

Industry Outlook Report

The Chemicals Industry in 2010

David Hurwitz and Gordon Nechvatal

The global chemicals industry provides a steady stream of new products and innovative technologies, enhancing quality of life and helping sustain scarce resources. On average, however, industry participants have failed to deliver the financial performance that today's capital markets expect, suggesting the need to change the way they operate. Other fundamental driving forces – including social/environmental, macroeconomic/political, market dynamics, and technical developments – are adding to the pressure for change. In response, chemical firms will need to transform themselves, rethinking the way they create value for their customers and focusing on core competencies and core activities.

In this article, Arthur D. Little's global chemicals experts describe how the chemicals industry will have to transform itself and what the successful companies of 2010 will look like. We hope this discussion will prove useful not only to industry participants but also to companies in other industries competing in globalizing and maturing markets.

An Industry in Transition

The chemicals industry is a huge business: at some \$1,600 billion, it is more than twice the size of the world market for telecommunications equipment and services (\$750 billion). Moreover, it forms a vital link in the value chain of every other industry, supplying everything from plastics for packaging and durable goods to process chemicals for electronics and intermediate chemicals, active ingredients and performance materials for life science, aerospace, food, construction, consumer goods, and automotive applications.

Company Models Today. Today's chemicals companies fall into one of five broad models, depending on their product portfolios (Exhibit 1). Understanding which of these models it best matches has helped many a company determine what it needed to do to thrive, or perhaps just to survive, in the last decade. The models are the Commodity Company (e.g., Exxon Chemicals); the Specialty Company (e.g., H.B. Fuller); the Commodity/Specialty hybrid (e.g., BASF); the Life Sciences Company (e.g., Novartis or Monsanto); and the Life Sciences/Specialty hybrid (e.g., Roche).

We believe that these models will need to be replaced by new ones based on market-oriented competencies (i.e., capabilities that create value for customers). These new models will guide industry development for the next 10 years.

Changing Times. Observers of the chemicals industry of the early 1980s would hardly recognize it today, as the industry has already changed significantly. Many of the leading companies of 10 years ago have disappeared: for example Quantum, formerly the largest polyethylene producer in the world, is now part of Equistar; Betz Laboratories, which bought Dearborn from W.R. Grace, has itself been bought by Hercules; and Nobel Industries and Courtaulds are now both part of Akzo Nobel.

Exhibit 1

Examples of Company Models in the Chemicals Industry Today

Commodity Chemicals Companies	Commodity/Specialty Hybrids	Specialty Chemicals Companies	Specialty/Life Sciences Hybrids	Life Sciences Companies
<ul style="list-style-type: none"> • Petrochemical arms of oil majors • Equistar • Huntsman • Asia-Pacific conglomerates • RWE-DEA • Sabic • Borealis 	<ul style="list-style-type: none"> • Mega-hybrids <ul style="list-style-type: none"> - BASF - Dow - DuPont - DSM - Solvay 	<ul style="list-style-type: none"> • Emerging <ul style="list-style-type: none"> - Clariant - Ciba Specialties - Rodia - ICI • Traditional <ul style="list-style-type: none"> - Rohn & Haas - Morton - Great Lakes 	<ul style="list-style-type: none"> • Bayer • Roche • Akzo-Nobel 	<ul style="list-style-type: none"> • Emerging <ul style="list-style-type: none"> - Zeneca - Novartis - Hoechst - Monsanto • Traditional <ul style="list-style-type: none"> - AHP - Merck

Some of today's leading companies did not even exist 10 years ago. Of these, some emerged through the breakup of large groups, others through the consolidation of commodity chemical assets, still others through investment in downstream petrochemicals, often through strategic alliances. The new leaders include:

- Clariant, a product of the spinoff of the Sandoz chemicals operations and the subsequent merger with the Specialty Chemicals Group of Hoechst
- Equistar, a commodity chemicals joint venture formed from the petrochemicals interests of Lyondell, Occidental Chemical, and Quantum
- Elenac, formed from the polyethylene interests of BASF, Hoechst, and Shell Chemicals
- Equate, an ethylene-derivatives joint venture between PIC of Kuwait and Union Carbide

Other chemicals groups have reinvented themselves as life science companies, shedding the more traditional parts of their businesses. ICI, having split into a life sciences/ specialties company (Zeneca) and a commodity chemicals company (ICI), has turned itself into a specialty company through strategic acquisitions (including the purchase of Unilever's Specialty Chemicals Group). American Cyanamid, Monsanto, and Rhône-Poulenc are focusing on life sciences, spinning off their chemicals operations.

