

Chemicals Practice

The state of the chemical industry—it is getting more complex

Three trends may change the future of the chemical industry.

This article was a collaborative effort by Florian Budde, Obi Ezekoye, Thomas Hundertmark, Alexander Klei, and Jeremy Redenius, representing views from McKinsey's Chemicals Practice.



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Two years ago,¹ we observed a change in investor sentiment toward the chemical industry and speculated about the potential reasons. Now, we revisit those observations to confirm the underlying assumptions and trends. The relative share performance of the chemical industry has continued to deteriorate as these challenges continue to be in effect. We now see an ongoing decline in the growth rate of the demand for chemical products. Major trends such as the accelerating deglobalization and potential regulation to curb climate change will not make it any easier. In this article, we describe how the strategic context of the chemical industry is changing and discuss how COVID-19 might influence these considerations.

Shareholders increasingly skeptical

The sentiment of investors toward the chemical industry continues to change. The traditional overperformance of the chemical industry has not only slowed over recent years but also turned into a concerning underperformance from 2017 to

2019—and thus totally independent of the COVID-19 crisis (Exhibit 1).

As we examine why shareholders' sentiment has changed, we can look at the two drivers of value for any industry: return on invested capital (ROIC) and growth.

ROIC: The chemical industry succeeded in increasing its ROIC in the first half of the investigated period. However, industry ROIC has not grown further since around 2011 and has recently started to decline globally. The proliferation of new, predominantly Chinese competitors in many segments is leaving a trace.

Growth: Volume growth for chemicals has been trending downward over the past 20 years, even before the onset of COVID-19. Projections have suggested this trend is continuing—driven largely by an ever-maturing Chinese market.

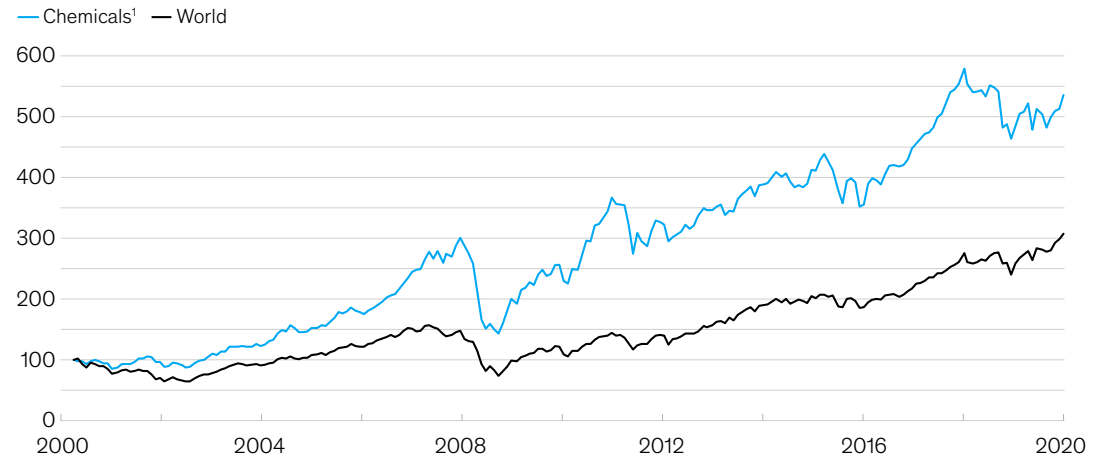
¹ Florian Budde, Obi Ezekoye, Thomas Hundertmark, Manuel Prieto, and Theo Jan Simons, "Chemicals 2025: Will the industry be dancing to a very different tune?," March 14, 2017, McKinsey.com.

Chemical companies will need to consider strategies under a level of uncertainty—and they may still be forced to make risky bets.

