Supply Chain Confidence

The Key to Effective Supply Chains Through Improved Visibility and Reliability

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This paper explores the impact confidence has on supply chain performance and its related costs. Businesses tend to concentrate on the traditional tangible elements of the supply chain, and fail to recognise the damaging effect that the lack of trust by its users and members can have. Although difficult to precisely quantify, the confidence factor can have significant impact on inventory levels and operating costs. One of the main drivers to increasing confidence is timely accurate information giving stakeholders true visibility along the supply chain.

Managing supply chains in today’s competitive world is increasingly challenging. The greater the uncertainties in supply and demand, globalisation of the market, shorter and shorter product and technology life cycles, and the increased use of manufacturing, distribution and logistics partners resulting in complex international supply network relationships, have led to higher exposure to risks in the supply chain. Further, it is essential to understand the risks your company bears versus your suppliers and customers. The supply chain is not necessarily a win/win environment.

Supply chain risks come in many different forms. First, the financial risks can be huge. Inventory costs due to obsolescence, markdowns and stock-outs, can be significant. Personal computers devalue by more than one percent per week. Recent statistics showed that retail markdowns constitute about 20% of total retail volumes. Mismanaged supply chains, leading to excessive or mismatched inventory, are thus liable to huge financial risks. Financial risks can also present themselves through the risk of reworking stock and penalties for non delivery of goods.

The complexity and uncertainty forces of a supply chain can also drive the “chaos” risks of a supply chain. These chaos effects result from over-reactions, unnecessary interventions, second guessing, mistrust, and distorted information throughout a supply chain. The well-known bullwhip effect, which describes increasing fluctuations of order patterns from downstream to upstream supply chains, is an example of such chaos. Deming called this “nervousness.” This increased nervousness will of course lead to higher costs and inefficiencies through over-ordering and ‘squirreling’ inventory.

The existence of nervousness and chaos in a supply chain also means that it is impossible to make the right decisions for every player in a supply chain. The risks of making the wrong or ineffective decisions, or decision risks, become the inevitable consequence. Thus, for example, it will not be possible to design optimal production schedules if there is uncertainty as to when materials or components will be available.

Ultimately, the supply chain is exposed to market risks, i.e., missing the market opportunities presented. A supply chain can not be responsive to changing market trends and customer preferences if the right market signals can not be obtained. A supply chain can not penetrate a new market segment due to its inability to change production or supplies to meet the new demands. Finally, market opportunities can be missed when customer orders with short order lead times could not be met.
A supply chain with high risk exposure cannot be efficient. A manager running a supply chain with these risks lacks confidence in the supply chain.

**Lack of Supply chain confidence**

<table>
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<th>No confidence in:</th>
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<tr>
<td>• Order cycle time</td>
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<td>• Order current status</td>
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<td>• Demand forecasts given</td>
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<td>• Suppliers’ capability to deliver</td>
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<td>• Manufacturing capacity</td>
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<td>• Quality of the products</td>
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<td>• Services delivered</td>
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**The Risk Spiral**

Where do these supply chain risks come from? There are evidently tangible risks in the supply chain which lead to its poor performance, but what are not recognised in the same way are the intangible elements, that of the attitudes and perceptions of the users and members of the supply chain. The intangible lack of confidence in a supply chain leads to actions and interventions by supply chain members, which collectively, could increase the risk exposure. A classic example of this is the potential reaction from the customer facing end of a business. For example, if a sales team believes that order cycle and order fulfilment times are not reliable, they will devise their own means of addressing this. They may order stock so as to have supplies to support their key customers and put in phantom (i.e., their own private buffer stock) orders to secure supply, all causing inefficiencies. This risk spiral exists everywhere, and the only way to break the spiral is to find ways to increase confidence in the supply chain. To do so, we need to understand the elements of the supply chain that can reduce the lack of confidence – visibility and control.

