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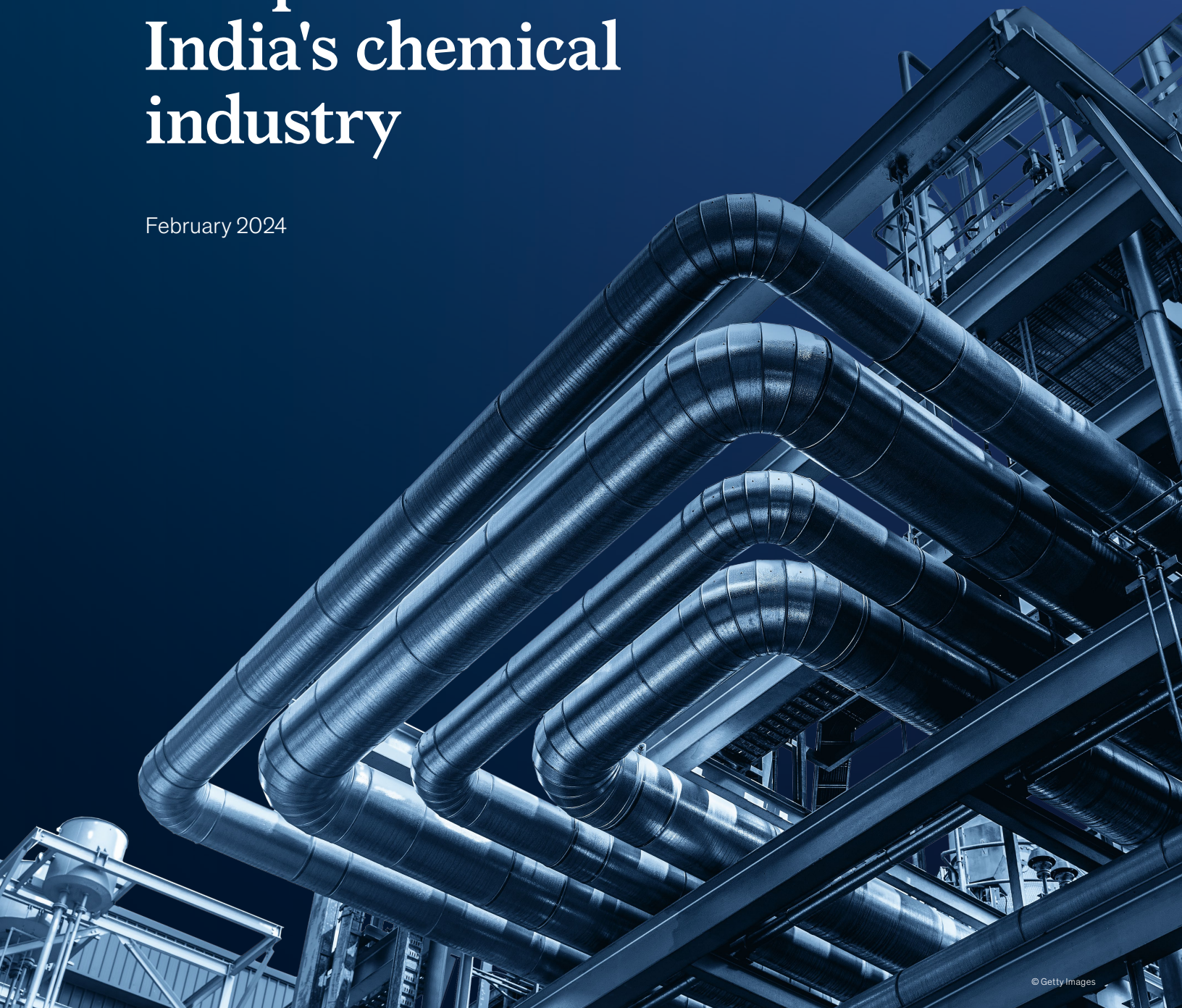
Securing competitiveness in India's chemical industry

February 2024



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Acknowledgements

McKinsey & Company has developed this independent research report as the knowledge partner for the 17th Annual India Chemical Industry Outlook Conference.

The authors would like to thank the Indian Chemical Council (ICC) for hosting the conference. We are particularly grateful to ICC office bearers, including Rajen Mariwala (President, ICC, and Managing Director, Eternis Fine Chemicals Ltd), Kamal P. Nanavaty (Chairman, Conference & Exhibition Expert Committee, ICC, and President – Strategy Development, Reliance Industries Ltd), Kartik Bharat Ram (Vice President, ICC, and Joint Managing Director, SRF Ltd), and Ramya Bharathram (Additional Vice President, ICC, and Managing Director & CFO, Thirumalai Chemicals Ltd).

The authors would also like to thank Bimal Goculdas (Managing Director & CEO, DMCC Specialty Chemicals Ltd), Ravi Goenka (Executive Chairman, Laxmi Organic Industries Ltd), Ravi Kapoor (Non-Executive Director and Chairman, Heubach Colour Pvt Ltd), D. Sothi Selvam (Director General, ICC), and Sanjoy Bhattacharya.

Many McKinsey colleagues provided valuable advice and analysis for this report, including Arnau Bages-Amat, Sweety Chandak, Autumn Hong, Praveen Krishnan, Divy Malik, Emily Mendelsohn, Lalit Naik, Siddharth Periwal, Anuj Rikhye, Simon Tamayo, and Yuan Tian. We would also like to thank McKinsey's project team consisting of Sanyam Gupta, Ayush Sirothia, and Sankalpa Venkatraghavan. We are thankful to Vikas Gujaran, Sarath Kumar, and Bharti Sachdeva for designing this report, and Anamika Mukharji, Fatema Nulwala, and Raksha Shetty from the communications team for their support.

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Executive summary

For a decade, the Indian chemical industry has been a global outperformer in demand growth and shareholder wealth creation. However, global headwinds have recently interrupted this momentum. Chemical companies in India could navigate these challenges and enhance their future prospects by boosting their competitiveness.

Indian chemical industry: Interrupted momentum

Indian chemical companies performed better than their global counterparts with strong total shareholder returns (TSR) growing at an annual rate of 20 percent between 2014 and 2023, compared to the global average of 6 percent. This changed, however, between 2020 and 2023, when average TSR growth for Indian chemical companies dipped to 9 percent due to falling margins. While the chemical industry also used to deliver better returns than the associated upstream and downstream segments in the value chain in India, this trend, too, has seen a downturn in the past three years.[1]

The effect of global headwinds

Multiple factors explain the declining competitiveness of Indian chemical companies. The first two are the fallout of stalling global demand and of overcapacity in key export markets. In the past two years, the chemical industry has faced a widening trade deficit with exports declining 4 percent annually.[2] Year-on-year (y-o-y) growth of India's chemical exports to North America dropped significantly, from 21 percent (between 2019 and 2021) to 2 percent (from 2021 to 2023). Europe and Asia–Pacific (APAC), which accounted for about half of India's chemical exports, also saw steep dips in y-o-y market growth (from 11 percent to 1 percent in Europe, and from 10 percent to 4 percent in APAC).[3]

Overcapacity in Europe could drag utilization below 70 percent by 2030 for several products, as capacity remains high at home and demand stalls abroad.[4] Declining demand in APAC could lower utilization and prompt oversupply till 2025, driven by the current demand-supply dynamics in China.[5] In the near term, China is expected to become a net exporter of petrochemicals while it has so far been a net importer. Over the past year, Chinese consumption has declined by nearly 15 percent. The consequent cut in export prices is pressuring chemical companies in India.

The third factor is commodity price volatility. Geographical unrest, global overcapacity for a few chemicals, and demand-supply dynamics in China have caused and aggravated market volatility. For example, over the past two years, petrochemical margins dropped due to rising feedstock prices and falling capacity utilization. These challenges could intensify with continuing oversupply.

While the headwinds are a common backdrop, the performance of all companies has not been uniform. The global economic outlook has turned volatile, but some companies have differentiated themselves through building their resilience and competitiveness.

[1] TSR analysis based on data from Corporate Performance Analytics by McKinsey.
[2] UN Comtrade, ITC Trade Map.
[3] Ibid.
[4] IHS-Markit, WTS-HIS-Markit, McKinsey Economics Analytics Platform.
[5] Chemical Insights by McKinsey.

Focus areas for India's chemical leaders

Over the past few years, chemical companies in India have emphasized growth and capital excellence. However, securing a competitive advantage in a volatile market could require a broader approach that builds in functional excellence and streamlines margin expansion. In this context, company leaders could focus on five proposed priorities:

1. **Building functional excellence in every pocket of the organization:** Indian chemical companies can build this muscle, especially through digital and analytics-based performance improvement that could increase their annual EBITDA by 400 to 500 basis points.

2. **Internationalization and becoming truly global:** In a macroenvironment of stalling global demand, Indian companies could still seek out new value pools. Toward this, they could build or acquire a suite of institutional capabilities such as global business development, customer access channels, local legal entities, supply chain infrastructure (warehouses, depots, et cetera), application development setups, and deep regional regulatory understanding. Doing so could help companies increase overall annual revenue by 10 to 30 percent.

