Digital Supply Chain Planning in Chemicals
Mastering six capabilities to win
The speed of change is increasing and digital technologies are on the rise. What does this mean for supply chain planning in the chemical industry?

Embrace change to gain competitive advantage

Advanced digital technologies, such as big data, analytics, cloud, connected devices and social media, are driving new opportunities to integrate along the business value chain, develop smarter products and offer innovative services. In fact, total expected benefits from digital transformation amount to US$14.4 trillion by 2022, of which US$2.7 trillion are attributed to supply chain-related savings. Thus, chemical companies have an unprecedented opportunity to accelerate their digital supply chain journey—but they need to get started now.

However, many chemical companies currently lack the digital maturity to begin (see Figure 1). Unlike customer-oriented industries like electronics and high tech that excel at enhancing digital experiences, chemical companies have limited interactions with end customers, which reduces their ability to seize revenue-enhancing opportunities.

But change is in the works. The vast majority of chemical company executives now recognize that digital is critical to gaining a competitive advantage. Case in point, 94 percent of Accenture survey respondents expect to increase their digital investment in the next three years, and more than half (57 percent) expect that optimizing the supply chain is one of the biggest areas of opportunity. The key is to develop the right set of digital supply chain capabilities to achieve this promise.

Figure 1: The chemical industry lacks maturity in digitalization

Source: “New Businesses, New Competitors: Germany’s Top500 and the Digital Challenge,” Accenture, 2014. Company Performance on the x-axis is calculated based on average year-over-year revenue growth and profitability between 2008 and 2012. Values range from a low of zero to a high of 100. Digital Index on the y-axis is based on major digital areas, such as strategy, offerings and processes. Values are as follows: 1 = mostly, 2 = partially, 3 = somewhat, and 4 = rudimentary digitalized. All values are not weighted averages.
The starting point is understanding the major supply chain challenges facing chemical companies today as this helps to focus on capabilities with the greatest impact. Against the backdrop of a generalized resistance to change and the limited application of new technologies, these challenges include the following:

- Asset-intensive global production networks and multi-level product structures that result in complex optimization problems
- High asset utilization coupled with volatility that demands greater flexibility to adapt to changes and disruptions
- Long production lead times (in some sectors like agrochemicals) further complicated by seasonal demand patterns, a high number of SKUs and dependency on actual weather conditions
- Availability and price of raw materials, which can be greatly influenced by macroeconomic trends and geopolitical developments
- Slow progress on sustainability-related improvements due to obstacles created by functional silos, insufficient technological capabilities and lack of end-to-end transparency
- Ineffective collaboration with business partners and peer companies as connecting enterprise systems can take a significant amount of time
- Complex customer segmentation resulting from the combination of large product portfolios and widespread customer base
Develop digital supply chain capabilities

Chemical companies need to develop a notion of where digitalization can have the greatest impact on gaining competitive advantage in supply chain planning. Based on Accenture’s experience working with all of the chemical companies in the Fortune Global 500 and over 130 chemical clients globally, this report gives guidance on how to master the challenge.

We believe the six key supply chain (SC) capabilities to master include the following (see Figure 2):

1. **Demand Sensing**
   Advanced analysis of structured and unstructured data to identify relevant patterns and predict demand development.

2. **Supply Chain Collaboration**
   Interlock with customers, suppliers and other partners in the value chain, leveraging technology to exchange information.

3. **Dynamic Inventory Management**
   Continuous inventory parameter analysis and adjustment to optimize safety and buffer stocks in a multi-stage supply network.

4. **Profit, Sales & Operations Planning (PS&OP)**
   Proactive balancing of demand and supply constraints considering possible business scenarios and their impact on profitability.

5. **Supply Chain Resilience**
   Monitor and proactively manage supply chain risks to improve the organization’s ability to cope with unexpected, disruptive events.

6. **Supply Chain Control Tower**
   Integration of the data visibility, analytics and execution layer as a platform across all supply chain functions to improve flexibility and responsiveness.

---

**Figure 2: Supply chain planning capabilities framework in a digital supply network**

Source: Accenture project experience
A Closer Look at Digital Supply Chain Capabilities

Demand Sensing
Demand sensing is the ability to identify demand patterns and incorporate the conclusions into the supply chain planning organization. By compiling, structuring and assessing relevant information from various sources, the capability supports short-term planning (through inputs such as weather forecasts, commodity prices and real-time order information), as well as long-term planning (through information technology or economic trends). Ultimately, this leads to increased automation in the planning process, improved forecast quality and a potential to reduce inventory.

