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Managing Global Supply Chain System as a Business' Lifeblood in the Era of Market Uncertainties: Best Practices from Nissan

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Abstract

Even when the turbulences are quite disruptive, Nissan starting from the days of the more devastating Japan earthquakes of 2011, has remained resilient to withstand the effects of all economic unpredictabilities and shocks. Given the global supply chain management challenges that the modern global businesses experience, it is such insights that motivated this study to use systematic review as the qualitative research method to evaluate the global supply chain management approaches that Nissan uses. Through such analysis, the study aims to discern the best practices that can be adopted by the global businesses experiencing certain global supply chain management-related challenges. To recover its supply chain operations, thematic analysis of several studies indicated that Nissan adopted a recovery plan reflecting a combination of supply chain recovery strategies encompassing effective leadership, agility and flexibility, contingency planning, and profiling and prioritization. Since Japan is one of the global hotspots for earthquakes and tsunami, Nissan introduced the strategies for managing its supply chain disruptions in the way that bolsters its business continuity, survival and sustainability during a disaster. It adopted innovative operations to mitigate the impact of electricity outages. Besides emphasising suppliers' usage of alternate sourcing, Nissan also adopted buffer stocking as compared to JIT system. Nissan introduced a more effective supply chain risk management, while also focusing on the bestselling cars, US and Chinese markets as well as continuous evaluation and improvement. Nissan had its own unique challenges, but it is still a set of such best practices that the businesses experiencing certain supply chain management challenges can explore.

Keywords: Global Supply Chain Management, Disaster, Disruptions and Business Performance

1. Introduction

Efficacy of supply chain operations is the lifeblood that bolsters a business' overall effective market performance and competitiveness. It is the global supply chain system that improves a firm's capabilities to bolster its competitiveness by responding and delivering the required goods to the customers [1]. It ensures the timely delivery of goods and services to any location that the customer requires. If the business is able to deliver its goods in as efficient manner as possible, it influences improved customer satisfaction. It is through such distinct capability that the business can be able to differentiate itself from rivals by bolstering improved customer satisfaction and loyalty. The global supply chain system also influences a firm's cost competitiveness [2]. It is how the business manages and control costs along its global supply chain system that influences significant cost reduction.

As the business moves its raw-materials from the suppliers to its various operational locations or moves its finished products to the final consumers, it is how it manages and controls costs that influences its overall cost competitiveness. In the end, effective cost management and control across the global supply chain system reduces the overall operational costs. This improves a firm's cost competitiveness whilst also enlarging its operational profit margins and the obtained net profits. Such a view is supported in the Williamson's "Transaction-Cost Economics Theory" of Supply Chain Management [3]. The theory posits that throughout the supply chain system, firms strive to control and reduce costs in order to respond to the customers' needs for lower price commodities.

However, Barney's "Resource-based Theory" argues that a firm's supply chain system is part of its unique strategic value creating network that bolsters a firm's overall competitiveness [3]. Just like such a view, the Network Theory of Supply Chain Management as well as the Integration Theory hold a business' supply chain system to constitute of several factors that influence a firm's overall effective performance. In effect, theories state that effective integration and management of the activities in the supply chain network is essential for bolstering a firm's operational efficiency. Activities' integration in the supply chain system improves operational synergy that bolster's a firm's operational efficiency [4]. Unfortunately, even if

the use of systems theory also bolsters the effectiveness of supply chain management by analysing and responding to the needs of all the actors, the contemporary global supply chain system still remains quite vulnerable to unpredictable changes and uncertainties. As the world moved its goods from various locations to different destinations around the world, it did not take long before the 2008 financial crisis caused the global economic meltdown [6].

As economic recession crept in, demand fell and companies across the world responded with order cancellations or significant reduction of orders. With time, the world economic system recovered from the effects of the 2008 financial crisis. But it didn't take long before the 2015 energy crises caused another turbulence increasing the prices of energy and transportation costs. This affected cost control and management in the global supply chain system, but not to the extent of the disruptions caused by the Covid-19 pandemic [7]. When Covid-19 erupted, it suddenly held multitudes of goods at various warehouses in the manufacturing plants, airports, seaports, rail stations and several different locations around the world. Yet as the manufacturers or suppliers had created a lot of stock to respond to the unfolding demand before Covid-19, it became difficult and costly to manage large volumes of goods that businesses had as their inventories.

