

Natural Disasters: Opportunity Utilization and Crisis Alleviation within a Development of Strategic Management Model

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Abstract This paper presents a PhD research plan that aims to increase the knowledge of the changing industry and competitive environment during the impact of natural disasters and increase management capacities and techniques as a guideline. The available opportunity for improving and implementing firm's strategies will be focused on minimizing the impact and determining a firm's performance to survive any disruptive situation. Furthermore, this research will investigate the effect of natural disasters on a few firms' performance on previous cases under changing industry conditions and competitive environment analysis and a firm's strategy. As a firm's strategy plays a vital role in a crisis situation, the organization survival depends on the decisions managers make. The research will use qualitative data collection by interviewing managers of selected industries in both in the proactive and reactive strategy, as well as quantitative methods through questionnaire survey for statistical generalization.

Keywords: Natural disasters, Crisis alleviation, Firm's opportunity, Competitive abilities, Industrial and Competitive environment

1. Research Motivation

Natural disasters create a great impact on worldwide human society. The devastating impacts have caused massive damages and losses to livelihood and property, especially, during the past decade both scale and diversity of natural disasters has been significantly growing. Multinational Corporations cannot deny the rising in actions in order to respond to the impacts as they have destroyed business functions, and their impacts have changed business and industrial operations, strategies and structures.

During the flooding in Thailand in 2011, many businesses collapsed because they were unable to adapt and lacked the knowledge and ability needed to manage an unexpected situation. Even for those that did not collapse, many businesses were forced to close for a period of time whilst the impact of the natural disaster was at its greatest. Consequently, businesses are now seeking new knowledge as a blueprint to learn how to cope in future situations. Therefore, an idea of how companies can realize and utilize opportunities during times of change is being proposed. How can firms enhance their capabilities and use the changing situation

to their advantage to alleviate the problems associated with the turbulent environment?

In November 2011, the way to operate businesses in Thailand was interrupted by the massive impact of flooding. It was reported that the flood damage cost the Thailand's economy an estimated of \$ 40 billion, accounting for 12.7% of the country's GDP [12]. From the Ministry of Commerce statistics both Thai and foreign companies have shut down businesses due to the flooding because of their lack of ability to handle the situation during the disaster [39]. For the surviving companies, it has taken a long time to recover back to normal operation. The floods also reduced the firm's growth, profit and global competitiveness. Its impact even went beyond the Thai market and slowed down the global movement. The most affected area was the supply of hard disks as Thailand is the main manufacturing and investment base [16].

One extreme weather event can have a major impact on the economic and business sectors, such as shifting markets, business location, production process, distribution, regulation, technology, market structure and infrastructure issues ([9], [35]). Many firms are increasingly aware of the importance about dealing with natural disasters, especially those that have no experience or do not have adequate knowledge to deal with disasters. To protect business operations and supply chains from unexpected events, many organizations have developed the ability to rapidly evaluate ongoing change and react immediately to unpredictable and fast changing environment.

Nevertheless, with these changes some companies could see it as the time for investment. As it is argued that an ever changing environment provides opportunities, such as introducing new technology that can lead to entering a new market or obtaining resources [19]. During the disaster a huge demand exists because of the consumer panic, people buy commodities and store them for future use. At the same time, some manufacturers had to shut down the operations due to damages. The companies that have no products to supply to the markets, would lose their market share to the competitors, which took this chance to introduce their products to the market while the demand and supply are sensitive. On the other hand, some companies had products imported to gain more profit while some used free mass media to advertise their company in Corporate Social Responsibility (CSR) campaign. In order to protect the market each company applied different strategies: the most effective strategies companies have to introduce to maintain any market share.

This research proposes that organizations which can adapt to the situation and create opportunities from the threats would have a higher chance to recover from the crisis and gain a competitive advantage.