3. **Accelerating innovation:** As they globalize, Indian chemical companies could focus on both application-based innovation and new product development, particularly import substitution. This could also potentially increase annual revenue by around 5 to 10 percent.[6] A sharp focus on innovation and research has helped incumbent chemical companies create differentiation between them and their competitors.

4. **Sustainability as a dual play—defense and offense:** As the industry accelerates toward decarbonization to meet stricter regulatory requirements and changing customer expectations, companies could proactively develop an offense play where they build green alternatives based on green feedstock and formulations while also investing in bio-based opportunities.

5. **Deepening and globalizing their talent pool:** Companies could equip themselves with the right skill set and capabilities across functions such as research and development, technical sales, and shop-floor operations.

Of these, the first two, improving functional excellence using digital tools, and adopting truly global strategies, could help to enhance margins in the near term. The remaining ideas could ensure the continued relevance and competitiveness of these companies. Such priorities could help the Indian chemical industry to shape the future of chemical companies and potentially meet the ambition of a US $1 trillion chemicals market by 2040.[7]

[6] Mehdi Miremadi, Chris Musso, and Jonas Oxgaard, "Chemical innovation: An investment for the ages," McKinsey, May 1, 2013.
[7] "India: The next chemicals manufacturing hub," McKinsey, February 28, 2023.

01 India's chemical industry: Interrupted momentum

The Indian chemical industry has consistently rewarded its shareholders more than its counterparts abroad and associated industries at home. However, over the past three years, margin pressure has impacted returns and raised concerns about future performance.

The challenge of margins for a robust performer

Between 2014 and 2023, India's chemical industry outperformed the global chemicals market. Robust revenue growth on the back of rising demand, a keen focus on profitability, and a rise in industry multiples kept total shareholder returns (TSR) rising at a cumulative annual growth rate (CAGR) of 20 percent during this period.[8] In the same time frame, its global counterparts were delivering returns at under 8.5 percent CAGR.

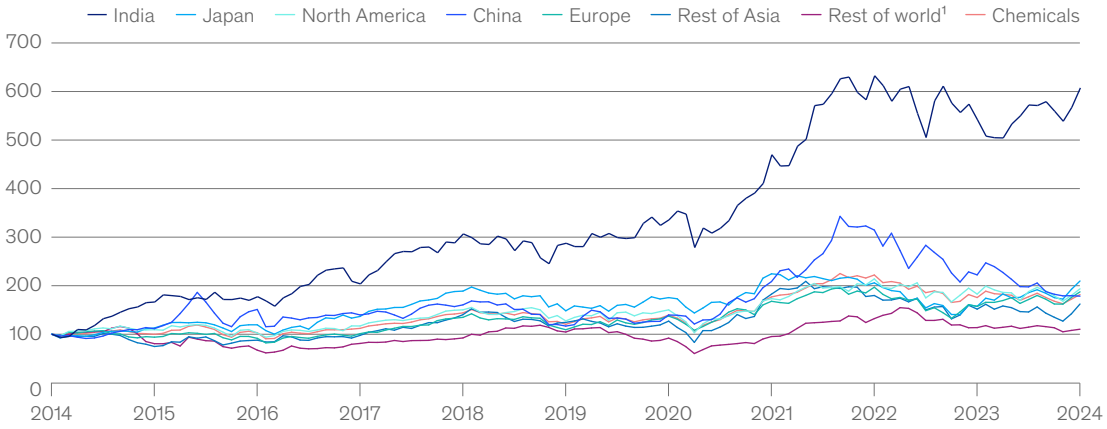
India's appeal as a manufacturing hub, coupled with its improved ease of doing business, energized the Indian chemical sector.[9] With reliable access to raw materials, and low capital and operating costs (including labor, utility, and overhead expenses), the industry consistently optimized operations and built cost competitiveness. This, along with a culture of continuous process innovation, helped the industry deliver robust returns.

[8] Analysis of TSR of top 38 chemical companies in India, based on data from Corporate Performance Analytics by McKinsey.
[9] *Doing Business 2020: Economy Profile—India,* World Bank Group.

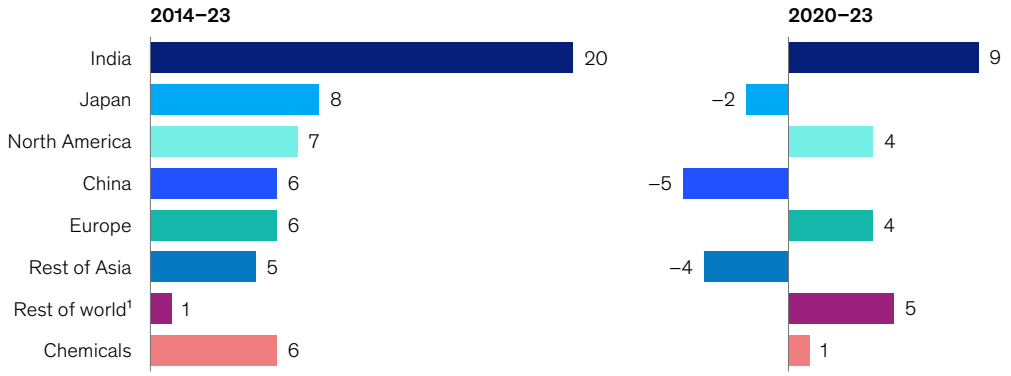
Exhibit 1

The Indian chemical industry's relatively higher returns to shareholders have recently been muted.

Total shareholder returns (TSR), index (Dec 2013 = 100), $



TSR, CAGR, %



[1]Rest of world includes companies across Middle East, Africa, Latin America, Australia, and New Zealand; top global companies by market capitalization considered for analysis (n = 482).
Source: Corporate Performance Analytics by McKinsey

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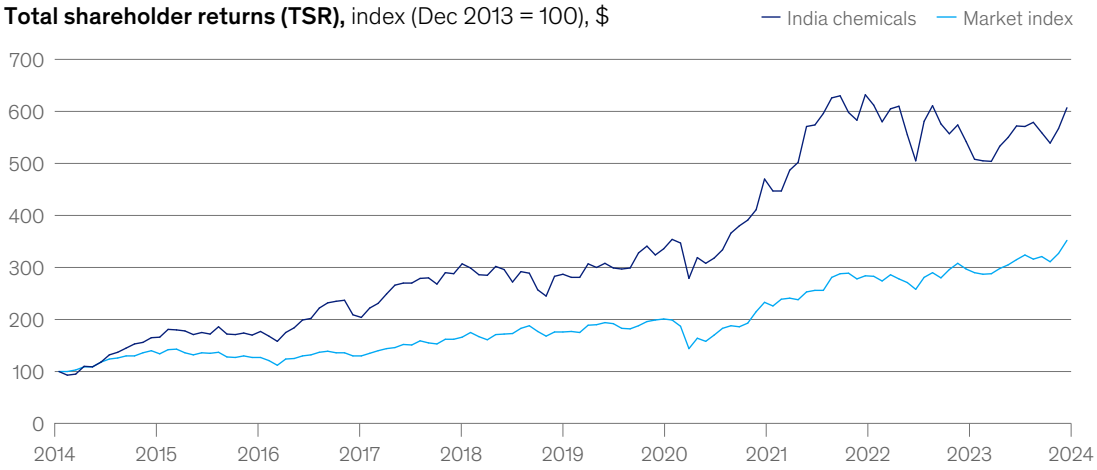
During this time, the Indian chemical industry also consistently surpassed associated upstream and downstream industries in the value chain within India, as well as the broad market index (Exhibit 2), on average, over the decade. However, the same trajectory appears again: between 2014 and 2023, the Sensex TSR had a CAGR of 13 percent, lower than the 20 percent for chemicals; but between 2020 and 2023, the Sensex TSR attained 16 percent growth, nearly double that of chemicals, which had fallen to 9 percent. This drop in performance requires closer examination.

Exhibit 2

Over the last three years, the associated upstream and downstream industries have also started outperforming the chemical industry.