Like covid-19 was not damaging enough, it did not take long before the damage caused by the Covid-19 was further exacerbated by the advent of Russia-Ukraine War [6]. Though most global businesses have managed to recover from all these, it still instigates questions as to the best approach for managing a business' global supply chain system in the increasingly changing and unpredictable modern business ecosystem. These raise questions as to whether it is the traditional system of holding stock or the use of JIT (Just-In-Time) operational system which is the best. This is because given the unpredictabilities of the modern business environment, eventualities arising from sudden changes in variables like political disputes inducing the disruptive Russia-Ukraine War or natural disasters like tsunami or earthquakes in Japan can easily emerge to distort the efficacy of even the supply chain system considered the most efficient in the world [7].

In such situations, the introduction of a more effective recovery strategy is not just essential for aiding the recovery of the overall business, but also for recovering the disrupted supply chain operations [1,5,8-11]. Despite these complexities, it is often still Nissan which is credited as the global business that has a more resilient global supply chain management. Even when the turbulences are quite disruptive, Nissan starting from the days of the more devastating Japan earthquakes in 2011, has remained resilient to withstand the effects of all economic unpredictabilities and shocks. Given the global supply chain management challenges that the modern global businesses experience, it is such insights that motivates this study to use the methodology described below to evaluate the global supply chain management approaches that Nissan uses. Through such analysis, the study aims to discern the best practices that can be adopted by the global businesses experiencing the global supply chain management-related challenges.

2. Methodology

Systematic review is used in this study as the qualitative research method for evaluating how Nissan evaluates and responds to its global supply chain disruptions. Systematic review refers to the critical content analysis technique that focuses on evaluating the existing studies with the motive of identifying and addressing the question that has not been addressed by most of the existing studies [12]. In this study, it is was found that despite several studies evaluating Nissan's successful recovery from the 2011 Japan earthquakes, only a few studies have explored how the best practices exhibited by Nissan can be extracted and adopted by the global businesses that even sometimes fail to completely recover from the disruptive global turbulences like Covid-19 pandemic. To respond to such a question, the process of systematic review in this study is structured according to four steps encompassing literature search, designation of inclusion/exclusion criteria, data extraction and data analysis [13].

Literature search was accomplished with the motive of identifying the literature which are relevant to Nissan's global supply chain system. To accomplish that, the process of literature search explored questions like what kinds of global turbulences has Nissan 's global supply chain system ever experienced? How did Nissan respond to the events that disrupted its global supply chain system? What plan did Nissan use to recover its supply chain operations? What operational strategies is Nissan currently using for managing its global supply chain disruptions? What is the Nissan's best global supply chain management practices that can be emulated by the other global businesses going forward? In addition to using these critical questions, probe during the literature search process also entailed the use of keywords like "Nissan's Supply Chain System", "Nissan's Global Operational Strategies", "Nissan's Best Global Supply Chain Management Practices", "Turbulences in Nissan's Global Supply Chain System", "Nissan's Global Supply Chain Recovery Strategies". While using these keywords and research questions, the process of literature search was accomplished using search engines like Web of Science, Google, Scopus and PubMed. To discern the articles or literature to be extracted, the article had to have been published in English and in the period between 2011 and 2025. The article must have also elucidated well the insights on Nissan's global supply chain management system. Literature meeting all these criteria were extracted and analysed using thematic analysis to discern how they offer coherent insights, as drawn from Nissan's best practices on managing the global supply chain system as a business' lifeblood in the era of market uncertainties. Below are the results of the analysis.

3. Results

Immediately after the end of the 2011 earthquake in Japan, Nissan effectively handled its supply chain recovery process in the way that improved its brand image and reputation

[14]. But still a critical analysis of how it did so to recover from the negative impacts of the disaster whilst also turning around the operational efficiency of its global supply chain system is essential for discerning where it did right or wrong so as to improve its future disaster recovery strategies. For other businesses to learn from Nissan, this study offers a critical analysis of:

- Nissan's Plan to Recover Its Global Supply Chain Operations
- Nissan's Operational Strategies for Managing Supply Chain Disruptions
- Nissan's Recovery Strategy and Improvements for Future Crisis

Details of these are evaluated as follows.