2. Literature review

Natural Disasters

Hallegatte and Prylusi [15] define a natural disaster from an economic view point as “a natural event that causes a perturbation to the functioning of economic system, with a significant negative impact on asset, production factors, output, employment, or consumption”. Market losses from natural disasters can occur to losses to trade goods and services and prices. Even though it is difficult to define a cost from a disaster, the literature provides ideas about indirect (output) losses from natural disasters as the major view point in various aspects. Indirect losses are defined for market share lost or permanent destruction of economic activities in the affected area. In the short term, the businesses are not able to produce until electricity is restored. In the long-term, it can also create a permanent negative shock for an affected area because the activities have moved to less risky location. The impacts also lead to change in consumption and change in prices because disasters can act as a stimulus which can lead to a decrease of production or even a rise in the demand for commodities and reconstruction sector.

Natural disasters are divided into 5 sub-groups which are 1) biological: epidemic, insect infestation and animal stampede, 2) geophysical: earthquake, volcano and mass movement (dry) 3) hydrological: flood and mass movement (wet), 4) meteorological: storm, 5) climatological: extreme temperature drought, and wild fire. From the year 2002-2011, hydrological represented the highest hits number on the average of occurrence (197), followed by meteorological (102), climatological (59) and Geophysical (36) [13].

From the destruction of earthquake in Port-au-Prince (Haiti) in 2010 and hurricane Katrina in 2005 in the US, it is clearly seen that both industrialized and developing countries are equally vulnerable to natural disaster event [15]. However, it is found that developing countries are the most vulnerable and the impact of disasters on gross domestic product (GDP) is 20 times higher than in industrialized countries. Evidence shows that damages will increase to both people and the economic system. In 2011, the impacts of weather disasters reached the world highest recorded and it was over 78 per cent of disaster losses [42] with 332 times in 101 countries, killed 30773 people, affected 244.7 million victims and cost US\$ 366.1 billion. The losses from natural disasters in 2011 rose by 235% compared to the average damages in the years between 2001 and 2010 of US\$ 109.3 billion [12].

The impact of natural disasters has increased especially in Asian - Pacific countries[37], for example, the Indian Ocean Tsunami in 2004, Sichuan earthquake in 2008, devastating floods in Pakistan, India and China in 2010 and the tsunami in Japan in 2011 ([40], [41]).

Comparing the year 2012 and the global average damages during 2002-11; the economic losses increased from 129.33 US\$ bn. (avg. 2002-2011) to 157.34 US\$ bn. (2012), although the number of natural disasters decreased from 394 (Avg. 2002-11) to 357 (in 2012). This is because the infrastructures in high-income countries play an important part in economic value. Even though, the Americas was the second most often hit geographical area from 79 natural disasters at 22.1% (hurricane Sandy, drought, and storm), it became the highest suffer which accounted for 65.7% of the global damages. Meanwhile, Asia was the highest per cent at 40.6% of global disaster hits (145 disasters); it was the second of the global disaster damages at 17.8%. Europe was the third rank of the global disaster damages and the world natural disaster hits at 15% and 18.2% respectively [13]. It is obvious that Europe suffered the most from floods, droughts and storms, especially during 1989-2008, the floods accounted for 40% and the storms were 33% of the economic losses [38].

Business level

Firm's Function, Management Style and Stakeholder Partnership

Since disasters affect the global market which may harm the way of operation and management [40], and affect corporate strategy and capital structure [29]. Organizations feel insecure and are facing risks from the constant changes, it forces the organizations to adapt and change their strategy and prepare some plans in order to reduce the impact and protect the businesses disruption [32]. This has led to a rise in the number of case studies about natural disasters. Firstly, a study about the perception of executives and environmental uncertainty influences the way to structure a firm and its activities. It was found that high perceived environment uncertainty by executives tend to change strategies in order to reduce the initial impact. But the level of perception does not significantly impact the company on a day-to-day level [25], and size of location where firms operate. The main factors of organizational preparation for coping with a major crisis or disaster is the responsibility of both top and middle level management, government organization and organizations with more than 500 employees [11]. Stakeholder relationships have been studied widely and suggested as one of an important solution. Nohria [23] supports that organizations need to develop responses to ongoing changes in the environment by building a global network of people,

cooperating with related members such as communities and competitors during the crisis to support their capability against threats. Therefore, the organization's structure, which is distributed leadership, dispersed workforce and flexible rule is in a better position to respond to threats during any crisis.

