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Technology-enabled procurement for chemical companies

They recognize the importance of strong purchasing capabilities, but few have transformed the function into a source of real strategic advantage. Digital and analytics can help.

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Chemical companies have worked hard in recent years to rethink their procurement functions. Many have undertaken large-scale procurement transformations to make spending more transparent, to develop their processes and the capabilities of their people, and to create category strategies for their largest spending areas. Those efforts have cut costs significantly.

A cross-industry perspective, however, suggests that the industry still has room for improvement. In McKinsey's latest Global Purchasing Excellence (GPE) benchmark, the chemical industry is only a midranking player (Exhibit 1). Its average score for a basket of procurement best practices—2.4 out of 5.0—is well behind those of the highest-performing sectors, such as automotive and consumer packaged goods.

That gap matters. Our analysis shows a clear link between procurement practices and financial performance. On average, the annual procurement savings of companies in the top quartile of the GPE benchmark are some 25 percent higher than those of average performers. The procurement leaders are more profitable, too, with an EBITDA[1] margin 17 percent higher than the midpack players'.

Purchasing costs are equivalent to 50 to 70 percent of sales revenue for chemical companies, so it is the biggest single contributor to operating profitability. Reducing overall spending by 6 to 12 percent is a realistic goal, based on what we have observed in our recent work in the industry. These savings have the potential to boost earnings before interest and tax (EBIT) by three to eight percentage points.

To reach the next step in procurement performance, chemical companies should look at the approaches of top players in leading industries, such as the automotive sector. These companies already had a strong foundation in place, including robust category strategies, good negotiating skills, and well-disciplined practices that internal requisitioners follow closely. In just the past few years, however, these leaders have boosted this kind of traditional "analog" procurement excellence with a carefully selected and combined set of technology-enabled solutions.

This new wave of digital procurement is improving performance in three fundamental ways. First, it gives companies better information by using advanced analytics and the power of big data. Second, it is making possible more effective collaboration between suppliers, internal customers, and business partners. Finally, it is streamlining processes with new workflow systems and forms of automation, especially in transactional and tactical procurement activities.

In this article, we describe how these new approaches work and how they are already generating value for the chemical companies leading the way.

Data analytics

New digital tools are transforming the ability of companies to aggregate, organize, and analyze complex data, so purchasing teams can identify opportunities more quickly and make smarter decisions at every stage of the procurement process. Consider two important examples: spending analytics and price forecasting.

