The ROI of Supply Chain Resiliency:
It's More Than You Think

A White Paper by Sourcing Innovation

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Introduction

Supply chain resilience is becoming more important by the day because the frequency, magnitude, and associated costs of supply chain disruptions are increasing by the day. The frequency of disruptions is now such that the likelihood that a manufacturing organization will ***not*** experience a disruption in the next twenty four months is a mere 2%!

This means that a disruption is all but inevitable for the average organization –- and without resilience, the impact of such a disruption could be significant. In the UK Manufacturing sector, the average cost of a single disruption is £230,000, not counting the cost of management time to deal with the disruption, revenue losses from lost customers, or the impact on the organization's reputation. (Reputation losses also can be significant. A study by Cirano found that a one-point decrease in reputation was associated with an average market loss of $100 million for a Fortune 50 company in the US.)

As a result, most organizations understand the importance of proactive supply chain risk and resiliency strategies, but lack a clear understanding of what return on investment (ROI) they might expect by investing in these types of programs. This white-paper will examine the different types of cost savings that can be obtained through a proactive supply chain risk and resiliency strategy based on supply chain visibility, and also provide a model that can be used to calculate the ROI that could be obtained from an effective supply chain risk management program enabled by good supply chain visibility.

Minimum Requirements for Attaining ROI with Supply Chain Resiliency

Building a resilient supply chain is not an easy task, given the wide range of preventable, strategic, and external risks of an economic, environmental, geopolitical, societal, and technological nature that can befall an organization. The World Economic Forum's 8th Annual Global Risks (2013) Report covered a landscape of 50 external, global, risks that can affect an average organization.

To support a truly resilient supply chain and drive the required return on investment will require a solution partner and platform that includes the following key features and functionality:

Key Feature	Key Functionality
Multi-tier Data Repository	• Tier 1, tier 2, … tier n (raw material) suppliers • Facilities and locations • Products, supporting facilities, supporting services • Logistics carriers and 3PLs • BoMs, AVL's, and associated demands and revenues • Extensible data model to hold all relevant information • Scalable architecture to allow for growth
Supply Chain Risk Analysis	• Financial, location, supply, etc. and aggregated risk scores • Aggregated supplier, category, product, part, regional, and country risks • Heat Maps by supplier, location, category, etc. • Single point of failure and hotspot identification • Multi-tier risk and mapping visualization • Single sourced parts / product risk • Recovery risk scores and business impact analytics • Exportable Risk Assessment Reports
Supplier Management	• Financial and risk data, risk scores, and criticality • Facilities and locations and recovery times • Products and services • Key personnel and emergency contact information
Product Management	• Suppliers and their sub-tier supply chains • Alternate suppliers and facilities • Product BoM, demand, risk data, and revenue impact
Scenario Planning	• Alternate supply chain identification • Support for continuity plan creation and management on a supplier, category, or product basis • Definition of supplier, location, category, product, and other custom risk thresholds for monitoring purposes • What-if impact analysis on NPI (design for resiliency)
Global Crisis Monitoring	• 24x7x365 global event monitoring • Filtering to ignore duplicate and non-impactful events • Automated identification of potentially affected suppliers or products and end-user notification • Automated alerts when the risk threshold for a supplier, location, category, product, etc. is reached
Crisis Response & Recovery Management	• Crisis tracking • Suppliers and products impacted and impact severity • Mitigation and continuity plan selection • Prioritization and resource assignment • Execution workflow and progress tracking • Metrics and reporting

Despite the cost and effort involved in implementing a solution or platform, integrating it into supply chain processes, and transforming the organizational supply chain into one that is resilient, the benefit of doing so will deliver a significant ROI. For example, a $1 billion manufacturer will save over $3 million annually as a result of operational improvements alone, and can expect to save an additional $11 million, or more, as the result of preventing just one significant supply chain disruption.

The ROI of Supply Chain Resiliency

To calculate the ROI of supply chain resiliency, it is first necessary to understand the costs associated with a supply chain that is not resilient – the costs that make up a supply chain.

Whether they are for physical or virtual goods and/or services, there are a plethora of costs at each step in the supply chain. In a physical goods supply chain, the costs start adding up as soon as a miner picks up a shovel or gets into a commercial digger to mine raw material and continue to accumulate until the product is returned by a consumer, reduced into its component parts for recycling or converted back into raw material form to power another supply chain.

In a services supply chain, the costs start adding up as soon as the first person takes the order for a repair service on a machine on a production line and continue to pile up until the plant is shut down. These costs include labor, overhead, raw materials, production, transportation, insurance, sales, and warranty, among others. While these costs are usually broken down into fixed and variable cost-categories, a more meaningful breakdown focuses on recurring and one-time costs. Savings are found when recurring costs are reduced and one-time costs are eliminated.

