Supply Chain Risk Management -
A Comparative Study of Small to Medium Sized Enterprises vs. Large Enterprises

MBA 992 Research Project
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Completed in partnership with the Canadian Supply Chain Sector Council
Executive Summary

Recent times have seen an increase in the efforts of many researchers as well as enterprises in the area of risk management related specifically to supply chain (SC) disruptions stemming from both man-made and naturally occurring events. The majority of the prevalent research on Supply Chain Management (SCM) pertains to Large Enterprises (LE’s). The focus of this project will be on what Small to Medium sized Enterprises (SME’s) can and should be doing in regard to risk management as it relates to SC disruptions.

An enterprise’s strategy for the mitigation of and response to SC disruptions is a critical element of the enterprise’s overall SCM strategy. The enterprises that passively embrace risk of SC disruptions without planning for and anticipating such disruptions leave themselves vulnerable to, in most cases, significant financial loss and in some cases worse. Pro-active SC disruption management strategies, like the one outlined in this paper, that focus on both the mitigation of risk and the specific and detailed response actions needed to cope with and respond to such disruptions, can be a source of competitive advantage. Further, this type of strategy can mean the difference between a SC disruption causing a minor dip in operations and performance for an enterprise, versus a SC disruption ceasing an enterprise’s operations all together.

The end deliverable of this research project is the Five Step Guide to Supply Chain Disruption Management Strategy for SME’s. The model includes five steps:

- Potential SC Disruption Identification
- SC Disruption Classification and Vulnerability Assessment

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- SC Risk Mitigation Strategy Development
- SC Disturbance Response Development
- Organizational Forward Planning

The model is dynamic in nature and each step in the model is to be revisited by SC managers frequently in order to keep up with the dynamic and ever evolving nature of SC disruption.

The purpose of this emergent design research project was to develop a strategic SC disruption management framework for SME’s. Through the findings of the research, a framework has been created that can be used by managers of SME’s to strategically plan for and respond to SC disruptions. When SME’s attempt to implement SC management initiatives they often find themselves dealing with a unique set of challenges that LE’s typically do not face. The recommendations made, have been made while taking into consideration the unique nature of SME’s and the challenges that SME’s face.
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1.0 Introduction

1.1 Preface

Recent times have seen an increase in the efforts of many researchers as well as enterprises in the area of risk management related specifically to SC disruptions stemming from both man-made disruptions and natural disasters. In an increasingly competitive SC landscape, managers are looking for insights into where SCM is going in the future and how enterprises are and will be managing the risks associated with SC disruptions. Man-made SC disruptions include, but are not limited to, political, economic, social and technological forces. Relevant natural disasters include, but are not limited to, hurricanes, mud-slides, floods, and tornadoes. Both man-made disruptions and natural disasters pose an immediate threat to all SC’s. SC managers are beginning to pay more attention to such threats.

It should be noted that for the purposes of this project the term LE will be used to describe enterprises consisting of 250 employees or more, SME will be used to generally describe enterprises consisting of less than 250 employees. I acknowledge that whether an enterprise is defined as an SME or LE often depends largely on the nature industry or sector the firm operates in. Further, it may be appropriate to define size by the number of employees in some industries, while it may be more appropriate to use revenues or turnover in others (or some other balance sheet item). For the purposes of this project we will define SME and LE in terms of number of employees. SME will include everything from small start-up companies to mature medium size enterprises.

The majority of the prevalent research on the SCM pertains to LE’s. The focus of this project will be on what SME’s can and should be doing in

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regards to risk management as it relates to SC disruptions. SME’s are often not large enough to warrant specific strategic teams or divisions devoted to SCM initiatives; they often lack the required capital to invest in SC personnel, SC technology upgrades, and SC infrastructure. Further, SME’s often recruit personnel with strong operational, distribution and/or logistics expertise rather than those with broader strategic SC perspectives. The result is often a short sighted focus on internal enterprise efficiencies rather than forward looking, big picture, strategic, cross-enterprise perspectives. Consequently, SME’s are often ill-prepared for sudden SC disruptions.

1.2 Relevance

Enterprise survival in the modern business environment is no longer an issue of one firm competing against another firm, but has, instead, become an issue of one SC competing against another SC. SC managers, enterprises, and researchers are now, more than ever, focusing on not only SC efficiencies, but also SC resilience to risk and disruption. In 2004, top executives at Global 1000 firms stated that they consider SC disruptions and their associated operational and financial risks to be their single greatest business concern.

1.2.1 Global Supply Chains and Supply Chain Disruption

In Yossi Sheffi’s book entitled “The Resilient Enterprise, Overcoming Vulnerability for Competitive Advantage”, he details the example of the complexity of the SC involved in the creation of an Intel Pentium processor that is used to power a Dell computer.

Sheffi explains how the process begins in Japan, where a single crystal is grown into an ingot of silicon by Toshiba Ceramics. The silicon ingot is

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then sliced into thin wafers by suppliers and flown across the Pacific Ocean to one of Intel’s semiconductor fabrication sites in either Arizona or Oregon. The wafers are processed and then flown back across the Pacific Ocean to Intel’s Assembly and Test Operations in Malaysia. Here the wafers are further processed and sealed in ceramic packages. The packages are then shipped back across the Pacific Ocean to Intel warehouses in Arizona. When needed “the packages are shipped to Dell factories in Texas, Tennessee, Ireland, Brazil, Malaysia, and China, or to one of its contract manufacturers in Taiwan, to be used as components in Dell computers”\(^7\). The chain of events ends when the product is shipped from Dell to the end consumer’s home or office anywhere in the world.\(^8\)

This example highlights the increasing complexity and sophistication of today’s SC’s and how enterprises are now dependant on utilizing a truly global SC.

**Figure 1 - Supply Source Projections**

![Market Share Projections](https://example.com)

(Source: A.T Kearney, Inc. Institute for Supply Management)

Figure 1 details the shift that is occurring in where supply sources are located in the world. These locations create many new challenges and

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\(^7\) Sheffi, Yossi. (2005), The Resilient Enterprise-Overcoming Vulnerability for Competitive Advantage. MIT Press.

\(^8\) Ibid
expose enterprises to new SC disruption risk. Also, the increasing need to penetrate emerging markets for consumption of goods is making the problem of SC disruption even more acute\(^9\).

Due to the interwoven nature of the modern SC, the smallest disruption can have devastating effects on an enterprise. As SC’s increase in complexity and as the world of international trade and business becomes more uncertain due to increased risk of terrorism, climate change, ever changing politics, increased border security, etc., more and more organizations are beginning to strategically plan for major SC disruptions. Figure 2 is a graphical representation of the increasing sources of risk for businesses with global operations.

