Standing on the Shoulders of Robots

+ How Automation Elevates the Role of Supply Chain Planners

Dealing with Complexity

In today's highly competitive global economy, fraught with demand volatility, uncertainty and risk, the supply chain planner's role has never been more strategically important.

Nor has it ever been more difficult to get right. The need to continually make optimal tradeoffs between service levels and profitability targets is rendering old planning approaches and tools obsolete. It's one reason why industry gurus like Lora Cecere strongly advocate 'systems thinking' and applying advanced simulation techniques that are found more in gaming than in traditional operations planning.

At the same time, more companies now accept that orchestrating today's multi-echelon, extended and highly responsive supply chains takes the collaborative participation of stakeholders across sales, marketing, finance, operations and executive leadership. It increasingly also involves external trading partners.

This growing stakeholder involvement and supply chain complexity means that compared to a decade ago, most of the companies we work with are deploying advanced, automated planning tools alongside S&OP and other types of integrated planning processes.

For all these reasons, the planner's role has expanded to include an improbable mix of technical analytical skills and communications and interpersonal skills. A recent, typical job ad for a demand planner lists technical criteria including APICS and Six Sigma certification, alongside "negotiation, communications, and presentation skills". Not surprisingly, companies are finding it increasingly difficult to recruit these polymaths. Some are resorting to hiring two types of planners: one analytical and the other skilled in communication, facilitation and negotiation. Building armies of planners, however, can become convoluted, expensive and inefficient.

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The more successful companies are 'outsourcing' tasks to technology. Although it appears likely that automation will replace some tasks and roles, the ones that remain will be far more desirable. According to a report by the Gartner community SCM World called *Anticipating the Future of Supply Chain Work*, "High value-adding tasks requiring creativity and problem-solving will replace those that are low value, routine and mundane."

In this short brief, we'll unpack these issues and show that when planners 'stand on the shoulders of robots', they become happier and more productive, and their companies much more competitive and profitable.

Supply 'Chains'—Not Chains but Complex Systems

Even when supply chains could still be represented as actual chains, they were nearly impossible for humans to plan accurately. The classic 'beer game'[1] many of us industry professionals played in college or in training courses demonstrates how extreme inventory buildups and stockouts occur (aka "The Bullwhip Effect") even when planners make seemingly logical, conservative decisions in a simply supply chain.

Today's supply chains, however, are far from simple. No longer describable as 'chains' they are complex, orchestrated and adaptive systems whose processes flow in many directions, often simultaneously. When you factor in variables on the supply side like lead times, distribution complexity, materials availability and climate risk along with demand-related factors like promotions and social media trends—not to mention all the item-specific variables—planners are faced with a staggering number of factors to consider.

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For many years companies have been trying to boost planning outcomes by focusing on what seems instinctively right—improving forecast accuracy. However, to address the kind of demand volatility most companies experience today, raising forecast accuracy reaches a point of diminishing returns. It is most useful for predictable, fast-moving items. To improve service levels for slow-moving, long-tail items, it's more important to focus on achieving a smart inventory mix. Inventory must serve the demand by taking into account the probability and size of the order.

This is why modern supply chain planning needs to move beyond forecasting to demand modeling and building 'digital twins'. According to Nucleus Research "Although many organizations are using relatively sophisticated forecasting models, forecasting alone is insufficient to solve the complex inventory optimization scenarios that customers face."[2] In other words, you still get a bullwhip effect of excess inventory or stock-outs that builds in severity over time.

The Ideal Process for Automation

Elements of supply chain planning, therefore, are ideal tasks to outsource to machines, which can execute analytical tasks and repetitive calculations faster and more accurately than humans. In other words, this isn't a case of machines replacing people's jobs: automation plugs a skills gap that humans can't practically fulfill.

This is why concepts like "automated planning", "lights out planning", "low touch or no touch planning" or even "driverless supply chain planning", are gaining currency. Using intelligent, self-learning software, supply chains run more autonomously. Planners are freed up to orchestrate information-sharing across commercial teams and build partnerships with sales, marketing, manufacturing and executives.

1 The Beer Game is a role-play simulation game that lets participants experience typical coordination problems of (traditional) supply chains, in which information sharing and collaboration does not exist. In more general terms, this supply chain represents any non-coordinated system where problems arise due to lack of systemic thinking (Source: The Supply Chain Academy).
2 Nucleus Research: Answering Inventory Complexity. April 2019

Tap Into the Power of Machine Learning

One technology area in particular holds the potential to dramatically improve planning outcomes: machine learning. Gartner predicts that, "by 2020, 95% of SCP vendors will be utilizing supervised and unsupervised machine learning somewhere in their SCP solutions."[3] The research firm has identified several use cases in supply chain planning where machine learning can be applied. The top three are demand forecasting, supply planning and demand sensing and shaping.

Machine learning's ability to find patterns (like seasonality and shopping behaviors) in huge data sets and also get smarter over time make it the perfect complement to human planning efforts. The iconic 'Bond-mobile' manufacturer Aston Martin's spare parts operation used a machine learning engine to analyze the vast array of historical data collected over decades and pick out eight completely new categories of behavior. It used these categories to optimize inventory replenishment plans, raising service levels while reducing inventory costs by 18%.