Total shareholder returns (TSR), index (Dec 2013 = 100), $



TSR, CAGR, %		2014–23	2020–23
Upstream feedstocks	Metals and mining	15.5	34.8
	Oil and gas	13.2	12.9
Chemicals	Chemicals	20.0	9.0
Downstream customers	Automobiles	13.2	21.9
	Construction materials	14.3	17.5
	Consumer products	16.4	9.9
	Pharmaceuticals	9.5	5.9
	Indian market index	13.0	16.0

Source: BSE Sensex; Corporate Performance Analytics by McKinsey: Top Indian companies by market capitalization (n = 485)

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The impact on total shareholder returns

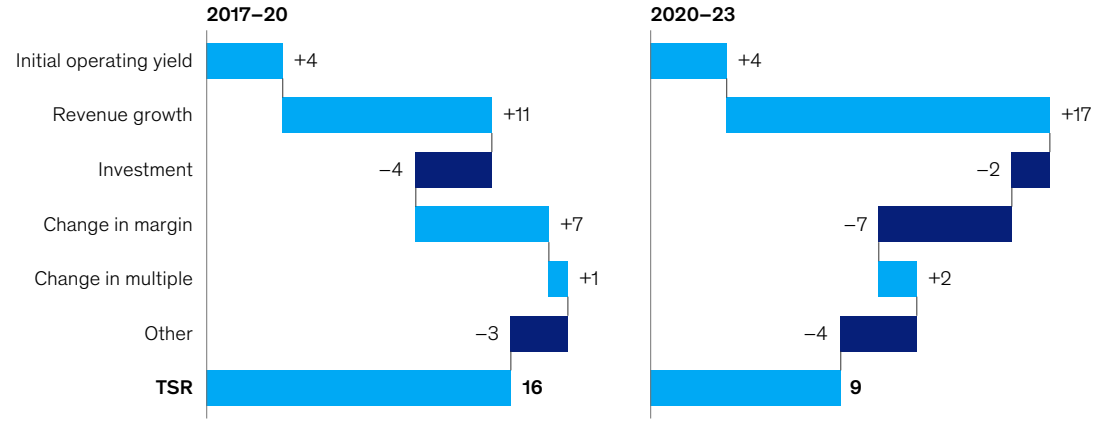
The TSR decomposition[10] of 38 top chemical companies in India shows that the TSR decline is the outcome of their margins falling from 12 percent, on average, in 2020 to 10 percent by 2023 (Exhibit 3). The gradual erosion in shareholder returns witnessed in the past three years is at odds with the attractive revenue growth during the same period (2020 to 2023). Revenue CAGR rose to 17 percent at this time, from 11 percent between 2017 and 2020. However, a part of the revenue growth between the two time periods can be attributed to price escalation in the chemical industry, as reflected in the wholesale price index (WPI) of chemicals and chemical products growing at a CAGR of 11 percent between 2020 and 2023.[11]

[10] TSR decomposition explains the impact of key factors such as revenue growth, change in margins, and invested capital on TSR in that period. TSR depends on factors affecting capital gains as well as other factors, such as dividend yield, affecting cash flow contribution.
[11] Wholesale Price Index Data, Office of Economic Adviser, Department for Promotion of Industry and Internal Trade.

Exhibit 3

Operating and nonoperating factors have impacted the total shareholder returns of the Indian chemical industry.

Impact on total shareholder returns (TSR), %



Note: Absolute revenue growth is considered for calculating revenue impact on TSR; others include various factors affecting cash flow distribution like dividend yield, etc; figures may not sum to 100%, because of rounding.
Source: Corporate Performance Analytics by McKinsey: Top 38 Indian chemical companies considered

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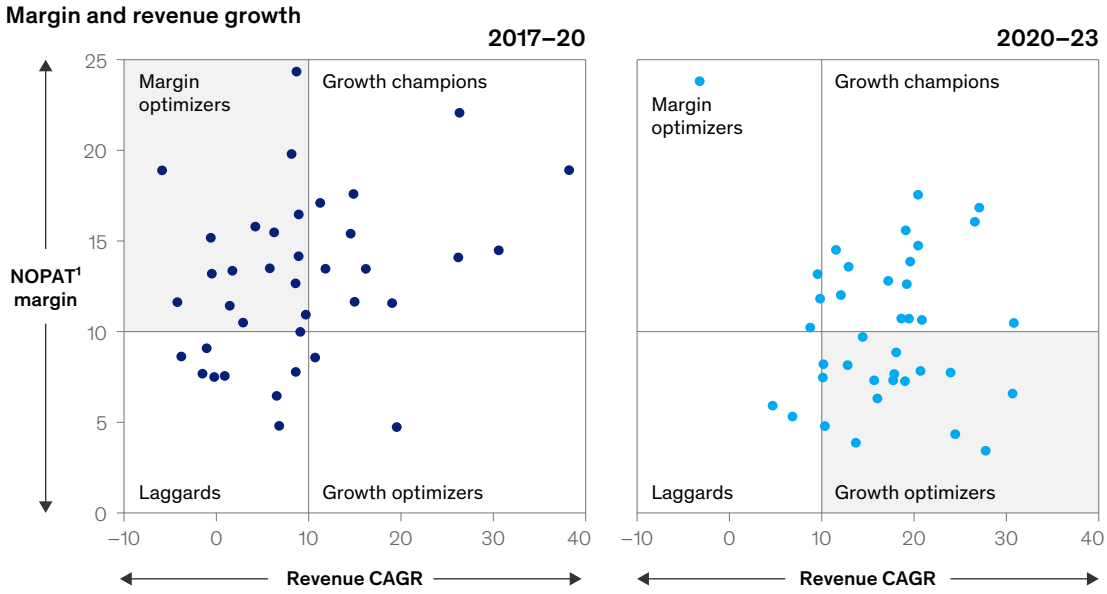
The drop in TSR occurs against the backdrop of an increasing influence of revenue growth, rather than margins, as a determinant of industry performance. Mapping the revenue CAGR and net operating profit after tax (NOPAT) margin trend for the 38 companies studied showed that 23 companies grew their revenue CAGR between 2020 and 2023, as compared to between 2017 and 2020. This growth, however, coincided with a decline in their average NOPAT margins and consequently the TSR across the same period (Exhibit 4).

Exhibit 4

A recent high-revenue phase has come at the expense of falling margins, which need to be addressed.



[1]Net operating profit after tax.
Source: Corporate Performance Analytics by McKinsey: Top 38 Indian chemical companies

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Narrowing margins have impacted TSR growth for the Indian chemical industry. A marked shift to defending margins while encouraging growth could shape the success of this industry.

02 The effect of global headwinds

The pressures faced by the chemical industry reflect the sluggish global consumption over the last four years. At the root of the slowdown is an interplay of three factors: stalling demand growth in India's export markets, overcapacity in major global economies, and commodity price fluctuations. Together, these are hurting the competitiveness of the industry as a whole and reducing the margins of chemical companies in India.

The world's top consumers have been slowing down spending. Per capita consumption in countries such as the US, China, Japan, and the EU nations has been slackening, and projections indicate stagnation between now and 2030.[12] Per capita consumption in India, however, is expected to rise.

Intertwined factors affecting competitiveness

A combination of three headwinds has been affecting Indian chemical companies. First, while the country has healthy consumption growth at home, its chemical exports are facing stalling demand growth, with a 4 percent annual decline over the past two years. Second, as India's biggest importers see their demand slow down or rapidly add internal capacity, Indian exports to these countries are falling, dragging industry margins with them. Finally, external factors such as ongoing geopolitical instability are disrupting supply chains. This leads raw material prices to fluctuate, further impacting competitiveness in a highly commodity-dependent industry.

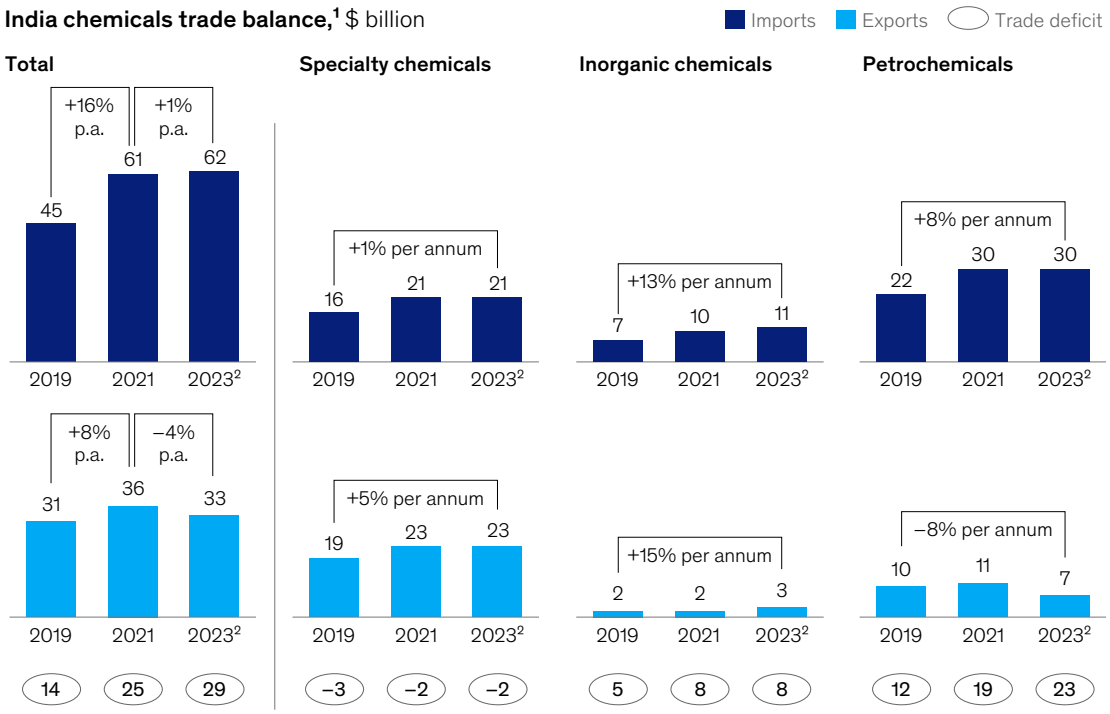
[12] Analysis of data from Oxford Global Economics.

