

Parameter-Driven Supply Chain Planning Models

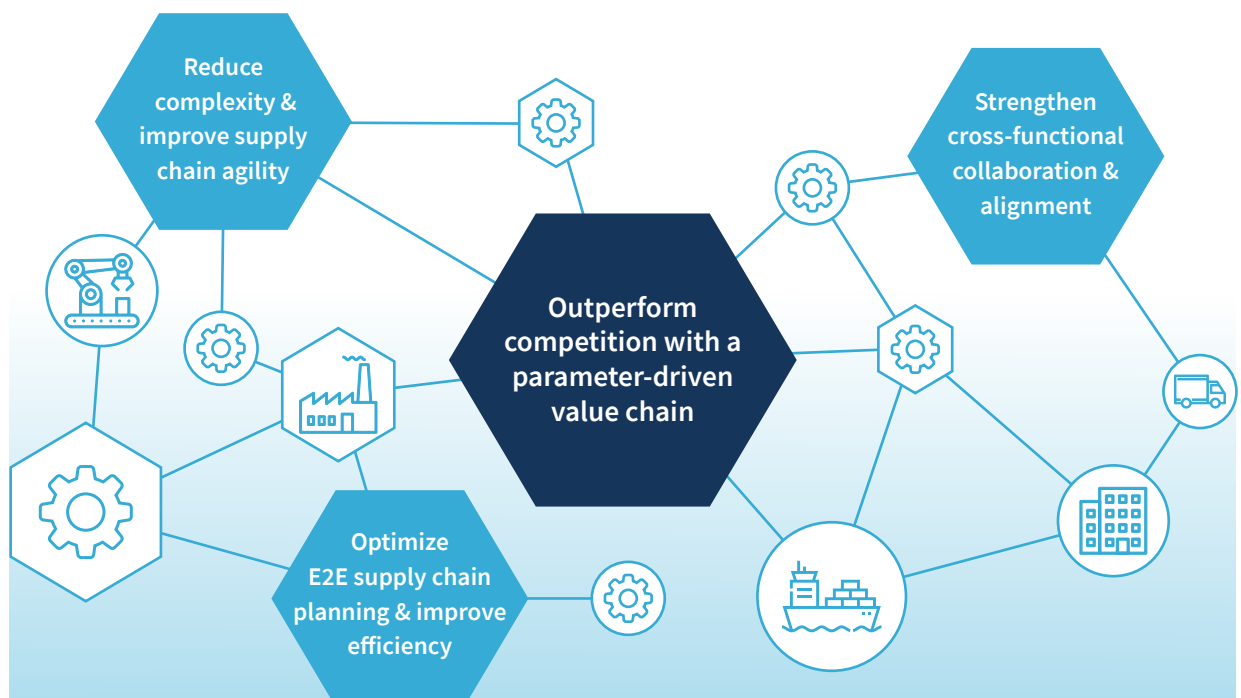
Outperform Competition with a Parameter-Driven Value Chain

Supply chain management in modern business operations includes a complex network of processes involved in the production, distribution, and delivery of goods and services. The ever-changing dynamics of global markets, growing customer demands, and the complexity of modern business environments have stretched traditional supply chain planning methods to their limits. In response, companies should turn to a more advanced and adaptable approach by parameterizing their value chains end to end. This marks a paradigm shift in supply chain planning, leading to increased adaptability and enabling better decision-making. It makes use of company-wide aligned variables or parameters in supply chain planning models that represent key decision factors, such as demand patterns, lead times, production capacities, and target inventories. Instead of trusting on fixed values, parameterization allows planners to adjust these variables dynamically, and consequently to reflect changes in the supply chain environment.

By leaving traditional planning hierarchies in favor of this more synchronized approach, companies can respond effectively to market developments, customer demands, and supply disruptions. In this thought paper, we will explore the concept of a parameter-driven value chain, and how it can offer companies a distinct competitive advantage, namely reduced supply chain cost, better service levels, and increased responsiveness. The following topics will be addressed:

- ▶ Reduce and manage complexity: improve supply chain agility
- ▶ Strengthen collaboration and alignment: build strong partnerships
- ▶ Improve end-to-end supply chain planning: achieve greater efficiency

Figure 1:
Outperform competition with a parameter-driven value chain



Reduce and Manage Complexity: Improve Supply Chain Agility

Modern supply chains have changed into complex networks connecting suppliers, manufacturers, distributors, and customers across borders and time zones. Yet, conventional planning methods often find themselves struggling to capture the complicated interdependencies and disruptions inherent to these complex systems. Here, the use of firefighting and ad-hoc solutions, products of experienced expertise and quick thinking, stands as a barrier against unforeseen disruptions and shows one way to meet the demanding challenges that arise.

