IDC MANUFACTURING INSIGHTS OPINION

As we move through 2015, the subject of the future of the supply chain has come back into focus. What does the future supply chain look like, and what do we expect some of the essential characteristics to be? Although this requires a degree of speculation, there are also some trends and technologies that clearly are having, and will continue to have, an enormous impact on the supply chain:

- The next-generation supply chain will be a networked supply chain that will sit at the center of three lobes – demand aware, supply visible, and innovation networked. The ubiquitous connectivity and the analytics-enabled customer, supplier, and even consumer allow us to do things today that were not previously possible. Point-to-point relationships must give way to dynamic networks where latency and cost are not tolerable.

- Mobility, as well as modern mobile tools, continues to transform the way supply chains conduct their business. Mobility is not new to the supply chain. Purpose-built, hardened mobile devices have been in use in the logistics and transportation areas for decades. Yet, while these devices are very good at what they do, they have "narrow" functional capability and are not able to function as a broader data consumption and dissemination tool. And as big data proliferates, for the supply chain employee who spends his or her time away from a traditional office, the ability to both consume and disseminate this data is critical.

- Collaboration, via traditional or modern social media tools, is a critical capability for the future of the supply chain. As outsourcing proliferates, and the importance for key partners grows, collaboration both within the manufacturing enterprise and outside of these key partners is critical to the success of the supply chain and of the business as a whole.

In the opinion of IDC Manufacturing Insights, how manufacturing companies prepare for these three critical areas will go a long way toward determining the effectiveness of their supply chain. To return to the old people-process-technology saying, this is not just about the modern technology; it is also about the people, and it is most certainly about the process.
CURRENT SITUATION

Manufacturing supply chains have been experiencing massive change since the global recession (largely) ended in 2010. While there is a tendency for us to always think that the "now" is the period of most significant change, because it is in the moment, there is reason to believe that this will continue to be true in 2015. A number of factors are influencing the current evolution of supply chains, and we'd like to touch on them here:

- **Consumer/customer centric.** There seems to be little question that supply chains are much more aware of the consumer/customer than ever before. Therefore, central to discussions of strategy and competency are questions of how to personalize products, manage "mass customization" from facilities that are not well suited for that very purpose, ensure the highest level of product quality from increasingly distributed global supply networks, and provide consistently high levels of customer service.

- **Demand awareness.** While there has been a decades-long discourse on the relative merits of being "demand driven," there is little question that supply chain organizations can benefit from greater visibility into the cadence of demand. While some businesses will never use demand signals to inform factory-run strategies, the ability to better manage service performance and late-stage assembly/postponement through enhanced insight into demand patterns and more accurate supply chain forecasts is quite apparent.

- **Resiliency.** It is increasingly critical for manufacturing supply chains that operate in an environment characterized by volatile demand and complex supply to have the ability to respond quickly to unforeseen events. There is no such thing as a perfect forecast or a perfect plan, so the ability of the supply chain to rapidly compensate for variations from the "forecast" becomes important in meeting service obligations.

- **Data driven.** Repurposing the old saying that "you cannot improve what you don't measure" into "you cannot respond to what you don't see" speaks volumes for the many manufacturers that are wrestling with massive, and constantly growing, amounts of data. If we put the terminology of "big data" aside for the moment, the reality is that the requirement for supply chain organizations to broaden their "supply chain intelligence" is paramount, and it is increasingly unacceptable to "not know" — particularly when consumers are increasingly empowered with "ubiquitous visibility."

- **"Always on."** It is more an overall business requirement, perhaps, but one that clearly impacts the supply chain and fulfillment/customer service in particular. The world is moving to a "24 x 7 x 52" mentality, with expectations for around-the-clock shipment and customer and consumer service support. Just as the 3PL community has moved essentially to an "always on" approach, so will the logistics and fulfillment functions within the consumer products manufacturer, essentially adopting a 24 x 7 x 52 "continuous" logistics operations and supply chain model.

- **Digitally executed.** Whether adopting modern document management processes and technologies, mobile tools, demand signal repositories, or emerging technologies like 3D printing, the world is going digital and the supply chain is not to be spared.