3.1. Nissan's Plan to Recover its Supply Chain Operations

As Brown insinuates, supply chain operations connote the process of managing the flow of unfinished goods from the points of sourcing to the points of manufacturing and then finished goods from the points of manufacturing to the points of sale [15]. If disrupted, this can affect the effective business performance. Nissan as an historical disruptive operator in the global auto-making industry has experienced several significant disruptions to its supply chain operations. However, it was the 2011 disaster and supply chain disruptions caused by the earthquake in Tokyo that subsequently put to test the capabilities of Nissan to effectively respond to a crisis disrupting its seamless supply chain operations. To recover its supply chain operations, thematic analysis of several studies indicated that Nissan adopted a recovery plan reflecting a combination of supply chain recovery strategies encompassing:

- Effective Leadership
- Agility and Flexibility
- Contingency Planning
- Profiling and Prioritization

Details of these are evaluated as follows.

3.1.1. Effective Leadership

To provide effective leadership after the disaster and going into the future, Nissan created the Global Disaster Control Headquarters (GDCH) which took control of planning and implementation of its disaster recovery strategies. As Ivanov et al.,'s theory indicates, it is this command center that became the center for directing and offering guidance on how Nissan could recover not only its supply chain system, but also its overall business operations that had been disrupted by the 2011 disaster [16]. Earthquake disruptions had distorted all forms of Nissan operations; hence the creation of Global Disaster Control Headquarters was essential for providing new vision and direction to the employees, investors, suppliers and business partners. GDCH's creation just immediately 15 minutes after the earthquake had ended also improved leadership effectiveness as well as the confidence and trust that employees, suppliers, investors and other business partners had about Nissan's resilience to remain sustainable even in the midst of disrupting adversity [17]. It signaled Nissan's resilience to limit risks of misinformation about Nissan's capabilities after the end of the disaster as well as acute reputational damage that would have easily arisen after the earthquake's disruption of Nissan's global supply chain system. During the implementation of its recovery plan, Nissan did not only recognise the values of effective leadership, but also the importance of using an agile and flexible approach to supply chain recovery management.

3.1.2. Agility and Flexibility

In the event of a crisis, Nissan recognises agility and flexibility as key for leveraging a business' faster recovery from the unfolding disaster and crisis. Immediately after the end of the earthquake, Nissan leadership had already set up the leadership and management structure to analyse the situation and discern how to quickly recover its supply chain operations from the unfolding disaster and crisis before it became difficult and costly for it to effectively do it. During such initiatives, agile response emerged from Nissan's supply chain recovery plan as critical for leveraging a business' continuity and sustainability during a crisis. Through agile response, Nissan was able to create Global Disaster Control Headquarters (GDCH) that quickly moved in to ensure all the employees, suppliers and business partners were safe and ready to start all over again. This motivated employees to create a sense of leadership that inspired employees to get re-energized to get their business out of a crisis [18]. Since Nissan deals with multitudes of customers as well as auto distributors and dealers around the world, such agile response to the unfolding crisis also offered confidence and trust to the employees that though Nissan is experiencing a crisis, it would not take too long before it commences business gain. Immediately after the stabilization, this was reflected in the prioritisation of car exports to US and China. Nissan also capitalized on selling only its bestselling cars in order to generate revenues that would improve its financial sustainability. Nissan was able to immediately introduce and apply such strategies not because it adopted agile and flexible operations as part of its organisational culture, but also contingency planning.