The strategy are further supported in policy terms; White [40] also mentions that building partnerships in public-private engagement, and community network will help companies share information, operational tools and long-term strategic thinking. They are able to respond and prepare for the next expected event. Saldana-Zorrilla [30] studied how unexpected natural disasters affect agricultural livelihoods and Mexican economic policy. When the negative impacts are increasing, it reduces farmers' expectations of future earning and increases their emigration desire. Therefore, the social programs and post-disaster aid need to be employed in terms of financing and temporary Government aid. However, the pre-disaster assistance programs, such as communal saving and insurance have not been applied practically. Overall, it is important to understand stakeholder perception and preference because it can help to reduce their vulnerability. Hence, the solution for improving farm incomes, reducing poverty and emigration in Mexico can be addressed with stakeholder-based solutions which focus on loss-sharing and risk transfer mechanisms.

Past Experience and size of business

Some studies mention that for an organization to survive is dependent on the ability to minimize risk through its crisis management plan. Past experiences in crisis events have been found as an important driver that makes companies more concerned with any crises. To begin with, organizations will develop climate change strategy and planning as a response after experiencing an unexpected climate surprise. They include climate trend in their strategy development because it is unpredictable and effects their operations. Nevertheless, they apply adaptations as reactions rather than proactive way to mitigate risks and impacts [14]. A small business focus in the study shows that the entrepreneur are concerned for crisis planning because of their past experience in crisis events, rather than the existence of a crisis management plan [32].

A good case study for business recovery from natural disasters belongs to Runyan (2006) [28], where the researchers interviewed the managers of small businesses in the US on how they responded to hurricane Katrina. It presents an interesting point that small businesses are the easiest vulnerable group and takes them longer time than large corporations for recovering because most of them lack pre-disaster planning and the owners are the only decision maker, so these factors caused them losses of inventory and equipment in the event. When they wanted to recover

and reinvest in new inventories and infrastructure, it became more difficult to reach to the employee and financial support. In some business sector such as restaurant their supply chain were interrupted for long period of time because some raw materials (e.g. fresh produce) were lacked in supply, so it even takes more time to return to the normal operation unless they will find a new supplier. The article also shows that one of the abilities to minimize the damages is to move their inventories before a disaster; however, it is impossible in large scale. Furthermore, some business owners who responded quickly to the situation were able to generate large income by being one of few owners who opened their businesses. The available opportunity to increase in sales can occur by having a smaller number of competitors and increasing population density due to people evacuating area stuck by natural disaster.

Type of Industries

Lopez-Gamero et al. [22] found that these factors affect managers to perceive the impact of environment uncertainty on different levels. The lowest level of environment uncertainty is in the area of technology. In contrast food, agriculture and industrial waste management sectors are mainly concerned because of the resources involved. Winn et al. [40] analyzed the length and type of phenomenon impact that natural disasters had in each sector of an industry. The conceptual of Massive Discontinuous Change (MDC) was presented for organizations to be able to adapt and respond to the climate impact in terms of sustainability, crisis, risk, resilience and adaptive organizational change. Following that Linnenluecke et al. [21] presented more about the types, characteristics and impact of extreme weather events and economic impact in different aspects for organization to understand before building organizational adaptation and resilience to the impacts. The theoretical and practical frameworks on the organizations adaptation and resilience were proposed to strengthen business capacity to respond and reduce the impact of extreme weather events by focusing on the specific variables that cannot be managed in advance, during or after the crisis and disaster. Therefore, both of the frameworks proposed by those authors were theoretical concept, so it needs deeper analysis in detail for practical use in the future. Beermann [5] analyses the impact of climate change to 3 groups of German food industry with different degree of vulnerabilities as an assessment tool before developing corporate adaptation. The potential risks are considered as changes 1) change in demand (eating habit) 2) fluctuations in product quality and quantity (rise in prices, time and quality) 3) Economic exposure (increase in foreign competitors and increase prices of world resources) 4) increase in production insecurities (insecurities of up-and downstream production process). Therefore, the concept of pro-active adaptation will allow firms to be aware of the risks and lead to create new business models, products and planning for building resilient and strategies to cope with change in the long term.

