognition	16.80 (3.40)	17.30 (3.75)	0.52
	Affect	9.20 (4.20)	13.30 (5.34)	0.0001*
	Trust	20.73 (6.69)	20.82 (6.06)	0.95
	Behavior	27.56 (4.58)	26.30 (4.30)	0.19
Projection	Risk identification	12.11 (3.99)	12.25 (4.05)	0.87
	Cognition	13.62 (4.74)	16.31 (4.24)	0.006*
	Affect	11.00 (6.39)	13.04 (5.57)	0.11
	Trust	23.47 (6.89)	25.34 (5.99)	0.18
	Behavior	25.64 (4.46)	24.75 (3.65)	0.30

The same procedure was applied to the terrorist attack data, which was split again according to national groups to investigate the effect of gender on attitudes at the SA levels.

a. Malaysian

There was no gender effect for any of the three levels of SA for the Malaysian sample at $p < 0.05$ level.

b. Indonesian

In the Indonesian sample, there was only one significant difference found, which was in behavior at the comprehension level, $F(1,42) = 5.10$, $p < 0.03$ (see Table 21).

Table 21. Effect of gender on Indonesian's risk attitude towards terrorist attack at 3 SA levels

SA Level	Process Variables	Mean and Std. Deviation (bracket)		Sig.
		Male	Female	
Perception	Risk identification	13.18 (3.81)	13.41 (5.07)	0.87
	Cognition	12.74 (2.72)	13.23 (3.68)	0.61
	Affect	16.74 (5.25)	14.94 (5.68)	0.29
	Trust	26.48 (4.43)	26.52 (5.05)	0.97
	Behavior	30.00 (3.78)	29.88 (4.93)	0.93
Comprehension	Risk identification	14.96 (4.02)	13.88 (4.88)	0.43
	Cognition	17.85 (4.04)	16.41 (3.14)	0.22
	Affect	13.00 (5.79)	13.76 (4.65)	0.65
	Trust	21.25 (6.24)	20.11 (5.87)	0.55
	Behavior	25.18 (4.54)	28.05 (3.28)	0.03*
Projection	Risk identification	12.03 (4.05)	12.58 (4.16)	0.67
	Cognition	16.14 (.21)	16.58 (4.38)	0.74
	Affect	13.18 (5.15)	12.82 (6.32)	0.84
	Trust	24.51 (6.23)	26.64 (5.51)	0.26
	Behavior	24.22 (3.59)	25.58 (3.69)	0.23

4.4 ABC Assessment

Table 22 summarizes the results of ABC assessments in terms of perceived impact on affect, behavior, cognition (ABC) from watching the tsunami and terrorist attack videos.

Table 22. Impact of watching disaster video on affect, behavior and cognition domains

Domains	Measures	Tsunami	Terrorist attack
Affective	Anger	Moderate impact	High impact
	Fear	Severe impact	High impact
	Sadness	Severe impact	High impact
Behavior	Approach	Create awareness, Donate	Create awareness, Donate
	Avoidance	-	-
	Immobility	Offer prayers that have no certain outcome	Offer prayers that have no certain outcome
Cognition	Physical	Severe impact	High impact
	Psychological	Severe impact	High impact
	Social relations	High impact	High impact
	Moral/Spiritual	High impact	High impact

To test the hypotheses that Indonesians differed from Malaysians in terms of their ABC, and that males and females also differed in terms of their ABC, the Kruskal-Wallis test was used to compare the means of nationality and gender for each domain of affective, behavior and cognition.

4.4.1 Tsunami

Watching a tsunami disaster video did not influence the affect of national groups in terms of anger, fear and sadness. However, there was an influence of gender on the feeling of fear towards tsunami

where females rated greater fear than males, but these results were not significantly different, $\chi^2 = 3.80$, $p = 0.51$ (Table 23).

Table 23. Gender comparisons of anger, fear and sadness in gender in tsunami condition

Measures	Gender	N	Mean rank	df	Chi-Square	Sig.
Anger	Male	50	46.07	1	0.00	0.98
	Female	41	45.91			
Fear	Male	50	41.43	1	3.80	0.05
	Female	41	51.57			
Sadness	Male	50	41.72	1	3.53	0.06
	Female	41	51.22			

Kruskal-Wallis test was used to compare the means of national groups and gender in avoidance, approach and immobility behavior. There was no significant difference of national groups and gender in these behaviors. However, the test revealed a significant difference of national groups in tsunami condition for psychological impact, $\chi^2 = 7.31$, $p = 0.007$ (Table 24).

Table 24. Nationality comparisons of physical, psychological, social relationships and moral/spiritual in tsunami condition

Measures	Nationality	N	Mean rank	df	Chi-Square	Sig.
Physical	Malaysian	45	45.20	1	0.10	0.75
	Indonesian	46	46.78			
Psychological	Malaysian	45	39.13	1	7.31	0.007*
	Indonesian	46	52.72			
Social relationships	Malaysian	45	47.03	1	0.16	0.69
	Indonesian	46	44.99			
Moral/spiritual	Malaysian	45	43.28	1	1.13	0.29
	Indonesian	46	48.66			

4.4.2 Terrorist attack

There was no influence of nationality on affect, expressed as anger, fear or sadness in the terrorist attack condition. There was, however, a significant gender difference for sadness in terrorist attack condition, $\chi^2 = 7.67$, $p = .006$. Female participants rated higher impact of sadness than male participants (Table 25).

Table 25. Comparison of anger, fear and sadness in gender for terrorist attack condition

	Gender	N	Mean rank	df	Chi-Square	Sig.
Anger	Male	40	49.99	1	3.23	0.07
	Female	49	40.93			
Fear	Male	40	40.01	1	3.22	0.07
	Female	49	49.07			
Sadness	Male	40	37.38	1	7.67	0.006*
	Female	49	51.22			

Kruskal-Wallis test indicated that there was no significant difference of national groups and gender in avoidance, approach and immobility behaviors. Besides, there was also no significant difference

detected in national groups and gender for perceived physical, psychological, social relationships and moral/spiritual impact of the disasters.

4.5 Information Networks

4.5.1 Information dissemination by Malaysians

Figure 6 presents the top five recipients of disaster information as ranked by Malaysian subjects. Spouse/Partner was ranked as the first recipient of information, followed by Parents in second and third ranking. The fourth recipient was siblings, followed by Friends as the fifth recipient of disaster information. The preferred method of communication with all five recipients was using voice call, suggesting that disaster victims prefer to connect directly via voice rather than using other social media modes.

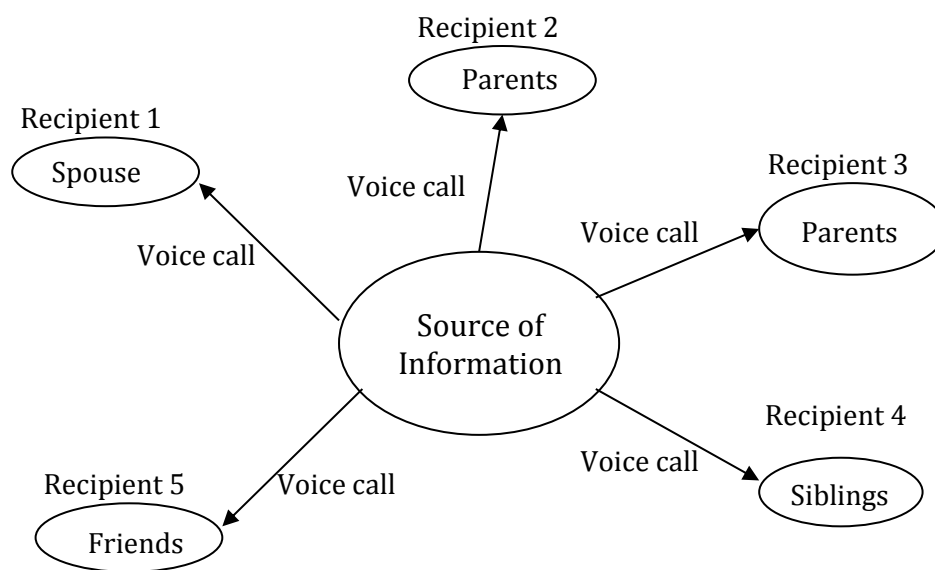


Figure 6. Top five recipients of disaster information with method of communication by Malaysian subjects

To illustrate the concepts in information dissemination, we used a text mining technique, *Leximancer* (<https://www.leximancer.com>) to analyze the narratives. Groups of concepts that co-occur together throughout the entire text corpus are depicted in the form of themes. These themes are presented in the form of heat-mapped where hot colors (red, orange) denote the most important themes, and cool colors (blue, green) denote those less important. Commonality or connectedness of the emerged concepts can be deduced from their close proximity to each other as seen on the concept map.

Figure 7 shows a semantic map for the first ranked recipient i.e. 'Spouse/Partner'. Malaysians expected them to disseminate the disaster information to 'Parents' which emerged as a dominant theme. This first level of dissemination includes relatives, children and siblings. The second level of dissemination by Spouse/Partner is to alert the local authorities, public and other family members, as shown in the second theme 'Local Authorities'. They also assumed that the Spouse/Partner would inform the 'Police' and government at the third level of dissemination.

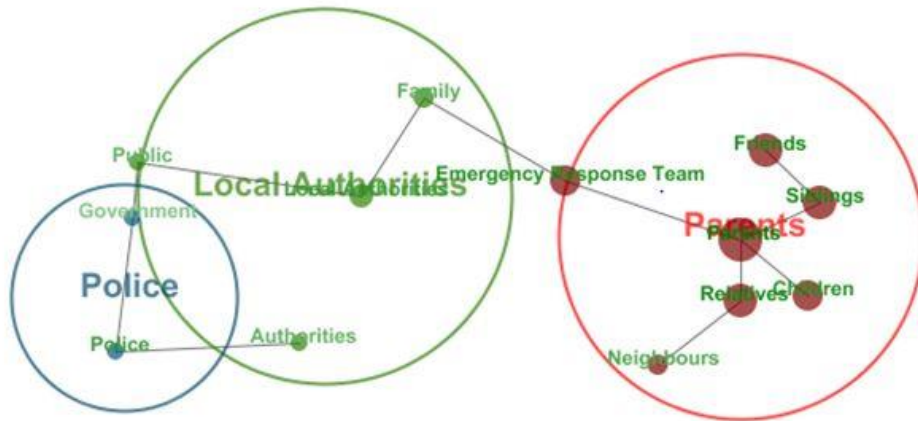


Figure 7. Semantic maps of information dissemination for first ranked recipient 'spouse/partner' as projected by Malaysian subjects

Next, Malaysians anticipated the second and third ranked recipient 'Parents' to immediately inform relatives, friends, co-workers and neighbors about the disaster information they received from subjects. At the following two levels, they expected their parents to notify parties such as the emergency response team, local authorities and police so that appropriate measures can be taken in dealing with the disaster.

Finally, siblings and friends were ranked as the fourth and fifth recipient, respectively, of the disaster information. The same trend in information dissemination was found between both recipients across all three levels of network. They assumed that both siblings and friends would first inform their parents, partner, children and relatives. The following groups, at the second level, would be neighbors, local authorities, followed by community, co-workers and police at the last level.

4.5.2 Information dissemination by Indonesians

The ranking of the top five recipients of disaster information by Indonesian subjects was quite similar to the Malaysian subjects (Figure 8). 'Parents' were ranked as the first and third recipients while 'Siblings' were ranked as the second as well as the fourth recipients of disaster information. 'Friends' were ranked as the fifth recipient. Voice call was again the preferred communication method to contact the top five recipients.

Figure 9 illustrates the semantic map of information dissemination for Indonesians' first ranked recipient, 'Parents'. The dominant theme is 'Relatives,' followed by 'Emergency Response Team' and 'Family'. They expected their parents to convey the disaster information to individuals such as siblings, neighbors, children and friends at the first level. Next, their parents would make contact with the local authorities and emergency response team as well as notifying their colleagues about the disaster. Finally, they would inform extended family members.

For the second ranked recipient 'Siblings', Indonesians assumed that a similar approach to information dissemination would take place at the first and second levels as for the previous recipient. The only difference was at the third level, where authoritative individuals such as police were informed.

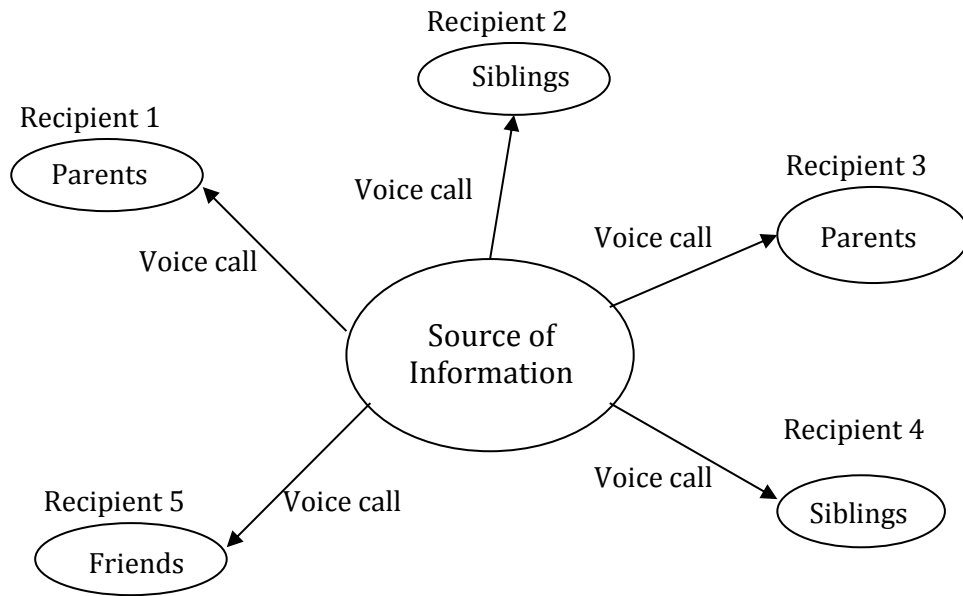


Figure 8. Top five recipients of disaster information with method of communication chosen by Indonesian subjects

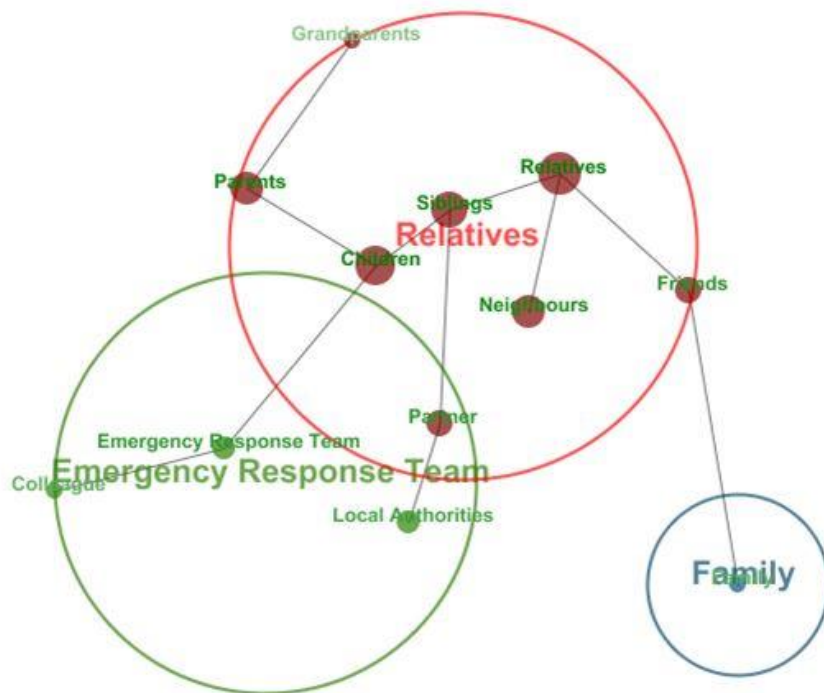


Figure 9. Semantic maps of information dissemination for first ranked recipient 'parents' as projected by Indonesian subjects

Indonesians' choice for third recipient in receiving the disaster information was once again 'parents'. Parents would first inform individuals including children, relatives, partner and siblings. Next, they would notify co-workers and strangers, followed by authority officials such as police and extended family members.

For the fourth and fifth ranked recipient, Indonesians selected siblings and friends, respectively, to receive the disaster information. Subjects presumed that both recipients would contact parents, children, partner and relatives at the first level, followed by individuals such as strangers and colleague. Finally, at the third level, they would inform the community and police about the disaster information they received.

4.5.3 Preferred communication mode

Participants unanimously chose Voice call using land line/hand phone as the preferred method to communicate with all five recipients. They also rated Voice call using landline/hand phone as the most effective method to communicate (Table 26). Sending distress signals and verbal messages were rated as the second and third most effective method. Meanwhile, the non-verbal method of instant message using smartphone and text message using mobile phone was rated as the least effective method in disseminating disaster information. There was no meaningful relationship between the everyday use of communication device and the method participants chose to contact the five recipients in disaster situation. This implies that direct human-to-human interaction is important to disaster prone victims rather than indirect ways of social media.

Table 26. Effectiveness of communication methods

Communication method	Malaysia	Indonesia
Voice call using land line/hand phone	6.08	6.03
Send distress signal	5.06	5.27
Verbal message	5.40	4.07
Instant message using smart phone	4.70	4.28
Text message using mobile phone	4.29	4.18

4.6 Team Trust

4.6.1 Regional group

A Pearson correlation test was performed to test the hypothesis regarding the relationships between the four subscales of team trust measures, namely: competence, integrity, benevolence and predictability. Two Malaysian subjects were excluded from the analyses as they did not complete the group task and team trust scale, thereby the total number of subjects was 178. The results are presented in Table 27. There are high positive correlations between all four subscales of the team trust measure, where:

- competence*integrity, $r=0.88$, $p<0.0001$;
- competence*benevolence, $r=0.84$, $p<0.0001$;
- competence*predictability, $r=0.85$, $p<0.0001$;
- benevolence*integrity, $r=0.80$, $p<0.0001$;
- predictability*benevolence, $r=0.85$, $p<0.0001$;
- predictability*integrity, $r=0.86$, $p<0.0001$.

Table 27. Pearson correlation between team trust subscales

		COMPETENCE	INTEGRITY	BENEVOLENCE	PREDICTABILITY
COMPETENCE	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	178			
INTEGRITY	Pearson Correlation	0.88**	1		
	Sig. (2-tailed)	0.0001			
	N	178	178		
BENEVOLENCE	Pearson Correlation	0.84**	0.80**	1	
	Sig. (2-tailed)	0.0001	0.0001		
	N	178	178	178	
PREDICTABILITY	Pearson Correlation	0.85**	0.86**	0.85**	1
	Sig. (2-tailed)	0.0001	0.0001	0.0001	
	N	178	178	178	178

** Correlation is highly significant at $p < 0.01$ level (2-tailed).

A non-parametric test, Kruskal Wallis H (equivalent to one-way analyses of variance) was carried out to test if subjects from different national groups, genders, and age groups scored differently on the four measured subscales of team trust (Table 28). There were no significant differences at $p < .05$ level for the mean rank scores of the four team trust subscales across national groups, with the exception of Benevolence subscale, $H(1)=4.66$, $p < 0.05$, where Malaysians (Mean Rank=97.77) scored higher on the Benevolence subscale, compared to Indonesians (Mean Rank=81.41).

Table 28. Kruskal Wallis test on team trust subscales for nationality

	COMPETENCE	INTEGRITY	BENEVOLENCE	PREDICTABILITY
Chi-Square	2.74	0.85	4.66	0.05
df	1	1	1	1
Sig.	0.10	0.36	0.03*	0.83

The evaluation of team trust was based on team performance of either passing or failing the group task. There were no significant differences for any of the subscales (Table 29). Finally, no significant difference was found between genders for any of the team trust subscales.

Table 29. Kruskal Wallis test on team trust subscales for team performance

	COMPETENCE	INTEGRITY	BENEVOLENCE	PREDICTABILITY
Chi-Square	0.70	0.51	0.84	0.36
df	1	1	1	1
Sig.	0.40	0.48	0.36	0.55

4.6.2 National groups

a. Malaysian

To further analyze the differences in team trust between the two national groups, Kruskal Wallis tests were performed on each dataset. There were no significant gender differences for Malaysians on any of the team trust subscales (Table 30).

Table 30. Kruskal Wallis test on team trust subscales by gender for Malaysians

	COMPETENCE	INTEGRITY	BENEVOLENCE	PREDICTABILITY
Chi-Square	0.19	0.31	0.60	0.90
df	1	1	1	1
Sig.	0.66	0.58	0.44	0.34

b. Indonesian

In agreement with the findings for Malaysia, there were also no significant gender differences for the Indonesians on any of the team trust subscales (Table 31).

Table 31. Kruskal Wallis test on team trust subscales by gender for Indonesians

	COMPETENCE	INTEGRITY	BENEVOLENCE	PREDICTABILITY
Chi-Square	0.02	0.11	0.10	0.41
df	1	1	1	1
Sig.	0.88	0.74	0.76	0.52

The results suggest that gender did not affect the development of trust within a team, whether among Malaysians or Indonesians. But trust on the basis of competence, integrity, benevolence and predictability of team members is important in a disaster situation.

5 NARRATIVE ANALYSIS IN SITUATION AWARENESS

In this section, we report the reasons given by subjects, using text mining to analyze their narratives in two tasks: Task 1 on Risk Identification and Task 3 on Disaster Risk Attitude. The narratives describe their views and 'experience' at three levels of situation awareness: perception, comprehension and projection. Semantic maps were derived to complement the quantitative findings in Section 4 for the associated tasks.

The text mining tool, *leximancer*, extracts words from a text corpus to generate concepts (Smith & Humphreys, 2006; Khalid et al., 2008). For this study, we limited the concepts to those with a relevant percentage of 20% and greater. Concepts that co-occurred together throughout the entire text are grouped in clusters to form themes. These themes were presented in circles distinguished by colors, where hot colors such as red and orange denote the dominant theme, while cool colors such as blue and green denote less dominant theme. The connectedness of the emerged concepts was deduced from the close proximity of each concept to one another. The relationship between concepts was then mapped in the form of 'knowledge pathways' and the strength of the relationship are given by the correlation using *r* values. The correlation is calculated for the first and the last concepts in the path.

5.1 Identifying Risks in Tsunami

Malaysians chose image 5 (see Appendix 2) as representing severe hazard risks, while Indonesians selected image 6. Their views are reported separately for each SA level.

5.1.1 Perception level

Malaysian. Figure 10 illustrates a semantic map for responses given by Malaysian subjects. The dominant theme that emerged is *Lives* followed by *Tsunami*. The dominant theme is made up of concepts such as 'lives', 'properties', 'destruction', 'occur', 'disease', 'consequences', 'death', 'waves', while the second theme comprised 'tsunami', 'bodies' and 'area'.

The main concept 'lives' in the dominant theme is strongly associated with words such as 'properties', 'destruction', 'disease' and 'death' as they appear very close to each other. The second frequent occurring concept is found in the theme *Tsunami*, which includes 'people' and is associated with words such as 'dead' and 'tsunami'. This suggests that at the perception level of SA, subjects were able to identify risks that would warn them of potential danger to their lives if they were in a similar situation.

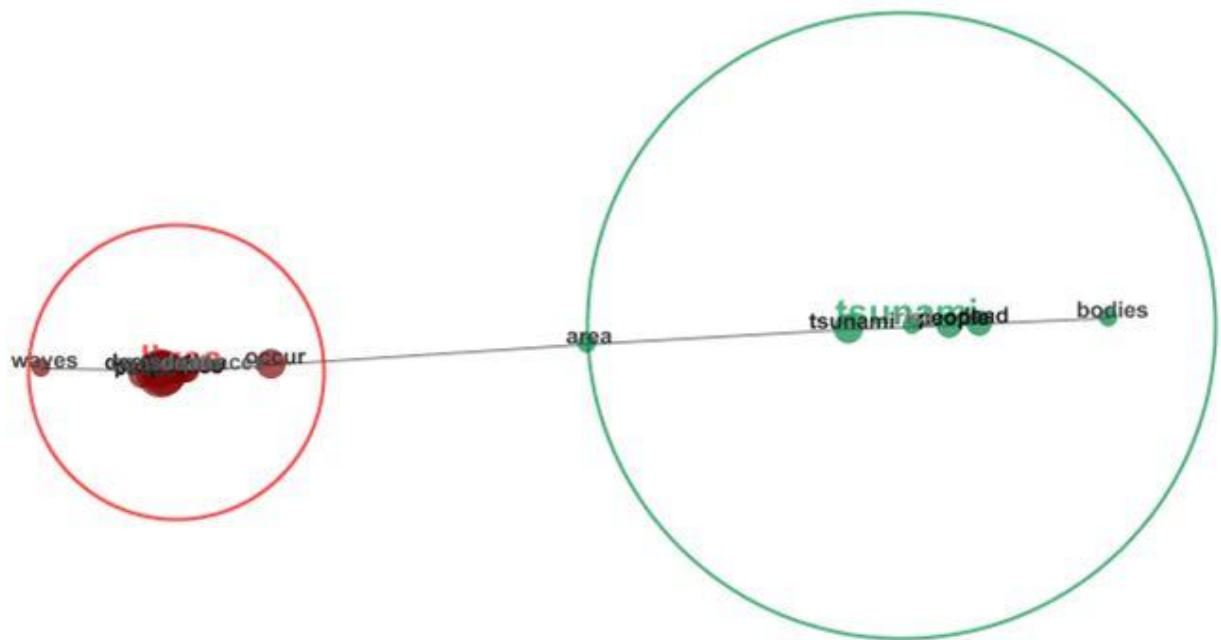


Figure 10. Dominant themes of risk-related tsunami identified by Malaysians at the perception level

Figure 11 shows the knowledge pathways between concepts, the strength of relationship between these concepts and the sequence in which they occurred. The results show a strong positive correlations for the main concept: lives → properties → destruction → occur → disease ($r=0.99$); and for the second concept: people → tsunami → bodies ($r=0.99$).



Figure 11. Concepts pathway for “lives” in tsunami reported by Malaysians at the perception level

Indonesian. Figure 12 shows four themes that emerged from the narratives: *Tsunami*, *Wave*, *Things* and *Resident*. The dominant theme *Tsunami* shows subjects’ initial perception of the tsunami as a dynamic phenomenon given emergent words such as ‘suddenly’, ‘occur’, ‘disaster’ and ‘self’.

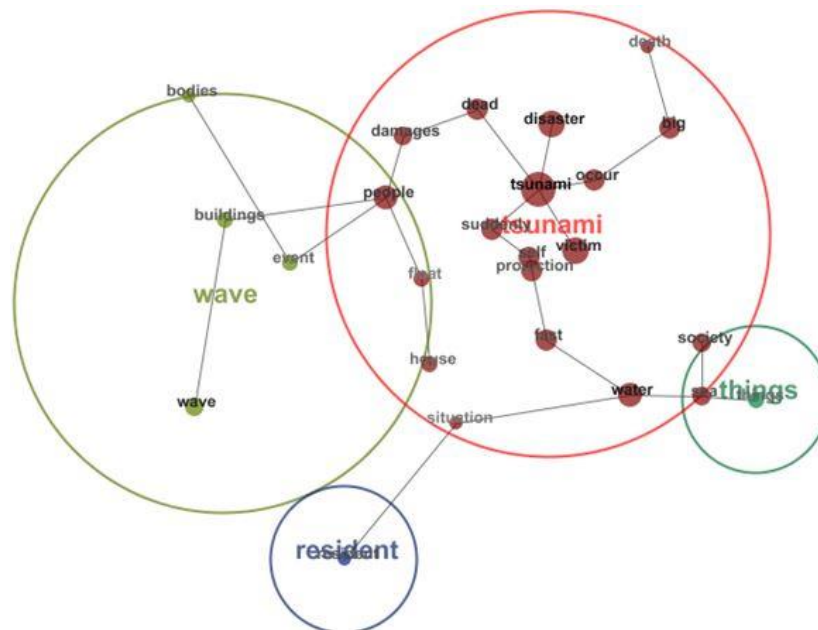


Figure 12. Dominant themes of risk-related tsunami identified by Indonesians at the perception level

Figure 13 shows the relationships between the main concept ‘tsunami’ and its co-occurring words which were highly correlated: tsunami → disaster → dead → people → float → house ($r=0.71$). The second concept ‘loss’ in the dominant theme was closely linked to words such as ‘death’, ‘victim’ and ‘event’. A strong positive correlation ($r=0.83$) was found between disaster → victim → occur.

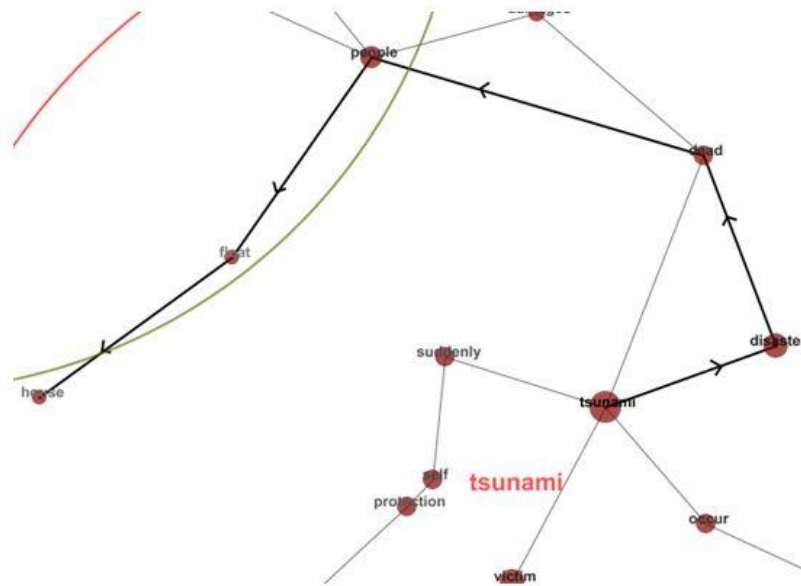


Figure 13. Concepts pathway for “tsunami” reported by Indonesians at the perception level

5.1.2 Comprehension

Malaysian. At the comprehension level of SA, a different set of concepts emerged for Malaysians (Figure 14). Two central themes were produced where *Loss* is the dominant theme followed by *Tsunami*.