Spending analytics

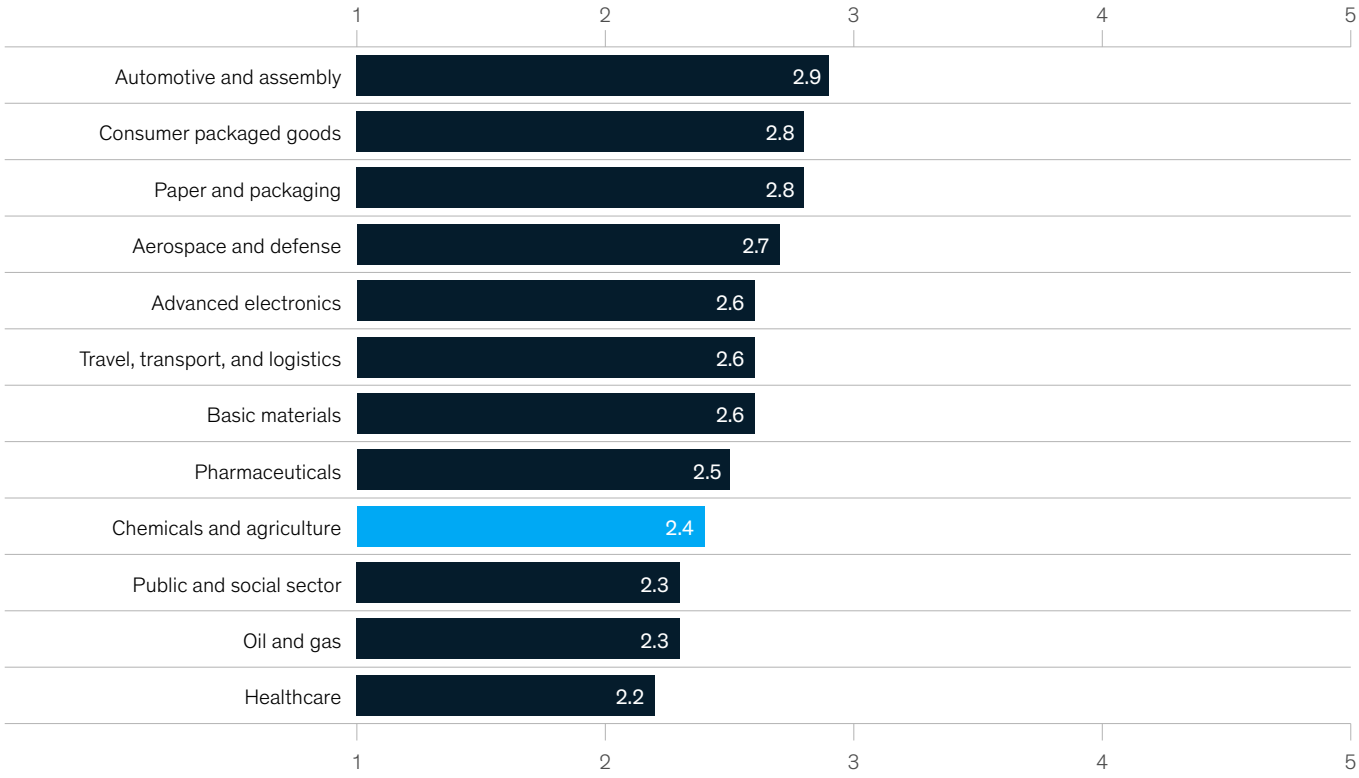
Standard business-intelligence tools are good at extracting and analyzing information from enterprise-resource-planning (ERP) systems but can require familiarity with database design and specialist programming skills. What's more, not all procurement data are simple or well structured: important information may be spread across an array of formats, from spreadsheets and specification documents to paper records. By contrast, today's spending-analytics tools are designed to address the activities purchasing

[1] Earnings before interest, taxes, depreciation, and amortization.

Exhibit 1

The chemical industry is a midranking player in purchasing performance.

Average Global Purchasing Excellence[1] score, by industry, score 1–5



[1] Based on scores in McKinsey's Global Procurement Excellence survey, which covers more than 1,100 organizations worldwide.

Source: McKinsey analysis

professionals find most frustrating. They can extract and merge data from various sources and then deploy machine-learning algorithms to cleanse, classify, and enhance the data.

At one industrial-gas player, misalignment between the purchasing and finance functions meant that some suppliers were paid too early, which put pressure on cash flows. In other cases, valuable early-payment discounts were missed. To address the issue, the company developed a spending-analytics system that merged its vendor, purchase-order, and invoice databases. From the resulting database of 100,000 transactions and more than 5,000 suppliers, the company identified 500 suppliers for which targeted-payment-term extensions would be a low-effort, high-feasibility option. The system could also send push messages to finance when early payments were needed to secure discounts.

Category-analytics solutions, which uncover cost-reduction opportunities by using category-specific algorithms to identify patterns in transaction data, are the next horizon of spending analytics. These are particularly effective for identifying opportunities in midsize and small purchases that central purchasing teams typically lack the

capacity to monitor. One global pulp-and-paper company with annual chemical purchases of more than $2 billion a year successfully adopted a category-analytics approach to help it manage its spending. With more than 500 materials and 2,000 specifications across dozens of sites, the five-manager central team inevitably focused on the larger categories, leaving midsize purchases and the long tail of small buys to local purchasing agents.

Recognizing that this approach wasn't optimal, the company built a category-analytics system to look for savings opportunities across the portfolio of products. The prices paid for individual materials were linked to external benchmarks, such as commodity indices or import–export price databases, and the system used a number of automated-analysis approaches to filter the data. That helped it spot situations where, for example, local agents had been slow to renegotiate prices when they fell. While the individual purchases were relatively small, the savings opportunities added up quickly. In just three months, the company had cut its total chemical spend by around 1 percent.

Category analytics is also highly effective in managing procurement for maintenance, repair, and operations (MRO)—a growing area of application. Thanks to automated text-recognition tools, companies can now digitize and consolidate data from paper reports and maintenance records. That helps them achieve greater transparency for their spending on spare parts and consumables. One European chemical company with over 100,000 unique stock-keeping units (SKUs) for maintenance materials (at ten sites) achieved substantial savings with this approach: it used the analytics tools to identify identical or similar parts and then to detect pricing inconsistencies for them across locations.

