LEAN Supply Chain Management

A Paradigm Shift in Supply Chain Management in the Chemical Industry

Supply chain management (SCM) requirements have changed significantly over the past few years. The buzzword nowadays when managing global supply chains is adaptation to increasing global complexity and volatility. Growing pressure from financial markets and the difficulty of increasing operating margins and working capital in this environment require efficient planning and execution of global value-added processes. More and more companies are therefore relying on LEAN Supply Chain Planning. This approach not only greatly simplifies existing planning processes; it also improves the synchronization and variability management of global supply chains.

A recent survey among supply chain managers impressively demonstrates the urgent need to adapt existing SCM concepts to the new reality: Three-quarters of top managers consider market volatility as the biggest challenge to their supply chains, followed by supply chain complexity. Most companies have chosen adapting to the "VUCA" world - an acronym of the words "Volatility", "Uncertainty", "Complexity" and "Ambiguity" - as a major strategic target. In this context, global SCM can play a key role.

Traditional planning approaches fail in today's VUCA world
Particularly for companies in process industries, increasingly frequent market fluctuations, associated with the high level of complexity involved in global value creation processes, bring with them hitherto unknown problems and challenges. Production processes in the chemical industry are generally characterized by long production times. Production of chemical materials often takes months. If the chemical supply chain cannot respond quickly to fluctuations, supply bottlenecks will very quickly threaten many downstream industries. Particularly in the pharmaceutical industry, to take another example, the reliability of supply is the highest principle: It is simply unacceptable to allow poor supply chain planning to threaten the supply of essential drugs.
To ensure optimal responsiveness and efficiency in supply chain processes, almost all companies in process industries have in recent decades established global planning departments and invested heavily in their planning systems.

The challenges of today's VUCA world show more and more the major flaw of Advanced Planning and Scheduling (APS) and Enterprise Resource Planning (ERP) systems that form the planning backbone of the global value chain: They work effectively only when extremely reliable forecasts, especially regarding market trends and customer demand, are available.

**Key elements of "LEAN" Supply Chain Planning**

Three planning and management concepts are particularly emphasized in order to effectively align planning processes in process industries with the requirements of the VUCA world. They also form the key elements of LEAN SCM.

Cyclic Planning with Rhythm Wheels: Many companies have achieved great success incorporating lean manufacturing principles when designing their manufacturing operations to achieve greater efficiency. With cyclic planning and control of entire supply chains it is now possible to transfer these ideas to global end-to-end value-added processes. In process industries it is especially important to devote attention to the optimal design of set-up procedures and campaign sizes, as well as to orient them in accordance with rapidly changing market demand. Without optimal set-up sequences - e.g. shifting from bright to dark colors or from high to low concentrations - companies risk substantial production losses and cost increases.

To reduce inventory and increase the utilization of capital-intensive equipment, more and more companies rely on "Rhythm Wheels". These planning models make it possible to efficiently plan a variety of products while at the same time smoothing capacity load to avoid costly production peaks. The nature of Rhythm Wheels (see Fig. 1): It continuously repeats a given production sequence. Each wheel spoke symbolizes the production of a certain product. It arranges the products in an optimal order to utilize assets and operate more cost effectively. When planned according to Rhythm Wheels, production processes can even be perfectly aligned with fluctuating market demand. The lengths of the wheel's spokes - and thus production volumes - are continuously synchronized based on a pull-logic according to existing stocks and customer orders.

End-to-end synchronization along the supply chain: Value chains in the chemical industry are typically extended across a variety of production stages and are often
spread over several plants around the world. In order to ensure cost effectiveness and alignment with markets, supply chain synchronization is of utmost importance. Only effective synchronization can relegate production delays or even failures to the past. In this context Rhythm Wheels can achieve significant improvement; they not only optimize processes in order to determine the load on a production machine, they also help to achieve effective global timing mechanisms for production processes along all parts of an international supply chain.

All steps along the supply chain should be closely coordinated with one another and, ideally, mesh like gears (s. fig. 2). Traditional planning concepts, however, have always failed in this respect. Unless production orders are adapted to local conditions, effective synchronization of upstream and downstream production stages is nearly impossible. By establishing a stable production rhythm complex production networks in the chemical industry can be successfully synchronized, thereby reducing lead times and increasing responsiveness.

Variability management on the capacity and inventory side: In many companies in process industries, it has been common practice to counteract demand fluctuation primarily through adjustments of production plans. However, (safety) stocks - although the name suggests they are meant to absorb the impact of market volatility- were previously thought of only for planning a red line such that tapping into such (safety) stocks would spread panic through planning departments. The consequences of such one-sided variability management, however, are no longer acceptable in the VUCA world. While stocks and thus capital costs continue to rise, production peaks can be met only by maintaining costly excess capacity and incurring overtime costs in the workforce.

"LEAN" Supply Chain Planning helps companies to manage variability efficiently. By adjusting cycle times in production, capacity can be utilized consistently to actively counteract production peaks - in capital-intensive companies in process industries this is a key competitive advantage. If actual demand is significantly above expectations, stocks are actively used in planning. Indeed, it is among the great advantages of "LEAN" Supply Chain Planning that planning cyclically with Rhythm Wheels makes it possible to match production capacity with stocks more efficiently (s. fig. 3).

Results and industry trends
Many companies have recognized that the more complex and challenging requirements of the business world demand new and innovative approaches in
supply chain planning and coordination. Many consider targeting just individual elements in their planning processes, for example improving forecast accuracy or optimizing inventory, as a failed strategy. Such piecemeal efforts at most cure symptoms on a short-term basis, but they do not create the agility and robustness needed by modern supply chains in the VUCA world. Therefore, more and more companies are relying on LEAN Supply Chain Planning. It greatly simplifies existing planning processes and helps in particular to improve synchronization and variability management along global supply chains.

Companies that have implemented LEAN Supply Chain Planning report consistently positive experiences with the new approach. Through better variability management (addressing a major challenge of the VUCA world) it is possible to improve the management of stocks, service levels, and lead times. The results shown in fig. 4 are based on six industry cases. Due to concerns with confidentiality the results from the various cases which involve leading companies such as Novartis, AstraZeneca, Eli Lilly and PCI, a BASF company, were averaged.

The experience of various consulting projects by Camelot Management Consultants in the field of LEAN Supply Chain Planning and academic research and development in cooperation with leading European universities are summarized in the comprehensive book "LEAN Supply Chain Planning". Such pioneers and industry leaders in the chemical industry as BASF, Dow Chemical, and DuPont today all rely on cyclic scheduling with fixed production sequences. A central motivation for introducing LEAN SCM for manufacturers of both specialty and basic chemicals, in addition to generally simpler planning processes, is above all more efficient synchronization of their often highly complex global production processes.

Learn more about Lean Supply Chain Planning, just visit www.leansupplychainplanning.com.

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