



**Ross** Enterprise

# Issues and Competitive Strategies For the Chemical Industry

W H I T E P A P E R

## **Summary**

Today's Chemical Manufacturer is faced with a number of challenges, from vacillating customer demands and increasing competition to rising costs and regulatory compliance. Given these complex challenges, chemical companies of every size cannot afford to wait for the pace of change to slow in order to make key decisions. To remain competitive, chemical manufacturers must be innovative in terms of R&D and additionally throughout their operations in order to maintain profitability and drive future growth.

## INTRODUCTION

Today, chemical manufacturers of every size are faced with markets where the pace of change is at an unprecedented level. Some chemical manufacturers are experiencing tremendous growth, while others are simply trying to keep their doors open.

Regardless of their current strength or weakness, every company in the industry is faced with every type of operational pressure, including:

- Vacillating customer demands
- Intensifying global competition
- Skyrocketing oil prices and other direct costs
- Constant mergers and divestitures
- Opportunistic partnering even with competitors
- Increasingly stringent regulatory and customer requirements

Despite the size of the industry and the increase in worldwide demand for all types of chemicals, margins must be managed closely due to rising costs and more demanding customers. All of these operating challenges are compounded by the tremendous breadth of product categories, which force firms to dedicate tremendous resources to constantly innovate in order to maintain market share and capitalize on new opportunities.

In addition to innovation through research and development (R&D), chemical manufacturers also are forced to innovate in terms of best practices and business processes. Companies must implement proven tools that provide additional product quality and safety testing, the ability to bi-directionally expand the supply chain and provide production support around the world.

Given this complex environment, chemical companies of every size cannot afford to wait for the pace of change to slow in order to make key decisions. Companies must find ways to continually innovate in every area of their operations in order to maintain profitability and drive future growth.

## INDUSTRY TRENDS AND ISSUES

### Customer Requirements

Over the last decade, the chemical industry has been on a rollercoaster resulting in dramatic swings in producer and consumer pricing and purchasing power. From 2000 to 2003, sales of everything from petrochemicals to paint were sluggish with inventory virtually overflowing storage tanks, and the producers' pricing power was weak.

Today, demand has improved dramatically as world markets continue to grow. Plants are operating around the clock to meet the increased demand. While this shift in demand would appear to place all of the power in the hands of the producers, buyers still retain tremendous purchasing power because a large percentage of the increased demand is for specialty products that meet very specific manufacturing requirements.

In order to retain existing customers, as well as grow the customer base, chemical manufacturers are being forced to accept these increasingly complex customer requirements. These special demands have a tendency to rapidly consume manufacturing capacity, making customer's product requirements one of the primary factors in the growth and stability of any manufacturer. Chemical companies are being forced to expend tremendous resources to understand their customer's current product requirements, understanding their preferences in terms of service, and anticipate what they might require next.

### GLOBALIZATION – THREAT AND OPPORTUNITY

#### Threat

Globalization has given rise to the so-called BRIC economies. Brazil, Russia, India and China (BRIC) have taken prominent roles in the global chemical markets as a result of their ability to offer lower material, production and labor costs.

The emergence of these markets onto a global stage has placed significant pricing and supply chain pressure on domestic chemical manufacturers. Companies are faced with significant competition on price and are being forced to cut costs in order to remain competitive.

These newer markets have also forced many manufacturers to rethink their traditional approaches to managing their supply chains. Many chemical manufacturers are now buying from or selling to companies in these regions and are being forced to develop much more sophisticated global supply chains.

Many domestic manufacturers are also opening plants in these regions in order to take advantage of lower production costs. However, this approach to managing globalization also adds additional complexity to the global supply chain as inventory and capacity is now being managed globally as opposed to regionally in North American plants. Companies now require real time visibility to their global operations and are not able to leverage older paper-based systems to manage their operations.

## Opportunity

Emerging global markets offer tremendous growth opportunities for manufacturers if they are able to successfully manage more complex distribution channels and supply chains, integrate fragmented operations and track information and product flow worldwide. Industry players must also overcome geographically dispersed customers, sales offices, distribution centers, laboratories, plants and suppliers, as well as the unique cultural aspects of each region.

In order to manage these issues and capitalize on the tremendous growth and cost saving opportunities presented by the BRIC economies, chemical manufacturers have been scrambling to reposition their offerings, acquire or divest local assets, and seek joint ventures and partnerships with local manufacturers that have the local experience and knowledge needed to be successful in each region.