Ironically, the ambition of operational efficiency can lead to a counterintuitive outcome – greater complexity. Sophisticated planning systems, determined for the ideal of "fully integrated plans," can implicate complications in supply chain operations. Despite their purpose to streamline processes, these systems can sometimes be inflexible when confronted with dynamic changes.

Strategies and measures to tackle complexity

However, within this complexity, parametrization emerges as a solution. By creating a synchronized yet dynamic model of the supply chain, it becomes easier to manage and optimize the flow of goods and information, providing a new level of navigational clarity. Ad-hoc decisions are replaced by aligned parameters, firefighting becomes obsolete or at least much more effective.

Another challenge is related to the so-called bullwhip effect, which affects operational efficiency by amplifying fluctuating demand signals throughout the entire supply chain. Decoupling has proven to be a successful strategy to address this issue. This approach involves strategically separating certain parts of the supply chain, effectively reducing complexity and sensitivity to fluctuations. For instance, imagine a manufacturer dealing with volatile consumer demand for a specific product. To mitigate the bullwhip effect, they might introduce an inventory buffer between the production process and the distribution phase. This buffer, replenished according to stable, long-term forecasts or actual consumption, serves as a dynamic countermeasure. Downstream from the decoupling point, production becomes responsive to real-time demand signals, reducing the amplification of downstream disruptions.

In this illustrative scenario, decoupling simplifies the supply chain structure and facilitates a more effective management of production segments. The three prominent decoupling methodologies, "Order Point Method", "Lean Manufacturing" and especially "Demand-Driven Material Requirements Planning (DDMRP)," underscore the significance of this approach.

Through accurate analysis of key factors such as lead times, demand variability, and supplier performance, companies create fundamentally agile and adaptable supply chains. This agility allows them to quickly address disruptions and shifts in customer demand, establishing a competitive edge in dynamic markets. In this context, metrics serve as navigational guides, enabling supply chain managers and senior executives to make informed, data-driven decisions, and quickly adapt strategies to dynamic market conditions.

