



## TECHNOLOGY SPOTLIGHT

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# Overcoming Supply Chain Complexity with Predictive Logistics

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*Increasing complexity continues to be a leading topic among supply chain executives. For many, the solution to this challenge has been to deploy modern technology in hopes of improving the ability to make sense of what is going on across the supply chain. However, this approach has resulted in an increase in complexity for most supply chain environments.*

*As technology has proliferated across the supply chain, the amount of data available about the operation has increased drastically. While there is more data available, the traditional challenges of siloed data, dirty data, and unstructured data continue to plague supply chains and their related operational systems. Dropping modern supply chain applications into such environments does not necessarily help solve the problem; in many cases, it compounds the data issue.*

*These challenges are especially prevalent relative to logistics because the logistics function touches internal and external business processes. This paper examines the challenges around data and complexity in the supply chain and looks at predictive logistics applications and how they can help manage complexity and drive value. The paper also looks at the role of predictive logistics vendor ClearMetal in this critical supply chain market.*

## Addressing Supply Chain Complexity with Machine Learning

Complexity is a constant challenge for the manufacturing supply chain. While supply chain complexity has been a perpetual challenge, we have found that the degree of complexity has increased dramatically in recent years because of several factors, including:

- **Scale.** Companies in the supply chain have historically focused on building physical economies of scale (bigger metal versus smarter software) to keep up with global trade growth and drive down unit cost; however, in turn, this created overcapacity and complexity that now require new efficiencies. Today, all sit with daunting tasks — pressure to drive efficiency, too many manual processes, and poor data quality. Moreover, these companies haven't developed the competency to build sophisticated technology themselves and aren't sure how to best leverage new burgeoning technologies.
- **Customer demands.** Customer preference and expectations are constantly changing. Today, customers expect rapid product innovation, accelerated delivery times, and greater reliability, and they increasingly expect customized products. Managing demand in today's supply chain to accommodate an increasingly fickle end customer is placing tremendous pressure on the supply chain to evolve.
- **Rapid pace of change.** Everything in the modern supply chain is about managing change. Customer preferences, material requirements, business processes, and technology all contribute to the rapid pace of change in the market. The pace of change is driving the need for manufacturing supply chains to become more intelligent in how they operate. They must rely on

this added intelligence to understand what is happening and how it will impact the business as well as how they must adapt to continue to meet the needs of the market. Indeed, the manufacturing supply chain must become an innovation driver for the organization to keep up with such rapid change. Supply chains are being looked at to help develop new business models as well as products/offerings/services and, ultimately, drive value for the customer.

- **Modern technology.** The sophistication of modern technology is immensely beneficial to operating a modern supply chain. Technology such as artificial intelligence (AI), machine learning, advanced analytics, and Internet of Things (IoT) has so much potential to add value, yet the "way forward" is not always clear. New technologies present such a massive opportunity to evolve business processes, or even transform the business model, that it is hard to know where and how to start.
- **Data proliferation and management.** A consequence of adopting modern, digital technology is the ability to capture data across all aspects of the supply chain. Challenges related to data management include data cleanliness, reliability, and availability. Data silos are often a challenge as companies struggle to find a single source of the truth. The IoT and the need for external data are compounding the challenge as new data sources are delivering an immense amount of information relative to the supply chain. Given the historical struggles to transform data into actionable intelligence, as manufacturers look to adopt new technology, they must have a detailed plan for data and analytics and how to provide business insights.

Each of these forces is putting pressure on supply chains to evolve their business processes and embrace technology to enable a more modern process. Logistics is one area of the supply chain in particular that needs modernization. Each of the previously mentioned complexities makes it ever more challenging to position and move inventory and assets throughout the network.

While modern technology is playing a role in the complexity, companies that effectively utilize technology that aligns with the needs of their business significantly outperform their peers.