Supply Chain

Natural disasters are a low-likelihood to occur, but if it happens, it has a high impact risk, businesses should understand and identify their own supply chain vulnerability areas ([24],[10]). In terms of preparation and adaptation, there are some convincing arguments supporting them, Autry and Bobbitt [1] states that the company itself should prepare by introducing supply chain security orientations, which integrated both security vulnerabilities and risk management issues for achieving competitive advantage. Securing supply chain and managing supply chain risks can increase the firm's ability to reduce disruptions risks and able to recover quickly in the event of any issues. Following that, Busch [6] stated that companies need to develop capabilities to adapt to climate-related disruptions through firm resource supply, production process and production distribution. They can acquire the capabilities from climate knowledge absorption as information generating, climate-related operational flexibility as short term adjustment, and climate integration as a long-term capability. With respect to remain competitiveness, the company is suggested to invest in securing the resilience of consumer markets, production and supply chains.

Another aspect about supply chain and natural disasters are presented by Henri et al. [17], during a natural disaster modern production organization which has bottlenecks production, which has been designed to small and limited number of inventories and suppliers, are easy to be interrupted due to inability of their suppliers to deliver the amount of goods, transportation restriction or even the ability of workers and customers to access the production area. Therefore, the ability to recovery depends on production locations. During a turbulent time when a supplier cannot deliver goods, the businesses can diversify production risk by considering more options of clients, suppliers and large inventories in various locations. They may consider various alternative options, such as import goods from outside, the client may purchase and stock alternative commodities from local producer or potential producer. Similar studies in this area have been discussed by Christopher et al. [8] and Nohria [23], they mention that one supplier or single source may be beneficial in terms of cost and quality, but it makes companies more vulnerable. The companies should create a resilient supply chain by considering an alternative source or open source model. Another similar study with the concept of supply chain network risk was studied in technological turbulence environment, it is suggested that firm should maintain their competitive advantage and minimize the risks by integrating multiple suppliers which have ability to cope with the risk. The proposed framework is classified and predicts the potential of each supplier in any disruptive events. It is useful for practical use as it can prepare

firms to reduce the risks by preparing themselves with a proper mitigation and response. The conclusion is suggested to apply different suppliers with different strategies in order to mitigate supply chain risk for both focal firm and suppliers because each supplier is operating in a different environment. This conceptual model assess to various factors: 1) supplier's strategy and structure; suppliers types, business location and supply chain type (e.g. lean, agile and hybrid) 2) Supplier Attributes; financial Performance, human resource factors, operational factors, culture and relationship factor, while external environments is a factor that create more risks [34].

The literature has been searched by using various key words in the similar concept with 'natural disaster' such as 'crisis situation' or 'climate change' in order to receive comprehensive information and ideas. From the above examined, the literature is mostly focused on the view point of pre-impact and post-impact of natural disasters, organizational preparedness, resilience, response and adaption. Therefore, most of them are offered in concept which is difficult to use practically. Obviously, there are not enough studies that show how businesses respond **during** natural disaster because it can have a greatly influence to help businesses reducing costs and impacts of natural disasters. As under difficult situations, there can be rich opportunities for innovational entrepreneurs. Organizations can exploit the opportunities through implementation of strategies and activities for securing consumer markets, productions and supply chains by learning the factors that could help gaining competitive advantage in a climate of extreme adversity, such as matching unneeded resources to unmet needs [7]. The research in terms of strategic management is deficient, so it would be very useful and important to understand the changing situation and environment for applying and being patterns in future uses.

3. Research Questions

From the researcher's observation, **during** the flooding situation in Thailand, some organizations could survive and recover fast whereas some did not. As a result they had to cease to operate. During any natural disaster, everyone is stressed and panicking, so management had to change their strategy from their ordinary plans in order to survive. The organizations which can leverage its capabilities and adapt to the situations are able to turn their threats into opportunities and will have a higher chance to survive and maintain operating.

