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Possibility of Disaster Research through Survey of Risk Management

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Abstract

The final objective of this research is to find whether risk management and business continuity plans were useful countermeasures against the Great East Japan Earthquake and Tsunami, how these countermeasures changed after the disaster, and whether they worked. Mayer et al. (2008) conducted a survey of around 2,000 businesses in the southeast Texas region affected by Hurricane Rita. This paper compares the results of their survey on risk management and how businesses were affected by the disaster with the results of a survey on the Japanese case.

Moreover, the U.S. and Japanese samples showed that businesses suffered from serious facilities damages as a result of the natural disasters. However, they also showed the differences in the damages between the U.S. and Japanese samples, such as employee shortage or traffic distribution. Further, with regard to the differences in risk management between the two samples, I found that U.S. businesses tend to take a reactive approach against a natural disaster, while those in Japan tend to take a comprehensive approach.

Keywords: Risk management, business continuity plan, natural disaster, Hurricane Rita, Great East Japan Earthquake and Tsunami

1. INTRODUCTION

With the increasing possibility of critical situations—not only financial crises, but also natural disasters—much attention has been paid to research on the topics of risk and crisis. Soin and Collier (2013) mention that:

“Recent world events including the global financial crisis, the financial crisis facing the Eurozone, the horsemeat scandal, the Japanese earthquake and tsunami, the floods in Thailand and the *Deepwater Horizon* oil spill in the Gulf of Mexico have all refocused and intensified interest in risk” (p. 82).

Risk and crisis have been recognized as important topics in the field of accounting research over past decades. However, most previous studies on these topics have focused on the narrative scope, such as a “financial” crisis, although there are various types of critical situations that companies face. Hearsh (1995) notes that high-magnitude events result in a reduction in control and the ability to manage, as the capacity of organizations to meet the demands of the impact of the crisis or disaster event is exceeded by the demands of the situation.

Although a natural disaster is a type of disaster event, there were few studies that focused on management accounting subjects prior to the Great East Japan Earthquake and Tsunami in 2011. During this disaster, companies located not only in Tohoku, but also in the rest of Japan were forced to discontinue their business activities for a while. This is because of not only the magnitude of the damage, but also the globalization of firm activity and complexity of the supply chain. The management control of many firms was disrupted at this time, although most of them had risk management systems or business continuity plans (BCPs) in place. However, these systems and BCPs had to be refocused after the disaster. The final objective of my research is find whether risk management and BCPs were useful countermeasures against the Great East Japan Earthquake and Tsunami, how these countermeasures were changed after the disaster, and whether they worked. Moreover, my research is ongoing and focuses on the implications of risk management and BCPs for firm management control, including supply chain management. This paper presents previous BCP research, which has been addressed in both disaster and information technology research, for the purpose of having a rich discussion on risk management, including BCPs and management control, to achieve my final research objective. Therefore, this paper focuses on the early stages of my research.

The rest of the paper is organized as follows. Section 2 presents previous studies on BCPs and disasters. Section 3 discusses the results of the questionnaire survey conducted in Japan in 2013, and analyzes and compares them with those in the U.S. case of Hurricane Rita. Finally, in Section 4, I conclude the paper and present my plan for future research.

2. Literature Review

A BCP is designed to avoid or mitigate risks, reduce the impact of a crisis (i.e., disaster condition), and reduce the time to restore conditions to a state of “business as usual” (Cerullo and Cerullo, 2004). Moreover, BCP seeks to eliminate or reduce the impact of a disaster condition before it occurs, though a disaster contingency recovery plan is primarily a reactive approach (Cerullo and Cerullo, 2004).

Ginger et al. (2006) mentions that the number and severity of large-scale disasters in the last 100 years has been growing dramatically. Additionally, large-scale disasters have a distinct lifecycle, and over the course of the lifecycle. Moreover, a large-scale disaster makes it difficult to organize, manage, and coordinate the many diverse agencies and stakeholders delivering services (Ginger et al., 2006). Therefore, the companies and governments need to prepare networks that support recovering from and conducting disaster situations (Ginger et al., 2006). In fact, Mayer et al. (2008) surveyed 2,000 businesses in southeast Texas after Hurricane Rita and shows that the respondents were plagued by recurring problems of short-term liquidity, long-term profitability, or employee shortage, as well as loss of customers/market share.

