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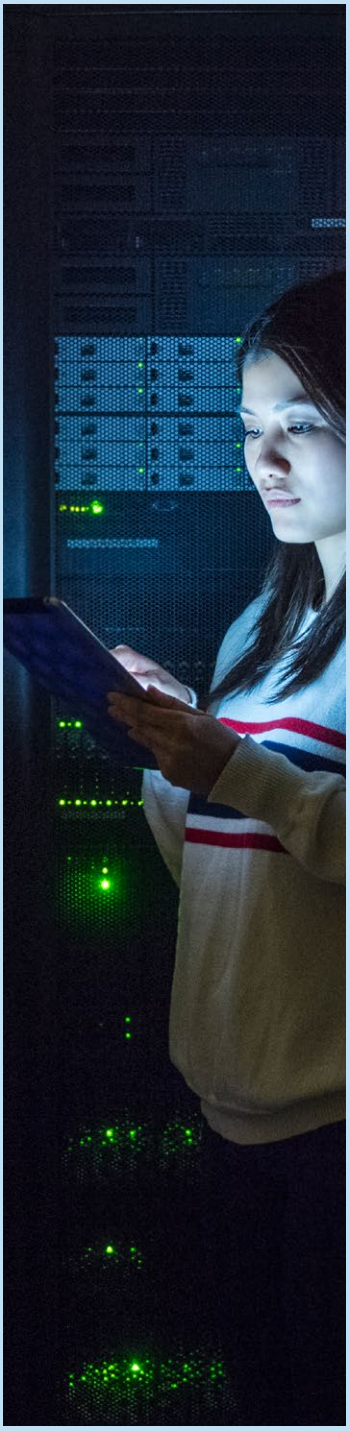

DIGITALIZING SALES & OPERATIONAL EXECUTION – (DS&OE)

Prepare and prevent, don't repair and repent:

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Abstract

Digitalized Sales and Operational Execution provides near real-time visibility of demand and supply at a granular level. This includes robust tracking and execution to balance the demand and supply along with optimizing inventory, lowering cost, and boosting the top line. Sales and Operations Planning is a big picture process that is much larger than the execution time frame, resulting in failure of the expectations or actual numbers meeting the projections which leads to constant firefighting. The main struggle for supply chain planners starts post Sales and Operations Planning i.e. with the execution of the plan. The experience & challenges that front-line planners face are not very well captured or addressed in the S&OP, leading to significant gaps when it comes to execution. This inevitably expends the supply chain leading to a loss in revenue, higher execution costs, and lower customer satisfaction. Sales and Operational Execution is the process to break Sales and Operations Plan to a more granular level to identify and act on deviations between the latest Sales and Operations Plan and operational details. This apportioning of Sales and Operations Planning makes it more actionable by bringing it closer to operations and more importantly, defining business rules for criteria and thresholds for identifying significant deviations and recommending course correction. A real-world model merges the two and thus the Sales and Operational Execution links the tactical planning with the granular execution by providing a more collected and controlled mode of operations to the supply chain.

"Unfortunately, because supply chain managers have demonstrated an ability to execute in the short term and put out fires as they occur, in some ways, we are actually rewarding the arsonists."

– **Mike Griswold**,
Vice President of Research, Retail at Gartner [1]

Difference between S&OP & S&OE

Supply chain managers have S&OP (Sales and operations planning), then they have the real world. The real world comprises of a time fence planning, separating the strategic planning period of S&OP with a relatively shorter operations execution phase S&OE (Sales and operations execution).

S&OP is an aspect of supply chain planning that aims to create a unified and consensus-based business plan to forecast demands. Key input drivers are the Sales, Marketing, Manufacturing, Finance, and Distribution functions. It is an iterative process that is based on a like-to-like annual comparison of the planning cycle. S&OP develops a holistic approach to planning and forecasting by involving cross-functional team collaboration.