Global stalling demand and overcapacity

As import dependency grows and exports decline, India's trade deficit has doubled since 2019 (Exhibit 5). The 4 percent decline in exports comes on top of around a 5 percent drop in volumes across exports. The volumes of petrochemical (petchem) exports, primarily building blocks and polymers, have fallen at a rate of over 15 percent in the past two years.

Exhibit 5

A 4 percent year-over-year decline in exports, as imports increased, led to a widening trade deficit in the Indian chemical sector.



[1]Excludes fertilizers, pharma end products, and consumer products; includes pharma intermediate chemicals.
[2]For 2023, H1 exports are extrapolated for the entire year.
Source: UN Comtrade

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Petchem[13] is the key segment facing a twin blow: exports have been declining at around 8 percent, while imports have been rising at around 8 percent. The widening trade deficit contributes to around 80 percent of the total chemicals trade imbalance. Lagging cracker infrastructure in the country and the scarcity of key feedstocks and minerals could continue this trend. Polymer imports, which make up a third of all petchem imports, have grown steadily at 15 to 16 percent over the past four years, pushing up imports overall.[14] Of these imports, the two largest polymers, polyvinyl chloride (PVC) and polypropylene (PP), are expected to account for around 13 percent and around 8 percent, respectively, of total petchem imports.[15] The dip in exports is primarily due to building blocks such as C8 (paraxylene) and C6 (benzene).

[13] Petchem includes building blocks, intermediates, and end products (C1–C8 derivatives).
[14] Chemical Insights by McKinsey: analysis based on UN Comtrade data.
[15] Ibid.

The specialty chemicals[16] segment is expected to drive exports growth, showing a consistent growth of around 5 percent y-o-y over the past four years. India could remain a net exporter in the segment, driven by agrochemicals, dyes and pigments, cosmetics/personal care, and food ingredient chemicals that account for around 80 percent of total Indian specialty chemical exports. While exports in the inorganic chemicals segment have grown steadily, contributing to nearly 8 to 10 percent of exported value, the segment remains reliant on imported raw materials such as phosphorus, potassium, and titanium.

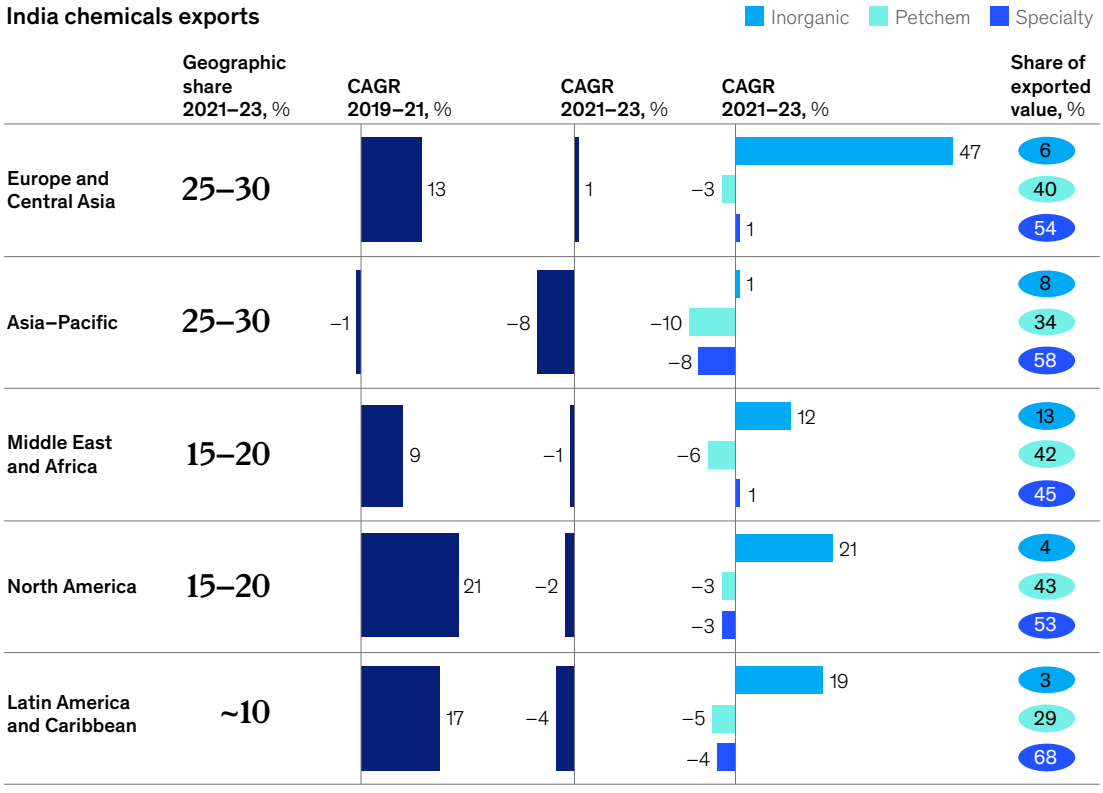
Across all geographies, exports show a drop in a comparison of growth rates from 2021 to 2023 versus 2019 to 2021 (Exhibit 6). North America grew 21 percent y-o-y from 2019 to 2021. However, from 2021 to 2023, that trend was reversed, with petchem and specialty chemicals exports dropping, likely due to supply chain constraints and industry destocking. For example, in 2023, chemical companies carried approximately 75 days of inventory, compared to the prepandemic average of 45 days.[17]

[16] Specialty chemicals include dyes and pigments, agrochemicals, electronic chemicals, flavors and fragrances, cosmetic chemicals, nutraceutical ingredients, food and feed additives, plastics additives, rubber-processing chemicals, adhesives and sealants, construction chemicals, specialty polymers, cleaners, industrial and institutional, surfactants, textile chemicals, water management chemicals, paper chemicals, flame retardants, lubricating oil additives, antioxidants, petroleum refining and chemical process catalysts, biocides, and corrosion inhibitors.

[17] Ajay Joshi, "Agrochem seeing subdued demand, battery chemicals in focus," January 2024, *The Economic Times*.

Exhibit 6

All geographies have seen an exports downturn, with North America and Latin America declining the most.



Source: ITC Trade Map

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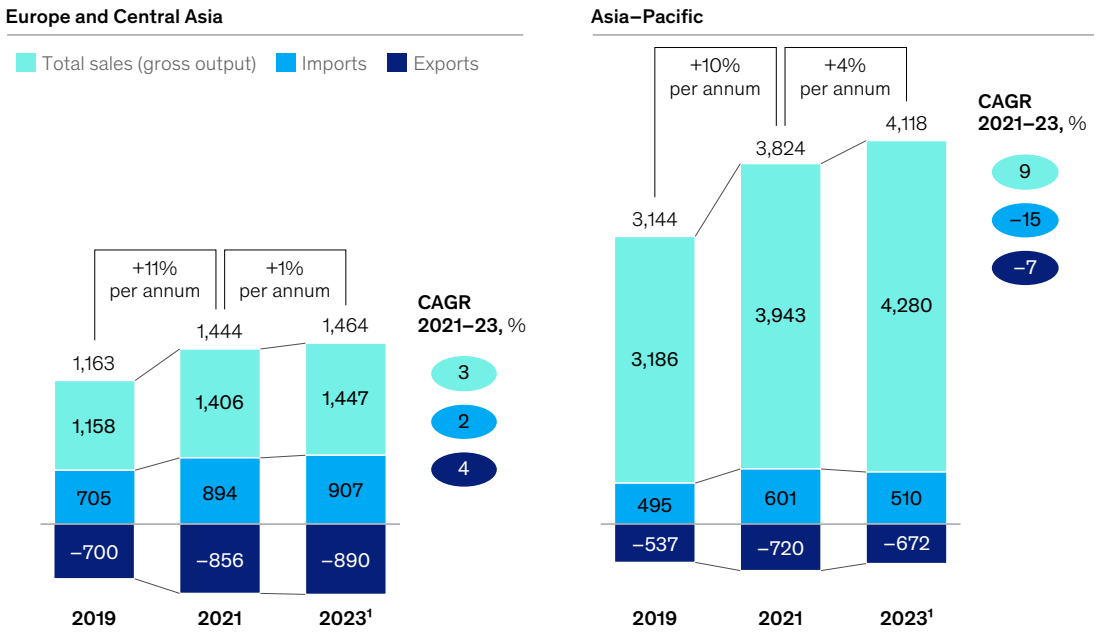
In Latin America, too, growth of imports from India declined from 17 percent in 2019 to 2021 to minus 4 percent from 2021 to 2023. Overall, total imports fell by 37 percent with reducing trade deficits, indicating an increasing reliance on domestic production. Additionally, competition with Chinese suppliers leading to price cuts has potentially contributed further to the decrease.

Europe and APAC, which constitute nearly 50 percent of the Indian exports market, showed a consumption slump in the period of 2021 to 2023 compared with the preceding two years (Exhibit 7). In Europe, consumption slowed down from 11 percent yearly growth to 1 percent, while APAC experienced a drop from 10 percent to 4 percent in this period.

