



Alignment Between Supply Chain and Operations Execution: The Formula for Higher Profits in Chemicals

Roch Gauthier, Sr. Director Product Management,
Supply Chain Management

Taking a Systems View of the Value Chain

Though supply chain planning and operations execution teams have related goals, they approach their business from entirely different perspectives. All too often, this results in disconnects that not only limit profits but also leads to gaps between plans and execution. Misaligned business processes, changing demand patterns and priorities, as well as unexpected manufacturing operations issues keep chemical producers from reaching the highest possible margins.

However, there are new approaches to develop competitive advantages in the value chain and increase profits. With the right technologies in place, chemical manufacturers can achieve sustainable states of alignment between supply chain and operations execution teams to close gaps between plans and actuals; leading to improved margins. According to recent Gartner research, 85% of manufacturing respondents reported that their biggest challenge related to smart manufacturing strategies is integration with other supply chain functions. Research participants believe “the connection to their organization’s broader supply chain transformation is hazy”ⁱ. More visibility into increasingly complex supply chain networks offers the opportunity to make better decisions and align supply chain and operations teams daily in order to reach unprecedented levels of agility and customer centricity.

Same Goals, Different Perspectives

Supply chain and operations execution teams both want the organization to succeed: They’re focused on delivering the right products, in the right quantities, at the promised times, with the level of quality that customers expect. Yet each team takes a different approach to accomplish those goals. Some examples of how their methods and priorities vary:

Focus	Supply Chain Planning	Operations Execution
Geography and assets	Regional or global: the entire supply chain network; often containing numerous manufacturing assets	Hyperlocal: A production facility
Primary considerations	Revenue, Costs, Forecasts, Product Families	Safety, Orders, Shipments, SKUs
Time horizon of attention	18 - 24 months forward visibility	Today and tomorrow
Business processes and cadence	Monthly Sales & Operations Planning (S&OP) or Integrated Business Planning (IBP) processes	Daily Operations team meeting to discuss Yesterday-Today-Tomorrow



With these differences in place, it's no wonder the operations team finds it challenging to operationalize the high-level monthly plan and goals the supply chain team develops. Something obvious to operations such as key storage constraints for specific materials at a manufacturing facility may not be so obvious to the supply chain team. Similarly, operations may not have visibility into broader scope problems. Establishing feed-forward and feed-back alignment processes between supply chain and operations, along with enabling tools to equip each team to perform effectively, is a formula for higher profits in chemical companies.

Industry leaders are recognizing the financial benefits of implementing technologies that help manage complex, intertwined variables impacting supply chain and operations. Accenture research found that chemical executives rank planning and scheduling and materials management/supply chain as top priorities for digital investment.ⁱⁱ Companies that have invested in digital report

Alignment:

Teams moving forward in unison towards agreed upon decisions and goals, that everyone owns completely and is committed to, with precise coordination and execution.

improved quality, real-time process optimization, more effective plant management and faster processing/reduced time to market—changes that can differentiate chemical companies from their competitors.

Better Alignment Leads to Bigger Profits

Executing a plan is a daily battle - one that often spans multiple fronts beyond a manufacturer's control. Chemical producers contend with last-minute customer orders, changes in raw material availability and natural events that disrupt operations. Focusing on the factors owner-operators can control reduces risk and reveals opportunities to increase margins. Ordering the correct quantities of raw materials and establishing business processes that support collaboration and communication. Tending to these concerns and enabling teams and individuals to reach sustainable states of alignment is the only way to win this never-ending daily battle.





High-fidelity models powered by predictive and prescriptive analytics now allow companies to evaluate the economical and operational ripple-effect impacts of different strategic, tactical and operational business choices and scenarios. High fidelity models also help to facilitate dialogue among teams in order to ultimately establish clear responsibility, accountability and alignment on how best to proceed.

Creating Synergies to Optimize the Value Chain and Improve Margins

In the past, even though people and processes may have been connected across departments, the systems they used were not. Supply chain planning software and manufacturing execution tools worked in isolation from one another. New technology creates synergies between these systems, allowing chemical companies to reap the benefits of tightly aligned supply chain and manufacturing operations.

The latest supply chain tools can help strengthen both feed-forward and feed-back processes between supply chain and manufacturing operations. High-fidelity scheduling models can determine the coordinated set of actions needed to achieve the monthly high-level S&OP/IBP plan. These models can consider economics and constraints that most supply chain planning tools fail to take into account. Realistic daily or weekly production goals,

derived from high-fidelity scheduling, can now be shared with manufacturing operations teams. As an additional benefit, both teams can visualize production goal attainment in near real-time via synergies with manufacturing execution systems (MES).