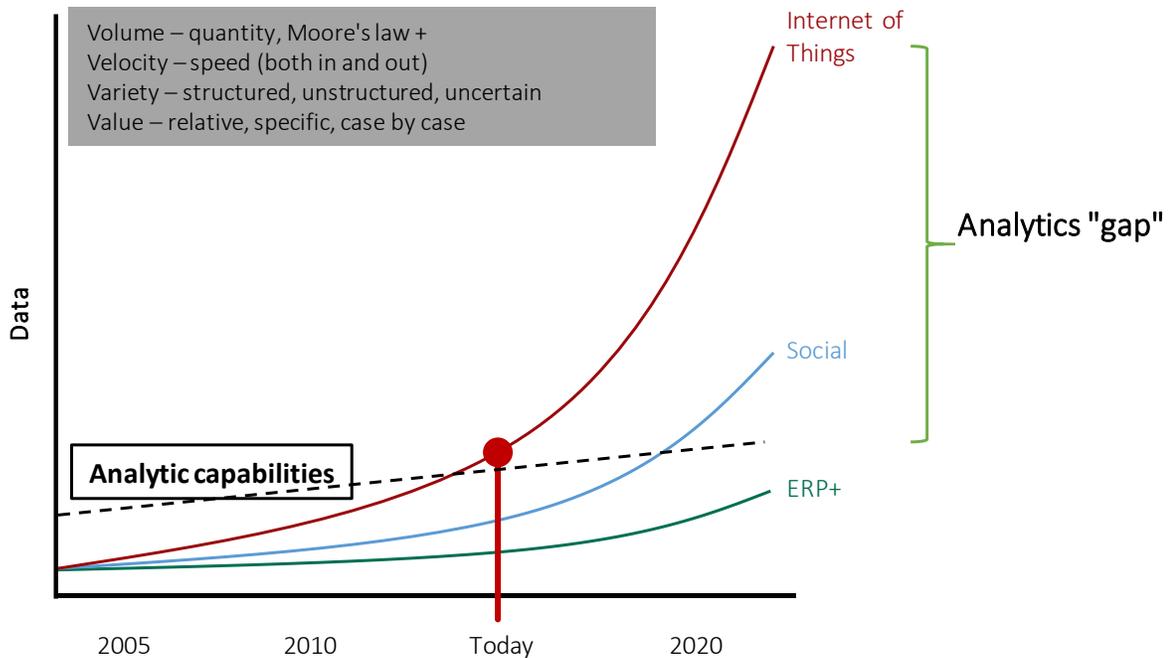
## The Data Challenge

Today's supply chains are indeed data rich. So much data is available about the operation, but unfortunately, the availability of the data does not mean that the data is being used effectively. Data management has long been a challenge, but this challenge is compounded because the volume of data that is created is far outpacing our ability to consume the data.

The analytics gap is the result of the exponentially increasing availability of data coupled with tepid growth relative to analytic capabilities (see Figure 1). However, this scenario introduces an opportunity for companies that are more advanced, relative to analytics, to create a competitive advantage.

**FIGURE 1**

## The Analytics Gap



Source: IDC Manufacturing Insights, 2017

Keep in mind that the analytics gap is not simply a function of an inability to analyze all of the data. This challenge is impacted by traditional data management issues of cleanliness, availability, and reliability of the data. Indeed, the emergence of technologies such as AI, cognitive computing, and machine learning is drastically improving the power of analytics. However, these types of technologies rely on quality data inputs to deliver quality outputs.

## Leveraging Machine Learning and AI in the Supply Chain

When thinking about transformative technology for the supply chain, we must consider machine learning and AI. Such tools are helping reduce risk, improve processes, and drive more intelligent decision making in the supply chain.

The more traditional approach to managing supply chain complexity has been to address it with scale. While this approach makes supply chains bigger and more widely distributed, it does not make supply chains more intelligent. Conversely, this approach may make some supply chains more brittle because they can become so extended that they are unable to adapt to change.

A more modern approach to dealing with complexity is to make better use of the information that already exists within the supply chain. Companies must look to modern technology to enable them to identify opportunities to better manage complexity through innovation. This is where machine learning and AI come into play. With regard to the analytics gap, it is not that data about the supply chain does not exist; rather, it is that most companies are unable to tap the value within the data.