**Figure 2 – Most Critical Risks to Firm Operations**

![Bar chart showing the most critical risks to firm operations.](source: A.T. Kearney Foreign Direct Investment Confidence Index, 2005)

1.2.2 Supply Chain Disruptions and Their Impact on Operating Performance

SC disruptions are receiving increasing attention in both the world of business and academia. SC disruptions have a direct impact on an

enterprise’s performance and overall profitability\textsuperscript{10}. Key metrics including operating income, sales, cost structure, assets, and inventories\textsuperscript{11} are negatively impacted by even the slightest SC disruption. In 2005, Hendricks and Singhal, examined 885 SC disruptions (announced by publicly traded firms) and studied the associated impact on operating performance. I have summarized their findings in the table below. After adjusting for the performance of the controls, they found that in the year leading to the announcement of SC disruptions on average the associated effects were as follows:

\textbf{Table 1 – Supply Chain Disruption and Their Impact on Performance}

<table>
<thead>
<tr>
<th>Metric</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income</td>
<td>107% Decrease</td>
</tr>
<tr>
<td>Return on Sales</td>
<td>114% Decrease</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>93% Decrease</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>6.92% Decrease</td>
</tr>
<tr>
<td>Sales Costs</td>
<td>10.66% Increase</td>
</tr>
<tr>
<td>Assets</td>
<td>6.08% Increase</td>
</tr>
<tr>
<td>Inventories</td>
<td>13.88%</td>
</tr>
</tbody>
</table>

(Source: Adapted from Hendricks, K.B & Singhal. 2005)

Also, it was documented that most enterprises do not recover quickly from the negative consequences of SC disruptions. “During the two-year period after the glitch announcement, the changes in operating income, sales, total costs, and inventories are insignificantly different from zero”\textsuperscript{12}.

Given the serious economic consequences of SC disruptions, managers, researchers, and academics must examine this area further. In the past, in regards to SCM, enterprises have focused primarily on increasing


\textsuperscript{11} Ibid

\textsuperscript{12} Ibid
efficiency (lowering cost structures) and responsiveness of their SC\textsuperscript{13}, but the modern enterprise must now also focus on the reliability and robustness of their SC. Further, the modern enterprise that has strategies in place to both mitigate and respond to SC disruption holds an inherent competitive advantage over others in their industry.

1.3 Purpose

The purpose of this emergent design research project was to develop a strategic SC disruption management framework for SME’s. The project examined multiple organizations including both SME’s and LE’s in order to gain a thorough understanding of the area of risk management related specifically to SC disruptions stemming from man-made disruptions and/or natural disasters. Through the findings of the research a framework has been created that can be used by managers of SME’s to predict and strategically plan for SC disruptions. The examination has compared the risks and associated mitigation and response strategies employed by LE’s versus those of SME’s.

1.4 The Partnership

This project was completed in partnership with the Canadian Supply Chain Sector Council (CSCSC) who has provided direction, support and linkages with key informants in the sector. The CSCSC provides leadership and value-added service to the sector and their initiatives attempt to respond to identified industry needs and issues. A key goal of the Council is to establish and strengthen linkages with the educational community and this partnership is aligned with that goal. The CSCSC has the mandate "To identify and assess the impact of new and emerging technologies, innovations and conditions that have the greatest impact on the SC sector, and to develop an appropriate strategic human resources action plan for

Canadian industry and academia”\textsuperscript{14}. The CSCSC aims to realize broad industry representation; be connected to SC sector stakeholders and responsive to the business and human resources needs of the sector; and consistently achieve results through soundly designed and managed projects.\textsuperscript{15}


\textsuperscript{15} Ibid
2.0 Methodologies

Secondary external data was gathered from a variety of sources including published material, online databases, trade association publications, public presentations, and academic textbooks. As always, the secondary data is a prerequisite to the collection of primary data. The secondary data served as the backbone for this project and aided in the overall trajectory and design of the project.

Primary data that was identified by the researcher for the specific purpose of addressing the needs of this research project was gathered via key informant interviews. The informants interviewed included SC managers, project managers, and procurement experts from a variety of organizations, industries, and regions of the world. The informants represented both large, medium, and small sized enterprises. The interview guidelines can be found in Appendix 1.
3.0 Background & Previous Work

For the purposes of this paper and the related discussion it is important to establish common terms, concepts, and definitions. These terms, concepts and definitions have been outlined and discussed thoroughly in previous works, projects, and research. In this section I examine the background work and previous research to describe the most pertinent and relevant terms, concepts, and definitions as they related to modern SC management.

3.1 Supply Chain

Craighead et al. explained in 2007 that the term SC can more accurately be described as a supply network.\(^{16}\) The supply network comprises different entities that are connected by the physical flow of materials. The various entities in the SC are known as nodes. Nodes are involved in many things including manufacturing, conversion, distribution, logistics, warehousing, and/or selling. A complete depiction of the SC includes all organizational entities (nodes), and all relationships between the specific point of origin and the point of final consumption.\(^{17}\)

**Figure 3 – Typical Supply Chain for Manufacturer Z**

(Source: Craighead, 2007)

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\(^{17}\) Ibid
The SC depicted in Figure 3 for manufacturer Z details the various layers of suppliers that flow through manufacturer Z as well as the various distribution channels that flow materials away from manufacturer Z to the final point of consumption.

### 3.1.1 Supply Chain Characteristics Critical to Disruption Management

Craighead et al. describes three critical characteristics of SC’s in regards to the mitigation and response to SC disruptions. These characteristics include *SC density*, *SC complexity*, and *node criticality*. In examining the topic of SC disruption, these characteristics are of importance and should be briefly explained.

*SC density* refers to the spacing of nodes within the SC. When the nodes are located closely together (ie: in a cluster) the SC can be described as being dense. Alternatively, when the nodes of the SC are spread out and not clustered, the SC can be described as being less dense. SC density can also describe the number of clusters within a SC.\(^\text{18}\)

*SC complexity* is a function of two factors; the total number of SC nodes and the total number of forward, backward, and inter-node material flows within a SC.\(^\text{19}\) A more complex SC will have a greater number of nodes and flows than a less complex SC.

*SC node criticality* refers to the importance of a node within the SC. In theory each node in the SC adds value and is therefore important. The degree to which the node adds value influences the nodes relative criticality. A node that produces a critical element of the end product will be more critical than a node that produces something that is not critical or is easily substituted. Further, a node that distributes material to many other nodes


\(^{19}\) Ibid
3.2 Supply Chain Disruption

SC disruptions are essentially a temporary misalignment of supply and demand. For the purposes of this paper I will adopt the definition as stated by S.M. Wagner and C. Bode in 2006, who contend that SC disruption is “an unintended, untoward situation, which leads to SC risk.”