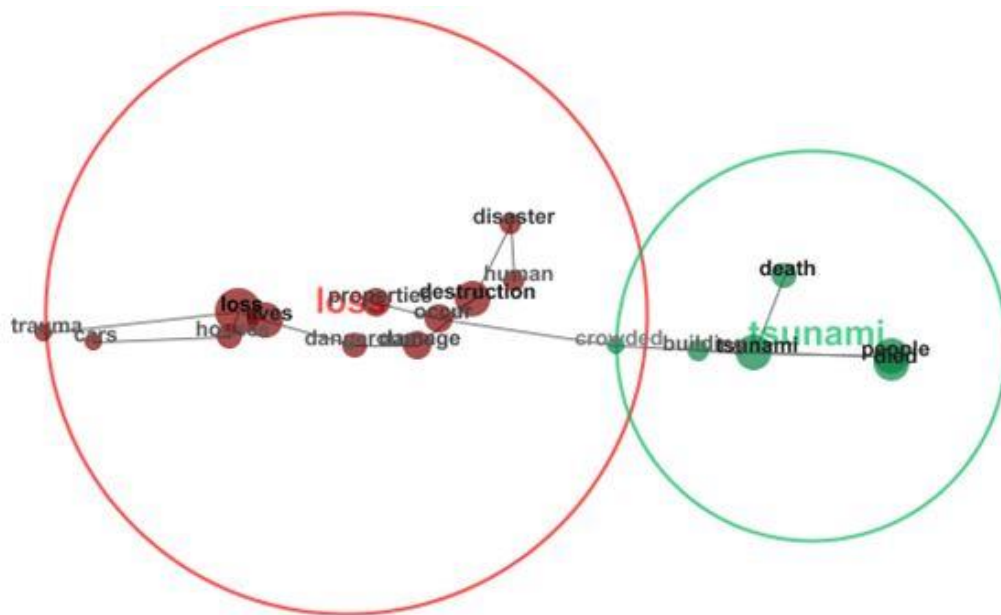


Figure 14. Dominant themes of risk-related tsunami identified by Malaysians at the comprehension level

The main concept ‘loss’ appeared in the dominant theme with sporadic interactions with concepts such as ‘houses’, ‘trauma’, ‘dangerous’ and ‘lives’. Figure 15 shows that the relationship between loss → lives → destruction → disaster → human was highly correlated ($r=0.71$). The second concept

'death' found in the *Tsunami* theme highlighted words such as 'destruction', 'disaster' and 'people' that were closely linked. There also exists a strong positive correlation between the concepts death → tsunami → people → died ($r=0.87$). These results suggest that subjects were able to identify the risks in the tsunami scene which could serve as cues in the future.

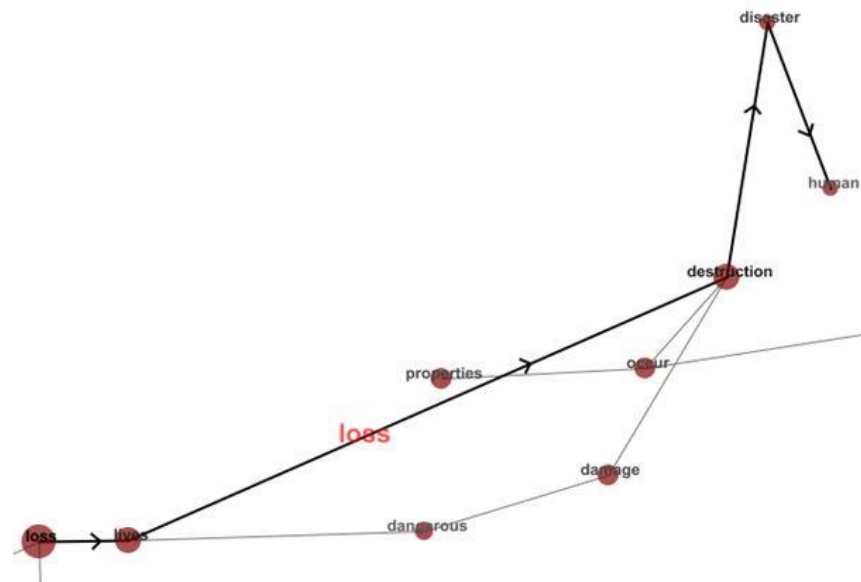


Figure 15. Concepts pathway for “loss” in tsunami reported by Malaysians at the comprehension level

Indonesian. Figure 16 represents concepts at the comprehension level of SA as reported by Indonesians subjects. Five central themes were generated where the dominant theme was *Tsunami* followed by *Sea*, *Self*, *Death* and *Area*. Concepts related to the main concept ‘tsunami’ located in the dominant theme include words such as ‘big’, ‘die’, ‘consequence’ and ‘involved’, suggesting that Indonesians were apprehensive of the risks induced by the tsunami as illustrated in the image.

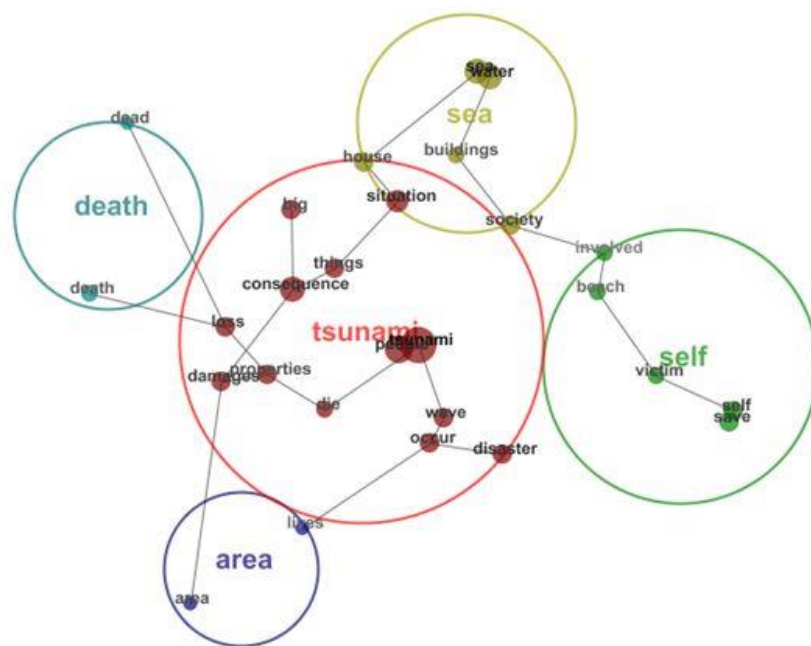


Figure 16. Dominant themes of risk-related tsunami identified by Indonesians at the comprehension level

The knowledge pathways derived for the main concept tsunami → people → properties → die revealed a high positive correlation ($r=0.85$), see Figure 17. In addition, the second concept ‘sea’ found in the second theme ‘wave’ produced a strong positive correlation between concepts such as: sea → water → building ($r=0.88$).

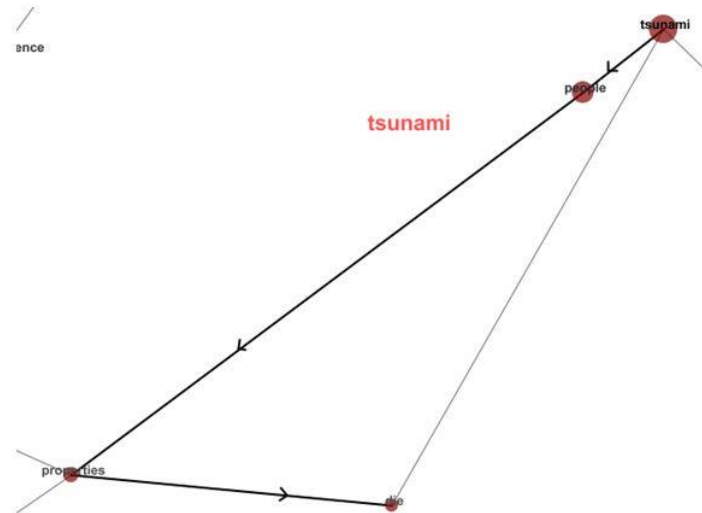


Figure 17. Concepts pathway for “tsunami” in tsunami as reported by Indonesians at the comprehension level

5.1.3 Projection level

Malaysian. At the projection level of SA, three central themes emerged: *Disease* followed by *Lives* and *Destroy* (Figure 18). These themes were derived from concepts such as ‘disease’, ‘spread’, ‘pollution’, ‘water’, ‘death’, and ‘destruction’.

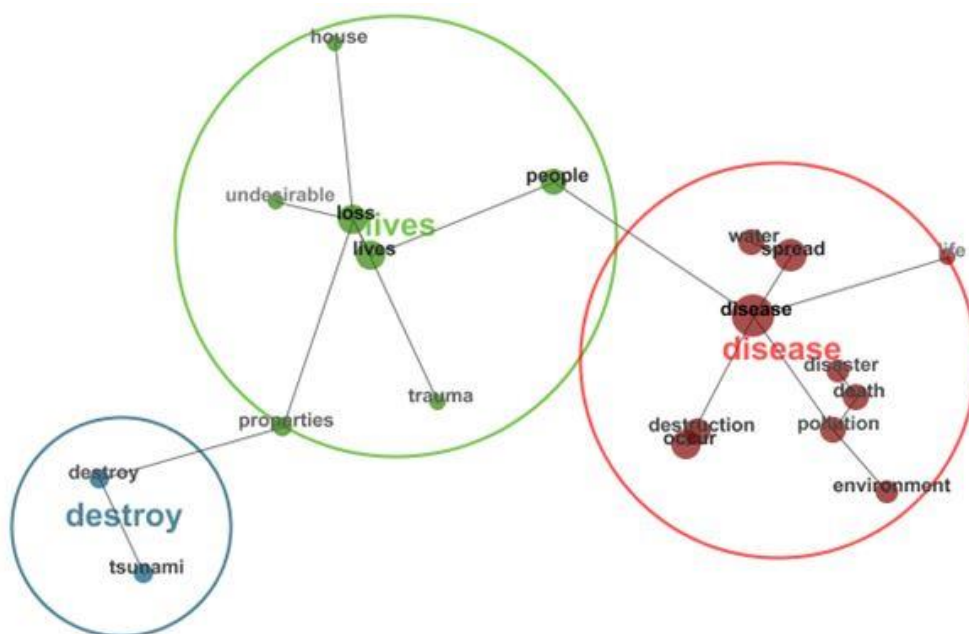


Figure 18. Dominant themes of risk-related tsunami identified by Malaysians at the projection level

The main concept 'disease' showed subjects were concerned about the tsunami inducing a risk towards their health and safety. Figure 19 shows a strong mapping of words such as 'life', 'environment', 'pollution' and 'spread'. Although the concepts tend not to appear in the form of clusters, a high positive correlation was found between disease → spread → water → death → pollution ($r=0.87$). The second concept 'loss' shown in the second theme further supports subjects' concern for their psychological and physical health with emerged concepts such as 'undesirable', 'trauma', 'destruction' and 'lives'. There exists a strong positive correlation between loss → lives → people → occur → trauma ($r=0.81$).

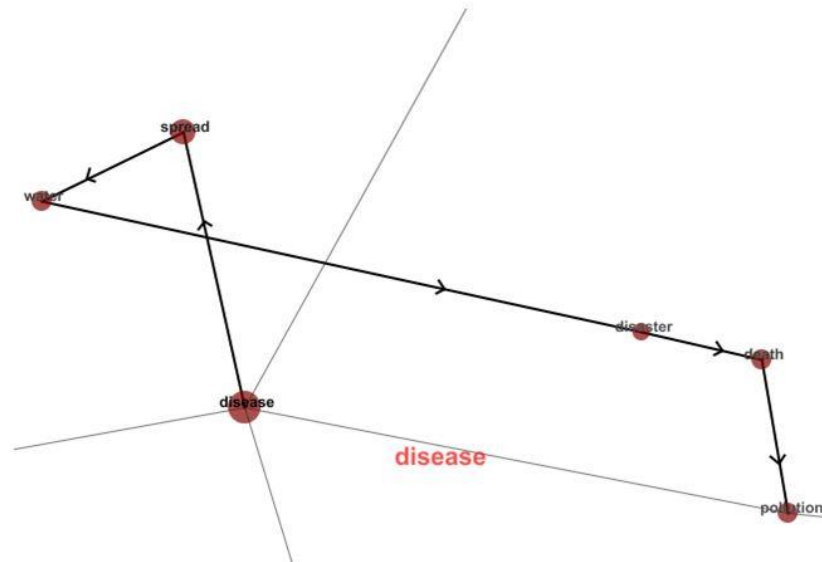


Figure 19. Concepts pathway for “disease” in tsunami reported by Malaysians at the projection level

Indonesian. Figure 20 shows frequently occurring concepts reported by Indonesians at the projection level. These include: 'occur', 'loss', 'water', 'house' and 'victim'. Four central themes emerged where the dominant theme was *Occur* followed by *Water*, *Society* and *Big*. The main concept in the dominant theme was highly connected to 'pollution', 'trauma', 'victim', 'disease' and 'society'.

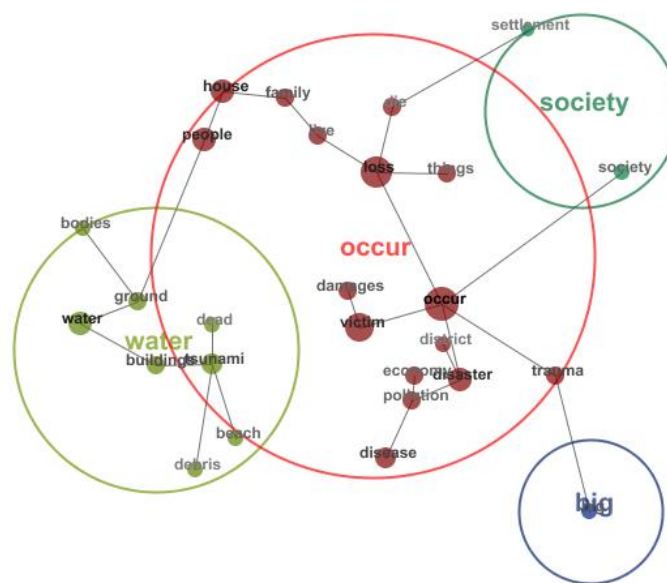


Figure 20. Dominant themes of risk-related tsunami identified by Indonesians at the projection level

Figure 21 identifies the knowledge pathway for occur → victim → pollution → economy → damages, which had a strong positive correlation ($r=0.86$). The second concept 'loss' was highly associated with words such as 'family', 'things', 'die' and 'district' with mappings from loss → house → people ($r=0.75$). This suggests that Indonesians projected the loss and damages of both material and immaterial things as potential risks in tsunami disaster.

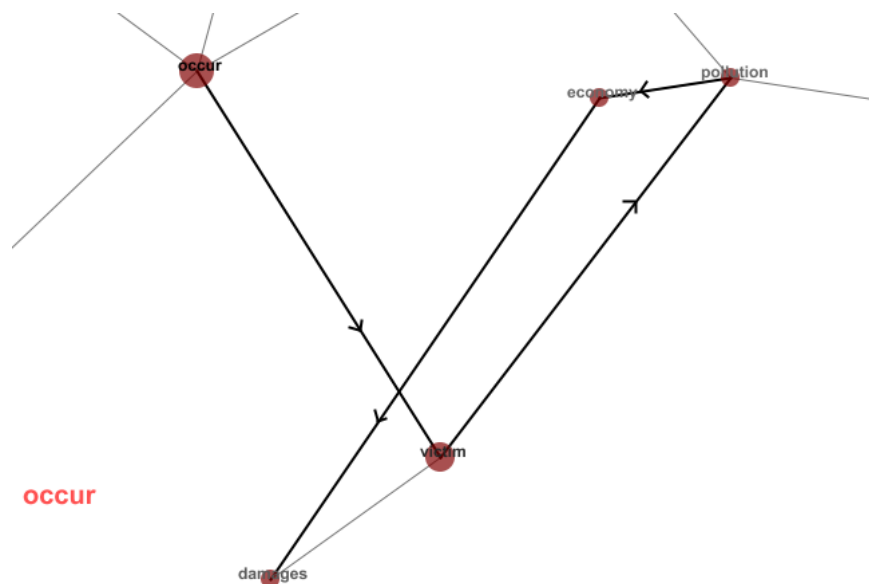


Figure 21. Concepts pathway for “tsunami” in tsunami as reported by Indonesians at the projection level

5.2 Identifying Risks in Terrorist Attack

Both groups selected the same terrorist attack image 5 as depicting the highest risk. However, their responses are reported separately to elucidate differences in their views.

5.2.1 Perception level

Malaysian. Figure 22 shows words such as ‘terrorist’, ‘building’, ‘attack’, ‘people’, and ‘death’ grouped in three central themes: *Terrorist*, *Building* and *Lives*. At this level of SA, subjects’ identified cues from the image that pose a potential danger.

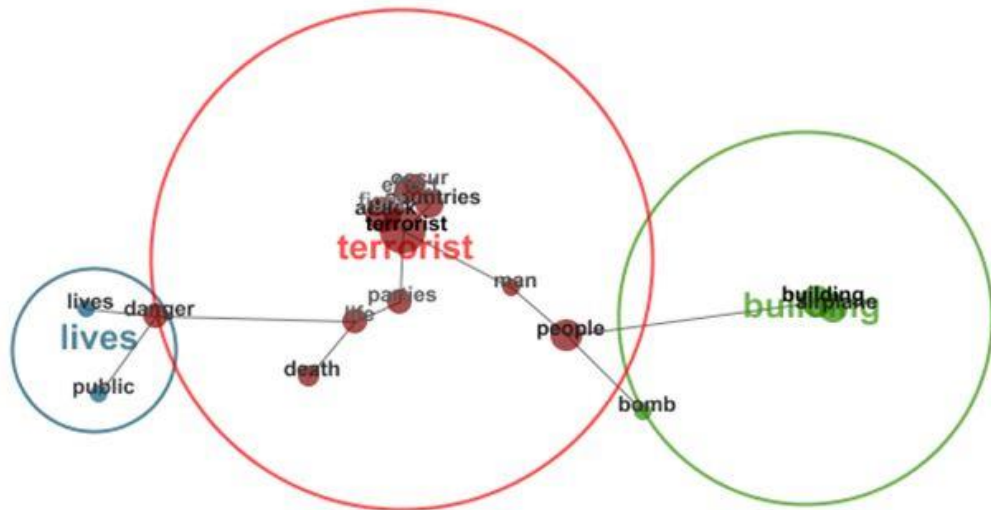


Figure 22. Dominant themes of risk-related terrorist attack identified by Malaysians at the perception level

Figure 23 shows the word 'terrorist' mapped to 'fight', 'attack', 'parties' and 'life'. These concepts represent the cues perceived as the initial exposed hazards of the disaster scene. A strong positive correlation was found for concepts: terrorist $\rightarrow$ attack $\rightarrow$ countries $\rightarrow$ occur ($r=0.94$). The second concept 'building' found in the second theme was also highly correlated with the words: building $\rightarrow$ airplane $\rightarrow$ people $\rightarrow$ bomb ($r=0.74$).

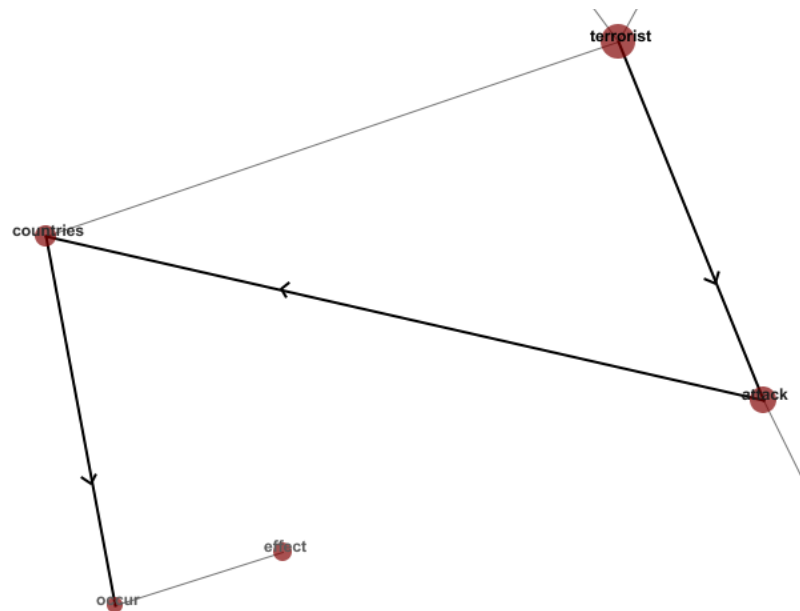


Figure 23. Concepts pathway for "terrorist" in terrorist attack as reported by Malaysians at the perception level

Indonesian. Figure 24 illustrates Indonesians perception of risks as represented by frequently occurring concepts, including: 'people', 'terrorist', 'bomb', 'situation' and 'death'. Three central themes

were produced in representing the groupings of these concepts. *People* appeared as the dominant theme followed by *Event* and *Immediate*.

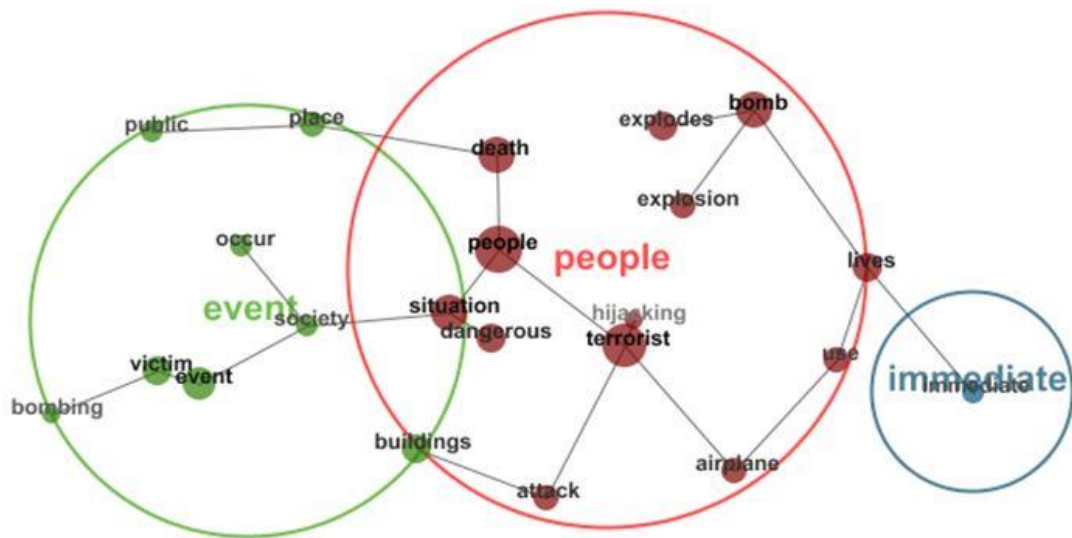


Figure 24. Dominant themes of risk-related terrorist attack identified by Indonesians at the perception level

Figure 25 explores the knowledge pathway between *people* → *terrorist* → *airplane* → *hijacking* which was highly correlated ($r=0.84$). The second concept 'terrorist' was related to concepts such as 'airplane', 'use', 'attack' and 'society'. The correlation for: *terrorist* → *situation* → *victim* → *event* → *buildings* → *attack* was high and positive ($r=0.82$). These results indicate the type of cues and risks perceived by Indonesians in human-induced disaster at the perception level of SA.

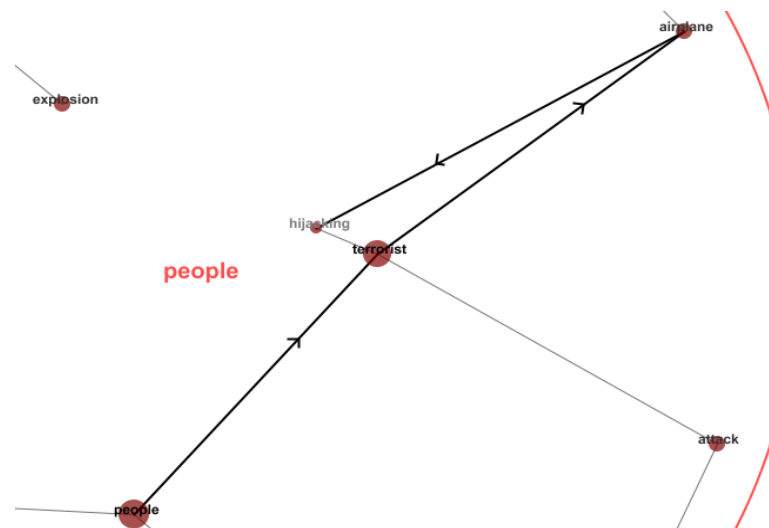


Figure 25. Concepts pathway for "people" in terrorist attack reported by Indonesians at the perception level

5.2.2 Comprehension level

Malaysian. Figure 26 illustrates the resulting semantic map produced at the comprehension level of SA in risk identification for terrorist attack disaster image 5. Only central themes were generated, where the dominant theme is *People* followed by *Situation*. Some concepts appeared frequently throughout

the text corpus, including: 'innocent', 'people', 'place' and 'death'. This demonstrates Malaysian subjects' understanding of the disaster risks in the selected high risk image.

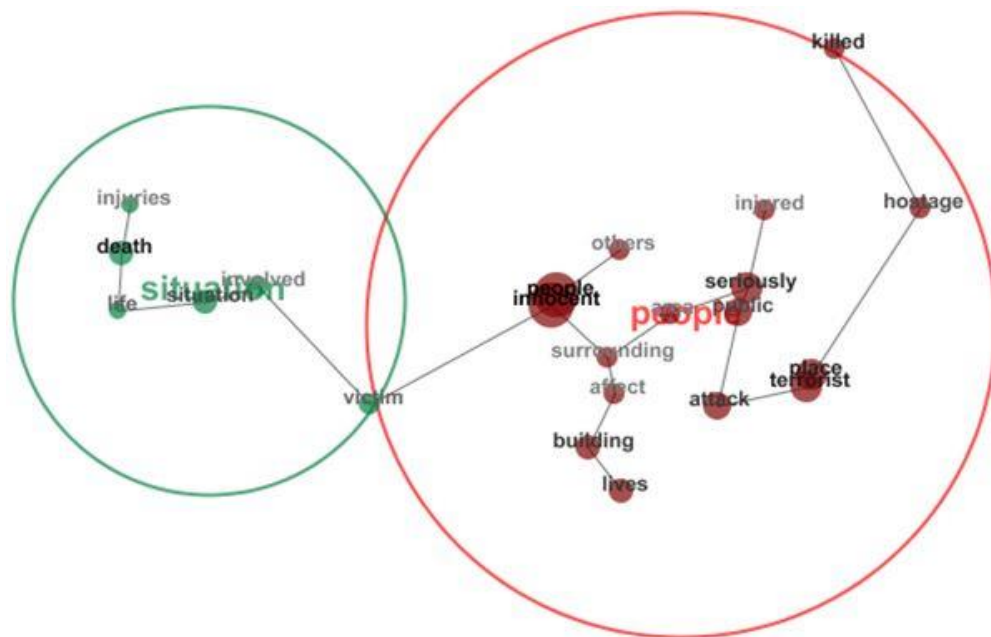


Figure 26. Dominant themes of risk-related terrorist attack identified by Malaysians at the comprehension level

Figure 27 shows that the main concept 'people' was linked to 'public', 'seriously', 'surrounding' and 'hostage'. At this level of SA, it seems that subjects' were making sense of the risks that they identified earlier at the perception level. Relationship between the concepts people → terrorist → attack → lives → building was greatly significant ($r=0.83$). Further analyses of the second concept 'terrorist' showed that the related concepts were similar to the main concept as the concepts are clustered together under the dominant theme. However, the knowledge pathways were different. A strong positive correlation was found for concepts; innocent → people → terrorist → attack → public → area → surrounding ($r=0.92$). This points to the inferences made by Malaysian subjects of the risks inherent in disaster image 5 when they understood what might happen in the scenario.

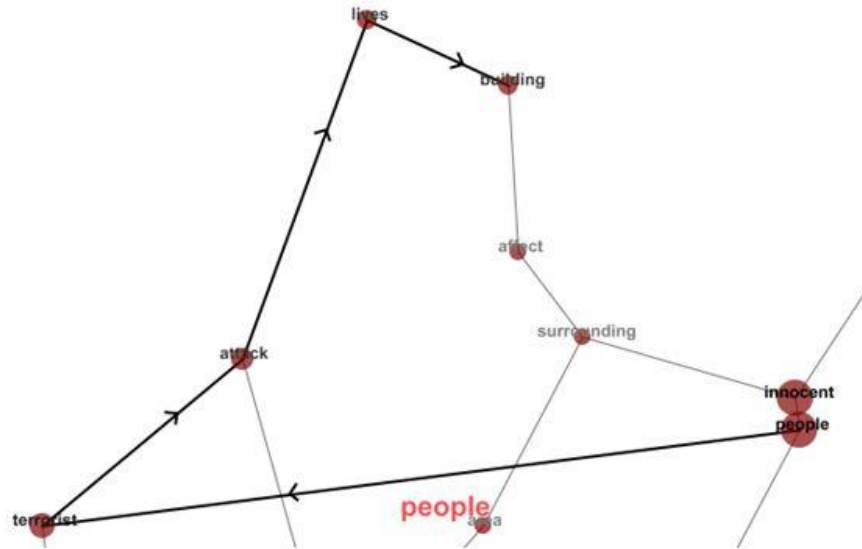


Figure 27. Concepts pathway for “people” in terrorist attack as reported by Malaysians at the comprehension level

Indonesian. Figure 28 shows four central themes that were generated from the narratives at the comprehension level: *Victim* was followed by *Death*, *Damages* and *Self*. Several concepts describe the scene when subjects comprehended what could have transpired such as: ‘terrorist’, ‘people’, ‘victim’, ‘bomb’, ‘lives’, and ‘threatened’.

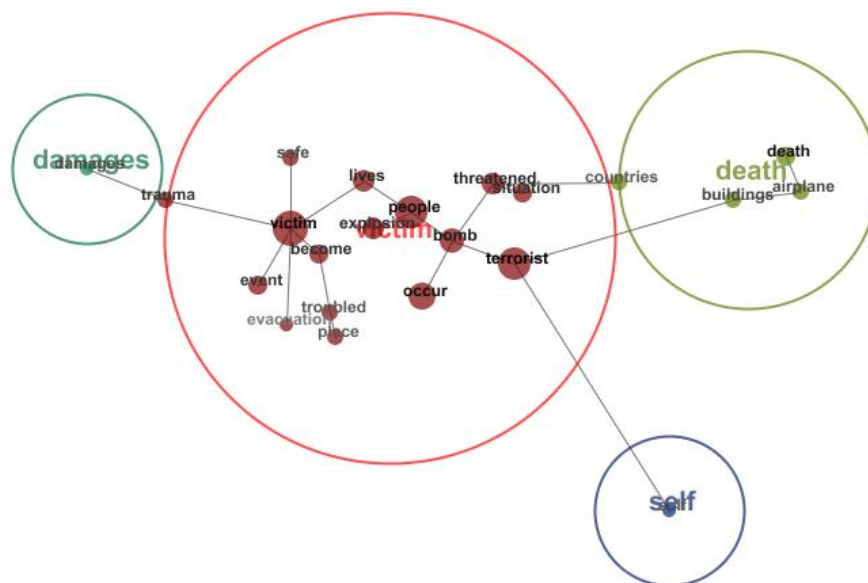


Figure 28. Dominant themes of risk-related terrorist attack identified by Indonesians at the comprehension level

The main concept ‘victim’ in the dominant theme was highly associated: victim → people → occur → evacuation ($r=0.86$), see Figure 29. A strong positive correlation was found between the concepts: terrorist → occur → bomb → threatened → situation ($r=0.90$). Given Indonesians’ experience with

terrorist attack, they seem to have a different and more detailed understanding of the disaster risks than Malaysians.

