

# Cultivating an Agile Supply Chain in the Chemicals Industry

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*Industry Paper*

*By Laura Rokohl, Chemicals Supply Chain Industry Marketing Manager, Aspen Technology*

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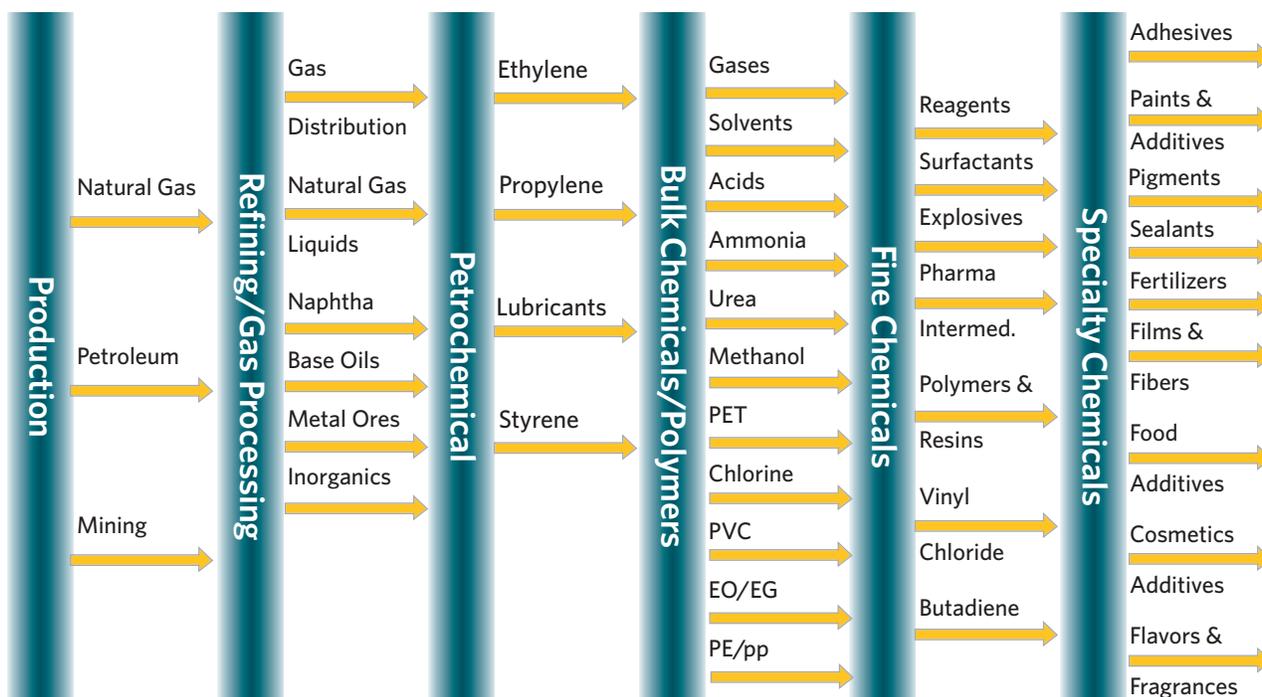
## Introduction

The chemicals industry today faces a series of business challenges. Rising costs of raw materials, regulatory issues, and vertical integration from bulk to specialty chemicals are creating the need for complex supply chains with many degrees of freedom. Product portfolios are expanding to drive new sources of revenue and higher margins, necessitating the creation of new markets and customer specific requirements to stay competitive. Business responsiveness becomes paramount in this customer-focused culture, putting pressure on chemicals producers to overcome the barriers to agility to improve profitability and continue to meet customer needs.

## Unexpected Events Rule the Supply Chain

One thing is certain—supply chain disruptions will inevitably occur. The complex global supply chains of the process industries feel the ripple effect of events that previously had only local reach. A catastrophic event such as a tsunami or hurricane can disrupt feedstock availability and cause capacity outages. A logistical disruption, such as Mississippi River flooding causing a closure to barge traffic, forces chemical companies to scramble to find other modes of transporting both raw materials to manufacturing facilities and products to customers.

Of course, not all disruptions are a result of natural disasters—demand volatility is also a significant area of concern. According to a 2011 survey conducted by Aberdeen Group, 45% of the Chief Supply Chain Officers surveyed indicate their



The Process Industry Value Chain: Companies look to vertically integrate, converting petrochemicals further downstream to higher value-added specialty chemicals products.

supply chain was disrupted by a sudden increase in customer demand. And with increasingly demanding customers, especially in the specialty chemicals sector, a quick response is essential.

The good news is that many chemical companies are well positioned to respond to these unexpected events thanks to the sophisticated global supply chains that they already have in place. The challenge is knowing how to react when such events occur. Consider the example on page 3 of a company faced with a raw material shortage. Quick analysis is needed to determine shifts in supply and distribution, allocation of limited capacity, and the impact on customers and suppliers.

## Barriers to Agility

In the chemicals industry, both demand and supply can fluctuate quickly and widely. The need for agility is not a new concept, so why do chemical companies that seem to have much of the infrastructure in place for an agile supply chain continue to struggle to achieve it?

### Drowning in Data

Aberdeen reports that over 84% of companies still rely on spreadsheets and manual data gathering to support some part of their supply chain. The process of harnessing the necessary data is labor intensive in that it often has to be compiled from disparate systems (ERP, manufacturing systems, etc.) and manipulated into a usable form. The data chore precludes the analysis required to detect an anomaly or trend and react quickly enough to make a difference.

For those companies that do leverage technology to manage their supply chains (either best-of-breed or ERP), islands of information can still exist due to organizational silos and a lack of integrated business processes between supply chain functions.