According to Nick Wilson, Senior Inventory Planner, Parts Operations, the new focus on seasonality has been transformational: "The great thing about the eight categories is that people can see them. This has not only educated the purchasing team in important new skills, but has also really given them confidence in the planning system."

3 Gartner: Current Use Cases for Machine Learning in Supply Chain Planning Solutions. Analyst: Tim Payne. 19 May 2018

Take an Incremental Approach to Automation

We recommend companies approach moving to automation in stages. The process of cleansing data and calculating baseline demand is the ideal starting point. In this stage, intelligent software can generate a probability-based forecast and planners enrich it with their own knowledge. Over time, as the system gets smarter, planners can take a more hands-free approach and just deal with exceptions. This frees up planners to focus on adding value through market intelligence and business smarts.

At UK wholesaler RS Components, global supply chain planning boss Andrew Lewis believed in automating demand planning and replenishment. He said, "For some time now, I've wanted to be able to separate off the creation of the statistical forecast from the enrichment of it by the demand planners...I want my demand planners to be 'people people' with interpersonal skills, who can bring out from other [business] functions the sorts of things the system can't possibly know... making the eventual consensus forecast—the demand plan—absolutely as good as it can be."

For more sophisticated problems like forecasting inventory levels in line with promotions or new product introductions, advanced analytics like machine learning, can raise the game further. Machine learning adjusts the baseline demand forecast by identifying the effect of demand indicators. It can "decode" both structured and unstructured data streams, analyzing the variables and indicators and their complex interactions and patterns in an automated fashion to self-learn demand profiles.

Modeling, Scenario Planning and 'Digital Twins'

We said previously that modern supply chains are systems, not chains. Although more advanced techniques like simulation might sound daunting, the tools, processes and skills to manage this are becoming more mainstream. The first step is building a good data model, and the devil in getting digital twins right lies in the detail. "The quality of answers or decisions generated by the software depends heavily on the quality of the data model, or how well the model represents reality at the point in time at which the answers are generated."[4]

With a robust data model and advanced planning software, you have the foundation for 'what-if' scenario planning so that you can test the impact of different inventory decisions on service levels. There is also a growing body of case studies about companies applying new techniques like building supply chain "digital twins" - essentially 'what-if' planning on steroids. Global bearings giant, SKF, is a great example. It built a robust data model of its 800,000+ SKUs and a digital twin of its entire distribution network. However, SKF's Business Transformation Manager Joerg Schlager echoed Gartner's guidance about data model quality: "If you are going to travel safely on autopilot, take care of your input."

So far eight of SKF's warehouses (about one third of the total) and two factories have achieved full "autopilot" status. The demand planner role has been elevated to 'global planner,' responsible for handling 'exceptions' and supporting customers from all regions.

Read the full case study "How SKF uses a supply chain twin to enable integrated planning" online in Supply Chain Quarterly.

Learn to Trust the System to Unlock More Benefits

Perhaps the biggest challenge for any supply chain leader is learning to trust highly sophisticated planning systems that aren't transparent like spreadsheets and other simple tools. As Nucleus Research analyst Seth Lippincott reflected in his 2019 report *Answering Inventory Complexity*, "changing behaviors can often be more difficult than changing software, and building trust in the recommendations from a tool does not happen overnight."

The choice boils down to this: would you rather have visibility of your supply chain software's inner workings or visibility of your supply chain? Until organizations become more willing to take their hands off the wheel, there will always be a level of productivity and financial benefit that will remain unattainable.

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We get that it takes a leap of faith to put trust in a completely new type of system and way of working. This is why we typically start working with a proof-of-concept, then expand the number of SKUs in the data model and reduce the manual forecast overrides over time. In most situations where we've worked with companies to the point of near full automation, the reaction is similar to that of Joseph Ludorf, managing director of Cipla Medpro Distribution Centre "If I had the chance to do it all over again, I would have started much sooner".

Standing on the Shoulders of Robots

Global eyewear manufacturer Shamir Optical's Nili Azura is an excellent example of a planner whose role was elevated through automation. Nili joined Shamir in 2002 as an entry-level production planner at one of the company's manufacturing plants. She spent her first decade getting involved with many parts of the company, including marketing, manufacturing and IT. Through her interest and initiative she gained an understanding of the operations 'big picture' and also the details of how each component part worked and contributed to the whole. As such, Nili became very involved in setting up and adding her business intelligence to the new supply chain planning system, which achieved exceptional outcomes:

- Inventory levels reduced by more than 25% overall while consistently achieving service levels exceeding 99%
- Ability to run a much larger network of 26 locations with 65,000 SKUs, across the different sites, using only three planners
- Average number of stockouts reduced from 600–700 SKU locations to fewer than 400, despite increasing the number of stocking locations from eight to 26

In 2011, Nili joined the global supply chain team at Shamir's headquarters and as of 2016 Nili is Shamir's global supply chain planning manager. With the planning system handling the day-to-day forecasting, Nili is freed to deal with any exceptions that arise, apply her business knowledge, work with stakeholders across the business and mentor new team members. As such Nili's story is the ultimate example of striking the optimal balance between humans and machines in supply chain planning.

"The current generation wants the opportunity to be creative and solve challenging problems. They are not infatuated with the mundane. They want the flexibility to leverage their unique understanding of NextGen supply chains."[5]

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