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The Next Wave of Innovation in the Chemicals Industry

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BY VIJAY SARATHY, JAYANT GOTPAGAR, AND MARCUS MORAWIETZ

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The world is potentially on the brink of an age of new powerful materials, ushered in by innovation in the chemicals industry. But to be central players in this story, today's incumbent chemicals companies will need some vital prerequisites: restructuring of their product portfolios, successful exploitation of digital technologies, and rewriting business models to generate higher returns on their investment in innovation.

To understand the dilemma facing the chemicals industry today, you have to understand its past. Its history since World War II can be divided into two broad eras. The first period (from the 1950s through the 1970s) was a time of constant innovation. Dozens of new chemicals and compounds were discovered and commercialized. Most of these were plastics and polymers, many derived from hydrocarbons, particularly petroleum. The high value of these innovations allowed the chemicals sector to play a pivotal role in global economic activity.

After 1980, though, the pipeline of new products largely dried up. During the next 30 years, until 2010, chemicals companies focused on growth through global expansion. It started with demand-led growth in Korea and Taiwan and then China, followed by new markets in the petroleum-rich (and thus feedstock-advantaged) Middle East. As these regions undertook ambitious new

projects, many Western chemicals companies moved production into these regions. They discovered that the returns on investment in emerging markets were higher than the returns on R&D spending. Moreover, in these global high-growth regions, new materials were not a priority for customers. Instead, to succeed in this landscape, chemicals companies needed a competitive cost structure and a plan for growing market share against local players selling “good enough” products (products with 80 percent of the functionality at 50 percent of the price). Innovation was not a primary concern.

But then, on the heels of the financial crisis of 2008, globalization stalled. As their products turned into commodities, chemicals companies expanded through acquisition. As a result, many legacy chemicals businesses are large and cumbersome. Their R&D funds are spread too thin for them to compete against more entrepreneurial outfits on long-term research projects with uncertain outcomes. They rely on revenues from best-selling chemicals that are decades old. Polyvinyl chloride (PVC) was invented in 1913, polyethylene in 1936, and polypropylene in 1954. Even specialty chemicals that are highly profitable when first introduced — including many additives, pigments, and polycarbonates — can easily become commodities, with producers competing largely on price.

Meanwhile, innovation in the materials world has

Vijay Sarathy

vijay.sarathy@pwc.com
is a thought leader with Strategy&, PwC's strategy consulting group. He helps chemical industry executives interpret changes in their external environment to develop pragmatic strategies for profitable growth. He is a principal with PwC US, based in Boston.

Jayant Gotpagar

jayant.gotpagar@pwc.com
is an advisor to executives for Strategy&. Based in Houston, he is a principal with PwC US. He focuses on strategy-driven transformation programs for chemicals industry clients.

Marcus Morawietz

marcus.morawietz@pwc.com
is an advisor to executives in the chemicals industry for Strategy. He is a managing director with PwC Strategy& Germany, based in Frankfurt.

taken on a new life — largely outside the established chemicals industry. For example, the nanoscale revolution — the remarkable discoveries of two-dimensional, single atom materials such as graphene from carbon or silicene from silicon — has resulted in new materials that are lighter, stronger, more malleable, and more temperature-resistant than any chemical products in history. But despite their potential applications in technology, healthcare, consumer goods, manufacturing, and the environment, their immediate profit potential is still unknown. A few startups and academic research centers are conducting most of the R&D on these new materials — and gaining most of the initial revenues from them. They are, in effect, drawing the contours of a new chemicals industry. The incumbent large chemicals companies, with their R&D centers in a state of neglect, are barely involved.

If the incumbents remain on the sidelines, the industry could cede the “high ground” to the upstarts. There is still time for the stalwarts to make up for their lethargy and profit from nanomaterials and other notable breakthroughs. In fact, if you look closely, some of the recent strategic steps taken by chemicals companies hint that the sector may be moving in this direction — and perhaps poised to recover the mojo it once had with plastics.

Three new developments could help the chemicals industry lead a new age of materials innovation.

The quest for portfolio coherence. Activist investors have been particularly vocal in the chemicals industry during the past decade, a trend that's likely to continue. They see value that is trapped in incoherent and overly ambitious portfolios, and believe that breaking these companies up will allow the new entities that emerge to

offer more focused value propositions. This idea is already having an impact. Recently, we have witnessed “big bang” restructuring deals in various chemicals sectors, including crop protection, industrial gases, and coatings. When this quest for portfolio coherence is complete, the chemicals industry will be populated by more targeted companies, each of which can more fully dedicate its resources to enhancing its individual market narrative. As innovation resumes, these newly structured chemicals companies can better harvest organic growth opportunities, rather than continuing to rely on M&A

The emergence of digital technologies. Some chemicals companies are adopting digital technologies that will allow them to become true materials and solutions providers to their customers. For example, they are installing sensors at customer sites to track how their products perform in their customers' (and sometimes even the customers' customers') operations. The sensors will allow the chemicals providers to continually improve their products and will give them a direct relationship with their customers' end businesses. Their products will now be embedded in the innovation and operations functions at automobile, aerospace, technology, hardware, consumer goods, and healthcare equipment companies, to name a few, where they will gather data that leads to insights, culminating in stickier relationships and more sales to each customer.

Business model innovation. Endorsing portfolio coherence and digitization doesn't by itself make a company more innovative. It must simultaneously align these activities with an innovative business model that generates healthy, self-sustaining returns from R&D investments. In some cases, wholly new approaches will

have to be adopted, such as outcomes-based pricing and sharing the risk with customers in implementing new materials and products. Steps like these can forestall product commoditization while ensuring high margins.

The plastics revolution was so world-changing that it sustained the chemicals companies for decades. With the advent of new materials and their extraordinary possibilities, chemicals companies face another transformative moment. They must choose what to be in the new materials age: witnesses or leaders. +

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