SPECIAL REPORT
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Advanced Analytics are Changing the Focus of Supply-Chain Management

As supply chain becomes more integral to your company's success, are you taking advantage of these important technologies?

Not too long ago, supply-chain managers relied on historic data combined with forecasts to develop plans to guide their day-to-day activities. Management relied on these plans to understand how much product needed to be manufactured, what capacity was required for that volume, and how customer expectations could be met. These plans were tweaked monthly or quarterly and renewed annually.

No more.

Supply-chain planning and management are undergoing a rapid evolution with the application of machine learning and advanced predictive analytics. More accurate fact-based decision-making is already emerging faster than might have been anticipated a few years ago, and the pace of that change will continue to accelerate. The time is here to determine how your enterprise will benefit from these advancements.

Until now the use of machine learning and advanced predictive analytics to develop artificial intelligence (AI) in supply-chain management has been typified by pilot projects, proofs of concept, and initial adoptions.

The very nature of supply-chain value is also changing, from being a tool that increases efficiency to becoming a competitive advantage that enables an organization to grow and prosper. Even a small supply-chain performance ROI percentage improvement now justifies the time and expense needed to engage this technology.

Concurrently with the pace of these advances is a rise in the rate of adoption—and the rate of change in the technology itself. All these factors have converged to make it easier and less costly for new adopters to engage with AI. Based on the results that we've seen to date, the technology has entered early maturity for commercial transactions.

Where to begin?
The need for planning hasn't disappeared with this technological revolution, but the role of planning is changing. What former President Dwight Eisenhower said decades ago is even more appropriate today: "Plans are worthless, but planning is essential." In other words, the tools of the planning process may add more value than the plans themselves. If the process is robust, then it can be rapidly repeated to respond to change.

As AI ascends, planning will still be an important process although actual plans will become more dynamic and agile. Plans might last only a day, hours or minutes before they will be reviewed and rapidly revised based on the massive real-time data stream that feeds machine learning and predictive analytics. With the Internet of Things (IoT) and connected devices now firmly in place throughout the world, integrated platforms move data seamlessly between different actors in the supply chain. This very high level of connectivity is making it possible for end users to access data and information they would not have thought possible three or four years ago.

How it works
In the realm of machine learning, there are three levels of engagement: supervised; unsupervised; and deep learning.

Supervised machine learning requires data of a known structure; i.e., customer code, customer name, annual sales, etc. The system knows the data it's retrieving, as well as the desired solution. It uses that information to identify correlations and causation if possible.

At the next level, unsupervised learning works with data of a known origin but unknown structure, looking at the data points for cross-reference matches and recognizing correlations between different data over time.

Deep learning is the most complex. Artificial neural networks process much like a human brain and can identify cause-and-effect relationships. These networks are built with logic nodes. The deep learning machine categorizes data throughout this network and every time it receives a new data point it works through the network answering yes or no questions about that data point until it gets to the lowest common node.

Food wholesalers, as one example, can develop new metrics with deep learning. Grocery store tests in the United States, Great Britain, France and elsewhere are underway to finally realize the promise of eliminating check-out lines, first attempted with the introduction of RFID tagging a couple decades ago. Now, from smart cameras throughout the stores, consumer selections are recorded when products are picked from shelves and placed in shopping carts.

This creates tremendous efficiency for the manufacturer and distributor, of course, but it also creates an entirely new data stream for food wholesalers. The cameras record more than the shopper removing

an item from the shelf. When a shopper puts a selection back on the shelf, the cameras record that too. Perhaps the item was too expensive, the wrong size, the wrong flavor, or one of many other possible reasons. With enough data over time, machine learning and AI analyze why certain products are successful and others are not, providing a metric that has not been previously been available for food wholesalers.

Where do we go from here?

One specific application of machine learning is product cluster analysis, which allows planning at an aggregated product level (a cluster). For a consumer goods manufacturer that has thousands of SKUs at multiple selling and/or customer locations, it has only been practical to manage their product flow at an aggregated (or hierarchy) level, rather than at the SKU level. These hierarchies have been chosen somewhat arbitrarily—by brand, by product size, by financial category, or by some other category that was practical to manage—rather than truly correlating to the sales behavior of the product.

These hierarchies have been better than nothing, and have been used to develop budgets, capacity requirement plans, raw materials requirement plans, and longer-range strategic planning.

Now, machine learning makes it possible to look for products that have common sales behavior, common capacity consumption, common raw material consumption, and common profit contribution. Under this regime, analysis can also be much more reliable because it results from a much larger product sample, providing greater confidence in the relevance and accuracy of the data.

It has also become possible to mine data across multiple supply chains to discover how components critical to one type of production are being affected by other, unrelated, consumption trends. For example, basic capacitors and resis-

tors are used across a wide range of products in the automotive, healthcare, consumer electronics, and other industries. It could be useful for a healthcare product provider to know if a major electronic manufacturer is significantly increasing its own demand for standard capacitors and resistors, allowing more time to plan for potential supply scarcity and/or increased cost.

Advanced analytics come into play here, with automated decision-making that would quickly toggle between dual component sources as their ability to supply fluctuates.

Accelerating complexity makes change imperative

Geopolitical upheaval is underway, with previously predictable trade patterns now in turmoil. China, Britain, Central America and other markets now require much greater attention from supply-chain planners and managers. Fortunately, the advent of machine learning and advanced predictive analytics arrived when the need was greatest.

As noted earlier, the planning process is essential, even as the lifespans of plans shrink to days and/or hours. Now, by using machines to produce advanced predictive analytics, planners and managers can rapidly change/update plans to meet the challenges of the increasing pace of change.

For example, 3D printing is headed toward the ability to print products to a customer's particular specifications, and at a location so close to the customer that it greatly decreases inventory and its related costs.

It is also now reasonable to envision platforms or ecosystems that will take the initiative when the need arises for shifts in supply-chain strategies. This could even extend to product manufacturing that is customized to the individual customer level.

Data, which used to be viewed as a discipline best handled by the information technology group, should now be viewed as a critical enterprise asset. The manufacturers who can best leverage data will be highly successful. The tools are now available to do just that, with machine learning and advanced predictive analytics. To ensure a successful future, consider these technologies when you are selecting a supply-chain partner for your organization.

Resource Link

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Roles will change, not disappear

Valuable supply-chain planning and management career opportunities won't disappear, but they will evolve as machine learning and advanced analytics become more common. Logistics, IT and operations experience will become less valuable as the need for analysis, strategic planning and collaboration rise.

Jobs in the future will likely change in two main ways.

First, the reliance on mathematics will be greatly reduced because machines will be doing most of the computing. Using this output, professionals will instead spend much of their time planning and reevaluating those plans based on different scenarios. There will be more time and more information available to support "what if" planning—to more freely consider the impact of product launches, changes and seasonal variations. Such scenarios will be computed by machine, allowing the planners to choose the best option.

The other new role supply-chain managers will play is that of the collaborator. With the Internet of Things (IoT), supply-chain systems are more connected. The more profound change, though, is that people are now more deeply connected. Global teams can message, video call, attend virtual meetings, email, and link up via collaborative platforms that support simultaneous communication and decision-making among suppliers, supply-chain service providers, and customers. For example, it may even be possible that the central role of the supply-chain manager will evolve to be more of a deal maker—arbitrating between reducing a customer's supply, securing more capacity at a certain supplier, or taking advantage of opportunistic storage at a third-party logistics provider.

Clearly, these roles require very different skill sets that still need to be defined, trained for, and implemented. As you transform your supply chain, start cultivating individuals with these skills internally or by looking for non-traditional hiring channels.