No resting place – supply chain volatility never stops

Part 1: The volatility landscape – an overview
Supply chain volatility and risk have virtually always existed in business. Most organizations, however, treated them as operational outliers – something to be dealt with on a periodic basis using a contingency-plan approach. Essentially, volatility and risk were viewed and managed as discrete ‘one-off’ incidents separated by periods of down time and recovery.

The events of the last few years changed all that. Companies, countries – in fact, the entire world – were blindsided by chaos, which rained down upon them in the forms of corporate and financial systems meltdowns, housing market collapse, political upheaval, natural disasters, fuel crises, wars, global recession/depression, massive marketplace realignments and more. The nature of volatility – its amplitude and frequency – escalated radically, assuming ‘significant’ proportions in the words of one executive. Organizations found themselves scrambling to survive.

Today, in the aftermath of this global upheaval, business has entered a new era in which volatility is a systemic condition, rapid oscillation is a business constant, and recovery downtime is an outmoded concept. Traditional supply chain management models broke down or, at best, bent under the strain of the unknown and the unexpected.


X-treme Supply Chain Management (X-SCM) is the science of governing global supply chains experiencing instabilities of unprecedented amplitude, frequency and duration.
X-SCM tackles the conditions of systemic volatility, continuous oscillation, and few or no rest or recovery periods. It recognizes the need for collective, rather than sequential, risk management; and facilitates collaboration on the new scale that is necessary for survival. It challenges companies to ‘perpetual vigilance,’ to developing sense-and-respond supply chains that constantly scan their networks using business intelligence systems and exception reporting to detect anomalies that exceed tolerances. ‘Sentinel’ mechanisms act as an early warning system against potential threats and disruptions in the supply chain.

The new practice of X-SCM allows companies to manage their multidimensional supply chains effectively in ‘predictable’ times and in times of extreme supply chain change – even when the unthinkable happens and a devastating event up-ends their supply chain.

This white paper discusses the findings of ‘phase two’ research into X-SCM. The phase two research effort took two forms: an online survey of 300-plus companies (manufacturers, distributors and third party logistics firms) as to their views on and activities around supply chain volatility management; and 15 in-depth interviews with senior supply chain executives.

**Continuing research efforts**

To further the body of research into supply chain volatility management, IBM and the Supply Chain Management Center, Robert H. Smith School of Business, University of Maryland and Council of Supply Chain Management Professionals (CSCMP) have established the X-SCM Consortium. This consortium, comprising global leaders from the manufacturing, distributor and third party logistics (3PL) communities, both guides and participates in X-SCM research and ongoing dialogue. The goal is to move the science of X-SCM forward by investigating the following areas:

- Ongoing trends in supply chain volatility by industry segment
- Predictive metrics that provide ‘look-ahead capability’ into the intensity of volatility in the supply chain
- Executive perspectives on the array of response options available to manage varying types of volatility

The first project undertaken within the X-SCM consortium was an online survey of 301 supply chain, sales and IT decision makers in the manufacturing sector regarding business and supply chain volatility. The survey, sponsored by IBM and conducted in the second half of 2010 by a University of Maryland research team, was designed to gain insight into how manufacturers, distributors and third party logistics service providers (3PLs) are responding to the change and risk forces driving their supply chains. The survey asked about:

- Their top business and supply chain concerns
- Their priorities for managing volatility
- Capabilities and practices they have developed or are developing to assist in managing volatility and risk

Additionally, the research team interviewed 15 senior supply chain executives to probe these issues in greater depth.

In this white paper, we examine the survey results and executive interview findings. We take a closer look at how volatility is shifting corporate supply chain strategy, and explore future directions in managing supply chain volatility and risk.

**Part 2: The supply chain volatility survey**

The online executive survey asked manufacturers, distributors and 3PLs how they are responding to supply chain volatility. Specifically, it asked:

- What are their top concerns?
- What are their priorities for managing volatility?
- What volatility management capabilities and practices have they focused on implementing?