3.1.3. Contingency Planning

With the understanding that earthquake or tsunami is common occurrences causing disaster in Japan, Nissan adopted contingency planning as part of its critical supply chain operational strategies. Through such approach, the hope was that in event of a crisis, the contingent plan would be introduced as part of the supply chain operation's recovery plan. Nissan not only learnt from past disaster, but also introduced seismic retrofitting requirements in its plants and facilities situated in all earthquake prone areas. As part of the contingency plan, seismic retrofitting is aimed at strengthening the resilience of Nissan's operational infrastructures and facilities to withstand and minimise devastating damages from the unfolding earthquakes, disasters and crisis [19]. Nissan also created and prepared evacuation centres and routes so that in the event of a disaster, it could easily effect its rescue plans to bolster its commitment of enhancing employee safety. As part of its contingency planning, Nissan often does drills and simulations to improve the skillfulness, competencies and

capabilities of its employees to effectively execute recovery activities or rescue operations in the event of a disaster. Due to such capabilities, Nissan was able to fastly rescue and recover most of its critical supply chain operations immediately after the end of the earthquake [18]. It is such frequent drills and simulations undertaken for the past six years that improved the degree of Nissan's preparedness to deal with the current disaster. In that process, Nissan was also able to engage in profiling and prioritization so as to identify areas of priorities that must be the focus for it to quickly recover its supply chain operations.

3.1.4. Profiling and Prioritization

To quickly gain insights into the nature of the damage so as to identify the most affected areas that must be quickly addressed for the business to recover from the crisis, Nissan used some sort of profiling and prioritisation. In that process, Nissan recognised that the successful rescue and improvement of the safety of its employees, suppliers and vendors is essential for it to quickly recover from the crisis. This is because the efficacy of its supply chain system depends on the availability as well as willingness and motivation of the employees to immediately begin work after the crisis. Drawing from Linton et al.,'s theory, this enabled Nissan to easily commence operations after the end of the earthquake. In addition to that, Nissan also introduced a system where suppliers are required not to rely on just one manufacturing plant to create and supply the required car components, but to use a combination of alternate manufacturing facilities [20]. Usage of alternate manufacturing facilities implies if one or two manufacturing facilities are destroyed by the disaster, the supplier can instead rely on the other manufacturing facilities to produce and deliver the required car components. Such a move would not only aid faster recovery of the supply chain system, but also continuity of the business as efforts are undertaken to aid the full recovery of the supply chain system from the disaster [21]. Nissan recognised effective communication during disaster as critical for enhancing the effectiveness of supply chain recovery plan. Such reasoning is supported by Alicke et al., as well as Hollingsworth that the effectiveness of "Supply Chain Recovery Plan" is measured by a combination of six constructs encompassing the degree of the adopted transparency mechanisms, inventory for meeting existing demand, production optimization, logistics management, effective stress testing and exploration of quicker sources of revenues to avoid liquidity crisis [22,23]. However, to survive immediately after the earthquake, Nissan did not just introduce a more effective supply chain recovery plan, but also adopted more effective operational strategies for managing supply chain disruptions.

3.2. Nissan's Operational Strategies for Managing Supply Chain Disruptions

Since Japan is one of the global hotspots for earthquakes and tsunami, Nissan must have previously experienced a series of other disasters that disrupted its operations. To manage its supply chain disruptions in the way that bolsters its business continuity, survival and sustainability during a disaster, Nissan often adopts a combination of operational strategies encompassing:

- Innovative Operations to Mitigate Impacts of Electricity Outages
- Suppliers' Usage of Alternate Sourcing Strategy
- Use of Buffer Stocking as Compared to JIT
- Supply Chain Risk Management
- Focusing on Bestselling Cars
- Focused on US and Chinese Markets
- Continuous Evaluation and Improvement

In that context, details of these operational strategies are evaluated as follows.

3.2.1. Innovative Operations to Mitigate Impacts of Electricity Outages

Since earthquake had damaged most of the power generating sites in Japan or around Tokyo, power outages affecting production in various manufacturing sites and factories became a common phenomenon. This disrupted Nissan's operation, production and capabilities to meet the unfolding global demand for various types of cars. To respond to such disruptions that affected the efficiency of its global supply chain operations, Nissan did not only invest in the generation of in-house electricity, but also introduced night-time operations [14]. Night time operations is more effective for the reason that as most of the households connected to national electricity grid go to sleep even the load on electricity generation reduces to reduce the risks of outages. To further mitigate the effects of power outages on its supply chain disruptions, Nissan also innovatively introduced a change of its work-week to enable the plants operate at the near optimum level to respond to various supply chain needs. To respond to such needs, Nissan required its suppliers to use alternate sourcing strategies.

