A.T KEARNEY

Controlling Complexity in the Chemical Industry

Complexity management drives strategic goals

The chemical industry is undergoing rapid change. Major players are remaking and updating product portfolios they have pursued for decades. Through recent M&A activity, some companies are increasing their scale and critical mass, while others, such as BASF and Dow, are pursuing new, more customer-focused specialty areas. These changes have prompted many chemical companies to take a fresh look at their organizations—particularly at the growing complexity. Companies that take control of their complexity can release hidden earnings potential, in some cases increasing margins by 2 to 5 percent. Margin improvements like these can mean the difference between success and failure.

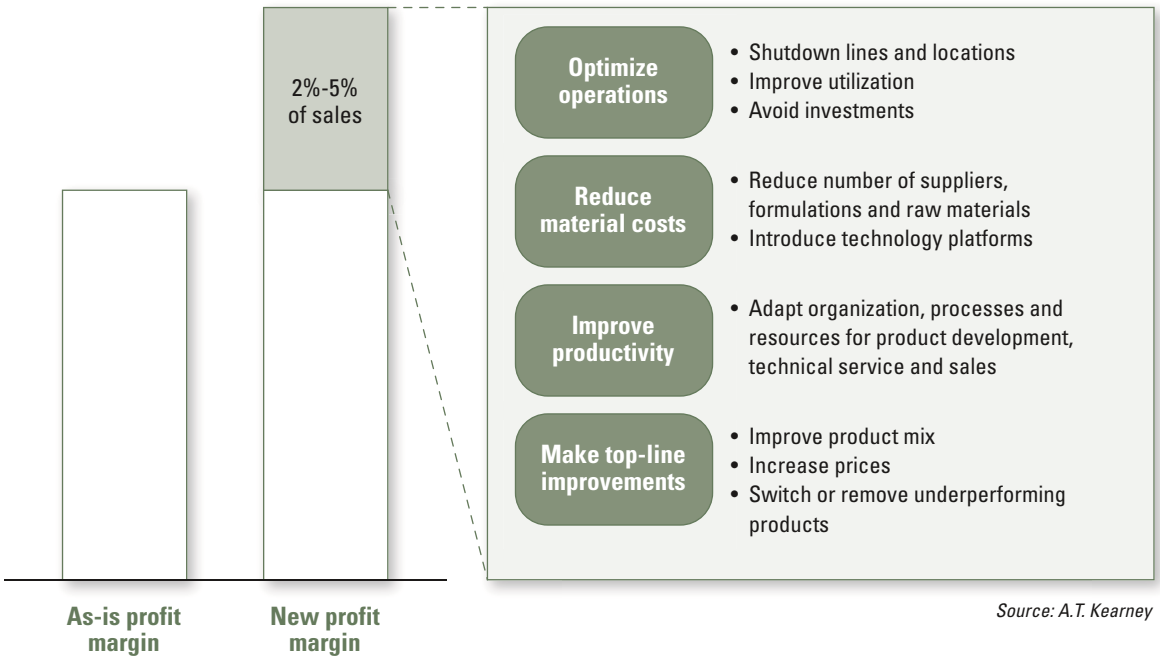
Three major trends are reshaping the chemical industry—globalization, M&A, and product specialization representing a renewed focus on meeting customers' needs. These trends are forcing many chemical companies to deal with increased complexity. Dow with its push into market-facing businesses and its pursuit of Rohm and Haas, BASF's reach for the Ciba specialty business, and Henkel's acquisition of a majority stake in National Starch are all examples of companies grappling with increased complexity.

As complexity grows, managing it effectively becomes key to maintaining profitability. Companies that get complexity under control and keep it there find that it is well worth the effort. By reducing complexity and costs in raw materials, production, sales and delivery, and by improving product pricing, companies can improve earnings by 2 to 5 percent *(see figure 1 on page 2)*. Indeed, a recent A.T. Kearney survey reveals that executives who believe their companies manage complexity better than their competitors grow twice as fast and are 70 percent more profitable. This suggests that managing complexity will become a business priority—both to protect margins and to keep resources focused on growth.

