

# INTERRUPTED SUPPLY CHAINS AND JUST-IN-TIME

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## INTRODUCTION

Hurricane Katrina, the tsunami in Asia and the September 11, 2001 terrorist attacks have caused serious interruptions to business supply chains. Before the September 11<sup>th</sup> attacks, not many businesses had developed contingency plans related to supply chain disruptions. This paper will review issues arising out of random disruptions in supply chains and discusses this impact on the lost productivity of just-in-time scheduling and supply chain management. We then propose a six-part checklist as a starting point for firms wishing to deal with future random supply chain interruptions.

### **Just-in-Time**

Since the 1980's when companies transformed their operations based upon just-in-time techniques, businesses have used technology to make their supply chain more flexible. These systems perform best in environments that are stable and mirror trends that are evident in historic averages. They will not be able to predict or cope with the random interruptions such as those experienced from Katrina, the tsunami and the September 11<sup>th</sup> terrorist attack. Companies will need to improve their communication and information sharing with customers and suppliers to cope and to deal with these random interruptions. The solution to this issue is not to abandon the successful just-in-time techniques but to adjust them to meet the new realities. Responding to these events through increasing safety stocks might be too expensive and ineffective. When evaluating an organization's supply chain, the focus should be on "optimizing" inventories to achieve the highest possible service levels at the lowest possible costs.

### **Examples of Random Supply Chain Interruptions**

Random supply chain interruptions are not new. Events such as natural disasters and strikes have occurred before but none of these occurrences had the same extensive impact on such a large scale as those that have occurred recently – from automotive manufacturing to retail operations to electronic manufacturers.

- Due to the events of September 11<sup>th</sup> Ford Motor Company shut down five of its U.S. plants in part because the company could not get enough engines and drive train parts from suppliers in Canada.
- Lightolier, a small Massachusetts based company which provides interior architectural lighting solutions, had a shipment of materials that were held up in Japan for days due to the suspension of air travel, which delayed delivery of lamps to many retailers. (Briscoe 2001)
- In 1997 Toyota was affected by a fire at Aisin Seiki Company which supplies brake parts that cost the company an estimated \$195 million and 70,000 units of production. The fire was at a plant that was the sole supplier of brake parts for all but two Toyota models and forced the

company to shut its 18 assembly plants in Japan for a number of days. As a result Toyota embarked on a review of components that were sourced from a single supplier. (Landberg 1997)

- In 1996 General Motors Corp. was forced to shut down 26 assembly plants because of a 17-day strike that occurred at the Delphi brake plant located in Dayton, OH. This interruption in the company's operations led to a nearly \$1 billion decrease in the company's first quarter operations. (Fitzgerald 1996)

## **Supply Chains and the Future**

The new found focus on the supply chain in the 21<sup>st</sup> Century is brought about because of a belief in business that "the supply chain is the last frontier – the last place where you can take out costs, improve service, and tip the balance on the profit and loss statement." (Hellweg 2002) Random supply chain interruptions have a negative effect on each of the three beneficial aspects of low inventories. The first obvious benefit is a savings in the physical space that is necessary to store the inventory in either warehouse locations or within the manufacturing work areas. Having lower levels of inventory helps with freeing up capital used to purchase additional inventory and in the cost of operating and managing the stocking levels. These higher levels of inventory needed to protect against random supply chain interruptions will mask the second key aspect of the just-in-time philosophy, which is streamlining operations -that the higher level of inventory damages an organization's development of rapid problem solving and flexibility since problems are not readily and easily identifiable.

## **Border Issues**

One of the long-term changes that will affect organizations' supply chains is the increase in border security that will slow the cross border. Organizations will also need to evaluate their geographic sourcing locations by the amount of risk they will encounter in each region. The cost of the increased border security is estimated to "...amount to \$51 billion per year, or one-half of 1 percent of U.S. gross domestic product." (Wong 2001) The Customs Service has begun inspecting more goods than ever before. The Coast Guard is requiring shippers to give details about all members on board along with detailed information about the cargo that is being shipped. An example of how these new security procedures are affecting firms is Western Digital, which used to be able to receive its product that is shipped from Malaysia after only an initial check by Customs that lasted just a few minutes. Now Customs officials are examining each shipment's documentation, which is extending the process for up to two days. The delays at the Canadian border, the United States' largest trading partner, have had major effects on the supply chains of companies in both countries. In the days that followed the events of September 11<sup>th</sup>, shipping goods across the border, which usually took 15 minutes before the attack, have increased to more than 18 hours. This border wait has come down to an average of a just few hours, but even this increase has caused some companies to reevaluate their supply chain.

## **Technology Solutions**

The use of technology can be an integral piece of the solution for organizations to deal with future supply chain interruptions. Companies can make the choice of dealing with these issues by simply building costly warehouses and increasing the amount of inventory that is carried or increase the implementation of e-commerce tools that have been developed during the last several years. For example, through accelerated use of e-business solutions one could say, 'I need 4,000 widgets and am willing to pay this,' and there will be companies out there that will bid on it.' (Shah 2001)

Organizations can also employ more conventional technology to assist them in preparation for random supply disruptions. One method that is increasing in popularity is the development of a supply database containing information about the company's suppliers. Data such as the country of origin and the methods and costs of transportation is compiled for each of the company's suppliers. These advance databases are designed to communicate with the company's manufacturing systems and use historical data to rate the performance of each of the company's suppliers. In the event of an unplanned interruption, companies can use the systems to find alternative suppliers and meet the demand of their customers. There are many companies that have developed specialized inventory-optimization software that can be used to evaluate and react to event probabilities such as changes in weather and other random supply chain interruptions. Companies such as Rapt (<http://www.rapt.com/>), Optiant (<http://www.optiant.com/>), SmartOps (<http://www.smartops.com/>), and Baxter Planning Systems (<http://www.bybaxter.com/>) have each developed proprietary analytical systems that perform the necessary mathematical calculations to evaluate and react to events such as changes in weather and other unforeseen circumstances.

### **Solution Checklist**

The issues that have been created by random supply chain interruptions are numerous and affect each company in different ways depending on their industry and operation. There is not a 'one size fits all' solution to these issues and they need to be tailored to fit each company's specific needs and demands. This is not an issue that can be solved by the implementation of a large enterprise computer system or by the adoption of new or cutting edge management techniques. The focus throughout should be on optimizing inventories to achieve the highest possible service levels at the lowest possible costs. The following checklist highlights the issues that will need to be evaluated to begin the assessment process of the supply chain:

- Increased Visibility
- Increased Communication
- Evaluate Suppliers' Locations
- Evaluate Transportation Methods
- Evaluate Safety Stock Levels
- Develop Contingency Plans

### **CONCLUSION**

Managing supply chain risks is challenging because disruptions can occur for a wide variety of reasons. The issues and solutions that are raised within this paper present a roadmap for organizations so they can begin to focus their resources on the changes that will produce the greatest level of security and performance for their firm's supply chain. Unfortunately random supply chain interruptions are events that only appear to be increasing in both quantity and severity and are incidents for which every company will need to prepare. Those organizations that heed these warnings and prepare themselves will be able to respond to future events without damaging customer satisfaction or the organization's reputation and at the same will not be burdened with drastically higher levels of inventory that will be both costly and ineffective.

**References: Available upon request**