3.2.2. Supplier's Usage of Alternate Sourcing Strategy

From the analysis of how its existing production and supply chain operations had been affected by earthquake, Nissan recognised that had it not been relying just on one factory for supplying certain car components, its production would have not been widely disrupted to undermine supply chain efficiency [18]. To mitigate such disruptions in the future, Nissan introduced alternate sourcing where it asked its Tier 2 and 3 suppliers to use alternative sourcing for car parts. In that process, Tier 2 and 3 suppliers would be required to establish factories for manufacturing the same car parts in various parts of the country. If one plant is affected by the disaster, production would not come to standstill to affect supply chain operations as the suppliers would still be able to use the other unaffected plants to deliver the required car parts. It seems Nissan aims to blend usage of such a strategy with the use of buffer stocking as compared to JIT.

3.2.3. Buffer Stocking as Compared to JIT

In most of the modern manufacturing settings, Ivanov argues that production managers are increasingly adopting JIT (Just-In-Time) operational system whereby it is only the amount of output which is required by customers in a given period of time which is sourced and delivered [16]. Using such approach, JIT aims to reduce costs of storage, mitigate

risks of deterioration during storage that could affect quality as well as customer focus by sourcing, producing and delivering only the quantity and quality that the customer desires [14]. Nissan was able to continue operation immediately after the earthquake because of the bulk stocks it had purchased some few months before the earthquake. Since this improved its capabilities to meet the demands in the US and China, it seems going into the future, Nissan will balance the use of JIT with some form of bulk or buffer stock purchasing to mitigate risks of supply chain disruptions if a disaster occurs. In that process, Nissan may adopt supply chain risk management as part of the operational strategies for mitigating supply chain disruptions [17].

3.2.4. Supply Chain Risk Management

Drawing from Brown's analogy, Nissan not only uses contingency planning, but also more proactive approach for managing and responding to risks and supply chain disruptions [24]. From such proactive operational approach, it seems Nissan has adopted a more effective supply chain risk management as part of the strategies for managing its supply chain disruptions. Because of the concerns raised by Shiga that "if Nissan adopted what he called a "supply risk management chain" that incorporated principles of risk management, Nissan's power of monozukuri—process engineering activities and craftsmanship in manufacturing—would be strengthened", it seems Nissan has now integrated the use of supply chain risk management to mitigate supply chain disruptions. As Connor notes, supply chain risk management is a proactive process that requires constant risks analysis, identification, profiling and mitigation to bolster the overall efficiency of supply chain operations [14,25]. In addition to introducing supply chain risk management, Nissan also just focused on selling the bestselling cars in order to mitigate the effects of supply chain disruptions.

3.2.5. Focusing on Bestselling Cars

Instead of producing and trying to sell all the cars of which some would have been hard to sell, Nissan decided to just focus on the production and selling of the bestselling cars. This enabled Nissan to juggle around shortages of materials and to quickly gain some revenues that could have been used to improve its financial liquidity as it aspires to mitigate supply chain disruptions. Instead of focusing on the production of all kinds of cars that would not even have the available supplies for production, Nissan strategized just to produce and sell the best-selling cars [18]. This became a viable strategy for enabling Nissan continue operating so as to generate some quick sales and revenues from the bet selling cars to be used to finance the recovery strategies. In that process, the bulk stocking system that Nissan had used just before earthquake occurrence had also become instrumental for levering production continuity. To further bolster the generation of revenues that would be used for financing recovery strategies aimed at mitigating supply chain disruptions, Nissan also decided to just focus on the US and China markets.

3.2.6. Focused on US and Chinese Markets

As part of the operational strategies aimed at mitigating supply chain disruption, Nissan introduced a strategy of just focusing on selling and delivering cars into the US and Chinese markets. Instead of attempting to serve the whole world in the midst of acute shortages of inputs and materials, Nissan opted just to focus on serving the US and China markets. US and China markets were some of Nissan's best global markets [21]. In effect, the attempt to focus just on serving the US and Chinese markets not only influenced increased revenue generation, but also improved competitive capabilities because as most of Nissan's rivals were unable to deliver due to the disaster, Nissan continued with serving its most attractive markets. Such approach improved the confidence and trust that the market had in Nissan's resilience to spur improved competitiveness that continued to create and deliver enormous values even long after the end of the disaster. Yet as Nissan recognised the need to strengthen its supply chain operations, it also adopted continuous evaluation and improvement as part of the strategies for mitigating supply chain disruptions.