In our work across industries and within the chemical sector, we have found that successful complexity management is based on the following tactics:

- Establishing the right complexity strategy (based on the strategic intent of the business)
- Creating transparency into the cost and value of complexity

Figure 1
Manage complexity to improve profitability



Source: A.T. Kearney

- Understanding the complexity trade-offs across the value chain
- Installing a sustainable complexity management mechanism

Although many companies have successfully deployed one or two of these tactics, only a few companies have been able to master all of them. Those that do, however, are more profitable (in low-margin businesses) and free up extra resources to focus on innovation and growth.

The following offers a brief discussion of each tactic.

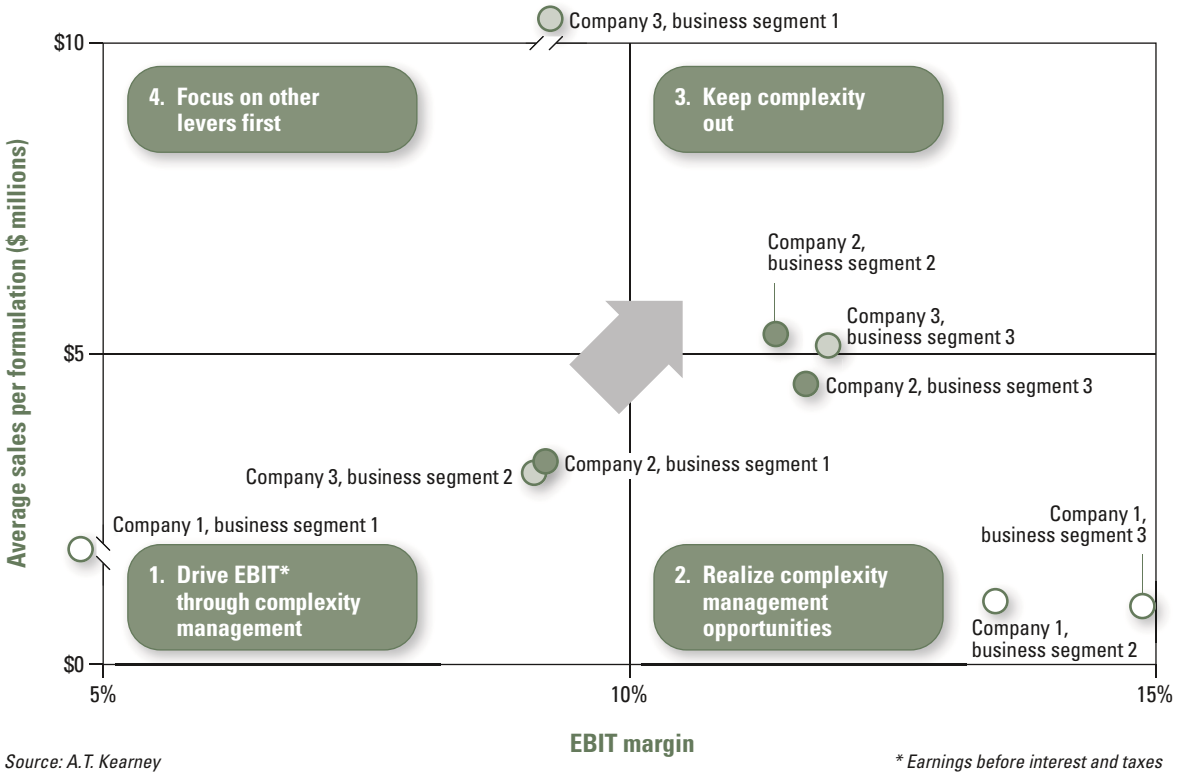
Establishing the Right Complexity Strategy

In general, a chemical business gets more complex the further downstream it is from petroleum and gas feedstocks. For example, a basics or intermediates chemicals business with a few products and a handful of large customers is far less complex than a polymers business with hundreds of products and customers. Specialty chemical businesses—especially those serving multiple end-use markets, with hundreds of products, and thousands of customers—are the most complex.

