High Performance in the Chemical Industry:
Achieving Competitive Advantage Through Technology Enablement
Accenture analysis shows new technologies offer significant opportunities for cost reduction and growth in the chemicals industry, if only companies keep an open mind on new ways to seek better returns.
Accenture Strategy recently assessed the financial performance of 100 chemical companies around the world. We then examined those findings in light of what we have seen in our extensive work in the industry, as well as with clients in other industries. Our goal was twofold:

1. To better understand the sources of competitiveness and superior performance
2. To identify opportunities that chemical companies could pursue to improve their chances of long-term success.

**Competitiveness and performance in the chemical industry**

Our research confirmed that chemical companies exhibit significant differences in performance—even among companies operating in similar geographies and segments. One commonly used measure of financial performance is EBITDA Margin, or Earnings Before Interest, Taxes, Depreciation and Amortization, divided by total revenue. Another valuable measure that can distinguish winners and losers is the change (delta) in EBITDA Margins over time.

As Figures 1 illustrates:
- The spread in the EBITDA Margin is significant, even for companies operating in the same segments
- Six of the top 10 companies operate businesses that are raw material-intensive
- Only two companies headquartered in Europe are among the top 10 companies

Not all companies assessed reflected. Georgia Gulf is now Axiall, Momentive Performance is Momentive, and Momentive Speciality is Hexion.
A closer look at these financial measures revealed four interesting phenomena that may be helping to shape industry performance.

Do not oversimplify commodities
A number of companies in our research manufacture large volume products such as ethylene, benzene and polyethylene. These commodity-focused businesses showed significant performance improvements over the past five years. At first glance, access to more affordable raw materials seems to be an obvious contributor—especially for companies that use US shale gas or other cost-advantaged raw material sources. However, on closer inspection, there is clearly more going on. We observed a focus on performing operational excellence, especially by investing in people, technology and scale assets.

Stagnation in specialties
There is a long-held belief that specialty chemical companies tend to perform higher margins and growth. The performance data of the last several years call that belief into question. There are many reasons why growth in the specialty chemicals sector is stagnant. The past five to 10 years has seen a significant rise in large, diversified chemical companies focusing on specialties. At the same time, there has been a dilution of differentiating product features in certain segments. It has also become increasingly difficult to develop new molecules and functionalities. Finally, efforts to manage cost structures and implement enabling technologies might no longer receive the attention they once did.
The temporary nature of EBITDA improvements
Only half of the sample companies managed to improve their EBITDA Margins from 2009 to 2013 by more than 1 percent; the other half performed less than 1 percent improvement or saw EBITDA decline. Even though the chemical industry is cyclical, the EBITDA Margin peaks of individual companies revealed a wide distribution across the 2009 – 2013 period, which suggests that it takes more than a favorable cycle seeking to achieve a high EBITDA Margin. From our perspective, this reflects a tendency among chemical companies to implement improvement initiatives that deliver only short-term EBITDA impacts (as opposed to technology-enabled initiatives that produce more sustainable improvements).

The role of SG&A cost management
The effective management of selling, general and administrative (SG&A) costs can boost an organization’s overall financial performance. We found that approximately 60 percent of the chemical companies we reviewed were able to stabilize or reduce the share of SG&A costs over the 2009 – 2013 period. However, far fewer managed to convert their SG&A cost reductions into profits (See Figure 2).

We found that chemical companies are at different stages of maturity when it comes to using technologies to facilitate things like collaboration, automated “no touch” administrative processes, and digital marketing, customer experience management or mobile salesforce support. From our perspective, this indicates a significant potential for chemical companies to apply technology solutions to enhance SG&A costs and grow EBITDA.

The wildcard nature of innovation and patents
While it is an established belief that research and development (R&D) drives profitable growth, our data does not show a relevant link among R&D spend, number of patents and EBITDA (or sales growth). When we looked at compound annual growth rates (CAGRs), we found that R&D spend on an aggregated level rose less than revenues and EBITDA, which suggests the companies in our sample have invested less in R&D. But a closer analysis revealed significant regional differences. For example, the R&D expenses of Europe-based companies developed in line with revenues and EBITDA, which suggests that they invested a proportional share of their additional revenues in R&D. For US-based companies, R&D expenses grew at a slower rate than EBITDA, whereas in Asia-Pacific, R&D spending outpaced EBITDA growth. The rise in the number of patent filings by China is also noteworthy.

In summary, our research indicates that profitability improvements are often temporary and driven by external factors such as supply-demand balance or improvement programs targeting specific areas such as administration or sales. However, few companies managed to seek financial performance improvements that lasted more than several years.
Technology-enabled performance improvements

Technology-driven improvements—from those that assist digital marketing, advanced process controls or automation of labor, to those that underpin new operating models—are essential components of a strategy aimed at performing sustainable competitive advantage and profitability. We see those opportunities in every industry, and the chemical industry is no exception. In fact, for chemicals, we believe new and digital technologies are poised to deliver step-change performance improvements at a pace not experienced before.