3.2.7. Continuous Evaluation and Improvement

As Nissan introduced and implemented a combination of the operational strategies for mitigating supply chain disruptions, it also undertook continuous evaluation and improvement to enhance the capabilities of its operational strategies to effectively mitigate the unfolding supply chain disruptions. Though Nissan had a contingent plan prior to the occurrence of the earthquake, during its implementation, Nissan kept on assessing and improving things like the need for usage of multiple factories for the supply of the same components [14]. In that process, Nissan also created the Crisis Management Committee that continued to evaluate, identify and tackle production related issues as they emerged. The Crisis Management Committee noted that since Nissan had underestimated the damage caused by the disaster, change and modifications of disaster recovery strategy would be more instrumental for mitigating supply chain disruptions [19]. New evacuation centres, routes and food stockpiles and resources were introduced to serve where they were required. It is not only these that imply Nissan attempted to introduce strategies that bolster the mitigation of its supply chain disruptions, but also Aggarwal and Srivastava Theory on "Recovering Supply Chain Operations" that indicated Nissan to have adopted a more effective business recovery strategy [14].

3.3. Nissan's Recovery Strategy and Improvements for Future Crisis

Even if Nissan could be having an effective recovery strategy, studies did not indicate any detailed recovery plan reflecting critical logical activities that must be accomplished to enable Nissan recover from the disaster. Instead Nissan just uses discrete actions that it is executing to enable the recovery from the disaster without the details of the recovery plan from which such strategic actions are derived [14]. If Nissan's recovery strategy is appraised in the context of Herrera's Criteria for Appraising Effectiveness of a Recovery Strategy, it can be deciphered that it does not meet some of the criteria that include [26].

- Clarity of Purpose
- Crisis Management Priorities

- Plan Assumptions and Scope
- Recovery Flow-Chart
- Severity Matrix
- Command Centre
- Effective Communication
- Monitoring and Evaluation

As Stobierski notes, Nissan could have been using emergent strategy in which strategic actions do not unfold from any strategic plan, but from the analysis of the merging situation that dictates the strategic actions that must be undertaken [27]. This contrasts with the deliberate strategy that requires the use of a carefully pre-meditated strategy. Though Nissan could have been using emergent strategy, the use of deliberate strategy, in line with Giannakis and Papadopoulos' theory, would have offered clear insights into the main strategic plan that Nissan is using to enhance its recovery from the crisis [28]. Due to lack of the recovery plan from which the recovery actions are derived, the purpose of Nissan's recovery plan is also not clear. In addition, it is not clear that Nissan is using any recovery flowchart to chronologically manage the implementation of a combination of its various required recovery strategies. During the recovery process, Nissan has placed significant emphasis on evacuating and ensuring the safety of employees, customers and the suppliers because when the employees are safe and active, it becomes easier to execute the required activities that can drive the recovery process [18]. Though Nissan became known as the best business for conceptualizing and executing the best recovery strategy, lack of such a flowchart can affect the effective management of the recovery process. Nissan could also have been using severity matrix since it was able to identify employees, supply chain and manufacturing plants/facilities as the most affected parts of its business that needed actions. However, the fact that its severity matrix has not come out clearly may also affect employees' understanding of the areas requiring immediate actions for the business to quickly recover from the crisis.

Despite such deficiencies, Nissan's recovery strategy had an effective command center that emphasised effective communication as critical for managing the recovery process from the disaster. Immediately after the end of the earthquake, Nissan created and established the Global Disaster Control Headquarters (GDCH). It is the Global Disaster Control Headquarters (GDCH) that became the command center directing attention to the areas that required actions. Such areas included identification and taking actions to address the most affected areas like employee evaluation and safety, suppliers' wellbeing, the markets like US and China to focus on and the bestselling cars to deal with as the business waits for the effects of the disaster to subside. Though using more of an emergent recovery plan rather than a deliberate one, Nissan while using its GDCH as the command center still adopted a more effective communication strategy.