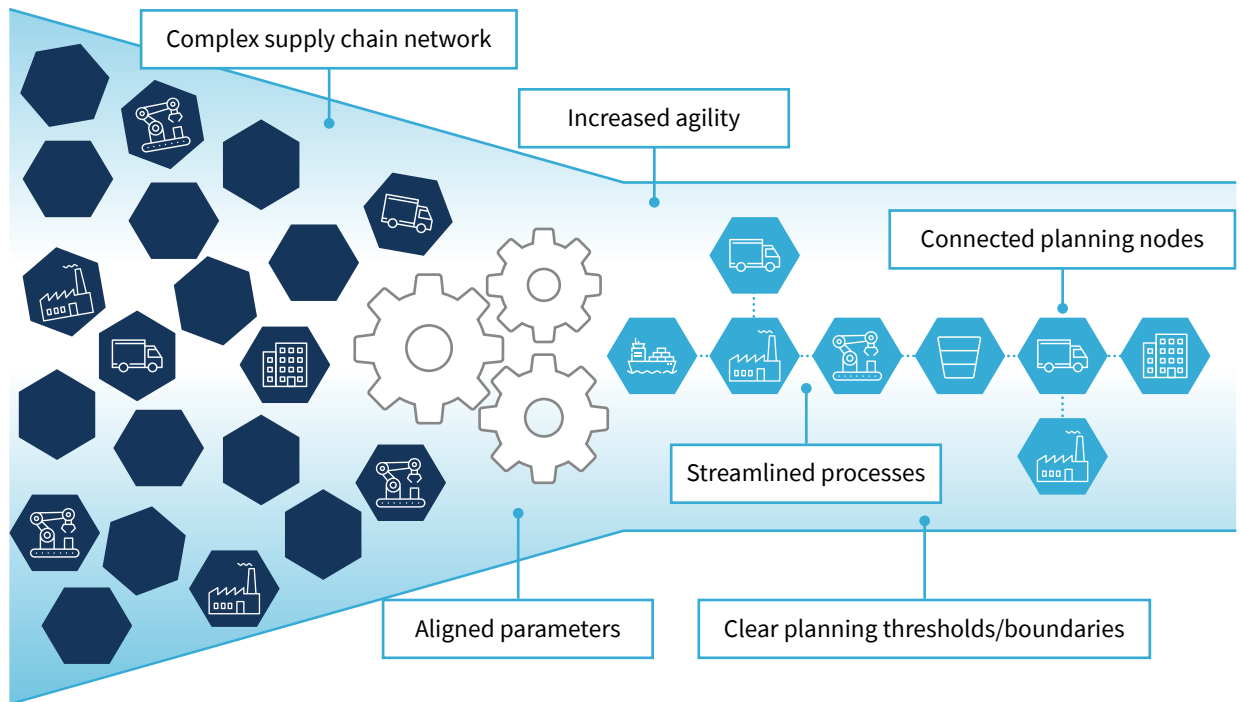
Aligning and setting key parameters

Within a parameter-driven supply chain, the synergy of planning steps is critical for achieving the highest operational efficiency and responsiveness. This approach is based on aligning and setting key parameters – e.g., reorder points, and lead times – leading to controlled inventories and production schedules. Buffers, strategically situated at crucial links, facilitate the smooth coordination of planning steps. These buffers, responsive to demand fluctuations and changing lead times, ensure stability by absorbing disruptions without propagating them upstream and illustrate the fusion of strategic anticipation, manifested in parameters, with near real-time adaptability. This coordination of inventory, production, and distribution allows businesses to confidently navigate today's complex business landscape.

In addition, parameterization enables scenario modeling via automation of planning, empowering decision-makers to simulate diverse strategies and their potential outcomes. By assessing the implications of each choice, companies gain insights and can choose the most beneficial path, proactively identifying bottlenecks, vulnerabilities, and inefficiencies. Furthermore, parameters serve as the heart for comprehensive performance analyses, completing the circle of strategic supply chain management. In essence, the current landscape demands a balance between complexity and efficiency, and through strategic methods such as decoupling, parameterization, and scenario modeling,

organizations can achieve this balance and successfully navigate through complexity while embracing adaptability. In the next chapter, we will address how the connection of consecutive nodes of a supply chain through parameters promotes closer collaboration and alignment between involved supply chain functions.

Figure 2:
Reduce and manage complexity: improve supply chain agility



Strengthen Collaboration and Alignment: Build Strong Partnerships

In the previous chapter, we explained how the introduction of parameters facilitates to reduce supply chain complexity while allowing for greater agility. Another key benefit of parameterized supply chains is their ability to foster collaboration and alignment among supply chain functions. Collaboration and alignment in the context of a parameter-driven supply chain refers to the strategic and operational efforts of various stakeholders within the supply chain ecosystem to work together and ensure consistent adherence to predefined parameters and guidelines. With multiple stakeholders involved in the process, from suppliers to production facilities to distributors and customers, it is essential to maintain effective communication and coordination. Metrics create a common language and shared visibility across organizational functions and the impact of plan adjustments. With access to the same data and performance metrics, cross-functional teams can effectively collaborate and coordinate their actions toward common goals, moving from isolated local decisions to global optimization.

Imagine a retail company where cross-functional teams work together to minimize lead times for their customers. Metrics such as shorter production cycles drive their collaboration. The design team adapts product designs for streamlined manufacturing, while procurement ensures the selection of fast and reliable suppliers. Manufacturing uses lean practices, and logistics optimizes delivery routes. When adjustments are needed, such as design revisions, predefined parameters ensure seamless tracking across teams. This synchronized approach increases flexibility and maintains alignment towards the common goal of ensuring customer satisfaction.