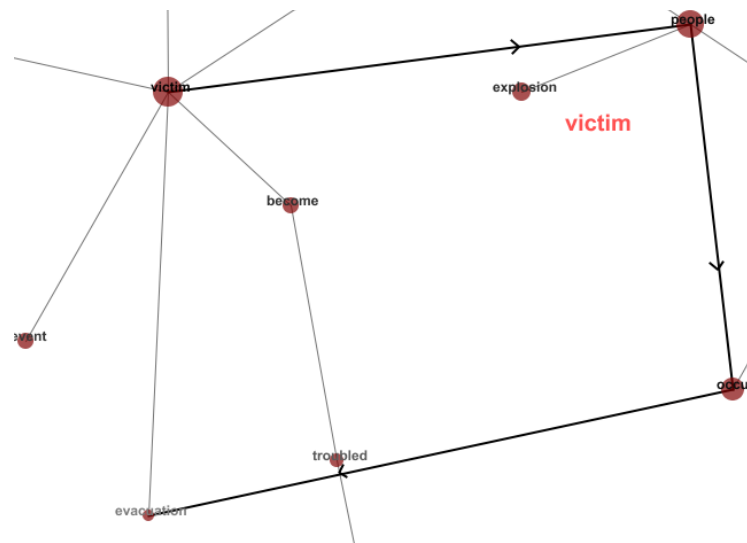


Figure 29. Concepts pathway for “victim” in a terrorist attack reported by Indonesians at the comprehension level

5.2.3 Projection level

Malaysian. Figure 30 shows four central themes that emerged at the projection level of SA. The dominant theme *People* is followed by *Terrorist*, *Killed* and *Death*. These themes were formed from words such as ‘country’, ‘die’, ‘people’, ‘war’ and ‘life’.

Figure 31 shows that the main concept ‘people’ co-occurred with other concepts such as ‘innocent’, ‘die’, ‘explosion’ and ‘country’. The knowledge pathways between people → die → country → war → fear produced a high positive correlation ($r=0.82$). These result demonstrated the type of predicted disaster risk that Malaysian subjects tend to associate with based on the terrorist attack scene in image 5. The second concept ‘country’ produced a high positive association with words such as ‘die’, ‘people’ and ‘terrorist’, mapping from country → war → terrorist → place → worst → explosion ($r=0.82$).

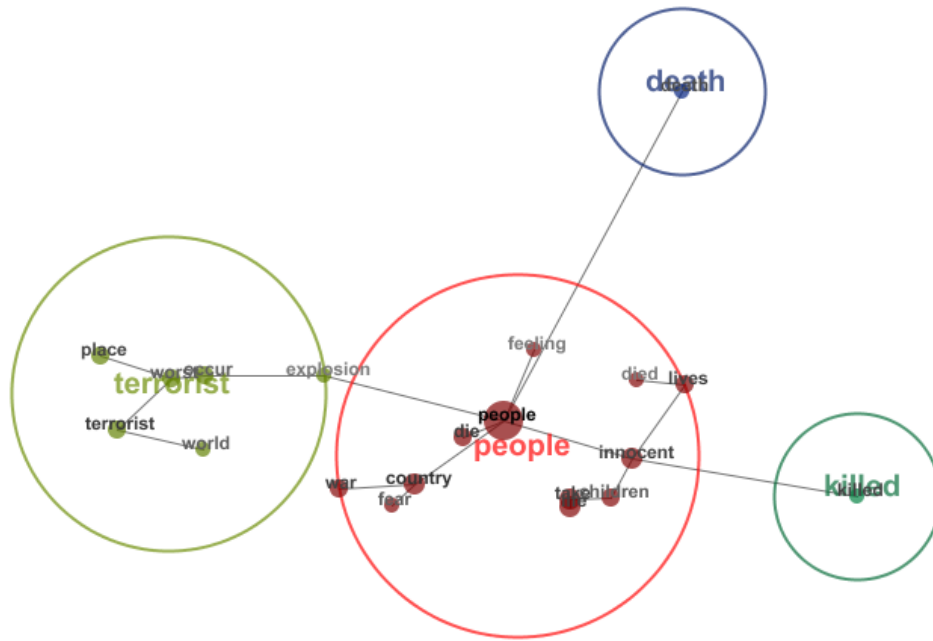


Figure 30. Dominant themes of a risk-related terrorist attack identified by Malaysians at the projection level

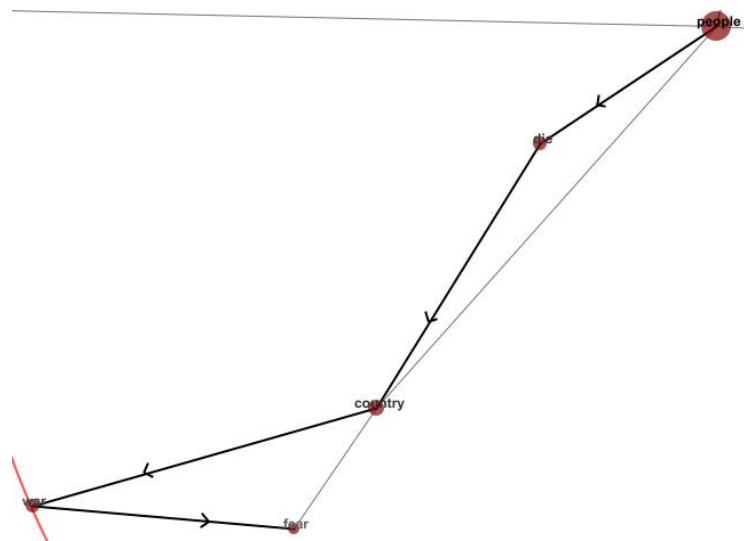


Figure 31. Concepts pathway for “people” in terrorist attack as reported by Malaysians at the projection level

Indonesian. Three central themes appeared at the projection level, see Figure 32. The dominant theme was *Terrorist* followed by *Event* and *Attack*. These themes were derived from frequently co-occurring words such as ‘victim’, ‘terrorism’, ‘airplane’, ‘buildings’ and ‘peace’.

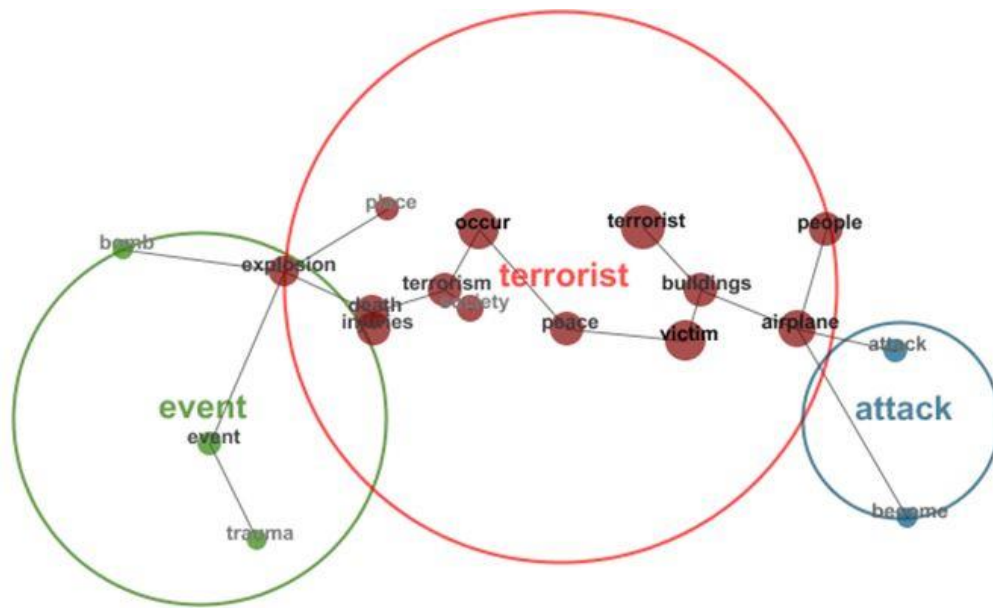


Figure 32. Dominant themes of risk-related terrorist attack identified by Indonesians at the projection level

A strong positive correlation was derived between concepts: victim → terrorist → airplane → buildings ($r=0.84$). Other associations were found between 'peace', 'trauma' and 'death'.

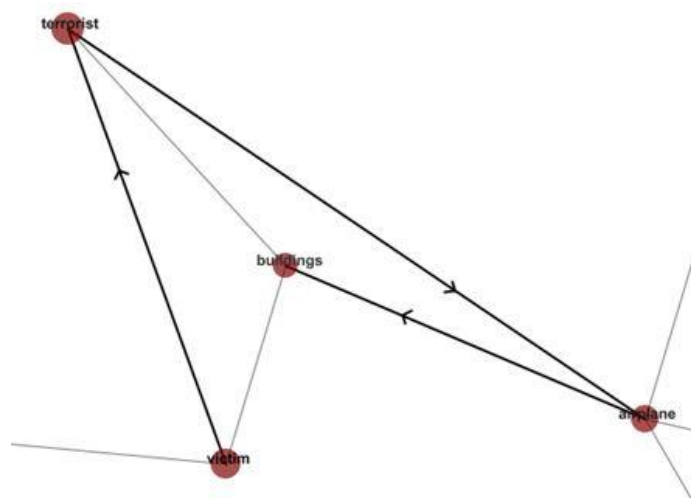


Figure 33. Concepts pathway for "victim" in terrorist attack as reported by Indonesians at the projection level

5.3 Risk Attitudes toward Tsunami

In this section we report the narratives by 90 subjects. These were based on videos of tsunami, which were displayed so that they corresponded to the three levels of situation awareness. To provide informative analyses of the various views, the words and semantics derived from Malaysians and Indonesians were analyzed separately.

5.3.1 Perception level

Malaysians. Figure 34 shows the overall concepts that emerged at the perception level of SA. Throughout the entire text corpus, words such as ‘water’, ‘fast’ ‘tsunami’ and ‘running’ co-occurred frequently. Four central themes were generated, where the dominant theme was *Water* followed by *People*, *Property* and *Panic*. ‘Water’ was strongly associated to other concepts such as ‘flooding’, ‘coming’, ‘speed’ and ‘vehicle’.

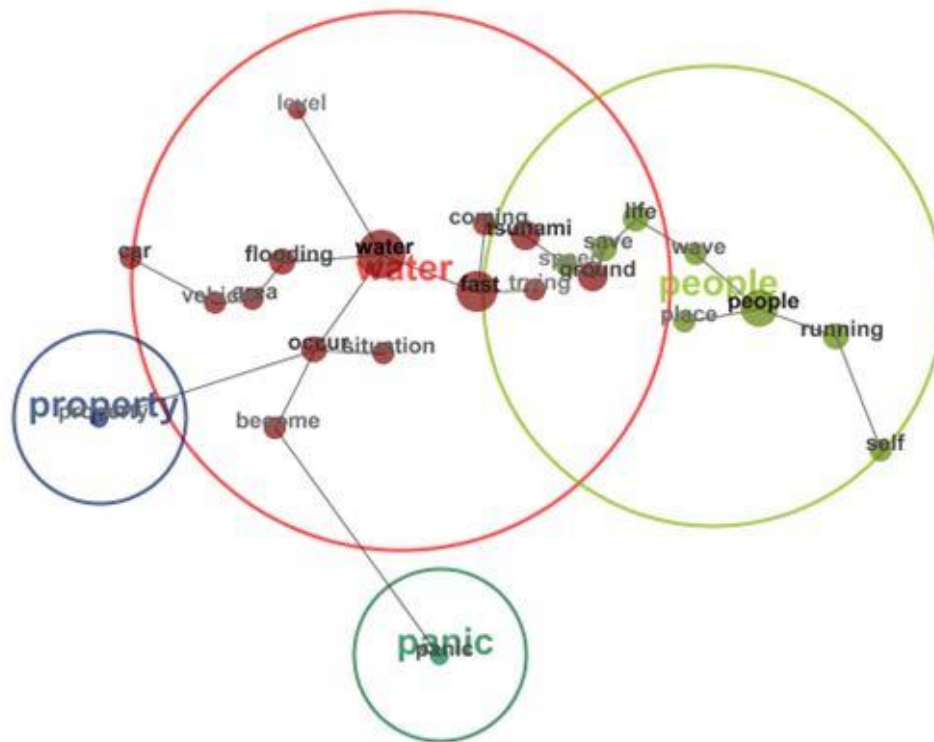


Figure 34. Dominant themes of Malaysian risk attitudes toward tsunami at the perception level

Figure 35 shows the knowledge pathway between the words: water → fast → tsunami → coming, were highly correlated with $r=0.87$. A second concept ‘people’ was found in the second theme and was related to ‘running’, ‘save’, ‘place’ and ‘trying’. This suggests the actions that Malaysians perceive and how they would behave at this level of SA. A strong positive correlation; $r=0.90$ was obtained between people → running → wave.

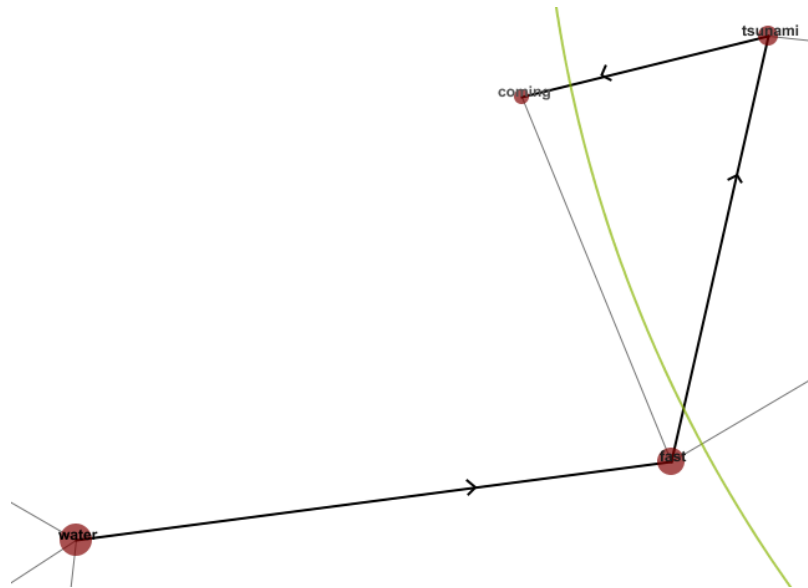


Figure 35. Concept pathways for “people “as gauged from Malaysian attitudes towards tsunami at the perception level

Indonesian. Figure 36 illustrates that Indonesians made reference to concepts such as ‘people’, ‘panic’ ‘water’ and ‘current’ at the perception level. Their reactions were based on the tsunami video that they watched. Three central themes were generated, where *People* was the dominant theme followed by *House* and *Disaster*. The concept ‘people’ was mapped to concepts such as ‘away’, ‘loss’, ‘try’ and ‘panic’. A second frequent co-occurring concept in the dominant theme was ‘water’, which was associated with concepts such as: ‘fast’, ‘direction’, ‘current’ and ‘house’. These concepts highlight that Indonesians perceived that the tsunami event would have an immediate impact on people in the surrounding areas.

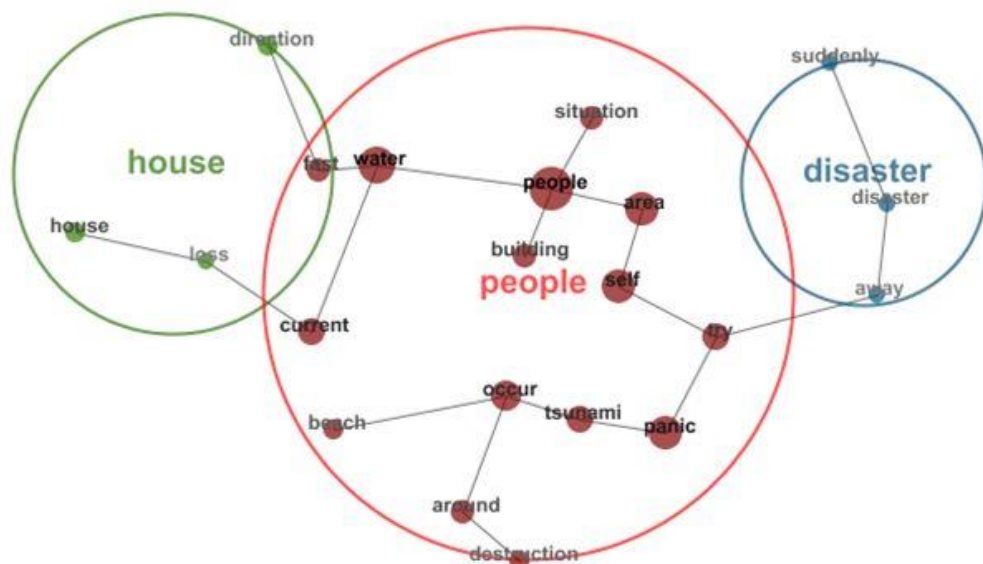


Figure 36. Dominant themes of Indonesian risk attitudes toward tsunami at the perception level

Figure 37 shows that the relationship for knowledge pathways between people → occur → area → tsunami is highly correlated, $r=0.74$. Likewise, the second concept water → fast → house → loss is also highly correlated ($r=0.78$).

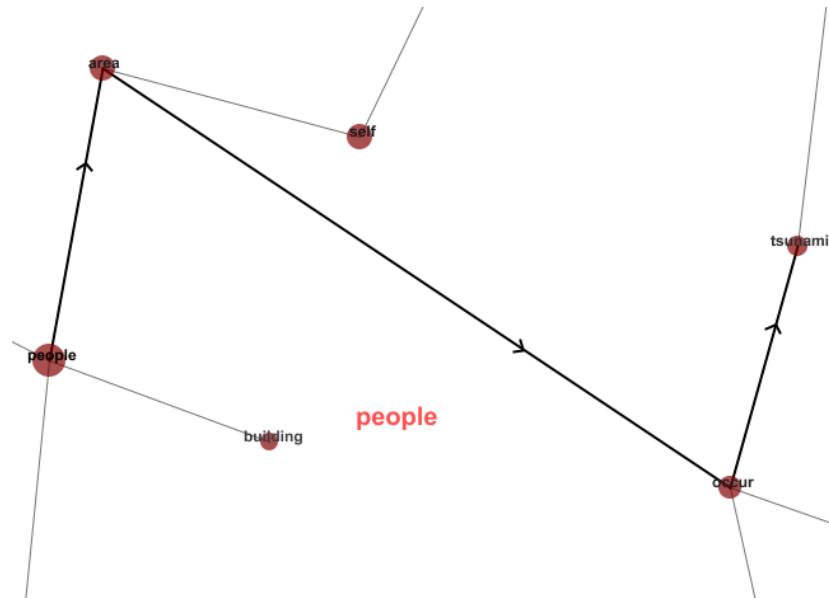


Figure 37. Concept pathways for “people “as gauged from Indonesian attitudes towards tsunami at the perception level

5.3.2 Comprehension level

Malaysian. Figure 38 revealed that certain concepts that did not emerge at the perception level of SA were instead generated at the comprehension level. These include: ‘swept’, ‘damages’ and ‘anxious’, which suggests that subjects started to make sense of the evolving tsunami situation rather than just perceiving it. Three central themes were discovered where the dominant theme *Water* was followed by *Running* and *Cars*.

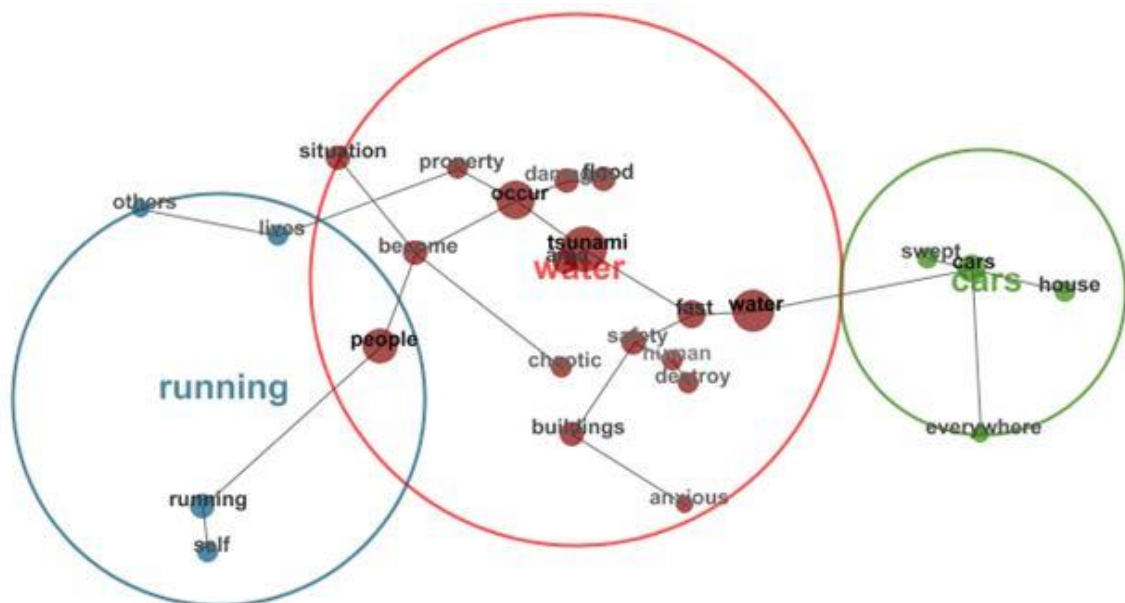


Figure 38. Dominant themes of Malaysian risk attitudes toward tsunami at the comprehension level

Figure 39 illustrates the knowledge pathway generated by the map for the concepts water → tsunami → occur → flood → area → fast. There was a strong positive correlation between the words, $r=0.93$. A second concept 'tsunami' found in the dominant theme was also highly correlated between words tsunami → occur → situation → become → chaotic ($r=0.87$).

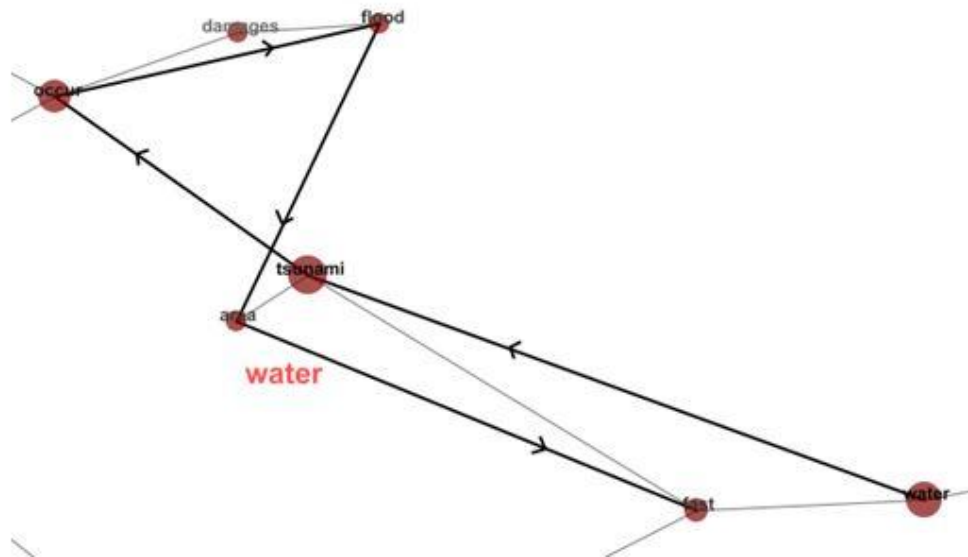


Figure 39. Concept pathways for "people" as gauged from Malaysian attitude towards tsunami at the comprehension level

Indonesian. At the comprehension level of SA, a different set of general concepts emerged for Indonesians. These were in addition to similar concepts cited by the Malaysians, see Figure 40. Five central themes were discovered where the dominant theme was *People* followed by *Tsunami*, *Place*, *Current* and *Disaster*. Indonesians, on the other hand, tended to cite concepts that denote behavior and affect such 'running', 'panic' and 'try'.

Figure 41 reveals the knowledge pathways derived for the main concept people → self → try → high → ground, which had a strong positive association of $r=0.84$. A second concept tsunami found in the second theme also revealed a strong positive correlation $r=0.87$ between related concepts such as tsunami → occur → destroy.

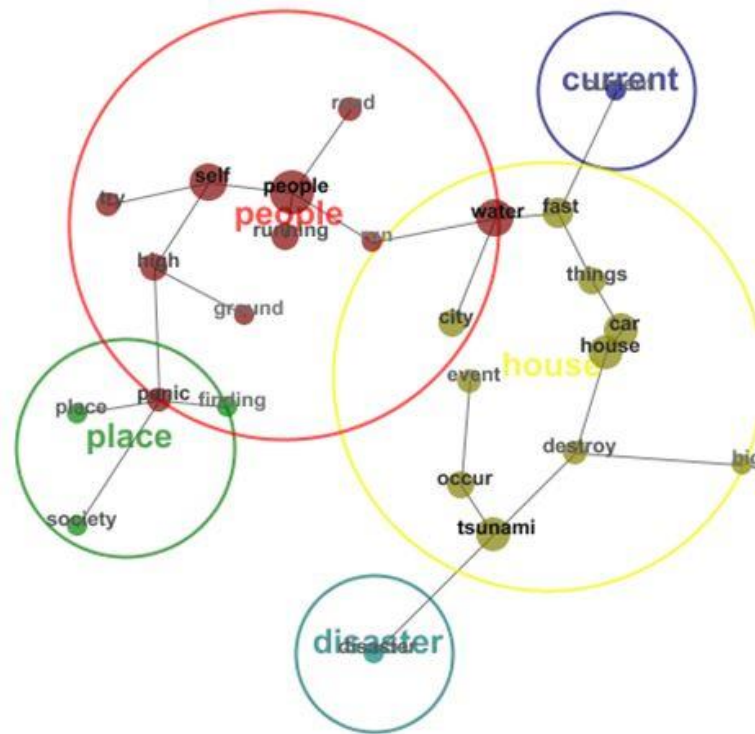


Figure 40. Dominant themes of Indonesian risk attitudes toward tsunami at the comprehension level

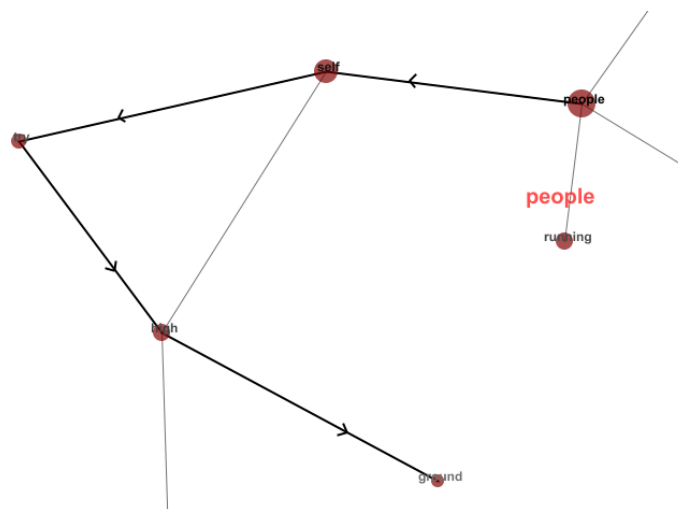


Figure 41. Concept pathways for “people “as gauged from Indonesian attitude towards tsunami at the comprehension level

3.5.3 Projection level

Malaysian. Figure 42 shows that the risk attitude of Malaysian subjects at the projection level of SA produced frequently occurring concepts such as ‘thinking’, ‘die’, ‘destroy’ and ‘victims’. These words illustrate how respondents were able to predict what happens next to people after a tsunami disaster. The overall concepts were clustered into three central themes, where the dominant theme was *Loss* followed by *Spread* and *Cars*. The main concept ‘loss’ in the dominant theme was found to be strongly

mapped with risk attitude components such as 'trauma' (affect), 'die' (cognition) and 'saving' (behavior).

Figure 42. Dominant themes of Malaysian risk attitudes toward tsunami at the projection level

Figure 43 shows the mapping of words in the knowledge pathways from people → loss → lives → die → building → trauma → victims. This produced a strong positive correlation ($r=0.93$). A second concept 'place' also appeared in the dominant theme and was associated with the concepts 'shelter', 'family', 'death' and 'damage'. There was a strong positive correlation ($r=0.91$) between concepts: place → loss → lives → destroy → shelter, suggesting that Malaysians predicted the outcome of disasters such as a tsunami to lead to the destruction of safe places for shelter.

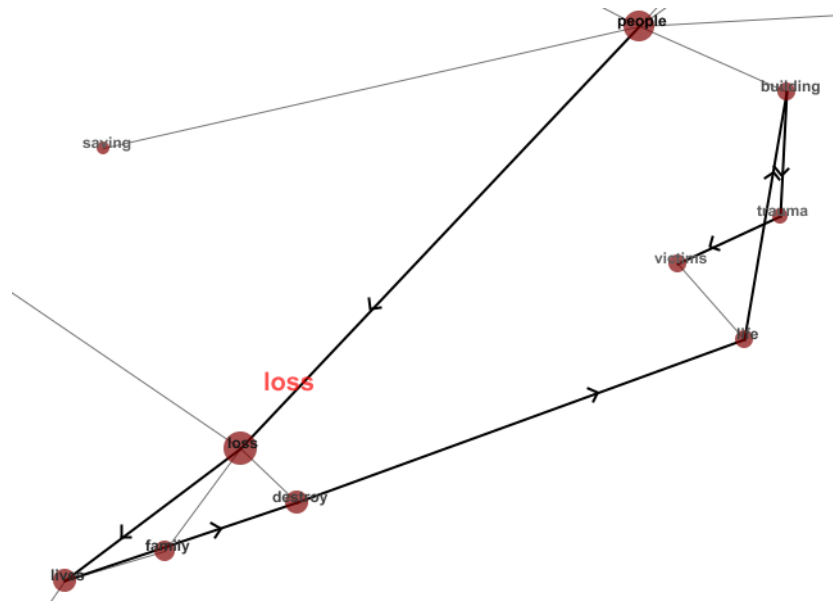


Figure 43. Concept pathways for “people “as gauged from Malaysian attitude towards tsunami at the projection level

Indonesian. At the projection level of SA, three central themes emerged with the dominant theme *People* followed by *Occur* and *Safe*. Words such as 'loss', 'destroy', 'trap' and 'property' in the dominant theme 'people' were found to be closely interrelated, while in the second theme 'occur' the closely-linked words were 'tsunami', 'disease' and 'victims'. These words indicated subjects' projection of what might happen next to people after a disaster such as a tsunami. In general, subjects related 'people' to words such as 'family', 'trauma', 'lives', 'safe' and 'property'.