SC disruptions are triggered by an underlying event or series of events. These events can be classified broadly into supply disruptions and demand disruptions. Further classification can be made into man-made disruptions and natural events, predictable and unpredictable events, and internal versus external disruptions. An example of a man-made, predictable SC disruption is the financial default of a key supplier. An example of a natural, unpredictable SC disruption is the destruction of an entire region by a natural disaster such the events in 2005 with Hurricane Katrina. I will not discuss all classifications, but will briefly discuss supply disruptions and demand disruptions.

3.2.1 Supply Disruptions

SC disruptions do not only result from major man-made events or natural disasters. In many industries, especially those that grow at a fast pace, supply often simply can’t keep up with demand, creating the aforementioned misalignment between supply and demand. An example of this is occurred in the year 2000, when a shortage of metal tantalum led to a three-fold price increase and shortage of tantalum capacitors. Tantalum capacitors are used by cell phone producers, computer makers, and other electronic makers. This shortage of supply occurred at a time of booming demand for these products. The SC disruption lead to lead-times in excess

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of 1 year in many cases and severely limited the capacity of many enterprises.\textsuperscript{23} This is a prime example of an external SC disruption.

Internal SC disruptions are often over looked by business, but these disruptions can also have devastating affects. The loss of key personnel can seriously impact the SC within an organization. The relationships, contacts, and knowledge held by key employees are invaluable to operations and the management of an enterprise’s SC. Improper or nonexistent continuity planning and or lack of internal communications can compound such disruptions. An extreme example of internal SC disruption occurred at Akami, the high technology company based in the USA. On September 11, 2001 Akami lost their co-founder and chief technology officer, Daniel Lewin, who was on board one of the 9/11 planes.\textsuperscript{24} Such tragedies are rare, but their impact can be devastating. This is a good example of an internal disruption that impacts the organizations SC.

### 3.2.2 Unexpected Demand Disruptions

Demand imbalances or disruptions result in unexpected declines or spikes in demand for a company’s products or services.\textsuperscript{25} Demand disruptions can be caused by any number of issues including events that are internal and/or external to the enterprise. It was mentioned by one key informant that demand disruptions can be as unsettling as supply disruptions in some situations. These demand disruptions are often competitor driven demand disruptions that in turn impact the supply side of the equation.

An example of an unexpected demand disruption occurred in 2001 when the Bridgestone/Firestone tires being used on all Ford Motor Company’s Explorer SUV’s where recalled due to a manufacturers defect. The tires were recalled after the tire failures were blamed for “hundreds of accidents and at

\textsuperscript{24} Ibid
\textsuperscript{25} Ibid
least 174 deaths in the U.S."\textsuperscript{26}. The recall included 6.5 million tires initially but later ballooned to 19.5 million tires\textsuperscript{27}. The negative effects on the Ford brand and Bridgestone/Firestone brand were widespread. Further, because of the consumer scrutiny on both companies and the inability of both Ford Motor Company and Bridgestone/Firestone to accept blame, Ford Motor Company ended a 95 year relationship with Bridgestone/Firestone. Ford Motor Company use to put Bridgestone/Firestone tires on all of its best selling Explorer SUV’s. After the tire recall, Ford began to give the consumer the option of which tire they wanted on their vehicle. According to Ford, after the tire recall incident, only 1% of consumers chose Bridgestone/Firestone.\textsuperscript{28} This sudden decrease in demand for Bridgestone/Firestone and the loss of a longstanding buyer was a major and unexpected demand disruption for Bridgestone/Firestone. From Ford’s point of view, they lost a critical and longstanding supplier, and they now have a large gap in their tire SC.

Demand imbalances also include sudden unexpected spikes in demand which leads to lost sales, lost customers, and often poor service. In 2007, Nintendo Co., the worldwide leader in interactive entertainment, released the Wii gaming console. Demand for the product far exceeded Nintendo’s projections. According to IDC video game analyst, Billy Pidgeon, “supply will not meet demand until 2009”\textsuperscript{29}. Consumers worldwide are trying in vain to get their hands on the elusive Wii gaming console. The product is in constant demand. Demand disruptions like this are a nuisance for the consumer and are not ideal for Nintendo, but this type of disruption is rarely catastrophic for an enterprise.

\textsuperscript{27} Ibid
\textsuperscript{28} Ibid
3.3 Supply Chain Vulnerability

All enterprises are vulnerable to SC disruption, but the degree to which they are vulnerable varies. Sheffi describes SC vulnerability as a function of the likelihood (probability) of disruption and its potential consequences (impact). Figure 4 details this relationship. The vertical axis represents the disruption probability and the horizontal axis represents the consequences of the SC disruption. Sheffi Yossi. (2005). The Resilient Enterprise – Overcoming Vulnerability for Competitive Advantage. MIT Press.

Figure 4 – Sheffi’s Dimensions of Vulnerability

Vulnerability is highest when both the disruption probability and the consequences of disruption are high. Alternatively, vulnerability is lowest when the disruption probability and the consequences of disruption are low. In regards to daily scope of operations and regular management issues, SC disruptions of high probability and low impact are common. Examples of such disruptions include the typical challenges associated with logistics and

shipping, quality problems, employee (internal) errors, and small variations in demand. These issues are part of doing business and are common in all enterprises and in all industries. The SC disruptions that call for planning and response that fall outside the typical daily operations and that have the potential to make or break an enterprise are the “low probability/high-impact events”\(^{31}\). These events are usually not expected and there effects are large in scale. As always different industries and different enterprises face different types of disruption and varying levels of vulnerability.

Stephan Wagner and Christophe Bode build on Sheffi’s work in relation to SC vulnerability. Their work focuses on the design of an enterprise’s SC being a critical factor in the organizations degree of vulnerability. Several SC design characteristics can “amplify a firm’s exposure to risk”\(^{32}\). In particular, Wagner and Bode, highlight that an enterprise should avoid both customer and supplier dependence. Further, the concepts of single sourcing and global sourcing are viewed as important concepts in terms of overall SC vulnerability. In stable environments single sourcing and global sourcing are ideal, but in the typically dynamic business environment such initiatives should be evaluated from a risk management perspective by enterprises and SC managers\(^{33}\). These initiatives should only be pursued when the risk-benefit trade off is favorable.

### 3.4 Supply Chain Disruption Mitigation and Response Strategies

When examining SC disruptions it is important to focus on both the risk mitigation strategies and response/recovery strategies of the enterprise. A focus on one or the other is incomplete and leaves enterprises susceptible to severe financial loss.\(^{34}\) When examining an enterprise’s vulnerability it is essential for SC managers to attempt to reduce the likelihood of SC

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\(^{33}\) Ibid

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disruption by mitigating risk, and also to develop response strategies, thereby increasing overall resilience (ie: the ability to recover quickly). The distinction between mitigation strategies and response strategies is an important one to highlight and is an integral element in the management of SC disruption.