Price forecasting

A second major use for data and advanced analytics is price forecasting, especially at large industrial organizations that wish to enhance their strategy and decision making for purchases of major commodities. In the chemical sector, these companies are applying this approach to important intermediate and precursor categories (such as ethylene glycol) and to polymers (such as polyvinyl chloride).

The traditional approach to commodity purchasing is based on a combination of market intelligence and experience-based judgment. Companies convene their global buyers and market analysts on a regular basis to share opinions on likely movements. The outcome is based on consensus, with the aim of managing risk. Technology now offers companies an alternative. Market participants can take advantage of their internal data (such as order intake and stock levels) and combine this information with the right third-party data (for example, commodity-price indices, stock levels of manufacturers and distributors, and trade statistics). By creating such a well-structured decision-making process, organizations can build a competitive advantage.

One global fertilizer company, for example, had built a sophisticated, effective model to predict long-term price movements for an important commodity raw material. This long-term forecasting system supported financial planning, hedging strategies, and investment decisions. But the model could not predict short- and midterm price fluctuations, which could be as high as 10 to 20 percent over one or two months. Filling that blind spot could create substantial value.

To tackle the issue, the company's sourcing managers, a team of data scientists, and a data translator set out to build a machine-learning model that could predict market trends over the short and medium term. The effort aimed to determine, not the exact future price of the commodity, but whether that price was likely to rise or fall in coming weeks. That would allow the company to optimize purchase timing, the choice of sourcing country, and transport arrangements.

Over a four-week development period, the team tested more than 400 potential predictive variables from five years of data. Eventually, it found 30 drivers that could forecast the short-term direction of prices with up to 75 percent accuracy. Subsequent analysis of the data showed that in

most cases where the model failed, discrete events (such as political interventions in the market or force majeure events) were not represented in the data. This suggested that a further refinement of the new approach was needed, so analytical outcomes were tested against general market expectations before decisions were made. Encouraged by the revised system's success, the company now aims to reduce commodity spending by 2 to 3 percent through better market timing.

End-to-end collaboration with suppliers and internal customers

The second area where technology can have an impact on procurement is more efficient collaboration with external and internal partners. Here again, MRO services are ripe for technology-enabled change. In an end-to-end collaboration approach, leading players apply a combination of improved planning, "cleansheeting," and supplier-performance management.

Digital MRO-service cleansheet apps, which help maintenance planners define the scope and details of complex contractor jobs at the shop-floor level, incorporate information on the amount of time typically required for the thousands of individual tasks that make up maintenance jobs. Using the data, the app helps companies rapidly calculate bottom-up "should" costs for common maintenance jobs. They can then compare these costs with quotes they receive from contractors (Exhibit 2).

At one specialty-chemical company, this approach revealed an average gap of about 40 percent between the prices suppliers quoted for maintenance services and what the jobs should cost. When the company analyzed the root cause of the discrepancy, it discovered improvement opportunities. Although the contractor was inefficient and tended to overstaff jobs, internal issues created problems, too—including long delays in the issue of work permits; a lack of coordination between planning, on the one hand, and operations and maintenance, on the other; and poor job preparation.

That set the stage for an analytics-enabled spending-improvement program that enabled the company to reduce maintenance-service costs by 15 percent. The cleansheeting app, now part of the company's standard approach to MRO procurement, uses time and price parameters agreed on with the contractors to generate and send job requests. Produced in this way, requests not only contain all information necessary for purchase orders but also provide for automated invoice matching in the subsequent invoicing process. This feature improves tracking within the company and helps the supplier to monitor its own performance and measure the effectiveness of improvement efforts.

Companies with advanced procurement capabilities also deploy user-centered portals extensively: a single point of entry for suppliers, requestors, and other stakeholders across the entire source-to-pay process. These portals link multiple components of the entire process (such as requests for quotations, orders, and payments) and in this way simplify and streamline its management (Exhibit 3).