In Figure 45, the knowledge pathway for main concept 'people' produced a high correlation between people → things → property → car → trap → current ($r=0.82$). At this level of SA, Indonesians were concerned about how a tsunami could deeply affect their environment and threaten the safety of their lives and family members and the potential loss of their property. There existed a high positive correlation ($r=0.85$) for words between: occur → tsunami → people → things → house → destroy, indicating that subjects predicted the outcome of disasters such as tsunami to lead to the destruction of property and loss of family members.

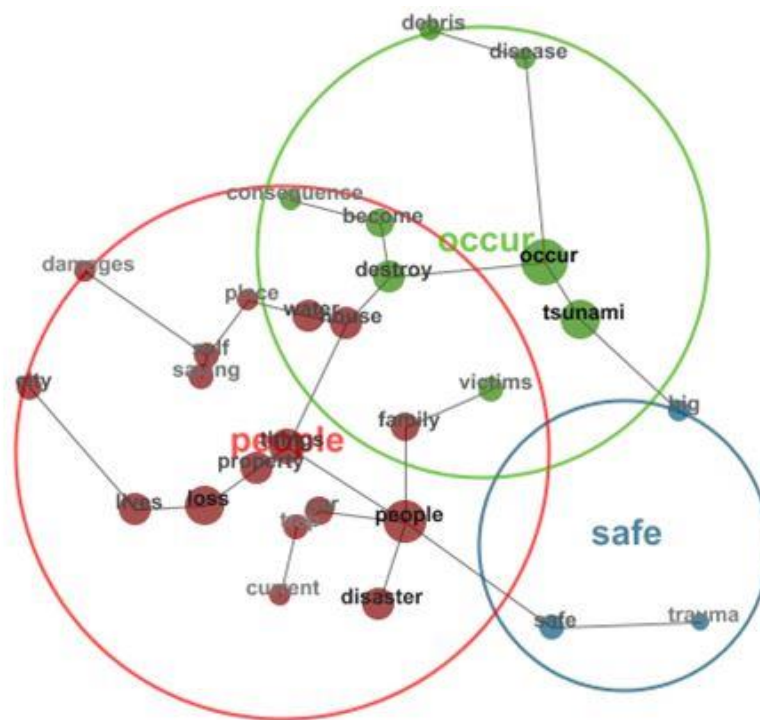


Figure 44. Dominant themes of Indonesian risk attitudes toward tsunami at the projection level

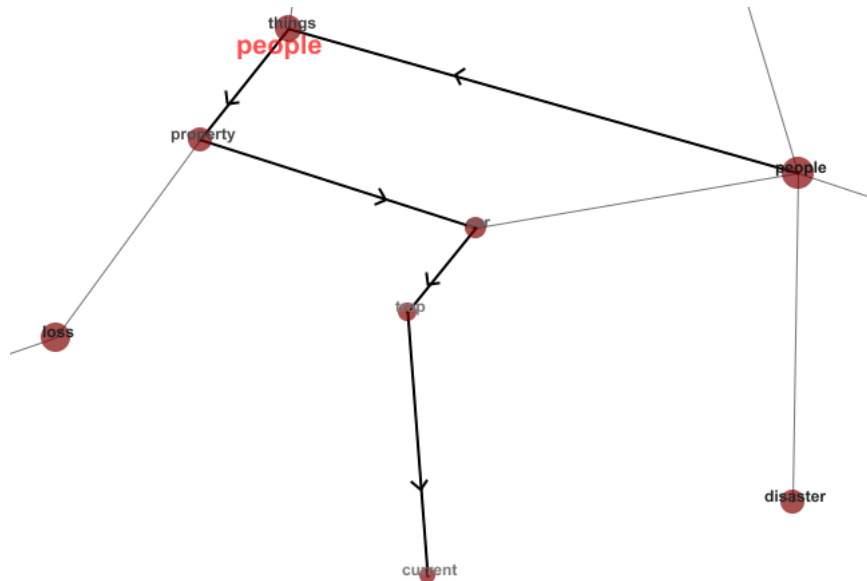


Figure 45. Concept pathways for “people “as gauged from Indonesian attitudes towards tsunami at the projection level `

5.4 Risk Attitudes toward Terrorist Attack

5.4.1 Perception level

Malaysian. Figure 46 shows three central themes with associated concepts that emerged at the perception level of SA namely: *People*, followed by *Airplane* and *Saving*. Concepts that occurred frequently throughout the text corpus were: ‘people’, ‘building’, ‘screaming’ and ‘smoke.’ The main concept ‘people’ was strongly mapped to risk attitude components such as: ‘screaming’ (behavior), ‘chaotic’ (cognitive) and ‘fear’ (affect).

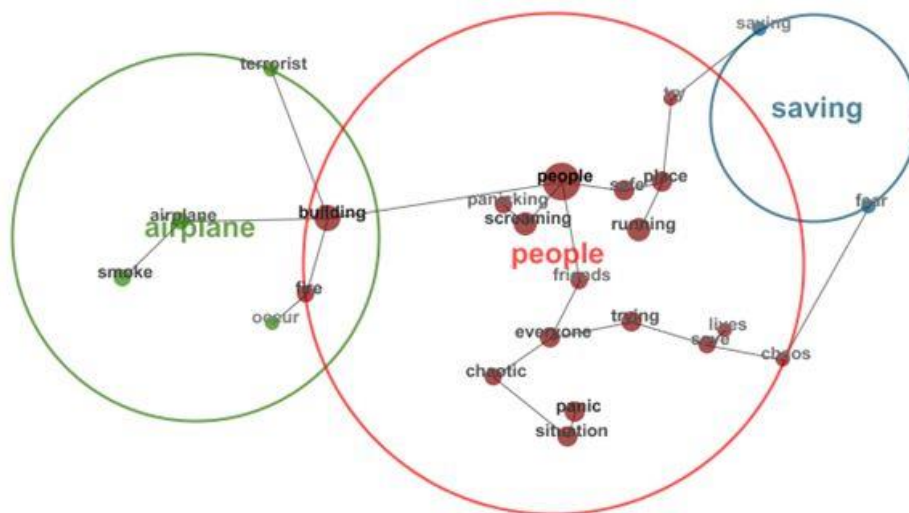


Figure 46. Dominant themes of Malaysian risk attitudes toward terrorist attack at the perception level

Figure 47 depicts the knowledge pathway between concepts: people → screaming → running → place → safe → try, which was highly correlated, $r=0.82$. Even at this SA level, subjects perceived behavioral actions. The second concept ‘buildings’ located in the second theme was mapped to

'airplane', 'smoke' and 'fire'. There existed a high positive correlation between building → fire → occur ($r=0.70$).

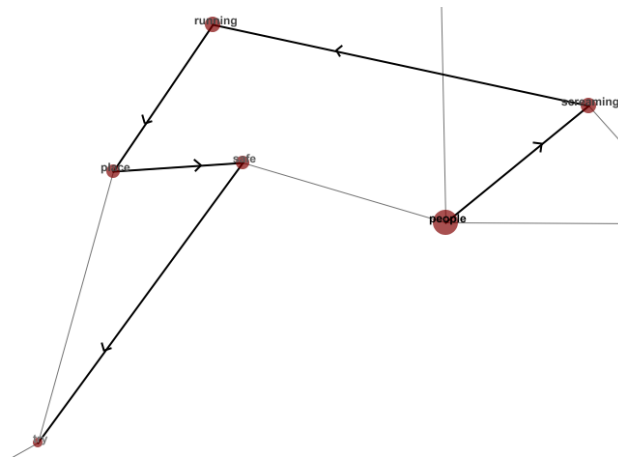


Figure 47. Concept pathways for “people” as gauged from Malaysian attitudes towards terrorist attack at the perception level

Indonesian. The dominant theme in Figure 48 was *People* followed by *Airplane* and *Fear*. Frequently occurring concepts include ‘people’, ‘panic’, ‘buildings’ and ‘save’, which made up the three central themes. The main concept ‘people’ found in the dominant theme was highly mapped to ‘save’, ‘hysterical’ and ‘running’, suggesting that Indonesians perceived their actions and emotions were running high at this SA level.

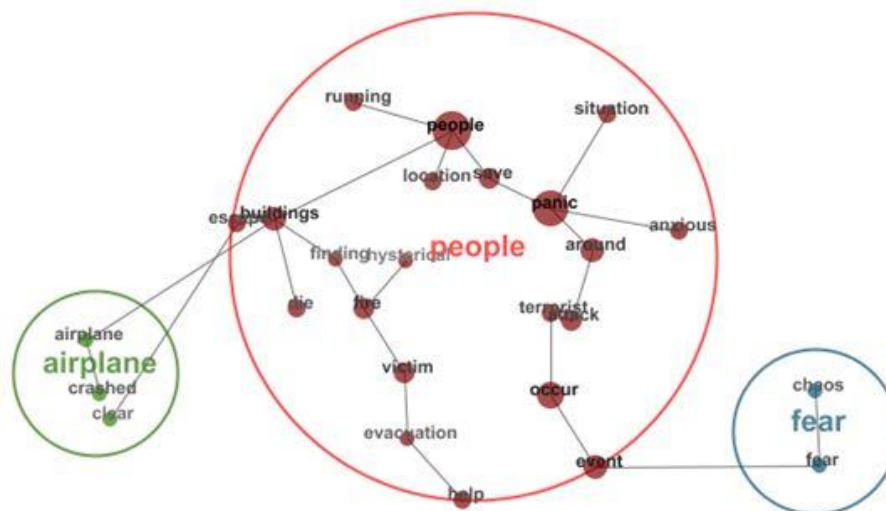


Figure 48. Dominant themes of Indonesian risk attitudes toward terrorist attack at the perception level

Figure 49 highlights the relationship between concepts people → buildings → finding → hysterical, which was highly correlated with $r=0.82$. A second concept ‘panic’ was highly correlated to panic → occur → around → attack → terrorist ($r=0.75$). These findings suggest that Indonesians risk attitude reflected behavioral and affective components.

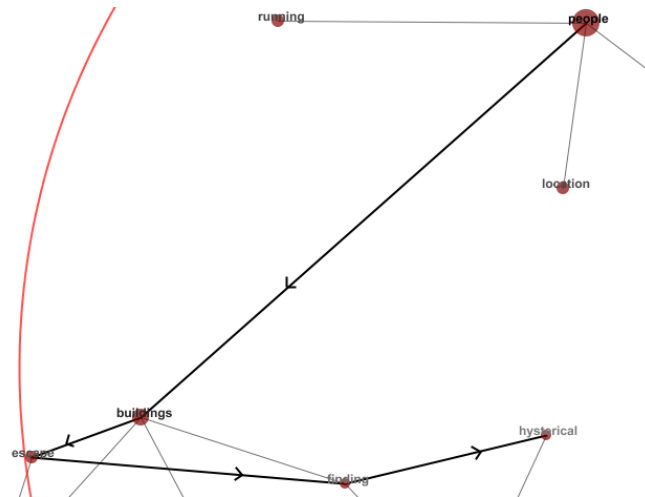


Figure 49. Concept pathways for “people” as gauged from Indonesian attitudes towards terrorist attack at the perception level

5.4.2 Comprehension level

Malaysian. Figure 50 shows five central themes at this SA level starting with *Buildings* followed by *Attack*, *Unknown*, *Chaotic* and *Debris*. Words that made up the themes included ‘airplane’, ‘attack’ and ‘terrorist’ indicating that Malaysians understood that the disaster shown in the video was an act of terrorism. The second concept ‘people’ found in the dominant theme was linked to words such as ‘someone’, ‘danger’ and ‘save’, suggesting that people were in danger and needed to be saved.

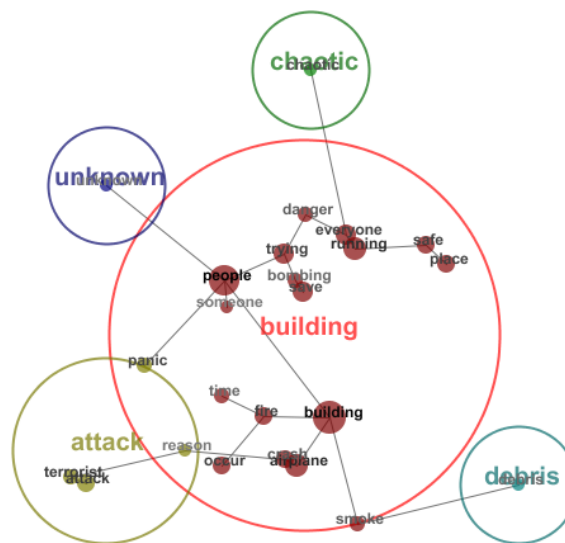


Figure 50. Dominant themes of Malaysian risk attitudes toward terrorist attack at the comprehension level

Figure 51 shows that a strong positive correlation was found for concepts between people → running → everyone → save → bombing → someone, with $r=0.95$. The second concept ‘buildings’ was associated with words such as ‘crash’, ‘airplane’ and ‘smoke’. Both of these concepts suggest that at the comprehension level of human-induced disaster, Malaysian subjects tended to seek relevant information from their surroundings in order to understand the situation.

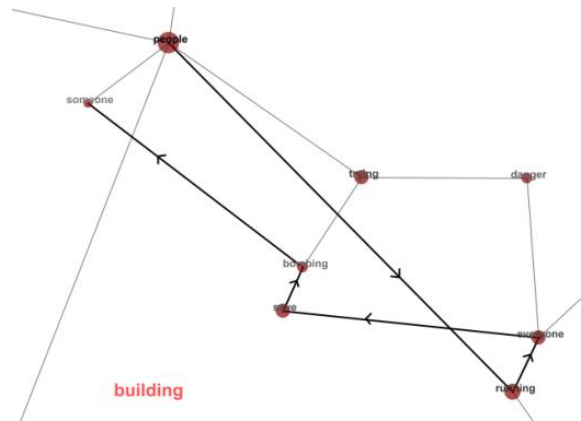


Figure 51. Concept pathways for “people” as gauged from Malaysian attitudes toward terrorist attack at the comprehension level

Indonesian. At this comprehension level of situation awareness, the resulting semantic analysis produced three central themes starting with *People*, followed by *Airplane* and *Become*, see Figure 52. The concept ‘people’ again appeared as the main concept and was mapped to words such as ‘place’, ‘safe’, ‘running’ and ‘finding’. Other concepts that emerged were ‘worry’, ‘finding’, ‘chaos’ and ‘terrorist’.

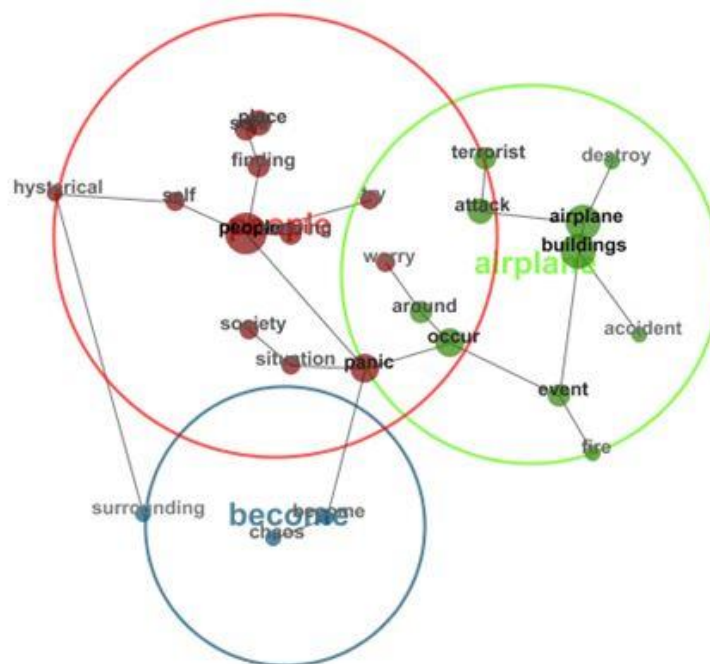


Figure 52. Dominant themes of Indonesian risk attitudes toward terrorist attack at the comprehension level

In Figure 53 below the knowledge between the concepts *people* → *place* → *safe* showed a strong positive correlation with $r=0.94$. The second concept ‘airplane’ showed a strong positive correlation between *airplane* → *buildings* → *occur* → *attack* → *terrorist* → *destroy* ($r=0.91$). This suggests that Indonesians understood the terrorist attack, but their responses were not reflected in their risk attitudes.

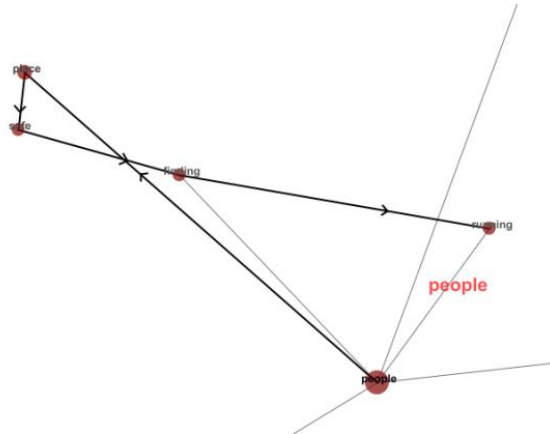


Figure 53. Concept pathways for “people” as gauged from Indonesian attitudes towards terrorist attack at the comprehension level

5.4.3 Projection level

Malaysia. Five central themes emerged where the dominant theme was represented by *People*, followed by *Place*, *Safety*, *Terrorist* and *Occur*, see Figure 54. The main concept ‘people’ was highly mapped with concepts to risk attitude components such as ‘escape’ (behavior), ‘rescue’ (trust) and ‘dead’ (RI).

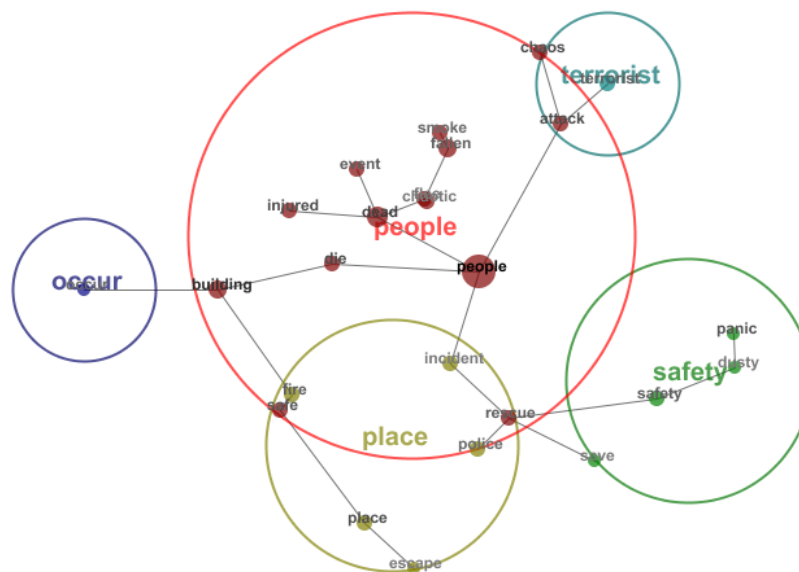


Figure 54. Dominant themes of Malaysian risk attitudes toward terrorist attack at the projection level

Figure 55 shows the knowledge pathway between the concepts *people* → *dead* → *event* → *chaotic* → *flee* → *incident*, which had a strong positive correlation ($r=0.87$). This suggests that the individuals’ predicted outcome of the terrorist attack shown in the video was reflected in the behavior of people (flee) and also caused by the potential disaster risks involved (dead). A second concept ‘building’ was associated to words ‘fire’, ‘die’ and ‘safe’, and the relationship between *building* → *fire* → *safe* was highly correlated ($r=0.82$).

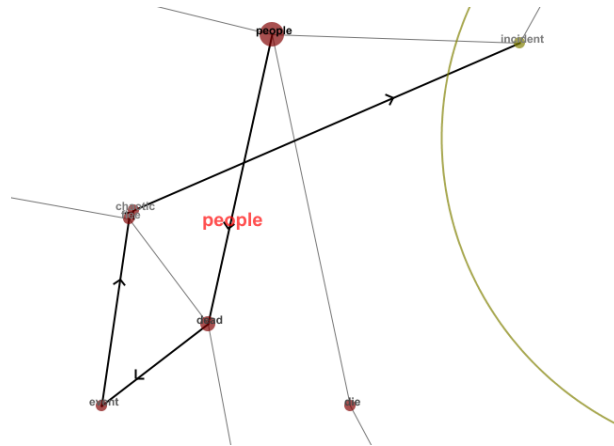


Figure 55. Concept pathways for “people” as gauged from Malaysian attitudes toward terrorist attack at the projection level

Indonesian. Figure 56 revealed three central themes where the dominant themes were *Collapse* followed by *Terrorist*, *People* and *Police*. These words showed how subjects predict what might happen to people after a disaster such as a terrorist attack.

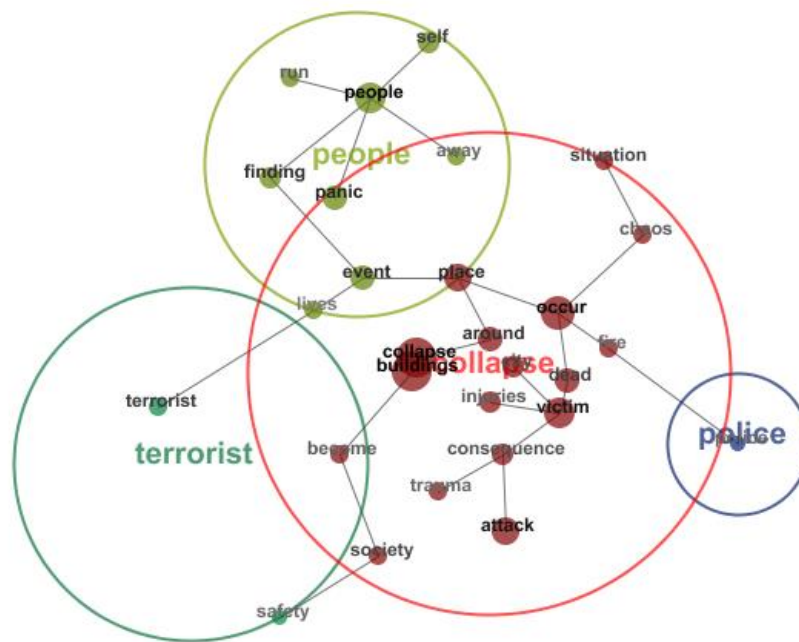


Figure 56. Dominant themes of Indonesian risk attitudes toward terrorist attack at the projection level

Figure 57 shows that the relationship between the concepts collapse → occur → victim → dead → injuries was highly correlated with $r=0.87$. At this level of situation awareness, it seems that subjects were concerned about how the terrorist attack situation could deeply affect the safety of their lives. The knowledge pathway produced for the concept buildings → collapse → occur → victim → dead → consequence → trauma had a strong positive correlation ($r=0.82$). The results proved how Indonesian subjects predicted the outcome of disasters such as terrorist attack, which can have repercussions on their physical and psychological health.

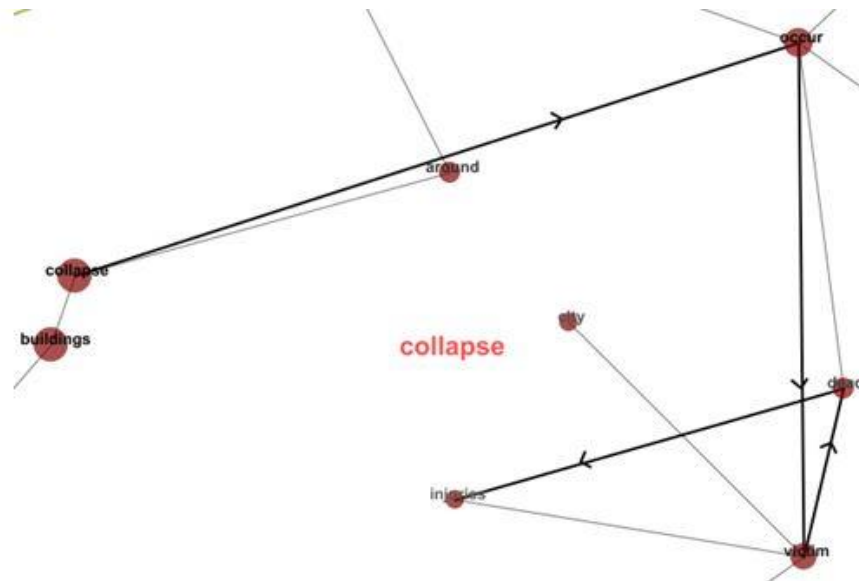


Figure 57. Concept pathways for “collapse “as gauged from Indonesian attitudes towards terrorist attack at the projection level

5.5 Summary

Risk identification. The groups selected different images for tsunami but identified risks similarly. For terrorist attack, both groups identified the same image that they considered had the highest hazard risk. However, their comments regarding both disasters differed slightly at each level of situation awareness. The main difference was that Malaysians had less to say about the risks compared to Indonesians due to lack of exposure to both types of disasters. Their narratives were more generic while Indonesians provided more details. There were fewer themes revealed in the narratives of Malaysians (about 2-3) relative to Indonesians (about 3-5). Earlier, we established that Malaysians are culturally different from Indonesians in terms of their cognitive ability. It is hence possible that the observed differences in cognitive style were produced by differences in their social orientation and experiences (White, 2012).

Risk attitude. There were also differences between Malaysians and Indonesians in risk attitudes. Although they watched the same disaster videos, the views of Malaysians regarding the disaster scenes at each level of SA were general, unlike Indonesians who were specific about the behavioral actions to take and the emotions induced by the disaster scenarios. Both groups, however, focused on *people* as a critical factor in their narratives irrespective of disaster type. Their concern for lives and the impact of disasters on health and psychological well-being calls for greater awareness of human re-engineering of disaster through education rather than physical reengineering.

In short, these differences in psycho-cultural SA are informative and provide suggestions on how to train and manage communities for disaster preparedness taking into account that differences in social orientations can impede disaster management and recovery.

6 DISCUSSION

6.1 Cultural Cognition: Analytic vs. Holistic

Cultural cognition takes into consideration how people perceive and make decisions. Analytical thinkers select more dispositional facts than holistic thinkers (Klein et al., 2008). Cultural cognition varies between countries and individuals. Khalid et al. (2008) noted that Indonesians are more analytical in their thinking as compared to Malaysians. To further investigate this phenomenon we used two scales: Relevance of Facts (RoF) and Memory of Facts (MoF). The results showed a significant effect of nationality on Total Dispositional facts (TOTDIS), Mean Relevant Dispositional facts (MRELDIS) and Mean Relevant Situational facts (MRELSIT). However, there was no difference between Genders.

Unlike Malaysians, Indonesians selected information that was related to personal attributions. This reflects differences in information processing strategy, where Indonesians typically rely on dispositional facts and Malaysians turn to holistic aspects. Holistic thinkers tend to regard people, objects and events as inextricably related (Ji, Peng, & Nisbett, 2000; Ji, 2008). Hence, the hypothesis that Indonesians are more analytical and Malaysians more holistic was accepted. Despite originating from similar cultural backgrounds, there were clear differences which we attributed to differences in social orientation and experience with disasters. The ability to judge the relevancy of complex information is important (Klein et al., 2008). This is especially true in rapidly evolving and dynamic situations that can lead to disasters. In this respect, the Indonesians fared better than the Malaysians.

According to Fothergill, et al. (1999) and Fothergill and Peek (2004), females are more vulnerable than males in disaster situations. This is due to their lack of confidence in handling dynamic changes in the environment, which may be a result from their domestic role as homemakers. There was a significant difference between Malaysian males and females in Total Situational (TOTSIT) facts, suggesting that females were indeed more easily affected by the situation than males.

Differences in the ability of individuals to recall facts can also be attributed to external or internal causes and are also a function of nationality and gender. The correlations obtained suggest that the ability to recall certain facts was due to the type of attribution made in the RoF task. Indonesians recalled dispositional facts in both RoF and MoF. This gives further support to the proposition that persons who rely on dispositional attributions are able to recall more dispositional facts (Klein et al. 2008; Lin 2008).

However, there were also significant correlations between total dispositional content in RoF and total situational facts in MoF, which indicated a loss of information due to the limitations of the short-term memory. The difference between information input to the task and the resulting output was about 15-30 s, which is longer than the holding time of short-term memory (5-10 s). Hence there was no direct carry-over from the input to the output. Four tasks were performed during an hour's time. These tasks served as distraction, since they would nullify the current information store and the response would depend on the specificity of memory recall – dispositional versus situational facts. The elimination of the last few items from memory was due to the displacement of these items from short term memory, by using a distracting task (Bjork & Whitten, 1974).

6.2 Risk Identification

One main issue is whether people agree on the amount of risks inherent in a disaster? The level of agreement in risk identification is important for managing group behavior. Both groups seemed to agree in identifying hazard risks for both tsunami and terrorist attack. They were more agreeable in identifying risks of potentially low hazards as compared to high hazards. In other words, it was easier to estimate hazards in less risky situations as compared to highly risky situations, and in particular terrorist attack, which were judged as the most risky scenarios.

Both groups differed in identifying the risk inherent in tsunami images with severe hazards. This could be due to the fact that occurrences of tsunami in Indonesia are more frequent than in Malaysia. Prior disaster experiences directly affect an individual's risk perception (Kunreuther 1996; Riad & Norris, 1998). Individuals who have been exposed to natural disasters and have first-hand experiences tend to have better knowledge and awareness of exposure to potential dangers. Likewise for pre and post disaster management individuals with previous experiences are better prepared and also more likely to adhere to evacuation warnings.

Disaster experiences can also help in strengthening coping mechanism in affected populations, thereby increasing their level of resilience (Turnbull, Sterret & Hillboe, 2013). Other demographic factors such as educational background can also influence the perceived level of risk (Boon et al., 2012; Wamsler et al., 2012).

Differences in culture cognition between Malaysians (holistical thinking) and Indonesians (analytical thinking) also play a role in risk identification. In assessing a situation they look for different information in assessing a situation. A semantic analysis of narratives on risk identification provided an insight into the type of risks that are identified for the different types of disasters (see section 5). Holistic thinkers tend to view a situation from a broad perspective and look for information they can use to classify the situation. They focus on relationships, similarities and dissimilarities among objects when organizing the environment (Nisbett et al. 2001; Klien et al. 2008). This behavior was clearly manifested in the explanations of hazards given by Malaysians, who focused on hazards they identified as high risk. According to them, the destruction and loss of lives was a potential disaster risk which is first perceived and later analyzed; corresponding to the perception and comprehension levels of SA. For the third level, the projection level of SA, Malaysians predicted the outcomes of environmental and health risk such as spread of diseases, trauma and water pollution that could take place as a result of the tsunami disaster.