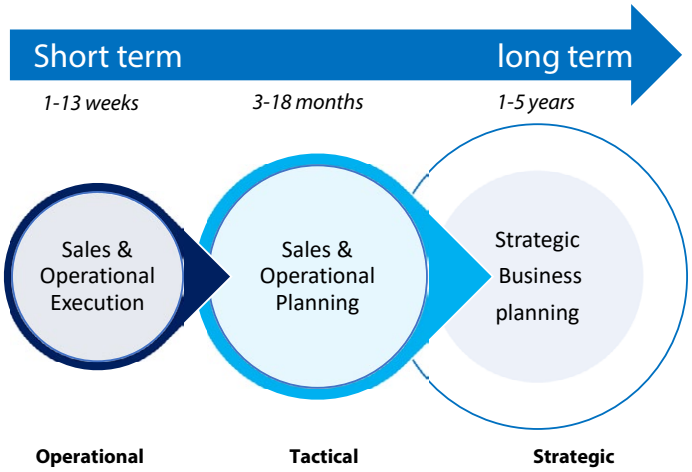


Figure 1: Short tem to long term view of Supply & Demand planning

Historically, S&OP used to be an annual exercise but with time the S&OP horizon has shortened to half-yearly, quarterly, or even bi-monthly. S&OP is a big-picture process that is much larger than the execution time frame. This results in failure of reality meeting the expectations; or actual numbers meeting the projections which lead to constant firefighting.

The main struggle for supply chain planners starts after the S&OP process i.e. with the execution of the plan. Though the strategy is set up by the executives, it is the front-line planners who need to manage and fulfill the requirements and often they fly in dark. The experience & challenges that front-line planners face are not very well captured or addressed in the S&OP, leading to significant gaps when it comes to execution. Fluctuations in demands, shortages, delays, and disruptions can lead to a weakened supply chain and leading to a loss in revenue, higher execution costs, and lower customer satisfaction.

Reason for challenges in Execution:

The stark difference between design and practice.

With the increase in complexity of supply chain, global delivery, information flow, new product introductions; a longer-term plan doesn't translate well into execution and a short-term execution plan doesn't support the financial plan. Fluctuations in demand or market not responding in projected manner, lack of cross-functional perspective and inability to coordinate with stakeholders in a short time leads to chaos and making trade-offs more challenging. In short term, issues are more volatile and take away crucial time from the planners. This results in worsening the short-term uncertainty leading to the rushed ordering of raw materials, frequent rescheduling of production, adding cost to supply, and bottom line erosion, and hence the need for S&OE.

S&OE breaks S&OP to a more granular level to identify and act on deviations between the latest S&OP plan and operational details. This apportioning of S&OP makes it more actionable by bringing it closer to operations and more importantly, defining business rules for criteria and thresholds for identifying significant deviations and recommending course correction. A real-world model merges the two and thus the S&OE links the tactical planning with the granular execution by providing a more collected and controlled mode of operations to the supply chain. The exact timing of the S&OE horizon should be determined by business needs that can begin immediately or, at the end of the frozen period.