The survey population broke down as follows:

<table>
<thead>
<tr>
<th>Respondents by industry segment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High tech</td>
<td>36%</td>
</tr>
<tr>
<td>Industrial products, tools, or machinery</td>
<td>23%</td>
</tr>
<tr>
<td>Consumer products</td>
<td>21%</td>
</tr>
<tr>
<td>Pharmaceuticals/life sciences/medical devices</td>
<td>14%</td>
</tr>
<tr>
<td>Food and beverage</td>
<td>13%</td>
</tr>
<tr>
<td>Automotive</td>
<td>11%</td>
</tr>
<tr>
<td>Appliances, furniture, etc.</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

*Figure 1*
Corporate priorities for managing volatility and risk
What are companies’ highest priorities for managing volatility and risk? According to the survey, customer-related strategies – such as reducing order cycle times, shortening time to market, entering or expanding in new market segments and managing demand – were key priorities. Again, priorities differed significantly based on company size. Globalization tended to be a bigger concern for enterprises with over a billion in revenue, whereas smaller firms placed more emphasis on managing demand (Figure 3).

Top priorities for managing volatility and risk impacting supply chain decisions – Revenue

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Total</th>
<th>Under $500M</th>
<th>$500M to $1B</th>
<th>$1B to $5B</th>
<th>$5B or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce order cycle times to customers</td>
<td>56%</td>
<td>61%</td>
<td>57%</td>
<td>57%</td>
<td>52%</td>
</tr>
<tr>
<td>Reduce time to market of new product introductions</td>
<td>55%</td>
<td>49%</td>
<td>53%</td>
<td>59%</td>
<td>56%</td>
</tr>
<tr>
<td>Accelerate globalization to open new market segments and distribution channels</td>
<td>53%</td>
<td>46%</td>
<td>43%</td>
<td>58%</td>
<td>60%</td>
</tr>
<tr>
<td>Overcome trade barriers and inward-oriented regionalization</td>
<td>37%</td>
<td>31%</td>
<td>40%</td>
<td>41%</td>
<td>36%</td>
</tr>
<tr>
<td>Manage volatile demand – unexpectedly accelerating or decelerating demand</td>
<td>54%</td>
<td>62%</td>
<td>64%</td>
<td>45%</td>
<td>49%</td>
</tr>
<tr>
<td>Design and implement improved performance measurement systems</td>
<td>49%</td>
<td>51%</td>
<td>51%</td>
<td>43%</td>
<td>50%</td>
</tr>
<tr>
<td>Increase supply chain visibility and resiliency</td>
<td>55%</td>
<td>56%</td>
<td>57%</td>
<td>58%</td>
<td>51%</td>
</tr>
<tr>
<td>Manage supply chain slowdown of spending on product, inventory and distribution in order to conserve cash</td>
<td>47%</td>
<td>46%</td>
<td>54%</td>
<td>41%</td>
<td>46%</td>
</tr>
<tr>
<td>Move supply chain software applications and transactions to cloud computing to reduce computing infrastructure costs</td>
<td>37%</td>
<td>44%</td>
<td>36%</td>
<td>36%</td>
<td>35%</td>
</tr>
<tr>
<td>Outsource manufacturing or logistics to significantly reduce costs and increase flexibility</td>
<td>35%</td>
<td>41%</td>
<td>34%</td>
<td>39%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Figure 3: Current and desired practices for managing supply chain volatility
Among survey participants, the three most common practices used to manage volatility today include supply chain synchronization, data security/compliance, and risk sharing (e.g., such as greater collaborative demand management and collective inventory management). These three practices are the key future focus areas for companies as well (Figure 4).

**Addressing persistent vulnerabilities**

Despite the differential uses of automation cited above, a high percentage of survey companies – regardless of size – still employ manual and/or ad hoc processes for monitoring supply chain changes, exceptions and disruptions. This finding constitutes a ‘red flag’ with regard to participants’ real ability to detect and manage potential volatility.

In fact, deficient sense-and-respond capability in most of the surveyed firms produced potentially serious blind spots. These blind spots – or information black holes – comprised several types:

- Most prominent across all companies – a lack of real-time demand data
- Inadequate supply chain financial data and emerging trade risk were more serious black holes for the largest companies ($5B plus)
- Supplier problems were more serious for manufacturers ($5B plus)
- Intra-company communication issues were more serious for 3PLs
- Distributors were more concerned about lack of visibility into schedule changes and shipment status

Other survey data about automating volatility management practices provided further evidence of a corporate divide along revenue size. Visibility of orders, inventory, and delivery/service levels had the most net automation of all activities across respondent companies. However, companies with higher revenues ($5B or more) were significantly more likely than those with smaller revenue (under $500M) to look to automation to drive collaboration with suppliers, optimize delivery frequencies, enhance communications with third party logistics providers (3PLs) and share demand/production plans and release schedules with supply chain partners.

