Managing the Supply Chain AI

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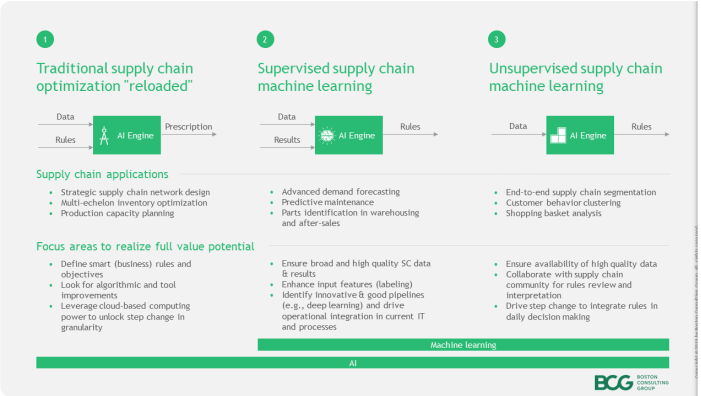
In our last post, we talked about what Artificial Intelligence (AI) means for supply chains and brought some light to the admittedly quite intricate terminology. In this post we would like to take you one step further: We think that making a difference between artificial intelligence, machine learning, and deep learning is not only of technical nature, but should also steer investments and management attention to the right topics in order to maximize value.

From our point of view, looking at typical AI use cases in supply chains is a good starting point to make those crucial decisions. As each of those use cases has its sweet spots in terms of supply chain applications, yet also has markedly different key areas to focus on, let's have a look at each of them.



Traditional supply chain optimization “reloaded”

This use case is likely the most traditional and also most widely applied one. From our experience, more than 70% of existing implementations fall into this category. Supply chain decisions in this category are being made based on supply chain data inputs onto which specific rules are applied. For example, this is the case for strategic supply chain network design decisions where large amounts of transactional delivery and product data are combined with smart optimization rules in order to come up with an optimized distribution network.

Most of this cluster's applications are already around for a quite a while. Nonetheless, many companies are currently pursuing those opportunities as recent advances in data management and optimization tools now allow to unlock additional value. In our strategic supply chain network design example above, many companies can realize supply chain cost savings > 20% from applying those data-driven optimization methods.

So where should supply chain leaders focus on when they pursue applications in this category?

1. **Defining the right decisions rules and objectives** going into AI-driven models is key. For example, including sustainability measurements in addition to the traditional supply chain metrics such as costs and service levels are on many companies' agendas today.
2. **Algorithmic improvements**, for example for highly complex optimization tasks, is still important once

companies want to increase the frequency of re-planning or hit the limit of currently available computing power. The good news here is that the labor market availability for the required profiles with respect to these techniques is comparably good. Also a significant number of trusted and well-tested software solutions to pursue this category's applications are available.

3. **Cloud-based computing power** (for example, from Amazon Web Services, Google Could Platform, or Microsoft Azure) can help companies to scale important supply chain applications to a broader scope. This not only refers to a broader usage of those applications in the organization, but also unlocking a finer resolution when it comes to planning (e.g., going from part categories to individual SKUs).

Supervised supply chain machine learning

With this use case, we come to the activity hot spot of many companies that consider themselves leaders in the analytical supply chain space. Demand forecasts are optimized down to the individual SKU-level taking thousands of data points into account. Machine break-downs are identified before they happened using real-time sensor data. Returned parts in service kits are identified through image recognition techniques speeding up the refurbishment process.

All of those approaches have in common, that they learn the rules of the game from a significant amount of data and previously seen actual outcomes (= results). In the demand forecasting example, this means learning the rules to predict the future demand based on historical data (such as sales history, weather patterns, economic data) and previously seen actual demands. As our colleagues at **BCG Gamma** have shown in various cases, EBIT improvements of > 5% are possible when a better forecast accuracy drives down inventories and creates better margins through fact-driven volume allocations.

We believe that there are distinct requirements to play successfully in this category:

1. **Data availability** and access to a broad (and potentially today still undefined) and high quality set of data should be the top priority in this use case. For example, implementing data lakes to store a variety of data points is a first step in order to generate future value from it.
2. **Data augmentation** is another important topic. Supply chain leaders have to keep in mind that that the right input data points (= features) are available for use. In some cases this even that those features even have to be created and augmented in order to realize the full value of machine learning approaches. Take for example a high tech company realizing that a key input to their ML-based forecasting algorithm was only available in an unstructured format in the marketing department. Creating adequate data interfaces and aligning on a different way of capturing the data jointly with marketing was key here.
3. **In-depth knowledge** of advanced approaches such as deep learning as well as integrating the AI results into the existing IT and process landscape requires sufficient attention. Given the current talent shortages for data scientist and the still very much ingrained distrust of data-driven approaches in many traditional organizations, this is probably one of the more challenging aspects a supply chain leader faces.

Unsupervised supply chain machine learning

This use case is probably one of the rare species in advanced analytical supply chain approaches, yet its value should not be underestimated. In unsupervised supply chain machine learning, data is fed into the AI engine without any (significant) context and it will come up itself with the set of rules - often based on the similarity of different data points. How can this be useful? For example, companies use this to discover any previously unknown patterns in their customers' ordering behavior.

The classical example here is that Walmart leveraged this technique to discover the famous *diapers-and-beer-correlation* on typical Friday night customers which made them locate both products closer together in their stores to stimulate sales. More recently, companies use these kind of approaches to update their supply chain segmentation based on what the data tells them about the most relevant clusters in customer and product behaviors. This in consequence gives them the opportunity to shape service levels and right-size their supply chain costs to the specific segments often yielding significant value.

This category is markedly different from the others in terms of focus areas:

1. **Availability and quality of data** should, not surprisingly, also deserve a high priority here. Yet, supply chain leaders should keep in mind that it often takes more than just feeding the results into day-to-day operations.
2. **Review and interpretation** of results from an advanced data-driven customer segmentation by experts of the supply chain community is critical in order to avoid acting on a purely random data appearance.
3. **Changing day-to-day practices** such as more frequently adjusting product placements (in store or online) based on shopping basket analyses often requires more significant changes in the back-end processes than in the other use cases.

So what now?

New opportunities from artificial intelligence applications put supply chain leaders on the hot seat: Selecting the right analytical approach to solve a specific problem can only be a first step. More importantly, investments have to be steered towards the most important areas to put the key prerequisites into place in order to realize the full potential from AI. And this comes, as we have seen, from a variety of distinct areas: from IT-related initiatives (such as building up a data lake infrastructure) to strategic topics (such as rethinking your current supply chain segmentation). In

addition, the rapid rate of progress in AI is still unchanged and we can stay curious what the future will bring.

Are you ready?

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Even though #COVID19 is top of mind among many supply chain leaders these days, let's not forget that there are other disruptive forces currently unfolding. That's why we will give more insights on where supply chain leaders should focus on during AI implementations in the second part of our point-of-view on #AI in #SupplyChainManagement. Check it out!

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