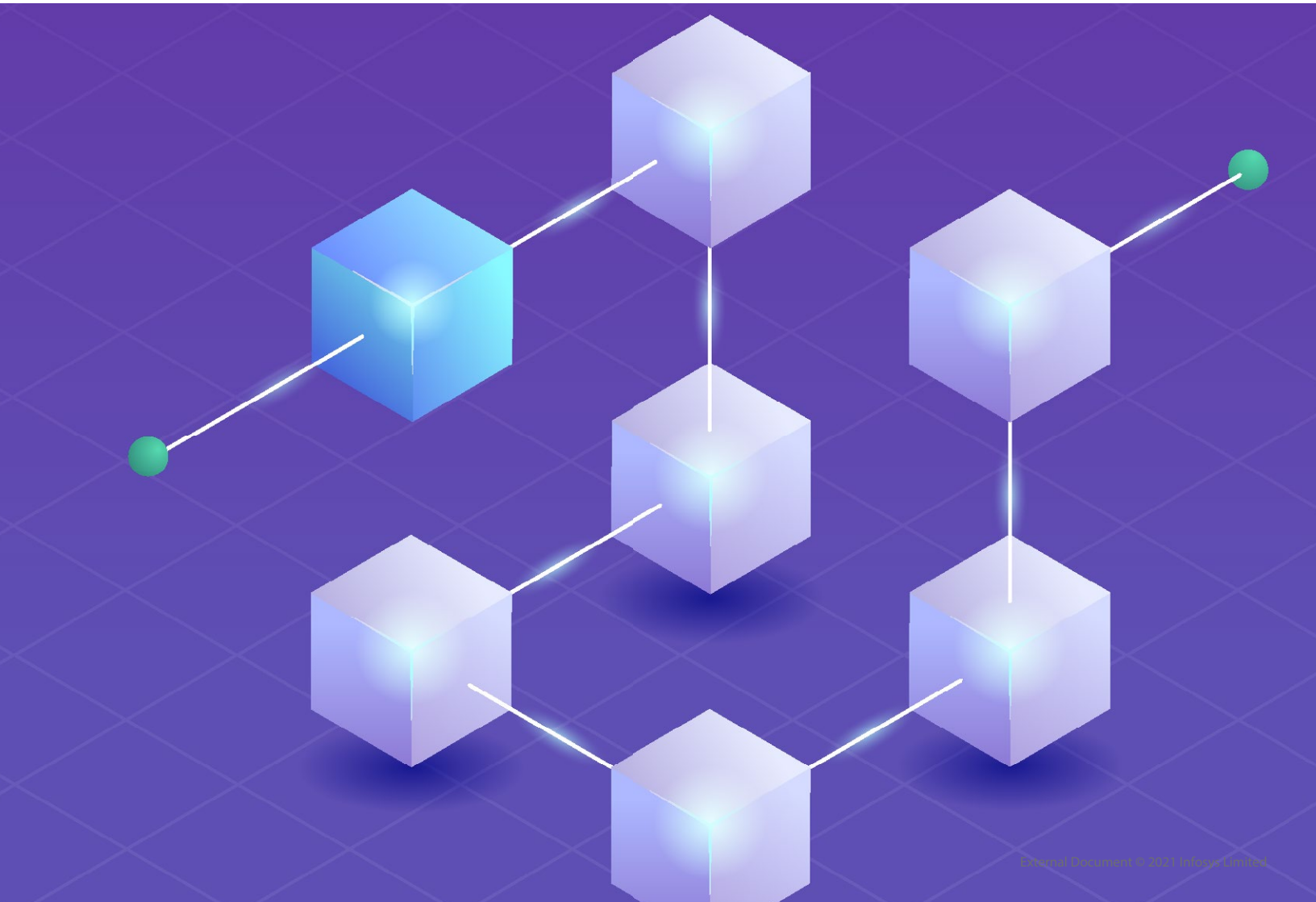
Connecting S&OE and S&OP

"A ship that sails without a compass will get lost at sea."

- Matshona Dhliwayo

You don't just set up the sail without the navigation system, it's required for regular monitoring and course correction as you can't plan for scenarios of the sea.

S&OE work as a navigation system for the committed demand and plan, the S&OP provides input to the S&OE that subsequently translates into the operational plan. Key information is gathered in S&OP, but it does not focus on the operational level. Operational planning is focused on the short term with specific steps. Regular updates on performance and metrics from S&OE help in navigating to fulfill the plan. It is designed to give a daily or weekly snapshot of a company's actual, real-time demand & supply view, providing inputs for plans to be more realistic and identify the gaps in the early stages.