Forces Driving Change. The catalysts for change in the chemicals industry fall into five categories (Exhibit 2):

- *Financial forces*, including shareholder demands for improved financial performance
- *Macroeconomic/political forces*, including economic growth, free trade, industrial development plans, and national employment objectives
- *Market dynamics*, including product maturation and globalization of customers
- *Technology developments*, such as microscale manufacturing and the widespread adoption of sophisticated IT systems such as Enterprise Resource Planning (ERP) systems
- *Social issues*, including pressure for environmental change (e.g., sustainable development)

The main catalyst for change, especially in North America and increasingly in Europe, is the need to improve shareholder returns, as quoted chemicals companies have under-performed their local stock markets (Exhibit 3).

The pressure for sustainable development is also becoming an increasingly important force for change. Until a few years ago, the industry had a poor environmental record. Now, however, companies have realized that they must make more environmentally responsible decisions and thus invest billions of dollars in environmental compliance. Indeed, the industry leaders are moving beyond compliance, exploring ways to conduct business in an environmentally sustainable way – lowering their consumption of virgin raw materials, increasing the efficiency of their manufacturing processes – and reaping the business benefits of so doing. As the industry becomes more efficient, its ability to generate employment and hence national wealth is diminishing (as evidenced by the thousands of jobs lost across major companies in 1998). This means that the Brundtland definition of sustainable development – „meeting the needs of the present without compromising the ability of future generations to meet their own needs“ – will play an increasingly prominent role. (For further discussion of sustainable development, see the fourth quarter 1998 issue of *Prism*.)

Industrial development in the emerging markets in Asia, Central Europe, and Latin America will have a big influence on the chemicals industry. Looking out over the next 10 years, these regions are expected to have faster economic growth than the more mature economies of the developed world. They will thus have greater growth in chemicals demand and, in line with our catalysts for change, offer opportunities for some chemicals companies. Despite the economic crisis in Asia, development in the Asia-Pacific region will help shape the chemicals companies of tomorrow.

For the moment, Asia has slipped from high growth and high chemicals industry investment to limited expansion and cautious investment. The recent economic crisis has reduced exports to the region, depressed the earnings of global firms, and delayed planned investments. In response, global and local firms will be taking a close look at strategies for Asia, seeking ways to reduce risk while participating in the inevitable industry restructuring. We expect a two- to three-year consolidation period before the region returns to rapid growth. The long-term outlook, however, is promising, with opportunities for innovative companies. By 2010, Asia will represent almost 40 percent of the global demand for chemicals. (*See sidebar.*)

Exhibit 2

Forces Driving Change in the Chemicals Industry

Financial Forces	<ul style="list-style-type: none">• Increasing shareholder pressure• Chemical company underperformance• Access to capital• Senior management incentives
Macroeconomic/ Political Forces	<ul style="list-style-type: none">• Political stability and infrastructure investment• Macroeconomic growth• Free trade• Deregulation/privatization• Competitive access to raw materials
Market Dynamics	<ul style="list-style-type: none">• Maturing product and regional markets• Resegmentation of customers around value/performance• Globalization of customers and suppliers• Rising costs to deliver services
Technology Developments	<ul style="list-style-type: none">• Continuing demand for product and process innovation• Revolution in information technology• Need to master more complex technologies• Increasing role for biotechnology
Social Issues	<ul style="list-style-type: none">• Increasing environmental concerns, including growing pressure for sustainable development• Growing health and safety legislation• Population growth• Pursuit of improved lifestyle• Management of employment issues• Availability of skilled employees

Exhibit 3

Indexed Relative Performance of Chemicals Companies Worldwide, 1991-1998



Source: Datastream

We expect the pace of change in the industry and its markets to increase. This means that companies will have to be smarter about doing business and managing their financial and capital asset bases. To gain competitive advantage, they will have to be prepared to take bigger risks (e.g., entering emerging markets or being first to market with a new technology). Failure to change will prove costly. In 2010, as many as half of today's leading chemicals companies may no longer be around, at least not in the form they take today.