Streamlining efficiency and collaboration

In the context of a parameter-driven value chain, synchronization becomes a powerful tool for managing complexity. Emphasizing synchronization at the tactical configuration level improves operational efficiency. This strategic approach promotes seamless operations by executing tasks within predefined control ranges, reducing the need for reactive crisis management. Teams skillfully handle exceptions within established parameters, ensuring a consistent operational flow. The established connection tracks changes and their impact throughout the value chain, provid-

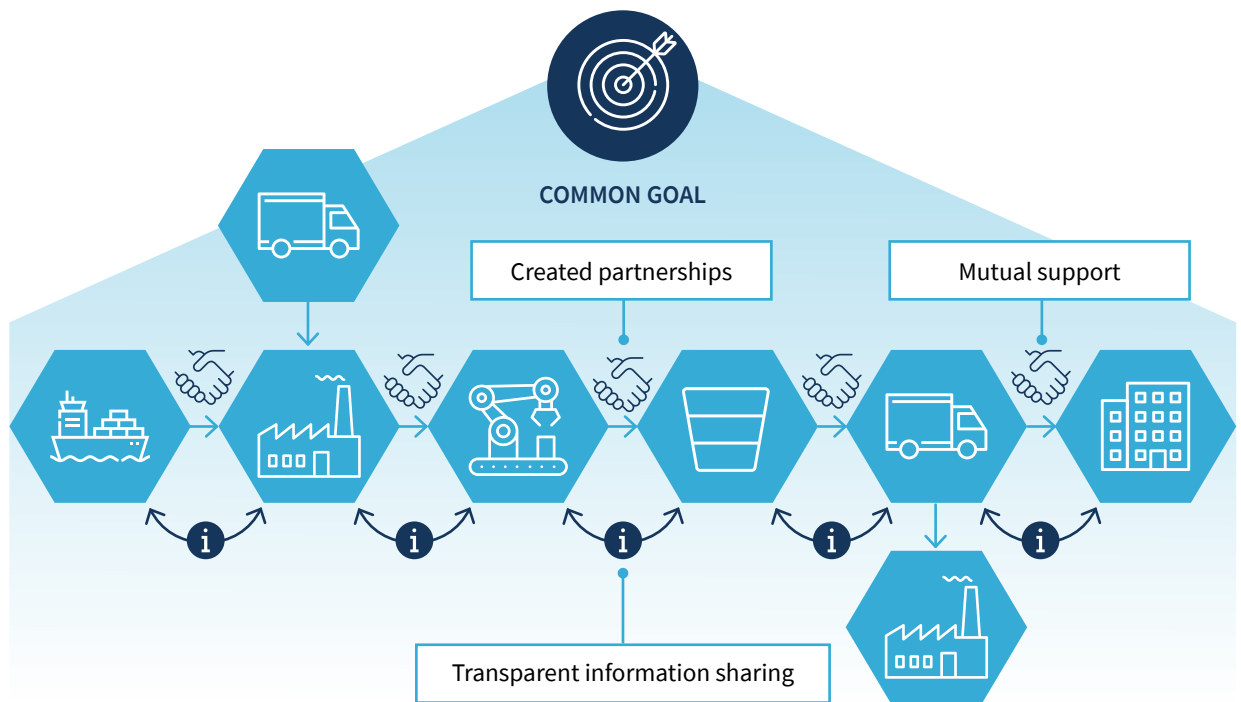
ing clear insight. Ultimately, synchronization within a parameter-driven value chain streamlines processes improves adaptability, and enables informed decision-making.

In addition to internal processes, parameterization also fosters better collaboration with external suppliers and partners. By sharing relevant supply chain parameters with external stakeholders, companies can improve communication and align goals, strengthen relationships, reduce cycle times, and improve overall performance.

In today's supply chain landscape, collaboration and alignment are critical success factors. This requires stakeholders within the parameter-driven supply chain ecosystem to work together cohesively while adhering to established parameters. This cross-functional coordination fosters ownership, teamwork, and a shared sense of purpose. Metrics serve as measurable targets that unite teams in pursuit of common goals. Tracking plan adjustments through parameter linkages makes the impact of changes transparent. This collaboration extends to external partners, improving communication, streamlining processes, and strengthening overall performance. In this context, synchronization within a parameter-driven value chain optimizes operations, mitigates disruptions, and enables informed decision-making for greater adaptability and efficiency.

When these principles are implemented throughout the chain, significant efficiency improvements can be achieved. How parameters support this vision of an optimized end-to-end value chain is discussed in the final chapter.