A large chemical portfolio player uses demand sensing for forecasting and sales development based on internal information about customer industries, complemented by external economic indicators and stock exchange reports. For example, fluctuation in the automotive industry has an impact on the production of automotive coatings, catalysts, engineering plastics and rubbers. By applying demand sensing, the chemical company increased its forecast accuracy to above 90 percent.4

Supply Chain Collaboration
Collaboration technology affects supply chain planning mainly through improving visibility, automation, synchronization and coordination. Although a number of chemical companies have developed one-to-one collaborative planning, forecasting and replenishment (CPFR) solutions for their key partners, collaboration at scale can only be achieved via cloud-based collaboration platforms. These platforms offer an automated exchange of supply chain-specific information such as forecasts or delivery schedules with customers and suppliers. Integrating business partners into a cloud solution can also be done within days, instead of months.

One leading chemical portfolio player, for instance, uses the cloud for its order management, finance, material management, purchasing and transport management supply chain collaboration processes. By taking this route, the company cost-effectively integrated more than 2,000 business partners worldwide—customers, suppliers, e-billing partners and carriers—and significantly reduced manual order processing efforts.5

Dynamic Inventory Management
In order to reduce inventory costs while improving customer service levels, dynamic inventory management provides an end-to-end assessment of the supply network and the ability to adjust inventory parameters to enhance safety and buffer stocks at various supply chain stages. This includes pooling at appropriate stages in the network, postponement strategies and segmenting the responses for different channels with the help of service levels. Today's multi-stage inventory products are enhanced with optimization-based technologies with business intelligence and analytics capabilities.

Companies that establish dynamic inventory management often set up a dedicated center of excellence to support business units and to scale up according to their needs. As an example, a chemical company launched a centralized shared services model for inventory optimization. Now the organization provides tailored services to all business units throughout the supply network, such as postponement strategy analysis, safety stock optimization and predictive analytics. The services delivered up to a 20 percent reduction in inventory costs.6

Profit, Sales & Operations Planning
Traditional sales and operations planning balances demand and proactively plans supply constraints in order to meet overall business objectives. PS&OP adds a financial perspective to the process and supports chemical companies in evaluating the implications of a constrained plan by incorporating functionalities such as “what-if” scenario capabilities, financial impact analysis and an optimization engine to define an optimal outcome. These capabilities are enabled by analytics technology to support the PS&OP decision-making process, namely demand-shaping analytics (provide scenarios for product portfolio change, price and promotions, opportunities and risks) and responsive supply analytics (provide supply scenarios based on demand range forecasts, supply capability adjustment, and supply risk scenarios).

Using scenario management and financial impact analysis, feedstock and commodity businesses can support their decision making regarding capacity allocation and significantly optimize their profitability. Chemical companies can also use predictive analytics to forecast raw material prices in order to optimize regional asset utilization and increase operating margin.

Supply Chain Resilience
Given today’s global supply networks and interlinked economies, disruptive events such as earthquakes or employee union strikes have a greater impact on supply chains. These events are hard to predict, leaving chemical companies exposed to demand and supply risks on both the strategic and operational levels.

With the rise of digital, new supply chain resilience risk management applications and services are available to help companies monitor, analyze and respond to critical disruptions in real time. For example, a chemical supplier could subscribe to a cloud-based supply chain risk management service, which models the critical entities and material flows of a company’s supply network, and assesses exposure and vulnerability in different risk categories. With this information, the company could develop mitigation actions and back-up plans for critical facilities.

Supply Chain Control Tower
Although not a new concept, establishing an effective supply chain control tower has become more feasible with digital technology. It improves the linkage between planning and order fulfillment, which in turn leads to better customer service and optimized inventory levels in line with supply chain segment requirements.

When organized as a shared service platform, the digitalized supply chain control tower integrates three essential sub-capabilities: (1) visibility to understand “what is happening” in real time and across all entities of the supply chain; (2) analytics to tell “why is this happening” and “how could we improve” by analyzing root causes and simulating solution options with their impact on supply chain performance and operational cost; and (3) execution to orchestrate the implementation of the action plan collaboratively with the relevant functions. One chemical company, for example, transformed its supply chain operations into a shared service, which resulted in end-to-end management of global shipments and five percent improvement within a year.7
Match capability development to chemical industry segment

It is important to note that the relevance of these six digital supply chain planning capabilities differs between chemical industry segments, which are defined by the level of assets required as well as service and innovation intensity delivered (see Figure 3).

Accenture has identified four segments—Scale Operator, Commodity Balanced, Specialty Balanced and Service Provider—complemented by a fifth overarching segment, Portfolio Players, which are typically global and diversified enterprises. Each chemical segment has different supply chain characteristics; therefore, they must focus their capability development accordingly.