Exhibit 7

Europe and APAC markets, both major importers (greater than 50 percent), have been sluggish over the past two years.

Total chemical consumption, $ billion



¹For 2023, H1 exports are extrapolated for the entire year.
Source: IHSM WIS Database, ITC Trade Map, World Bank

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Overcapacity in Europe

The falling demand for European exports means that utilization across a range of products could dip to under 70 percent by 2030,[18] an estimate based on existing supply, currently announced capacity additions, and forecasted demand projections.

European chemical exports are facing headwinds across geographies. In China, the surge in local capacity has led to a nearly 7 percent year-on-year decline in exports from Europe. Inflation Reduction Act incentives for domestic manufacturers in the US are also potentially impacting demand from Europe.[19] In the Middle East, there has been a move toward specialty chemicals, away from upstream crude oil domination, with increasing investments by state-owned players in specialty chemicals in China.

Stalling demand in APAC

Lower utilization is expected across major petchem value chains (ethylene, propylene, polyethylene terephthalate, PVC) in APAC. This is expected to result in an oversupply in the near term until 2025, driven primarily by a slowdown in demand in China.[20] Further, capacity additions of naphtha crackers, ethane crackers, methanol-to-olefins and coal-to-olefins plants, and propylene dehydrogenation (PDH) plants are expected for polyethylene (PE) and polypropylene (PP). Here, the analysis of utilization is based on demand projections.

For near-term supply, capacity is projected based on announcements to invest in facilities, while for the longer term, conservative estimates have been derived.[21] In the medium term till 2027, the market is expected to be balanced for PE and PVC due to increasing utilization in the face of anticipated demand. However, PP and polyethylene terephthalate (PET) could remain in oversupply with an overall slowdown in the plastics, resin, and fiber markets. In the longer term, by 2032, these products are expected to reach a balance between supply and demand.

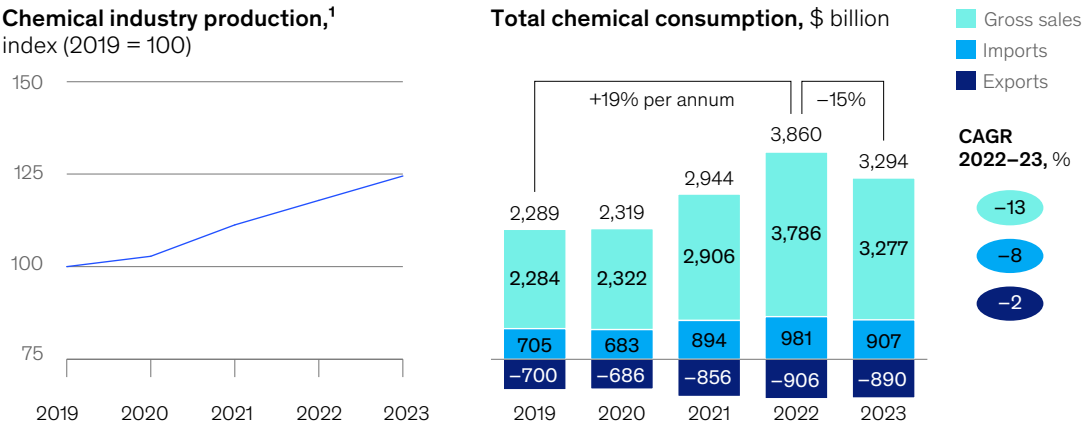
China's growing capacity is likely to disrupt global markets going forward. The country plans additional capacity of around 22 million tons for propylene and 30 million tons for ethylene by 2027. This, along with overall demand sluggishness, creates an overcapacity scenario. In fact, around 60 percent of the confirmed capacity additions for ethylene worldwide is expected from China.[22] From being a net importer of petrochemicals, China is projected to surpass self-sufficiency and become an exporter.

Overall, in China, production has risen by 6 percent from 2019 to 2023 (Exhibit 8, where the production index is shown with production value in 2019 indexed to 100). In contrast, total consumption grew by 19 percent from 2019 to 2022 but declined by 15 percent the following year. Driven by a 13 percent fall in sales and an 8 percent dip in imports, this decline has created an oversupply. As a result, Indian players face steep pricing pressure from Chinese counterparts in export markets, and as demand continues to stagnate, Indian export value could further decline.

[18] IHS-Markit, WTS-HIS-Markit, McKinsey Economics Analytics Platform.
[19] "Inflation Reduction Act, 2022," December 12, 2023, IEA.
[20] Chemical Insights by McKinsey.
[21] IHS-Markit, WTS-HIS-Markit.
[22] Eren Çetinkaya, Ruchin Jain, Brian Roth, and Sari Varpa, "Excellence in petrochemicals: What it will take to win," McKinsey.

Exhibit 8

Overcapacity is resulting in excess supply from China in global markets, creating steep competition for Indian exports.



Note: Figures may not sum to 100%, because of rounding.
[1]Annual volume in MTA considered.
Source: IHSM WIS Database; ITC Trade Map; Eren Çetinkaya, Ruchin Jain, Brian Roth, and Sari Varpa, "Excellence in petrochemicals: What it will take to win," McKinsey

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Commodity price fluctuations

A number of global supply chain disruptions are impacting energy supply worldwide. The chemical industry, heavily dependent on commodities, is feeling the heat of market volatility. We analyzed this in the context of petrochemicals based on the two key drivers—feedstock prices and capacity utilization. When crude oil prices dipped from 2015 to 2018, margins soared for PE and PS (Exhibit 9), reflecting a healthy demand-supply balance. However, 2021 to 2023 saw a double blow to margins, as crude oil prices declined by nearly 17 percent and utilization declined by three to five percentage points globally.

As companies continue to diversify into specialty chemicals, the impact of commodity price volatility goes down. However, oversupply could continue in the coming years, causing utilization challenges and margin pressure.

The need for resilience

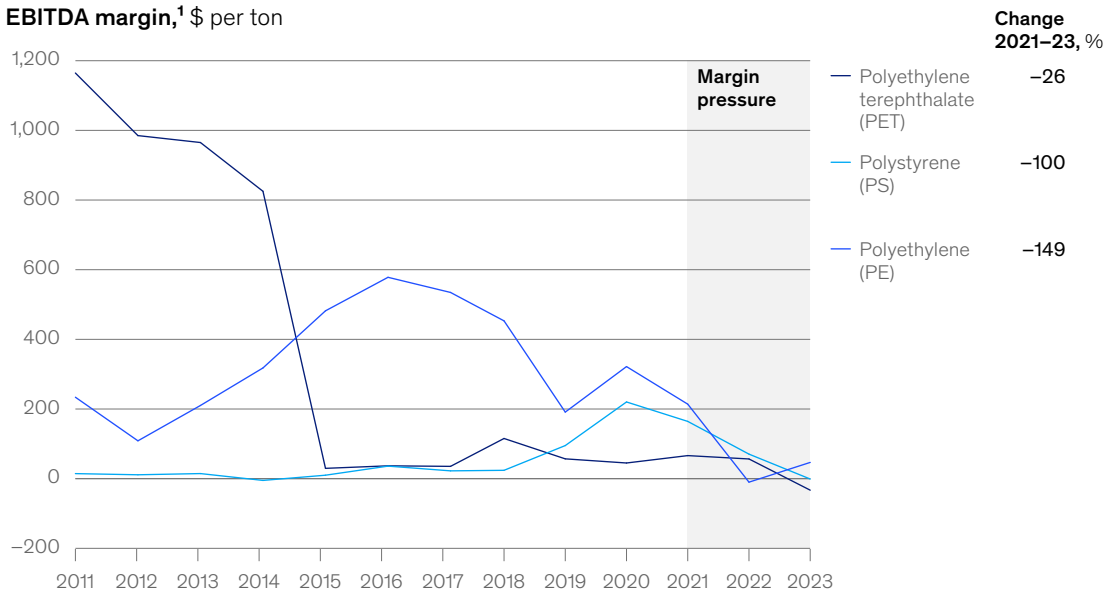
Despite the headwinds forming a common backdrop for all chemical companies, a few have successfully built resilience and performed better than their peers. These companies have typically overcome the headwinds by adopting an agile operating model, meticulously identifying value chain and market adjacencies and building in cost prudence across operations and capital expenditure. In this context, chemical companies in India could reflect on some crucial questions:

1. Have they capitalized on their cost leadership position in key value chains where they have a structural competitiveness?

2. Have they doubled down across exhaustive demand centers, becoming truly global or attaining a fair market share in primary/secondary home markets?

Exhibit 9

Petrochemicals have faced a dual challenge of increasing feedstock prices and demand-supply imbalance, resulting in margin pressure.