The ROI of a resilient supply chain primarily comes from taking advantage of recurring savings opportunities and eliminating one-time costs associated with disruptions.

Savings Opportunities on Recurring Costs

Recurring costs include manpower costs, associated overhead costs, raw material and component costs, cost of goods sold, transportation and insurance costs. These costs are necessary for the supply chain to function and cannot be eliminated. Savings come by reducing these costs or from controlling their rate of increase

during times of (high) inflation. Multi-tier supply chain visibility is critical to success in cutting or controlling these costs.

Sourcing Cost Avoidance (Advanced Sourcing)

What does multi-tier supply chain visibility have to do with sourcing? Everything. Thanks to Aberdeen Research, it has been known since 2005 that advanced sourcing techniques, which generally revolve around spend analysis and decision optimization, reduce organizational spend, on average, by 12%.

However, what wasn't so obvious until recently was the value of multi-tier visibility. For example, a 2012 FERMA4 study found that the majority of firms with advanced risk management practices, built on good end-to-end supply chain visibility, had EBITDA growth over 10% and revenue growth over 10%. The EBITDA growth came from lower costs. The lower costs resulted from better sourcing decisions enabled by better multi-tier supply chain visibility and total cost-of-ownership models. While the degree of savings enabled by multi-tier visibility will vary from organization to organization depending on the complexity of the supply chain, an organization can expect to save, on average, an additional 15% if it has the multi-tier visibility required to do informed multi-sourcing.

A recent comprehensive computational study, undertaken by Haitao Li and Mehdi Amini and published in 2011, also has demonstrated that multi-tier visibility can drive cost savings of up to 15%, on average. Why the savings? Their analysis of 2,000 scenario variations of a five-tier multi-echelon supply chain for PC assembly showed that with multi-tier modeling, an organization can apply a model that builds in the impacts of potential, and likely, supply chain disruptions and that, when solved, yields a true multi-source solution that is resistant to disruption and that will prevent the need for costly re-sourcing exercises that are common when an organization needs a component now and has no other choice but to go back to market on short notice. (According to research conducted by IBM, re-sourcing efforts will increase costs by up to 30% over the "optimum" solution.)

This study serves to bring home the unique value provided by a multi-tier supply chain visibility solution:

1. It allows an organization to build real world sourcing models and take both cost and disruption impact into account
2. When the organization can't multi-source from tier 1 providers, it can help the sourcing team identify options other than inventory stockpiling to address risk. These options include building a strategic relationship with sub-tiers, buying raw materials or parts on behalf of (sub) tier suppliers, etc.
3. When no other strategic options are available, it can help the organization determine the right amount of inventory to stockpile because it will provide a more accurate picture of the necessary recovery times and associated

supply chain costs to accurately trade-off inventory versus second-sourcing costs.

Without multi-tier visibility, not only is a supply management organization unable to build accurate cost models necessary for cost optimization, but it also is unable to factor in the effects of supply chain disruption at various supply chain levels and make supplier awards in a resilient way. What most organizations fail to realize, and what most solution providers offering strategic sourcing decision optimization solutions fail to point out, is that the *optimal* solution returned by the model when only a single supply chain tier is taken into account is very sensitive to the data provided and underlying assumptions, which may not be realistic. Even a minor change in pricing, lead time or availability can have major impacts on the ultimate cost.

Many sourcing cost reduction opportunities will not be discovered without a comprehensive modeling effort which relies on cost and lead time data from all levels of the supply chain as well as data on the impact of disruptions. This type of data is not available unless the organization has multi-level visibility into its supply chain.

So what does visibility mean when sourcing for an average $1 billion manufacturing organization? Considering that a typical best-in-class, manufacturer will spend 58% of revenue on suppliers, that over 50% of this spend will be direct, and that 90% of this spend will be under management, it has the potential to find reductions on over $260 million of spend. If the organization has 80% of this spend mapped end-to-end in a good supply chain visibility solution, and sources at least one third of this spend every year, then almost $69 million of spend can be affected annually. If the organization is able to find an additional savings of just 3% (which is a mere 20% of the 15% savings enabled by advanced sourcing techniques) due to good supply chain visibility, that's another $2.1 million it can save every year thanks to multi-tier supply chain visibility.