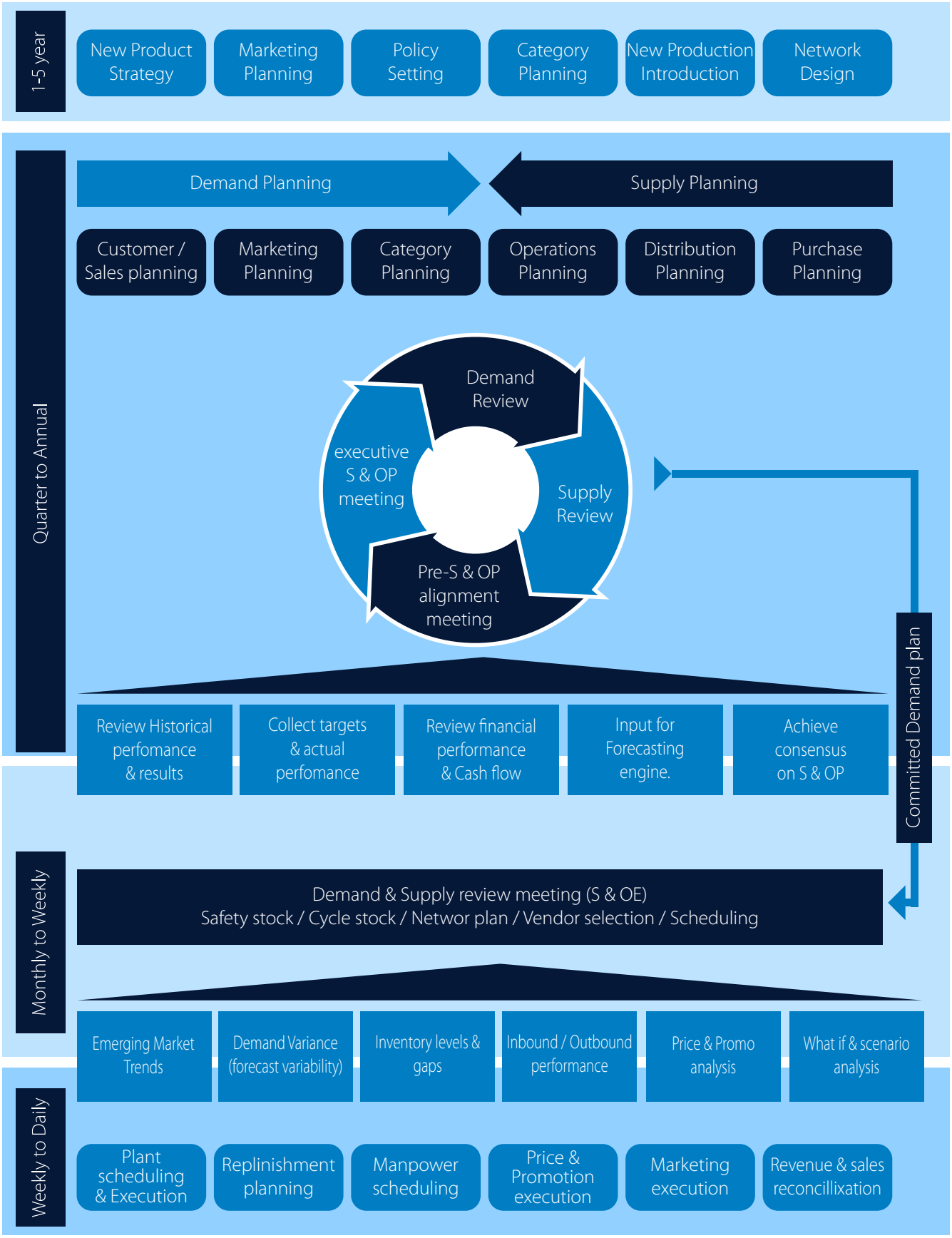


Fig 2: Connection between long term strategy planning, S&OP and S&OE

The Objective

S&OE aims to compare demand and forecasts, making sure the production can deliver fast via operational pivots like inventory buffers, lead times, asset utilization and optimized inventory. The visibility available in a short time frame process helps track the S&OP and S&OE alignment.

A well-executed S&OE closes the feedback loop for S&OP providing near real-time conversion of plans into results. Two factors play a key role in identifying the strengths and weaknesses of the supply chain - how speedily the problem is recognized & the issue is resolved. S&OE provides early warnings that help businesses adjust their plans and responds to uncertainties.

In summary the S&OE aims to:

- *Bridge gap between planning and execution*
- *Improve customer service levels*
- *Optimize inventory*

How Digitalized Sales & Operational Execution (DS&OE) can help

The need for any business is quick recognition of the problem and resolving the issue. Digitalizing brings agility into the supply chain by improving visibility, demand sensing, triggering alerts, analyzing the drivers and recommending corrective actions. DS&OE provides near real time visibility of demand and supply at market and cluster level for robust tracking and execution to balance the demand and supply all the while optimizing inventory, lowering cost and boosting the top line.

Buffers/ Curbing Volatility

Inefficient demand and production forecasting often lead to supply chain risk and volatility. One of the most significant contributions of S&OE is to reduce this risk and curb volatility. Taking a wholesome approach to viewing a business's supply chain operations, S&OE acknowledges short term demand fluctuations. This helps keep long term operational plans and strategies aligned near real time, thereby reducing the gap between demand forecast and actual demand . Besides increased customers satisfaction, this also enhances supply chain's dexterity leading to efficiency in meeting orders and avoiding inventory overages, unused freight capacity etc. While, there is always room for error and disruptions in supply chains at a global levels are unavoidable, small adjustments and corrections in short runs can decrease the magnitude of the bullwhip effect in the supply chain to contain risks.

Improve Visibility

Improving estimated and real time demand alignment is one of the major benefactions of S&OE but the execution also keeps intracompany operations consistent with the principles of Industry 4.0. With deeper insights in estimated and real time demand deviations, and

dispersions in forecasted planning and schedules, DS&OE can enable greater visibility of supply chain at organizational level.. The key input of S&OE is (near) real time data and informational transparency ensuring higher clarity in internal and external operations and planning in companies that embrace such workflow changes. It provides a holistic picture of production planning to the planners to appraise and prevent the inefficiencies in supply chains that were initially obscured due to siloed effect. Increased visibility not only improves planning accuracy but also establishes a synergistic relationship in disparate production planning.