[1]Chemical Insight's proprietary margin model has been utilized to derive historical cash flow margins for SEA; HDPE integrated with ETH gas phase steam cracking with a capacity of HD 650 KTA, ETH 1500 KTA, PP 550 KTA integrated with PRO 500 KTA, PS 250 KTA, PET 600 KTA is used.
Source: CMA by OPIS (formerly IHSM); World Bank Commodity Price Data; Chemical Insights by McKinsey

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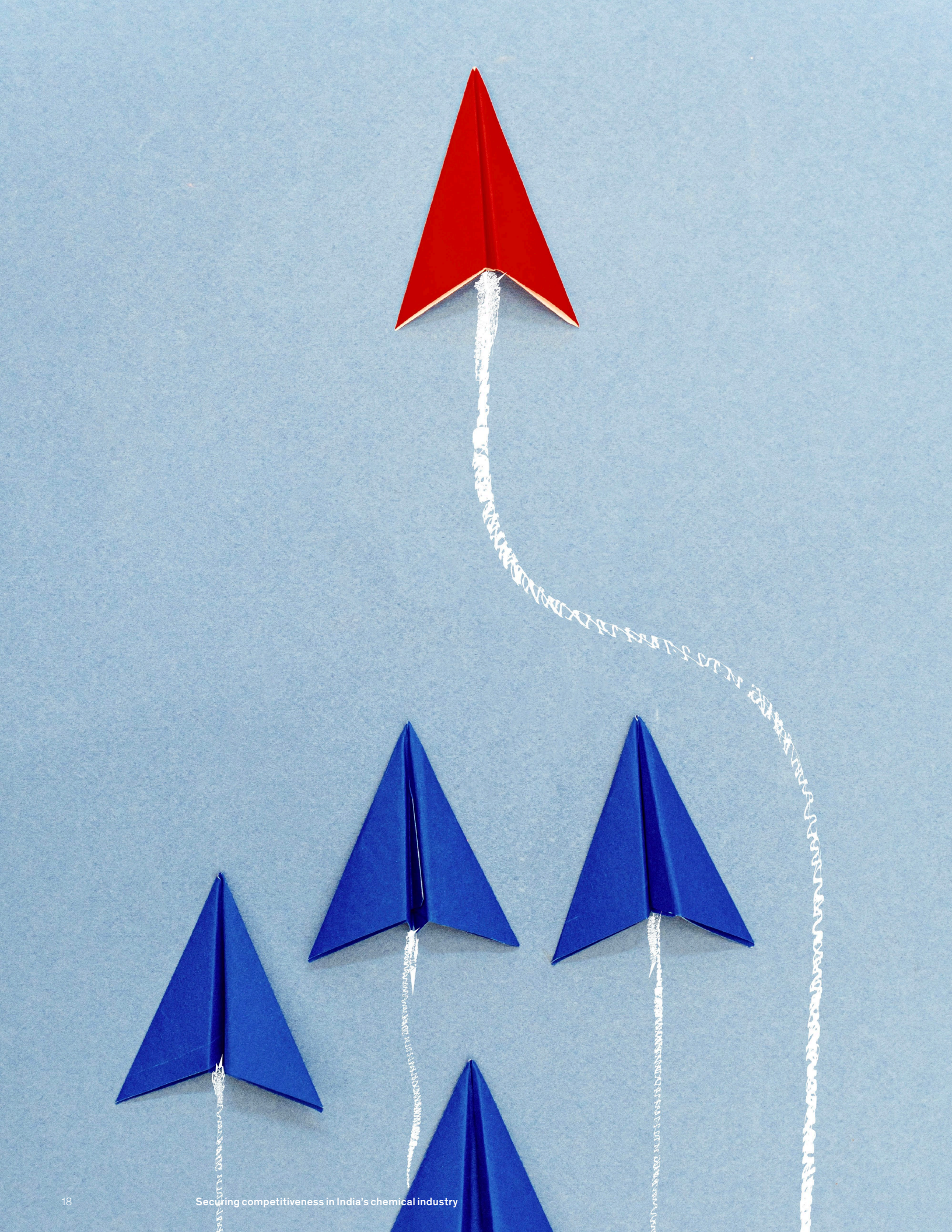
3. Have they ensured that application development with their customers/partners is a core part of their DNA? Has customer centricity been their key area of focus?

4. Have they holistically thought through the approach on value creation through the shift toward sustainability? Are they using an offense approach or playing defense?

5. Have they considered inorganic strategies for growth and delivering value to customers, such as mergers and acquisitions (M&A)?

The answers to these questions could guide companies as they consider their approach to build resilience for the future.



03 Focus areas for India's chemical leaders

Securing a competitive advantage could shape greater resilience for companies in a volatile market. The leaders of chemical companies could consider five priorities: striving for functional excellence using digital, becoming truly global, accelerating application-based innovation and product development, focusing on sustainability (both defense and offense), and deepening and globalizing the talent pool. The first two, improving functional excellence using digital tools, and adopting truly global strategies, could enhance margins in the near term. The other three could foster continued relevance and competitiveness.

1. **Building functional excellence in every pocket of the organization:** Most Indian chemical companies underinvested in this during the growth phase of the industry. The adoption of digital and analytics-based performance improvement, where most Indian companies have remained behind peers, could help to enhance annual EBITDA by 400 to 500 basis points.

2. **Becoming truly global:** Even in a macro scenario of stalling global demand, Indian companies could identify new value pools, and go after them by building or acquiring a suite of institutional capabilities such as global business development, customer access channels, local legal entities, supply chain infrastructure (warehouses, depots, et cetera), application development setups, and deep regional regulatory understanding. Companies building on these moves could see an overall annual revenue increase of 10 to 30 percent.

3. **Accelerating innovation:** A sharp focus on innovation and research has helped incumbent chemical companies differentiate against their competitors. Indian chemical companies could focus on both application-based innovation and new product development, particularly import substitution. This could increase annual income by around 5 to 10 percent.

4. **Sustainability as a dual play (defense and offense):** While the industry accelerates toward decarbonization as a defense move to meet tighter regulations and changing customer expectations, companies could also develop an offense play. This could entail building green alternatives and formulations while also investing in bio-based opportunities.

5. **Deepening and globalizing the talent pool:** Companies could equip themselves with the right skill sets and capabilities across functions such as research and development, technical sales, and shop-floor operations.

1. Building functional excellence in every pocket of the organization

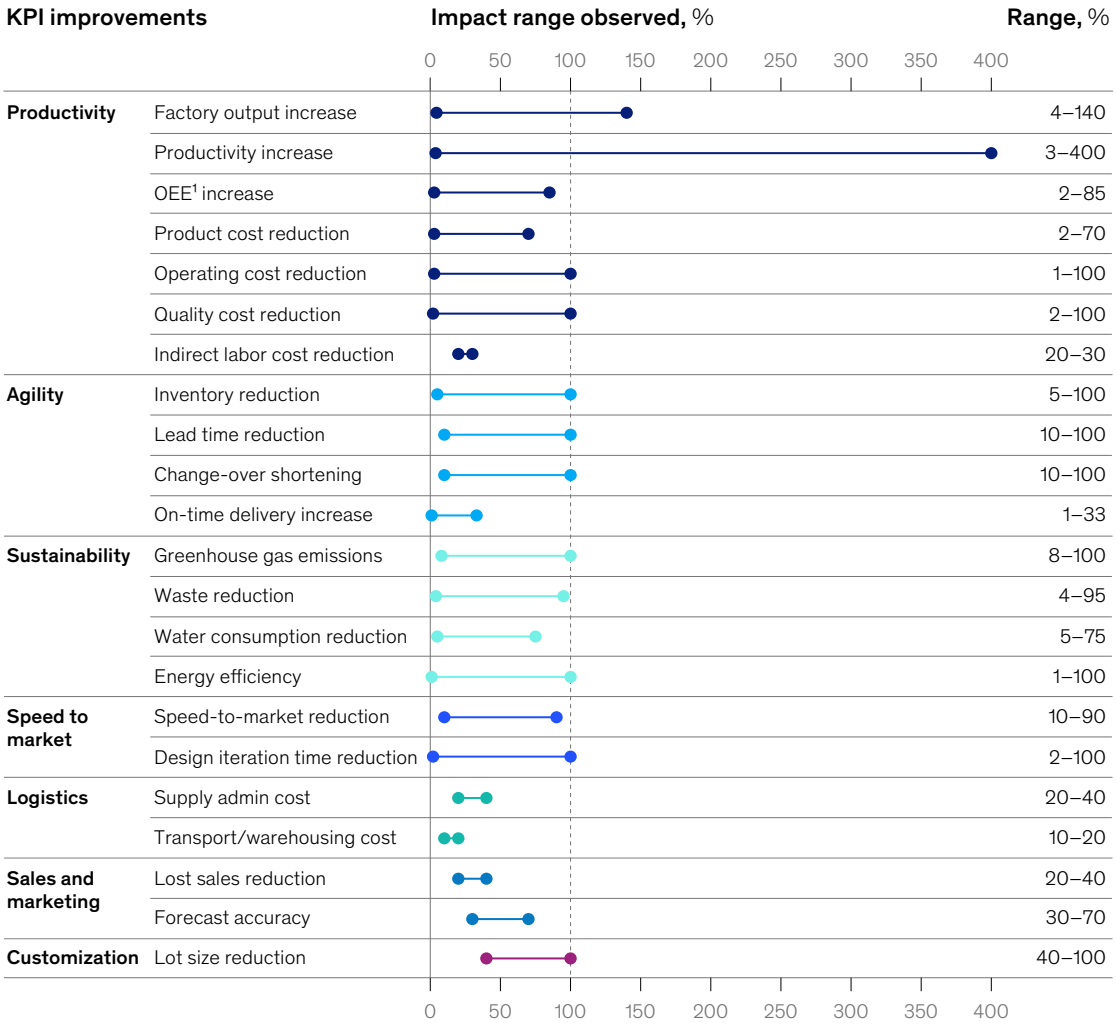
Chemical companies could control costs through digital and analytics-led operations excellence, dynamic pricing, procurement excellence, and supply chain management.