On the other hand, Williamson (2007) indicates the results of the survey by SteelEye Technology in 2006, which show that 83% of respondents reported having a formalized BCP. However, only 68% of all firms have implemented a formal BCP (Williamson, 2007). Duncan et al. (2011) suggest that some of the more important reasons that firms may not have a BCP include temptations to deny the possibility of low-probability events, possibility of little or no payback, and pressing nature of the current problems.

This study shows the results of risk management and its effect on Japanese companies during and after the Great East Japan Earthquake and Tsunami. It is useful to compare the survey from Mayer et al. (2008) with our results, though the size of the effected area of the disaster is different. Moreover, the works of Duncan et al. (2011) and survey of Williamson (2007) provide insight into our results.

3. Results of Questionnaire Survey and Comparison with Case of Hurricane Rita

3.1 Impact of natural disaster

In 2013, I conducted a questionnaire survey concerning the Great East Japan Earthquake and Tsunami. The survey was sent to 1,723 of the listed companies in Japan, and a total of 279 (16.2%) were collected. Most respondents were negatively influenced by the disaster. On the other hand, 33.3% of 243 companies that reported a negative influence did not have a main office or factories. See Figure 1 for more details.

Figure 1. Influence of Great East Japan Earthquake and Tsunami on Business¹

(Respondents are listed companies in Japan)

| | Respondents | Percentage |
|-----------------------|-------------|------------|
| Negative Influence | 243 | 87.7 |
| No Negative Influence | 34 | 12.3 |
| Total | 277 | 100 |

(Figures 6-7, Okazaki, 2016, p. 81)

Moreover, Figure 2 shows which disaster effects the listed Japanese companies faced, as these effects are slightly different from those faced by unlisted companies in the disaster area.

Figure 2. Effects of Great East Japan Earthquake and Tsunami on Business

(Respondents are listed companies in Japan)

| | Not Influenced | | | | | | | Significantly Influenced | | | | | | | N | Ave | Med | Std.Dev |
|--|----------------|-------|-------|-------|-------|-------|-------|--------------------------|----|----|----|----|----|----|-----|-----|------|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | |
| 1. Damages of facilities or equipment | 13.8% | 21.3% | 10.5% | 9.6% | 20.9% | 14.6% | 9.2% | 33 | 51 | 25 | 23 | 50 | 35 | 22 | 239 | 4 | 3.83 | 1.95 |
| 2. Confusion of traffic distribution | 7.2% | 9.7% | 10.6% | 16.0% | 24.9% | 16.9% | 14.8% | 17 | 23 | 25 | 38 | 59 | 40 | 35 | 237 | 5 | 4.51 | 1.77 |
| 3. Power shortage | 7.1% | 10.8% | 12.0% | 14.9% | 29.9% | 12.5% | 12.9% | 17 | 26 | 29 | 36 | 72 | 30 | 31 | 241 | 5 | 4.39 | 1.73 |
| 4. Difficulties of supplying and procurement | 5.5% | 9.2% | 12.6% | 14.7% | 24.8% | 19.8% | 13.5% | 13 | 22 | 30 | 35 | 59 | 47 | 32 | 238 | 5 | 4.57 | 1.71 |
| 5. Sales decrease | 9.2% | 13.8% | 12.1% | 15.9% | 23.1% | 13.0% | 13.0% | 22 | 33 | 29 | 38 | 55 | 31 | 31 | 239 | 4 | 4.21 | 1.84 |
| 6. Financial difficulties | 66.4% | 13.9% | 5.9% | 8.8% | 2.9% | 0.8% | 1.3% | 158 | 33 | 14 | 21 | 7 | 2 | 3 | 238 | 1 | 1.76 | 1.32 |
| 7. Employee shortage | 56.5% | 16.9% | 7.6% | 10.1% | 5.1% | 2.5% | 1.3% | 134 | 40 | 18 | 24 | 12 | 6 | 3 | 237 | 1 | 2.03 | 1.49 |

(Figure 3, Sasaki et al., 2015, p. 4)

In addition, in Figure 3, I show the results of the same questionnaire given to the unlisted companies located in the disaster area in order to compare them with those of Mayer et al. (2008), relating to the disaster area of Hurricane Rita. My survey was conducted on the unlisted companies in six prefectures in the northeast area of Japan that suffered from the disaster, and the questionnaire was sent to 826 companies, with responses from 212.

¹ This figure quotes from Sasaki et al. (2015).