The study aims to examine the following research questions; 1) Are there any changes in any industries and competitive environment **during** the impacts of natural disaster: why some firms develop opportunities better than other firms? 2) What are those strategies developed, selected and implemented **during** the crisis for maintaining firm performance, recovering from losses and resuming business as

normal? 3) Are those different strategies influencing firms to recover at different level of performance?

4. Research Objectives

To seek and identify the strategy from the phenomenon, it is necessary to explore different aspects. The PhD research is concerned with a comprehensive investigation on the relationship between industry and competitive environment during the impact of a weather disaster and the management techniques, strategies and activities used for maintaining and gaining the competitive advantage and to resume normal operation. To determine key factors of firms' strategy that can lead to sustainability of a firms' performance in developed and developing countries under a natural disaster. To review the available opportunities for improving company situation, and implementing new strategies in business and policies in order to minimize the impact of environmental disasters. To determine the potential each factor has and the business performance used to survive any crisis situation.

5. Conceptual Framework

With regards to the above literature review, there is a research gap which has not been studied how firms react **during** a natural disaster and what is the interaction between firm's strategy and performance. In normal situation firm's strategies are not designed for being disruption. When there is an external threat from natural disasters, it needs an additional framework that can explain the relationship and situation of each item. The below framework in Figure 1 shows the relationship between an industry and its competitive environment, firm's strategies and firm performance in normal business activities can react after being disturbed by a natural disaster as an external shocks. The framework will allow us to understand how each function influence each other in high uncertainty situations. Determinants will be found out to explain which firms' strategies can adjust better than others under the scope of primary activities of the value chain. The organizations which are able to have a resilient function and structure, and provide a quicker in response, will have high chance to reduce the outside risk [34].

The framework is designed by having 3 elements; 1) Industry and Competitive Environment, 2) Firm's Strategies; primary activities of value chain and adjusting strategies to disruptions 3) Firm Performance.