Digital interventions are a relatively untapped tool to help chemical companies embed operational excellence. Industry 4.0 technologies such as advanced analytics, AI, and cloud computing have made the leap from proof of concept to the shop floor in a host of industries, and the chemical industry must not be left behind.

Companies embarking on a digital and analytics enablement journey could be guided by focused improvement areas such as the World Economic Forum (WEF)'s accredited 4th Industrial Revolution (4IR) Lighthouse (Exhibit 10). These could help to chart the path to transform factories, enabling them to change ways of working and empower analytics-backed decision making in everyday operations. The 4IR technologies could de-bottleneck capacities, improve conversion, and reduce costs without major capital expenditure. Digital initiatives surface complex interrelationships between material properties and process parameters, helping companies to improve yield, energy efficiency, throughput, and product quality for a potential annual EBITDA boost of around four to five percentage points across manufacturing interventions.

Exhibit 10

Companies embarking on a digital transformation could be guided by the impact of digital and analytics at the World Economic Forum Lighthouses.



Note: The Global Lighthouse Network is a World Economic Forum initiative cofounded with McKinsey & Company. It examines the future of operations and considers how the 4th Industrial Revolution (4IR) technologies are shaping production.
[1]Overall equipment effectiveness.
Source: WEF Lighthouse Network

McKinsey & Company

In the last six years, only two chemical players (materials and petrochemicals) are among the 153 WEF-identified Lighthouses across different industry sectors, with none from India.[23] With greater digital uptake, this could change. A digital and analytics leader in petrochemicals and refining (one of the two WEF chemical Lighthouses mentioned above) achieved around 10 percent annual EBITDA impact through 20 advanced analytics use cases, ranging from yield and throughput improvement using sensors, to quality improvement through predictive modeling and in-process traceability.

While 90 percent of CEOs acknowledge the transformative potential of digital and analytics, only around 17 percent have actively invested in such initiatives.[24] Surveys show that three misconceptions are at the root of this gap: first, the belief that the talent required to set up digital interventions is tough to onboard; second, that the current data and technology architecture of the company cannot support advanced analytics; and third, a perceived difficulty of upskilling the existing workforce to adopt the data-backed decision-making mindset. Overcoming these limiting beliefs could help unlock significant value.

Dynamic pricing is especially relevant for the chemical industry, with its volatile prices of basic building blocks, capacity constraints, and demand-supply imbalances. It also has buyers from multiple industries, each with varying willingness to pay. Being able to frequently adjust end-product prices is especially useful in this context and could help improve return on sales by 1 to 3 percent.[25]

A global specialties player used advanced analytics-based machine-learning algorithms for pricing. It implemented a better-structured system that included features such as appropriate premiums for differentiated products, levels of discount for large and long-term customers, and the capabilities to track and ensure pass-through of raw material cost increases. Over the period of a year, the company increased its return on sales by three percentage points.

Data-driven value-based pricing is a useful tool to segment customers for dynamic pricing. This could allow companies to set transaction-level prices for differentiated products such as specialty chemicals, factoring the value created by the product, brand value, competition, and customer relationship. Several chemical companies worldwide now adopt a "next-best-alternative"[26] pricing approach for their largest customer accounts that buy differentiated products.

Companies keen to try dynamic pricing could set up the right data infrastructure to support digital pricing tools and put in place organizational systems and processes to adhere to price realization.[27]

Procurement excellence, or obtaining raw materials at the right price, specification, quantity, and quality, is fundamental to company profitability. Purchasing expenditures are equivalent to 40 to 60 percent of

[23] Global Lighthouse Network, World Economic Forum.
[24] "Transforming India's chemical sector through digital and analytics," *CII blog,* December 2023.
[25] Arnau Bages-Amat, Jochen Böringer, Yutaro Kakimoto, and Georg Winkler, "Dynamic pricing: Using digital and analytics to take value pricing in the chemical industry to the next level," May 27, 2019, McKinsey.
[26] Next-best-alternative pricing is an approach that helps sales teams set a price based on an assessment of the incremental value to the customer that the supplier's product creates in comparison with the customer's next-best-alternative product.
[27] Arnau Bages-Amat, Walter Baker, Nicolas Magnette, and Georg Winkler, "What really matters in B2B dynamic pricing," October 1, 2018, McKinsey.

sales revenue for specialty chemical players and 60 to 80 percent of revenue for commodity products manufacturers.[28] Raw material pricing volatility further creates an imperative for the right purchasing decisions.

Procurement leaders could use digital tools and advanced analytics to boost resilience in this scenario. They could examine their exposure to EBITDA fluctuations through commodity price risks by analyzing and investigating the correlations between the prices of feedstocks and their end products.[29] They could also use data-driven models to predict price movements for optimal procurement decisions. Such models are built through a fundamental understanding of market forces, identifying and mapping variables, defining potential situations for modeling, followed by data ingestion, and feature engineering of the variables identified as well as developing and sustaining price-prediction models and simulators.

Building on top of digital, generative artificial intelligence (gen AI) could improve performance and unlock substantial value in procurement, especially across spend bases consisting of indirect and MRO (maintenance repair operation) spends. Gen AI can operationally classify unstructured data such as work orders for spares, inspection reports for services, and shift logs for shop-floor-based maintenance. This enables the archetyping of critical spend buckets at a granular level, tightens external vendor management, and improves workforce efficiency.

AI models have helped companies to generate a forecasted price curve for buying commodities, through price prediction based on machine-learning techniques and geospatial analysis. Take the example of a chemical manufacturer that developed a model to predict the price of coal, using index movements, demand-supply dynamics, econometric data, weather forecasts, and satellite imagery. Price predictions were used to inform an algorithmic procurement strategy, improving buying and hedging risk. Such models can be customized to simulate potential future scenarios of prices under the changes of specific variables, incorporating private and public data to ensure companies capture value.

While digitizing procurement could be the answer, a McKinsey survey of chief procurement officers and CXOs found that more than half (55 percent) did not know the best-in-class solutions for procurement.[30] It will also be important to rethink the capabilities necessary for enabling digital procurement, for instance, setting up the right channels to validate market intelligence, cross-category collaboration for initiatives such as e-auctions, inventory optimization, et cetera.

With respect to supply chain management, chemical companies are experiencing high demand variability and long forecast lead times, increasingly complex and tightly interconnected raw material value chains, and heightened customer expectations. We see three areas of potential significant impact from digital and analytics in chemical value chains: first, probabilistic demand forecasting using predictive analytics; second, end-to-end network optimization including closed-loop planning and margin-optimized production; and third, robotics in material handling within warehouses and transportation.

[28] Raffaele Carpi, Marco Moder, Frank Plasschaert, and Marco Ziegler, "Pursuing purchasing excellence in chemicals," June 13, 2016, McKinsey.
[29] Arno Gerken, Olivier Plantefève, and Xavier Veillard, "Managing industrials' commodity-price risk," October 28, 2019, McKinsey.
[30] McKinsey CPO Survey 2022, 67 respondents across multiple sectors—Metals, Consumers, Chemicals, Pharmaceuticals, Travel, Transport, and Logistics.

2. Becoming truly global

In a macro scenario where global demand is stalling, companies can seek out the most strategic spaces where they could play—that is, the right international markets and the right end-use segments—through data-driven micromarket mapping and customer universe buildout. Armed with data on regional trends, target customers in end-use industries, market size, market share, and growth and margin potential, companies could discover cross- and upselling opportunities in global markets. Tapping into such new value pools could potentially increase annual revenues by around 10 to 30 percent.

It would then be critical to design a how-to-win road map to capture export markets. Companies could invest in infrastructure in the form of local legal entities, supply chain setups near key ports (including stocking units, long-term shipping line agreements, et cetera), and sales offices for their second-home global markets. While traditional go-to-market choices such as direct versus distributor will be important, Indian chemical companies could also tap into evolving new-age digital channels in the mature chemical markets of China and Europe. These include open B2B platforms (online stores, deal match portals, vertical buy/sell platforms) and brand proprietary B2B platforms.

Investing in key talent pools such as global sales teams proficient in local languages and market dynamics, application development scientists, and regulatory experts is also important. Our research on B2B customer decision journeys shows that 80 percent of the buyers in the chemical and materials industries find it helpful to speak to someone in person when they get a completely new product or service. Having a direct presence in a global market could have significant implications for a sales organization going to market.[31]

Additionally, companies could build global sales organizations to create a dynamic experience for customers and use digital tools and data to power sales operations. Providing e-commerce-like transparency and resolving pain points across the customer decision journey through digital platforms could improve customer experience scores.