Many real-world examples of this type of savings have been published. The Pepsi Bottling Group, for example, decided in 2005 to move from an annual sourcing process that was left up to the business unit directors to implement as they saw fit to a network-based approach in 2007 which implemented an optimized production sourcing strategy that aligned the disparate business functions. Even without the full depth of multi-tier supply chain visibility and modeling capabilities offered by current tools, Pepsi was able to save $6 million on $201 million of spend, or 3%, on raw materials and supplies alone, decrease transport miles by 2% (and fuel costs), increase ROIC from 7.6% to 7.8%, and, most importantly, reduce warehouse out-of-stock levels which produced an additional $12.3 million cases of inventory for sale.

And these savings are just the tip of the iceberg. Consider the early success achieved by P&G when it adopted advanced sourcing and decision optimization in 2003 and subsequently applied it to $3 billion worth of raw ingredients, packaging, service,

and transportation categories, modeling the network whenever possible. With input from suppliers, it was able to identify almost $300 million, or 10% of spend, in savings opportunities.

Effective recurring cost reduction, however, cannot depend on effective sourcing and procurement alone. A focus on other areas of supply chain visibility and resiliency – areas such as manpower and insurance – is also critical to ROI success.

Manpower Reduction

A detailed investigation will generally reveal that the biggest cost in any supply chain is manpower. An average manufacturer might spend 59.9% of revenue on the goods and services it sources from a company that employs a lot of manpower to produce them from raw materials that are mined by a company that employs a lot of manpower to mine those raw materials. The farther back in the chain one goes, the greater the percentage of money being spent on manpower vs. the goods and services being sourced. These manpower costs, especially those focused on non-value-added tactical or administrative functions, can add up fast and cost a reasonably sized procurement organization millions of dollars a year.

Good supply chain visibility significantly reduces two types of manpower costs in an average supply management organization: Supplier Information Management (SIM) and risk management event monitoring.

When one considers that a large organization can easily have 20,000 suppliers, maintaining supplier information takes a considerable amount of effort, especially considering the breadth of information required by the supply management, engineering, accounts payable, risk management and logistics departments of the organization.

In fact, Gartner found that an average $1 billion company spends 1,000 hours every week managing suppliers and their information. This time is primarily spent on data entry and maintenance, contact requests for updated data, compliance monitoring, performance monitoring, accounts payable and invoice verification. At least one-quarter to one-half of this time is spent on supplier information management alone, which is the equivalent of 6 to 8 FTEs (Full Time Employees) for a $1 billion dollar company.

At an average fully burdened cost of $114 thousand a year for a large manufacturing organization (based on CAPS data), an average $1 billion company is spending almost $1 million annually on the creation and maintenance of supplier data – and this is probably a low estimate.

If an organization has a good web-based supply chain visibility solution, this data can automatically be collected, monitored, and updated from available data sources and suppliers can be given the tools to maintain their own data. If the visibility

solution covers the suppliers that constitute over 80% of the annual spend, over 80% of the work will be eliminated and the organization will save about $700 thousand a year on SIM.

Risk management event monitoring also takes a considerable amount of staff time. A typical $1 billion manufacturer has 72 full-time category sourcing managers and 20% of these will be senior buyers and managers who will need to spend at least 20% of their time monitoring for potential supply chain disruption events to keep disruptions to a minimum.

As a result, an average $1 billion manufacturer has, or should have, the equivalent of three FTEs, or more, dedicated to simply monitoring for events that might pose a risk and analyzing their potential impact. The total cost: another $350 thousand, or more, being spent on data gathering and analysis that can be fully automated by a good supply chain visibility solution that monitors news sources, identifies the affected locales, cross-references the locales with the organization's supplier and product database, and only presents a risk management professional with an analysis of the possible severity and (financial) impact to the company of those events that could potentially disrupt a source of supply. This reduces the amount of time a risk management professional needs to spend analyzing risk by over 90%, allowing them to focus the majority of their time on risk prevention and mitigation.

CBI Insurance Rate Reductions

Most organizations, and finance personnel, think insurance is insurance is insurance and the premium is the premium is the premium, but that's not the case. The premium, especially where Contingent Business Interruption (CBI) is concerned, is based heavily on the insurance company's assessment of the risk inherent in the organization's business -- and the less visibility the insurance provider has, the higher the risk the insurance provider assumes by default, and the higher the premium that the company has to pay.

Contingent Business Interruption insurance premiums are on the rise as a result of a run of recent disasters and product failures in manufacturing supply chains. Insurers are scrutinizing BCI and other types of (supply chain) risk insurance contracts much more carefully than in the past and companies are being asked to take steps to demonstrate supply chain resilience before such contracts are issued.