Companies must have the right complexity management strategy in place for each of their businesses. A "one size fits all" strategy and culture will not work. It will only lead to inefficiencies (in commodity chemicals) and unhappy customers (in specialty chemicals).

We often hear that there is good complexity and bad complexity and the best companies are able to balance the two by having the "right" level of complexity. The question then is, what is the

Figure 2
The "complexity health check"



Source: A.T. Kearney

** Earnings before interest and taxes*

right level of complexity for a chemical business? Insight into the answer can be found by performing a "complexity health check," tailored for the chemical industry.

In chemicals, a good measure of complexity is average sales per formulation (or grade).[1] In specialty chemicals, if average sales per formulation fall below about $5 million, managing complexity should be on the radar screen; when average sales per formulation fall below $2 million, reducing complexity should be a priority.[2] A more complete view of complexity and its business impact can be gained by combining this complexity indicator with profitability, using an earnings threshold of 10 percent.[3]

Figure 2 illustrates the results of a complexity health check for the reporting business segments of three specialty chemicals players with annual revenue of $5 to $15 billion.[4] Sales per formulation in the analyzed business segments range from a high of $11 million to a low of $1 million at the upper end of the complexity scale. The EBIT

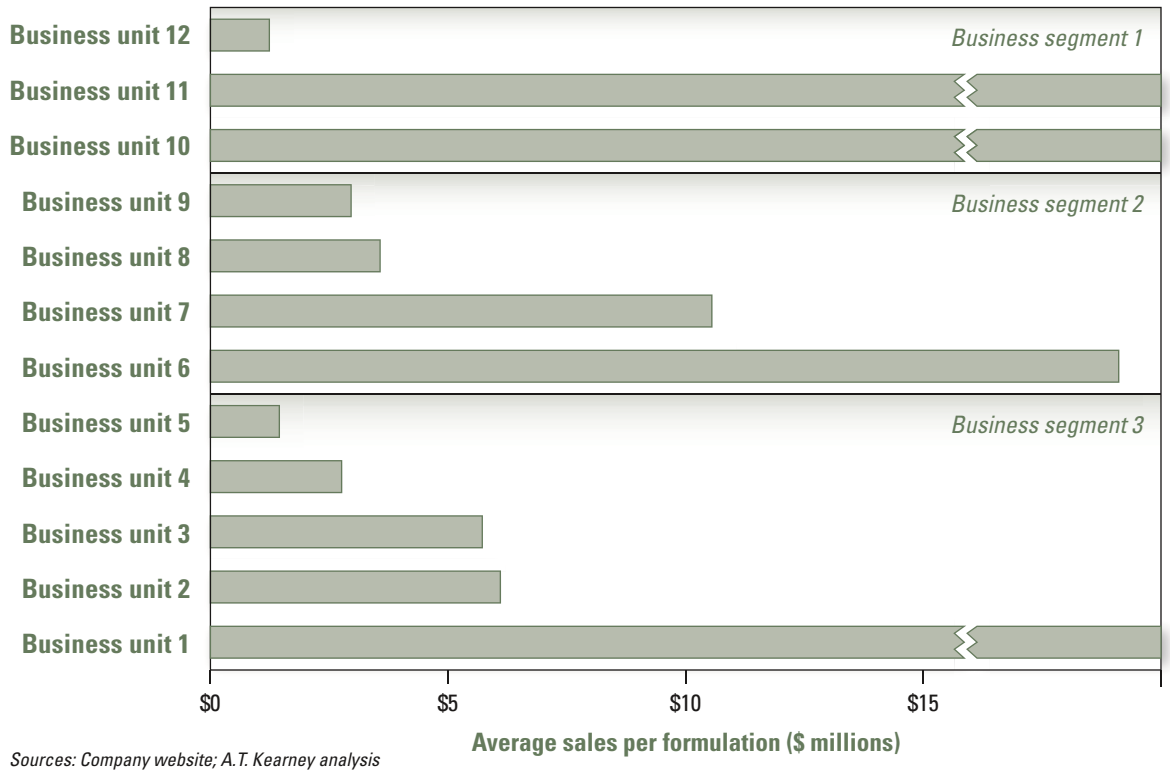
[1] *Average sales per formulation is determined as businesses sales divided by the total number of product formulations sold by that business.*
[2] *All monetary amounts are in U.S. dollars.*
[3] *All references to earnings refer to EBIT (earnings before interest and taxes).*
[4] *Business segments are those with publicly reported sales and profit margins.*