Chemical manufacturers are also investing in new supply chain management tools and enterprise applications to help them successfully manage their global reach. These systems are being used to link geographically distributed plants, as well as virtual capacity in the form of plants operated by local business partners. These tools are helping companies realize the market potential in emerging economies, while at the same time capturing the tremendous cost savings offered by locating production facilities in the local markets.

## Rising Costs and Reduced Margins

While the soaring prices of crude oil have had a positive impact on some back-integrated petrochemicals, most chemical manufacturers are dealing with significant increases in prices for both raw materials and energy. The price index for chemicals rose 9.5% in 2005, compared with a 7.2% increase for all commodities produced in the U.S.

In addition to the negative impact on profit margins and pricing flexibility, rising raw material costs are forcing many manufacturers to consider the capital expenditures associated with building new plants closer to the supply source. At the same time, the increases in energy and transportation costs are forcing the same suppliers to consider locating manufacturing plants as close to their largest customers as possible.

When the sources of supply and demand are located in the same region, these critical decisions are easier to manage, and can often represent a significant opportunity to lower production and distribution costs to support margins. However, as is often the case, the sources of supply and demand are in widely distributed locations, leaving manufacturers with a difficult, if not impossible choice on where to expend capital resources.

This challenge of successfully balancing these options is compounded because most small- and mid-size manufacturers lack the visibility across their organization needed to make effective decisions. The lack of integration between key groups like sales, finance, manufacturing, and operations, makes it extremely difficult to perform the appropriate cost/benefit analysis for capital expenditures or to simply balance the overall production load.

## Environmental Regulations, Recall Protection and Risk Management

Both domestic and global chemical manufacturers are faced with markets that continue to demand new, "better", and safer products that satisfy both customer and governmental regulations. In both North American and the European Union (EU), chemical companies are faced with evolving programs and procedures from domestic regulatory agencies including the U.S. Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA) and the Food & Drug Administration (FDA), as well as international agencies like the European Environment Agency (EEA).

Today, the chemical industry, and companies that rely on chemicals as primary inputs are faced with a wide range of new and evolving regulations including Restrictions on Hazardous Substance (ROHS) and others that require compositional analysis, development of material safety data sheets (MSDS), environmental analysis and hazards identification.

Globally, the chemical industry is working to understand the impact of a number of different regulations including ECLIPS (European Classification and Labeling Inspections of Preparations, including Safety Data Sheets), REACH (Registration, Evaluation and Authorization of Chemicals), SCALE (Science, Children, Awareness, Legislation and Evaluation), and GHS (Global Harmonized System for the Classification and Labeling of Chemicals). Implementing and ensuring compliance with employee safety guidelines, possible food contact rules, monitoring emissions (which are often delineated by regulatory permits), and even validating the origin and composition of products are all mission-critical processes that contribute to the cost of doing business.

As companies seek to increase their control and in turn, minimize the risks, they discover that many varied activities, both within and outside the organization, must be considered and operations up and down the supply chain must all be addressed. The resulting challenges of how to minimize the risks while keeping operational costs down to maximize profits and enable growth then become magnified.

Regulatory compliance represents significant costs, including initial investments in systems, devices, training, etc. Perhaps more significant is the ongoing cost of people and the loss of productivity. However, while the direct costs associated with compliance are high, the non-compliance can be even more costly.

The question is how much risk a company is willing to take? Non-compliance can lead to fines, shutdowns, product recalls, loss of market share, or even the end of the company. For most, these risks are overwhelming, and compliance is mandatory.

Regulations demand the collection, organization, and retrieval of information. For all but the simplest chemical companies, a manual approach to compliance is difficult, if not impossible. Examples of simple chemical companies would include a manufacturer with a very limited product line, few ingredients, a simple process, and few customers.

The vast majority of chemical manufacturers do not fit into this category. These companies must rely on computerized systems to meet regulations at a practical cost. Computerized systems can assist in collecting the information required; do an outstanding job of organizing data, and producing the information required in a timely and organized fashion.

## Other Challenges (Facts of Life)

There are a number of other challenges or operational requirements that every chemical manufacturer must be prepared to address whether they manufacture benzene, soda ash, semiconductor polishing slurry, pigments, food additives, paint, or any other type of chemical or chemical related product. Many of these stem from a traditional mindset that often causes companies in mature industries to make decisions based on the way that decisions have always been made.