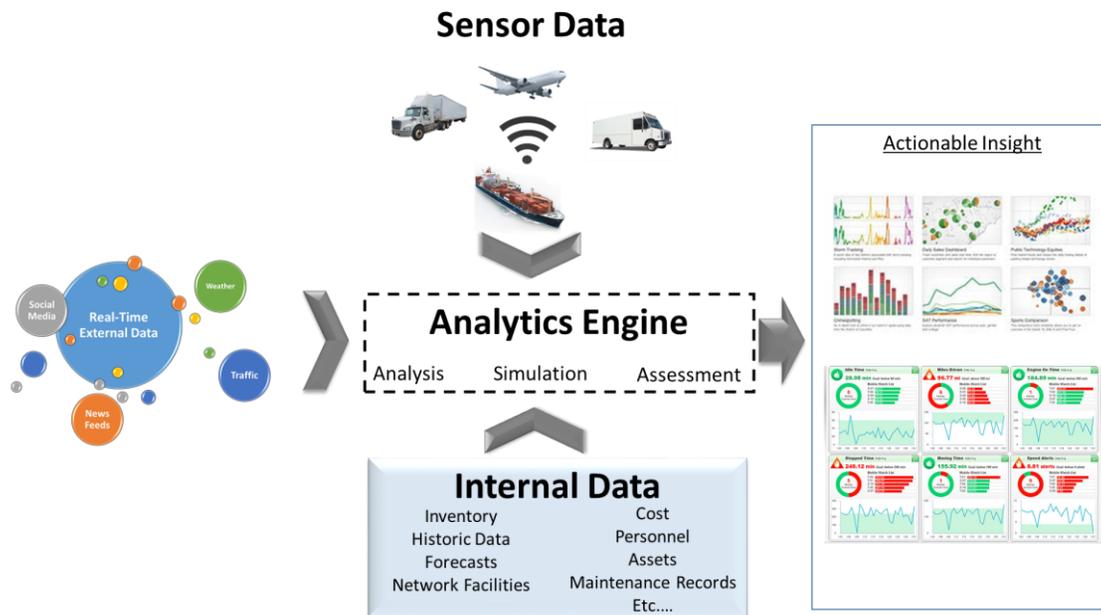
Machine learning and AI provide the technology to automate some of the processes related to drawing meaningful insight out of data. A perfect example of this is the use of machine learning and

AI to help logistics management. This technology can drastically help supply chains sort through the abundance of data (historic, current, public, social, etc.) and apply logic to better direct the flow of assets throughout the logistics network.

At the end of the day, it is about the data, and any increase or improvement in data quality or availability can result in valuable business insights. As shown in Figure 1, this can be sensor or social media data, or it can be more traditional ERP data. Ultimately, the data drives decision-making algorithms (see Figure 2).

**FIGURE 2**

**Data Feeds Decision Making**



Source: IDC Manufacturing Insights, 2017

However, it is not just about leveraging technology to gain insights. Machine learning has become a powerful tool in data management. Technology innovators are embedding machine learning and AI into their applications to advance data management. These tools are helping identify and smooth outliers, fill in for missing data, and cleanse dirty data. The ability to improve the data inputs drastically boosts the ability to draw meaningful insight out of data. Indeed, the old adage, "garbage in/garbage out" holds true. The objective here is to leverage modern technology to enhance the quality and reliability of data to drive better outcomes.

**Improving Logistics with Predictive Intelligence**

While opportunity for betterment exists across the supply chain, the end-to-end logistics process is littered with opportunities to improve with the use of modern technology. For example:

- Shippers are often challenged with managing inventory.
- 3PLs are challenged to meet SLAs and extend visibility and reliability out to their shipper customers.
- Terminal operators would benefit from an improved ability to staff labor, configure yard layout, and optimize equipment utilization.

- Freight forwarders and non-vessel operators struggle with managing booking allocations aligned with shipper demand forecasts.
- Carriers often struggle to manage equipment use and position equipment usage to align with the demand and supply forecast.

Traditionally, the logistics industry has been slower than other industries to adopt technology innovation. However, companies that do adopt modern technology often outperform their peers. Many in the logistics industry understand that as technology continues to deliver innovation that drives value, they must get better at leveraging technology within the business process.

Today, technology is available to deliver value in the area of predictive logistics. Advanced analytics coupled with machine learning makes engaging in such modern technology a feasible approach to improving logistics. Logistics operations have ownership of tremendous amounts of data, but they must make significant improvements in how they leverage this data to deliver intelligence in decision making.

Predictive intelligence in logistics is about improving the flow, positioning, and utilization of mobile assets as well as decisions on orders and inventory positions. Consider a logistics operations team that must decide whether to expedite a shipment by air versus the more traditional ocean route to satisfy inventory and delivery requirements and avoid being 10 days late. Air freight is extremely costly but obviously faster. With greater predictive intelligence that a shipment via ocean will be only 5 days late (not 10), the logistics team can make the call to not go by air but stick with ocean and save significant cost while still maintaining proper inventory levels and delivery.