Figure 3. Effects of Great East Japan Earthquake and Tsunami on Business

(Respondents are unlisted companies in Japan)

| | Not Influenced | | | | Significantly Influenced | | | | N | Ave | Med | Std.Dev |
|--|----------------|-------|-------|-------|--------------------------|-------|-------|-----|---|------|------|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | | |
| 1. Damages of facilities or equipment | 10.7% | 15.8% | 13.6% | 9.6% | 17.0% | 17.5% | 15.8% | 177 | 5 | 4.22 | 2 | |
| | 19 | 28 | 24 | 17 | 30 | 31 | 28 | | | | | |
| 2. Confusion of traffic distribution | 1.7% | 4.5% | 7.9% | 10.7% | 17.5% | 28.8% | 28.8% | 177 | 6 | 5.4 | 1.55 | |
| | 3 | 8 | 14 | 19 | 31 | 51 | 51 | | | | | |
| 3. Power shortage | 9.0% | 11.2% | 10.1% | 14.6% | 18.5% | 21.4% | 15.2% | 178 | 5 | 4.47 | 1.89 | |
| | 16 | 20 | 18 | 26 | 33 | 38 | 27 | | | | | |
| 4. Difficulties of supplying and procurement | 5.1% | 6.8% | 11.3% | 15.8% | 19.8% | 20.9% | 20.3% | 177 | 5 | 4.82 | 1.74 | |
| | 9 | 12 | 20 | 28 | 35 | 37 | 36 | | | | | |
| 5. Sales decrease | 8.3% | 7.2% | 10.6% | 13.9% | 19.4% | 18.9% | 21.7% | 180 | 5 | 4.72 | 1.88 | |
| | 15 | 13 | 19 | 25 | 35 | 34 | 39 | | | | | |
| 6. Financial difficulties | 38.4% | 16.4% | 17.5% | 14.1% | 5.1% | 5.1% | 3.4% | 177 | 2 | 2.6 | 1.7 | |
| | 68 | 29 | 31 | 25 | 9 | 9 | 6 | | | | | |
| 7. Employee shortage | 46.6% | 16.9% | 9.0% | 10.7% | 7.3% | 4.5% | 5.1% | 178 | 3 | 2.49 | 1.84 | |
| | 83 | 30 | 16 | 19 | 13 | 8 | 9 | | | | | |

(Figures 2-3(A), Okazaki, 2016, p. 147)

Mayer et al. (2008) show both the impacts and losses due to Hurricane Rita, which include extra expenses (83.3%); building damage (78.4%); loss of business income (77.3%); wind damage (76.3%); property damage (67%); electrical breakdown (57.7%); mechanical/equipment damage (32%); expediting expenses, vandalism or theft (10.3%); lost data (10.3%); flood (9.3%); and fire (2.1%).

Some results of Mayer et al. (2008) are quite similar to ours. For example, both results show building or property damage because natural disasters cause physical damage. Further, Mayer et al. (2008) also show the effect of Hurricane Rita on business operations, as presented in Figure 4.

Figure 4. Effects of Hurricane Rita on Business Operations

| Business operations | % |
|-----------------------------------|------|
| Employee shortage | 57.7 |
| Short-term liquidity problems | 46.6 |
| Loss of customers/market share | 30.9 |
| Inventory shortage | 27.8 |
| Long-term profitability problems | 26 |
| Loss of viability/competitiveness | 14.4 |
| Strained supplier relationships | 12.4 |
| Loss of vendor/shippers | 11.3 |
| Negative publicity | 7.2 |
| Inventory surplus | 5.2 |
| Bankruptcy | 0 |

(Table 2, Mayer et al., 2008, p. 18)

The results show differences at this point. For example, over 50% of respondents reported difficulties of supplying and procurement in my research, and only around 11.3% showed loss of vendor/shippers and 27.8% showed inventory shortage in Mayer et al.'s (2008) survey.

Additionally, with regard to employee shortage, unlisted companies in the disaster area of Japan were not so significantly affected, while Mayer et al.'s (2008) survey showed it as having the highest negative impact. In the Japanese disaster area, it was not only an earthquake, but also a tsunami, that destroyed many buildings and killed many humans; as such, I expected that the problem of employee shortage in the disaster area would be more significant. The results did not show a significant impact of employee shortage on Japanese companies. I examined the differences in the averages of whether a company had an office in the disaster area, and found the significant difference between them: broadly speaking, companies with offices in the disaster areas were affected by employee shortage in both the U.S. and Japanese disaster situations.

3.2 Recovery, Risk Management, and Business Continuity Plans

The recovery/revival after the Japanese disaster was smooth as a whole, and the result of the speedy recovery/revival was not related to whether the companies had a main office/factory, as shown in Figure 5.