Indonesians, being more analytical thinkers, were inclined to attend to the focal objects rather than the context. They used rules and categorizations for the purposes of organizing the environment (Nisbett & Miyamoto, 2005). Indonesians made more comprehensive observations as compared to Malaysians. They described related risks both at the perception and comprehension levels, including fatalities, destruction of properties and buildings, and at the prediction level they discussed the probability that these structures would be swept away by large waves in a tsunami disaster. Indonesians expected economic crises to occur due to sustained damages of properties and pollution. They also predicted that people would suffer the loss of homes from the tsunami disaster.

For the human-induced disasters, Malaysians and Indonesians selected the same high risk images. These predictions were also made at the projection level of SA. However, their identifications of risk were different due to differences in cognitive style. Similar to the previous description of high risk tsunami disaster, Malaysians explained and predicted the risks associated from the image of terrorist

attack based on the perceived relationship between the focal object and the surrounding field (Nisbett, et al., 2001). At the perception level, Malaysians' assessment of the risk elements in the image of terrorist attack focused on the occurrence of an attack on a country, where people in the buildings and airplanes were involved and bombs exploded. Indonesians, however, made a more focused observation where they perceived people in the airplane being hijacked by a terrorist and buildings were under attack and people become victims.

Malaysians again reasoned that the risk they identified in the terrorist attack image at the comprehension level of SA was based on overall elements from the scene and their context (Winerman, 2006). They inferred that lives of people in the buildings were at stake and the terrorist attacks took place in surrounding public areas.

At the projection level, following the terrorist attack, Malaysians made general predictions of how the country could be involved in the attack will be at a war, since the terrorist caused many casualties and people became fearful. As expected, Indonesians provided a detailed analysis of risks from the image of the terrorist attack both at the comprehension and projection levels of SA. They used abstract logic and dialectical reasoning rather than user-based experience (Norenzayan, et al., 2002). Finally the Indonesians explained how the victims of the terrorist attack would have to evacuate because a bomb threat situation could arise (comprehension level) and predicted that the act of terrorism would inflict death and injury to the victims involved, thus disrupting peace (projection level).

In sum, the ability to identify risks from scenes of high-risk disasters (i.e. perception) and being able to make sense of the cues that are perceived (i.e. comprehension), and predict future outcomes (i.e. projection), it is possible to prepare people for future natural and human-induced disasters.

6.3 Psycho-Cultural Situation Awareness

The group differences in disaster risk attitudes were more prominent in the natural disaster tsunami as compared to the human-induced terrorist attack. This could be due to the fact that Southeast Asia (SEA) has experienced a greater number of natural disasters as compared to human-induced disasters, such as a terrorist attack. SEA has also been identified as the most natural disaster prone region in the world where Indonesia, Thailand and the Philippines are among the most vulnerable countries (Centre for Research on the Epidemiology of Disasters, 2010). With this background Malaysians and Indonesians have developed distinct disaster risk attitudes based on experience, and they understand the vulnerabilities involved.

In both disasters Indonesians, as compared to Malaysians, were more positively engaged in identifying risk, how they thought and felt as well as how they trusted their surroundings; for all three levels of SA. However, in terms of behavior, Malaysians were more positively engaged than Indonesians at the comprehension and projection levels.

From past experiences with disasters, Indonesians were able to adopt the right frame of mind (identifying risk, affect, cognition and trust) during a disaster. However, due to their past experiences they adopted a less positive behavior for survival. Risk identification and cognition were identified as the two most important components that determine an individual's disaster risk attitude. These two elements were active across the three levels of SA. Individuals identify risk and perceive the environment at each level of SA. This leads to an attitude that is necessary for survival as the disaster situation progresses.

Gender difference was most obvious in the tsunami condition. In Malaysia, there were gender differences in 'behavior' at the perception level, 'affect' at the comprehension and perception level and 'trust' at the comprehension level. Meanwhile, in Indonesia, there were gender differences in 'affect' at the perception and projection level, and 'risk identification' at the projection level. From the findings, we can conclude that affect or emotions of people was influenced the most among the five components of disaster risk attitude, where female was found to have a less positive affect than male in all of the significant results. Being in a disaster situation, women would feel helpless, insecure and emotionally weaker compared to men. Some women, due to economic, ethnic, and age factors, are more dependent than others and this can be seen before, during and after a disaster happened (Enarson & Morrow, 1998).

In terrorist attack, the gender difference was not evident. This could be due to the nature of the disaster where survivability is dependent on the decision of an individual or group; therefore there may be difficulties in perceiving, understanding and anticipating the situation.

From the semantic analyses of narratives, Malaysians were more focused on the background elements of the tsunami scene at the perception level of SA. Their description characterized the rising level and movement of water with the onset of tsunami. They then described the behavior and emotions of people that they tend to panic and running away from the wave. Indonesians, on the other hand, perceived people first that they were in a state of panic and trying to get away from areas where the tsunami had occurred. Then, they explained how people would lose their homes because of the fast movement of water.

Malaysians as holistic thinkers preferred to have more information before making initial judgments on risk attitudes at the perception level of SA as compared to Indonesians who were proven to be analytic thinkers (Klein et al., 2008). At the comprehension level, the groups differed on the type of information they used in assessing their situation awareness. Malaysians had a tendency to concentrate on a wider scope of information in order to make sense of the evolving tsunami phenomenon. They deduced that the tsunami water would cause the area to be flooded very fast. People's safety was at risk and the buildings would be swept away, thus, the turn of events made the situation chaotic. Indonesians rationalized the tsunami differently. They understood that people would panic and run to higher ground to save themselves from the tsunami. In this regard, Indonesians tend to use feature-based and rule-based strategies rather than context in their cognitive processes (Buchtel & Norenzayan, 2009).

At the projection level of SA, Malaysians predicted general risk attitude related outcomes of the tsunami event presented in the third video while Indonesians' prediction were more specific. For example, Malaysians estimated the impacts of psychological trauma on the tsunami victims due to many casualties from destruction of places for shelter and buildings. Indonesians however predicted the outcomes of risk on people's safety where they get trapped in cars along with their things and properties as well as the occurrence of diseases from dead tsunami victims and debris.

Next, we looked at the reasoning of Malaysians and Indonesians for risk attitude in SA towards human-induced disaster. Note that in our earlier discussion, we found that subjects from both of these countries did not differ much in their risk attitude assessment towards the terrorist attack videos at each level of SA. This was also evident in the risk identification measures where Malaysians and Indonesians identified the same low and high risk images. However, due to their cultural variation in cognition, we were able to detect differences of their inferential processes in risk attitude towards

human-induced disaster such as terrorist attack across levels of SA. For instance, Malaysians were concerned that people would experience negative emotions and thinking induced by the terrorist attack at their perception level of SA. However, they perceived that people would display positive behaviors towards their survivability rather than negative affect and cognition such as screaming and running to find a safe place away from the fire in the building. Similar observations were made by Indonesians. They also tended to describe more details regarding the main object in the video, which was 'people'. However, their associations were more focused towards perceived feelings of hysteria and panic which would occur due to the terrorist attack and their reactions would not be content-related like the Malaysian reactions.

At the comprehension level of SA, Indonesians used a critical approach to make sense of the incident presented in the video. Our results suggested that Indonesians' understanding of the terrorist attack event were related to people's risk attitude and trust that they should run and find a safe place. They also identified a way to identify how the terrorist attack occurred and where the buildings were destroyed by the airplanes. Malaysians had more general reflection based on their SA at the comprehension level, where they explained reactions of people running and saving themselves, because the building was on fire after the plane crashed. They also inferred that someone was bombing the building but unknown to people. This made the situation chaotic.

Finally, Malaysians and Indonesians predicted different risk attitude at the projection level of SA. Malaysians expected both positive and negative effects of risk attitudes towards terrorist attack situation. Victims would try to flee from the chaotic event, but the chances of escaping were slim. As a result many casualties occurred since the building was on fire. Indonesians were specific in their predicted outcomes, which were based solely on what they saw in the terrorist attack video. They guessed how the collapse of the buildings would increase the number of dead and injured victims, which in turn created a traumatic experience.

A comparison of the results for the two disaster groups (natural and human-induced disaster) was undertaken for the two nationalities. It demonstrated how people identify, understand and anticipate outcomes differently in their SA due to their cognitive and nature of the disaster. This is supported by the ANOVA results (see Table 9) where significant differences were obtained for risk identification of natural and human-induced disaster in the Malaysian and Indonesian scenarios.

6.4 ABC Assessment

After watching the disaster video, participants from tsunami and terrorist attack condition were impacted differently in affective and cognitive. Anger was experienced more in the terrorist attack condition, while the impact on sadness was less. In a terrorist attack situation, there is a physical source of chaos and instability to channel the anger and blame for the destruction of lives unlike in natural disaster, therefore more anger is felt instead of sadness. Meanwhile, the physical impact of a tsunami was perceived to be higher than the physical impact of a terrorist attack. Other than that, the psychological impact of tsunami is also perceived to be higher. As tsunami often happened on a large scale, and the nature of tsunami is non-selective in "choosing" its victims, the physical and the psychological impact of the disaster is perceived to be higher. For example, when a tsunami strikes, not only does it involve loss of lives, it destroys houses and source of income for the people who are dependent on the fishing industry.

The findings suggested that Indonesian participants perceived a higher psychological impact of tsunami than Malaysian participants. As Indonesia suffered a terrible tsunami on 2006, they can relate more to the psychological toll of tsunami on the victims. Other than that, gender differences is also evident in the affective domain where female were more emotionally vulnerable in the context of fear during tsunami condition and sadness during terrorist attack condition. This could be contributed by their gender roles in the Southeast Asia where female are often the caregiver for children and elderly making them more sensitive and vulnerable than males.

Post-traumatic stress disorder (PTSD) is a common psychological problem faced by the victims of traumatic events, such as tsunami and terrorist attack. Walsh (1994) noted that PTSD is usually provoked by a traumatic event that is outside the range of common human experiences such as bereavement of family member, chronic illness, business losses or marital conflicts. PTSD is also common among children (Piyasil et al., 2007), adolescent (Nasir et al., 2011) and women (Breslau, 1997).

There was no difference in behavioral reactions of participants from either condition. The three most frequent reactions were to create awareness, donate and offer prayers that have no certain outcome. Two of these reactions are approach reactions while the third is immobility.

This research is important in order to predict how an individual would be impacted in their affective, cognitive and motor behavior by natural and human-induced disasters, so that when disaster does strike, there is proper care and support for the victims. From the findings, we conclude that the impact of disaster on individuals' feelings were influenced by type of disasters and by gender. The cognitive domain that measured the perceived impact of the disaster was influenced by nationality.

6.5 Information Networks

Participants seemed to put a priority in contacting their families and friends and predicted that the families and friends would then contact the authority or an emergency response team. During a disaster situation, individuals would resort to method that is fast and efficient in getting the disaster information across no matter what type of communication they rely on. Verbal communication is the most effective method since there is only little time delay in the process. However, it should be noted that during the Great East Japan earthquake, there was a network congestion resulting in usage restrictions on fixed lines and mobile phones (Japan Ministry of Internal Affairs and Communications, 2011). It is therefore important to assess the efficiency and effectiveness of various means of communication to help improve warning systems and calls for help during disasters (Mileti, 1995).

The results of this task would help in managing dissemination of disaster information among the public in Malaysia and Indonesia. As mentioned, the information flow could aid problem-solving and decision making. This is especially crucial at times of disasters. Recommendations such as raising the public's awareness through schools and community programs and enhancing the quality of information systems in the disaster management organization were also suggested.

6.6 Team Trust

In disaster, trust plays a critical role in enhancing communications between individuals; especially when hastily formed networks are created that operate for a limited period of time (Tatham, 2010). Low levels of trust can have a negative effect on cooperative behaviors of individuals while high levels of trust can assist in raising the efficiency of rescue efforts and post-disaster management programs.

The purpose of this task was to investigate if there are significant correlations between the four measured subscales of team trust. We also tested if there are significant differences concerning the dimensions of team trust as a function of nationality, demographic factor, and team performance. Results showed strong positive correlations between all four subscales of team trust. This suggests that the dimensions of trust such as competence, integrity, benevolence and predictability are not independent from each other (Adams & Sartori, 2008).

In the overall sample, the benevolence subscale was found to produce significantly different results for Malaysians and Indonesians, where the former obtained a higher mean rank score. We concluded that Malaysians had higher trust in the intentions of individuals; they are seen as non-manipulative and have favorable motives towards the individuals' interest. Several studies have shown how the role of trust has a greater affect on individuals who are holistic in thinking compared to analytic (Hideg, 2012; Becerra et al., 2013). Although we expected team performance to have an influence on team trust, our results showed otherwise. There may have been a confounding effect caused by familiarity of group members since most of them were either related (family members) or well-acquainted (co-workers, friends).

Finally, the results on gender differences proved that males and females were equal in team trust (Eckel & Wilson, 2003; Petrie, 2003) and not different as we earlier predicted. Thus, our hypotheses regarding the existence of difference in team trust between genders was rejected. In sum, nationality had a main effect on the levels of trust among individuals. Further studies should investigate the role of nationality in terms of analytic-holistic paradigm and how it influences trust of individuals/groups during disasters. This information can be used for designing an effective disaster management plan.

7 SUMMARY AND CONCLUSION

7.1 Summary of Findings

The hypotheses tested in Section 3 may be summarized as follows:

1. Indonesians were found to be culturally different from Malaysians in cognitive style, where Indonesians think analytically and Malaysians think holistically.
2. Indonesians applied their analytical skills in identifying risks across disaster types and across all levels of situation awareness (perception, comprehension, projection) compared to Malaysians who applied generic skills.
3. Indonesians adopted a different set of disaster risk attitudes than Malaysians at all levels of situation awareness. This was most evident for natural disasters such as a tsunami. In assessing disaster risk attitudes, Indonesians are also more analytical than Malaysians in analyzing both tsunami and terrorist attack, across all levels of situation awareness.
4. Indonesians shared similar patterns of information dissemination as Malaysians and similar preferences for communication devices in disseminating information as Malaysians.

5. Indonesians differed from Malaysians in post-hoc cognitive assessment of perceived risk impact of the disasters but were similar to Malaysians in post-hoc affective and behavioral assessment of disaster scenarios.

6. Indonesians trusted the team less in benevolence aspects of trust than Malaysians who were more optimistic towards the intentions and motives of others.

From the factor analysis of tsunami and terrorist attack (see Section 3), it was apparent that risk identification, cognitive, affect, trust and behavior evolved cyclically in the factor loadings. The components were not exclusive from each other as it is crucial that they function together to provide a comprehensive assessment of the dynamic situation. For example, the factors that emerged at the perception level of tsunami showed that psycho-cultural SA was related to *information gathering, emotional experience, hazard appraisal, hazard progression, safety trust, informational trust, cooperative behavior, environmental assessment and warning*.

At the comprehension level, the psycho-cultural SA factors concerned *situational trust, survival actions, vulnerability, emotional response, risk assessment, risk progression, escape assessment and foresee ability*. At the projection level, the factors described *environmental trust, security, emotional and motivational drive, survivability, aid dependency, predictive risk impact, predictive environment condition and behavior*. People first assess the present situation by gathering information from the environment and evaluating the risk involved. They then proceed to weigh their safety, well-being and finding ways to survive the situation. The assessment is crucial to ensure survivability during a disaster as it would make the individuals to become resilient in that dynamic situation.

7.2 Significance of Research Outcome

Understanding the difference between cultures through cognition especially within the Southeast Asian scenario is important. Several studies have suggested how Asians are supposed to be holistic in thinking. However, individuals from two countries; Malaysia and Indonesia were found to be culturally different from each other due to differences in their cognitive style. Hence, generalizations and assumptions that all countries representing the Southeast Asian are holistic in thinking cannot be made. In disaster risk management, acknowledging the difference between cultures of different countries can help in planning and implementing mitigation, preparedness, response, and recovery actions.

Perceptions of risk play a critical role in influencing the decisions people make particularly in disaster situations. Some of the differences manifested between people from different cultures as well as between technical experts and members of the general public where disagreements about the best course of action to take among several identified risk exists (Slovic, 1987; Weber & Hsee, 1999). Our findings showed that agreement in risk identification exists among individuals from the same population, irrespective of the type of disaster or the impact (high or low risk) it would cause. Another important finding suggested how differences between cognitive style, such as holistic and analytic thinking capabilities can influence risk identification. Thus, correct perceptions of risk can be made and misperceptions of risk can be avoided if government bodies, disaster relief organizers and other relevant parties are able to construct appropriate measures in preparedness (e.g. disaster warnings catered to the population) to deal with disasters of both natural and human-induced causes.

Once the risk has been identified, it may be possible to adopt an appropriate risk attitude that could maximize the probability of survival in times of disaster. There is no pre-determined set of risk attitudes that can be utilized in natural and human-induced disaster as different disasters evolve at a different rate and impose a different threat altogether. Our investigation of risk attitude at each situation awareness level indicated that risk identification and cognition are the most important components of risk attitude as information processing capabilities are required early to perceive and make decisions regarding other attitudinal components such as affect and behavior, and trust to play a role.

From the factor analyses (see section 3, Tables 7 to 8), the nature of occurrence of attitudinal components differed at each level of SA for each disaster type. For example at the perception level of SA for tsunami, the components iterate as follows: affect (calm) -> affect (in control) -> affect (strong) -> cognition (peaceful) -> cognition (quiet) -> affect (inquisitive) -> behavior (look around) -> trust (warning sign) -> trust (listen to people shouting) -> behavior (seek information) -> behavior (warn people) -> behavior (attend to warnings) -> affect (worry) -> behavior (do something) -> cognition (active) -> risk identification (high hazard), and so forth. This iterative nature of attitudes enables individuals to assess their knowledge and skills in order to remain resilient during the disaster.

However, being resilient during a disaster should not impede the aftermath effect of the disaster. PTSD has been found to be highly significant in children (Piyasil et al., 2007), woman (Breslau, 1997) and the elderly after a disaster event. Measures should be taken by the government and local authority to identify those who are vulnerable and susceptible to PTSD in the local area and provide a strong moral support and health care for the victims.

Findings from the current research suggested that Indonesians and Malaysians would disseminate disaster information to members of their family first before contacting a relevant disaster relief team. This is probably due to lack of awareness that any disaster-related information should be informed to the relevant party first in order for efficient rescue effort to take place. Therefore, the public should be made aware of this fact through seminars, public talks and at school. Phone call through fixed line and hand phone was rated as the most efficient communication method to get disaster information across. Radio satellite system should be installed in disaster prone areas to ensure a smooth flow of information even when disaster has impeded other communication methods.

The efficiency of rescue efforts and post-disaster management programs can be enhanced if proper communication lines are present between involved parties (affected population and disaster recovery team) of a disaster. All forms of communication are built on a solid foundation of trust, where it can greatly impede cooperation of within-group and between-group members. For instance, our finding implied that Malaysians have greater benevolence trust towards people than Indonesians, thus we can conclude how Indonesians would be less tolerant in accepting outside help (e.g. other countries, United States; organizations, United Nations). Steps to increase and build greater trust with the Indonesian population must be taken, so that conflicts that may occur during disaster emergencies can be avoided.

7.3 Limitations of the Research

The limitations of this research may be summarized as follow:

- *Representativeness of sample.* The stratification of sample according to the demographic variables resulted in smaller sample size per strata such as ethnicity, and age group. A larger sample size would have allowed for a better representative distribution of the Malaysian and Indonesian population within the selected variable. Thus, the results may only be generalized to populations that share similar cultural characteristics.
- *Test setting.* The data was gathered in the field in a natural setting to enhance ecological validity. However, such an uncontrolled natural environment invites various extraneous factors that cannot easily be controlled, including background noise from the surroundings, which may have caused a distraction. A laboratory setting with less confounding factors offers an alternative if it can be simulated to resemble the real-world environment.
- *Measurement.* The use of subjective measures only to assess disaster risk attitudes may not be sensitive enough to understand SA as the stimulus was presented in a way which permits passive engagement. Objective and direct physiological measures may be useful to provide real-time account of individual's disaster risk attitude at different SA levels.

7.4 Future Work

Given the limitations and scope of the research, future work includes replicating the study using a larger sample size to increase generalizability of the findings. This can be done by developing the Disaster Risk Attitude Survey as an online tool; thereby, data may be accessible anytime, anywhere and by anyone. This is beneficial since disaster affects everyone. The online mode also makes data collection easier and less time consuming as the data may be organized in a spreadsheet for efficient data processing and statistical analysis. However, the constraint is to ensure that children below 18 years of age are not eligible to participate and the informed consent form must be obtained prior to participation.

There is a need to validate the risk attitude model of SA in other cultural contexts in order to gauge its applicability as a framework for research and development. The model may prove to be useful in identifying vulnerability and resiliency of disaster-affected populations as it measures people's attitude at three levels of situation awareness.

The mode of stimulus presentation may be improved to enable immersive engagement in a disaster scenario for real-time measurement of psycho-cultural situation awareness. Design of disaster simulation experiments can help to enlighten our understanding of individual and group risk attitude by providing more accurate information and representation of their immediate responses. Moreover, undertaking the research in a more controlled environment as in a laboratory setting can help to alleviate potential confounding factors.

7.5 Final Remark

Culture has vast implications towards individual's cognition, emotion, and behavior. In the context of disaster, it plays an important role in reducing disaster risk vulnerabilities such as individual's exposure potential hazards as well as increasing the resilience of a disaster-affected population through proper implementation of evacuation and recovery plans. By acknowledging the culture of a population involved in disaster event through their way of thinking, be it holistic or analytic, related

governing bodies, authorities and experts can understand how these cognitive differences influence the disaster risk attitudes of individuals.

In dynamic situations like natural and human-induced disasters, individuals must learn to adapt to the constant changes in the environment to ensure survivability by knowing how their way of thinking can influence the way they manage, store and use information from the surroundings. In sum, measuring culture through individual's cognitive style of thinking can facilitate in disaster-related situations such as establishing how people prepare, react and recover from disaster events within the context of their culture.

There exist a different set of attitudes for individuals to cope with natural and human-induced disaster. Factor analyses supports this statement as the factor loadings for the two disaster groups differed in each stage of psycho-cultural situation awareness. Clearly, people's concerns for their safety and well-being follow their assessments of situations. To cope with the developing situations, people adapted to the risk through display of affect, behavior, cognition, and trust. This process evolved iteratively in a cyclic manner throughout each level of SA, allowing people to have better control of the evolving situation, thereby making them more resilient. By exploring the dimensions of attitude at three levels of situation awareness and their reasoning at each level, we obtained comprehensive insights of important SA concepts that can be used in disaster management studies and contribute to the current knowledge in this field. Development of a cultural-based disaster management system is recommended to deal with different types of disaster.

In conclusion, it has been shown that the Situation Awareness theory provided a useful framework for application in developing a national policy on disaster management. The investigation of risk attitude at each level of SA, as a function of sociocultural factors, provided an important insight into the development of psycho-cultural SA during a disaster situation, especially when the disaster is unfamiliar to the community.

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APPENDIX 1. Section A of Survey Questionnaire

Subject ID:

Date:

Start time:

End time:

SECTION A: PARTICIPANT PROFILE

INSTRUCTIONS: In this section you will provide particulars about yourself, your use of communication technology, and your experience with disasters.

1. Location of study (Town/City): _____

2. Venue (actual place): _____

3. Age groups:

- ☐ 18 - 23 years old
- ☐ 24 - 29 years old
- ☐ 30 - 35 years old
- ☐ 36 - 41 years old
- ☐ 42 - 47 years old
- ☐ 48 - 53 years old
- ☐ > 54 years old

4. Gender:

- ☐ Male
- ☐ Female

5. Occupation:

- ☐ Top Executives (CEO, Chairman, President)
- ☐ Professionals (Professor, Lawyer, Accountant, Doctor)
- ☐ Senior Executives & Officers (Director, Senior Manager, Lecturer)
- ☐ Junior Executives (Researcher, Tutor)
- ☐ Technicians (Chemical Technician, Engineering Technician)
- ☐ Sales Workers (Retail Assistant, Travel Agent, Telemarketer)
- ☐ Administrative Support (Secretary, Personal Assistant, Customer Service Representative)
- ☐ Craft Workers (Carpenter, Electrician, Maintenance Worker)
- ☐ Operatives (Bakers, Butchers, Programmers)
- ☐ Laborers and Helpers (Fishermen, Construction Worker)
- ☐ Service Workers (Nurse, Firefighter, Maid)
- ☐ Retiree
- ☐ Unemployed
- ☐ Student
- ☐ Other (please specify) _____

6. Ethnicity:

- ☐ Malay
- ☐ Chinese
- ☐ Indian
- ☐ Other (please specify) _____

7. Belief system/Religion:

- ☐ Islam
- ☐ Buddhism
- ☐ Hinduism
- ☐ Christianity
- ☐ Free Thinker (atheism)
- ☐ Pagan
- ☐ Other (please specify) _____

8. Educational background - please select your highest qualification:

- ☐ Primary School
- ☐ Secondary School
- ☐ Diploma
- ☐ Undergraduate (Bachelor degree)
- ☐ Postgraduate (Masters, Doctorate degree)
- ☐ Professional Certificate (e.g. ACA, CPA, CFP)
- ☐ None
- ☐ Other (please specify) _____

9. Language proficiency - please select your primary language:

- ☐ English
- ☐ Bahasa Melayu
- ☐ Mandarin
- ☐ Tamil
- ☐ Other (please specify) _____

10. Monthly income:

- ☐ No income
- ☐ Less than RM 800
- ☐ RM 800 - RM 2600
- ☐ RM 2601 - RM 4400
- ☐ RM 4401 - RM 6200
- ☐ RM 6201 - RM 8000
- ☐ RM 8001 - RM 9800
- ☐ RM 9801 - RM 11500
- ☐ More than RM 11501

11. Number of persons living with you:

- ☐ None
- ☐ 1 - 3 persons
- ☐ 4 - 6 persons
- ☐ 7 - 10 persons
- ☐ More than 10

APPENDIX 2. Task 1 – Risk Identification

Subject ID:

Date:

Start time:

End time:

TASK 1: RISK IDENTIFICATION

INSTRUCTIONS: Assume that you are in a RISK-related situation and you need to respond fast.

1. The images below show TSUNAMI situations. RANK ORDER the level of risk as perceived by you, where 1=HIGH RISK, to 6=LOW RISK.



Subject ID:

Date:

Start time:

End time:

TASK 1: RISK IDENTIFICATION

INSTRUCTIONS: Assume that you are in a RISK-related situation and you need to respond fast. The images below show TERRORIST ATTACK situations.

1. RANK ORDER the level of risk as perceived by you, where 1=HIGH RISK, to 6=LOW RISK



2. For the HIGHEST RANKED scene above (i.e. RANK 1), explain in detail:

2a. What risks do you perceive of the situation?

--

2b. What risks do you understand about the situation?

--

2c. What risks do you foresee will happen next?

--

APPENDIX 3. Task 2 – Relevance of Facts

Subject ID:

Date:

Start time:

End time:

TASK 2: RELEVANCE OF FACTS

INSTRUCTIONS: Read the scenario and answer all questions about the scenario.

Scenario 1

Ahmad was involved in a traffic accident in which he crashed his car into the front gate of a house near the main road.

The following are some facts about Ahmad as well as the surroundings and conditions at the time of the accident. For each fact, indicate whether you think the fact is irrelevant or relevant to the incident by circling the word “irrelevant” or “relevant” accordingly. There is no restriction on the number of facts that you can indicate irrelevant or relevant (but please answer all items). For those facts that you have circled “relevant”, rate the importance of the fact as a contributing factor to the occurrence of the traffic accident by circling the appropriate number on the 5-point scale provided. For those facts that you have circled “irrelevant”, no such rating is required.

1. Ahmad dislikes tasks that involve the need to attend to details. Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

2. There are some trees planted near to the front gate of the house. Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

3. There are some road works going on near the house. Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

4. Ahmad tends to disagree rather than agree with others. Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

5. Ahmad gets anxious easily. Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

6. It was raining heavily at the time of the accident. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
7. There was no one in the house at the time of the accident. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
8. Ahmad has poor eyesight. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
9. There is a school along the same road where the house is. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
10. Ahmad's car has the same color as the front gate of the house. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
11. Ahmad likes to drive at high speed. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
12. Ahmad likes to try new activities. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
13. The house is the first building along the main road. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High
14. Ahmad enjoys social activities and situations. Irrelevant Relevant
If relevant, rate its importance:
☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

Scenario 2

Lim, an undergraduate, was beaten up badly by two masked men as he was walking towards his car parked near the campus library.

The following are some facts about Lim as well as the surroundings and conditions at the time of the incident. For each fact, indicate whether you think the fact is irrelevant or relevant to the incident by circling the word “irrelevant” or “relevant” accordingly. There is no restriction on the number of facts that you can indicate irrelevant or relevant (but please answer all items). For those facts that you have circled “relevant”, rate the importance of the fact as a contributing factor to the occurrence of the incident by circling the appropriate number on the 5-point scale provided. For those facts that you have circled “irrelevant”, no such rating is required.

1. Lim is unsystematic and disorganized.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

2. Lim has offended many people on campus.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

3. It was raining slightly at the time of the incident.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

4. Lim prefers variety than routine.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

5. Lim often worries about a lot of things.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

6. Incidents, where other students were beaten up by masked men, have occurred in recent weeks.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

7. Lim was involved in a fight with a classmate recently where he beat up the classmate.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

8. There were many trees planted near to the campus library.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

9. Lim dislikes being alone.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

10. Random violence on the campus has been increasing.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

11. Lim gets suspicious about others' intentions easily.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

12. The color of Lim's car is red.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

13. The campus library is one of the largest libraries in the city.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

14. There is an undergraduate residential hall near the campus library.

Irrelevant Relevant

If relevant, rate its importance:

☐ Very Low ☐ Low ☐ Moderate ☐ High ☐ Very High

APPENDIX 4. Task 3 – Situation Awareness

Subject ID:

Date:

Start time:

End time:

TASK 3: SITUATION AWARENESS

INSTRUCTIONS: Watch the TERRORIST ATTACK videos. Answer ALL questions in detail.

