Business Continuity Planning for a U.S. Supply Chain

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Summary: Our research objective was to provide a directional sense of some key considerations for business continuity planning (BCP) specific to a company’s downstream distribution operations in the U.S. By quantitatively assessing the financial impacts arising from four hypothetical scenarios, the business impact analysis (BIA) showcased the merits of short time-to-recovery (TTR) in the event of a disruption. However, available information also appears to suggest that the estimated financial impact from carrying high-value inventory is not necessarily insignificant. Hence, a company may want to mitigate the likelihood of a scenario whereby large amounts of inventory become damaged. Qualitative information from industry participants in the study highlighted the importance of tailoring continuity plans to the unique supply chain needs of an organization.

KEY INSIGHTS

1. Companies would be in a much better state of readiness by conducting their business impact analyses (BIA) in terms of the predictable outcomes resulting from disruption scenarios.

2. BCP practices for downstream supply chains varied widely amongst study participants from various industries. These views reflected the different areas of concern arising from unique supply chain configurations that had to be taken into account in the planning process.

3. There is no one-size-fits-all continuity plan; every business continuity plan needs to be tailored to the unique supply chain needs of an organization.

Introduction

With the increase in outsourced manufacturing practices, product companies lose visibility over the supply chain. In longer supply chains that extend to various geographical regions, the entire system is exposed to more uncertainties. Furthermore, the loss in control of key processes in the system makes organizations more vulnerable to disruptive events such as natural disasters, labor disputes and economic crises. To minimize the impact of such disruptions, firms adopt business continuity planning (BCP) to prepare in advance of a disruption.

We study one company as the base case by focusing primarily on its North American supply chain. In doing so, we aim to help frame various considerations that could be taken into account when developing and improving on a continuity plan. This was achieved via a two-pronged strategy comprising of quantitative and qualitative elements to complement insights gained from the literature review.
Methodology and Analysis

The quantitative element takes the form of a business impact analysis, whereby the financial impact on the company was calculated given a certain scenario occurring at each of its two North American distribution facilities. Each scenario was the impact of a disruption event rather than being specific to the nature or type of disruption event. This was essential to avoid an analysis which was dependent on the specificity of a disruption event. Hence, the four scenarios were:

*Scenario 1: Facility was rendered inaccessible*

*Scenario 2: Facility was accessible, but 50% of merchandise was damaged*

*Scenario 3: Data center failure*

*Scenario 4: E-commerce global contact center breakdown*

The qualitative element is comprised of a series of interviews conducted with BCP and risk management professionals across various industries.

Business Impact Analysis Model

Business impact analysis (BIA) seeks to assess, at a high-level, the costs and loss in revenue if business operations at a downstream distribution node were to be disrupted for a certain amount of time. Our BIA model for distribution facilities allows for the following input parameters to be taken into account as part of the study:

<table>
<thead>
<tr>
<th>Description of Model Input Parameter</th>
<th>Units of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly rent for contingency warehouse</td>
<td>$/Sq.Ft.</td>
</tr>
<tr>
<td>Contingency warehouse space required</td>
<td>Sq.Ft.</td>
</tr>
<tr>
<td>Monthly rental for contingency Material Handling Equipment (MHE)</td>
<td>$/month</td>
</tr>
<tr>
<td>Percent of damaged inventory stock</td>
<td>%</td>
</tr>
<tr>
<td>Percent of revenue from wholesalers</td>
<td>%</td>
</tr>
<tr>
<td>Percent of revenue from retail stores</td>
<td>%</td>
</tr>
<tr>
<td>Percent of revenue from e-commerce</td>
<td>%</td>
</tr>
<tr>
<td>Amount of inventory held by wholesalers</td>
<td>Days</td>
</tr>
<tr>
<td>Amount of inventory held by retail stores</td>
<td>Days</td>
</tr>
<tr>
<td>Amount of inventory held by e-commerce fulfillment center</td>
<td>Days</td>
</tr>
<tr>
<td>Average COGS / Average MSRP</td>
<td>Dimensionless</td>
</tr>
</tbody>
</table>

Scenario 1: Facility was rendered inaccessible

When a facility was rendered inaccessible due to a disruption event, one might expect both inbound and outbound shipments at the facility to come to a halt. In defining this particular scenario, the assumption was that there was no damage to physical inventories already at the facility. Hence, the financial impact from Scenario 1 is comprised of (a) the lost revenue from disrupted shipments to customers, and (b) the additional rental costs from operating out of a third-party location for the period of time necessary before regular operations at the facility can be restored. This duration of time taken to restore full accessibility to the facility for resumption of normal operations after the occurrence of a disruption event is defined as time-to-recovery (TTR).

**Scenario 1 Financial Impact**

\[
\text{Scenario 1 Financial Impact} = [(\text{Per Day Revenue Lost from Disrupted Customer Shipments}) \times (\text{Days TTR} - \text{Customer Inventory Days On Hand})] + [\text{Daily Rental Costs at 3rd Party Location \times Days TTR}]
\]

(Note: Per day revenue is lost only when Days TTR > Customer Inventory Days On Hand)

**Scenario 2: Facility was accessible, but 50% of merchandise was damaged**

This particular scenario is defined as the circumstance whereby the facility remains accessible, although 50% of the inventory on-hand is taken as damaged. Since accessibility to the facility is not in question, it is assumed that regular outbound shipment of undamaged goods is able to resume after the disruption event. Hence, the financial impact from Scenario 2 is comprised of (a) the value of inventory on-hand that was damaged, and (b) the lost revenue from the consequent disruption of product shipments to customers. The duration of time taken by the facility to replace damaged product in order for the resumption of those product shipments to customers after the disruption event is defined as TTR.