Figure 3:
Strengthen
collaboration and
alignment: build
strong partner-
ships



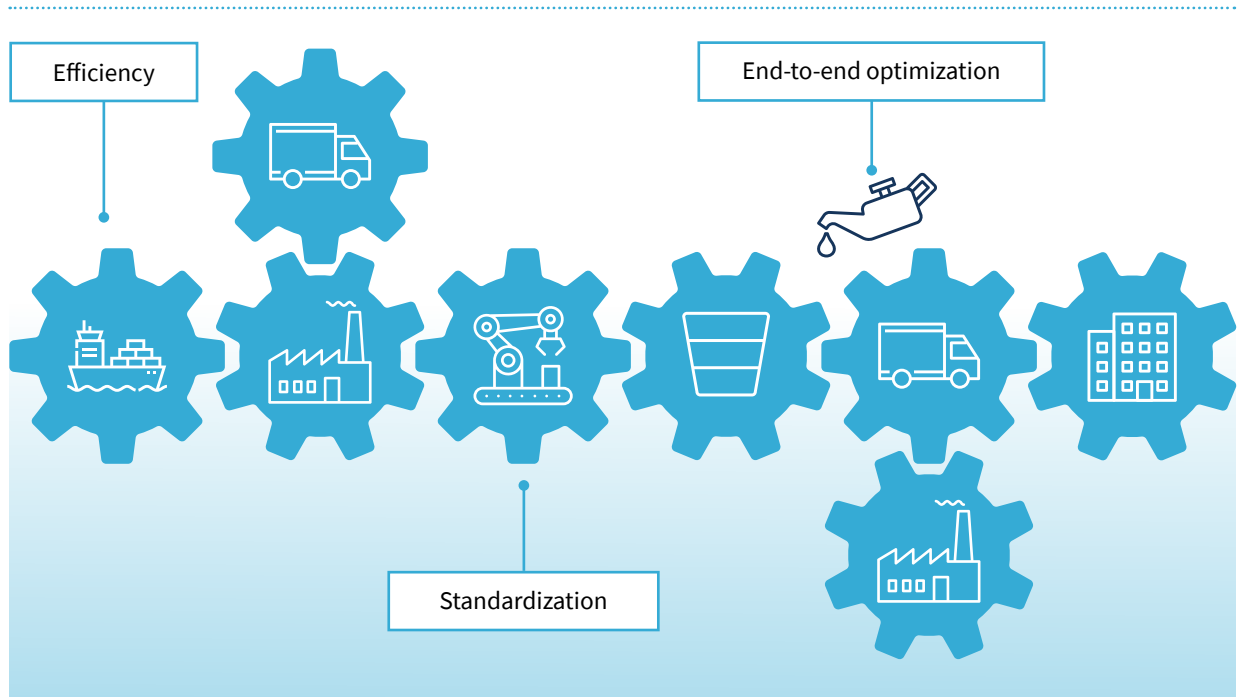
Improve End-to-End Supply Chain Planning: Achieve Greater Efficiency

Efficiency is an ongoing goal for supply chain organizations. Parameterization provides a means to consistently improve efficiency by regularly assessing performance metrics and fine-tuning parameters. When coupled with advanced analytics and predictive modeling, metrics enable companies to predict demand patterns, identify potential bottlenecks, and anticipate upcoming challenges. This predictive capability empowers decision-makers to proactively plan for different scenarios, inherently strengthening supply chain resilience by building flexibility into operations. By proactively managing and understanding risk, companies can accelerate their recovery from unforeseen events.

As an example, companies can easily simulate scenarios by adjusting parameters such as demand patterns or mimicking machine breakdowns and supplier shortages to gauge their impact across the value chain. Parameters and the establishment of limits and thresholds serve as the basis for standardization. As a result, the automation of succes-

sive planning steps, such as buffer replenishment, occurs seamlessly without manual intervention. Planners can then focus on exception handling instead of repetitive planning tasks. At the same time, any changes or plan adjustments at one point in the supply chain are automatically reflected upstream and downstream, ensuring parameter alignment. Without parameter-based connectivity, replanning across the chain would require multiple iterations.

Figure 4:
Improve end-to-end supply chain planning for greater efficiency



In conclusion, a parameter-driven value chain represents a transformative approach to supply chain planning that overcomes the limitations of traditional methods. By reducing complexity, increasing agility, fostering collaboration and alignment, and enabling efficient optimization, companies can build more resilient and competitive supply chains in today's ever-changing business landscape. Embracing parameterization represents a strategic leap forward for organizations seeking to stay ahead and thrive in the face of uncertainty and change.

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