In Part 3 of this paper, we relay comments from the senior executive interviews as to how volatility is changing corporate supply chain activities within their organizations.
Part 3: **volatility and its impact on supply chain strategy**

In the new business reality, predictable growth patterns and non-stop global expansion no longer are givens. As firms struggle not only to manage business uncertainty but to get out ahead of it, they are re-thinking virtually all aspects of their supply chains, including:

- Demand and production planning and management
- Inventory practices
- Supply chain partner relationships
- Network design and asset strategies
- Information strategies and capabilities
- Cost structures

The 15 senior executives interviewed as part of this research expanded on many of the concepts touched on in the online survey as to what organizations are doing to manage supply chain volatility. To address uncertainty, they are looking to cut inventory, shed assets, migrate to more variable cost structures, and optimize networks and processes to realize greater efficiencies. They also are looking to restructure the IT underpinnings of their supply chains and, in particular, take advantage of new collaborative computing architectures and technologies.

Executives described some of these changes, focusing on specific areas including demand and production management, transportation and supply chain technology.

**More flexible demand planning**

In the demand management arena, interview firms have implemented an array of strategies to mitigate the effects of economic volatility on their business. Greater flexibility forms the cornerstone of these efforts.

“We used to have formal, rigid annual budgeting,” one interviewee stated. “Today, we’ve moved toward a shorter-term, more flexible budgeting process linked closely to quarterly strengths/weaknesses/opportunities and threats (SWOT) analyses across divisions. Our intent is to create a more fluid, responsive, real-time demand planning capability.”

To spot demand changes more rapidly, this company created a centralized supply chain volatility monitoring group. Its mission: to constantly scan the global marketplace and mine company sales data for change indicators and new demand patterns. The group's goal is to identify which demand fluctuations are ‘ad hoc’ or one-off blips, and which reflect a true demand change – and execute accordingly.

At the same time, companies are embracing more adaptive inventory strategies. “We’re not trying to create perfect inventory levels, but instead create highly responsive systems that enable constant inventory adjustment,” one executive noted.

To support greater flexibility in responding to demand variability, this same organization has changed the way in which it contracts with 3PLs. Contracts are relationship-rather than transaction-based. They are partnership-oriented, longer term (five to seven years), and incorporate mechanisms that enable both parties to adapt to change. The over-arching goal of these partnership contracts is to be able to respond to demand variability as it occurs, while enabling longer term growth for both parties.

**Greater customer intimacy**

On the customer side, the economic meltdown made one thing perfectly clear – suppliers and customers no longer can afford arms length, disconnected relationships. That model impedes supply chain partners' ability to respond to and capitalize on change for the collective good. “Customer intimacy is the name of the game today,” one executive commented. “It requires a higher degree of collaboration between companies and customers, and includes such practices as ‘open book’ contracts, gain-sharing and longer-term business commitments.”

**Fluid production processes**

More flexible production capabilities go hand in hand with flex demand planning and customer intimacy. Customers – retailers, for instance – want access to inventory but don’t want to hold it. Manufacturers, similarly, cannot afford to carry excess inventory. This means that inventory levels across the end-to-end supply chain have been leaned out.
On the flip side, customer service performance requirements have never been higher. This creates a dynamic tension within the supply chain that can more easily result in cost or service failures if not managed proactively, and in real time.

Companies, therefore, are concentrating a lot of effort on developing more agile production capabilities that can better accommodate more frequent changeovers and shorter, smaller production runs – and do so profitably.

**Adaptable transportation management strategies**

Recent transportation capacity, rate and service volatility is forcing many businesses to completely re-think their transportation management strategies. When demand collapsed worldwide, for instance, ocean carriers mothballed hundreds of ships and adopted slow steaming practices. Shippers suddenly faced capacity shortages, longer transit times and higher rates. U.S. companies, as a result, began to question their Asia-only sourcing strategies and hedge their manufacturing bets. They revised production strategy to incorporate more near shoring and even domestic production.

Companies also rationalized their North American carrier and port networks. “We had 260 truckload (TL) carriers and 69 less-than-truckload (LTL) providers,” one manufacturing executive reported. “We took those numbers down to 70 and three TL and LTL carriers respectively. This exploits our scale so we get much better pricing. It removes complexity, simplifies our network, and significantly reduces potential volatility and deviation.”