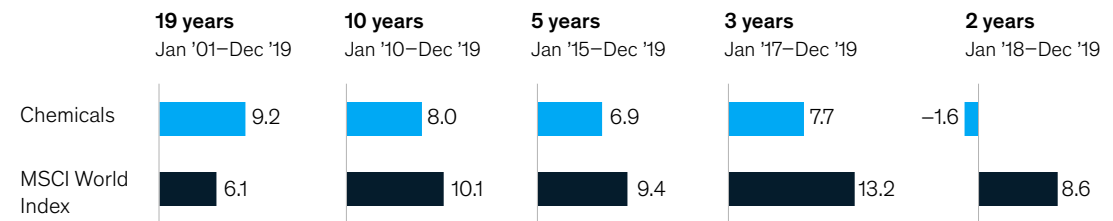
Exhibit 1

The chemical industry has outperformed the world index over the long run but not in the past few years.

Total shareholder returns (TSR), \$, index (100 = January 2001)



Total shareholder returns (TSR), compound annual growth rate, %



¹Excludes Bunge Fertilizantes and SABIC
Source: Capital IQ

Three trends that may change the future

Against this backdrop, we see three additional trends significantly affecting the future of the chemical industry: sustainability, demographics, and technology.

Sustainability

The strongly increasing intensity of economic human activity has resulted in a number of

concerning ecological developments, such as climate change, water shortage,² the reduction of biodiversity, and other challenges.

Let's focus for a moment on climate change: the planet is getting warmer, leaving humankind with a limited number of options. One will be to drastically reduce consumption in industrialized nations to meet the acceptable maximum of CO₂ emissions in a framework that prevents a 2°C temperature

²Thomas Hundertmark, Kun Lueck, and Brent Packer, "Water: A human and business priority," *McKinsey Quarterly*, May 5, 2020, McKinsey.com.

increase by 2050 (Exhibit 2). If this approach is not successful, societies will need to completely electrify their energy supplies (and increase reliance on renewables or nuclear)—which, in all likelihood, will require enormous investment. Unfortunately, if humans do not succeed in curbing climate change, they will face the consequences.

All three scenarios are challenges for the chemical industry. As the enabler of the physical world, it may need to deal with a relevant reduction in demand. The current debate about plastics recycling makes this clear: the best way to reuse material is nonuse in the first place. Any serious application of the circular economy will likely negatively affect overall demand growth for chemicals, depending on the exposure of each company's product portfolio. In addition, global electrification may inflate the price of energy (at least in some geographies), making the production of physical objects more expensive—thus reducing demand.

To plan for the future, chemical companies will need to develop answers for what these scenarios mean for their products' value chains—from the availability and prices of raw materials, to the price

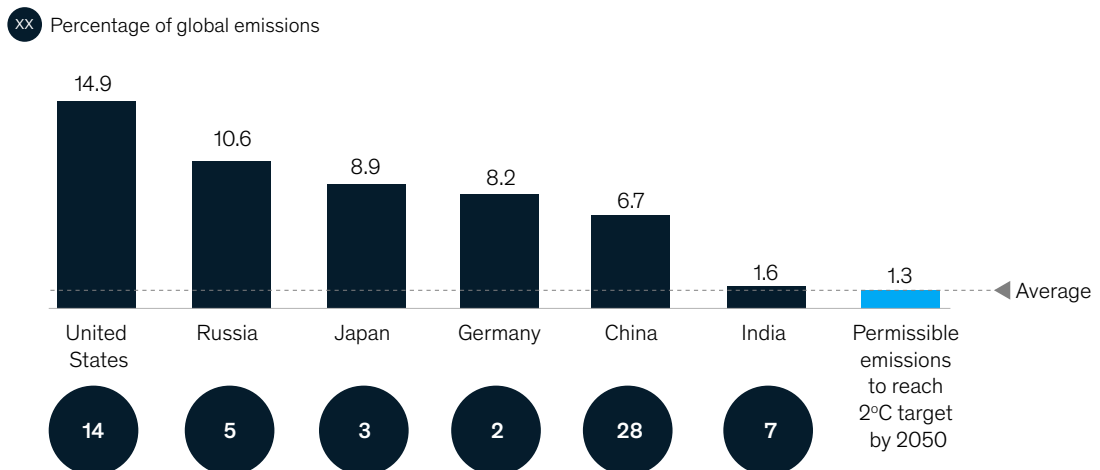
positions of production routes, to the changes in customer demand. Regardless of scenario, regulation will likely play an intensifying, crucial role as we see the planet continue to warm and the number of catastrophic events increase. Part of this regulation will likely vary by jurisdiction. Industry associations may very well see their role as the conduit for chemical companies to articulate themselves to governments expand. And as the chemical industry is a significant direct emitter of CO₂, leading management teams have started to incorporate carbon and broader environmental targets into their agendas. This is only the start—pressure will deepen from various stakeholder groups.