1. Assume that you are in this terrorist attack situation. What is going on around you? Describe what you perceive.

2. On first impression, how would you consider the risk?

Low hazard	☐	☐	☐	☐	☐	☐	☐	High hazard
Fast development	☐	☐	☐	☐	☐	☐	☐	Slow development
Much warning	☐	☐	☐	☐	☐	☐	☐	No warning
Unstable	☐	☐	☐	☐	☐	☐	☐	Stable
Constant	☐	☐	☐	☐	☐	☐	☐	Varies

3. How would you assess the situation?

Human is angry	☐	☐	☐	☐	☐	☐	☐	God is angry
Common	☐	☐	☐	☐	☐	☐	☐	Unusual
Active	☐	☐	☐	☐	☐	☐	☐	Passive
Peaceful	☐	☐	☐	☐	☐	☐	☐	Chaotic
Noisy	☐	☐	☐	☐	☐	☐	☐	Quiet

4. How would you describe your feelings?

Hysterical	☐	☐	☐	☐	☐	☐	☐	In control
Calm	☐	☐	☐	☐	☐	☐	☐	Distressed
Inquisitive	☐	☐	☐	☐	☐	☐	☐	Cannot care less
Strong	☐	☐	☐	☐	☐	☐	☐	Weak
Worried	☐	☐	☐	☐	☐	☐	☐	Cheerful

5. What do you trust at this initial level?

Distrust the warning siren	☐	☐	☐	☐	☐	☐	☐	Trust the warning siren
Listen to people shouting	☐	☐	☐	☐	☐	☐	☐	Do not listen to people shouting
Doubt I can escape	☐	☐	☐	☐	☐	☐	☐	Confident I can escape
Trust there is a safe place	☐	☐	☐	☐	☐	☐	☐	Do not trust there is a safe place
Do not trust information from others	☐	☐	☐	☐	☐	☐	☐	Trust information from others

6. How would you react?

Attend to warnings	☐	☐	☐	☐	☐	☐	☐	Ignore warning
Warn people	☐	☐	☐	☐	☐	☐	☐	Remain silent
Look around	☐	☐	☐	☐	☐	☐	☐	Focus on something
Do nothing	☐	☐	☐	☐	☐	☐	☐	Do something
Ignore information	☐	☐	☐	☐	☐	☐	☐	Seek information

Watch the **TERRORIST ATTACK** video.

7. Assume that you are in this situation, what do you understand about it? Explain the events happening around you.

8. Now that you understand the situation, how would you consider the risk?

Cannot foresee risk	☐	☐	☐	☐	☐	☐	☐	Foresee risk
Acceptable risk	☐	☐	☐	☐	☐	☐	☐	Too much risk
Many obstacles hinder action	☐	☐	☐	☐	☐	☐	☐	No obstacles hinder action
Not exposed to harm	☐	☐	☐	☐	☐	☐	☐	Exposed to harm
Impactful	☐	☐	☐	☐	☐	☐	☐	Inconsequential

9. How would you analyze the situation?

Safe	☐	☐	☐	☐	☐	☐	☐	Dangerous
Easy to understand	☐	☐	☐	☐	☐	☐	☐	Difficult to understand
Turbulent	☐	☐	☐	☐	☐	☐	☐	Calm
Stagnant	☐	☐	☐	☐	☐	☐	☐	Evolving
Dynamic	☐	☐	☐	☐	☐	☐	☐	Static

10. How would you feel about the situation?

Unafraid	☐	☐	☐	☐	☐	☐	☐	Scared
Threatening	☐	☐	☐	☐	☐	☐	☐	Non threatening
Hopeful	☐	☐	☐	☐	☐	☐	☐	Hopeless
Patient	☐	☐	☐	☐	☐	☐	☐	Restless
Vulnerable	☐	☐	☐	☐	☐	☐	☐	Guarded

11. What do you trust when you understand the situation?

Can make decision	☐	☐	☐	☐	☐	☐	☐	Cannot make decision
Disagree to action	☐	☐	☐	☐	☐	☐	☐	Agree to action
People can hear me	☐	☐	☐	☐	☐	☐	☐	People cannot hear me
Able to contact people	☐	☐	☐	☐	☐	☐	☐	Unable to contact people
Understand type of danger	☐	☐	☐	☐	☐	☐	☐	Cannot understand type of danger

12. How would you react to the situation?

Take the lead	☐	☐	☐	☐	☐	☐	☐	Follow others
Stay put	☐	☐	☐	☐	☐	☐	☐	Get away
Shout	☐	☐	☐	☐	☐	☐	☐	Be quiet
Do not call out to anyone	☐	☐	☐	☐	☐	☐	☐	Call out to someone
Freeze	☐	☐	☐	☐	☐	☐	☐	Run

Watch the **TERRORIST ATTACK** video.

13. What do you think will happen next? Explain what you predict might happen.

14. As the situation develops, what risk do you expect?

Potential health risk	☐	☐	☐	☐	☐	☐	☐	No health risk
No safety risk	☐	☐	☐	☐	☐	☐	☐	Safety risk
Threat to life	☐	☐	☐	☐	☐	☐	☐	No threat to life
Timely aid	☐	☐	☐	☐	☐	☐	☐	Delayed aid
Dead	☐	☐	☐	☐	☐	☐	☐	Alive

15. What can you foresee of the situation?

Possible to escape	☐	☐	☐	☐	☐	☐	☐	Impossible to escape
Low destruction	☐	☐	☐	☐	☐	☐	☐	High destruction
Sustain injury	☐	☐	☐	☐	☐	☐	☐	No injury
Opportunity for help	☐	☐	☐	☐	☐	☐	☐	No opportunity for help
High fatality	☐	☐	☐	☐	☐	☐	☐	Low fatality

16. What would you expect your feelings to be?

Fearless	☐	☐	☐	☐	☐	☐	☐	Fearful
Panic	☐	☐	☐	☐	☐	☐	☐	Secure
Trapped	☐	☐	☐	☐	☐	☐	☐	Freed
Relief	☐	☐	☐	☐	☐	☐	☐	Traumatic
Despair	☐	☐	☐	☐	☐	☐	☐	Motivated

17. What do you trust when the situation becomes critical?

Believe situation will stabilize	☐	☐	☐	☐	☐	☐	☐	Do not believe situation will stabilize
Do not believe there will be a shelter	☐	☐	☐	☐	☐	☐	☐	Believe there will be a shelter
Trust in help by authorities	☐	☐	☐	☐	☐	☐	☐	Distrust in help by authorities
No confidence in rescue team	☐	☐	☐	☐	☐	☐	☐	Confidence in rescue team
Believe device will work	☐	☐	☐	☐	☐	☐	☐	Do not believe device will work

18. What would you plan to do?

Act now, confront danger	☐	☐	☐	☐	☐	☐	☐	Act later, stay away from danger
Seek shelter	☐	☐	☐	☐	☐	☐	☐	Remain exposed
Ignore help from others	☐	☐	☐	☐	☐	☐	☐	Seek help from others
Help others	☐	☐	☐	☐	☐	☐	☐	Help myself
Use device to make contact	☐	☐	☐	☐	☐	☐	☐	Do not use device to make contact

APPENDIX 4a. Video on tsunami



APPENDIX 4b. Video on terrorist attack



APPENDIX 5. Task 4 – Information Network

Subject ID:

Date:

Start time:

End time:

TASK 4: INFORMATION NETWORK

INSTRUCTIONS: Please answer all questions based on the video you have just seen.

1. Assume that you were in the building when the disaster struck. You need to inform someone about the incident. Rank FIVE recipients below that you will alert instantly, where Rank 1=first recipient and Rank 5=last recipient.

☐ Spouse/ Partner	☐ Friends
☐ Parents	☐ Relatives
☐ Children	☐ Neighbors
☐ Siblings	☐ Co-workers
☐ Local authorities	☐ Strangers
☐ Emergency response team (Police, Ambulance, Firefighters, etc.)	

2. Indicate the method you would use to contact those FIVE ranked recipients.

	Text message using mobile phone	Voice call using landline / Hand phone	Instant message using smart phone	Send distress signals	Verbal message
Recipient 1	☐	☐	☐	☐	☐
Recipient 2	☐	☐	☐	☐	☐
Recipient 3	☐	☐	☐	☐	☐
Recipient 4	☐	☐	☐	☐	☐
Recipient 5	☐	☐	☐	☐	☐

3. Indicate how effective the methods you used in spreading information about a disaster.

	Very Ineffective	Ineffective	Somewhat Ineffective	Neither Effective nor Ineffective	Somewhat Effective	Effective	Very Effective
Text message using mobile phone	☐	☐	☐	☐	☐	☐	☐
Voice call using landline / hand phone	☐	☐	☐	☐	☐	☐	☐
Instant message using smart phone	☐	☐	☐	☐	☐	☐	☐
Send distress signals	☐	☐	☐	☐	☐	☐	☐
Verbal message	☐	☐	☐	☐	☐	☐	☐

4. For the FIVE top recipients that you have ranked in Question 1, name THREE recipients that you think they will send the information to next.

	Next THREE recipients		
	Recipient 1	Recipient 2	Recipient 3
Recipient 1 sends to:			
Recipient 2 sends to:			
Recipient 3 sends to:			
Recipient 4 sends to:			
Recipient 5 sends to:			

APPENDIX 6. Task 5 – Attitude (Affect, Behavior, Cognition) Assessment

Subject ID:

Date:

Start time:

End time:

TASK 5: ATTITUDE ASSESSMENT

INSTRUCTIONS: Please answer all questions based on the video you have just seen.

1. Rate on the scale below the impact of the disaster on your feelings.

	Minimal Impact	Low Impact	Moderate Impact	High Impact	Severe Impact
Anger	☐	☐	☐	☐	☐
Fear	☐	☐	☐	☐	☐
Sadness	☐	☐	☐	☐	☐

2. Select FIVE actions that you might take after watching the video.

- | | |
|--|---|
| ☐ Leave it to fate | ☐ Create awareness |
| ☐ Avoid talking about it | ☐ Offer prayers that have no certain outcome |
| ☐ Donate (money, clothes, etc.) | ☐ Join volunteer services |
| ☐ Ignore news, information | ☐ Refuse to help |
| ☐ Behave in erratic manner | |

3. Rate what you think is the impact of the disaster on the scale below.

	Minimal Impact	Low Impact	Moderate Impact	High Impact	Severe Impact
Physical (food, water, shelter)	☐	☐	☐	☐	☐
Psychological (self-concept, emotional well-being, identity)	☐	☐	☐	☐	☐
Social relationships (family, friends, co-workers)	☐	☐	☐	☐	☐
Moral/Spiritual (personal integrity, values, belief system)	☐	☐	☐	☐	☐

APPENDIX 7. Task 6 – Memory of Facts

Subject ID:

Date:

Start time:

End time:

TASK 6: MEMORY OF FACTS

INSTRUCTIONS: Earlier in this questionnaire (i.e. TASK 2), you were presented with the following scenario.

Ahmad was involved in a traffic accident in which he crashed his car into the front gate of a house near the main road.

After the scenario, you were presented with a list of some facts about Ahmad as well as the surroundings and conditions at the time of the accident. In the space provided below, write down at least 10 facts that you can remember.

Fact 1 _____

Fact 2 _____

Fact 3 _____

Fact 4 _____

Fact 5 _____

Fact 6 _____

Fact 7 _____

Fact 8 _____

Fact 9 _____

Fact 10 _____

APPENDIX 8. Task 7 – Team Trust Assessment

Group ID:

Subject ID:

Date:

Start time:

End time:

TASK 7 - GROUP TRUST

INSTRUCTIONS: RATE the group on the following items.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

	1	2	3	4	5	6	7
1. My teammates know what they are doing	☐	☐	☐	☐	☐	☐	☐
2. I can depend on my teammates to be fair	☐	☐	☐	☐	☐	☐	☐
3. I believe that my teammates have my best interests in mind	☐	☐	☐	☐	☐	☐	☐
4. I know what to expect from my team	☐	☐	☐	☐	☐	☐	☐
5. My teammates and I share common goals	☐	☐	☐	☐	☐	☐	☐
6. My teammates are helpful in accomplishing the task	☐	☐	☐	☐	☐	☐	☐
7. My teammates are committed to the group	☐	☐	☐	☐	☐	☐	☐
8. My team members communicate well	☐	☐	☐	☐	☐	☐	☐
9. I have faith in the abilities of my teammates	☐	☐	☐	☐	☐	☐	☐
10. My teammates are responsible people	☐	☐	☐	☐	☐	☐	☐
11. My team is motivated to support each other	☐	☐	☐	☐	☐	☐	☐
12. My teammates behave consistently	☐	☐	☐	☐	☐	☐	☐
13. In times of uncertainty, my team sticks to the plan	☐	☐	☐	☐	☐	☐	☐
14. My teammates understand how I feel	☐	☐	☐	☐	☐	☐	☐
15. My teammates convey honest opinions	☐	☐	☐	☐	☐	☐	☐
16. My team members work well together	☐	☐	☐	☐	☐	☐	☐

This is the end of the session.

Thank you very much for participating in the survey.

APPENDIX 8a. Team Trust Game

TASK 7 (GROUP) - STOP DISASTER!

INSTRUCTIONS: This task aims to understand how a group trusts each other in planning to stop future disaster. The task requires you to work as a team.

First, discuss and plan together how to stop disaster using **OPTIONS** given for the task.

Second, complete the budget sheet for the actions taken.

Third, **RATE** the group on the trust scale.

*Read the instructions, objectives and missions carefully. Discuss and decide among yourselves on how to plan, strategize and manage a town that is about to be affected by a disaster. **MARK** on the map where you plan to place the buildings and defences.*

INTRODUCTION

This task involves planning for a village in a coastal area in Southeast Asia. The village has 320 people who live mostly on fishing products and tourism. You have to protect as many people, buildings and livelihood as you can against a possible tsunami.

TASK OBJECTIVES

The tasks are:

1. Provide accommodation for 320 people: note that 170 are already housed, while 150 are still unhoused.
2. Build the following in suitable areas:
ONE (1) hospital
TWO (2) schools
THREE (3) hotels

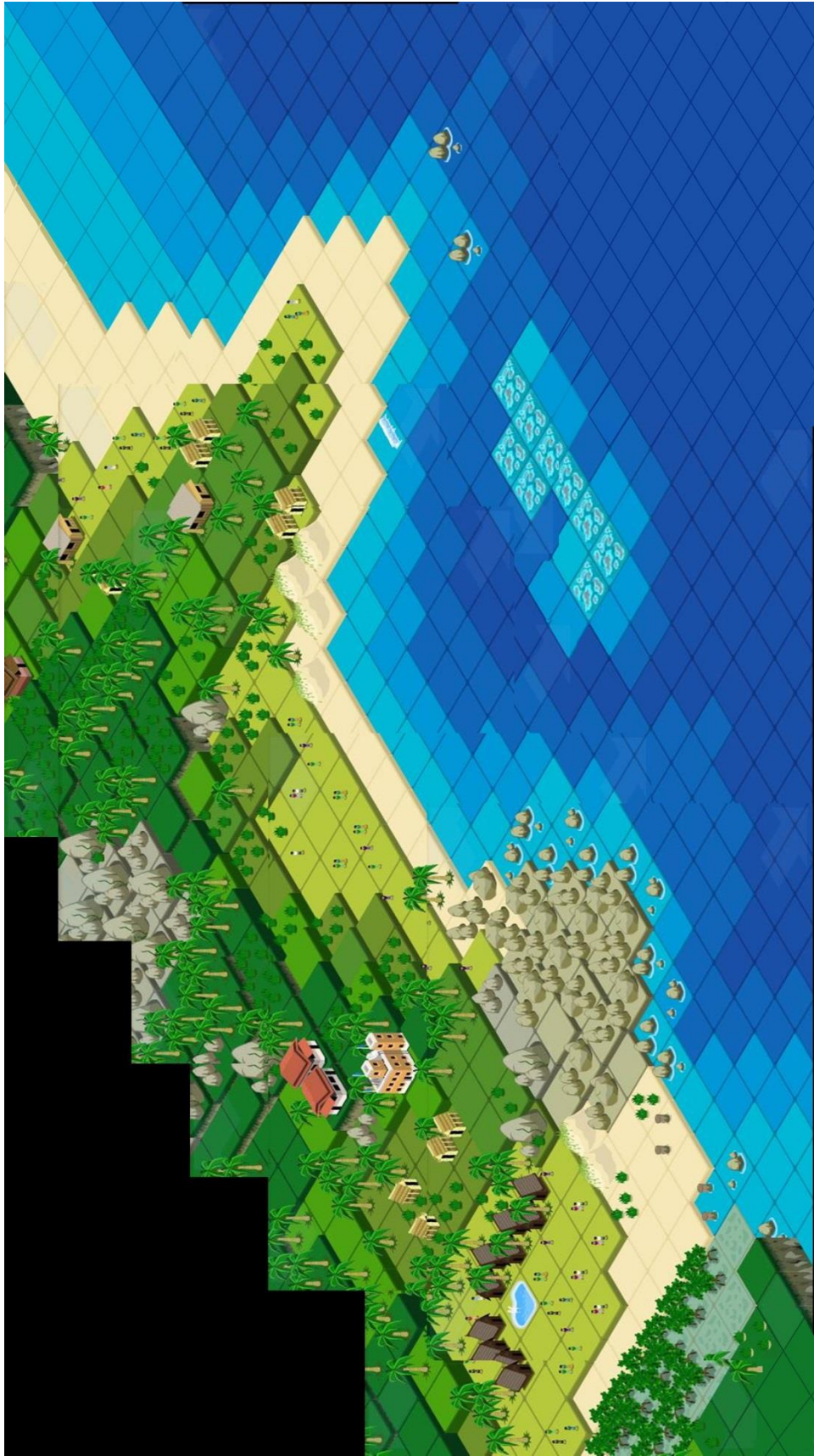
MISSION

In planning, your team needs to:

- Protect the people and their property against tsunami
- Apply different solutions of housing, upgrades and defenses
- Choose the best option and save as many people as you can afford
- Plan within a budget of RM 50, 000
- Work within a duration of 15 minutes

INFORMATION

1. Trees and coastal forests provide excellent natural protection against the destructive forces of waves and tsunami.
2. Building (high ground) – buildings further from the ocean or located on higher ground stand the best chance of survival during tsunami.
3. Defenses – large constructions like sea walls and breakwaters can be built along the shoreline to provide more protection, but they can also create problems if they are not studied carefully.
4. Evacuation plans are important for saving lives. They can use signs to show people the way to high ground and safer locations inland, or include community safety drills.
5. Sand bags/dunes are removed along coastlines by developer to provide easier access and scenic view. They can be effective in blocking waves and protecting houses inland from wind and erosion.
6. Upgrading buildings make them safer and occupants are protected better. By exploring available options to upgrade buildings you can reduce the possibility of loss and damages.
7. While schools and hospitals provide important education and medical help, they can also become important meeting and shelter points. They should always be constructed in safe areas and be protected as much as possible.
8. Mangroves and marshland are important. These wetland areas can protect local communities acting as breakwaters against waves and storms.
9. Having an early warning system in place can allow people to evacuate in time making a difference between life and death.
10. The best way to protect a building and its occupants from a tsunami is its wise placement. Hotel location needs to respect some distance from the shore. Tourists also need to be informed about dangers they may face when they are on holidays in unfamiliar conditions.



Group ID:

Subject ID:

Date:

Start time:

End time:

BUDGET SHEET

TYPE	COST (RM)	QUANTITY	TOTAL COST (RM)
BUILDINGS			
Hospital	5000		
School	2000		
Hotels	2000		
Concrete House (15 persons)	2000		
Brick House (10 persons)	1000		
Timber House (5 persons)	500		
Bamboo House (3 persons)	200		
DEFENSES			
Trees	100		
Coconut Trees	200		
Mangroves	300		
Sand dunes/bags	350		
Breakwaters	1000		
Seismic sensor	10000		
UPGRADES			
Radio system (2 available)	500		
Evacuation training (3 available)	450		
Local alarm system (1 available)	500		
Evacuation signs (2 available)	300		
Stop disaster! training course (3 available)	450		
1 week course (3 available)	250		
Building reinforcements (10 available)	300		

Can only be used for public buildings (not applicable for houses)

APPENDIX 9a. Instructions for Field Investigators

INSTRUCTIONS FOR FIELD INVESTIGATORS

1. Greeting.

- a. *Introduction: (Give name and position as Field Investigator)*

Brief description of the objectives of the research: “This survey gathers information about people’s risk attitudes toward disasters that occur in Southeast Asia and how they evaluate such events. Although these disasters have low probability of occurrence, they have high impact on people’s attitudes. You will participate in this study together with other persons from Malaysia and Indonesia. These two countries have experienced many such disasters. The findings of the research are important in minimizing disaster risks and for managing disasters when they occur.”

2. Participant’s rights.

- a. *Show a Consent Form.* “I want to explain your rights related to this study and what you will be asked to do. I will be glad to answer questions before we start.”
- b. *Voluntary.* “Your participation is voluntary. You may leave at any time with no penalty.”
- c. *Anonymity.* “Your name/identity will not appear in our records or in any report.”
- d. *Risk/benefit.* “There is no known harm from participating in this study. At the end of the session, you will benefit from understanding your attitudes towards disasters. Also, there may be some visual content that could be slightly disturbing due to the nature of the disaster which it tries to portray.”
- e. *Data summary.* “A summary of the data will be available in the first quarter of 2014. You can obtain it by sending an email to Dr. Halimahtun Khalid at mydamai@damai-sciences.com

3. Procedures.

- a. “First, you will read the consent form and sign it once you agree to participate.”
- b. “Next, you will complete a participant profile form. Once completed, hand it to me.”
- c. “To start each task, read the instructions. You must complete each task on your own. Do not discuss with others among you. Hand in the questionnaire to me after you have completed each task.”
- d. “Lastly, form a group and perform the last task. After 10 minutes of doing the task, complete the questionnaire on your own and hand it to me once you are done.”
- e. “Do you have any questions?”

4. Data collection.

- a. *Show the first set of material containing the consent form and general instructions for the survey. Inform them that refreshments are provided while they complete the survey.*
- b. *When participant has agreed to participate, show the second set of material (participant profile form). Be prepared to answer questions.*
- c. *Once it has been completed, show the third set of material (questionnaire) containing six individual tasks. Each task must be given separately to participants starting from task 1 to task 6. Videos will be shown to participant only for task 3. It can be repeated if requested by participant.*
- d. *Offer participant to take a short break (5 – 7 minutes) after completing the individual tasks.*
- e. *Participants are grouped together in groups of 2 to 4 for Task 7.*
- f. *Give participants group task material containing instructions, introduction, task objectives, missions, information, budget sheet, map, pen/pencil, color pencils, blank paper, and calculator.*
- g. *Explain to participants on how to perform Task 7. Answer any questions that they may have about the task.*
- h. *After they have completed the task (10 minutes), give Task 7 scale to each group member.*
- i. *Make sure that ALL test materials are collected upon completion of EACH task. CHECK that they have been filled up properly. Get participants to sign subject testing sheet, and pay for their refreshments.*
- j. *Thank participant at the end of the survey.*

APPENDIX 9b. General Instructions for Subjects

GENERAL INSTRUCTIONS

Natural disasters and human-induced disasters have increased around the world. It is important that people understand how to cope with such situations. Our research will explore the attitudes of people in dealing with disasters and how they evaluate such events.

You will participate in this study together with other persons from Malaysia and Indonesia. These two countries have experienced many such disasters. The findings of the research are important in minimizing disaster risks and for managing disasters when they occur.

Altogether you will complete SEVEN tasks. The tasks seek your judgement and opinions of disasters, either based on your personal experience, if any, or what you think might happen. You will be shown images and videos of disasters. These may be slightly disturbing. Let us know if you are uncomfortable with them.

Please respond to ALL questions. The entire session will take about 75 minutes.

Thank you for your valuable help.

APPENDIX 9c. Subject's Consent Form

Date:

Subject ID:

CONSENT FORM

Title of Study	Survey of Risk Attitudes toward Disasters
Purpose	I understand that the purpose of this study is to collect information about risk attitudes toward disasters as well as other information on team trust for disaster planning management.
Activities	I understand that during the survey I will complete seven tasks that seek my opinion in the form of questionnaire. I understand that I will also complete a participant profile form about myself. The study will take no more than 75 minutes to complete.
Risks/Benefits	I understand that there are no known risks from participating in this study. I will benefit through better understanding of people's attitudes towards disasters. The current study expands the literature on disaster management and can inform people how to cope with disasters more effectively.
Confidentiality	I understand that any information about me obtained from this study will be kept strictly confidential and that I will not be identified in any report or publication. I will be assigned a participant number by the field investigators.
Freedom to withdraw	I am aware that my participation is completely voluntary and that I can refuse to participate in this study after reading this consent form. In case that I wish to quit in the middle of the session, for any reason, I can do so, by simply informing the field investigator.
Availability	I understand that I may obtain a summary of these results when they become available in the first quarter of 2014 by contacting the principal investigator, Dr. Halimahtun Khalid, email mydamai@damai-sciences.com . The results will only show the average data for the entire sample. No individual results will be made available.
Investigator	I understand that I can ask any questions I have regarding this study from the field investigators.
Consent	I have read the above information describing this study. I am 18 years of age or older and freely consent to participate.

☐ I Accept

☐ I Do Not Accept

Signature

APPENDIX 9d. Specific Instructions for Subjects

SPECIFIC INSTRUCTIONS

You are about to perform SEVEN tasks using a Questionnaire.

The Questionnaire has TWO sections:

- Section A gathers background information about you, your use of technology and your experiences in disasters;
- Section B collects information about your opinions and evaluations of disasters by performing SIX tasks on your own and ONE task as a group.

Please complete ALL sections and tasks. There is no right or wrong answer. We are only interested in your opinions about what you think, feel and might do in the face of a disaster.

We assure that your information will be used for the purpose of this research only, and that your identity will not be revealed in any publication related to the project.

APPENDIX 10a. Pearson correlation coefficients and (two-tailed) p-values for tsunami condition at the perception level of situation awareness

	RI1	RI2	RI3	RI4	RI5	C1	C2	C3	C4	C5	A1	A2	A3	A4	A5	T1	T2	T3	T4	T5	B1	B2	B3	B4	B5
RI1	1	.355**	.030	.432**	.108	.025	.267**	.060	.347**	.084	-.004	.260*	-.013	.113	.109	.090	-.048	.016	.046	-.047	-.018	-.165	.086	-.103	.049
		.001	.774	.000	.310	.811	.010	.573	.001	.428	.967	.013	.902	.285	.303	.394	.651	.881	.665	.656	.864	.118	.420	.331	.645
RI2	.355**	1	-.201	.520**	.242**	.017	.169	-.330**	.377**	.147	.113	.167	-.163	.033	.301**	.131	-.061	.322**	.047	.168	-.055	-.081	-.072	-.111	-.032
	.001		.057	.000	.021	.874	.110	.001	.000	.165	.287	.138	.123	.758	.004	.214	.567	.002	.656	.110	.604	.444	.495	.293	.764
RI3	.030	-.201	1	-.063	.219*	.054	.110	-.062	.000	-.027	-.032	.090	-.280**	-.059	-.121	.063	-.030	-.292**	.073	-.053	.063	-.040	.112	-.176	-.122
	.774	.057		.552	.037	.613	.298	.557	.999	.798	.764	.394	.007	.578	.251	.556	.779	.005	.489	.621	.551	.710	.291	.096	.249
RI4	.432**	.520**	-.063	1	.222**	.124	.381**	-.180	.386**	.244*	.196	.408**	-.116	.258*	.337**	.145	-.038	.259*	.182	-.066	-.089	-.088	-.098	-.163	.023
	.000	.000	.552		.035	.240	.000	.088	.000	.020	.063	.000	.272	.013	.001	.171	.719	.013	.084	.532	.404	.409	.355	.122	.826
RI5	.108	.242*	.219*	.222*	1	.122	.300**	-.310**	.155	.142	-.080	-.025	-.165	.046	.024	.013	-.129	.059	.049	-.136	-.109	-.096	-.017	-.244*	-.015
	.310	.021	.037	.035		.248	.004	.003	.142	.179	.452	.813	.118	.662	.824	.904	.225	.577	.646	.200	.305	.364	.873	.020	.891
C1	.025	.017	.054	.124	.122	1	.150	-.036	.285**	.062	.163	.179	.023	.086	.126	-.061	-.088	.228*	.119	.005	-.100	-.092	-.029	-.011	-.122
	.811	.874	.613	.240	.248		.157	.734	.006	.559	.122	.090	.831	.416	.236	.568	.405	.030	.260	.960	.346	.388	.786	.919	.248
C2	.267**	.169	.110	.381**	.300**	.150	1	-.083	.376**	.148	.277**	.278**	-.060	.110	.238*	.193	.051	.132	.245*	-.152	-.156	-.089	-.093	-.159	.066
	.010	.110	.298	.000	.004	.157		.436	.000	.162	.008	.008	.571	.301	.023	.067	.634	.211	.019	.151	.139	.401	.380	.133	.537
C3	.060	-.330**	-.062	-.180	-.310**	-.036	-.083	1	-.049	-.079	-.004	-.072	.100	.073	-.188	.196	.325**	-.047	-.058	.129	.220*	.161	-.017	.228*	.155
	.573	.001	.557	.088	.003	.734	.436		.642	.456	.972	.497	.344	.492	.075	.063	.002	.657	.583	.223	.036	.128	.874	.030	.142
C4	.347**	.377**	.000	.386**	.155	.285**	.376**	-.049	1	.505**	.408**	.284**	-.318**	.050	.404**	.011	-.189	.166	-.063	-.037	-.076	-.147	-.224*	-.140	-.219*
	.001	.000	.999	.000	.142	.006	.000	.642		.000	.000	.006	.002	.637	.000	.918	.073	.117	.551	.727	.474	.165	.033	.186	.037
C5	.084	.147	-.027	.244*	.142	.062	.148	-.079	.505**	1	.194	.116	-.166	-.022	.002	-.191	-.175	.070	-.099	-.049	-.060	-.101	-.145	-.115	-.277**
	.428	.165	.798	.020	.179	.559	.162	.456	.000		.065	.274	.115	.838	.987	.069	.096	.509	.348	.643	.571	.342	.169	.277	.008
A1	-.004	.113	-.032	.196	-.080	.163	.277**	-.004	.406**	.194	1	.576**	.031	.306**	.373**	-.033	-.117	.262*	.058	.069	-.085	-.015	-.276**	.026	.001
	.967	.287	.764	.063	.452	.122	.008	.972	.000	.065		.000	.772	.003	.000	.754	.269	.012	.586	.513	.422	.889	.008	.804	.995
A2	.260*	.157	.090	.408**	-.025	.179	.278**	-.072	.284**	.116	.576**	1	.013	.430**	.361**	-.021	-.090	.237*	.227*	.029	.021	-.051	-.048	-.127	.026
	.013	.138	.394	.000	.813	.090	.008	.497	.006	.274	.000		.900	.000	.000	.843	.395	.024	.031	.786	.843	.634	.652	.229	.809
A3	-.013	-.163	-.280**	-.116	-.165	.023	-.060	.100	-.318**	-.166	.031	.013	1	.113	-.168	.031	.078	.120	.214*	-.034	.115	.011	.122	.149	.235*
	.902	.123	.007	.272	.118	.831	.571	.344	.002	.115	.772	.900		.286	.111	.773	.464	.256	.042	.747	.276	.921	.250	.157	.025
A4	.113	.033	-.059	.258*	.046	.086	.110	.073	.050	-.022	.308**	.430**	.113	1	.150	.113	.087	.233*	.201	.058	-.069	.095	.082	.047	.004
	.285	.758	.578	.013	.662	.416	.301	.492	.637	.838	.003	.000	.286		.155	.285	.411	.026	.066	.587	.513	.371	.440	.656	.967
A5	.109	.301**	-.121	.337**	.024	.126	.238*	-.188	.404**	.002	.373**	.361**	-.168	.150	1	.037	-.127	.233*	.061	-.108	-.410**	-.351**	-.244*	-.208*	-.003
	.303	.004	.251	.001	.824	.236	.023	.075	.000	.987	.000	.000	.111	.155		.728	.230	.027	.564	.308	.000	.001	.020	.048	.974
T1	.090	.131	.063	.145	.013	-.061	.193	.196	.011	-.191	-.033	-.021	.031	.113	.037	1	.422**	.176	.170	.308**	.134	.045	.129	.089	.290**
	.394	.214	.556	.171	.904	.568	.067	.063	.918	.069	.754	.843	.773	.285	.728		.000	.095	.108	.003	.206	.672	.223	.401	.005
T2	-.048	-.061	-.030	-.038	-.129	-.088	.051	.325**	-.189	-.175	-.117	-.090	.078	.087	-.127	.422**	1	.025	.097	.354**	.197	.226*	.094	.125	.329**
	.651	.567	.779	.719	.225	.405	.634	.002	.073	.096	.269	.395	.464	.411	.230	.000		.812	.361	.001	.062	.032	.377	.240	.001
T3	.016	.322**	-.292**	.259*	.059	.228*	.132	-.047	.166	.070	.262*	.237*	.120	.233*	.233*	.176	.025	1	.385**	.134	-.107	-.109	-.087	.105	.219*
	.881	.002	.005	.013	.577	.030	.211	.657	.117	.509	.012	.024	.256	.026	.027	.095	.812		.000	.206	.314	.303	.412	.322	.037
T4	.046	.047	.073	.182	.049	.119	.245*	-.058	-.063	-.099	.058	.227*	.214*	.201	.061	.170	.097	.385**	1	.087	-.038	-.067	.044	.189	.019
	.665	.656	.489	.084	.646	.260	.019	.583	.551	.348	.586	.031	.042	.056	.584	.108	.361	.000		.410	.722	.531	.678	.072	.858
T5	-.047	.168	-.053	-.066	-.136	.005	-.152	.129	-.037	-.049	.069	.029	-.034	.058	-.108	.308**	.354**	.134	.087	1	.242*	-.008	.166	.019	.287**
	.656	.110	.621	.532	.200	.960	.151	.223	.727	.643	.513	.786	.747	.587	.308	.003	.001	.206	.410		.021	.940	.115	.859	.006
B1	-.018	-.055	.063	-.089	-.109	-.100	-.156	.220*	-.076	-.060	-.085	.021	.115	-.069	-.410**	.134	.197	-.107	-.038	.242*	1	.362**	.239*	.192	-.013
	.864	.604	.551	.404	.305	.346	.139	.036	.474	.571	.422	.843	.276	.513	.000	.206	.062	.314	.722	.021		.000	.023	.068	.906
B2	-.165	-.081	-.040	-.088	-.096	-.092	-.089	.161	-.147	-.101	-.015	-.051	.011	.095	-.351**	.045	.226*	-.109	-.067	-.008	.362**	1	.089	.240*	.192
	.118	.444	.710	.409	.364	.388	.401	.128	.165	.342	.889	.634	.921	.371	.001	.672	.032	.303	.531	.940	.000		.402	.022	.068
B3	.086	-.072	.112	-.098	-.017	-.029	-.093	-.017	-.224*	-.145	-.276**	-.048	.122	.082	-.244*	.129	.094	-.087	.044	.166	.239*	.089	1	.019	.187
	.420	.495	.291	.355	.873	.786	.380	.874	.033	.169	.008	.652	.250	.440	.020	.223	.377	.412	.678	.115	.023	.402		.861	.075
B4	-.103	-.111	-.176	-.163	-.244*	-.011	-.159	.228*	-.140	-.115	.026	-.127	.149	.047	-.208*	.089	.125	.105	.189	.019	.192	.240*	.019	1	.084
	.331	.293	.096	.122	.020	.919	.133	.030	.186	.277	.804	.229	.157	.656	.048	.401	.240	.322	.072	.859	.068	.022	.861		.428
B5	.049	-.032	-.122	.023	-.015	-.122	.066	.155	-.219*	-.277**	.001	.026	.235*	.004	-.003	.290**	.329**	.219*	.019	.287**	-.013	.192	.187	.084	1
	.645	.764	.249	.826	.891	.248	.537	.142	.037	.008	.995	.809	.025	.967	.974	.005	.001	.037	.858	.006	.905	.068	.075	.428	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 10b. Pearson correlation coefficients and (two-tailed) p-values for tsunami condition at the comprehension level of situation awareness