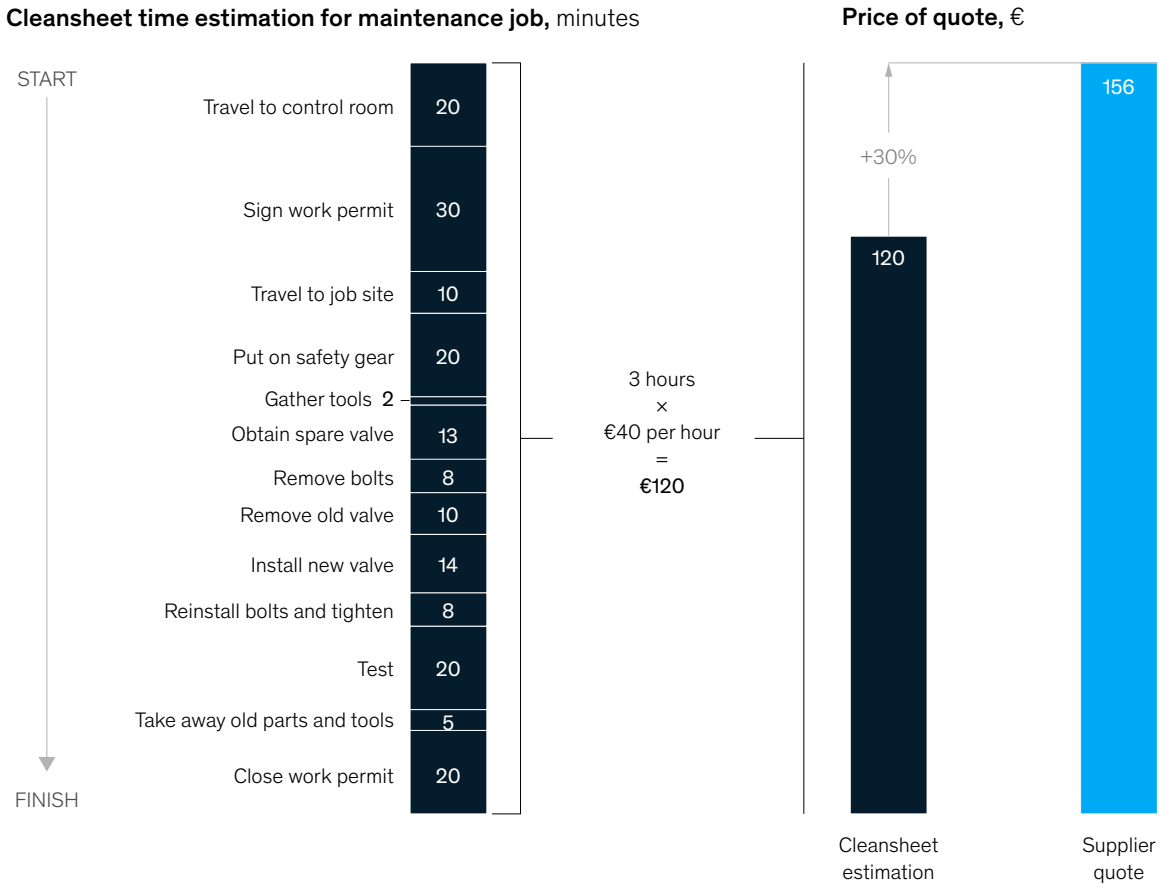
One large chemical company, for example, developed stakeholder portals and other applications, building them onto its existing ERP and procure-to-pay infrastructure as part of an effort to boost its end-to-end source-to-pay process digitally. In nine months, the transformation program reduced average source-to-pay lead times by 75 percent and improved on-time payments by 90 percent.

Digital process optimization and automation

The third category in which technology is delivering benefits for chemical companies in procurement is digital process optimization. At many companies in the sector, significant value leaks in the procure-to-pay process, especially indirect spending. Automation is one way to address this problem. Transactional procurement activities are prime candidates, but the adoption level of technologies such as robotic process automation (RPA) and smart

Exhibit 2

Cleansheeting helps chemical companies to compare their assessment of what a job should cost with suppliers' bids.



Source: McKinsey analysis

workflows varies widely in the chemical sector. The proportion of automatically generated purchase orders in a group of chemical players we analyzed, for example, ranged from zero to more than 90 percent.