**Visibility**

Confidence in a supply chain is weakened when end-to-end order cycle time, i.e., the time it takes from when an order is requested by a customer through to delivery, is excessively long vis-à-vis the competitive market. The increased internationalisation of supply chains and the prevalent use of subcontract manufacturing, distribution and logistics partners can contribute to the length of time it takes to complete all the needed steps in the process. Associated with pipeline length is the lack of visibility within the pipeline. Hence, it is often the case that one member of a supply chain has no detailed knowledge of what goes on in other parts of the chain – finished goods inventory, material inventory, work-in-process, actual demands and forecasts, production plans, capacity, yields, and order status.
Control
In addition to visibility, supply chain confidence requires the ability to take control of the supply chain operations. Sadly, most supply chains do not have a great deal of control once the order is released. Hence, even if a supply chain manager has visibility of some part of the pipeline, he/she often could not make changes in a short time. For example, even if information is obtained on demand changes or on yield shortfalls, the supply chain manager may be helpless, since the suppliers may not be flexible to respond to any changes, or there are no expediting options available, or the production line is inflexible and production scheduling changes are not feasible, etc. Semiconductor manufacturers are often faced with this problem of lack of control. The long lead times by factories are such that, even if the manufacturer is made aware of sudden market demand changes, it takes a long time to respond so that the market opportunities are then missed.

Chaos
Without supply chain confidence, members of the supply chain are liable to chaos and decision risks. Sales people start over-ordering since they do not have timely visibility of the correct demand signals, or they know from experience that supplies may be late or insufficient to fill the complete orders. Production plans are based on inflated production lead times due to similar lack of visibility and control. “Safety lead times” are commonly used in standard MRPs, since production planners do not want to be blamed for production delays. The lack of means to expedite or flexibility in manufacturing also mean that any yield shortfalls or production downtimes have to be made up by additional production, and as a result, lead times are stretched out in production plans. The irony is that, when planned production lead times are inflated, actual lead times will gradually match the planned target, a human behaviour known as Parkinson’s Law, which states that when a goal is too lax, then the tendency is for workers to relax and actually “achieve” the goal.
**Buffering**

Without visibility and control, it is common that the supply chain is plagued with buffer inventories. Buffering is another means employed by supply chain managers to hedge against the uncertainties and risks in the supply chain. Excessive inventory of course leads to higher financial risks. Another means by which supply chain managers hedge against supply chain uncertainties and risks is investing in excessive capacity. The well-known episode of 1995-6 in the semiconductor industry is such a lesson. The condition of 1995 was chaos, with many IC orders left unfilled, lead times were excessive, and supplier unreliabilities were at an all-time high. Worried that demand would continue to outstrip supply, semiconductor manufacturers were concerned with ways to assure supply. The problems faced by fab-less semiconductor manufacturers were even more acute. Without clear demand and supply visibility throughout the supply chain, and the feeling of not having control of their own fabrication capabilities had resulted in many fab-less semiconductor manufacturers finding ways to invest in capacity – some purchased pre-paid wafer capacities with foundries, some co-invested in new fabrication lines with their foundry partners, and some toyed with ideas like capacity options in the same way that options work in the financial market. When the 1996 market did not turn out to be as rosy, many of these manufacturers incurred significant financial losses. Without confidence, logistics providers also have to build slack into their operations. Quoted transportation lead times may have built-in safety times, and extra shipping capacities may need to be purchased. Lacking visibility of shipment and requirement schedules, unnecessary expedite shipments may be taken, or the wrong mode of transportation is used.

The lack of confidence also makes it difficult to be responsive to customers, to react to changes in market conditions, and to be competitive in providing customer service. Lead times quoted to customers tend to be longer, since added protection is needed when the sales representative does not have confidence in the supply chain. Similarly, contracts may be constructed in such a way that does not give much flexibility to the customers, and special requests by customers are turned down. The supply chain is no longer competitive. The supply chain is thus liable to market risks. This is exactly what Adaptec, a semiconductor manufacturer, was faced with in 1997. The inability to quote precise order lead times to their customers, and the failure to meet the lead times reliably have resulted in loss of market share.