The Thrust for Performance Improvement

The short-term pressure for double-digit growth in profits that shareholders in the western world have come to expect may compel firms to seek revenue (or top-line) growth through acquisition at a time when acquisition premiums and capital costs are high and margins are being squeezed. While firms in some parts of the world can still increase earnings by aiming for operational excellence and cost reduction, many in the United States and some in Europe believe that they have done as much as they can do.

The Asian Crisis and the Chemicals Industry

Only 18 months ago, most industry observers were optimistic about the growth of the chemicals industry in Asia. Today the outlook for Asia is highly uncertain. In our view, however, the forces that drove growth above 7 percent a year for many markets are intact. In the near future, we expect to see the following changes in the region that will lead to growth:

- An overhaul of fiscal policies and governance practices
- Consolidation due to changes in holding company and tax laws
- Increasing mobility, as a result of more flexible labor laws and welfare structures
- A redistribution and rationalization of capacity and customers, resulting from bankruptcies of small companies
- The replacement of personal relationships („cronyism“) with sound economic-based management as the basis for much decision-making
- A freer flow of commodities and finished goods through the reduction in tariff and nontariff trade barriers

The local players who survive the changes will emerge as stronger competitors. The firms that plan for change and achieve their goals are likely to remain independent (e.g., Formosa, LG, Mitsubishi, and Reliance), while other firms may pursue joint ventures with multinationals. Those that remain independent, however, may also form joint ventures or swap businesses to improve their competitive positions.

We expect the mergers of local players to result in five or six globally competitive North Asian companies. These mergers may form around ethylene centers – such as Chiba, Kawasaki, and Mizushima in Japan – with Equistar'-style deals. We also expect Japanese trading companies to rationalize and refocus, taking equity positions in plants in the region. This process may provide a bridge to future Japan-Korea alliances. Local „megacompanies“ will exploit their domination of end-use relationships to challenge western multinationals in key regional markets.

Building on their installed capacity, the regional operations of western multinationals will become more independent in terms of decision-making and will be led and staffed by locals. Multinationals will also use strategic alliances and acquisitions to enhance their positions throughout Asia. In the short term, multinationals are likely to use their strong cash positions to buy entry into Asian markets, to build new world-class facilities, and to dominate supply and distribution.

Japanese and Korean players, with their own distribution networks and past relationships with Chinese and other distribution channels, will however challenge these multinationals.

Other competition will come from Middle Eastern players as they implement their oil product strategies and seek new markets for their value-added hydrocarbon derivatives. And with their strong cash position, Middle Eastern producers may put their operations knowledge to work acquiring or building integrated refinery/petrochemical complexes in partnership with local firms.

1 Equistar is a US. petrochemical company formed from the commodity chemical operations of Lyondell, Millenium Chemical, and Occidental Chemical.

To meet the challenges of 2010, therefore, chemicals companies need to differentiate themselves from their competitors. Profitable growth can come only from finding a defensible way of capturing more value, i.e., offering customers a value proposition that enables the company to command a higher price for cost and invested capital than the competition can attract. This means that chemicals firms need to narrow the scope of

their activities – and to excel in the few they retain. The „Value Disciplines“ model proposed by Michael Treacy and Frederik Wiersema in *The Discipline of Market Leaders* suggests a way forward. They suggest that the market leaders in any industry excel in just one of the following disciplines, while at least equalling the performance of their competitors in the other two:

- **Product Leadership.** Companies sell a high-quality, often differentiated product that attracts a premium price without needing to be tailored to specific customers. Usually, the seller has proprietary control of the product technology, as Microsoft does in operating systems, Ciba Specialties in plastic additives, and Quaker Chemical in metal working fluids.
- **Customer Intimacy.** Companies sell the best overall solutions to customer needs; customers pay for a comprehensive service. Customer-intimate firms rely on branding, aggressive management of customer relationships, or both; they also seek innovative ways of delivering value to the end-user. Examples of such firms include IBM in systems integration, Betz Paper Chemicals in mill operations, and PPG in automotive painting.
- **Operational Excellence.** These companies sell a standard product at a very competitive price. They are the low-cost source of any chemical material that has matured and is purchased mainly on price and specification from several sources. They interact cost-effectively with their customers, leading through process improvement and occasional new product introductions. Notable examples of the operationally excellent are Wal-Mart in consumer retailing; Hunstman in packaging plastics, alcohols, and surfactants; and Exxon Chemicals Company in most of its product range.