The average company currently pays 10 cents to 12 cents per $100 of CBI insurance. That doesn't sound like much, but for a billion dollar manufacturer that needs to carry $100 million in CBI insurance, that's $100,000 a year. However, a company with good supply chain visibility can often get those rates reduced to 4 cents to 6 cents per $100 of CBI insurance, a 50% savings that recurs year after year, by proving that it is low risk. For an average billion dollar manufacturer, this easily amounts to $50,000 in recurring insurance savings.

Zurich's approach to supply chain insurance provides an excellent example. Zurich underwrites polices of up to $100 million and at least 85% of its insured organizations will experience a significant disruption in the next 12 months. To avoid large losses and financial instability, Zurich must price its insurance policies very carefully. As a result, before it will provide a quote for a large policy, Zurich undertakes a supply chain risk assessment that evaluates the potential client's supply chain map, key supplier details, risk factor information on key suppliers, and various risk scenarios based on a detailed framework that looks at twenty-three different supply chain risk factors.

Needless to say, the less information the client organization has on its supply chain, potential risks, and mitigations that are in place to prevent those risks, the riskier the client organization is from Zurich's perspective and the higher the quote the organization receives (if the organization is even provided a quote). The insurance saving opportunity might not be as substantial as some of the other savings opportunities, but it exists and recurs year after year and, over time, adds up, and as insurance rates continue to rise for the risky, the savings will increase.

Moreover, the insurance savings don't end with the premium reduction. According to a recent article in *New Century Transportation*, Supply Chain Digital is reporting that companies that experience large-scale disruptions are facing penalties from their insurance providers because they have failed to properly identify risks. In other words, in addition to year-over-year savings on the premium, there are one-time savings each time a potential disruption is averted because of a mitigation enabled by good supply chain visibility.

Savings Opportunities on a Per Disruption Basis

Per disruption savings and one-time costs include expedited shipping, (temporary) contingent labor, extra costs associated with temporarily switching to an alternate source of supply, and one-time costs associated with recalls and settlement payouts. These are costs that can often be eliminated, or greatly reduced, by making sure the supply chain runs smoothly. For example, accurately predicting orders and getting them in on-time generally eliminates the need for expedited shipping, accurately planning work and staffing daily operations greatly eliminates the need for contingent labor, and improving quality control to prevent defective products from reaching the end consumer will prevent recalls and lawsuits likely to result in costly payouts. The need to temporarily switch to an alternate source of supply generally occurs when a disruption occurs. Accurately monitoring supplier risk will prevent the organization from selecting a supplier in trouble, or in a troubled region where disruptions can be predicted with a high-degree of likelihood, and limit disruptions to unpredictable events like natural disasters. Immediate notification of a disruption will allow an organization to identify and acquire an alternate source of supply with less urgency, allowing the sourcing team to negotiate a better deal without having to bear expedited shipping costs.

Organizations today have an even greater opportunity to reduce the intermittent costs they experience every year. Their challenge is to eliminate, or at least greatly reduce, the need for expedited shipping, (temporary) contingent labor, extra costs associated with temporarily switching to an alternate source of supply, and one-time costs associated with recalls and settlement payouts. And while it might be impossible to plan for, or prevent, every contingency that can arise, it's usually the case that the majority of one-time incidents leading to extra, unnecessary costs can be prevented.

As already indicated, better planning improved by good visibility can eliminate the need for expedited shipping. Better planning also can greatly minimize the need for contingent labor, and better quality control, which is always enhanced with better supply chain visibility, will significantly reduce the defect rate in an organization's supply chain. And better monitoring will prevent defective products from being released to the customer, thereby preventing recalls.

Crisis Containment Savings

When a significant disruption occurs in an organization's supply chain, it can cost the organization millions, and if the disruption is severe, it can bankrupt the organization. While it is the case that most major disruptions don't bankrupt a company, it is also the case that most major disruptions cost a large company (tens of) millions to recover from, and that the most significant disruptions cost close to half a million dollars to recover from, or more.

Consider the case of the Boeing 787 Dreamliner. Almost four years late to market, a series of supply chain disruptions facilitated a supply chain train-wreck costing Boeing between $4 billion and $5 billion in additional development costs.

Boeing provides an appropriate example because, according to Zurich's recent 2012 report on *The Weakest Link* that studied UK Plc's Supply Chain, 86% of firms surveyed in manufacturing experienced significant disruptions in the past year, and 21% reported experiencing more than 10 disruptions in the past year! Supply chain disruptions are now so common that an organization has a one in five chance of experiencing 10 disruptions in a single year.