3.5 Supply Chain Management and SME’s

The majority of the prevalent literature, models, and strategies in SCM focus on LE’s. While these companies are usually the leaders in SC innovation, not all of their ideas, models, and concepts can be directly applied to SME’s. SME’s face a unique set of challenges and opportunities in their business environment. These challenges and opportunities should be examined as SME’s look to adapt to the evolving and truly global, modern SC landscape. Norek et al., in 2007, detail the unique set of challenges that SME’s encounter as they look to implement new SC management initiatives.

3.5.1 Challenges for SME’s

When SME’s attempt to implement SCM initiatives they often find themselves dealing with a unique set of challenges that LE’s typically do not face. The following is a list of just a few of these challenges as identified by Norek et al. in 2007

Decentralized SC organizations are common in SME’s. SME’s are usually not large enough to warrant units or divisions charged with the responsibility to plan strategically for SC disruptions. Further, SME’s often do not have the personnel with knowledge of sophisticated SC strategy and long term contingency planning.

Lack of clout and buying power makes it difficult for SME’s to influence suppliers by offering large volumes of business. This directly impacts the

36 Ibid
price of goods purchased as well as the SME’s level of priority with the supplier in the event of SC disruption. That is to say that when a supply disruption occurs the larger players often get the product before the SME’s. Also, the lack of economies of scale can make it more difficult for an SME to take advantage of outsourcing opportunities, as it is difficult to get the attention of large suppliers when the volume of purchases is smaller.\(^\text{37}\)

\textit{Lack of consistent business processes} is a common trait of SME’s. The lack of sophisticated business processes is manageable when the SME is small, but as the firm grows the resulting incomplete and inaccurate processes, documentation of product data and fractured IT systems makes it difficult for the SME to function and work with outsourced supply partners.\(^\text{38}\) Also, SME’s often lack detailed process documentation, due to employees wearing several “different hats” and working under intense time constraints. This creates many problems when SC disruptions occur, when partners want to connect systems and when key employees leave the organization.\(^\text{39}\)

\textit{SC technology concerns} are common for SME’s, primarily because most SCM software is designed specifically for LE’s.\(^\text{40}\) Also, the cost of state of the art SCM software acts as a deterrent for many SME’s. Most SME’s don’t have the required capital to invest in such technologies. This puts SME’s at a significant disadvantage and often prevents SME’s from linking SCM systems with other organizations in their SC.

\textit{The ability to attract top talent} is limited at many SME’s. Lack of compensation and lack of prestige are cited as major reasons for this.\(^\text{41}\) Most SME’s recruit people with, “strong operational, distribution, and logistics...
skills\textsuperscript{42}, rather than people with a broader international business and strategic SCM perspectives.

A lack of significant capital for investment is common in SME’s.\textsuperscript{43} They typically do not have the same options in regards to financing initiatives as LE’s do. SME’s often need to access loans or lines of credit to fund major initiatives and improvements. Investments in SCM initiatives such as mitigating and planning for SC disruptions are not usually at the top of the list in regards to investments for SME’s.

The aforementioned list of challenges experienced by SME’s, as originally detailed by Norek et al. in 2007, is by no means comprehensive, but it does provide some needed background into the unique challenges that SME’s are facing in today’s business environment.

3.5.2 Current Supply Chain Strategy and SME’s

Judging from the relatively small number of articles in circulation pertaining to SCM and SME’s, the current set of SCM literature has not been successful in addressing the unique needs of SME’s. SME’s have found it difficult to adopt modern SC disruption management strategies because of their various constraints including finance, infrastructure, and human resources among others.\textsuperscript{44} Vaaland and Heide, in 2007, found that SME’s give less attention to long term planning and control methods than do LE’s\textsuperscript{45}. One possible explanation given for this is that LE’s in general have organizational structures that allow for a greater focus on SCM strategy, planning, and control systems. Alternatively SME’s tend to adopt a more localized and short-term perspective, which leaves them susceptible to SC

disruptions that will catch them ill-prepared.\textsuperscript{46} If SME’s do not focus on the strategic side of SCM, specifically strategies pertaining to SC disruptions, they are sacrificing margins, market, share and possibly the organization itself.

4.0 Findings

During the primary research portion of this project I had the opportunity to speak with executives, project managers, and SC experts from a variety of enterprises and industries. Ten in-depth interviews were conducted. The experiences, expertise, and knowledge that the informants shared have been invaluable. Due to the nature of this project and the associated time constraints the data and information obtained is not necessarily quantifiable or statistically significant. However, in the following pages I will present the findings in a qualitative manner to share some of the rich information that was imparted to us by the informants. These individuals are working on the front lines and are dealing with the aforementioned SC disruptions on a daily basis. These are their stories, words, experiences, and advice.

4.1 The Pertinent SC Disruption Issues

At a recent conference I attended regarding purchasing, logistics and SC management, a presenter spoke of global sourcing and international SC management and described it as being like a Koala Bear. He explained,

“When you see a Koala Bear, similar to when you see global sourcing and/or SC opportunities, you want to hold it, have it, cuddle it, but if you hold it incorrectly, it will bite you”.

This analogy is accurate in describing the challenges that enterprises face in managing increasingly global SC’s that are filled with potential disruptions and risks. When speaking with the informants for this project I wanted to know what SC risks and disruptions were on their radar and which SC disruptions impacted their organization and industry the most. The responses were varied, as was expected, according to industry, region, and size of organization.
A large portion of the informants representing SME’s identified primarily man-made SC disruptions and risks. The most cited disturbances where those related to logistics disruptions that delayed or prevented the flow of goods between nodes in the SC. These logistical disruptions related to labour disruptions (including but not limited to labour strikes) at ports and railways, driver shortages at logistics providers, port congestion, railway container availability, general labour shortages, and security delays at the US/Canadian border. These disturbances are part of the day to day operations of many organizations. According to Sheffi’s vulnerability dimensions matrix they are highly probably, low consequence events. Nevertheless, they do need to be addressed and dealt with by SC managers.

The informants representing LE’s were dealing with many of the same aforementioned high probability, low consequence events on a daily basis, but they also spoke of low probability, high consequence events that they were aware of and planning for. The SC disturbances cited included pandemic planning, energy blackouts in large metropolitan areas, SARS breakouts (Toronto), hurricanes disrupting trans-Atlantic shipping, flooding in British Columbia’s lower main-land, mudslides closing railways, as well as major economic and market issues influencing supply and demand. These larger SC disruptions are often addressed by larger strategic initiatives. These types of initiatives are more common, judging on the basis of the informant interviews, in LE’s that have the resources, both human and capital, to address them. Often it was senior executive management who were charged with the responsibility of planning for and responding to such disruptions.