Excellence in one discipline demands a business design and culture that may exclude above-average performance in the other two. Today, many firms lack the skills to excel at any one value discipline and therefore attempt to go to market with all three. Often they lack proprietary technology, have only generic, readily available knowledge of customer processes or end-user requirements, or they carry significantly higher production costs than their competitors.

However, we believe that in the future, successful chemical companies will achieve differentiation not by focusing on one discipline to the exclusion of the other two, but by mastering differentiating aspects of the „secondary“ disciplines. For example, a commodity chemicals company that produces basic petrochemicals has to be operationally excellent to compete. It can differentiate itself, however, either through product leadership – producing a grade of material that competitors do not sell – or through an element of customer intimacy – understanding an end-use segment better than its competitors do.

In the short term, chemicals firms must make a conscious decision on how they are going to differentiate themselves. Then they need to organize and invest to develop the skills needed to put these disciplines into practice. Through this process, firms will evolve from the five business models discussed earlier to the success models of 2010.

Success Models of 2010

The successful chemicals companies of 2010 will have moved from the product-based models prevalent today toward the four competence-based models in Exhibit 4: Product Innovator, Solution Partner, Chemicals Utility, and Chemicals Service Provider. Each of these types of company employs a unique set of core competencies to create and capture value. The companies that adopt their own versions of the new model will satisfy their shareholders and other stakeholders (e.g., employees, customers, communities, and suppliers) by concentrating on what they do best.

The *Product Innovator*, whether a large company or a technology start-up, creates value through the development of proprietary products and technologies. Its skills are in discovery, rapid development, product commercialization, and patent protection. It identifies the new product or technology needs of chemical consumers and translates them into new molecules. Technology „sourcing“ is a key strength: licensing *out* intellectual property to bring in revenues or licensing *in* to fill gaps in a portfolio.

An increasing number of chemical technology start-ups will develop products and processes for larger chemicals companies to commercialize or for specific customers, just as software and biotechnology companies do for the electronics and pharmaceutical industries today.

The *Solution Partner* helps its customer succeed by tailoring formulated products, new molecules, or process improvements to solve specific problems. These firms will have deep insight into customer processes, end-use markets, and customer requirements, and will build strong customer relationships. Solution Partners may own facilities that formulate or synthesize tailored products; increasingly, however, they will outsource not just the production of active ingredients but the formulation of finished products. Solution Partners will concentrate on brand development, applications development, and formulation development, and will capitalize on their knowledge assets to deliver value.

Exhibit 4

Successful Models for Chemicals Companies in 2010

<i>Model</i>	<i>Characteristics</i>
Chemicals Utility	<ul style="list-style-type: none">• Good at manufacturing either commodity or specialty chemicals• Low-cost position• Focused manufacture of a narrow range of products• Efficient interface with suppliers and customers
Solution Partner	<ul style="list-style-type: none">• Good at proactively understanding markets and customers' needs• Tailors chemical formulations and fabrications to end-user requirements
Chemicals Service Provider	<ul style="list-style-type: none">• Provides chemical-related services to diverse end users• Ranges from sourcing of product for specific customers (acting as distributors or "virtual" chemicals companies) to operation of "outsourced" chemical-related activities within customer site, e.g., operation of paint shop in car assembly plant
Product Innovator	<ul style="list-style-type: none">• Develops and markets new patentable chemicals (e.g., for pharmaceutical, agrochemical, plastic additive applications)• Good at exploiting technology• Can be either innovative, biotechnology-like development company or more established company with respected market image

In the future, we expect Solution Partners to take over the management – and in some cases the ownership – of part of their customers' manufacturing processes (through outsourcing). The way PPG runs paint shops in several automotive assembly plants is a current analogy: it doesn't just sell paint, it sells painted cars.