If a significant disruption occurs, it is critical to contain the crisis as quickly and efficiently as possible, or costs will escalate rapidly. The 2012 Zurich study found that the average cost of a single disruption was £230,000 pounds or $360,000 dollars before management time, lost customers, and damage to corporate reputation (which could be substantial) is factored in. Without quick and proactive efforts to mitigate a supply chain disruption, an organization can expect to lose 11% of the revenue at risk from a disruption according to Zurich. Given that a major disruption for a $1 billion manufacturer will often put 10%, or more, of the organization's revenue at risk, this translates into a revenue loss of over $10 million from a single disruption for a $1 billion manufacturer.

However, if the organization has good supply chain visibility and advance warning, it can obtain another source of supply before production lines halt, shipments are missed, and stock-outs occur. The cost savings associated with being able to act rapidly are substantial. Even though there will be a premium as high as 30% of spend associated with having to obtain another source of supply on short notice, the cost savings from not having to deal with a full-blown crisis will be significant.

CAPS Research has determined that the average manufacturer spends 58% of revenue on sourced products and services. Even if costs across the board on affected revenue increased 30%, costs would still be capped at 75% of affected revenue, and the loss would then be capped at 17% of affected revenue. If the disruption impacted 10% of company revenue, maintaining 83% of that revenue adds 8% to overall company revenue and significantly impacts the bottom line!

Of course, crisis containment requires good visibility – specifically, it requires that the organization have visibility into a disruption early enough to take the necessary actions to mitigate it. Without this visibility, the organization will not be able to contain the crisis. But with this visibility, the organization will save millions.

Inventory Cost Avoidance from Good Crisis Containment

When a disruption occurs, typically only one raw material or component in an assembly becomes unavailable. The other raw materials or components used in the organization's products remain unaffected and the non-affected suppliers continue to deliver those products on the agreed upon schedule. As a result, inventory of these raw materials and components builds up, and so do the inventory carrying costs, which can approach 30%.

Inventory is not cheap. In addition to the capital that is tied up in the inventory, there are the facility storage costs (which include rent, overhead expenses for services like security, and property taxes), and the possession costs that include, but are not limited to, clerical costs (to track the inventory), insurance (to insure the inventory as a whole), theft (as the insurance policy will have a deductible and a maximum claim), taxes (when the organization takes possession), deterioration (as some inventory will get damaged or spoil), depreciation (as most components decrease in value over time), and obsolescence (if the inventory cannot be used in time). Having inventory sit idle as a result of a disruption is very costly.

How costly? According to IBM, the average supply chain disruption is six weeks, or about 1/8th of a year. Many sources, including the IMS (Inventory Management Society) estimate the average cost of carrying inventory is 25% per year. As a result, the average inventory carrying cost during a disruption is over 3% of the value of the inventory, where the value is equal to the amount spent on the inventory (as it has not yet been incorporated into a value-add product). If the disruption impacts a $100 million spend category, consequently, the organization can expect to flush $3 million down the drain in inventory carrying costs alone.

Shareholder Value Preservation

Every disruption results in lost shareholder value. Sometimes the loss is minor and recovered in a few weeks, or months, and sometimes it is significant and not recovered for years, if ever. This is especially true for reputation losses if the disruption becomes public and press coverage has a negative angle to it, such as child labor in the supply chain or a dangerous chemical or oil spill.

In a report published by CIRANO in 2012 on "Corporate Reputation: Is Your Most Strategic Asset at Risk?," the authors found that a one point decrease in reputation is associated with an average market loss of about $5 billion if the methodology is applied to the top 50 listed companies. And the situation can be much worse. For example, the stock price of BP fell by 52% in 50 days as a result of the Gulf of Mexico oil spill when the Deepwater Horizon drilling rig exploded on April 20, 2010.

In a study by the World Economic Forum and Accenture that was published earlier this year on "Building Resilience in Supply Chains," the organizations found that, on average, supply chain disruptions reduce shareholder value by 7%. This study was based on an analysis of 62 supply chain disruptions that were publicly announced during 2005 to 2011. For a company with a market value of $1 billion dollars, that's a decline in shareholder value of $70 million.

This is slightly better than the average decrease in shareholder value of 10.28% that Hendricks and Singhal found in 2003 in their paper on *the effect of supply chain glitches on shareholder wealth* where they focused on the effects of supply chain problem announcements. However, their 2005 finding, published in *an empirical analysis of the effect of supply chain disruptions on long-run stock price performance and equity risk of the firm*, that announcements of supply chain problems can, in the longer term, result in a mean abnormal return of nearly -40% coupled with significant increases in equity risks, still stands.