The six areas examined in the previous bullet points are not meant to be exhaustive, but they are the key factors that we see driving both the present and the future of the supply chain. Implicit in these trends, however, is the use of new technologies. Sometimes, it's a really new technology; sometimes, it's an extension of an old technology; or sometimes, it's the application of an existing technology in a
new way or to address a different business problem. Over the past couple of years, IDC Manufacturing Insights has been referring to a notion we call the three "Ds" value chain (see Figure 1). Focused around the supply chain and related business networks, the concept is underpinned with a Demand orientation that is Data driven and Digitally executed. Implicit in the three Ds are key technologies like demand sensing, big data/analytics, mobility, M2M/sensors, and collaboration/social business. We touch on a few of these technologies later in this white paper, but suffice it to say that manufacturers cannot accomplish business imperatives — such as doubling sales without adding head count, driving cost of goods down by 10% through procurement efficiencies, or improving delivery times by one full day without adding to transportation costs — without finding new ways to apply technology to the business process.

FIGURE 1

The Three "Ds" Value Chain

Source: IDC Manufacturing Insights, 2015
THE FUTURE OF THE MANUFACTURING SUPPLY CHAIN

In 2008, IDC Manufacturing Insights articulated a vision for the supply chain around the central idea of modernization that we called the modern supply chain. At the time, the idea of modernizing business processes and technology was compelling, and more than a few companies benefited from the resulting capabilities in navigating the global recession of 2009-2010. But it's almost seven years on, and while we have seen most of the modernization we envisioned, it is incumbent on us to now articulate a vision for the next five years. Some of this is inherent in the supply chain predictions we have made over the past couple of years (e.g., more tightly integrating both supply chain planning and execution), but largely we are building on the notion of the three "Ds" value chain to describe what we see as the next-generation supply chain – a networked supply chain (see Figure 2). As we described previously, the three "Ds" value chain is about being "demand oriented," "data driven," and then "digitally executed." Central to the notion are technologies like big data and analytics, visibility, and mobility, but it's also about key supply chain business processes, supply chain resiliency, service optimization, future factories, and product economics.

FIGURE 2

The Future Supply Chain

![Diagram of the Future Supply Chain]

1. An emerging supply chain that is data driven, demand aware, and digitally executed
2. With visibility, resiliency, and robust analytics as underlying principles

Source: IDC Manufacturing Insights, 2015
It is easy to talk with enthusiasm about "disruptive" technologies, and many of the trends we discuss in this white paper will be disruptive. But which trends are likely to be the ones that transform the supply chain? We believe that the supply chain will sit at the center of three lobes – demand aware, supply visible, and innovation networked. The ubiquitous connectivity and the analytics-enabled customer, supplier, and consumer allow us to do things today that were not previously possible. Point-to-point relationships must give way to dynamic networks where latency and cost are not tolerable. The IDC Manufacturing Insights 2014 Supply Chain Survey results are both a tantalizing glimpse into where manufacturers are headed and a red flag for where priorities and improvement activities may be at odds with our view of the future – a cost-driven short term certainly, but balanced with a service- and capability-driven long term.

- While many manufacturing companies are demand driven, many are not – at least not in the sense that consumption of an item in the marketplace triggers the manufacture of a replacement. But all businesses must be demand aware and be building downstream demand signals into their business forecasting process. The distinction between demand driven and demand aware may be subtle, but we believe it is important. The business must understand demand and be aware of potential demand shifts, but it may or may not be using those signals across the full breadth of the supply chain.

- At IDC Manufacturing Insights, we have argued for some years now about the importance of supply chain resiliency, particularly the ability of the supply side of the organization to respond to unanticipated business changes. Just as the old saying was that you "cannot improve what you don't measure," we would suggest that you "cannot respond to something you don't see." Consequently, the notion of supply visible is central to the future supply chain – and not just to tier 1 supply either.

- The notion of innovation networked is the third element we believe will both take from and inform the process of developing new products and the key role that the supply chain must play. In years past, research and development was the key generator of new ideas, which clearly is no longer true. With a network of diverse sources for potential innovation, companies that do not leverage these diverse sources will not be successful in the longer term.