**Scenario 2 Financial Impact**

\[
\text{Scenario 2 Financial Impact} = (\text{Cost of Goods Sold}) + [(\text{Per Day Revenue Lost from Disrupted Customer Shipments}) \times (\text{Days TTR} - \text{Customer Inventory Days On Hand})]
\]
Shipments Due to Damaged Inventory) \times (\text{Days TTR} – \text{Customer Inventory Days On Hand})

(Note: Per day revenue is lost only when Days TTR > Retail Store Inventory Days On Hand)

Scenario 3: Data center failure

Scenario 3 involves the failure of a data center which is central to all information processing and transactions relevant to the company’s operations at the facility. Given such a circumstance, it is assumed that all inbound and outbound shipments are only able to occur at a much lower level of productivity since workers have to resort to manual processes when the computer systems are malfunctioning. In this case, TTR is the duration of time taken for IT to restore the company’s data center operations to enable the resumption of regular productivity levels in outbound shipment processing.

Scenario 3 Financial impact = (Per Day Revenue Lost from Reduced Productivity Levels in Outbound Shipment Processing) \times (\text{Days TTR} – \text{Customer Inventory Days On Hand})

(Note: Per day revenue is lost only when Days TTR > Customer Inventory Days On Hand)

Scenario 4: E-commerce global contact center breakdown

The final scenario involves the failure of the company’s global contact center which impacts its e-commerce business activities. In this case, all physical inventory remains in saleable condition, however outbound shipments that are due to e-commerce activities, estimated at 30% of total outbound shipments, are disrupted. The magnitude of financial impact due to a disruption of the organization’s global contact center is hence given by:

Scenario 4 Financial impact = (\text{Per Day Revenue Lost from Disrupted Outbound E-Commerce Shipments}) \times (\text{Days TTR} – \text{Inventory Days On Hand at E-Commerce Fulfillment Center})

(Note: Per day revenue is lost only when Days TTR > Fulfillment Center Inventory Days On Hand)

Interviewing BCP and Risk Management Professionals

The qualitative element of our study involved interviewing BCP and risk management professionals to
A series of questions was designed to help us understand business continuity management within the context of the study participant’s experience. The questionnaire consisted of four parts: product attributes and demand patterns, supply chain set-ups, business continuity plans, and wrap-up questions.

The first part of the questionnaire aimed at understanding the main objective in the supply chain to create business value, as well as the key procedures and critical assets in the business to protect. In the second part, we looked at the supply chain design of the organization to identify critical nodes and links in the system. The supply chain set-up was based on the key attributes of the business, which were identified in the first part of the questionnaire. Next, we examined the specific business continuity planning for the organization, including what the development process was, which parties were involved in decision-making and what resources were invested. In this section, we also asked for past experiences with disruptions, if any, and what were the responses and lessons learned. Finally, we closed the discussion by providing an opportunity for respondents to bring up anything important they thought was not covered.

**Conclusion**

Our research objective was to provide a directional sense of some key considerations for BCP by studying one company with downstream distribution operations in the U.S. This was achieved via a two-pronged strategy comprising of quantitative and qualitative elements to complement insights gained from the literature review.

While classical notions of BCP have been heavily weighted with defensive measures drawing on redundant capacity in the event of a disruption, literature has served to enrich our perspectives. Several leaders in the field of supply chain risk management have suggested that a well-architected BCP could afford a company strategic levers for competitive advantage in the marketplace. By identifying opportunities in the product flow value stream where flexibility in operations could be incorporated, a company’s BCP becomes rounded out with applications that extend beyond the mere occurrence of disruption events.

Literature also addresses the multitude of disruption scenarios which adds to the complexity faced by companies in the development of their BCPs. While some amount of scenario-based planning has merit, it has been suggested that companies could be in a much better state of readiness by thinking in terms of the six capacity “failure modes” or predictable outcomes resulting from disruption scenarios. By considering how the company is able to navigate varying levels of capacity losses, an organization is able to reduce the risk of being caught flat-footed from a BCP that is too event-specific.

Quantitative analysis involving BIA showed that financial impact from a disruption scenario tracks with seasonality in product demand. BIA also yielded perspectives on how sensitive the financial impacts, for each of the four hypothetical scenarios, are to time-to-recovery (TTR). Such perspectives help in the framing of TTR goals in the development of BCPs. Additionally, the analysis facilitated an understanding of how financial impact from a disruption is dependent on the amount of inventory on-hand with customers downstream of the distribution facility. It is, however, important to note that our BIA may be conservative in nature due to the omission of other operational impacts or even spillover costs such as an associated loss of brand reputation from disrupted operations.

Qualitative analysis of interviews conducted revealed that actual BCP practices for downstream supply chains varied widely amongst study participants from various industries. These views reflected the different areas of concern arising from unique supply chain configurations that had to be taken into account in the planning process. This observation is in alignment with the lack of a standard BCP template in published literature. As one of the interviewees remarked, “It wasn’t like there was one template out there that you could use to fill in the blanks. Everything is so unique to each business.”

Although the results suggest that there is no one-size-fits-all BCP, we were able to identify some methods utilized by industry for the development of BCPs. For example, BIA was frequently used by study participants to highlight potential areas of risk or test the maturity of an existing BCP. Another example is the Time-to-Recover (TTR) concept mentioned by two of the leading BCP practitioners in industries as a method that helps in the identification of interdependent relationships that may be internal or external to a supply chain.