With excessive buffer inventory and capacity throughout a supply chain, as well as long pipelines from end to end, the information pertaining to the status and problems within the supply chain is also less available. It is even harder for the supply chain to be visible, and prompt actions to respond to irregularities or unexpected events are less feasible. Thus, there is even less confidence in the supply chain operation, and the vicious cycle of the risk spiral repeats itself – lack of supply chain confidence creates excessive supply chain risks, which in turns breeds actions by supply chain members that would further erode the confidence of the supply chain.
Supply Chain Confidence

Lack of confidence in practice

<table>
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<tr>
<th>Business Area</th>
<th>Lack of confidence outcomes</th>
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| Sales                  | ▪ Over order to hold buffer stocks for key customers  
                          ▪ Over quote on delivery times to customers - may loose the order 
                          ▪ Misuse of samples to compensate for lack of stock |
| Customer Service       | ▪ Cannot give accurate information on resolving supply issues  
                          ▪ May order buffer stock to assist customers |
| Operations             | ▪ Can derive no patterns on sales due to lack of confidence in other areas – forecasting becomes inaccurate and the trend continues 
                          ▪ Likely to over produce to compensate for other areas lack of confidence |
| Marketing              | ▪ Delays in essential product launches due to uncertainty of supply |
| Raw material supplier  | ▪ Does not have accurate forecasting and has suffered from previous emergency requirements, starts to hold more stock and passes the cost onto their customer |

Supply chain confidence reflects the perception of performance reliability at each step in the chain. In other words how much faith do the various players in a supply chain have in the ability of those ‘upstream’ of themselves to do what they say they’re going to do.

The higher the confidence the greater will be the willingness to reduce safety stock for example. Equally once confidence is gained there is likely to be a greater willingness to move further in terms of substituting information for inventory.

Where should supply chain confidence be measured? If we consider the supply chain to be, in effect, a chain of customers, then we should be seeking to measure the degree of confidence that each ‘customer’ in the chain has with their upstream ‘suppliers’. Because confidence is all about perceptions, it is perceptions that should be measured. As well as measuring this qualitative aspect of confidence, it should also be possible to find tangible measures of confidence. For example, how many days of inventory are carried at each step in the chain? Supply chain mapping is a helpful tool for highlighting those points where inventory is highest and therefore, presumably, where confidence is lowest.
To restore supply chain confidence and break the risk spiral, we must address the two basic elements of supply chain confidence: visibility and control.

Total end-to-end visibility will enable supply chains to be transparent, and the right information would be available to the right member of the supply chain at the right time. Enabling adequate control levers to be accessible by the partners will also allow prompt actions to be taken when information revealed such needs. Both visibility and control are critical for restoring supply chain confidence, although in some cases, one may take priority over the other. For example, in the figure below, we show how visibility and control are needed in situations with differing lead times and on-time performance.

Here are a few key levers to break the risk spiral:

**Information Accuracy, Visibility and Accessibility**
Throughout the supply chain, key operational metrics and status such as inventory, demand, forecasts, production and shipment plans, work in process, yields, capacities, backlogs, etc., are accessible easily by key members of the supply chain. Such information should be accurate and timely, rendering them useful for all parties for planning and re-planning purposes. Thus, it is important that the key indicators are tightly managed so that any updates are made as timely as possible. The accuracy of the data should be a source of confidence to the parties using the data.

**Alerts for Out of Control Conditions**
Any time when deviations from the plan have occurred, then the appropriate parties of the supply chain have to be alerted. Here, intelligent controls are needed to determine if the deviations are normal, random events, or if they represented some systematic or unexpected changes that warrant attention. The parallel to statistical process control can be drawn here. A process control chart should be sensitive
enough to detect out of control conditions, but not overly sensitive so as to cause the system to be overly nervous, with a lot of unnecessary changes and corrections.

**Responsive Corrective Actions**
We should provide members of the supply chain with contingency plans and the tools to make corrective actions when out of control conditions have been detected. For example, if the shipment schedules have deviated from plan due to customs clearance, then there should be clearly defined contingency plans for the logistics carrier to take appropriate actions, e.g., alternative supply source may be tapped, or product offerings to the customers may have to be changed.