Managing these three "lobes" as true networks (where customers, resellers, and consumers are part of the demand arm; suppliers and logistics service providers are part of the supply arm; and everyone is part of the innovation arm) enables speed, efficiency, and insight in ways not previously possible. We see tantalizing hints of the power of the business network and believe the future supply chain will fully embrace these lobes.

**MOBILITY IN MANUFACTURING**

There is little question that mobility continues to transform the way that supply chains conduct their business. Mobility is not new to the supply chain. Purpose-built, hardened mobile devices have been in use in the logistics and transportation areas for decades. Yet, while these devices are very good at what they do, they have "narrow" functional capability and are not able to function as a broader data consumption and dissemination tool. And as big data proliferates, for the supply chain employee who spends his or her time away from a traditional office, the ability to both consume and disseminate this data – not to mention the ability to access systems applications that are increasingly designed for the mobile device and for "mobile decision making" – is critical. This notion of "dissemination" is important. The role of mobility to funnel information in from the field is significant, clearly, but it is equally necessary to then channel information and insights back out.
The Use of Mobility Tools in the Supply Chain

Although the use of mobility tools in the manufacturing supply chain spans functional areas (see Figure 3), three areas offer the most immediate promise for business benefits — and they are the areas that manufacturers have been prioritizing:

- **On the factory floor**, company employees who are not working from an office still need up-to-date information about equipment status, factory line utilization rates, potential order/shipment changes, and anything that might affect the ability of the factory to meet business requirements.

- **In the warehouse**, where employees are typically engaged in operational tasks like bay replenishment, order picking, order staging, or inventory management, access to accurate information is critical. Though we have noted the existence of legacy barcode scanning tools, the need for more comprehensive and insightful business is critical if either changing incoming or outgoing shipments is to be managed flexibly.

- **In transportation**, where the truck is the office, the need for business information is particularly important because customers need and expect to be able to access the most recent information about their shipments. Mobile tools in transportation can also significantly increase the amount of information that is ultimately captured into systems of record.

Broadly, we see the following three areas where manufacturing supply chains can leverage mobility tools to drive both internal efficiency and external capabilities for customers:

- Managing the more effective capture of data about shipments, deliveries, locations, and so forth
- Better management and optimization of assets
- Proactive engagement with customers

**FIGURE 3**

*Mobile Connectivity in the Supply Chain*

![Diagram showing mobile connectivity in the supply chain](Image)
**Data Capture**

Surveys conducted by IDC Manufacturing Insights with supply chain professionals have revealed repeatedly that a significant amount of information generated in the field is not captured in any system of record. The insights possible from this information are therefore lost. In one survey, for example, 20% of shipment and delivery information failed to be captured and was lost. Although the reasons for this lack of capture vary, the single most common "root cause" was identified as the lack of tools to automatically capture the information. From the perspective of the supply chain, this loss of information — or at least the loss of visibility of the information — is problematic in two ways. First, the ability to drive internal operational efficiency is compromised. Second, and more importantly, manufacturers are increasingly expected to provide timely information and visibility to customers and to suppliers/partners. So this idea of data capture and dissemination is a dual one that allows supply chain employees to both consume information within the chain itself and share insights externally — either external to the supply chain or external to the business.

At the very least, the inability to provide robust data and information capabilities will put a particular manufacturer at a competitive disadvantage — particularly as these capabilities become core capabilities (i.e., "table stakes") over time. For example, providing complete arrival, departure, and shipment information electronically is now considered, by almost all customers, to be a basic capability of logistics. If a business is unable to do this, or does it in an inefficient way, it will be at a considerable competitive disadvantage.

**Asset Management**

Although many manufacturers have outsourced traditional factories to become less asset intensive, there are still lots of assets remaining to be managed, and even external partner assets can be "observed" for efficiency and effectiveness. Mobility tools are ideally suited to address both asset utilization and performance optimization. Indeed, so-called "e-Fleet" capabilities are arguably the hottest area right now for transportation and logistics companies.