The ROI of Multi-tier Supply Chain Visibility: Some Enterprise Examples

Headquartered in Singapore, Flextronics is a Fortune Global 500 contract manufacturer and distributor servicing major original equipment manufacturers (OEMs). It operates in 30 countries around the globe and works with thousands of suppliers worldwide to source hundreds of thousands of parts globally.

To help it bring its supply chain under control, Flextronics employed the Resilinc Supply Chain Visibility solution that mapped out its end-to-end supply chain. Having this data readily available enabled it to react more quickly during the Thailand floods and focus its recovery efforts on the 100 most critical impacted parts within a matter of days. This enabled Flextronics to avoid revenue and margin loss that would have otherwise occurred.

Flextronics was able to prevent this revenue and margin loss because it had end-to-end visibility into its supply chain and subscribed to a monitoring service that monitored global news feeds for events, including natural disasters, that could disrupt its supply chain. Flextronics knew within 24 hours that the industrial park that housed key suppliers was flooded, as well as which suppliers were in the park and immediate vicinity and which parts were produced by those suppliers. The company also was able to identify all suppliers in nearby industrial parks, and parts they produced, and had that complete list before the floods spread to those parks.

Within a week Flextronics had identified 20 suppliers that would be impacted and within two weeks, had identified 30 suppliers that would be impacted, as well as a thousand factories. These factories collectively produced almost 2,000 parts that would likely experience production disruptions and shortages.

However, because Flextronics had their supply chain fully mapped, and could pull in the current inventory and projected demand (and revenue) for each part, they were able to filter out those parts that were single sourced (as dual-sourced parts could be picked up from another supplier), low in inventory (as these represented disruptions in the near-term), and required in the production of high-revenue products (which typically make up the majority of a company's revenue stream). This allowed Flextronics to pair the list of parts of interest down from 2,000 to 100 for which alternate sources of supply had to be identified. While 100 parts is still a significant number of parts to have to find alternate sources of supply for in the short-term, it is a manageable number for a global sourcing team armed with all of the information it needs to do its job and an achievable number given notice.

Multi-tier supply chain visibility enables crisis containment and lack of visibility often results in a crisis. The Boeing 787 Dreamliner sourcing mishaps provide an excellent example of this.

Before going into production of the 787, Boeing changed its sourcing strategy. Key changes included outsourcing the majority of the major subsystems and assemblies to over 1,200 tier-one suppliers and giving them complete responsibility for these subsystems. These suppliers, in turn, contracted out sub-assemblies and components to thousands of tier-two suppliers who in turn contracted out sub-sub-assemblies and parts to thousands of tier-three suppliers.

Boeing, consequently, was receiving assemblies and components from over 5,400 factories across 40 countries belonging to tier-one suppliers and had no way to track who the tier-two and tier-three suppliers were or how they were performing. As a result, some tier-two suppliers were selected to produce components for which they had no experience. For example, after a lithium ion battery was involved in a fire onboard a Japan Airlines 787 flight, it was discovered that the tier one-supplier responsible for the electrical system (Thales) outsourced the lithium ion battery to a tier-two supplier (Yuasa) that had no experience in developing or building lithium batteries for commercial aircraft!

Boeing also experienced major delays every year during the construction process (including the shortage of bolts in 2007, a 58 day strike in 2008, major problems with suppliers in South Carolina in 2009, a lack of availability of the Rolls-Royce engines and a major delay in horizontal stabilizer delivery in 2010, and the electrical system problems in 2011) because it lacked immediate visibility into the causes of the disruptions as soon as they happened. Boeing would then have been able to take mitigating actions much sooner.

The year or two of delays that resulted from a lack of multi-tier supply chain visibility proved to be very costly to Boeing. Given that each year of delay cost Boeing over $1 billion dollars, the ounce of prevention that would have been provided with good visibility would have yielded considerably more than a pound of cure.

RFID: The Lower Boundary on the Value of Visibility

Given that the event monitoring and reporting technology required for deep supply chain visibility is new, and that success stories are limited to the supply chain leaders that also employ other advanced supply chain management technologies and techniques, it is understandable that one might be inclined to underestimate the value of visibility and the crisis containment that it enables, despite the examples provided above. However, there is a well-established baseline that can be used to provide a lower boundary on the value of visibility known as RFID.

RFID, short for Radio Frequency Identification, was developed to allow the automatic identification and tracking of inventory using wireless non-contact electromagnetic fields that encoded the relevant identification on cheap, often read-only passive tags that consist of simple ICs (integrated circuits).

In CPG and Retail, keeping real-time track of inventory is of paramount importance as approximately 40% of lost sales are due to inventory problems which are not the result of a stock-out at the local store. (According to Wal-Mart, the RFID strategy leader, the number is 41%.)