**Inventory Bloat:** When companies are able to get the right products in the right amounts in the right place at the right time, the enterprise is able to provide reliable deliveries to its customers while controlling inventory costs. However, the demands of the global chemical marketplace make it more challenging than ever to complete this complex balancing act.

Distribution networks are increasing in size and complexity; while at the same time customers are demanding shorter lead times and faster deliveries, creating pressure to increase rather than decrease inventory levels. Chemical manufacturers are often forced to consider carrying significant inventory stockpiles in order to help minimize line changes and to insure that products are available on demand. However, these higher inventory levels come with significant handling or holding costs that must be managed very closely in order to avoid additional drains on profitability.

**Plant Specialization:** Traditionally, chemical manufacturers have opted for lengthy production runs coupled with an after-the-fact sales and marketing strategy. This approach is especially common among basic chemicals manufacturers, where cost savings are dependent on economies of scale. These manufacturers seek to run plants around the clock with infrequent changeovers and would prefer to have entire plants that specialize in a single or a most a few products.

The results are lower production costs but with significant inventory and customer service challenges. This strategy of long, low-cost runs means rigidity, leaving manufacturers vulnerable to additional inventory surpluses.

This dichotomy between the efficiencies of long product runs and the adaptive capabilities of shorter runs is more apparent in the chemical industry than in most other industries. Chemical production encompasses many types of inventory, such as raw material, work-in-progress (WIP), in-test/sample material, rework/scrap material, products in transit, safety stock, and cycle stock, whereby changes in one component can significantly impact others. Smaller batch sizes reduce WIP levels, but also reduce productivity, whereas cycle times can be shortened to reduce cycle stock, but increasing the time spent making production transitions.

**Utilization:** The high fixed cost of each manufacturing facility traditionally drives management to push every plant to attain full capacity utilization. One of the most common techniques to achieving full utilization is to lower prices to increase demand and thereby increase utilization closer to 100%.

However, as utilization approaches 100%, accurate management of the supply chain becomes even more critical. Changing any aspect of production while the plant is at 100% utilization has a direct impact on other parts of the plan, supply chain, and customers. This link between utilization and supply chain management (SCM) makes the use of proven SCM and scheduling tools critical.

**Competitor or Partner:** Typically the manufacturing process is the weak link in the chemical supply chain because component products and semi-finished materials require long lead times that impede the quick-acting demand-driven principles. Manufacturers can do very little to accelerate many production processes as the laws of chemistry (e.g., the processing times) are largely inflexible, posing the challenges for manufacturers to integrate their demand forecasting, sales teams, plant floor personnel, etc.

To acquire the necessary raw materials and other inputs, it is not uncommon for fierce competitors to become partners in an effort to reduce costs. These competitor-partners often swap a commodity in one location for the same one in another location. In this case the need for proven technologies again plays a key role as these new partners tackle the job of tracing these complicated transactions.

## COMPETITIVE STRATEGIES FOR THE CHEMICAL INDUSTRY

In many circumstances larger chemical manufacturers appear to have all of the advantages of economies of scale. Which raises the question of how small- and mid-size manufacturers can compete in global markets successfully? In order to be successful in their target markets, these smaller manufacturers generally leverage some combination of the following competitive strategies.

### Chemistry

If the corporate strategy is to compete on superior chemistry (product development), then a chemical manufacturer must be able to develop and champion unique products, i.e., different specifications or molecules that make their product unique, for an extended period. This approach requires significant investments in on-going research and development (R&D) for companies to stay ahead of the competition and maintain the product innovation lead.

However, in addition to traditional R&D projects, new research dollars are increasingly being spent on methods for improving customer service than on product and process innovation. The new product development, at least for specialty chemicals, is often about a one-on-one relationship with the customer and involves developing a deep understanding of its needs for better molecule. Brand loyalty is not what enables a company to retain customers, but rather the right price, an accommodating relationship (e.g., consignment inventories), and, especially for specialty chemical manufacturers, special customer care and service, bundled with the ability to develop proprietary ingredients.

Therefore, as they constantly evolve, chemicals manufacturers have to thoroughly maintain effective formula/recipe and process control for consistent product and quality, and they have to optimize product portfolios based upon product performance to customer expectations, sales trends and forecasts, and production costs. From custom blenders to high-volume refiners, sustained competitive advantage is gained by offering a well-balanced set of quality products that meet customers and regulatory requirements coupled with increased operational efficiencies and the ability to embrace and leverage opportunities for business change.