One informant spoke of the effects of the SARS crisis in Toronto in 2003 and the impact that it had on the food and beverage industry and its associated SC’s. The informant explained how everything in the industry slowed down. Security at facilities was tighten to ensure that only healthy employees entered into the facilities, communication efforts with staff were
increased, and public safety became the new focus. Any organization manufacturing, distributing, and/or selling products in the food and beverage industry at that time in Toronto felt the effects of the SARS crisis and all SC functions slowed down as a result. This event was unexpected and the effects were significant. Because of it many organizations in that industry are now forward planning for other similar “pandemic type” outbreaks. In hindsight, the SARS crisis of 2003 was probably a positive thing because the scale of the disturbance was not devastating, yet it opened the eyes of many SC managers to begin planning for future “pandemic type” events.

Another informant spoke of the flooding that recently occurred in British Columbia in the spring of 2007. The flooding severely slowed the movement of goods through the region and it impacted the SC’s of many industries. The informant I spoke with described how,

“They knew the flood was coming, a committee was struck to deal with it, planning occurred, and the disruption was handled”.

Another informant cited the same SC disturbance, flooding in British Columbia, but cited it for different reasons. The flooding impacted his industry, which was the pharmaceuticals industry, by increasing the incidence of rabies which caused a decreased availability of certain vaccine ingredients on the market. These rare ingredients were difficult to obtain and the tightening up of this organization’s supply directly impacted the organizations operations. This example illustrates how SC disruptions can impact different industries and organizations in a variety of ways. Accordingly, organizations will plan for such disruptions in unique ways. This example further illustrates how, even when the disruption is the same or similar, the effects can be different depending on the organization and industry.
4.2 The Evolving Nature of Supply Chain Disruptions

The nature of SC disruptions has change greatly over the past 10 years. Globalization was a reoccurring concept that was cited by informants. Virtually every SC manager I spoke with was managing a global SC. One informant had this to say on the matter,

"We are more sophisticated in our procurement and SC operations than we were 10 years ago. We no longer look only in our own backyard when procuring”.

He went on to describe how in today’s market when, for example, they are procuring steel pipe they,

"Don’t just look at pipe, they examine and learn the steel industry; they look further down the SC than they used to."

This example illustrates how SC managers have evolved with the evolving SC. The functions of the SC manager are now far more complicated than in the past.

The availability of information, the use of technology, the emergence of developing nations, and the ability to procure for all corners of the earth were cited as being the primary reasons that global SC’s are now common place. These modern SC’s are more complex and vulnerable than ever before.

4.3 What SC Managers and Organizations are doing to Address SC Disruption

I was encouraged to find that many of the informants that I spoke with were a part of the development of specific strategies to mitigate and/or respond to SC disruption risk. Again, the LE’s were more advanced in this regard, generally speaking, than the SME’s. The strategies that were most
prevailed pertained to relationships within the SC, information technology (IT), process, policy and procedure, and promoting a suitable corporate culture.

4.3.1 Relationships

The development of strong relationships with both customers and suppliers was highlighted as a major SCM initiative by informants. Creating and maintaining such relationships was said to be critical in mitigating and responding to SC disruption. Having strong relations with customers and suppliers was said to aid in effective communications, help with supply and demand forecasting, and facilitate long-term planning of many of the organizations we spoke with.

As we observed earlier with the example of Ford and Bridgestone/Firestone, things do go wrong from time to time. Even though the two firms involved are LE’s, this remains a good example of how business relationships can breakdown when faced with adversity. The relationship between Ford and Bridgestone/Firestone spanned over most of the 20th century, yet when disruption occurred, the relationship fractured and never recovered. When things go wrong the strength of a relationship is often tested. A relationship breakdown like that of Ford and Bridgestone/Firestone is the type of situation an enterprise wants to avoid, as it can have long-lasting negative effects on both enterprises. When things do go wrong, and they often do, it is important to have strong relations with your business partners to aid in the recovery.

The types of relationships described by the informants were grouped into three broad categories. The categories are (1) strategic supplier relationships, (2) key regulatory relationships, and (3) key buying group relationships. I will discuss each category in detail in the following sections.
4.3.1.1 Strategic Supplier Relationships

Improvement and/or maintenance of relationships with key suppliers were often cited by informants as being an important strategy in the mitigation of risk associated with SC disruption. Informants spoke of creating “win win” situations where both the supplier and the buyer are benefiting from the transactions within the SC. Buyers and sellers are in a relationship that now resembles a collaborative partnership. The concept of collaborative negotiations is somewhat contrary to the typical business mindset. But this appears to be the way that business is being conducted. As one informant said,

“If we squeeze our supplier to hard, eventually they will be out of business, and we will be looking for new a supplier, which is not what we want”.

Healthy relationships between buyers and sellers are also important to maintain clear lines of communication. This is especially important in regards to forecasting supply and demand. Communication of demand forecasts between the seller and the buyer in the SC aids in the prevention of supply gaps which were identified by informants as a common SC disruption. In order to initiate and maintain strategic supplier relationships it is common to see key executives engage negotiations with key suppliers in order to ensure success. In several of the LE’s that we interviewed they spoke of having key personnel working as “in-plants” at the supplier’s site. That is to say, employees from “company x” are actually working on site at “supplier y” to manage relationships, oversee production, and ensure that quality, quantity, and timelines are up to standard.

Another informant detailed a specific program that was in place at his LE that helps to identify key/critical suppliers. The program helped the organization to prioritize the critical suppliers in the SC’s. Once these key/critical suppliers were identified, time and money was spent managing
these very important relationships. This program was helpful in prioritizing suppliers and identifying which ones were critical to the security and viability of the SC.

4.3.1.2 Key Regulatory Relationships

Key relationships with regulatory and government agencies are of great importance in regards to the flow of goods through the global SC. Having strong and healthy relations with regulators can keep organizations up-to-date with current regulation, law, and policy. Further, these relations can lead to opportunities for organizations to provide input as these regulations, laws, and policies are developed.

In the biotechnology and pharmaceuticals industries regulatory compliance is a major element of business. Regulatory compliance in biotechnology, for the most part, pertains to clinical trials, clinical endpoints, and FDA (Food and Drug Administration) approvals, but it also pertains to SC management and logistics. One informant spoke of the issues involved with shipping biological materials across international borders. Having strong relationships with regulators enabled this organization to implement the appropriate shipping infrastructure and processes to comply with regulation which included temperature controlled shipping, thorough product inspections, and a program to monitor the quality of the biological products that were received from suppliers.