Figure 5. Condition of Recovery/Revival after Disaster (of listed companies)

| | Strongly Non-Applicable | | | | | | | N | Ave | Med | Std.Dev |
|---|----------------------------|-------|-------|-------|-------|-------|-------|-----|-----|------|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | |
| 1. Recovery/revival was cost effective. | 3.8% | 9.2% | 11.3% | 36.4% | 18.0% | 14.6% | 6.7% | 239 | 4 | 4.26 | 1.46 |
| | 9 | 22 | 27 | 87 | 43 | 35 | 16 | | | | |
| 2. Recovery/revival was speedy. | 4.2% | 5.4% | 7.9% | 22.9% | 24.6% | 22.9% | 12.1% | 240 | 5 | 4.75 | 1.54 |
| | 10 | 13 | 19 | 55 | 59 | 55 | 29 | | | | |
| 3. Recovery/revival would contribute to growth in the future. | 6.7% | 14.7% | 18.9% | 37.0% | 11.3% | 7.1% | 4.2% | 238 | 4 | 3.69 | 1.44 |
| | 16 | 35 | 45 | 88 | 27 | 17 | 10 | | | | |
| 4. Recovery/revival was satisfactory as a whole. | 2.1% | 5.9% | 13.4% | 34.9% | 19.3% | 15.6% | 8.8% | 238 | 4 | 4.45 | 1.4 |
| | 5 | 14 | 32 | 83 | 46 | 37 | 21 | | | | |

(Figures 6-12, Okazaki, 2016, p. 87)

Interestingly, most of the respondents had already had to utilize risk management several times. Figure 6 shows the tackling situation of risk management, and nearly 50% of respondents modified their countermeasures against risks or started new measures after the disaster. In addition, almost 30% of companies have introduced BCP/BCM after the disaster. Those results imply that risk management is just a countermeasure against risks, which companies could forecast, but they need other countermeasures in the real-life context (Sasaki, 2016).

Figure 6. Tackling Situation of Risk Management

| | Countermeasure of Risks | | Start New Countermeasure after Disaster | N/A | N |
|---------------------------------------|-------------------------|----------|---|--------|-----|
| | Continue | Modified | | | |
| Identification of Significant Risks | 46.40% | 38.70% | 12.80% | 2.20% | 274 |
| | 127 | 106 | 35 | 6 | |
| Countermeasure against Risks | 43.50% | 38.40% | 15.60% | 2.50% | 276 |
| | 138 | 89 | 43 | 7 | |
| Training in Response to Risks | 50.40% | 32.50% | 10.90% | 6.20% | 274 |
| | 138 | 89 | 30 | 17 | |
| Planning Risk Management | 37.50% | 36.40% | 17.50% | 8.70% | 275 |
| | 103 | 100 | 48 | 24 | |
| Make Manual of Response to Risks | 36.20% | 44.60% | 15.20% | 4.00% | 276 |
| | 100 | 123 | 42 | 11 | |
| BCP/BCM | 22.50% | 37.30% | 30.80% | 9.40% | 276 |
| | 62 | 103 | 85 | 26 | |
| Disclosure of Information about Risks | 58.70% | 15.20% | 4.70% | 21.40% | 276 |
| | 162 | 42 | 13 | 59 | |

(Figure 1, Sasaki, 2016, p. 174)

However, we cannot compare these results with those of Mayer et al. (2008), which found that 39.3% of businesses had high preparedness and the majority of businesses (60.7%) took only a “few” or “some” preparedness measures (Mayer et al., 2008). Moreover, concerning strategic planning for disaster and preparedness measures, Mayer et al. (2008) show that the respondent companies mainly focused on disaster contingency recovery plans, which are a type of reactive, rather than comprehensive, approach. For example, major changes to countermeasures were made after Hurricane Rita, including purchasing backup generators (20.2%), storing copies of records offsite (10.6%), and becoming more aware of what insurance does not cover (17.4%)² (Mayer et al., 2008). See Figures 7 and 8 for more detail.

Figure 7. Strategic Planning and Preparedness Measures

| Measure | % before Hurricane | % Minor Changes after Hurricane | % Major Changes after Hurricane | % No Changes after Hurricane |
|---|--------------------|---------------------------------|---------------------------------|------------------------------|
| Purchased backup generators | 10.6 | 36.1 | 20.2 | 33 |
| Developed annual plan to generate new customers | 20.9 | 18.7 | 7.7 | 52.7 |
| Constructed upgrades to prevent future damage | 8.6 | 18.5 | 8.7 | 64.2 |
| Diversified product line, location, or target customers | 8.8 | 16.5 | 3.3 | 71.4 |

(Table 5, Mayer et al., 2008)

² The result of insurance coverage is omitted here.