Currently, we see opportunities in applying new technologies to drive efficiencies and productivity gains within specific functional areas such as production, R&D and administration. Importantly, we also see the potential of using technology to drive cross-functional performance improvements; from our perspective, these cross-functional applications can potentially deliver the greatest performance gains.

Asset-focused opportunities
As is the case in many asset-intensive industries, chemical companies face persistent challenges related to production yield and asset availability. New technologies, improvements in existing ones and gains in investment cases facilitate a step-change in performance. For example:

- Advanced technologies now make it possible for chemical companies to automate production, apply (and continuously improve) process controls, integrate asset sensors, and take advantage of manufacturing execution systems at the enterprise resource planning (ERP) level. Our experience shows that such technology-enabled solutions can produce yield increases of up to 5 percent.
- Advanced analytics now allow chemical companies to extract insights from a multitude of condition-monitoring records and asset data to dramatically improve asset maintenance. Real-time surveillance technologies and predictive analytics work together to help companies enhance maintenance activities, identify asset failures (and the root causes of those failures) and define algorithms to predict them. The impact of these types of technologies can be significant: up to 40 percent reduction of total maintenance cost, up to 80 percent reduction of unplanned downtime, and up to 30 percent reduction in spare parts inventory.
- Integrating the various information layers (i.e., asset sensors, manufacturing execution systems and ERP systems) can also help increase flexibility. For example, companies that switch from output-maximized to yield/cost-optimized operating models can better respond to demand-side changes.

Innovation-focused opportunities
With the difficulty in molecule-based innovation, the hunt for new applications for existing molecules has emerged as a R&D imperative. Many labs still operate the way they did decades ago—that is, with a high number of paper-based, manual activities and a good amount of trial and error. Today, a number of technologies already are available to increase operational efficiencies, internally within the R&D department and externally by leveraging a broader community of stakeholders.

- In many chemical R&D labs, up to 50 percent of resources are spent on tasks such as documentation, data entry and analysis, and order or material management. Our experience suggests that bundling repetitive, non-innovative activities in dedicated units, integrating data and information management, and automating workflows can facilitate chemical companies to shift up to 50 percent of resources from repetitive tasks to innovative activities.
- Despite the greater availability of data from measurement equipment, breaks in workflow and information flow continue to impede the integration of measurement equipment with analytical tools and electronic labs. Our experience shows that the use of currently available technologies can reduce cycle time of experiments by up to 60 percent.

Combined with statistical experiment planning, this can increase the effectiveness of experiments by up to 30 percent.
- Many labs that operate as silos often struggle to shift from molecule-based to application-based innovation, which requires a deeper understanding of external factors such as customer requirements, constraints and business models. Technologies are available that can help the labs tap internal and external knowledge pools and screen publications, communities, expert forums or social media to generate leads for new applications. Such a move to “open innovation” also allows them to avoid reinventing the wheel by spending resources on experiments that already have published results.

SG&A-focused opportunities
SG&A cost management is often discounted as a non-core process in the chemical industry. Many companies feel management attention is better spent on customer or production issues. The downside to this thinking is that factor cost increases, growth in number of reports and under-managed demand can lead to significant increases in SG&A costs. From our perspective, SG&A activities offer numerous opportunities for technology-based improvement:

- Business-to-business buyers increasingly expect the same type of seamless and convenient customer experience found in business-to-consumer shopping. Search engines, mobile applications or websites designed to create an engaging customer experience can help chemical companies reach new customers, manage sales channels and maintain post-sales relationships to reduce churn rates by as much as 30 percent.
- The effectiveness of field sales forces can be increased by giving them the right (mobile) tools, automating sales processes, and making applications available that allow them to, for example, develop real-time offers at the customer site.
- In administrative tasks, technologies—from self-service portals and reports, to collaboration tools, to applications that digitize content or automate the...
capture and integration of data—can significantly improve the timeliness and availability of information, while reducing manual effort. Our experience shows that cost improvements of 20 to 40 percent are feasible with the right technologies and mindset changes.

- For talent management and acquisitions, social media offers new interactive ways to extend communication with potential employees and increase the attractiveness of the company.

The subsequent gains in competitiveness can be significant. Accenture analysis of global chemical companies shows that leading companies managed to decrease their SG&A to sales ratios, while increasing their EBITDA margins. This phenomenon confirms what we have seen among our chemical clients that have applied new technologies to drive profitable growth.

Cross-functional opportunities
The aforementioned solutions are implementable today and can be used to drive value in individual functional areas. But cross-functional solutions, which are now emerging, have the potential to improve the performance of an entire business. The integration of systems and data breaks down barriers, links individual functions and facilitates transparency across the value chain.

Big data analytics deliver even more value by making it possible for chemical companies to generate insights that enhance planning processes across multiple areas. Consider the value associated with the integration of marketing and sales, production and supply chain planning. Advanced technologies now assist chemical companies to capture historic demand patterns and apply sophisticated algorithms to improve demand-planning reliability, as well as improve maintenance capabilities. The ability to integrate more reliable demand planning with production scheduling, predictive maintenance and procurement drives several key benefits:

- Shorter time to delivery, higher reliability and more topline growth
- Higher asset utilization and lower production costs
- Reduced inventory levels and less obsolescence
- Improved production planning that balances existing customer demand with the need for new R&D pursuits.
Based on our project experience and research, the impact of technology-enabled improvements can be significant and lead to step-change improvements in performance—especially if the initiatives are integrated and tailored to the specific requirements and chokepoints of the business.
Figure 3. Accenture analysis has revealed that technology-based improvements can have a significant effect on a chemical company’s profitability. The chart is illustrative of results we have seen over the past two years.