Another informant, this one from the food and beverage industry, stressed the importance of developing key strategic relationships with government agencies to better prepare for pandemic related SC disturbances. These relationships can be important for many reasons, but this discussion pertained to the SARS outbreak in Toronto. The informant spoke of the relationships that were developed and required in the food and beverage industry with government agencies as all interested parties attempted to comply with regulations to minimize the spread of SARS, while
at the same time continuing to do business. Healthy relationships aids in the communication process and helps to ensure all stakeholders are properly informed on the key issues.

4.3.1.3 Key Buying Group Relationships

A strategy being adopted by some SME’s referred to as “buying groups”, is giving SME’s greater buying power and clout. Buying groups are a group of smaller organizations that form an alliance and buy as a group from common suppliers. This results in lower prices because they are buying in larger volumes, but it also serves to mitigate SC disruption risk by providing the buying group with greater leverage. Often when a SC disruption occurs, and the supply of a certain product is depleted, suppliers have to choose who will get the limited supply of product. The product often is supplied to the organizations or buyers that are valued most; these valued buyers are the LE’s. Because the SME’s are part of a buying group, they are larger, they buy greater volumes of product, and they are therefore valued by the supplier. This strategy is a good SC disruption risk mitigation strategy for SME’s to employ and it is becoming a more common practice.

4.3.2 Information Technology

In recent times technology has transformed the way business is conducted. Technology has transformed SC management strategies and processes as well. Many of the informants I spoke with are utilizing new powerful IT tools that are aiding in the mitigation of and response to SC disruptions. These tools are especially helpful in conducting market analysis and in facilitating communication between enterprises. Other IT functions include performance mapping, sales forecasting, capability mapping as well as sourcing auctions.

It appears as though the LE’s are investing heavily in IT with often million dollar SAP systems in place. These IT systems span the globe and enable global SC operations. On the other hand, SME’s, generally speaking,
are using a wide variety of IT systems. Everything from advanced Excel spreadsheets to SAP systems of their own are being used. One informant from a LE spoke of the importance of remaining current with IT systems in order to stay connected with other external organizations and partners in their SC. He said,

"Today IT is external rather than internal like it was 5 or 10 years ago. It is now used to link organizations".

Utilizing the advanced IT systems that are now available is no longer a source of competitive advantage, but is now the industry standard. All organization, whether large or small, need to invest in such technologies as much as possible or they may be left behind.

**4.3.3 Process, Policy and Procedure**

In regards to formalized business process, policy and procedure (PPP) I found that SME’s often lacked in this area when compared with the LE’s. LE’s are by nature more bureaucratic and, due to their size, clearly documented PPP are required in order to manage and give direction to all employees. In regards to SC disruption, an organization’s PPP’s can help to lead and guide employees through the SC disruption; even an inexperienced employee can follow the PPP and utilize the past experiences of others to act in the most desirable fashion.

Many of the LE’s I spoke with explained how they follow PPP’s and document their actions whenever they encounter SC disruption. Well developed PPP’s increases the likelihood of an employee acting in a manner that is consistent with the enterprises overall SC strategy and it also creates efficiencies in the system. When speaking with one executive from a LE, I was told of his organization’s general procedure for dealing with a major SC disruption. It was clear to me that this procedure was engrained in his mind,
such that he (and others in the organization) always knew exactly what to do when faced with a major SC disruption. He said,

“First we identify the disturbance, then a committee is struck, the critical lead person is assigned, and finally, individual task ownership is assigned“.

He went on to say that,

“The most critical element is the task ownership...who owns what piece of the pie”.

It is clear from this short quotation that at this enterprise, organization of people, clarity of duties, and task ownership is critical when dealing with SC disruption. This is a good example of how PPP’s can aid in the mitigation of and response to SC disruption.

The research found that at SME’s the level of documentation, and formal PPP’s is less than at LE’s. However, due to the fact that at many of the SME’s the employees know many roles and “wear many hats” they are able to handle SC disruption. The employees know how to react because, typically, they are familiar with the overall operations of the firm. It should be noted that as SME’s grow it is important to document and develop PPP’s to deal with the growth in size of the organization. Further, PPP’s are always a good idea in terms of providing clarity and direction to employees and aiding in the training of new employees.

4.3.4 Corporate Culture

During the numerous key informant interviews that were conducted a common thread linked them all together when we spoke of enterprise and SC resiliency; that thread was corporate culture. The culture of an organization impacts all things and it definitely impacts the manner in which an enterprise
plans for and responds to SC disruption. Corporate culture impacts strategic supplier relationships, it influences the adoption of new technologies, and it effects the creation and adherence to PPP’s.

One informant spoke of the corporate culture at his organization as it related to SC management. He said,

“We plan for every eventuality here. Contingency planning is ingrained into every employee”.

It was clear from our discussion that SC disruptions were taken seriously and they were on the minds of all employees. This was due to the corporate culture that was present.

4.4 The SC Disruption Risk Levels at LE’s and SME’s

We spoke with all informants, regardless of the size of their organization, about whether or not they felt SME’s were at a greater risk of SC disruption than LE’s. I received a variety of responses that spanned the full spectrum from “yes, SME’s definitely are more at risk” to “not necessarily”.

SME’s may be at a disadvantage due to the lack of human and capital resources available to address SC disruption risk strategically. This lack of capital resources leads to the inability to invest in IT solutions and systems. A lack of buying power and leverage also leaves SME’s at a disadvantage in certain situations such as supply shortages. Also, from the research it appears that SC disruptions, contingency planning, and long term strategic planning were not being addressed as regularly in SME’s when compared with LE’s. However, SME’s do have organizational flexibility that they can use to their advantage. SME’s can embrace change and can adapt to environmental and market conditions quickly and efficiently. In the
forthcoming recommendation section I will detail some steps that SME’s can take to better prepare themselves for SC disruption.
5.0 Recommendations

From the secondary information that was reviewed and the primary interviews that were conducted, it became clear that many SME’s require a sequential model or framework through which to view SC disruption. The following recommendations are essentially a model to guide SME’s in the development of SC disruption mitigation and response strategies. Every attempt was made to make the recommendations general enough to ensure that they could be applied to all enterprises and industries.

5.1 A Guide to Supply Chain Disruption Management Strategy for SME’s

The guide is a five step model that is sequential in nature, but at the same time it is dynamic and never complete. Each step in the model will need to be revisited by SC managers frequently in order to keep up with the dynamic and ever evolving nature of SC disruption. The recommendations have been made taking into consideration the unique nature of SME’s and the challenges that SME’s face.

Stage 1 - Potential Supply Chain Disruption Identification

SC disruptions are present along the entire length of the SC and are diverse and ever evolving. It is the SC manager’s job to attempt to identify as many SC disruptions that may be on the horizon as possible. Many SC disruptions are unique to specific enterprises and industries while others are common to many enterprises and industries, and in some cases economies.