That same firm consolidated its export volumes through two west coast ports rather than the four it traditionally had used. “We had been shipping from four west coast ports to nearly 30 manufacturing points in Asia,” the supply chain VP said. “We consolidated those moves into two funnels originating out of Seattle-Tacoma and Southern California. In Asia, we deconsolidated those two funnels and fan shipments out to our plants.

“We also put in better trace and track tools to monitor container dwell time closely so we keep the pipeline moving,” he explained. The company also upgraded its tracking systems to gain visibility into individual container contents. This visibility lets the company mesh material flow with production schedules more effectively, and in so doing, reduce material inventories worldwide. “We now can meter inventory into our manufacturing plants, exactly matched up with production schedules.”

**Cloud computing and visibility tools**

Visibility – on a real- or near-real time level – is essential in these more intimate business relationships. To gain this visibility more quickly and without huge IT infrastructure investment, leading companies are ‘moving to the cloud.’ Cloud computing among trusted trading partners (whereby shared resources, software and information are provided to computers and other devices on-demand via the Internet) facilitates quick, highly scalable collaboration that is not possible with older, fixed-connection models and technologies.

For virtually all companies, virtually regardless of industry, cloud computing enables more and better business collaboration. It also fosters closer bonds – i.e., greater ‘stickiness’ – between and among supply chain partners.

Visibility and collaboration tools are only part of a leadership IT strategy, however. Companies are investing in business analytics to enable them to identify trends faster and more accurately. Business intelligence (BI) tools mine data from myriad sources – point of sale, demand management, inventory, order, warehouse and transportation management systems – to generate actionable information on which to base supply chain and business decisions.

“Our ability to see all the way from manufacturing to shipping and receiving is critical,” one interviewee stressed. “End-to-end visibility can protect the supply chain from volatility.”
Enabling technologies such as warehouse management systems (WMS) and transportation management systems (TMS) feed into this overall supply chain information profile. Real-time operational data from these systems is especially important for large volume manufacturing operations, where the quantity of data can quickly slow down the supply chain. "Our warehouses can be up to 1.8 million square feet in size, so information processing can make the difference between a truly responsive and a lagging supply chain," said another executive interviewee.

**Part 4: Future directions and priorities**

Looking to the future, what plans or actions will companies take to improve their ability to manage business and supply chain volatility? The 301 online survey respondents reported several major focus areas. They will:

- Better synchronize their supply chains end to end
- Create more effective risk sharing protocols and capabilities across the supply chain
- Improve volatility process management
- Improve supply chain security and compliance

Companies also anticipate bolstering the information aspects of their supply chains, through upgrade investments in supply chain data sharing, data security and compliance, and systems to enable volatility surveillance more effectively.

**Supply chain synchronization**

Supply chain synchronization rated as the highest area of future focus among all types of volatility management practices. Survey participants want to improve the ability to synchronize their supply chains end-to-end. To achieve this goal, organizations indicate they will concentrate on four key areas:

- **Supplier relationship management** – Deploying new or augmented tools and processes to manage/monitor suppliers, including at-risk suppliers
- **Multi-channel, cross-channel e-commerce** – Use of e-commerce tools to enable a single face to the customer, allowing orders to flow in from a variety of sales channels
- **Transportation management systems** – To optimize load consolidation, tendering and coordination of shipments

- **Order management hubs** – To enable the complex distributed order management processes required by today's highly complex supply chains. Such hubs break down the traditional barriers between suppliers and customers, enabling seamless order fulfillment across the entire supply chain. They allow the many-to-many collaboration necessary to get out in front of supply chain volatility.

**Risk sharing**

A second focus of future supply chain volatility management improvement efforts will concentrate on improved risk sharing. Trading partners, virtually regardless of their role in the supply chain, seek new ways of working together to improve overall risk/volatility exposure. Their goal is to be able to more quickly sense and respond to demand, but do so in the most cost effective, service appropriate manner.

Survey respondents cited specific interest in developing better available/capable-to-promise (ATP/CTP) and vendor managed inventory (VMI) processes and capabilities as ways of sharing risk. Better ATP/CTP processes help organizations ensure accurate promising based on a comprehensive view of inventory and planned availability from virtually all sources, including with partners. ATP/CTP supports order promising and fulfillment, aiming to manage demand and match it to production plans and capabilities. Improvements in ATP/CTP enable closer coordination between suppliers and customers, to the benefit of both. They smooth out the supply chain and reduce/eliminate potential waste.