The deployment of mobility tools across a fleet of trucks, for example, can cover a multitude of technologies, including cellular, RFID, GPS, and telematics, just to name a few. Some of these technologies are machine to machine, others are machine to person, and still others are person to person. The usefulness of a particular mobile technology will depend upon the use case, and we certainly expect business use cases to proliferate over time. In IDC Manufacturing Insights' research, the most common business use cases that we see from transportation and logistics companies are the following:

- Optimization of asset deployment — using mobility capabilities to precisely track asset location and availability in terms of both the actual asset and the associated product inventory (i.e., inventory on the truck, in the warehouse, or in process on the factory line) and feed that back both to the business and to any external partners that are essential to the particular process
- Energy and asset usage, including monitoring of downtimes, active usage times, and so forth
- Employee productivity (whether internal employees or those who work for external partners), including adherence to regulations like OSHA, as a way to both drive internal efficiency and ensure the accurate capture of root causes

The enormous pressure felt by manufacturing companies to drive down costs and extend useful asset lifetimes is putting significant focus on the productive use of mobile technology in the supply chain.
Customer Engagement

Perhaps the most important focus area for manufacturers in the adoption of mobility tools is the ability to drive deeper customer engagement. While the goals of cost control and cost efficiency are important, the ability to drive further competitive differentiation with customers is at the heart of the business. In the process of competing for business, it is increasingly difficult to win new business based on cost—in other words, lower prices. Not that there aren’t opportunities for further cost reduction—just that it isn’t likely to be a sustainable source of competitive advantage. Competitive advantage lies in the ability to better engage customers with improved capabilities to enhance the user experience. Using mobility technologies to provide capabilities like visibility, traceability, or systems connectivity will offer customers more effective ways to manage their business.

MODERN COLLABORATION IN MANUFACTURING

Much has been written on the subject of collaboration over the years, and two points seem to be universally true. One, better collaboration, either internally within the business or externally with suppliers or customers, invariably yields positive results; and two, when queried on the topic, companies invariably believe that their collaborative efforts can be improved upon.

In the IDC Manufacturing Insights 2014 supply chain predictions, we wrote that while business instinct will always have a place in the decision-making process, the reality is that data exists somewhere to facilitate just about every decision—you just have to find it and share it! We have had more than a few conversations with manufacturers that noted a particular business problem could have been averted if "we had only known what someone, somewhere in the business knew." And it is not just about what a business knows versus what a business doesn’t know; it is also about making information available to critical decision makers when and how they need it. Figure 4 illustrates the notion of using analytics and leveraging available data to expand the "practical" knowledge of an organization to include all of the things that may be known within the business and beginning the process of gaining insight from what "we don’t know that we don’t know"—actionable knowledge if you will!
Certainly the notion of big data is in play here, but so is collaboration. Central to the notion of increasing "supply chain" intelligence is the ability to collaborate with internal or external colleagues around common information.

**Intra-Company Collaboration**

While collaborating within one's company may seem easier than collaborating externally, many businesses have a rather rigid functional barrier, so internal collaboration can be a challenge. Indeed, in the IDC Manufacturing Insights 2014 *Supply Chain Survey,* when we asked what aspect of collaboration was a priority, the largest response was to focus on collaboration "within our business" (see Figure 5). Over the course of many conversations with manufacturers on the topic of intra-company collaboration, three priorities bubbled to the surface:

- Improve customer service
- Increase the performance of the new product development and introduction (NPDI) process
- Reduce costs

While these priorities may seem, on the surface, to be "motherhood and apple pie," they are ultimately what will determine whether a business is successful or not.
As shown in Figure 5, over half of the respondents (all working in the supply chain) said that collaboration either within the supply chain or across functions within the business was the focus for their collaboration efforts.