margins also indicate a wide spread from 3 percent to 15 percent.

As figure 2 illustrates, business units that fall into quadrant one, with low margins and high complexity, could benefit from a complexity management program to improve margins. Businesses in quadrant two probably have customers who willingly pay for a high level of product complexity, which is driving up earnings. (Even here there could be an opportunity to reduce complexity in some of the underlying business units.) Complexity management can be an effective tool enabling business segments to move from the lower quadrants toward the desired quadrant three. In quadrant four, margins are lagging behind higher-performing business segments, but complexity may not be the major reason.

Quadrant one is where a complexity management strategy can be the most effective tool—it is ideal for responding to shrinking margins due to product commoditization in certain business segments. Typically, identifying and implementing the right complexity management strategy goes below the business segment level. Figure 3 shows sales per formulation at the business unit level for one of the analyzed companies. Note that there is significant variation in the level of complexity within the same business segment. The right

Figure 3
The complexity footprint for company 2



Sources: Company website; A.T. Kearney analysis

management approach for each of these business units depends on the length of the product life cycle, maturity of the product portfolio and commoditization trends.

Creating Transparency into the Costs and Value of Complexity

The chemical industry is unlike most other industries due to the interdependency of assets, product technologies and markets. Multiple product lines are often produced from a common set of assets and sold into different markets.

Managing complexity in this industry requires transparency into all industry segments and applications to get a holistic view of the impact of complexity on cost drivers across the product portfolio. This is possible by building a new product hierarchy structure (with underlying technology platforms) that allows transparency into the major complexity cost drivers, such as the manufacturing process, raw materials and packaging. All can be mapped to the lowest appropriate product technology group.

Once this common structure is established, it is possible to ascertain the full and true costs of complexity. When taking on such an exercise, the focus should be on the costs that are most inaccurate within the current measurement structure used to gauge product profitability. For example, if frequent production changeovers, extra processing or scrap loss occur across products (to different degrees), and these characteristics are not allocated at the product level, then production may need to employ an activity-based costing approach to account for them. Beyond production, major cost blocks in SG&A are often allocated as lump sums to the P&L. Transportation, warehousing, sales and marketing costs are often accounted for by adding a fixed percentage to an individual product's cost of goods sold. As a result, product profitability often does not reflect the differential complexity level of one product versus another. Only after adjusting for the big sources of variation can the true costs of complexity be observed across products and, if applicable, across customers.

Once a product hierarchy structure is established, and companies have a better understanding of the true profitability of their products, complexity can be simultaneously reviewed across all market segments and technologies serving the business. Now, it becomes possible to challenge portfolio areas with low strategic value and low true profitability. Some areas will be targeted for elimination while others will be targeted for repair or growth. The product portfolio is then reviewed to identify "switch" or "delete" candidates to streamline the remaining portfolio. Armed with the true costs of complexity, it is then possible

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to review pricing on products that fall into the "keep" or "switch" basket.

By focusing on the most promising areas of the portfolio, specialty chemical companies can reduce their overall number of SKUs anywhere from 20 to 50 percent. For example, Clariant reported eliminating 25 percent of its 50,000 SKUs in a complexity pruning exercise.