	R16	R17	R18	R19	R10	C6	C7	C8	C9	C10	A6	A7	A8	A9	A10	T6	T7	T8	T9	T10	B6	B7	B8	B9	B10	
R16	1	.115	.213	.078	.136	-.099	.281	-.009	.066	.066	-.098	.008	.114	-.115	.173	.286	.163	-.059	.047	.087	-.038	.037	-.145	-.075	-.075	
		.277	.042	.461	.198	.348	.007	.936	.535	.535	.358	.943	.282	.277	.100	.006	.123	.580	.660	.414	.719	.727	.171	.478	.478	
R17	.115	1	.091	.105	.157	.151	.192	.291	-.206	-.185	.222	.180	.284	.272	.144	.163	-.035	.286	.288	-.046	.057	-.161	-.265	-.285	-.012	
		.277		.389	.320	.137	.153	.068	.005	.050	.079	.034	.089	.008	.009	.173	.122	.745	.006	.006	.665	.592	.127	.015	.006	.913
R18	.213	.091	1	.271	.413	.058	.144	.336	-.316	-.291	.084	.209	.127	-.007	.188	.088	.015	-.053	.045	.003	-.091	-.233	-.224	-.244	-.065	
		.042	.389		.009	.585	.173	.001	.002	.005	.428	.047	.230	.948	.074	.405	.890	.617	.674	.980	-.390	.026	.033	.020	.539	
R19	.078	.105	.271	1	.290	.493	.226	.446	-.415	-.118	.212	.360	.289	.365	.523	.244	-.093	.063	.055	.051	-.025	-.139	-.355	-.281	-.245	
		.461	.320	.009		.005	.000	.031	.000	.000	.264	.044	.000	.005	.000	.020	.380	.550	.607	.633	.816	.189	.001	.007	.019	
R10	.136	.157	.413	.290	1	.063	.101	.388	-.441	-.194	.149	.289	.034	.111	.302	.043	-.051	.106	.132	-.201	.083	-.046	-.593	-.324	-.152	
		.198	.137	.000	.005		.553	.339	.000	.000	.065	.158	.005	.746	.293	.004	.683	.629	.320	.214	.056	.432	.662	.000	.002	.151
C6	-.099	.151	.058	.493	.063	1	.151	.281	-.251	.068	.282	.424	.283	.416	.363	.215	-.189	.209	-.079	.154	.043	.055	-.146	-.157	.050	
		.348	.153	.585	.000	.553		.153	.007	.017	.523	.007	.000	.006	.000	.000	.041	.073	.047	.454	.146	.688	.602	.167	.138	.635
C7	.281	.192	.144	.226	.101	.151	1	.171	-.232	.060	.236	.133	.276	.252	.306	.313	.024	-.126	.085	.243	.180	.021	-.162	-.177	-.141	
		.007	.068	.173	.031	.339	.153		.105	.027	.575	.025	.209	.008	.016	.003	.003	.822	.234	.426	.020	.087	.842	.124	.093	.183
C8	-.009	.291	.336	.446	.388	.281	.171	1	-.655	-.178	.348	.423	.206	.295	.284	.172	-.112	.115	.160	.047	.160	-.170	-.552	-.484	-.293	
		.936	.005	.001	.000	.000	.007	.105	.000	.092	.001	.000	.050	.005	.006	.102	.289	.279	.129	.660	.130	.106	.000	.000	.005	
C9	.066	-.206	-.316	-.415	-.441	-.251	-.232	-.655	1	.170	-.213	-.266	-.280	-.242	-.263	-.120	.196	-.063	-.084	.045	-.182	.057	.550	.459	.271	
		.535	.050	.002	.000	.000	.017	.027	.000		.108	.043	.011	.007	.021	.012	.256	.063	.556	.427	.670	.084	.000	.000	.009	
C10	.066	-.185	-.291	-.118	-.194	.068	.060	-.178	.170	1	.064	-.008	.031	.036	.026	.081	-.094	-.035	-.055	.007	.004	.328	.061	.148	.045	
		.535	.079	.005	.264	.065	.523	.575	.092	.108	.550	.938	.769	.733	.805	.447	.377	.744	.605	.948	.970	.002	.563	.162	.674	
A6	-.098	.222	.084	.212	.149	.282	.236	.346	-.213	.064	1	.286	.241	.319	.142	.254	.061	.136	.104	.017	.233	-.082	-.232	-.229	-.131	
		.358	.034	.428	.044	.158	.007	.025	.001	.043	.550		.006	.022	.002	.181	.015	.566	.200	.325	.874	.026	.441	.027	.029	.215
A7	.008	.180	.209	.360	.289	.424	.133	.423	-.266	-.008	.286	1	.135	.337	.244	.095	-.288	.155	.035	.049	-.126	-.175	-.319	-.236	-.329	
		.943	.089	.047	.000	.005	.000	.209	.000	.011	.938	.006	.203	.001	.020	.369	.006	.143	.740	.648	.235	.097	.002	.024	.001	
A8	.114	.284	.127	.289	.034	.283	.278	.206	-.280	.031	.241	.135	1	.324	.412	.325	.044	.200	.338	-.060	.066	.072	-.161	-.059	-.007	
		.282	.006	.230	.005	.746	.006	.008	.050	.007	.769	.022	.203	.002	.000	.002	.678	.057	.001	.574	.534	.497	.128	.578	.949	
A9	-.115	.272	-.007	.365	.111	.416	.252	.295	-.242	.036	.319	.337	.324	1	.450	.332	-.045	.369	.244	.135	.228	-.123	-.236	-.119	-.133	
		.277	.009	.948	.000	.293	.000	.016	.005	.021	.733	.002	.001	.002	.000	.001	.672	.000	.020	.203	.030	.246	.024	.263	.209	
A10	.173	.144	.188	.523	.302	.363	.306	.284	-.263	.026	.142	.244	.412	.450	1	.396	-.032	.233	.227	.066	.090	.039	-.311	-.105	-.104	
		.100	.173	.074	.000	.004	.000	.003	.006	.012	.805	.181	.020	.000	.000	.000	.765	.026	.031	.536	.394	.711	.003	.323	.324	
T6	.286	.163	.088	.244	.043	.215	.313	.172	-.120	.081	.254	.095	.325	.332	.396	1	.220	.501	.284	.294	.415	-.178	-.181	.035	.014	
		.006	.122	.405	.020	.683	.041	.003	.102	.256	.447	.015	.369	.002	.001	.000	.036	.000	.006	.005	.000	.091	.085	.739	.894	
T7	.163	-.035	.015	-.093	-.051	-.189	.024	-.112	.196	-.094	.061	-.288	.044	-.045	-.032	.220	1	.055	.035	.250	.234	.084	.060	.109	.359	
		.123	.745	.890	.380	.629	.073	.822	.289	.063	.377	.566	.006	.678	.672	.765	.036	.606	.743	.017	.026	.430	.570	.303	.000	
T8	-.059	.286	-.053	.063	.106	.209	-.126	.115	-.063	-.035	.136	.155	.200	.359	.233	.501	.055	1	.359	-.005	.315	-.265	-.164	-.105	-.052	
		.580	.006	.617	.550	.320	.047	.234	.279	.556	.744	.200	.143	.057	.000	.026	.000	.606	.000	.964	.002	.011	.120	.322	.627	
T9	.047	.288	.045	.055	.132	-.079	.085	.160	-.084	-.055	.104	.035	.338	.244	.227	.284	.035	.359	1	.121	.193	.053	-.140	-.013	-.138	
		.660	.006	.674	.607	.214	.454	.426	.129	.427	.605	.325	.740	.001	.020	.031	.006	.743	.000	.255	.067	.616	.185	.906	.192	
T10	.087	-.046	.003	.051	-.201	.154	.243	.047	.045	.007	.017	.049	-.060	.135	.066	.294	.250	-.005	.121	1	.187	-.180	.144	.103	-.031	
		.414	.665	.980	.633	.056	.146	.020	.660	.670	.948	.874	.648	.574	.203	.536	.005	.017	.984	.255	.076	.088	.172	.332	.770	
B6	-.038	.057	-.091	-.025	.083	-.043	.180	.160	-.182	.004	.233	-.126	.066	.228	.090	.415	.234	.315	.193	.187	1	-.074	-.079	-.062	.012	
		.719	.592	.390	.816	.432	.688	.087	.130	.084	.970	.026	.235	.534	.030	.394	.000	.026	.002	.067	.076	.483	.458	.561	.913	
B7	.037	-.161	-.233	-.139	-.046	.055	.021	-.170	.057	.328	-.082	-.175	.072	-.123	.039	-.178	.084	-.265	.053	-.180	-.074	1	.019	.077	.327	
		.727	.127	.026	.189	.662	.602	.842	.106	.594	.002	.441	.097	.497	.246	.711	.091	.430	.011	.616	.088	.483	.859	.469	.002	
B8	-.145	-.255	-.224	-.355	-.593	-.146	-.162	-.552	.550	.061	-.232	-.319	-.161	-.236	-.311	-.181	.060	-.164	-.140	.144	-.079	.019	1	.468	.300	
		.171	.015	.033	.001	.000	.167	.124	.000	.000	.563	.027	.002	.128	.024	.003	.085	.570	.120	.185	.172	.458	.859	.000	.004	
B9	-.075	-.285	-.244	-.281	-.324	-.157	-.177	-.484	.459	.148	-.229	-.236	-.059	-.119	-.105	.035	.109	-.105	-.013	.103	-.062	.077	.468	1	.351	
		.478	.006	.020	.007	.002	.138	.093	.000	.000	.162	.029	.024	.578	.263	.323	.739	.303	.322	.906	.332	.561	.469	.000	.001	
B10	-.075	-.012	-.065	-.245	-.152	.050	-.141	-.293	.271	.045	-.131	-.329	-.007	-.133	-.104	.014	.369	-.052	-.138	-.031	.012	.327	.300	.351	1	
		.479	.913	.039	.019	.151	.635	.183	.005	.009	.674	.215	.001	.949	.209	.324	.894	.000	.627	.192	.770	.913	.002	.004	.001	

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 10c. Pearson correlation coefficients and (two-tailed) p-values for tsunami condition at the projection level of situation awareness

	RI11	RI12	RI13	RI14	RI15	C11	C12	C13	C14	C15	A11	A12	A13	A14	A15	T11	T12	T13	T14	T15	B11	B12	B13	B14	B15
RI11	1	.031	.277 ^{**}	.028	.438 ^{**}	-.080	-.071	.238 [*]	-.210 [*]	.420 ^{**}	.023	.471 ^{**}	.172	.045	-.056	-.188	-.024	-.367 ^{**}	.060	.046	-.275 ^{**}	-.596 ^{**}	-.077	.100	-.141
		.770	.008	.793	.000	.452	.503	.023	.046	.000	.825	.000	.103	.670	.598	.074	.820	.000	.571	.668	.008	.000	.466	.345	.183
RI12	.031	1	.243 [*]	.228 [*]	-.011	.083	.212 [*]	.101	.165	.058	.113	.055	.240 [*]	.308 ^{**}	.119	.075	-.065	-.003	.045	.132	.103	-.088	-.147	.073	.021
		.770	.020	.030	.915	.433	.044	.342	.118	.585	.286	.605	.022	.003	.262	.480	.539	.981	.673	.212	.332	.406	.164	.495	.847
RI13	.277 ^{**}	.243 [*]	1	.264 [*]	.277 ^{**}	.062	.169	-.410 ^{**}	-.065	.261 [*]	.092	.188	.360 ^{**}	-.236 [*]	.136	.050	.013	-.120	.014	-.002	.011	-.224 [*]	-.259 [*]	-.007	-.174
		.008	.020	.012	.008	.558	.109	.000	.542	.012	.384	.075	.000	.024	.199	.641	.904	.258	.894	.986	.921	.033	.013	.950	.099
RI14	.028	.228 [*]	.264 [*]	1	.098	.225 [*]	.030	.146	.186	.055	.089	.063	.165	.157	.104	.177	-.038	.190	.056	.344 ^{**}	.250 [*]	.117	.039	-.061	-.029
		.793	.030	.012	.354	.031	.777	.166	.078	.602	.403	.554	.118	.136	.326	.094	.719	.071	.597	.001	.017	.270	.712	.563	.787
RI15	.438 ^{**}	-.011	.277 ^{**}	.098	1	.335 ^{**}	.132	-.405 ^{**}	.085	.444 ^{**}	.372 ^{**}	.514 ^{**}	.445 ^{**}	.377 ^{**}	.288 ^{**}	.147	.244 [*]	.012	.164	.301 ^{**}	-.071	-.206 [*]	-.299 ^{**}	-.074	-.058
		.000	.915	.008	.354	.001	.213	.000	.424	.000	.000	.000	.000	.000	.006	.164	.020	.910	.120	.004	.503	.050	.004	.487	.582
C11	-.080	.083	.062	.225 [*]	.335 ^{**}	1	.202	.209 [*]	.389 ^{**}	.189	.288 ^{**}	.225 [*]	.364 ^{**}	.312 ^{**}	.355 ^{**}	.463 ^{**}	.430 ^{**}	.145	.167	.312 ^{**}	.132	-.012	-.203	-.344 ^{**}	.152
		.452	.433	.558	.031	.001	.065	.047	.000	.073	.006	.032	.000	.003	.001	.000	.000	.171	.115	.003	.213	.907	.054	.001	.150
C12	-.071	.212 [*]	.169	.030	.132	.202	1	.201	.363 ^{**}	.614 ^{**}	.187	.042	.156	.270 ^{**}	.441 ^{**}	.259 [*]	.284 ^{**}	.099	.059	-.058	-.195	-.278 ^{**}	-.331 ^{**}	-.167	-.029
		.503	.044	.109	.777	.213	.055	.057	.000	.000	.076	.691	.139	.010	.000	.013	.006	.349	.576	.582	.064	.008	.001	.114	.787
C13	.238 [*]	.101	.410 ^{**}	.146	.405 ^{**}	.209 [*]	.201	1	-.026	.312 ^{**}	.322 ^{**}	.322 ^{**}	.466 ^{**}	.363 ^{**}	.261 [*]	.089	.071	-.127	-.049	.015	.038	-.200	-.409 ^{**}	-.131	-.184
		.023	.342	.000	.166	.000	.047	.057	.804	.003	.002	.002	.000	.000	.013	.516	.506	.230	.645	.888	.720	.058	.000	.216	.081
C14	-.210 [*]	.165	-.065	.186	.085	.389 ^{**}	.383 ^{**}	-.026	1	.209 [*]	.157	.046	.142	.113	.285 ^{**}	.354 ^{**}	.346 ^{**}	.428 ^{**}	.294 ^{**}	.351 ^{**}	-.026	-.054	.049	-.180	.124
		.046	.118	.542	.078	.424	.000	.804	.047	.137	.665	.180	.288	.008	.001	.001	.000	.005	.001	.810	.609	.642	.087	.240	
C15	.420 ^{**}	.058	.261 [*]	.055	.444 ^{**}	.073	.000	.003	.047	1	.238 [*]	.499 ^{**}	.376 ^{**}	.317 ^{**}	.380 ^{**}	.157	.303 ^{**}	-.058	.136	.022	-.156	-.530 ^{**}	-.250 [*]	-.148	-.006
		.000	.585	.012	.802	.000	.073	.000	.003	.047	.024	.000	.000	.002	.000	.137	.004	.582	.198	.835	.139	.000	.017	.161	.958
A11	.023	.113	.092	.089	.372 ^{**}	.288 ^{**}	.187	.325 ^{**}	.157	.236 [*]	1	.475 ^{**}	.462 ^{**}	.521 ^{**}	.381 ^{**}	.108	.072	-.042	-.042	.164	.131	-.144	-.388 ^{**}	-.217 [*]	-.058
		.825	.286	.384	.403	.000	.006	.076	.002	.137	.024	.000	.000	.000	.000	.309	.495	.690	.691	.121	.215	.173	.000	.039	.588
A12	.471 ^{**}	.055	.188	.063	.514 ^{**}	.225 [*]	.042	.322 ^{**}	.046	.499 ^{**}	.476 ^{**}	1	.716 ^{**}	.500 ^{**}	.341 ^{**}	.120	.188	-.108	.160	.179	-.041	-.363 ^{**}	-.190	-.172	-.013
		.000	.605	.075	.554	.000	.032	.691	.002	.665	.000	.000	.000	.000	.001	.257	.074	.309	.129	.089	.699	.000	.072	.103	.901
A13	.172	.240 [*]	.360 ^{**}	.165	.445 ^{**}	.364 ^{**}	.166	.466 ^{**}	.142	.376 ^{**}	.462 ^{**}	.716 ^{**}	1	.513 ^{**}	.398 ^{**}	.239 [*]	.129	.002	.097	.086	.023	-.255 [*]	-.370 ^{**}	-.265 [*]	-.053
		.103	.022	.000	.118	.000	.000	.139	.000	.180	.000	.000	.000	.000	.000	.023	.221	.987	.360	.417	.828	.015	.000	.011	.620
A14	.045	.308 ^{**}	.236 [*]	.157	.377 ^{**}	.312 ^{**}	.270 ^{**}	.363 ^{**}	.113	.317 ^{**}	.521 ^{**}	.500 ^{**}	.513 ^{**}	1	.288 ^{**}	.265 [*]	.106	-.021	-.151	.098	.143	-.132	-.439 ^{**}	-.214 [*]	.015
		.670	.003	.024	.136	.000	.003	.010	.000	.288	.002	.000	.000	.000	.006	.011	.317	.844	.152	.355	.177	.212	.000	.042	.885
A15	-.056	.119	.136	.104	.288 ^{**}	.355 ^{**}	.441 ^{**}	.261 [*]	.285 ^{**}	.380 ^{**}	.381 ^{**}	.341 ^{**}	.398 ^{**}	.288 ^{**}	1	.474 ^{**}	.342 ^{**}	.049	.265 [*]	-.029	.069	-.056	-.282 ^{**}	-.255 [*]	.104
		.598	.262	.199	.325	.006	.001	.000	.013	.006	.000	.001	.000	.006	.000	.001	.644	.011	.788	.513	.601	.007	.015	.324	
T11	-.188	.075	.050	.177	.147	.463 ^{**}	.259 [*]	.069	.354 ^{**}	.157	.108	.120	.239 [*]	.265 [*]	.474 ^{**}	1	.720 ^{**}	.345 ^{**}	.370 ^{**}	.267 [*]	.197	-.014	.012	-.282 ^{**}	.282 ^{**}
		.074	.480	.641	.094	.164	.000	.013	.516	.001	.137	.309	.257	.023	.011	.000	.000	.001	.000	.011	.062	.892	.912	.007	.007
T12	-.024	-.065	.013	-.038	.244 [*]	.430 ^{**}	.284 ^{**}	.071	.346 ^{**}	.303 ^{**}	.072	.188	.129	.106	.342 ^{**}	.720 ^{**}	1	.264 [*]	.413 ^{**}	.312 ^{**}	-.023	-.131	.041	-.254 [*]	.252 [*]
		.820	.539	.904	.719	.020	.000	.006	.506	.001	.004	.495	.074	.221	.317	.001	.000	.012	.000	.003	.829	.217	.698	.015	.016
T13	-.367 ^{**}	-.003	-.120	.190	.012	.145	.099	-.127	.428 ^{**}	-.058	-.042	-.108	.002	-.021	.049	.345 ^{**}	.264 [*]	1	.418 ^{**}	.370 ^{**}	.285 [*]	.208 [*]	.219 [*]	-.005	.151
		.000	.981	.258	.071	.910	.171	.349	.230	.000	.582	.690	.309	.987	.844	.644	.001	.012	.000	.000	.006	.048	.037	.959	.152
T14	.060	.045	.014	.055	.164	.167	.059	-.049	.294 ^{**}	.136	-.042	.160	.097	-.151	.265 [*]	.370 ^{**}	.413 ^{**}	.418 ^{**}	1	.337 ^{**}	.063	-.065	.356 ^{**}	-.209 [*]	.044
		.571	.673	.894	.597	.120	.115	.575	.645	.005	.198	.691	.129	.360	.152	.011	.000	.000	.000	.001	.552	.538	.001	.047	.676
T15	.046	.132	-.002	.344 ^{**}	.301 ^{**}	.312 ^{**}	-.058	.015	.351 ^{**}	.022	.164	.179	.086	.098	-.029	.267 [*]	.312 ^{**}	.370 ^{**}	.337 ^{**}	1	.112	.024	.151	-.158	.210 [*]
		.668	.212	.986	.001	.004	.003	.582	.888	.001	.835	.121	.089	.417	.355	.788	.011	.003	.000	.001	.292	.821	.152	.134	.045
B11	-.275 ^{**}	.103	.011	.250 [*]	-.071	.132	-.195	.038	-.026	-.156	.131	-.041	.023	.143	.069	.197	-.023	.285 [*]	.063	.112	1	.408 ^{**}	-.031	-.156	.051
		.008	.332	.921	.017	.503	.213	.064	.720	.810	.139	.215	.699	.828	.177	.513	.062	.829	.006	.552	.292	.000	.768	.141	.628
B12	-.596 ^{**}	-.088	-.224 [*]	.117	-.206 [*]	-.012	-.278 ^{**}	-.200	-.054	-.530 ^{**}	-.144	-.363 ^{**}	-.255 [*]	-.132	-.056	-.014	-.131	.208 [*]	-.065	.024	.408 ^{**}	1	.123	.159	.236 [*]
		.000	.406	.033	.270	.050	.907	.008	.058	.609	.000	.173	.000	.015	.212	.601	.892	.217	.048	.538	.821	.000	.244	.133	.025
B13	-.077 [*]	-.147	-.259 [*]	.039	-.299 ^{**}	-.203	-.331 ^{**}	-.409 ^{**}	.049	-.250 [*]	-.388 ^{**}	-.190	-.370 ^{**}	-.439 ^{**}	-.282 ^{**}	.012	.041	.219 [*]	.356 ^{**}	.151	-.031	.123	1	.077	.175
		.466	.164	.013	.712	.004	.054	.001	.000	.642	.017	.000	.072	.000	.000	.007	.912	.698	.037	.001	.152	.768	.244	.469	.098
B14	.100	.073	-.007	-.061	-.074	-.344 ^{**}	-.167	-.131	-.180	-.148	-.217 [*]	-.172	-.265 [*]	-.214 [*]	-.255 [*]	-.282 ^{**}	-.254 [*]	-.005	-.209 [*]	-.158	-.156	.159	.077	1	-.065
		.345	.495	.950	.563	.487	.001	.114	.216	.087	.161	.039	.103	.011	.042	.015	.007	.015	.959	.047	.134	.141	.133	.469	.540
B15	-.141	.021	-.174	-.029	-.058	.152	-.029	-.184	.124	-.006	-.058	-.013	-.053	.015	.104	.282 ^{**}	.252 ^{**}	.151	.044	.210 [*]	.051	.236 [*]	.175	-.065	1
		.183	.847	.099	.787	.582	.150	.787	.081	.240	.958	.588	.901	.620	.885	.324	.007	.016	.152	.676	.045	.628	.025	.098	.540

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 11a. Pearson correlation coefficients and (two-tailed) p-values for terrorist condition at the perception level of situation awareness