Companies reported plans to expand their VMI programs and capabilities through investment in software solutions that help automate the ability to trigger replenishment of customer stocks under the direct management of the supplier. As in the case of ATP/CTP, automating and improving replenishment processes takes both time and inventory – hence risk – out of the supply chain.

Third on the risk sharing improvement list was postponement management. While the ability to postpone product differentiation closer to the customer order is important, survey participants’ focus on closer demand supply/coordination indicates a belief in the rewards of this strategy. This suggests that the ability to more quickly sense and respond (proactive) to changes in demand is more critical than late-stage product differentiation (reactive).
**Improved volatility process management**

Nearly a third of survey respondents ranked business process management, standardized integration platform, and embedded business analytics as ‘high priority’ for enabling better volatility process management.

Priority components of volatility process improvement include:

- **Business process management** – Solutions to enable easily-configured customer and supplier B2B processes
- **Standardized B2B integration platform** – Simplify communications and onboarding of business partners and sales/distribution channels to create and manage communities
- **Embedded business analytics** – Enhanced business intelligence tools that not only report performance but that aid in process improvement, pattern detection, and real-time decision making
- **Small-partner enablement** – Provide tools such as web portals and fax-to-EDI conversion services that will provide a cost effective way to automate small to mid-sized trading partner relationships

**Supply chain security and compliance**

Secure file transfer is a priority for a greater number of individuals versus other aspects of Supply Chain Security and Compliance. Secure file transfer delivers secure connectivity and collaboration with customers and business partners against virtually any data format; also allows for ad hoc file transfer of critical documents and files.

Other future compliance focus areas include:

- **Financial/tax compliance solutions** – Automates invoicing, regulatory, and tax compliance processes for enterprises doing business across multiple countries
- **Import/export/other trade compliance solutions** – Automate response to trade regulations such as 10+2 for U.S. imports, denied party screening, and so on

**Better volatility surveillance**

In line with achieving the preceding four priorities, companies are looking to build their capabilities in supply chain surveillance and alerting systems. This includes gathering real-time information across a customer’s supply chain network allowing proactive management of supply chain disruptions, missed due dates or other exceptions. Real-time management information dashboards roll up surveillance data into actionable reports and alerts, thereby allowing management to make faster, better decisions.

**Part 5: Conclusions and the way forward**

It is clear from the online survey and in-depth executive interviews that agility and responsiveness as unique supply chain disciplines are on the rise. Most companies have cut costs and inventories over the past two years, and will continue to do so. But the real opportunities in supply chain management lie in improving agility and visibility.

There is a lot of work yet to be done in this area. Largely manual, ad hoc trading partner collaboration practices continue to be the norm rather than the exception. Volatility management cannot improve if these processes are not automated, connected and streamlined.

Information black holes abound in areas such as demand and supply management. Better synchronization with external trading partners, made possible by enabling technologies and win-win business relationships, can virtually eliminate these black holes. Companies must get better at sensing, responding to and verifying supply chain activities and events. This, in turn, will overcome trust issues, and ultimately free companies up to manage supply chain volatility from a proactive rather than reactive perspective.
**Definition of terms – The six key focus areas**

**Volutility process management** – Having documented, formal definitions of what kinds of volatility matter (demand, new product, quality, economic, etc.) and how the organization will respond to each; having formal processes for managing trading partner activity

**Volutility surveillance** – The ability to sense, evaluate and respond to supply chain risks and volatility

**Risk sharing** – The ability to effectively collaborate with customers and trading partners on appropriate levels of inventory, shipment strategies, postponement strategies, etc.

**Risk outsourcing** – Outsourcing of IT, manufacturing or logistics processes as a means of quickly increasing or decreasing scale, minimizing capital expenditures and staying current with rapidly changing compliance requirements

**Supply Chain Synchronization** – The ability to seamlessly, automatically synchronize order fulfillment across a wide number of trading partners and/or internal business units

**Supply chain data security and compliance** – The ability to exchange data and intellectual property securely and efficiently with trading partners, in compliance with all local regulatory requirements, and with appropriate contingency plans in place