As was presented in the findings section, many organizations do not have formal processes, policies, and/or procedures (PPP’s) in place to identify and predict SC disruptions. As a result, when such disruptions do occur, the firm is left unprepared and vulnerable.
The first step in developing strategy to mitigate and respond to SC disruptions is to identify the potential disruptions before they occur. The development of a PPP’s to identify SC disruption before the disruption occurs is critical. The process itself should involve, at the bare minimum, the identification of potential disruptions and the assessment of the probability of occurrence. After this has been accomplished, the SC disruptions can be ranked in terms of probability and importance. This exercise will help management begin to think about the disruptions that are possible. The process itself will make the manager and the organization more aware of the external and internal environments and their potential impact on the organization. In order to identify potential disruptions, organizations and their members need to educate themselves and continue to learn over time. They need to be kept abreast of current issues, aware of changes in industries, knowledgeably of the markets they are sourcing from and selling to, and constantly be seeking the most up-to-date information.

The model presented is dynamic and each step within it requires constant injections of new information and knowledge on an ongoing basis. The modern SC manager will need to be continuously assessing and anticipating new potential SC disruption risk. The process of SC disruption identification is never complete.

**Stage 2 - Supply Chain Disruption Classification & Vulnerability Assessment**

After potential SC disruptions are identified, the next step in the model is to classify them and assess how vulnerable the organization is to such disruptions. The classification system used is adapted from Yossi Sheffi’s work in his book entitled, "The Resilient Enterprise, Overcoming Vulnerability for Competitive Advantage". The classification system is simple and involves classifying risks into four categories:

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1. Low Impact/High Probability Events
2. High Impact/Low Probability Events
3. Low Impact/Low Probability
4. High Impact/High Probability

The aforementioned dimensions of vulnerability matrix (refer to Figure 4) can be used as a visual representation of this classification system.

From this classification system the SC manager can more accurately assess the organization’s vulnerability to such SC disruptions. This will guide the SC manager in how he/she feels the organization should plan for specific SC disruptions.

**Stage 3 & 4 - Supply Chain Disturbance Risk Mitigation and Response Strategies**

Many of the following SC disruption mitigation strategies are strategies that were discussed and described by the key informants during the interviews conducted for this project. The following examples of strategies are not meant to be an exhaustive list. Further, it is not recommended that an organization only implement these mitigation strategies. These strategies are simply examples of suitable strategies for SME’s that are relatively easy to implement and inexpensive in terms of capital investment required.

The benefits of establishing and maintaining healthy *relationships* with key strategic suppliers and trading partners, key regulatory bodies, and buying groups cannot be understated. A focus on collaboration and mutually beneficial business transaction aids in the sharing of risk and improves communication channels; both of which help in the mitigation of the risk associated with SC disruption by enabling enterprises to react to supply and demand imbalances. Further when enterprises are working with suppliers it is a good strategy to adopt a multiple supplier strategy in order to diversify SC risk and avoid unexpected SC disruptions. With this strategy there will be more relationships to manager, but the outcome will be a more resilient SC.
The implementation of *formalized process, policy and procedure* (PPP) related to the mitigation of and response to SC disruption is an effective strategy to increase an organization’s resiliency against such SC disruption. Organizations that take the time to document and develop PPP’s will find that their employees are better equipped to mitigate and respond to SC disruptions. The development of PPP’s is common in LE’s that are typically more bureaucratic, but SME’s can benefit from this strategy as it aids in directing and guiding employees, it lessens confusion, ensures mistakes are only made once, and promotes enterprise information sharing. The development of PPP’s takes time but is relatively inexpensive to undertake. The types of PPP’s that a firm develops will be specific to the industry and organization itself, some examples of such PPP’s include:

- *Inventory management policies* may include abandoning or adopting just-in-time inventory (JIT) management policy. JIT has been a popular inventory management system for the past twenty years and has been the standard in many industries. However, recently some firms have moved away from JIT and have begun to store excess stock and raw materials in order to mitigate the risk of supply gaps.

- *Customer relationship management policies* may include specific guidelines to aid employees in their interactions with customers. An example is guaranteeing product within two weeks of the order. When shipping takes longer than two weeks, the customer will receive a personal phone call and a discounted rate. Customer relationship management procedures ensure that customers are treated equitably and these policies help employees to know what actions are appropriate in each situation.

- *Redundancy initiatives and policy* such as redundancy in inventory (as was already mentioned), redundancy in IT systems, and redundant human resources in critical positions are just a few examples of
redundancy initiatives and policy. These forms of redundancy enable firms to continue to serve their customers while recovering from a SC disruption.

- **Disaster response procedures** may include specific step-by-step procedures to be followed in the event of a major SC disruption. Such procedures ensure that the firm and its employees take the most efficient actions needed to recover from SC disruption. The creation of detailed response actions for specific SC disruptions will ensure that employees know what steps will be taken, when they will occur, and who will be responsible for each.

- **Off-shore sourcing and procurement procedures** are used to ensure buyers are following firm guidelines and acting in a systematic manner when buying off-shore. Sourcing off-shore items is complicated and can be risky. Employees must take into consideration taxes, duty fees, searching fees, mode of transportation, and many other risk factors. Formalized off-shore sourcing procedures can guide the employee and ensure all factors are considered, thus reducing SC disruption risk.

- **Single sourcing versus multiple sourcing policies** will vary depending upon the organization and industry. For the most part multiple sourcing policies are more resilient in regards to SC disruption and are therefore preferable.

These are just a few examples of PPP’s that enterprises may want to implement as SC disruption mitigation and response strategies.

**Investment in IT systems** is a requirement in the modern business world and especially in the area of SC management. Such technologies have the potential to aid enterprises internally by aiding in inventory management, product quality and expiration monitoring, market trend analysis and by generally improving the information available to SC management. An advantage can be achieved by implementing IT to improve
and enable external communications with other members of the SC by the 
linking IT systems. By linking systems the human element can be eliminated 
from the equation and tremendous financial and operational efficiencies can 
be obtained.

The corporate culture of an organization infiltrates all areas of business 
including SC management. It is in upper management’s best interested to 
facilitate a corporate culture that allows the organization to be flexible and 
able to respond quickly to the dynamic nature of business. Fluctuations in 
supply and demand as well as other SC disruptions are a part of business, 
and organizations need to accept this and be able to efficiently cope with 
such events. Instilling a culture that embraces change, open communication, 
and continuous learning is critical. Further, having a management team that 
is highly involved and aware of the operations of the firm will ensure that the 
SC strategies that are being developed by upper management are consistent 
with the overall operations of the firm. The process of changing corporate 
culture is long and challenging, therefore it is important for SME’s to attempt 
to ingrain this type of corporate culture in their people from the beginning. 
It is easier to breed a healthy corporate culture with a small group from the 
beginning and maintain it as the organization grows, rather than attempting 
to change the culture when the organization is large.