	R11	R12	R13	R14	R15	C1	C2	C3	C4	C5	A1	A2	A3	A4	A5	T1	T2	T3	T4	T5	B1	B2	B3	B4	B5
R11	1	.047 .663	-.040 .710	.149 .164	.276** .009	.027 .802	.368** .000	-.120 .264	.601** .000	.287** .006	.173 .104	.376** .000	-.243* .022	.105 .329	.204 .055	-.012 .910	-.179 .094	.088 .410	-.081 .452	-.091 .396	-.325** .002	-.284** .007	-.122 .254	-.211* .047	-.009 .933
R12	.047 .663	1	-.169 .114	.245* .021	.284** .007	.110 .305	.091 .397	-.249* .019	-.022 .839	.313** .003	.169 .113	.183 .085	-.063 .557	.077 .470	.208 .050	-.043 .687	-.187 .079	.159 .137	-.030 .779	.050 .643	-.090 .402	.001 .992	-.154 .150	-.003 .979	-.063 .559
R13	-.040 .710	-.169 .114	1	.030 .783	-.156 .146	-.018 .871	.063 .556	.053 .622	.043 .691	.042 .695	.021 .845	-.071 .510	.092 .389	.245* .020	.146 .172	-.020 .850	.280** .008	.267* .012	.033 .756	-.061 .572	-.010 .923	.148 .167	.098 .361	-.130 .225	-.034 .752
R14	.149 .164	.245* .021	.030 .783	1	.332** .001	.066 .541	.138 .198	-.117 .276	.171 .110	.576** .000	.186 .081	.107 .318	.010 .923	.187 .080	.148 .165	-.303** .004	-.059 .584	.019 .858	-.231* .030	.038 .721	-.257** .015	-.160 .134	-.099 .357	-.207 .051	-.151 .157
R15	.276** .009	.284** .007	-.156 .146	.332** .001	1	-.161 .132	.215* .043	-.270* .010	.150 .160	.297** .005	.029 .786	.127 .237	.009 .935	.153 .153	.051 .633	-.103 .335	-.106 .325	-.147 .169	-.349** .001	-.053 .619	-.200 .060	-.166 .121	-.198 .063	-.090 .399	-.014 .898
C1	.027 .802	.110 .305	-.018 .871	.066 .541	-.161 .132	1	.108 .312	.011 .916	.047 .662	.038 .724	.149 .162	.186 .081	-.050 .643	-.021 .842	.213* .045	-.034 .750	-.150 .850	.250* .018	.142 .184	.051 .633	.107 .318	-.106 .923	-.146 .167	-.081 .361	-.155 .752
C2	.368** .000	.091 .397	.063 .556	.138 .198	.215* .043	.108 .312	1	-.076 .480	.348** .001	.225* .034	.030 .780	.347** .001	-.086 .424	.006 .958	.259* .014	-.335** .001	-.288** .006	-.008 .937	-.155 .147	-.265* .012	-.382** .000	-.354** .001	-.218* .040	-.197 .065	-.372** .000
C3	-.120 .264	-.249* .019	.053 .622	-.117 .276	-.270* .010	.011 .916	-.076 .480	1	.026 .808	-.153 .153	-.090 .404	-.075 .484	.115 .284	-.029 .787	-.200 .060	-.034 .753	.111 .301	.102 .339	.078 .467	-.039 .717	.011 .918	.013 .906	-.198 .063	.121 .257	.044 .680
C4	.601** .000	-.022 .839	.043 .691	.171 .110	.150 .160	.047 .662	.348** .001	.026 .808	1	.182 .351	.100 .406	.406** .000	-.077 .473	.173 .105	.175 .102	-.151 .158	-.209* .049	.024 .826	-.125 .243	-.029 .790	-.365** .000	-.360** .001	-.175 .102	-.184 .084	-.067 .533
C5	.287** .006	.313** .003	.042 .695	.576** .000	.297** .005	.038 .724	.225* .034	-.153 .153	.182 .088	1	.472** .000	.233* .028	-.141 .189	.133 .214	.382** .000	-.169 .112	-.141 .189	.142 .203	-.136 .203	-.012 .909	-.330** .002	-.087 .002	-.112 .294	-.169 .114	-.205 .054
A1	.173 .104	.169 .113	.021 .845	.186 .081	.029 .786	.149 .162	.030 .780	-.090 .404	.100 .351	.472** .000	1	.468** .000	.091 .398	.195 .067	.445** .000	.029 .787	-.051 .632	.300** .004	.142 .184	.032 .769	.007 .950	-.064 .552	-.062 .561	.066 .540	
A2	.376** .000	.183 .085	-.071 .510	.107 .318	.127 .237	.186 .081	.347** .001	-.075 .484	.406** .000	.233* .028	.468** .000	1	.092 .392	.234* .027	.452** .000	-.059 .584	-.299** .004	.031 .776	-.097 .365	-.183 .086	-.211* .047	-.143 .183	-.174 .103	-.141 .106	-.100 .350
A3	-.243* .022	-.063 .557	.092 .389	.010 .923	.009 .935	-.050 .643	-.086 .424	.115 .284	-.077 .189	-.141 .398	.091 .398	.092 .392	1	.172 .107	.136 .204	.002 .982	.166 .120	.118 .271	-.035 .743	.086 .423	.041 .705	.333** .001	.053 .623	.178 .095	.175 .101
A4	.105 .329	.077 .470	.245* .020	.187 .080	.153 .153	-.021 .842	.006 .958	-.029 .787	.173 .105	.133 .214	.195 .067	.234* .027	-.172 .107	1	.091 .396	.189 .075	.170 .112	.222* .037	.045 .674	-.012 .909	.014 .893	.169 .114	.125 .244	.179 .093	.180 .092
A5	.204 .055	.208 .050	.146 .172	.148 .165	.051 .633	.213* .045	.259* .014	-.200 .060	.175 .102	.382** .000	.445** .000	.452** .000	.136 .204	.091 .396	1	-.203 .067	-.075 .485	.131 .220	-.106 .321	-.148 .185	-.191 .072	.011 .917	-.226* .033	-.227* .032	-.165 .123
T1	-.012 .910	-.043 .687	-.020 .850	-.303** .004	-.103 .335	-.034 .750	-.335** .001	-.034 .753	-.151 .158	-.169 .112	.029 .787	-.059 .584	.002 .982	.189 .075	-.203 .057	1	.308** .003	.097 .365	.255 .016	.187 .079	.402** .000	.366** .000	.274** .009	.142 .183	.429** .000
T2	-.179 .094	-.187 .079	.280** .008	-.059 .584	-.106 .325	-.150 .161	-.288** .006	-.141 .301	-.051 .049	-.299** .019	-.166 .632	-.170 .004	-.075 .120	.308** .112	-.075 .485	.308** .003	1	-.052 .629	.123 .252	.131 .220	.334** .001	.484** .000	.321** .002	.143 .182	.367** .000
T3	.088 .410	.159 .137	.267* .012	.019 .858	-.147 .169	.250* .018	-.008 .937	.102 .339	.024 .826	.142 .184	.300** .004	.031 .776	.118 .271	.222* .037	.131 .220	.097 .365	-.052 .629	1	.459** .000	.206 .053	.025 .818	.071 .506	.131 .221	.184 .084	.086 .421
T4	-.081 .452	-.030 .779	.033 .756	-.231* .030	-.349** .001	.142 .184	-.155 .147	.078 .467	-.125 .243	-.136 .203	.142 .184	-.097 .365	-.035 .743	.045 .674	-.106 .321	.255* .016	.123 .252	.459** .000	1	.115 .282	.316** .003	.167 .118	.170 .111	.091 .397	.124 .248
T5	-.091 .396	.050 .643	-.061 .572	.038 .721	-.053 .619	-.053 .633	-.265* .012	-.039 .717	-.012 .790	-.032 .908	-.183 .086	-.086 .423	-.012 .909	-.148 .165	-.187 .079	.131 .220	.206 .053	.115 .282	1	.274** .009	.499** .000	.119 .267	.153 .161	.108 .312	.125 .243
B1	-.325** .002	-.090 .402	-.010 .923	-.257* .015	-.200 .318	.107 .000	-.382** .000	.011 .918	-.365** .002	-.330** .002	.007 .950	-.211* .047	.041 .705	.014 .893	-.191 .072	.402** .000	.334** .001	.025 .818	.316** .003	.274** .009	1	.499** .000	.252* .017	.195 .067	.316** .003
B2	-.284** .007	.001 .992	.148 .167	-.160 .134	-.166 .121	-.106 .323	-.354** .001	.013 .906	-.360** .001	-.087 .419	.007 .945	-.143 .183	.333** .001	.169 .114	.011 .917	.366** .000	.484** .006	.071 .506	.167 .118	.119 .267	.499** .000	1	.364** .000	.333** .001	.430** .000
B3	-.122 .254	-.154 .150	.098 .361	-.099 .357	-.198 .063	-.146 .172	-.218* .040	-.198 .063	-.175 .102	-.112 .294	-.064 .552	-.174 .103	.053 .623	.125 .244	-.226* .033	.274** .009	.321** .021	.131 .221	.170 .111	.153 .151	.252* .017	.364** .000	1	.150 .161	.337** .001
B4	-.211* .047	-.003 .979	-.130 .225	-.207 .051	-.090 .399	-.081 .449	-.197 .065	.121 .257	-.184 .084	-.169 .114	-.062 .561	-.141 .186	.178 .095	-.227* .032	.142 .183	.143 .182	.184 .084	.091 .397	.108 .312	.195 .067	.333** .001	.150 .161	1	.299** .004	
B5	-.009 .933	-.063 .559	-.034 .752	-.151 .157	-.014 .898	-.155 .148	-.372** .000	.044 .880	-.067 .533	-.205 .054	.066 .540	-.100 .350	.175 .101	.180 .092	-.165 .123	.429** .000	.367** .000	.086 .421	.124 .248	.125 .243	.316** .003	.430** .000	.337** .001	.299** .004	1

**, Correlation is significant at the 0.01 level (2-tailed).

*, Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 11b. Pearson correlation coefficients and (two-tailed) p-values for terrorist condition at the comprehension level of situation awareness

	R16	R17	R18	R19	R10	C6	C7	C8	C9	C10	A6	A7	A8	A9	A10	T6	T7	T8	T9	T10	B6	B7	B8	B9	B10	
R16	1	.080	-.047	.255*	-.038	.036	.044	.070	-.011	-.148	.097	.055	.029	.160	.135	.072	-.129	.326**	.159	.070	.192	.082	-.181	-.125	-.170	
		.458	.661	.016	.726	.736	.684	.516	.921	.166	.367	.609	.785	.135	.206	.503	.228	.002	.136	.517	.072	.445	.090	.244	.110	
R17	.080	1	.234*	.240*	-.007	.254*	.321**	.215*	.036	-.048	.351**	.124	.134	.348**	.149	.234*	-.120	.122	.242*	.118	.097	-.360**	-.115	-.005	.019	
		.458		.027	.023	.945	.016	.002	.043	.740	.652	.001	.247	.210	.001	.163	.027	.263	.255	.022	.272	.366	.001	.283	.961	.857
R18	-.047	.234*	1	-.051	.237*	.030	.187	.140	.049	-.181	.064	.137	.053	.109	.239*	.252*	.054	.140	.196	.095	.157	-.313**	-.078	-.062	-.180	
		.661	.027		.638	.025	.780	.079	.190	.646	.089	.551	.201	.619	.310	.024	.017	.613	.189	.065	.378	.141	.003	.470	.561	.091
R19	.255*	.240*	-.051	1	.125	.330**	.087	.336**	-.206	-.099	.291**	.179	.237*	.185	.178	.152	-.154	.373*	.176	-.046	.098	.002	-.241*	.008	-.070	
		.016	.023	.638		.245	.002	.419	.001	.052	.358	.006	.093	.026	.083	.094	.155	.150	.000	.098	.667	.359	.988	.023	.937	.515
R10	-.038	-.007	.237*	.125	1	.204	.043	.211*	-.068	-.174	.075	.163	-.004	.015	.207	-.087	.036	-.074	-.040	-.221*	.087	-.021	-.147	-.325**	-.202	
		.726	.945	.025	.245		.055	.888	.048	.525	.103	.484	.128	.969	.886	.052	.415	.735	.488	.709	.037	.418	.846	.169	.002	.058
C6	.036	.254*	.030	.330**	.204	1	.344**	.355**	-.119	-.212*	.531**	.357**	.376**	.539**	.264*	.086	-.310**	.001	.035	-.062	.057	-.234*	-.262*	-.187	-.203	
		.736	.016	.780	.002	.055		.001	.001	.266	.047	.000	.001	.000	.000	.012	.423	.003	.994	.745	.563	.596	.027	.013	.080	.056
C7	.044	.321**	.187	.087	.043	.344**	1	.127	.009	-.110	.275*	.077	.133	.337**	.179	.152	-.067	-.004	.265*	.332**	.042	-.195	-.083	.015	.030	
		.684	.002	.079	.419	.688	.001		.236	.931	.303	.009	.472	.215	.001	.093	.155	.531	.968	.016	.001	.697	.067	.437	.887	.781
C8	.070	.215*	.140	.336**	.211*	.355**	.127	1	-.171	-.203	.340**	.538*	.268*	.273*	.413*	.186	.017	.187	-.030	.145	.169	-.248*	-.154	-.183	-.139	
		.516	.043	.190	.001	.048	.001	.236		.110	.057	.001	.000	.011	.010	.000	.081	.876	.079	.780	.176	.113	.019	.150	.086	.192
C9	-.011	.036	.049	-.206	-.068	-.119	.009	-.171	1	.126	-.077	-.124	.023	-.095	-.047	.051	.208	.012	.008	-.056	.011	.038	.025	.024	-.044	
		.921	.740	.646	.052	.266	.931	.110		.238	.475	.248	.830	.374	.663	.636	.050	.915	.944	.603	.917	.725	.817	.825	.680	
C10	-.148	-.048	-.181	-.099	-.174	-.212*	-.110	-.203	.126	1	-.294**	-.253*	-.125	-.259*	-.120	-.086	.138	-.133	-.087	.107	-.133	.039	.401**	.202	.251*	
		.166	.652	.089	.358	.103	.047	.303	.057	.238		.005	.017	.243	.014	.261	.425	.196	.213	.417	.316	.216	.719	.000	.058	.018
A6	.097	.351**	.064	.291**	.075	.531**	.275**	.340**	-.077	-.294**	1	.507**	.303*	.638**	.311**	.310**	-.203	.203	.199	.032	.256*	-.084	-.445*	-.207	-.137	
		.367	.001	.551	.006	.484	.000	.009	.001	.475	.005		.000	.004	.000	.003	.003	.057	.056	.061	.769	.016	.431	.000	.051	.202
A7	.055	.124	.137	.179	.163	.357**	.077	.538*	-.124	-.253*	.507**	1	.227*	.220*	.425*	.161	-.081	.226*	.124	.029	.172	-.186	-.294**	-.276**	-.208	
		.609	.247	.201	.093	.128	.001	.472	.000	.248	.017	.000		.033	.038	.000	.133	.452	.033	.249	.789	.107	.081	.005	.009	.050
A8	.029	.134	.053	.237*	-.004	.376**	.133	.268*	.023	-.125	.303*	.227*	1	.435*	.372*	.452**	-.148	.331**	.322**	.000	.195	-.071	-.269*	-.144	-.076	
		.785	.210	.619	.026	.969	.000	.215	.011	.830	.243	.004	.033		.000	.000	.000	.167	.002	.002	1.000	.067	.511	.011	.178	.478
A9	.160	.348**	.109	.185	.015	.539**	.337**	.273**	-.095	-.259*	.638**	.220*	.435*	1	.376**	.187	-.217*	.107	.134	.124	.272**	-.049	-.409**	-.115	-.183	
		.135	.001	.310	.083	.886	.000	.001	.010	.374	.014	.000	.038	.000		.000	.079	.041	.318	.209	.245	.010	.649	.000	.285	.086
A10	.135	.149	.239*	.178	.207	.264*	.179	.413**	-.047	-.120	.311**	.425**	.372**	.376**	1	.007	-.007	.106	.127	.007	.185	.015	-.221*	-.080	.073	
		.206	.163	.024	.094	.052	.012	.093	.000	.663	.261	.003	.000	.000	.000		.950	.950	.323	.236	.949	.082	.893	.037	.457	.496
T6	.072	.234*	.252*	.152	-.087	.086	.152	.186	.051	-.086	.310**	.161	.452**	.187	.007	1	.026	.443**	.492**	.309**	.368**	-.147	-.139	.003	.026	
		.503	.027	.017	.155	.415	.423	.155	.081	.636	.425	.003	.133	.000	.079	.950		.811	.000	.000	.003	.000	.170	.192	.978	.810
T7	-.129	-.120	.054	-.154	.036	-.310**	-.067	.017	.208	.138	-.203	-.081	-.148	-.217*	-.007	.026	1	.003	.001	-.008	-.127	.119	.198	.215*	.237*	
		.228	.263	.613	.150	.735	.003	.531	.876	.050	.196	.057	.452	.167	.041	.950	.811		.980	.991	.938	.236	.268	.063	.043	.026
T8	.326**	.122	.140	.373**	-.074	.001	-.004	.187	.012	-.133	.203	.226*	.331*	.107	.106	.443**	.003	1	.429**	.086	.307**	.061	-.162	.113	-.076	
		.002	.255	.189	.000	.488	.994	.968	.079	.915	.213	.056	.033	.002	.318	.323	.000	.980		.000	.425	.003	.571	.130	.291	.479
T9	.159	.242*	.196	.176	-.040	.035	.255*	-.030	.008	-.087	.199	.124	.322**	.134	.127	.492**	.001	.429**	1	.227*	.054	-.104	-.183	.039	.143	
		.136	.022	.065	.098	.709	.745	.016	.780	.944	.417	.061	.249	.002	.209	.236	.000	.991	.000		.032	.613	.334	.085	.716	.181
T10	.070	.118	.095	-.046	-.221*	-.062	.332**	.145	-.056	.107	.032	.029	.000	.124	.007	.309**	-.008	.086	.227*	1	.294**	-.129	.017	.186	.126	
		.517	.272	.378	.667	.037	.563	.001	.176	.603	.316	.789	.789	1.000	.245	.949	.003	.938	.425	.032		.005	.229	.878	.080	.239
B6	.192	.097	.157	.098	.087	.057	.042	.169	.011	-.133	.256*	.172	.195	.272**	.185	.368**	-.127	.307**	.054	.294**	1	.018	-.193	-.110	-.182	
		.072	.366	.141	.359	.418	.596	.697	.113	.917	.216	.016	.107	.067	.010	.082	.000	.236	.003	.613	.005		.868	.070	.303	.088
B7	.082	-.360**	-.313**	.002	-.021	-.234*	-.195	-.248*	.038	.039	-.084	-.186	-.071	-.049	.015	-.147	.119	.061	-.104	-.129	.018	1	.203	.424**	.345**	
		.445	.001	.003	.988	.846	.027	.067	.019	.725	.719	.431	.081	.511	.649	.893	.170	.268	.571	.334	.229	.868		.057	.000	.001
B8	-.181	-.115	-.078	-.241*	-.147	-.262*	-.083	-.154	.025	.401**	-.445*	-.294*	-.269*	-.409*	-.221*	-.139	.198	-.162	-.183	.017	-.193	.203	1	.475**	.410**	
		.090	.283	.470	.023	.169	.013	.437	.150	.817	.000	.000	.005	.011	.000	.037	.192	.063	.130	.085	.878	.070	.057		.000	.000
B9	-.125	-.005	-.062	.008	-.325**	-.187	.015	-.183	.024	.202	-.207	-.276**	-.144	-.115	-.080	.003	.215*	.113	.039	.186	-.110	.424**	.475**	1	.518**	
		.244	.961	.561	.937	.002	.080	.887	.086	.825	.058	.051	.009	.178	.285	.457	.978	.043	.291	.716	.080	.303	.000	.000		.000
B10	-.170	.019	-.180	-.070	-.202	-.203	.030	-.139	-.044	.251*	-.137	-.208	-.076	-.183	.073	.026	.237*	-.076	.143	.126	-.182	.345**	.410**	.518**	1	
		.110	.857	.091	.515	.058	.056	.781	.192	.680	.018	.202	.050	.478	.086	.496	.810	.026	.479	.181	.239	.088	.001	.000	.000	

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 11c. Pearson correlation coefficients and (two-tailed) p-values for terrorist condition at the projection level of situation awareness

	RI11	RI12	RI13	RI14	RI15	C11	C12	C13	C14	C15	A11	A12	A13	A14	A15	T11	T12	T13	T14	T15	B11	B12	B13	B14	B15
RI11	1	.201 .059	.471** .000	.081 .453	.001 .328	-.403** .993	.000 .998	.300** .004	-.140 .191	.197 .064	-.042 .699	.213* .045	.075 .482	.174 .103	.091 .398	.086 .423	.036 .741	-.063 .560	.098 .360	-.088 .411	-.138 .197	-.255* .016	-.005 .961	.153 .151	-.008 .941
RI12	.201 .059	1	.088 .410	-.357** .001	-.038 .724	-.183 .087	.200 .061	-.038 .723	-.284** .007	.009 .931	.051 .636	-.112 .296	-.151 .158	.091 .394	-.117 .274	-.016 .878	-.219* .039	-.278** .008	-.311** .003	-.093 .386	-.009 .934	-.204 .055	.065 .546	-.123 .250	-.052 .627
RI13	.471** .000	.088 .410	1	-.105 .328	.328** .002	-.173 .104	.193 .069	.511** .000	.124 .249	.445** .000	.064 .549	.460** .000	.281** .008	.322** .002	.274** .009	-.048 .655	.053 .620	-.254* .016	-.015 .891	-.266* .012	-.054 .615	-.428** .000	-.154 .495	.073 .031	-.229*
RI14	.081 .453	-.357** .001	-.105 .328	1	.038 .726	.032 .769	-.064 .551	.054 .616	.262* .013	-.095 .376	-.037 .732	.169 .112	.078 .470	.063 .557	.019 .859	-.014 .893	.102 .343	.150 .160	-.005 .962	.090 .404	-.131 .220	.199 .062	-.113 .291	.021 .845	.245* .021
RI15	.001 .993	-.038 .724	.328** .002	.038 .726	1	.219* .039	.245* .021	.391** .000	.409** .000	.397** .000	.371** .003	.311** .000	.477** .002	.323** .001	.337** .015	.258* .229	.129 .648	.049 .082	.186 .793	.028 .967	-.004 .987	.002 .987	-.213* .045	-.147 .169	.061 .569
C11	-.403** .000	-.183 .087	-.173 .104	.032 .769	.219* .039	1	.084 .434	-.053 .620	.258* .015	.050 .641	.170 .111	-.015 .888	.148 .167	.066 .537	.083 .437	.244* .021	.331** .002	.222* .037	.186 .078	.247* .173	-.027 .193	.193 .373	-.096 .090	.181 .531	-.067 .531
C12	.000 .998	.200 .061	.193 .069	-.064 .551	.245* .021	.084 .434	1	.237* .025	.126 .239	.451** .000	.450** .000	.051 .636	.142 .185	.370** .000	.045 .672	.057 .593	.074 .488	-.032 .769	-.073 .497	.015 .892	-.082 .445	-.226* .032	-.092 .390	.071 .506	-.119 .265
C13	.300** .004	-.038 .723	.511** .000	.054 .616	.391** .000	-.053 .620	.237* .025	1	.193 .069	.542** .000	.237* .025	.413* .000	.392** .000	.332** .001	.317** .002	.051 .637	.078 .466	-.123 .249	.173 .104	-.166 .120	.031 .771	-.231* .030	-.165 .123	-.040 .707	-.140 .190
C14	-.140 .191	-.284** .007	.124 .249	.262* .013	.409* .000	.258* .015	.126 .239	.193 .069	1	.168 .115	.155 .146	.221* .037	.371** .000	.134 .211	.087 .417	.212* .046	.109 .309	.244* .021	.196 .066	-.025 .817	.026 .811	.201 .059	-.163 .127	.001 .994	.069 .523
C15	.197 .064	.009 .931	.445* .000	-.095 .376	.397** .000	.050 .641	.451* .000	.542** .000	.168 .115	1	.308* .003	.272* .010	.219* .039	.221* .037	.182 .087	-.094 .381	-.058 .590	-.230* .030	.035 .747	-.221* .037	.045 .678	-.222* .036	-.188 .078	.097 .364	-.150 .162
A11	-.042 .699	.051 .636	.064 .549	-.037 .732	.371** .000	.170 .111	.450* .000	.237* .025	.155 .146	.308** .003	1	.320* .002	.445* .000	.629** .000	.474** .000	.254* .016	.189 .076	-.157 .142	.086 .422	-.020 .853	.177 .997	-.312** .003	-.329** .002	-.153 .152	-.041 .701
A12	.213* .045	-.112 .296	.460** .000	.169 .112	.311** .003	-.015 .888	.051 .636	.413** .000	.221* .037	.272* .010	.320** .002	1	.561** .000	.468** .000	.461** .000	.020 .851	.180 .092	-.199 .062	.126 .239	-.185 .083	.020 .851	-.226* .033	-.301** .004	-.134 .211	-.156 .145
A13	.075 .482	-.151 .158	.281** .008	.078 .470	.477** .000	.148 .167	.142 .185	.392** .000	.371** .000	.219* .039	.445* .000	.561** .000	1	.405** .000	.522** .000	.235* .027	.280** .008	-.120 .261	.184 .084	-.054 .613	.034 .755	-.165 .123	-.236* .264	-.037 .026	-.728
A14	.174 .103	.091 .394	.322** .002	.063 .557	.323* .002	.066 .537	.370* .000	.332* .001	.134 .211	.221* .037	.629** .000	.468** .000	.405* .000	1	.408** .000	.114 .288	.047 .659	-.146 .173	-.024 .824	-.154 .150	.134 .212	-.381** .000	-.256* .016	-.156 .143	-.109 .308
A15	.091 .398	-.117 .274	.274** .009	.019 .859	.337** .001	.083 .437	.045 .672	.317* .002	.087 .417	.182 .087	.474* .000	.461** .000	.522** .000	.408** .000	1	.344* .001	.285* .007	-.075 .482	.193 .071	.024 .820	.081 .451	-.164 .125	-.352** .001	-.213* .045	-.177 .097
T11	.086 .423	-.016 .878	-.048 .655	-.014 .893	.258* .015	.244* .021	.057 .593	.051 .637	.212* .046	-.094 .381	.254* .016	.020 .851	.235* .027	.114 .288	.344** .001	1	.538** .000	.279* .008	.419* .000	.306** .000	-.031 .771	.156 .144	.018 .867	.063 .558	.009 .936
T12	.036 .741	-.219* .039	.053 .620	.102 .343	.129 .229	.331** .002	.074 .488	.078 .466	.109 .309	-.058 .590	.189 .076	.180 .092	.280** .008	.047 .659	.285** .007	.538** .000	1	.212* .046	.532** .000	.396** .000	-.107 .320	.052 .630	-.006 .953	.135 .207	-.120 .262
T13	-.063 .560	-.278** .008	-.254* .016	.150 .160	.049 .648	.222* .037	-.032 .769	-.123 .249	.244* .021	-.230* .030	-.157 .142	-.199 .062	-.120 .261	-.146 .173	-.075 .482	.279* .008	.212* .046	1	.621** .000	.548** .000	.009 .935	.407** .000	.091 .398	.124 .246	.219* .039
T14	.098 .360	-.311** .003	-.015 .962	-.005 .082	.186 .080	.186 .497	-.073 .104	.173 .066	.196 .747	.035 .422	.086 .742	.126 .239	.184 .084	-.024 .824	.193 .071	.419* .000	.532** .000	.621** .000	1	.525** .000	.141 .187	.173 .104	.047 .661	.029 .788	.004 .973
T15	-.088 .411	-.093 .386	-.266* .012	.090 .404	.028 .793	.247* .019	.015 .892	-.166 .120	-.025 .817	-.221* .037	-.020 .853	-.185 .083	-.054 .613	-.154 .150	.024 .820	.306** .004	.396** .000	.548** .000	.525** .000	1	.013 .901	.278* .008	.105 .328	.050 .642	.093 .388
B11	-.138 .197	-.009 .934	-.054 .615	-.131 .220	-.004 .967	-.027 .799	-.082 .445	.031 .771	.026 .811	.045 .678	.177 .097	.020 .851	.034 .755	.134 .212	.081 .451	-.031 .771	-.107 .320	.009 .935	.141 .820	.013 .901	1	.012 .913	-.025 .820	-.114 .288	.021 .845
B12	-.255* .016	-.204 .055	-.428** .000	.199 .062	.002 .987	.193 .070	-.228* .032	-.231* .030	.201 .059	-.222* .036	-.312** .003	-.226* .033	-.165 .123	-.381** .000	-.164 .125	.156 .430	.052 .630	.407* .000	.173 .104	.278* .008	.012 .913	1	.056 .604	.000 .997	.365* .000
B13	-.005 .961	.065 .546	-.154 .150	-.113 .291	-.213* .045	-.096 .373	-.092 .390	-.165 .123	-.163 .127	-.188 .078	-.329** .002	-.301** .004	-.120 .264	-.256* .016	-.352** .001	.018 .867	-.006 .953	.091 .398	.047 .661	.105 .328	-.025 .820	.056 .604	1	.012 .908	.107 .319
B14	.153 .151	-.123 .250	.073 .495	.021 .845	-.147 .169	.181 .090	.071 .506	-.040 .707	.001 .994	.097 .364	-.153 .152	-.134 .211	-.236* .026	-.156 .143	-.213* .045	.063 .558	.135 .207	.124 .246	.029 .788	.050 .642	-.114 .288	.000 .997	.012 .908	1	-.225* .034
B15	-.008 .941	-.052 .627	-.229* .031	.245* .021	.061 .569	.051 .531	-.067 .265	-.119 .190	-.140 .523	.069 .162	-.150 .701	-.037 .145	-.109 .728	-.109 .308	-.177 .097	.009 .936	-.120 .262	.219* .039	.004 .973	.093 .388	.021 .845	.365** .000	.107 .319	-.225* .034	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 12a. Descriptive Information of Malaysian Subjects

	N	Minimum	Maximum	Mean	Std. Deviation
GENDER	90	1.00	2.00	1.6444	.48136
AGE	90	19.00	57.00	29.8667	8.77842
OCCUPATION	90	2.00	15.00	9.1889	5.33147
ETHNICITY	90	1.00	3.00	1.7556	.82532
BELIEF_SYSTEM	90	1.00	5.00	2.0111	1.16594
EDUCATION	90	2.00	8.00	3.8000	1.13375
INCOME	90	1.00	9.00	3.1778	1.78368
SMART PHONE	90	.00	1.00	.6222	.48755
MOBILE PHONE	90	.00	1.00	.5000	.50280
LANDLINE	90	.00	1.00	.1222	.32938
DESKTOP	90	.00	1.00	.3667	.48459
LAPTOP	90	.00	1.00	.8333	.37477
TABLET	90	.00	1.00	.2333	.42532
MAKE CALLS	90	.00	1.00	.9556	.20723
TEXT MESSAGE	90	.00	1.00	.7889	.41038
EMAIL	90	.00	1.00	.2333	.42532
FACEBOOK	90	.00	1.00	.5444	.50081
TWITTER	90	.00	1.00	.0667	.25084
INSTANT MESSAGES	90	.00	1.00	.3333	.47405
FLOOD_EXP	90	.00	1.00	.3778	.48755
ACCIDENT_EXP	90	.00	1.00	.5222	.50230
FIRE_EXP	90	.00	1.00	.1111	.31603
EARTHQUAKE_EXP	90	.00	1.00	.1222	.32938
TSUNAMI_EXP	90	.00	1.00	.1333	.34184
TERRORIST_EXP	90	.00	.00	.0000	.00000
Valid N (listwise)	90				

APPENDIX 12b. Descriptive Information of Indonesian Subjects

	N	Minimum	Maximum	Mean	Std. Deviation
GENDER	90	1.00	2.00	1.3556	.48136
AGE	90	19.00	55.00	27.8000	9.80048
OCCUPATION	90	2.00	15.00	11.8444	4.03889
ETHNICITY	90	1.00	3.00	1.8444	.84682
BELIEF SYSTEM	90	1.00	7.00	2.3556	1.36003
EDUCATION	90	1.00	5.00	3.5222	1.09368
INCOME	90	1.00	4.00	1.5556	.73609
SMART PHONE	90	.00	1.00	.5444	.50081
MOBILE PHONE	90	.00	1.00	.8778	.32938
LANDLINE	90	.00	1.00	.1444	.35351
DESKTOP	90	.00	1.00	.4222	.49668
LAPTOP	90	.00	1.00	.8111	.39361
TABLET	90	.00	1.00	.0444	.20723
MAKE CALLS	90	.00	1.00	.8889	.31603
TEXT MESSAGE	90	.00	1.00	.9778	.14823
EMAIL	90	.00	1.00	.1889	.39361
FACEBOOK	90	.00	1.00	.3667	.48459
TWITTER	90	.00	1.00	.1667	.37477
INSTANT MESSAGES	90	.00	1.00	.3222	.46995
FLOOD_EXP	90	.00	1.00	.1667	.37477
ACCIDENT_EXP	90	.00	1.00	.6333	.48459
FIRE_EXP	90	.00	1.00	.0333	.18051
EARTHQUAKE_EXP	90	.00	1.00	.7111	.45579
TSUNAMI_EXP	90	.00	1.00	.0111	.10541
TERRORIST_EXP	90	.00	1.00	.1000	.30168
Valid N (listwise)	90				

APPENDIX 13a. Tsunami Images with Severe Hazard Risks

Image 5 - Selected by Malaysians



Image 6 - Selected by Indonesians



APPENDIX 13b. Terrorist Attack Images with Severe Hazard Risks

Image 5 - Selected by Malaysians & Indonesians