For example, Scale Operators pursue high asset utilization to operate efficiently and must deal with volatile raw material prices impacting their margin. An effective PS&OP capability can help them make profitable decisions in an unstable environment.

Demand sensing and a supply chain control tower, on the other hand, will be more relevant for Service Providers because customer intimacy, delivery capability

Figure 3: Chemical industry segments and their characteristics

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>Chemicals supply chain</th>
<th>End use</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP (Portfolio Player)</td>
<td>Diversified companies, crossing &gt;2 business models</td>
<td></td>
</tr>
<tr>
<td>CB (Commodity Balanced)</td>
<td>Diversified customer structure (small/med/large)</td>
<td></td>
</tr>
<tr>
<td>SP (Specialty Balanced)</td>
<td>Diversified customer structure (small/med/large)</td>
<td>End customer/end market facing</td>
</tr>
<tr>
<td></td>
<td>Close customer collaboration; customization</td>
<td>Branded products</td>
</tr>
<tr>
<td>Scale Operators</td>
<td>Large volume client base</td>
<td>Often assumes customer processes</td>
</tr>
<tr>
<td></td>
<td>Strong price competition</td>
<td>Customized services</td>
</tr>
<tr>
<td></td>
<td>Large scale intermediates</td>
<td></td>
</tr>
<tr>
<td>Service Providers</td>
<td>End customer/end market facing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Branded products</td>
<td>Additives</td>
</tr>
<tr>
<td></td>
<td>Often assumes customer processes</td>
<td>Catalysts</td>
</tr>
<tr>
<td></td>
<td>Customized services</td>
<td>Personal care</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples

- Pesticides
- Paints
- Coatings
- Additives
- Catalysts
- Personal care
- Plastics
- Rubber
- Bulk intermediates
- Petrochemicals
- Fertilizers
- Industrial acids

Source: Accenture Research
and the provisioning of add-on services are more important for these businesses. Companies in the Specialty Balanced segment might even tailor their supply chain specifically for individual customers. For those, a high degree of integration and collaboration with customers contributes to success and profitability.

Portfolio Players need to develop a balanced set of digital capabilities, addressing the most important challenges of each segment. For example, they might focus on demand planning and efficiency to make their downstream and upstream segments benefit from digitalization.

The importance of the six digital supply chain planning capabilities for each chemical industry segment is illustrated in Figure 4.

![Figure 4: Relevance of digitalized supply chain planning capabilities by chemical industry segment](image-url)

<table>
<thead>
<tr>
<th>Chemical industry segment</th>
<th>Scale Operator</th>
<th>Commodity Balanced</th>
<th>Specialty Balanced</th>
<th>Service Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Demand Sensing</td>
<td>☹</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>2  Supply Chain Collaboration</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>3  Dynamic Inventory Management</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>4  Profit, Sales &amp; Operations Planning</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>5  Supply Chain Resilience</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>6  Supply Chain Control Tower</td>
<td>☹</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
</tbody>
</table>

Source: Accenture project experience
Measure potential benefits based on operational area

As previously mentioned, the potential benefit of a digital supply capability varies by chemical industry segment because the relevance for the respective segments is different. However, for chemical industry supply chains across all segments, operational efficiency is the prevailing value lever. As shown in Figure 5, the six digital supply chain capabilities can improve profitability by increasing revenue while reducing costs. For example, mastering the supply chain control tower capability to optimize order fulfillment and the supply chain resilience capability to reduce rush deliveries has the potential to reduce distribution costs up to three percent.

Figure 5: Impact of digitalized supply chain planning capabilities on a chemical company’s profitability