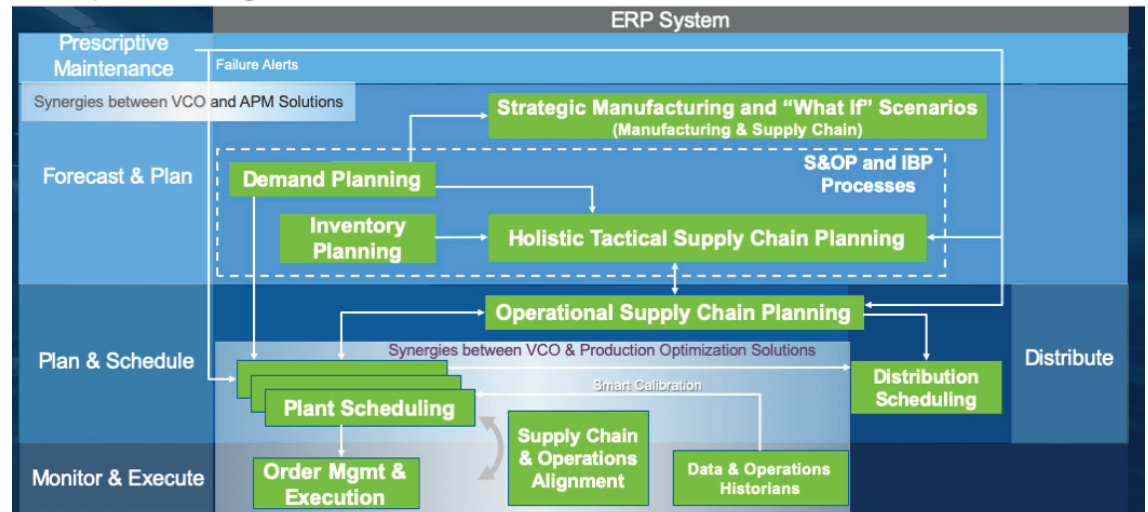
Companies can further enable daily alignment across teams through collaborative web hubs where staff can instantly bring attention to issues that require attention. These hubs offer an environment where extended team members can collaborate to resolve any issues. As daily alignment takes place, a historical archive of decisions and actions taken grows and becomes more valuable for future data mining and continuous improvement efforts. New and innovative self-healing supply chain capabilities ensure supply chain models remain as accurate as possible, reflecting actual conditions. Supply chain models can be readily calibrated to ensure they are in sync with demonstrated plant, equipment and process performance – aligning models and data in much the same way teams can be better aligned.

Finally, asset performance management (APM) systems with predictive analytics can provide advanced notice of equipment failure. Incorporating this data into high-fidelity planning and scheduling models allows chemical companies to determine the best time to perform maintenance to minimize overall schedule-related costs and customer complaints.

“We can do all the planning in the world we want, but if the scheduler isn’t scheduling to that plan, it doesn’t matter. Our money is made, to a large degree, when the scheduler executes to the plan and to what is most financially optimal for our company.”

George Baartmans, Senior Manager of Global Supply Chain and Analytics Solutions, Hexion Inc. ⁱⁱⁱ

Value Chain Optimization (VCO) Process Flow and Synergies to Improve Margins



The latest supply chain management tools can help create sustainable states of alignment in numerous business processes:

- **Strategic manufacturing and logistics scenarios:** Align on the economic and operational impacts of various strategic “what if” scenarios such as capital investment studies, manufacturing footprint optimization studies, product mix and volume transfer studies, as well as make vs. buy strategy studies
- **Tactical planning:** Optimize and align the organization’s overall supply and demand during the monthly S&OP/IBP process
- **Operational planning:** Determine the coordinated actions required to optimize stock transfer order movements aligned with internal and external demands
- **Detailed scheduling:** Create realistic production schedules aligned with S&OP/IBP goals that can also minimize inventories while simultaneously achieving high levels of on-time in-full (OTIF) order fulfillment.
- **Daily operations alignment meetings:** Enable daily alignment between supply chain and operations execution teams through a collaborative web hub that improves productivity by providing teams with quick and easy visibility to the information necessary to make proactive and informed decisions during execution.
- **Historical schedules and operations analysis:** Share the context that led to certain scheduling and operational decisions and actions in the past to align on a shared understanding.
- **Order management and execution:** Employ high-fidelity schedules to set achievable daily or weekly goals to align manufacturing operations with supply chain monthly S&OP/IBP goals.
- **Production goals attainment:** Align everyone on actual and historical goals attainment along with embedded comments and reason codes that help people to understand variances.
- **Periodic calibration of supply chain models:** Calibrate supply chain models based on demonstrated plant, equipment and process performance by quickly detecting manufacturing master data inputs that may no longer be valid.
- **Prescriptive maintenance:** Align maintenance, supply chain and operations on the best course of action in the face of unplanned downtime.