### Illustrative P&L structure

<table>
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<th>Sales</th>
<th>Technology-enabled measure</th>
<th>Impact (EBITDA)</th>
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| 100%   | • Higher price levels by pricing analytics and cross-functional pricing processes  
          • More innovations by shift from non-innovative to innovative tasks and open innovation  
          • Higher awareness, more interaction, less churn by digital marketing and digital customer experience management  
          • Less unscheduled outage by predictive maintenance                                                                 | • 0.2 - 1 p.p.  
          • 0.2 - 0.4 p.p.  
          • 0.2 - 0.4p.p.  
          • Up to 0.1 p.p. |
| Raw materials | 60%                                                                                                               | 1 - 3 p.p.       |
| Energy  | 3.5%  
          • Technology-enabled energy efficiency management                                                                 | 0.2 - 0.5 p.p.   |
| Production | - Personnel  
          | 5%  
          • Less personnel due to remote supervision and control  
          • Improved effectiveness by digital workforce enablement  
          • Improved effectiveness by MES – ERP integration and further optimizations                                                                 | 0.2 - 0.5 p.p.  
          • 0.1 - 0.4 p.p. |
| Maintenance | 2%  
          • Less cost due to predictive maintenance, mobile work order support                                                                 | 0.1 - 0.3 p.p.   |
| Site Services | 1%  
          • More effective workforce management                                                                 | Up to 0.1 p.p.   |
| Logistics | 2%  
          • More effective routes through track and tracing technology                                                                 | 0.1 - 0.3 p.p.   |
| Sales, Marketing, Customer Service | 4.5%  
          • Higher sales efficiency by mobile field force enablement and digital backoffice  
          • Digital customer service and technical services                                                                 | 0.2 - 0.5 p.p.   |
| R&D | 3%  
          • Automation of non-innovative tasks (potential for cost reduction) and integration of information flows                                                                 | Up to 0.5 p.p.  |
| EH&S | 0.8%  
          • Digital administration including self-services, digital no-touch processes                                                                 | 0.5 - 1 p.p.     |
| General & Administration | 3%  
          • Digital administration including self-services, digital no-touch processes                                                                 | 0.5 - 1 p.p.     |
| Depreciation | 4%  
          • Automation of non-innovative tasks (potential for cost reduction) and integration of information flows                                                                 | 0.5 - 1 p.p.     |
| EBIT | 10%  
          • Higher price levels by pricing analytics and cross-functional pricing processes  
          • More innovations by shift from non-innovative to innovative tasks and open innovation  
          • Higher awareness, more interaction, less churn by digital marketing and digital customer experience management  
          • Less unscheduled outage by predictive maintenance                                                                 | 3 - 9 p.p.       |

### Impact of technology-enabled initiatives

When it comes to technology-enabled improvements, companies typically implement one program or another. Such isolated initiatives rarely capture the full potential of technology to lower costs and/or drive growth. What is required is a dedicated, cross-functional program that is integrated and rolled out over time, typically two to four years. This approach is confirmed by an analysis of Accenture’s work with chemical companies. We recently reviewed the outcomes of chemical clients that have adopted a long-term, cross-functional approach to technology-enabled improvements over the past two years. We found that basically all of the typical line items of a company’s profit and loss statement had been impacted (see Figure 3).

### Beyond technology

The chemical industry is very likely to remain an industry with demand and supply uncertainties, intense competition and pressure from multiple stakeholders.

What has changed—and will continue to change—are the opportunities afforded by new technologies to mitigate the industry’s inherent challenges and volatility. New and digital technologies are enabling step-change performance improvements seek to achieve top-line growth or bottom-line cost reduction.

It is important to point out, however, that even though recent technology advances can help produce a number of benefits, the path to sustainable competitiveness and performance is not solely a “technology play”. Structural, process-based and mindset changes are imperative. Organizational roles and responsibilities, governance, workflows and culture need to be aligned. Decision-making speed must increase. So must the investment chemical companies make in technological and cross-functional training.

Finally, it is worth noting that the goal of achieving sustainable competitiveness and performance—even when it is primarily facilitated by technology—must be on everyone’s agenda. Every functional leader in a chemical company can and should be on the constant lookout for opportunities in which technology can be applied to drive the business forward.
About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with more than 305,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world’s most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$30.0 billion for the fiscal year ended Aug. 31, 2014. Its home page is www.accenture.com.

About Accenture Strategy

Accenture Strategy helps leading organizations shape and drive their plans for growth and innovation, competitiveness, new operating models, talent and leadership, and digital transformation. Accenture Strategy integrates business, technology and function strategies to improve agility and deliver tangible outcomes.

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