<table>
<thead>
<tr>
<th>Value Driver</th>
<th>Measure (Digital Capability)</th>
<th>Impact Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase Revenue</td>
<td>• Increase customer retention (SC Collaboration)</td>
<td>↑ up to 1% Sales</td>
</tr>
<tr>
<td>Reduce selling costs</td>
<td>• Reduce stock-outs (SC Collaboration, Demand Sensing, PS&amp;OP)</td>
<td>↑ up to 1% Sales</td>
</tr>
<tr>
<td>Reduce administrative costs</td>
<td>• Improve asset utilization through optimized supply balancing (PS&amp;OP)</td>
<td>↓ up to 5% Costs</td>
</tr>
<tr>
<td>Reduce distribution costs</td>
<td>• Increase process automation (Demand Sensing, SC Collaboration, Dynamic Inventory Mgmt.)</td>
<td>↓ up to 4% Costs</td>
</tr>
<tr>
<td>Reduce inventory costs</td>
<td>• Optimize order fulfillment (SC Control Tower)</td>
<td>↓ up to 3% Costs</td>
</tr>
<tr>
<td></td>
<td>• Establish centralized planning services (Demand Sensing, Dynamic Inventory Mgmt.)</td>
<td>↓ up to 3% Costs</td>
</tr>
<tr>
<td></td>
<td>• Reduce insurance and recovery costs (SC Resilience)</td>
<td>↓ up to 3% Costs</td>
</tr>
<tr>
<td></td>
<td>• Reduce inventory carry costs (Demand Sensing, Dynamic Inventory Mgmt.)</td>
<td>↓ 5-20% Inventory</td>
</tr>
<tr>
<td></td>
<td>• Reduce inventory holding costs (Dynamic Inventory Mgmt.)</td>
<td>↓ 5-20% Inventory</td>
</tr>
<tr>
<td></td>
<td>• Reduce insurance and recovery costs (SC Resilience)</td>
<td>↓ up to 4% Costs</td>
</tr>
<tr>
<td></td>
<td>• Reduce inventory write-offs (Dynamic Inventory Mgmt.)</td>
<td>↓ up to 2% Costs</td>
</tr>
<tr>
<td></td>
<td>• Reduce inventory carry costs (Demand Sensing, Dynamic Inventory Mgmt.)</td>
<td>↓ 5-20% Inventory</td>
</tr>
</tbody>
</table>

Source: Accenture project experience
Get started on the right mix of capabilities

Chemical companies will choose different paths based on their current digital maturity, industry segment and strategy. As shown in Figure 6, Accenture suggests an approach for establishing digital capabilities that can be used across business segments and tailored to a company’s needs.

Define: Prioritize digital opportunities based on business imperatives

The starting point for any digital journey is the definition of the company’s digital vision and the resulting strategy. It comprises identifying the biggest opportunities and setting the key business imperatives.

Chemical companies need to determine the strategic relevance of their different supply chain planning functions and the value these elements contribute to the company’s competitive advantage. Given the heterogeneity of the industry, expect priorities to vary significantly across the industry segments.

After mapping desired capabilities to operational value levers, developing a bottom-up business case helps to identify tangible benefits, which can be tracked after project closure. This includes identifying and evaluating the most promising opportunity areas and determining priorities.

Roadmap: Generate business value and design technical capabilities

Once digital priorities are clear, the next step is to create a roadmap. The roadmap consolidates all activities required for alignment with the development of the digitalized operating model—processes, organization, people and technology. Equally important, chemical companies need to define the interaction with and interfaces to external business partners since effective digital transformation does not stop at enterprise borders.

This program plan should incorporate short-term activities focused on quick wins and on agile execution of pilots to test key concepts. It will also be important to evaluate business and technology requirements in parallel and define technology platforms. For example, data-driven insights can be delivered to businesses much faster and in more detail if companies create a platform for accelerated data processing. Alignment with technology partners that can provide the appropriate platform is one of the steps in this phase.

Execute: Use agile methodology in digital delivery

Companies are increasingly using incremental implementation with multiple short cycles of design, build, test and deploy. The benefits from this agile focus are a shorter time-to-market, early delivery of customer value, transparency and visibility, as well as early risk identification.

Adopting this approach requires a flexible and ready-to-learn culture throughout the chemical company. It is recommended that a company selects business areas for piloting that already have a relatively high process and IT maturity.

Scale up: Take a flexible approach

As pilots report first results and quick wins deliver short-term benefits, the next step is to scale up the digital capabilities. Adopting a shared service model for supply chain planning can deliver the required flexibility and scalability, especially in large, diverse chemical companies.

Figure 6: The path to supply chain digitalization
Conclusion

Leveraging the digitalization of supply chain planning, chemical companies can address several industry-specific challenges and make an important leap to becoming competitive digital businesses. To realize this game-changing opportunity, chemical companies must evaluate the six digitalized supply chain planning capabilities and develop them according to their unique position in the market, using an agile and scalable model. The organizations that master the right mix of digital supply chain capabilities will be best positioned to innovate, compete and succeed in a fully digital business future.

References


3 Accenture analysis of 2015 Fortune Global 500 list and Accenture FY15 revenue in chemicals.

4 Accenture project experience.

5 Accenture Research.

6 Accenture project experience.

7 Ibid.

8 Ibid.
Follow the Conversation
@AccentureChems on Twitter
Accenture Chemicals on LinkedIn

To learn more about Accenture Chemicals, go to www.accenture.com/chemicals.
To read our Accenture Chemicals Blog, go to www.accenture.com/chemicalsblog.

About Accenture
Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions – underpinned by the world’s largest delivery network – Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With more than 373,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at www.accenture.com.