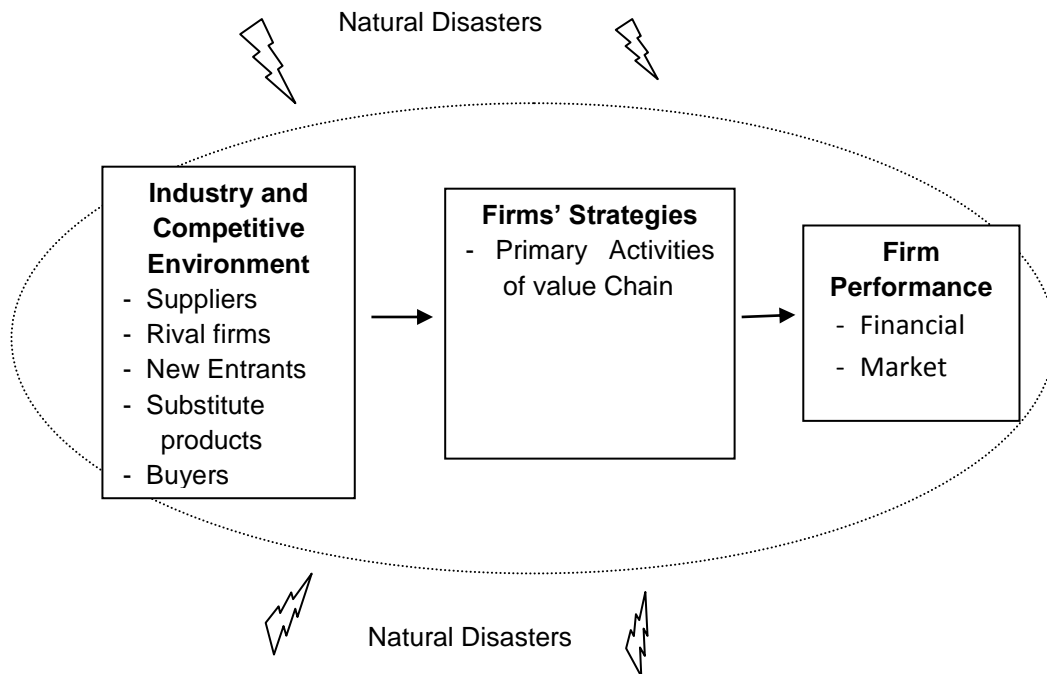


Figure 1: Preliminary Research Framework

Industry and Competitive Environment

During the natural disaster disruption, the industry and competitive environment changed from the normal situation to a new one. Organizations need to gain deep understanding of the structure of its industry and examine opportunities and threats that exist. The concept of Five Forces Model of Competition from Porter [26] allows the organizations to analyze the industry structure and competitive environment before identifying their own strategy.

Firm's Strategies

- **Primary Activities of Value Chain**

According to Ambec and Lanoie [1], efforts to conserve the environment do not always have to be costly; rather, they can increase revenue, while still improving company environmental performance. A company's value chain allows the company to build value through the primary activities or cost and the related support activities. Immediate appropriate strategies are needed for the rapid change of markets, as it is one factor that determines the success of industry [26].

In addition, companies can gain competitiveness by making opportunities under the turbulent environment [18]. Therefore, firms will increase their competitive advantage by price/cost, quality, delivery, dependability and time to market [20].

Firm Performance

Financial and market data instruments are used to measure the outcome of strategy in order to identify the abilities of a firms' performance to cope with a situation. The financial data is a credible method as it can classify firms from high to low performance [3], while market performance relates to the success in competitive advantage [2].

6. Research Methodology

This PhD research will be based on industry and competitive environment analysis with opened strategies, which the author will gather from questionnaire and interviews. The various methods of data collection will be used as follows;

Primary data

- Case studies including personal semi-structured interviews with senior managers
- Questionnaire survey
- Consideration to objective quantitative computer simulation experiments [27] would be given

Secondary data

- Database e.g. annual reports, SET and Compustat (Recovery Period, ROA, and return on Sale)

The PhD research will focus on analyzing the industry situation and the movement of strategies from 2 or 3 case studies in previous events in both proactive and reactive strategies. Also, the results about feedback and returns will be discussed. In terms of secondary data, the information will be analyzed to understand the full concept of the industry and the competitive analysis to complement the primary data collected. The information will be presented from the management perspective, so in-depth investigation from personal semi-structured interviews will be arranged first for the data analysis and insight knowledge of firm strategies, followed by a questionnaire survey. The appropriate number of interviewees will be selected from interested manufacturers for representing managers or decision-makers in two or three different industries that were affected from the extreme weather events: the type of industries will be considered on the urgent need and critical importance during the crisis. The data and strategies that are employed during the crisis will be acquired. The data base and questionnaires are gathered to calculate and analyze data in statistic terms.

7. Significance of Research

This PhD research represents a big challenge, which would contribute with advantages to both a micro and macro level: In terms of businesses, it will help all stakeholders involved to explore, develop capabilities and knowledge for management teams, shareholders and suppliers or even for dealing with policy makers with taxes and policies during any future crisis. In addition it also evaluates mechanisms, provides guidelines and knowledge using new management practices for organizations seeking investment opportunities through good practice. Furthermore, it would contribute to the knowledge of managers to understand and being able to allocate and prioritize the resources with the highest value [29] because organizations have limited resources, such as budget, time and knowledge. Moreover, decision-makers can forecast and plan the strategy in a proactive way which can lead to a competitive advantage while dealing with unexpected situations.

Turning to a macro level, Governments can provide the knowledge to business to prepare them during an expected natural disaster. It will also help to reduce the burden and budget, which is allocated for alleviating on any future disasters. Finally, communities can understand the situation and prepare the appropriate measures to deal with the disruptive situations.

Acknowledgements

The author wishes to thank her PhD supervisors: Prof. Chee Yew Wong and Dr. Luisa Huaccho Huatuco for their guidance on writing this paper.

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