## Price

If the corporate strategy is to compete on lower price, the low price approach is either a low cost strategy or a low margin strategy with the latter being unacceptable to most investors. The low cost strategy demands a clear and complete understanding of cost and on-going minimization of costs.

Real-time financial analysis of such key issues as quality, regulations, customer satisfaction, performance and profitability by customer, product, or location is critical, since company-wide visibility speeds the flow of goods, eliminates waste due to costly shelf-life expirations and returns, and gains the efficiencies necessary to meet product demand while keeping costs at a minimum. In addition to support for actual costing (that exposes all material and operation costs, including indirect costs or value resulting from co-products and by-products); there is an increasing awareness of the need for customer segmentation that allows the enterprise to match customer service levels to the value of the relationship.

## Quality

If the corporate strategy is to compete on superior quality, consistent product quality must match each customer's definition of quality not the enterprise's definition of quality. While many assume quality is defined as the highest level of product quality, the reality is that quality is the ability to satisfy each customer's demands for product consistency.

A company's ability to provide consistent quality begins with specifications and continues from purchasing to inventory to production and shipping. The ability to conduct elemental specification management, maintain lot genealogy and to manage, capture and track quality information across the production process and supply chain is fundamental to this effort. More important, however, is the ability to recognize and take action on early warning indicators related to "out-of-spec" issues.

Raw materials and active ingredients often vary in potency, grade and pH factors among other characteristics. The ability to dynamically adjust recipes based on material characteristics allow enterprises to produce product with consistent quality and maximize material utilization, with the accuracy required for chemicals manufacturers.

## Customized Products

If the corporate strategy is to compete on its ability to customize products, chemical manufacturers must possess flexibility, in terms of easy, customer driven product formulation, production processes and relatively short product runs. In specialty chemicals, in particular, the time-to-market process wins more business from recognizing and exploiting customers' needs than from trailblazing a new market with a purely technological innovation. The faster time-to-market and time-to-volume, the greater advantage these companies have over their peers, and the greater chance to gain market share.

## Customer Service

If the corporate strategy is to compete on superior customer service, the chemical manufacturer must intimately know its business, swiftly communicate with internal and external constituencies, and be easy to do business with. Experience shows that customer service means customer loyalty and in many cases, the ability to charge a premium. In markets where products are undifferentiated superior customer service often wins the day.

The keywords here are communication, visibility, and collaboration, which are enabled by a common tool and centralized information repository that link customers (i.e. sales, marketing, support) with the back-office operational systems (financial, inventory, supply chain). Major customers are increasingly setting technical and business process requirements and deadlines for their suppliers, requiring manufacturers to have effective systems for managing these customer demands.

## SUMMARY AND RECOMMENDATIONS

In many cases, the mid-size chemical manufacturer must compete using a combination of these different competitive strategies. However, in order to be successful using any one of these approaches, companies must possess the information systems needed to manage operations, since reducing costs, increasing quality and agility, and improving customer service demands operational excellence and business insight.

Strong internal systems, namely Enterprise Requirements Planning (ERP), serve as the foundation for operational excellence. But simply having a system does not mean it supports operational excellence. In the chemical industry, many older systems have failed to keep up with the needs of the industry.

Of course, not all ERP systems are created equal. Some have been designed and are well tuned for the specific needs of the chemical industry. The chemical company evaluating the need for a new ERP system or in the process of selection must focus on those needs that are critical to their success. The differences between chemical ERP and generic ERP are in the operational details of the business and the right ERP can make a significant difference in the ability of a chemical company to compete; part 2 of this article, "The Role of Enterprise Applications in the Chemical Industry" deals with these issues.

## ABOUT ROSS ENTERPRISE FOR CHEMICAL MANUFACTURERS

Ross Enterprise is CDC Software's comprehensive suite of applications for Chemical manufacturers. The suite of applications includes enterprise resource planning (ERP), supply chain management (SCM), warehouse management, customer relationship management, real time performance management and business analytics. Together, these systems address the unique challenges of the Chemicals industry by providing an industry focus for cost control and customer satisfaction, detailed product costing and profitability analysis, formulation, process control and product quality, and for regulatory compliance and risk mitigation. Ross Enterprise is used worldwide by over 1,200 companies including LA-CO/Markal, GEO Specialty Chemicals, Summit Industrial Products, and SI Group.

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