To clarify the state of its performance after the disaster as well as its future, Ghosn, Nissan's CEO invited reporters and explained to them the nature of the damage, the duration it would take the engine-making plant to recover and start operating again as well as the future of Nissan after the disaster [18]. This improved the overall confidence and trust that the employees, customers, investors, suppliers and other stakeholders had in Nissan as a vibrant business entity to quickly recover from the crisis. To ensure the success of the recovery plan, Nissan not only introduced cross-functional teams and regional teams to enhance effective execution of the recovery activities, but also mobilized all the required stakeholders. In stakeholder mobilization, Nissan adopted and integrated corporate social responsibility as part of the strategies for enhancing the recovery process. During the evacuation and rescue processes, Nissan not only focused on identifying and evacuating its employees, but also the people from the surrounding communities who had been affected by the earthquake. This improved the brand image of Nissan as a business which is not only concerned about profit generations, but also the wellbeing of the population. For the modern businesses, such findings raise certain managerial implications that must be embraced by the contemporary business managers [29].

3.4. Managerial Implications

Generally, Nissan seems to have adopted more effective recovery strategies that enabled it to overcome the impact of the disaster. But to achieve better positive results in the future, it is suggested that the modern businesses must consider adopting strategies encompassing:

- **Usage of Technology in Contingent Planning:** To improve the efficacy of its response to the unfolding disaster that may disrupt its supply chain operations, businesses need to explore how the modern technologies like artificial intelligence, machine learning and big data technologies can be integrated to improve the effectiveness of contingency planning. Having a clear contingency plan is good because once a disaster occurs, the use of the contingency plan can just be engaged. However, in that process, the use of technologies like artificial intelligence, machine learning and big data is essential for businesses to gather, analyse and discern from the unfolding trends as to whether a major disaster is most likely to occur. This will improve the efficacy of contingency planning for businesses to put in place the required resources, equipment, machineries and technologies to respond if the disaster occurs. Such approach must be integrated with the use of a more effective recovery plan.
- **Use of Effective Recovery Plan:** Contingency plan must be integrated with the use of effective recovery plan to aid faster recovery and improve the efficiency of the supply chain operations immediately after the end of the disaster. Businesses need to adopt a more deliberate recovery plan as contrasted to using emergent recovery plan that often creates confusion about the understanding of what must be done where and during what time. Introduction of a more effective recovery plan must be accompanied with the use of severity matrix as well as the recovery flowchart.
- **Use of Severity Matrix and Recovery Flowchart:** During more complex damages caused by earthquakes or tsunami or any other unpredictability in the future, severity matrix and recovery flowchart will highlight

the most affected areas requiring more immediate attention. Such profiling of the areas of severity influences the accuracy of the most essential areas that must be addressed to bolster the speed of the recovery process. Such initiatives must be accompanied by the balanced use of bulk and JIT stocking.

- **Balanced Use of Bulk and JIT stocking:** Most studies indicate some bulk of components that Nissan had bought before the earthquake to have been instrumental for rescuing its supply chain operations from disruptions. However, this appears to have been an accidental approach rather than a deliberate bulk purchasing approach. Since from Nissan's awful experience, businesses now understand that they operate in the constantly changing and unpredictable business world, it is advised that in addition to using alternative sourcing that it has so far adopted, it must also use balanced bulk and JIT stocking approaches. Bulk stocking will save disruptions of supply chain operations during eventualities that suddenly cause stock shortages.
- **Integrate Effective Change Management:** Even if Nissan was introducing new recovery strategies introducing new operational approaches and structures, most studies did not indicate the extent to which Nissan integrates effective change management as part of its recovery enhancing strategy. In future, businesses must consider integrating a more effective change management strategy to aid the seamless change and transition from the practices and strategies that Nissan does not desire to the new ones.
- In future, all these new strategies will not only improve the business' faster recovery from the undesirable effects of the disaster, but also the faster recovery of its supply chain operational efficiency.

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