In the context of the diverse and fragmented nature of the chemical market, this development may spell an opportunity for those who make the right strategic moves. Different portfolios will vary in their exposure to the upcoming regulation and upcoming trends. For example, the bodies of self-driving cars might be made of plastic because the radically reduced number of accidents no longer requires them to be made of steel and aluminum. Other examples may include insulation materials (for buildings and to protect power infrastructure

Exhibit 2

Humans can fight climate change by reducing CO₂ emissions.

Per capita annual CO₂ emissions, 2017, tonnes per year



Source: Carbon Dioxide Information Analysis Centre; Global Carbon Project; International Energy Agency; Our World in Data

from increasing wildfire risks), materials enabling energy storage, construction chemicals to protect shores, or bio-based or recyclable materials.

To tap these opportunities, chemical companies will need to consider strategies under a level of uncertainty—and they may still be forced to make risky bets. For an industry that has been historically accustomed to a relatively predictable demand growth, this will be a new experience.

Demographics and geopolitical tensions

In many countries, life expectancy is increasing, and birth rates are declining. However, another demographic development has a much more forceful impact on our lives: the shift of relative wealth from the West to the East. By around 1970, China and India accounted for less than 10 percent of world GDP, while Western countries and Japan accounted for more than 80 percent. This dynamic has changed. China alone already makes up for more than 30 percent for chemical demand and supply, and the 40 percent mark appears to be in reach.

In principle, this apparently positive development can help lift people out of poverty and contribute to greater equal opportunity for many more people on the planet.

As a result of surging political instability, the chemical industry must confront diverging standards in supply chains and other economic restrictions. Many indicators suggest diverging standards will likely continue and even build. Luckily, most chemicals are intrinsically multiregional rather than truly global products. Yet intercontinental trade is still significant for many players, such as those with access to advantaged feedstock or labor costs, and many chemical companies are dependent on customers that ship their products from continent to continent.

One specific example is capital allocation to greenfield assets or cross-border M&A: depending on which trade scenarios develop, assets in certain countries might be highly valuable (with inbound trade being restricted) or a liability (with restricted

feedstock or exports). All international companies will have to deal with the consequences of this new world and, to the extent that governments allow, reposition themselves to be more multiregional. This task will be particularly challenging for Western players, who may find themselves partially being excluded from Eastern growth markets. Conversely, exclusion of Eastern players from Western markets is also on the rise. In addition, technological leadership might increasingly move toward the East, making the situation more difficult for Western companies.

Technology

Historically, the chemical industry has generally been a slow adopter of new digital or analytics technologies. Moreover, the current wave of artificial intelligence (AI) reaches the shores of chemical companies quite slowly. This can be easily rationalized on the basis that the chemical industry is a provider of physical goods, usually with a relatively small number of suppliers for a given product and, therefore, relatively high industry utilization. Still, new digital approaches can provide incremental and relevant benefits (mostly around asset and commercial productivity).

However, we would very much caution against extrapolating these developments to predict the future, in particular because of the accelerating progress of technological development—and how the chemical industry might be affected:

- AI is increasingly pervasive in all activities that deal with large sets of data—such as production, marketing and sales, and R&D—opening the way to a new level of functional excellence and a delay in capital expenditures. Leading chemicals players have already begun making the required investments into these capabilities and are thus benefiting from resulting productivity gains (“analytics-enabled functional excellence”) and can build on strong foundations for future technological progress of AI.
- Real-time information availability has the potential to change decision making. Having more-robust information (such as on sales,

cost, and inventories) earlier than other players may constitute a competitive advantage and eventually become table-stakes—lagging behind will be a significant disadvantage.