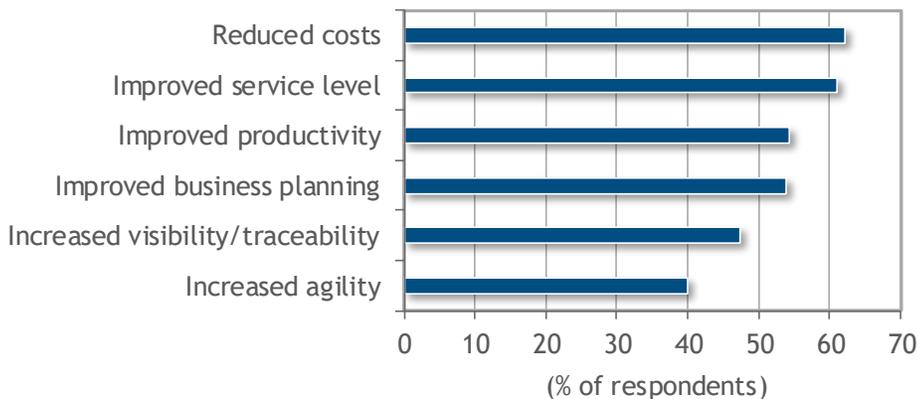
### The Value of Deploying Intelligent Logistics Applications

The deployment of technology that can inject intelligence into the logistics function can deliver tremendous value for the end-to-end supply chain. Transportation and logistics is one of the most expensive areas of the supply chain. As such, it must also be considered one of the areas in the supply chain with the most potential for improvement.

IDC Manufacturing Insights' 2016 *Supply Chain Survey* found that manufacturing, retail, and wholesale companies with above-average analytic capabilities achieve a number of benefits (see Figure 3).

**FIGURE 3**

#### Benefits of Above-Average Analytic Capabilities



Source: IDC Manufacturing Insights' *Supply Chain Survey*, 2016

Intelligence in logistics enables supply chains to reduce lead times, reduce the risk of late deliveries, improve service levels, and drive downstream value. As the global logistics network continues to become more complex, companies must embrace the evolution of technology as a lever to achieve business value.

## Advancements in Machine Learning/AI Drive Value for the Supply Chain

Three major trends are driving the market for predictive intelligence in logistics:

- **Avoidable complexity.** Manufacturing logistics is complex, and companies often layer unnecessary complication on top of this inherent entanglement. That convolution is inherent means that it cannot be solved through traditional means and requires new approaches, more accurate and more complete data, and advanced analytics to better turn that data into actionable insights and ensure better business performance and service reliability.
- **Growth of data.** Organizations today have an embarrassment of riches when it comes to data, yet it is not always clear what they should do with it. As illustrated in Figure 2, data is coming at organizations from a variety of places. Much of the data is structured, though much of it is increasingly unstructured. Further, the IoT has created a new mechanism for capturing operational data. This phenomenon is now delivering organizations a more granular level of data, at times even down to the individual component of an asset. These data "opportunities" have driven innovative technology companies to develop advanced analytic applications that can help make sense of the abundance of information available.
- **Emergence of machine learning and AI.** Machine learning and AI are tools that are helping manage the two previously mentioned trends. Through machine learning and AI, organizations are able to leverage modern technology to help sort through the abundance of information related to an operation.

Each of these technology trends is playing a major role in the market for delivering predictive intelligence for logistics. Organizations looking to leverage predictive intelligence must understand the role of data in the predictive intelligence equation. Predictive intelligence requires historic and real-time data to convert this information into actionable intelligence.

Because of the importance of the data inputs, organizations must be able to ensure the quality of data inputs in the analytics engine. The sheer volume of data available today makes this a challenging task. However, advances in machine learning and AI are helping organizations manage this data.

In addition to leveraging machine learning and AI for data management, these technologies are useful in helping deliver and improve analytics. The use of such modern technology is enabling logistics operations to improve upon more traditional analytics applications to deliver next-level value.