The *Chemicals Utility* offers efficient manufacturing and delivery of commodity or multisourced chemical products at competitive delivered prices. These companies cut costs through advanced process technology, world-scale production, efficient conversion, astute raw material sourcing, efficient logistics, and low overheads. Companies that choose the Chemicals Utility model will capture most commodity petrochemicals as well as specialty chemicals, such as citric acid, architectural paints, and mature plastics additives, which are becoming commodities. Equistar and Huntsman are taking this course within basic petrochemicals and downstream derivatives, and Valspar is doing the same in architectural paints.

The *Chemicals Service Provider* will capitalize on the trend to outsource noncore chemical-related functions to suppliers. It will manage part of the customer's chemicals operations or assume responsibility for some technical aspect of manufacturing or for ancillary operations. Included in this emerging category are firms such as Air Products and Air Liquide, which are meeting the chemicals requirements of semiconductor manufacturers. Some specialist chemicals distributors will become „virtual chemicals companies,“ meeting specific customer and market needs by sourcing products or services from several suppliers. Aceto Chemical is an early example, in that it not only sells to life science development organizations but manages their sourcing value chains worldwide.

The Chemicals Service Provider will not, however, provide overhead functions unrelated to technical operations. These functions will be left to general business service providers, some of which may emerge from the current restructuring of chemicals firms. Included in this group are service companies that support IT software and systems, site infrastructure, shared services, and overhead functional activities.

Moving Toward the Success Models

The migration toward the four ideal company models will be a process of focused investment, formal or informal alliances, joint ventures, and acquisitions or divestments. During this process, firms will develop their core assets or knowledge bases (product or application technology or customer intimacy), separating or spinning off central functions that they no longer need. The early phase of this process will be driven by financial performance and supported by activity-based costing, market-based transfer pricing, and the elimination of cross-subsidies. The transformation will be made possible by the aggressive adoption of ERP information technology to improve decision-making with more transparent and accurate information.

As a result, we expect industry participants to shed non-value-adding vertical integration, as well as physical assets and plant operations, in favor of networked – even virtual – company structures. We expect participants to become more entrepreneurial, taking more risks and looking for more profit and value from intellectual property, proprietary know-how, and brand and customer management.

To thrive in the new environment, chemicals companies need to start aligning themselves with one of the four company models now. First steps include assessing their tangible and intangible assets – equipment, technologies, patents, human resources, brand, expertise, etc. – before deciding which model is most appropriate and developing a migration plan. In this process, companies need to decide which critical assets they should keep, which will produce more value through sale or license, and which they should invest in themselves. Companies also need to determine which, if any, of their businesses are likely to become chemicals utilities, which will provide a platform for the creation of knowledge-based businesses, and which should become chemicals services businesses.

To move forward, managers will need to unbundle activities. Each business unit will need to closely reflect its ideal success model, and each will then be operated as a separate business. This shift involves implementation of activity-based costing to ensure more appropriate overhead cost allocations. Activity-based costing will also lead to greater clarity about the quality of the business and will show what strategic actions are required to strengthen individual units. Management will also need to decide how to realize the most value from each business – whether by joint venture, management buyout, trade sale, initial public offering, or spin-off to create a new stand-alone entity.

Conclusion

The pressures on the chemicals industry are going to intensify over the next few years with the expected cyclical downturn in profitability, the maturation of product and market segments, new environmental and social driving forces, and the economic uncertainty in Asia Pacific.

As a result, the next decade is going to see dramatic change. To prosper in this environment, chemicals companies need to develop a plan to compete, not just this year or next year, but in 2010. The sooner a company starts thinking about the future and evaluating its options, the better it will be able to control its own destiny. In the short term, aggressive restructuring and the application of the value discipline concept could make the chemicals industry a model for other industries. When they see the results, other industries will follow the chemicals industry's example.

David Hurwitz is a Principal in Arthur D. Little's Global Chemicals Practice and is based in Cambridge, Massachusetts. He works on strategic planning, technology strategy, and customer/market management.

Gordon Nechvatal is a Principal in Arthur D. Little's Global Chemical Practice, based in London. He focuses on strategy and operations management.

The authors would like to acknowledge key contributors to this article: Paul Arwas, Ian Diamond, John Goldhill, Robert Henske, Marc Kalton, Kirtland Mead, and Frederik Van Oene.