Momentive Boosts Customer Service and Profitability

Momentive realized redesigning their North American supply chain network could deliver multi-million dollar savings. The company created a model to assess its supply chain performance and then conducted various what-if analyses to identify the best redesign. Sr. Supply Chain Management Systems Specialist Adam Collier explained, “the model uses optimization to determine the lowest cost distribution plan while still fulfilling all demand and honoring constraints.”^{iv} The same solution can be used to evaluate their European and Asian supply chains, delivering additional savings.

In addition, Momentive optimizes their supply chain daily by employing high fidelity production and stock transfer orders (STOs) scheduling models. These models are able to prioritize demands and take into account key constraints and costs spanning the entire supply chain such as raw materials, production, logistics, inventories and demands. Inventory at multiple sites dropped 25% while simultaneously improving on-time in-full (OTIF) order fulfilment metrics by 20 points. The company also saw a 40% decrease in supply lead time as a result of using such models.^v

Aligning People, Processes and Goals

Creating alignment across the organization is the first step in optimizing the value chain. Linking supply chain and manufacturing operations teams via collaborative web portals helps to break down functional silos while enabling precise coordination and execution on both sides. It also ensures consistency and accountability – everyone on the team can see the goals and detailed game plan, track progress and adjust as new opportunities and issues emerge.

Establishing both feed-forward and feed-back loops between supply chain and operations execution business processes – and connecting more frequently to align on changing priorities and assess progress – allows chemical companies to become more customer centric, agile and profitable.

Forecasting and planning: Determining the most efficient and profitable way to operate the supply chain to meet expected demand over the course of the next 18 to 24 months is challenging to say the least. Implementing an effective S&OP or IBP process is key. This monthly process connects demand planners, supply planners, product managers and sales and account teams to better predict demands and balance supply to come up with the most profitable game plan.

JM Huber's Demand Planning Manager Deborah Morris shared that "Prior to using the forecast and actually getting very organized around this, we used to do a lot of work in expediting – air freight-ing from Europe to the U.S. warehouses. We have not done any expediting in the last 12 months and a real root cause of that was having the right stock in the right place and being able to reorder based on that good forecast."^{vi}

Perstorp's S&OP Process Manager Steve Oelbrandt and Nils-Petter Nytzen, Global Capacity Manager, explained to *Forbes* that their supply chain optimization model is incredibly detailed, including 1.5 million variables and 500,000 constraints. Perstorp is evaluating supply/demand scenarios based on marginal contribution impacts. When the article was published, their comprehensive supply chain planning model contained one-third of the company's 10 production plants in Europe and Asia and was still growing. The goal was to have the whole company in a unified model.^{vii}

Scheduling: Many organizations have invested heavily in S&OP and IBP tools. Yet they're still trying to schedule using unwieldy Excel spreadsheets. Moving from low-fidelity "buckets of time" resolution to a high-fidelity "continuous time" resolution with more sophisticated scheduling tools can deliver massive value, allowing operations teams to more easily visualize the constraints linked to different manufacturing resources and create executable tasks aligned to achieve monthly S&OP/

IBP goals. Such tools can also factor in changes in daily demand and support different approaches to scheduling depending on the readiness of the businesses or users: interactive drag-and-drop, business rules automation or even optimization. In addition, the latest scheduling technologies are designed to work with the complete spectrum of production processes, including continuous, semi-continuous or batch.

Providing manufacturing teams, schedulers, unit leaders, operators, material planners, R&D teams and maintenance a collaborative hub where they can discuss scheduled activities drives unprecedented levels of alignment. This is a much better alternative to endless email chains where people may be left out or miss critical information. One single source of truth can also provide visibility into the context that led to certain decisions. For example, documenting changes such as raw material delays, changes in negotiated times for carrier loading activities, or equipment problems provides clarity and detail around historic data used to adjust plans and models.

Monitoring and execution: Many manufacturing facilities track monthly production goal achievement using hand-drawn charts on a whiteboard. This old school approach limits visibility into production goal attainment vs. the monthly goals and fails to provide context around factors contributing to deviations and variances in production goal achievement. Modern



systems let teams display KPI production portals in conference rooms at each plant to create awareness and focus employees on the importance of meeting production goals.

As a result of using KPI portals, Perstorp improved asset utilization rates. High-level snapshots based on target performance levels help drive continuous improvement throughout the organization, fostering greater cross-functional collaboration with near real-time access to the current health of plant operations.^{viii} At a glance, users can see current performance levels and areas for improvement. Drill-down functionality enables users to investigate and uncover the root cause of any dips in performance so they can quickly take corrective action and minimize upset conditions.