Specifically, these lost sales result from the fact that an associate cannot find a product when a customer wants it because it has been misplaced in the store, warehouse or distribution network. This is a problem that can be corrected with RFID which, with the aid of a simple reader, can tell each worker where the item (package, or pallet) needs to go next. Indeed, the only inventory problems that RFID can't fix are those that are the result of human error. As a result, if an organization employs Six Sigma or other best-practice processes, and minimizes human error, it can easily achieve an 80% solution. For example, in the case of Walmart, reclaiming just 10% of the sales lost to inventory problems (which make up a mere 4% of lost sales) amounts to a 0.1% increase in revenue.

Extrapolating, just fixing inventory management problems due to lack of visibility within an organization's supply chain could increase revenue by 1%. Real-time visibility into supply chain disruptions is all about insuring inventory availability throughout the supply chain. When one considers that the average retail stock-out rate is 8%, resulting in an average sales loss of 4%, the value of visibility starts to become clear, especially when up to 30% of these stock-outs are a result of upstream supply chain disruptions and not shelf-replenishment or inventory management practices. In short, by not having real-time visibility into its supply chain and advance knowledge of disruptions, a retailer is losing out on an additional 1% (or more) of revenue. This might not sound like a lot, but for a sector with an average after-tax operating margin of a mere 3.5%, it's huge.

CPG manufacturers, however, face even greater supply chain visibility challenges than do retailers, and greater ROI potential. Even if 30% of a retailer's stock-outs are due to supply chain disruptions, that's typically only 2.5% of their product portfolio of hundreds, or thousands, of products. Most CPG manufacturers, on the other hand, will typically only manufacture a few dozen products, and a disruption in this case will have ten times the impact – demonstrating once again value of early visibility into supply chain disruptions and crisis containment.

The ROI Model

Simply put, the ROI model is the following:

ROI = Recurring Savings + Per Disruption Savings

where

Recurring Savings = Manpower Savings + Insurance Savings + Sourcing Savings

Per Disruption Savings = Crisis Containment + Inventory Cost Avoidance

Each savings number is calculated using the statistics and calculations described in the previous section. Table 1 outlines the potential ROI for a $1 billion manufacturer. A typical $1 billion manufacturer could expect to save approximately $3.1 million on an annual basis as a result of recurring supply chain savings and $11.1 million each time a major supply chain disruption is prevented. The savings will be slightly lower if the organization is more operationally efficient than average, and will be significantly higher if the organization is less operationally efficient than average. Note that shareholder value loss is not included in the basic model as shareholder value loss is minimal in those companies that are able to keep the disruption from the public.

As described in the previous section, the manpower savings come from SIM savings and event monitoring savings; the insurance savings come from the reduction in the organization's CBI premium; and the advanced sourcing savings come from better sourcing of Spend Under Management. The crisis containment savings come from preventing the losses associated with a supply chain disruption that disrupts supply, and the inventory cost avoidance savings come from reducing the raw material and component inventory on hand that sits idle while the organization is waiting for the last raw material or component needed for production.

RECURRING			TARGET SAVINGS	LOW (70%) ESTIMATE	HIGH (130%) ESTIMATE
Manpower	SIM	Approx. 1FTE per 166M	0.684 M	0.479 M	0.889 M
	Monitoring	Approx. 1FTE per 333M	0.263 M	0.184 M	0.341 M
Insurance	Premium Reduction	50% reduction on CBI	0.050 M	0.035 M	0.065 M
SUM	Advanced Sourcing	Approx. 2.1 M per B	2.061 M	1.443 M	2.679 M
		SUB-TOTAL	*3.058 M*	*2.141 M*	*3.975 M*
ONE TIME					
Per Disruption	Crisis Containment	Approx. 9% of affected revenue saved	9.089 M	6.363 M	11.816 M
	Inventory Cost Avoidance	Approx. 3.5% of affected spend saved	2.027 M	1.419 M	2.634 M
		SUB-TOTAL	*11.116 M*	*7.782 M*	*14.450 M*
		TOTAL	**14.174 M**	**9.922 M**	**18.426 M**

Table 1: Potential ROI for an Average $1 Billion Manufacturer

How much could an organization save with a resilient supply chain enabled by a good supply chain visibility solution? Using the expected savings calculations described in detail in the previous sections, and industry averages, one can quickly calculate an order-of-magnitude savings number based simply on the organizational revenue and the revenue associated with the largest product line that could be affected by a disruption using the following calculation where Revenue is the organizational Revenue in Millions and Affected is Affected Revenue of the largest product line in Millions:

$$((Revenue/166+Revenue/333)*0.114M + 5*Revenue/100{,}000 + 0.0021*Revenue) + (0.09*Affected + 0.035*0.59*Affected) \approx$$

$$(0.001 * Revenue + 0.00005 * Revenue + 0.0021 * Revenue) + (0.09 * Affected + 0.02 * Affected) =$$

$$\mathbf{(0.00315 * Revenue) + (0.11 * Affected)}$$

A validity check finds that a $1 billion manufacturer with a $100 million product line could save $3.15 M + $11 M = $14.15 M with a resilient supply chain solution.