One specialty-chemical company—at the lower end of the automation scale—found that unclear technical details and missing part numbers for low-value items caused most process delays and manual work. Across all the company's plants, those small issues added up, raising costs significantly. To address the problem, the company created a simple digital material-number system, initially defining critical parts and adding other items later as needed. Using a simple algorithm to streamline the selection and ordering process, the company linked this system to its requisitioner tool. By reducing maverick spending and enabling volume bundling for specific part numbers, the effort reduced spending during the first year of operation by 2 percent across the categories included in the database—a return on investment ten times the setup costs.

Organizations at the upper end of the automation scale use a range of more advanced automation technologies. RPA, for example, automates entire procurement processes. Robots (software

Exhibit 3

The supplier portal helps manage orders and encourages suppliers to respond more quickly.

1. **Access to the portal**
   Supplier connects to the portal using Windows credentials
2. **View of ongoing requests for proposals**
   Supplier can access all current requests for quotes and can apply via the portal
3. **View of orders**
   Supplier can look at status of orders and can access historical data on closed ones
4. **Real-time access to operational details**
   Supplier can navigate through relevant reports
5. **Notifications**
   Supplier receives notifications when the status of an order or request for quote has changed

Source: McKinsey analysis

programs, in this case) in each major external-spending category process incoming orders from the business, using natural-language processing (NLP) to interpret free-form text and match order requirements to a group of suppliers. The procurement system then automatically sends out requests for bids, which a robot can compare. Using the information the robot provides, an internal buyer then decides which bid to accept. At one US player, a diagnostic revealed that automation, principally through RPA, could reduce the labor costs of transactional procure-to-pay activities by 40 percent.

Process mining is another area where automation can have an impact. With just a few mouse clicks, process-mining systems, automatically digging through transaction data to map the standard process for specific tasks, help procurement managers visualize the process flow and all activities involved. More significantly, process-mining tools can also identify variants and deviations from this standard process, showing the number of times each variant occurs and the time required for every step.

One leading global commodity-chemical producer, for instance, used process-mining tools to analyze its procure-to-pay processes. The effort, which enabled the company to reduce rework and cut maverick spending by 35 percent, helped to pinpoint the root causes of significant process deviations. The analysis also paved the way for a 30 percent increase in automation across the full source-to-pay process.

Many chemical players have significant opportunities to increase automation in procurement. Yet they should bear in mind that advanced analytics and end-to-end collaboration have greater overall benefits. In most digital procurement projects, 85 percent or more of the opportunities come from making procurement more effective—in other words, reducing expenditures—and less than 15 percent from efficiency improvements.

Building a digitally enabled procurement function

For chemical companies, systematic transformation programs are the most successful way to capture the value of the new digital-procurement technologies. Digital tools are part of a broader set of procurement best practices, not an addition to or replacement for them.

Organizations must therefore maintain their focus on the fundamentals of procurement excellence. That means optimizing their commercial capabilities, so they buy things more cheaply, and their technical capabilities, so they buy precisely what they need,

as well as improving the procurement process to buy as efficiently as possible. As companies address each of these dimensions, they can pursue opportunities to use data and analytics, smart collaboration tools, and new approaches to automation and process optimization.

These approaches work best anchored in a new next-generation procurement operating model[2] addressing all the elements necessary when organizations, aiming to reach their full potential, transition to a digitally enabled procurement function. Elements of this operating model include a new organizational setup in which agile teams play a more important role, strong governance to develop and deploy digital solutions in a way that assures consistency and control, a new set of digital and advanced-analytics capabilities, and a focus on maintaining the quality of master data to fully leverage the power of data.

One further critical ingredient of a successful digital-procurement transformation is a user-centric approach. The best-performing companies adopt design thinking in their procurement transformations. In other words, they consider the end-to-end journeys taken by users of the procurement system (including internal customers, suppliers, and purchasing personnel) and create experiences that meet the users' needs along the entire process.

To do so correctly, key users are brought together with design experts, technology experts, and users from other functions to lay out the process journey, identify the worst pain points across the process, and locate possible digital solutions. This approach not only improves digital solutions but also helps generate enthusiasm for new approaches because affected users can see how the proposed changes will benefit them.

With commitment, top-management support, and a strong plan in place, a user-journey approach can have its first tangible impact in as quickly as 12 to 16 weeks. Our experience in other industries suggests that chemical companies could reduce overall spending by 8 to 12 percent in two to five years.

[2] See Samir Khushalani and Edward Woodcock, "A next-generation operating model for source-to-pay," December 2018, McKinsey.com.

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