- The level of pattern recognition made possible by AI will likely increase performance transparency around equipment and employees, chemical products (in particular, specialties), management teams, and individual activities or business lines. This transparency will inform shareholders and educate their view on the operational and strategic performance of companies.
- Technology might lead to certain process automations (for example, pricing machines negotiating with procurement machines) and change the way chemical companies think about complexity, scale, and in- and outsourcing of administrative activities in particular.

While it continues to be unlikely that the chemical industry at large will experience a revolution, the evolution it faces will be continuously accelerating in speed and eventually significantly change the way things are done. Chemical companies will need to stay alert and abreast of these developments.

Implications for strategy development

All these developments will make strategy development for chemical companies more complicated (especially because they may be interdependent). While technology may help to cope with climate change, evolving trade dynamics may make the fight against its effects more complicated, as the regulation in different jurisdictions may vary significantly.

Although every company must solve the challenges it faces in a way befitting its individual product portfolio and context, some points stand out for industry-wide consideration:

- Growth assumptions may need to be revisited in the light of likely upcoming sustainability regulation and the resulting impact on customer demand. In general, regulation and geopolitical considerations may be much more relevant factors than what management teams have experienced in the past.
- The value of flexibility and optionality will increase in the years to come and competitive advantage will be redefined. For an industry that is used to building increasingly larger plants that have a lifetime of many decades, this concept will not be easy to adapt. Examples of this flexibility include partnerships, cooperation, tolling arrangements, or more broadly designed research programs—as well as the design of smaller, more-flexible production units, since they have been already adopted by other industries, such as pharma companies.
- Asia, and specifically China, will become the center of the chemical industry. Assuming a steady development—a courageous assumption—India will follow on China's path, though only in a few decades.
- As modern digital technology becomes more relevant, its initial focus will be on increasing productivity, but it will also have the potential to support the development of new business models. Later, we may see significant shifts in customer value pools and far-reaching automatization of business processes. Should quantum computing become available on a broader scale, it may rejuvenate part of chemical R&D.

All of the above will happen in an environment where shareholders will be ever-better informed and thus more demanding on financial and environmental, social, and governance performance. In fact, we believe ESG performance

will be benchmarked as highly as cost and other productivity metrics in the past.

What about COVID-19?

The COVID-19 pandemic is far from over, and no one can foresee any extreme developments. Short of a comorbid event, COVID-19 is another crisis—of which the industry has experienced time and again.

Revenues of the chemical industry are tied to GDP development, and the top line of chemical companies will dip a little more than the GDP while companies downstream in the respective value chains will empty their warehouses. In return, the uplift after the trough of the crisis will be much higher than the increase in GDP, since the very same downstream companies need to restock.

By that logic, the stocks of chemical companies have performed somewhat in the middle of the pack, and it is plausible to assume that they will continue on this trajectory. Depending on individual product portfolios, some are hit harder (such as those supplying producers of durables) than others (such as in the food ingredients space), and some others might yet profit (such as producers of packaging materials).

While keeping their employees safe, management teams have spent days and nights maintaining supply chains, procuring necessary raw materials, and dealing with a host of new regulations and

practical difficulties. But while the COVID-19 crisis has certainly accelerated some developments (such as digitization, flexible work arrangements, and geopolitical tensions), has it changed anything of the overall strategic context in which the chemical industry operates, or any of the fundamental trends described above? It's unlikely.

A more detailed assessment on the impact of COVID-19 on petrochemicals can be found in our recent publication "The impact of COVID-19 on the global petrochemical industry."³

The pace of change will continue to accelerate. This is true for practically every industry as well as for chemicals. Management teams in the chemical industry should prepare for this accelerated change as soon as the fight against COVID-19 permits.

³Divy Malik, Parth Manchanda, Theo Jan Simons, and Jeremy Wallach, "The impact of COVID-19 on the global petrochemical industry," October 28, 2020, McKinsey.com.

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