**FIGURE 5**

**Business Collaboration**

<table>
<thead>
<tr>
<th>Category</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within our business (i.e., between supply chain and marketing or sales)</td>
<td>30</td>
</tr>
<tr>
<td>Upstream with suppliers (i.e., buy-side B2B collaboration)</td>
<td>20</td>
</tr>
<tr>
<td>Within the supply chain (i.e., between planning and execution)</td>
<td>25</td>
</tr>
<tr>
<td>Downstream with customers (i.e., sell-side B2B collaboration)</td>
<td>15</td>
</tr>
<tr>
<td>With external logistics providers</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>

n = 299

Source: IDC Manufacturing Insights' Supply Chain Survey, 2014

**Inter-Company Collaboration**

Not to be ignored, inter-company collaboration is very important as well – particularly as companies continue to outsource capabilities to external partners. What may have been an internal collaboration one year can well be an external collaboration the next. Indeed, we see that external collaboration is important based on the survey results shown previously (refer back to Figure 5). 23% of supply chain respondents said that upstream collaboration with suppliers was the focus, and clearly, there are opportunities to improve communication, visibility, and business alignment. Fewer said "downstream with customers" in part because most businesses have already invested in downstream collaboration and it's more mature and in part because supply disruptions have become more prevalent in recent years.

In discussing the topic of inter-company collaboration with manufacturers, we identified three clear priorities:

- Improve customer service
- Reduce cost of relationship
- Develop more strategic relationships (i.e., partner of choice)

The focus clearly is on service and cost, but it's interesting that many manufacturers are also looking for more strategic dialog with key suppliers.
The Aging-Emerging Dynamic

People are at the center of collaboration, and the dynamics of the employee base are changing rapidly. Older employees, with enormous knowledge and experiences, are accepting of technology, but they are not "digital natives"; younger employees, new to the workplace, have grown up with ubiquitous connectivity and an instinct for things like social media and have very different expectations for technology and their work environment. The point is that generational differences will also drive different approaches to collaboration. Older employees are more likely to use the telephone, email, or actual face-to-face conversations as the primary vehicles for collaboration. Younger generations will predominantly use text messaging and social media. This suggests that the prior discussion on mobility is an important facilitator for collaboration among younger employees, but it also means that collaboration technologies will have to be agile enough to span multiple communications platforms and approaches.

ESSENTIAL GUIDANCE

In this white paper, we have discussed the importance of networks, mobility, and collaboration and the role we believe they must play in the future of the supply chain and the benefits that can accrue. The ability to fully integrate the demand, supply, and innovation aspects of the supply chain into one networked entity is both exciting and unnerving. Data identification, capture, and analysis play a huge role in this future supply chain, and unless manufacturers plan to add employees (which we can assure you, they do not), the only practical solution is the deployment of technology solutions.

Actions to Consider

Not all manufacturers will experience the challenges and opportunities that we have articulated in this white paper in the same way or to the same degree – and they will not make the same strategic choices. But it is important to be clear about differentiation and the first principle for the supply chain. Otherwise, the consequential tactical and operational decisions that are made will not move the business forward in a consistent way. It is critical, therefore, to answer three key questions:

- What is the first principle for my supply chain – service, cost, or quality?
- In terms of business process change and technology adoption, is my business a leader, a fast follower, or a laggard?
- What is the role of the supply chain within the strategic context of my business?

Companies should not delude themselves in answering these questions. For example, it is perfectly acceptable for a company to decide that its business is a cost-centric fast follower and that it will view supply chain through the lens of efficiency and the elimination of waste – if, indeed, that is what will best enable success in the marketplace.
IDC Manufacturing Insights does suggest, however, based on the answers to the preceding questions, that companies look at their supply chain capabilities in a number of critical areas:

- Am I using commerce networks within my supply chain today, and if so, what have been the early insights?
- Am I encouraging or discouraging the use of mobile tools in my business? (Are they viewed as key capabilities for solving business problems or as opportunities for employees to "goof off"?)
- Am I encouraging or discouraging the use of social media tools in my business? (Are they viewed as key capabilities for solving business problems or as opportunities for employees to "goof off"?)
- Have you considered the technical ramifications (e.g., privacy/security, a BYOD policy, or the implications of different generations of employees)?

If you are not doing all, or even any, of these things, what opportunities are you missing? And keep in mind that "optimal" is relative – a moving target – and that best-in-class performance is quickly superseded. Somewhere, some company is doing all of these things. It may not be a competitor of yours – at least not yet.
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