Self-healing supply chain capabilities can quickly surface inaccurate information within the master

data that makes up the foundation of planning and scheduling models. Until recently, planners and schedulers typically requested that plant production engineers validate the tens to hundreds of thousands of master manufacturing data inputs (e.g. processing times, yields, setup times, cleanout times, transition times, etc.) used in their models. Engineers often defer these time- and data-intensive analyses, resulting in less accurate models. This increases risks, as these models are often used to make customer order promises and commitments. Self-healing supply chain capabilities help identify these proverbial needles in the haystack with minimal time and talent input.

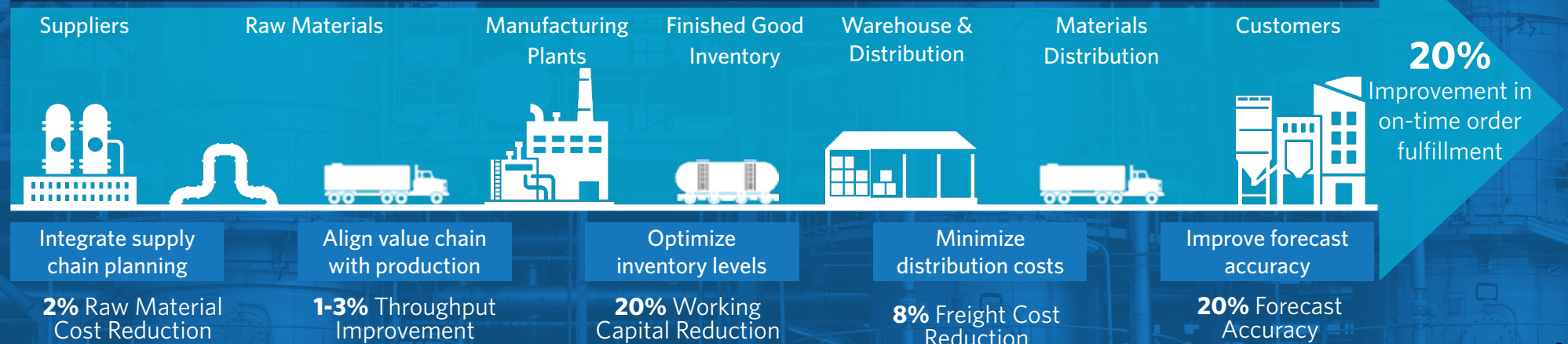
Prescriptive Maintenance: Traditional preventive maintenance alone cannot eliminate unexpected breakdowns. With breakthroughs in predictive maintenance powered by low-touch machine learning (ML), it's possible to extract value from decades of design and operations data to

recognize precise failure patterns and accurately predict equipment breakdowns weeks or even months in advance. Longer term visibility of impending equipment failures brings an opportunity to ask: "When should we take planned downtime to ensure minimal disruptions, costs and impact to customer order commitments and relationships?" Incorporating potential failure scenarios into supply chain planning and scheduling models powered by mathematical optimization (MO) methods can provide the answer.

In a recent *Forbes* article, Steve Banker of ARC Advisory Group stated, "In supply planning, a self-healing supply chain would seek to determine when a key production machine might go down, and then using planning to proactively deal with that situation. AspenTech is probably the closest to a productized solution in this area."^{ix}

Value Chain Optimization and alignment enables margin improvements

Holistic optimization of supply chain leads to increased overall capacity and lower costs



Alignment Creates Greater Profit and Customer Centricity

Aligning the entire value chain allows chemical companies to be more agile and responsive to changes in supply and demand. More accurate forecasts and holistic supply chain optimization, coupled with high-fidelity schedules designed to achieve on-time in-full order fulfillment goals – give chemical producers a competitive advantage. Establishing a reputation as a reliable and customer centric supplier helps create brand preference among your customers.

With new synergies spanning supply chain management (SCM), manufacturing execution (MES) and APM systems, chemical companies can reach unprecedented levels of customer centricity, productivity and profitability. Focusing on value chain optimization delivers far greater margin increases than simply tackling portions of the supply chain or production processes. Gartner VP Analyst Simon Jacobson advises, “Pursue the supply chain convergence aggressively by focusing on the horizontal alignment of manufacturing operations with other supply chain functions.”ⁱ Aligning supply chain and manufacturing operations teams every day via feed-forward and feed-back business processes can allow specialty chemical companies to capture millions of dollars per year in savings.

According to an Accenture survey of chemical executives, more than half those who have invested in digitalization report profit increases of 5-20% while a quarter saw profits grow more than 20%.ⁱⁱ More sophisticated systems that lay the foundation for artificial intelligence and machine learning, while currently building stronger alignment between supply chain and operations, deliver higher value. Chemical companies can no longer afford manual systems and silos that create gaps between plans and actual production.



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