Understanding the Complexity Trade-Offs Across the Value Chain

Complexity trade-offs are defined by finding the right balance between value and cost of complexity. Identifying the right trade-offs can be a challenge, but leading as well as lagging indicators of complexity can give indications that the cost of complexity may exceed the value of variety. Leading indicators are business behaviors or structures that create or enable complexity issues to persist in the business even though the impact may not yet be fully understood or measurable. Lagging indicators are measurable signs that complexity is potentially an issue for the business. The following are typical leading and lagging indicators:

Leading indicators of complexity include:

- Focus on revenue growth rather than profitability
- Failure to understand true customer requirements
- Inability to understand full product or service costs and profitability
- Limited (or nonexistent) product life-cycle management process and unclear responsibility for complexity management

Lagging indicators of complexity include:

- Flat or decreasing profitability despite sales growth in line with expectations
- More products but no improvement in overall profitability
- More business segments, industry segments or brands but no additional value generation
- Limited success in complexity reduction or product pruning programs

There are several other indicators that do not fit into either the leading or lagging categories. For example, a poorly integrated acquisition will leave a company with overlapping products, formulations and technologies; rivals that radically change their business models will have an impact on the business landscape and competitive strategies; and commoditization of formerly differentiated specialty products will result in a loss of pricing power. All of these are indications of increased complexity.

Complexity can tie up or consume resources across the entire company and its impact must be accounted for in trade-off decisions at each point in the value chain. For instance, *product development* is forced to manage a broad portfolio of projects resulting in overly long development cycles. *Purchasing* grapples with high transaction costs, managing a large number of raw materials and supplier relationships, and a loss of purchasing power due to a reduction in average purchase size. *Manufacturing* faces long lead times, frequent changeovers, increased cycle times, capital investment, and rising scrap and rework levels. *Outbound logistics* is pressured by long lead times, excessive inventory levels (including obsolete finished goods) and lost sales due to lack of available products. At the end of the chain, *Marketing, Sales and Service* are plagued by inefficient sales and service operations, cannibalization of sales, forecasting errors and increased expenditures on advertising an overly broad range of products and variants.

Finding the right trade-offs requires making the right decisions on which complexity to keep versus variants to be reduced. We typically answer these questions using a cross-functional approach with participation from all the above parties in the value chain and arming them with a complexity and cost fact base. Should a high complexity and low margin technology platform be consolidated into another one or should the number of products of that platform be significantly simplified? A sound complexity decision must be based on transparency to the true cost and impact of complexity as well as the strategic value of underlying technology platforms and business segments.

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Installing a Sustainable Complexity Management Mechanism

Sustainable complexity control requires keeping complexity from entering the business, having visibility to the level of complexity in the business, and having a process to remove non-value adding complexity from the business. Companies that successfully manage their complexity do so by deploying a cross-functional team from product development, procurement, production, sales and marketing, among other areas. Team members are asked to address complexity across the entire value chain—determining what is good complexity versus bad complexity, and then monitoring functions and processes, using business-unit specific thresholds and criteria, to prevent complexity from creeping back in. For example, business units with commoditized products and low margins would have a lower tolerance for complexity than business units selling differentiated, higher margin products. Appropriate thresholds for adding new products, new raw materials and new processes are built into the new product development process and used to keep non-value adding complexity from entering the business.

Complexity metrics should be included in existing scorecard systems, typically as part of the business unit metrics, and include measures of both level of complexity (such as sales per formulation) and product profitability, often at the level of major product line. Finally, platform teams, often under the direction of product management, should be actively involved in the product life-cycle management process. Product lines and their relative life-cycle positions in key end-use applications can be actively tracked against market trends and competitive position versus same and potential substitute technologies. Product lines with low profitability, high levels of complexity and limited differentiation owing to a mature life-cycle stage should be targeted for removal from the business portfolio.

Complexity as Strategic Priority

Complexity management is becoming a strategic imperative for the chemical industry and offers the opportunity to both redefine the position of legacy businesses and technologies as well as to optimize new businesses created by M&A activity. Industry leaders are adopting and integrating this thinking into their business plans and are developing a holistic product and technology platform management capability. While getting complexity under control is not easy, the industry trends and profitability payoffs suggest that more companies will take up the complexity challenge as a strategic priority.

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