*“We have an informal, unstructured process that utilizes a mix of metrics that have little or no action plan follow-through. It is spreadsheet driven and prone to error. Integrating and performing what-if analysis is next to impossible. The assumptions are not clearly articulated throughout the process and impact the trustworthiness of the business decisions.”*

—Manager of Logistics, Large Chemicals Manufacturer

## Lack of Scenario Management and Modeling Tools

Chemical companies are looking for tools to help them understand the range of possible responses to an unexpected event, operational upset, or demand change. Complex supply chains have many degrees of freedom, and it is virtually impossible to determine the impact a decision will have on the competing objectives and cost trade-offs associated with procurement, production, and distribution without the help of technology.

### Application Example: Disruption in Raw Material Supply

A company that manufactures and sells chemical fertilizers has a large, vertically integrated manufacturing unit consisting of a urea plant, an ammonia plant, and two complex fertilizer plants. Excavation work being carried out by a contractor building a highway has damaged the underground naphtha pipeline feeding the site.

A major fire broke out due to leakage in the pipeline carrying this feedstock and has yet to be repaired. In light of the naphtha stock-out, the urea and ammonia plants have been shut down. The company's complex fertilizer manufacturing plants at the same facility may also have to be shut down due to non availability of ammonia and phosphoric acid, key raw materials.

At this point, the company's supply chain organization must spring into action, examining possible responses to the impending fertilizer plant closure. Here are a few options they can consider:

- Examine alternate sourcing options for fulfilling demand for fertilizer products. Can production be increased at another facility to compensate for the loss in capacity?
- Import the key raw materials from another supplier. This will incur additional transportation costs, but if the company has strategic suppliers and make vs. buy flexibility, this is a viable option.
- Determine the most profitable orders to fill before raw material stock is exhausted and renegotiate delivery dates for lower priority customers.

The company needs to have the ability to determine which of these options are possible, or just as importantly, most profitable. The importance of quick and easy access to the right data and rigorous, economic-based business simulation cannot be overstated. But not all companies have the processes and tools to make informed decisions in a timely manner, with visibility into what the short- and long-term impact will be for the business.

## Myopic Focus on Efficiency

Traditional supply chain processes focus on efficiency and cost control. The outcome is typically a modest improvement in return on assets (ROA), but not necessarily in agility or responsiveness. In fact, efficient supply chains that focus on being high-speed and low-cost often fall victim to deteriorating performance and become uncompetitive because they don't adapt to changes in the market.

For example, price volatility affects the decisions made by chemicals manufacturers, from feedstock selection in the bulk chemical industry to proliferation of product specifications in the specialty chemicals industry. Recent record highs in energy and commodity costs are a reminder to supply chain professionals that they cannot assume any price stability when making inventory, transportation, or manufacturing decisions.

## Cultivating an Agile Supply Chain

It is stating the obvious to say that best-in-class companies are leveraging technology and using agile supply chains as a competitive differentiator. But what steps can chemical companies—especially ones that already have much of their supply chain infrastructure in place—take to foster agility in their supply chain?

### **Visibility and Fact-based Decision Making**

Visibility into the right information is half the battle. Transforming the sea of data into a usable format facilitates decision-making based on facts and economics, rather than focusing on solving the crisis of the moment in the short term. An easy to use interface can enable the user to hone in on the specific information required to react to variability in customer orders, demand forecast, material availability, and production capacity. Exception reports should direct the user to the highest priority problems and side-by-side comparison reports containing related information provide guidance on the best course of action for profitability.

### **Expect the Unexpected .... and Plan for It!**

The ability to perform rigorous business simulation via what-if analysis is a 'must-have' for chemical manufacturers. Without this capability, companies are blind to both profitable opportunities and potential risks. Best practices dictate developing a 'playbook' to respond to unplanned events, both upside opportunity scenarios and downside risk mitigation scenarios. By identifying a set of scenarios to consider and the circumstances under which they would apply, chemical companies can be much more nimble when the unexpected occurs and make the best decision both tactically and strategically.

One major specialty chemical producer was faced with a colossal challenge in 2008 when Hurricane Ike threatened the Gulf Coast of the United States, where they had several assets. As expected, plants were shutdown and feedstocks were disrupted. Thanks to robust scenario analysis capability, they were able to activate supply contingency plans and reschedule all of their plants before power was even restored to many of their customers.

### **Adaptability and Alignment**

In addition to changes in supply and demand, companies face changes in markets that can alter their supply chain strategy. If chemical manufacturers don't adapt their supply chains, they won't stay competitive for very long. In terms of technology, this means keeping the systems that support supply chain functions aligned with your business. This alignment should include both alignment of information and alignment of incentives. This is crucial for sustaining value and maximizing supply chain performance.

## In Conclusion

The best supply chains aren't just fast and cost effective. They are also agile and adaptable, and they ensure that all stakeholder interests are in alignment. While it is hard to assign a monetary value to having the ability to react, agility drives improvements in customer service, asset utilization, and inventory management.

## References

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#### **Worldwide Headquarters**

Aspen Technology, Inc.  
200 Wheeler Road  
Burlington, MA 01803  
United States

phone: +1-781-221-6400  
fax: +1-781-221-6410  
[info@aspentech.com](mailto:info@aspentech.com)

#### **Regional Headquarters**

##### **Houston, TX | USA**

phone: +1-281-584-1000

##### **São Paulo | Brazil**

phone: +55-11-3443-6261

##### **Reading | United Kingdom**

phone: +44-(0)-1189-226400

##### **Singapore | Republic of Singapore**

phone: +65-6395-3900

##### **Manama | Bahrain**

phone: +973-17-50-3000

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[www.aspentech.com/locations](http://www.aspentech.com/locations)