Supply chain leaders like Benetton have basically invested in gaining the confidence of the supply chain through visibility and controls. Benetton’s extensive EDI network linking its design centre with the network of outsourced manufacturers, sales agents, retail outlets, transportation carriers and logistics centres allow the supply chain to become transparent. Its investments in flexible manufacturing lines with its famous postponement concepts in manufacturing, cycle time reduction, and its state-of-the-art distribution centre also enable it to respond to demand signals promptly, by being able to change production schedules and distribute the right products to the right markets to meet the highly seasonal demands of apparel products. The company has also invested in computer-aided design tools which are linked to computer-aided manufacturing tools, concurrent design processes, and cross-trained design teams so as to reduce the new product development cycle. This enables the company to introduce new products in the middle of a season in response to the fashion trends of the season. It is no wonder that the company is known as the “smart operator” of the apparel industry, and has earned the nickname of “McFashion,” in recognition of the company’s success in being a “quick-response” provider.

As indicated earlier, the lack of supply chain confidence and the exposure to excessive market risks had hurt the market share of Adaptec, a semiconductor manufacturer. It was not until 1997 when the company invested in internet technologies to gain visibility of its supply chain operations throughout the complete supply chain, consisting of Adaptec in Milpitas, California, TSMC in Taiwan, ASAT in Hong Kong, and Seiko in Japan, that the company began to regain some of the confidence in its supply chain performance. Working with logistics providers and design teams at the multiple companies that span the Adaptec supply chain, Adaptec was able to put in place control levers to respond to out of control conditions promptly, those improving its supply chain drastically. The result was that the total cycle time was reduced by 50%, inventory dropped by 30%, customer satisfaction significantly improved, and ultimately, improving ROA and profitability.
Supply Chain Confidence

**Synchronising the supply chain**

Once information can flow across the supply chain, then we are only a short step away from a dramatic reduction in total system inventory whilst simultaneously improving responsiveness to demand. The ability to match supply more closely with demand we call *agility* and the key to agility is speed. If flows through the pipeline can be accelerated then it stands to reason that volatile unpredictable demand can be met more precisely. Even better, there is less inventory in the pipeline because it is shorter – in effect we have substituted information for inventory.

However, agility is not a single company concept. Rather it implies synchronisation from one end of the pipeline to the other. In other words all the players in the supply chain are marching in step, to the same drum beat as it were.

Synchronous supply requires transparency of demand and pipeline inventory in as close to real time as possible. It also requires a willingness on the part of all the members of the supply chain to work to a single supply chain plan. Even a short while ago such an idea would have seemed fanciful. However, two things have changed the landscape of supply chain management in the last few years. The first of these is the availability of the technology and the software to enable the capture and sharing of information across a supply chain – increasingly using extranets. The second, even more fundamental change, is the increasing willingness of members of the supply chain to put aside the traditional arms-length relationship with each other and in its place move towards a closer, partnership-type arrangements.

Evidence of these information-based collaborative supply chains is emerging in industries as diverse as automobiles, grocery retailing and apparel manufacturing. One leading UK retailer Sainsbury has developed an extranet to enable suppliers such as Nestle to access point of sale data. Nestle are now better positioned to re-supply Sainsbury and in turn can share that data with their materials and packaging suppliers. The effect is staggering, the whole supply chain is now demand-driven rather than forecast driven.

In high fashion, traditionally, companies in the apparel industry have had pipelines up to twelve months long with all the risk that that implied. The Spanish company Zara can move from design to in-store availability in a matter of weeks as a result of closely connected, highly synchronised arrangements with out-sourced suppliers. For companies like Zara, these supply chains are increasingly global and yet, through transparency of information, they can still maintain a high degree of agility, and confidence.
While supply chain risks tend to paralyse most supply chains, the case is not hopeless. Successful companies are the ones that break the risk spiral through a careful review of the tangible elements of their supply chain, as well as addressing the confidence of its users and members through visibility and control. The benefits are much more than cost reduction, but also, as we argued earlier, the reduction of market risks leading to increase in sales and market share, penetration to new markets, and speedy new product introduction. The efforts are not easy, but the payoffs are potentially huge.

For more information about how technology solutions and services can help companies improve their Supply Chain Confidence please contact Rachel Lawrence at Vastera U.S. 703.661.9006 or Derek Brown at Vastera U.K. +44 (0) 1784 220400.