## Considering ClearMetal

ClearMetal Inc. is a predictive logistics company that has developed a data intelligence platform with several associated predictive visibility applications to drive business value. The company's applications are designed by logistics industry experts along with technology innovators that target the end-to-end logistics process. ClearMetal has taken the approach of looking at the traditional deficiencies related to the logistics process and the underlying core data challenge. The company has created tools to drive improvements that make it easy for the logistics industry to engage with modern technology. ClearMetal's applications address the multiple components of the logistics industry:

- For shippers and consignees, the applications deliver predictive supply chain management to help address traditional inventory and logistical challenges. The solution delivers functionality such as predicted time of arrivals (PTAs) through "track, trace, and predict" to improve dependability, visibility, and exception management to drive supply chain and inventory performance.

- Freight forwarders and non-vessel operators gain predictive revenue and yield management to increase revenue and margin and both better utilize container vessels and improve booking allocation management.
- Ocean carriers can optimize fleet efficiency with predictive asset management. ClearMetal's solution predicts container supply and demand to reduce repositioning cost as well as customer booking behaviors to improve margin and customer service.
- Ports and terminals can leverage predictive activity to drive utilization improvements of equipment and labor and to enable "differentiated" levels of customer service to shippers, shipping companies, and customers.

The benefits of the ClearMetal approach are varied and nuanced. Reducing inventory and buffer stock is important to shippers and consignees, but there are other important operational benefits like DC management, improved service provider partner relationships, and some exporter interests that include improvements in customer service by reducing variability in shipping duration and arrival times.

Predictive intelligence enables the logistics industry to achieve next-level value by making effective use of the data that is available about the operation. ClearMetal has developed its applications to address some of the most common challenges associated with logistics. By leveraging the predictive logistics applications with embedded machine learning, the end-to-end logistics process can become more efficient.

### **Challenges**

Although the logistics market has clearly become more willing to embrace modern technology, the way forward is not always clear. Logisticians are a grounded, pragmatic bunch, and they are inherently distrusting of unproven technology. They are not laggards, necessarily, but they have to be convinced that something is an improvement before engaging completely. In this sense, ClearMetal will face an uphill battle (as all new companies do) in gaining adoption from an industry that requires "proof" to adopt new approaches while quickly falling back on traditional approaches to try to address their challenges.

Additionally, there is competition in this area. The evolution of technology has driven application development companies to focus on developing applications that target the logistics market. While ClearMetal's Data Intelligence platform is driving value, the company will face competition from both emerging technology vendors and established players that are increasingly developing advanced analytic and predictive applications for the logistics industry.

### **Conclusion: Achieve Value Through Intelligent Logistics Applications**

Complexity is inherent in supply chain management, especially in the area of global logistics management. There is an abundance of data available about the movement and utilization of assets, containers, and inventory, yet the logistics industry in general has struggled to find ways to optimize and reduce the waste associated with the logistics function. However, modern technology is delivering applications that are better equipped to deliver value in today's incredibly complex operating environment.

One of the more transformative applications of modern technology for this critical supply chain function is the use of machine learning to help improve logistics decision making and operations. As the volume of data available for analysis relative to logistics continues its exponential increase, the modern logistics operation must embrace modern technology in an effort to drive improvements and value. It is no longer sufficient to tackle complexity with scale; rather, logistics operations must improve the way in which they utilize their existing assets to get greater value out of existing assets

and the network. Machine learning provides a mechanism to identify patterns and produce actionable insight with a reduced reliance on manual effort.

IDC believes that complexity relative to the logistics function will only continue to increase, and to the extent that ClearMetal can address the challenges outlined in this paper, the company has a great opportunity to succeed and deliver value to the logistics industry.

For logistics-dependent companies looking to apply machine learning to their decision-making processes, IDC offers the following points of guidance:

- **Baseline your performance against the performance of the broader market.** Understand how well your organization is performing today to identify performance gaps that will drive value for the operation.
- **Understand that machine learning is not a cure-all.** When leveraged appropriately, machine learning is a tool within the overall supply chain tool box that has the potential to drive productivity improvements and reduce waste.
- **Define the problem you are going to solve.** Machine learning can help with a wide variety of business challenges. That said, the technology must be used in a targeted manner.
- **Leverage commercial off-the-shelf products and services.** It can be tempting to try to build a custom application, but as in the case of ClearMetal, there is likely a product already developed that can help you.

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