Stage 5 - Organizational Forward Planning

The overarching concept of this model is to organizational forward 
planning. It is included as step 5, but it truly encompasses everything that is 
being recommended. Organizations and SC managers need to plan to 
mitigate SC disruption risk and plan to respond to SC disruption when it 
occurring. Enterprises, especially SME’s, need to look beyond the day to day 
operations of the organization. Enterprises need to strategically plan for 
growth and consider what that growth will do to the SC and how it will 
impact the overall resilience of the SC.
One useful exercise for organizational forward planning is the creation of a forward looking organizational chart, with specific positions, anticipated future positions, and the timing and metrics used to decide when to install the new positions. The goal here is to take the long term view and to strategically plan for organizational growth and expansion.

The following is a visual representation of the Five Step Guide to Supply Chain Disruption Management Strategy for SME’s. By working through the steps, SME’s will have a sequential and systematic guide to thinking about and planning for the relevant SC disruptions in their industry. In summary it is important for SME’s to:

- Identify Potential Supply Chain Disruptions
- Classify Supply Chain Disruption and Assess Vulnerability
- Develop Supply Chain Risk Mitigation Strategies
- Develop Supply Chain Disturbance Response Actions
- Conduct Organizational Forward Planning

The model is dynamic in nature and each step in the model is to be revisited by SC managers frequently in order to keep up with the dynamic and ever evolving nature of SC disruption.
A Guide to Supply Chain Disruption Management Strategy for SME’s

The tool below is designed to help managers to think strategically about SC disruptions and the required mitigation and response strategies. This tool is a systematic way to approach SC disruption by identifying key SC disruption risks, classifying the SC disruptions, developing preventative strategies for all SC disruptions, developing response actions for each SC disruption, and developing forward thinking personnel to create more robust, resilient enterprises and SC’s.

<table>
<thead>
<tr>
<th>Potential SC Disruption Identification</th>
<th>Using Yossi Sheffi’s Dimensions of Vulnerability Matrix, classify the identified potential SC disruptions.</th>
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</thead>
<tbody>
<tr>
<td>Identifying and recognizing the relevant potential supply chain disruptions is the first step in the SC disruption management process.</td>
<td>(Source: Adapted from Sheffi, 2005)</td>
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</tbody>
</table>
**A Guide to Supply Chain Disruption Management Strategy for SME’s**

This is an ongoing process. The environment your enterprise operates in is dynamic and the SC risks will evolve with time. It is essential that your enterprise continuously evaluates and builds on your SC disruption management strategy.

<table>
<thead>
<tr>
<th>Mitigation Strategies</th>
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<tbody>
<tr>
<td>Implement the key mitigation strategies for the identified SC disruptions.</td>
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<table>
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<tr>
<th>Response Actions</th>
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<tr>
<td>Create detailed response actions for specific SC disruptions. What steps will be taken, when will they occur, and who will be responsible for each.</td>
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<table>
<thead>
<tr>
<th>Organizational Forward Planning</th>
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<tbody>
<tr>
<td>Look beyond the day to day operations of the organization. Strategically plan for growth and consider what that will do to your SC and how it will impact your resilience to SC disruption.</td>
</tr>
</tbody>
</table>
7.0 Conclusions

The SC’s of tomorrow will continue to increase in complexity and sophistication. They will span the globe and incorporate many suppliers, wholesalers, retailers, distributors, and logistics providers. Because this web of players is so dependant on one and other and so intertwined, assessing where vulnerabilities lie will become increasingly difficult.

An enterprise’s strategy for the mitigation of and response to SC disruptions is a critical element of the enterprise’s overall SC management strategy. The enterprises that passively embrace risk of SC disruptions without planning for and anticipating such disruptions leave themselves vulnerable to, in most cases, significant financial loss, and in some cases worse. Pro-active SC disruption management strategies, like the one outlined in this paper, that focus on both the mitigation of risk and the specific and detailed response actions needed to cope with and respond to SC disruptions, can be a source of competitive advantage. Further, this type of strategy can mean the difference between a SC disruption causing a minor dip in operations and performance for an enterprise, versus a SC disruption ceasing an enterprise’s operations all together.

Acknowledgements

This project was supported by the Canadian Supply Chain Sector Council and would not have been possible without their valuable contributions. Further, thanks goes out to the many enterprises, executives, and other informants that took the time to share their expertise, experiences, and knowledge. Finally, special thanks go out to the University of Saskatchewan’s Edwards School of Business, its Faculty and the MBA Administrative Office for their direction and support throughout the project.
References


Appendices

1. MBA 992 Interview Questions and Areas of Interest

A cover summary report will be provided to all informants in appreciation for participation. This report will provide a summary of the research findings. No company or individual identifying information will be included in the report.

**Informant’s anonymity will be protected.**

**Section I**

The goal of this section is to discuss, in a general context, what supply chain disruption is and how it has evolved in recent times.

- Discussion on what is meant by supply chain disruption.
  - What does supply chain disruption mean to you?
  - Brainstorm natural & manmade supply chain disruptions.
  - What is your experience with supply chain disruption in your career?

- How has supply chain disruption changed/evolved in the past 10 years?
  - Globalization
  - Climate change
  - Is change unique to certain sectors?
  - Is change unique to certain countries or regions of the world?

- What are the most relevant risks now versus 10 years ago?

- Can companies prepare for all disruptions? If so how?
  - What role does corporate *culture* play in the mitigation and recovery from supply chain disruptions?
  - How important and how valuable are strong *relationships* with suppliers within the supply chain?

**Section II**
The goal of this section is to discuss supply chain disruption in more detail and to examine specific mitigation and response strategies employed by industries and organizations.

- What are the key risks that your organization has identified as threats to your supply chain? (predictable and unpredictable events) (natural and manmade disruptions)
- How does your organization prioritize potential supply chain disruptions?
- What are some key characteristics of identified supply chain disruptions?
  - Location of suppliers (clusters)
  - Number of suppliers
  - Relationships with suppliers
  - Size of supplier
  - Size of buyer
- What mitigating strategies, policies, and/or procedures has your organization adopted?
- What kind of competitive analysis occurs in your industry and company?
  - Do you watch to see what competitors are doing in regards to supply chain disruption risk?
  - Is there a company that you model or follow; or are you the company that others model or follow?
- What advantages/disadvantages do small and medium size enterprises have when attempting to mitigate and respond to supply chain disruptions?

**Conclusion**

- Brief discussion about the industry, where the organization fits in that industry and the informant’s role at the company and past experience in the field.