Here are some of the benefits:

- *Tri direction visibility- product level, location level & time level*
- *Systematically capturing supply chain incidents and centralizing them for weekly review*
- *Promotion performance reports*
- *Monitoring actual demand and supply variance by line items*
- *Inbound and outbound performance tracking*

Cognitive capabilities

Probabilistic demand forecasting

The objective of forecasting is to estimate future demand. Traditionally, multiple statistical time series techniques were used to generate forecasts. They are usually single-valued (mean or median forecast) and optionally come with simple uncertainty measures. However, choosing these values essentially amounts to premature decision making, which triggers information loss when compared to underlying probabilities of possible sale. A probabilistic forecast takes the form of a predictive probability distribution over future quantities. It represents an estimation of the respective probabilities of possible future outcomes of a random variable. In contrast to single-valued forecasts, such as median time-series forecasts or quantile forecasts, probability forecast represents a probability density function. Probabilistic forecasting aims to maximize the sharpness of the predictive distributions, subject to calibration, based on the available information. Probabilistic forecasts can be applied to numerous domains but they are especially useful for supply chain optimization by taking uncertainty into account that helps manage risk. It is not just about improving average demand predictions but also about assessing all possible outcomes including demand volatility, which has the biggest impact on service levels.

Probabilistic delivery performance

Delivery performance, both inbound and outbound has a major impact on supply chain performance and it can impact service levels, lead to penalties and damage customer experience. Delivery performance also impacts inventory, which needs to be recalibrated on the basis of demand distribution and delivery lead time distribution.

Through Machine Learning classification models, probabilities for on-time deliveries are computed for each shipment. When there is high level of certainty that a shipment will miss its Estimated delivery date, an alert can be triggered and assign the shipment with a risk level. New estimated delivery dates are re-computed to alert the customers as well as planners for appropriate actions. These delivery distributions along with demand variability are also used to estimate inventory level and the reorder point for inventory.

Dynamic inventory management (reorder level or safety stock)

This aims to determine optimal reorder level or safety stock level using demand and supply variability. The probability distribution function of demand during lead-time by using a simulation model when the demand and the lead-time both follows a probability distribution of any arbitrary shape. The simulation model estimates a new probability distribution function of demand during lead-time in the considered inventory system. The demand during lead-time, is estimated by merging the two distributions of demand and lead-time. This simulated demand probability distribution is estimated and tested. It is used to calculate the inventory required or the reorder level to meet the desired service level.

Fig 3 - Cognitive supply chain needs good blend of visualization, tracking and AI capabilities to support supply chain managers and provide actionable recommendations

Automated alerts or identifying exceptions / issues

An S&OE platform can provide visibility into potential shortages and function as an early warning system to alert the right people. Automation can dramatically reduce the time to discovery of an issue; allowing preventive measures to be taken before it becomes a catastrophe. With the ability to respond faster,, the impact across the supply chain is reduced and the risk to the customer is diminished. The alerts and triggers can be linked to probabilities of demands, supply, gaps etc. Automated PO and inventory ordering can also be linked to alerts.

Roadmap

Real-time Visulization

- IT infrastructure that can power real-time data visualization
- Real-time data by integrating suppliers and transport partners

Cognitive Intelligence

- Data analytics & AI to adopt cognitive capabilities
- Monitoring risk and testing contingencies
- Scenerio analysis
- Forecasting and testing operations over the coming days and weeks

Digital twin

- Integrated business planning
- Use IoT devices or other smart technology to power live warehouse monitoring and freight tracking
- Understanding supply chain dynamics and behavior
- Bottleneck discovery
- Automated network optimization
- Exhaustive simulation capability

Figure 4- Roadmap for DSOE : from Visualization to Digital Twin

Successful Digitalization of S&OE deployment depends on access to real-time data from suppliers, transport partners etc. The journey starts from building visualization capabilities & metrices in real time that integrate data from multiple sources in an automated fashion. Hence, developing cognitive capabilities to support decision making and making the analysis palatable with visual outputs and validations is necessary. This unification along with business knowledge helps decision makers to visualize output, identify and sort possible issues across multiple stakeholders. Expanding this proficiency across supply chain will lead to perfect digital twin (virtual supply chain replica). This complex data driven web requires a great deal of integration which we are enabling for our clients.

Reference

1. https://www.gartner.com/smarterwithgartner/how-to-set-up-soe-in-supply-chain-planning/

2. https://ssrn.com/abstract=2405902

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