Figure 8. Procurement Procedures

| Measure | % before Hurricane | % Minor Changes after Hurricane | % Major Changes after Hurricane | % No Changes after Hurricane |
|---|--------------------|---------------------------------|---------------------------------|------------------------------|
| Stored copies of records offsite | 41.5 | 20.2 | 10.6 | 27.7 |
| Ordered extras of hard-to-replace parts | 7.6 | 34.8 | 6.5 | 51.1 |
| Created backup vendors and shippers | 9.7 | 32.3 | 3.2 | 54.8 |
| Stored invoices, shipping lists offsite | 29 | 14 | 2.2 | 54.8 |
| Developed pre-arrangements with vendor requirements | 26.1 | 14.1 | 3.3 | 56.5 |
| Created new relationships with vendors and shippers | 13.1 | 21.1 | 0 | 65.6 |

(Table 6, Mayer et al., 2008)

Here, we have to caution that Mayer et al. (2008) do not focus on management or management control in disasters. Nevertheless, their results show an interesting phase, which may be caused from the cultural differences between Japan and the Western world.

4. Conclusion and Future Research

This paper reviewed the previous literature on BCPs and disasters. I found that some works focused on the practical possibility of BCP, although the research was mainly conducted in a non-accounting area. However, one of these studies, Mayer et al. (2008), surveyed the effect of Hurricane Rita on businesses in the southeast Texas region as well as their preparedness against the hurricane. Then, I compared their results with those regarding Japanese companies after the Great East Japan Earthquake and Tsunami. Although the analysis did not necessarily show the counterparts of both survey results, there were some implications for future research, in particular, what we need to do to continue this research on disasters and risk management as well as what we should analyze when we treat Japanese company cases.

Power (2004) states, “Risk management organizes what cannot be organized... The risk management of everything holds out the promise of manageability in new area. But it also implies a new way of allocating responsibility for decisions which must be made in potentially undecidable situations” (p. #). Many natural disasters have occurred this year, such as the Kumamoto earthquake and Typhoon No. 10 in Hokkaido, and companies needed to take measures against each situation; moreover, the countermeasures were totally different from those of the companies after the Great East Japan Earthquake and Tsunami. Therefore, as a future research plan, we are going to conduct many case studies on disasters because risk-management research is difficult to generalize.

References

- Cerullo, V. and M. J. Cerullo. (2004). Business continuity planning: A comprehensive approach. *Information Systems Management*, 21(3): 70-78.
- Coleman, L. (2004). The frequency and cost of corporate crises. *Journal of Contingencies and Crisis Management*, 13(3): 116-128.
- Duncan, W. J., V. A. Yeager, A. C. Rucks, and P.M. Ginter. (2011). Surviving organizational disasters. *Business Horizons*, 54(2): 135-142.
- Ginger, P. M., W. J. Duncan, L. C. McCormick, A. C. Rucks, M. S. Wingate, and M. Abdolrasulnia. (2006). Effective response to large-scale disasters: The need for high-reliability preparedness networks. *International Journal of Mass Emergencies and Disasters*, 24(3): 331-349.
- Hearth, R. (1995). The Kobe earthquake: Some realities of strategic management of crisis and disasters. *Disaster Prevention and Management*, 4(5): 11-24.
- Mayer, B. W., J. Moss, and K. Dale. (2008). Disaster and preparedness: Lessons from Hurricane Rita. *Journal of Contingencies and Crisis Management*, 16(1): 14-23.
- Okazaki, R. (2016). *Crisis wo Norikoeru Management Control*. Tokyo. Chuo Keizai (in Japanese).
- Power, M. (2004). *The Risk Management of Everything*. London: Demos.
- Sasaki, I. (2016). Risk, crisis, and a frontier of management accounting. *Kaikei*, 189(2): 173-185.
- Sasaki, I., R. Okazaki, and K. Oura. (2015). A survey on management accounting in the disaster. *The Journal of Cost Accounting Research*, 39(1): 1-10.
- Soin, K., and P. Collier. (2013). Editorial: Risk and management in management accounting and control. *Management Accounting Research*, 24(2): 82-87.
- Williamson, B. (2007). Trends in business continuity planning. *Bank Accounting and Finance*, 20(5): 50-52.