Then, if the organization wants a more detailed estimate of the ROI it can obtain, it can do a more advanced calculation by completing Table 2.

Recurring				
Manpower				Total
FTEs required for SIM		* Avg Fully Burdened Cost		
FTEs for Event Monitoring		* Avg Fully Burdened Cost		
Insurance				
Current CBI Cost		* Expected Premium Reduction %		
Advanced Sourcing				
Spend Under Management		* Additional Savings %		
			SUB	
Per Disruption				
Crisis Containment				
Annual Revenue in Largest Category		* 9% Expected Savings		
Inventory Cost Avoidance				
Annual Spend in Largest Category		* 2% Expected Savings		
			SUB	
			GRAND	

Table 2: Detailed ROI Calculation for a Resilient Supply Chain enabled by Visibility.

A validity check using a $1 billion manufacturer with a $100 million product line, in Table 3, demonstrates an ROI of approximately $14.7 million.

Recurring				
Manpower				TOTAL
FTEs required for SIM	6	* Avg Fully Burdened Cost	0.115M	0.690M
FTEs for Event Monitoring	3	* Avg Fully Burdened Cost	0.115M	0.345M
Insurance				
Current CBI Cost	100K	* Exp. Premium Reduction %	50%	0.050M
Advanced Sourcing				
Direct SUM Sourced Yearly	86M	* Additional Savings %	3%	2.580M
			SUB	3.665M
Per Disruption				
Crisis Containment				
Annual Revenue of Largest Product Category	100M	* Expected Savings %	9%	9.000M
Inventory Cost Avoidance				
Annual Revenue of Largest Product Category	100M	* Expected Savings %	2%	2.000M
			SUB	11.000M
			GRAND	14.665M

Table 3: Detailed ROI Calculation for a 1 Billion dollar Manufacturer with a Resilient Supply Chain enabled by Supply Chain Visibility.

Conclusion

Headline: CEO and CPO Forced to Resign Due to Massive Supply Chain Losses

The CEO and CPO of XYZ Corp. resigned today as a result of intense shareholder pressure after the company experienced hundreds of millions of dollars in lost sales during the critical holiday season. XYZ Corp., a major global provider of electronics, was unable to keep up with demand after it incurred major supply disruptions as a result of massive flooding in the Chiba Toke Midori-No-Mori, Sodegaura Shiinomori, and Futtsu District Industrial Parks due to the recent Typhoon that flooded much of the Chiba Prefecture. XYZ Corp, which claimed it did not realize that the majority of the base components came from suppliers in the Chiba Prefecture Industrial Parks, stated that it expected that it's diversity in it's tier one supply base would provide a buffer against this type of disaster and that it should have had nothing to worry about. However, as noted by the head of the Supply Chain Program at ...

The ROI calculations presented in this report are based on solid industry data gathered and analyzed by top analyst and research firms including Aberdeen, Gartner, IBM and Zurich among others. One cannot deny is the possibility of the above headline being about your company is very real as long as your organization does not have a good supply chain visibility system in place. Not knowing whom your tier two and tier three suppliers are puts your organization at a significant risk if your supply chain contains a single point of failure. Just ask Boeing! When an aircraft has to be delayed because of a battery, which was produced by a sub-tier supplier that speaks volumes to the importance of supply chain visibility.

However, regardless of the severity of the risks that threaten to disrupt your organizations supply chain, and the magnitude of savings that are expected from the ability to employ good crisis containment strategies, the organization will still see a significant ROI from the existence of a good supply chain visibility solution. While our calculations project recurring savings of roughly 3 million per billion dollars of revenue, an organization which makes aggressive use of advanced sourcing after the acquisition of a good visibility platform, or which is able to offload a lot of SIM activities to the supplier or the service provider of the platform, has the potential to save considerably more than this, and increase the ROI well beyond the 10X that would be obtained if the solution cost less than 300 thousand annually and saved more than 3 million.

In conclusion, not only is supply chain visibility vital for any multinational with complex global supply chains, but the ROI the solution enables should pay for the solution at least ten times over.

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