A global B2B chemical company rolled out a new commercial performance management tool with a tailor-made dashboard to its sales organization. The interactive tool allowed users to see detailed financials, assess pricing opportunities, and check funnel progress. They could filter the data as needed for crucial transparency on matters related to the team, individual sales representatives, and even customers. This data unlocked consistently fact-based, productive discussions at the regular performance huddles across all levels of the organization.[1]

[1] Jochen Böringer, Alexander Dierks, Isabel Huber, and Dennis Spillecke, "Insights to impact: Creating and sustaining data-driven commercial growth," January 18, 2022, McKinsey.

M&A could also act as a major contributor to top-line growth among companies, using bolt-on acquisitions to access new geographical markets, market segments, products, and technical applications. International M&A could help to acquire new digital capabilities, build resilient supply chains, and upgrade operating models.

[31] "Digital sales & analytics: Driving above-market growth in B2B," May 2018, McKinsey.

3. Accelerating innovation

Indian chemical companies, as they internationalize, could focus on improving both application-based innovation and new product development, particularly for import substitution. With growing commoditization in parts of the industry, many question the value of innovation and the expense of R&D versus returns. While innovation performance can vary a great deal, the outcome depends on the familiarity of technology and degree of penetration in the end market or application. The development journey for any new product or application is complex, with a significant lead time. However, despite this lag between implementation and results, the benefits are substantial. For companies, such initiatives could bring about an average annual uplift of 10 to 30 percent of revenue.

Companies could start prioritizing their new product development pipeline based on market or customer needs, putting a clear and appropriate product strategy in place. Additionally, since India imports approximately US $60 billion of chemicals today,[32] it represents an opportunity to tap this white-space demand through import substitution. The application of gen AI in R&D could also be a tool to open up a variety of opportunities (Exhibit 11).

Once a focused product pipeline is designed, a stage-gate process could be institutionalized. This could be digitally enabled through recipe and patent logs, checklists and signoff across stages, and powered by digital dashboards to track progress and lower cost and time of development. Postlaunch excellence is equally important to introduce a new product to customers with a compelling pitch and sales conversion process.

Application-based innovation can also generate significant value in familiar markets. For example, while a silicon-focused chemical company could be a leader in textiles-focused siloxanes or elastomers, it would still have white spaces to tap into in other applications and end-use segments such as footwear, leather, construction, personal care, et cetera. It might target these opportunities through focused application development.

Companies could get through difficult times by investing in smart R&D and innovation to find new sources of growth and profit. They can differentiate themselves in this way, creating value out of tough experiences and putting strategic distance between them and their competitors.

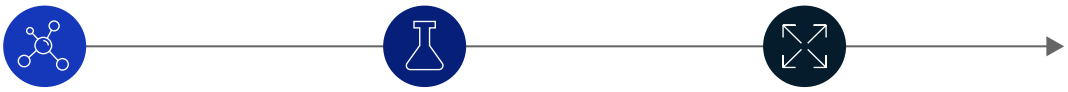
[32] UN Comtrade.

An agrochemical player used AI-driven analytics on IP trends to identify gaps and opportunities. The company discovered it was behind its peers in patent activity in its top three investment areas. A broader look at the sector level of activity also indicated if there were any other potential blind spots, while peer group activity comparison showed areas where the client was leading beyond the gaps in their portfolio. This resulted in a 30 to 40 percent increase in research productivity.

Exhibit 11

Gen AI in R&D can help build opportunities.

Applications at each R&D step



Molecule selection
- Molecular optimization
- Formulation optimization
- Material optimization

Molecule development
- Reaction conditions optimization
- Retrosynthetic route optimization

Application development
- New applications for a specific compound/polymer/etc

Gen AI productivity impact by business functions[1]

Low High

	Total, $ billion	**Total,** % of industry revenue
Total impact	80–140	0.8–1.4
Marketing	12–19	0.12–0.18
Sales and channel	18–25	0.17–0.24
Corporate IT (excl SWE[2])	0.8–1	0.01
Product research and development (excl SWE)	20–36	0.19–0.35
Software engineering (corporate IT)	8–16	0.07–0.15
Software engineering (product development)	5–10	0.05–0.09
Supply chain	1–2	0.01–0.02
Procurement management	1–3	0.01–0.03
Manufacturing	5–11	0.05–0.11
Legal	1–2	0.01–0.02
Risk and compliance	3–5	0.04–0.05
Strategy	1–1.5	0.01
Finance	2–5	0.02–0.05
Talent and organization (incl HR)	2–4	0.02–0.04

Note: Figures may not sum to 100%, because of rounding.
[1]Excludes implementation costs (eg, training, licenses).
[2]Software engineering.
Source: MGI Data

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4. Sustainability as a dual play (defense and offense)

As investors and consumers increasingly expect strong environmental, social, and governance (ESG) practices from companies, organizations in India and abroad are responding with efforts to decarbonize and attain net zero. By the very nature of its industry, chemicals is a space that can make a big difference to such efforts, given that it contributes to 2 percent of the total global emissions and 1 percent of India's emissions.[33] Indian chemical companies have the opportunity to play a defense game and keep pace with rising stakeholder expectations and also go on the offense with their sustainability initiatives.

Three actions could constitute a defense play. First is by tracking and evaluating ESG impact. ESG scores are increasingly important as drivers of market capitalization, therefore it is imperative for Indian companies to track their ESG impact, unpacking their scores to examine and compare the underlying performance measures.

Second, managing and understanding exposure is important. Climate change risk could eventually be priced into market value. Therefore, companies must take stock of their exposure to climate change and its possible impact (for example, effluent discharge, carbon footprint, et cetera).

Third, the time is ripe for companies to act, moving beyond pledges to actionable, detailed transition plans for net-zero commitments that could earn stakeholder trust and benefits (for example, lower cost of capital).

Playing the offense game on sustainability is an opportunity to modify and shift the portfolio of chemical companies. Exploring green growth opportunities could require two measures: introducing green products developed through sustainable processes, and entering greener segments with bio-based investments.[34] Indian chemical companies may want to explore opportunities to introduce bio-based or less carbon-intensive products, thereby balancing their portfolio of products. There exist a plethora of white spaces in the chemical industry that companies could leverage through green business initiatives (Exhibit 12).

Many Indian chemical companies are yet to gather significant momentum with their sustainability commitments, and those on this journey are largely taking a defense-first approach so far. Proactively prioritizing green initiatives could be a growth opportunity for chemical companies, ensuring their relevance, demand, and competitiveness in the long term.

5. Deepening and globalizing the talent pool

India's chemical companies would need to overcome a critical talent shortage across all levels and functions of the organization to secure competitiveness. With many institutes lacking the right curriculum and infrastructure, India relies on foreign talent for chemical R&D.[35] Similar issues affect the blue-collar workforce. They lack the essential vocational skills related to basic chemistry, adherence to standard operating processes, and awareness on environment, health, and safety (EHS). This, coupled with inadequate training infrastructure, results in an annual deficit of 100,000 to 150,000 skilled workers in the chemical industry.[36]

[33] EMIT database, 2022, McKinsey Sustainability Insights.
[34] "Accelerating India's sustainability journey in chemicals," April 4, 2022, McKinsey.
[35] Basis ICT, industry interviews.
[36] ITI (industrial training institute) count, Ministry of Skill Development and Entrepreneurship; "Guidelines on upgradation of 1396 government ITIs through public private partnership," April 2008, Directorate General of Employment & Training Ministry of Labour & Employment, Government of India; "Skilling efforts need to be scaled up," April 2022, The Hindu BusinessLine.

Exhibit 12

Green business initiatives could help companies enter the plethora of existing white spaces in the chemical industry.

Green business initiatives by category

Decarbonization of power
- Renewable power generation
- Microgrids and resiliency
- Flexibility and energy storage
- Grid and customer energy analytics
- Advanced solar PV technology

Low-carbon mobility
- Electrification of vehicle power trains
- Next-gen batteries
- Charging infrastructure and energy services
- Fleet decarbonization

Circular products and packaging
- Sorting and processing tech
- Sustainable packaging
- Circular products and upcycling
- Reverse logistics supply chain services

Water and waste management
- Industrial water treatment
- Infra rehab and management
- Water analytics and smart management
- Advanced waste to energy
- Waste management

Low-carbon agriculture and food supply chain
- Low-carbon proteins
- Sustainable timber
- Tech enhancements for crop yields
- Crop preservation/waste reduction
- Methane inhibitors

Hydrogen and low-carbon fuels
- H_2 electrolyzers
- H_2 blending materials
- Hydrogen mobility
- Project development
- Biorefineries
- Biofuel innovation

High-efficiency buildings
- Energy efficiency and building controls
- Building electrification
- Green building materials
- On-site clean energy

Industrial decarbonization
- Green cement and CO_2 negative aggregates
- High-efficiency iron and steel production
- Decarbonization of industrial process heat
- Industrial energy efficiency

Carbon capture and utilization (CCUS)
- Sorbents for carbon capture
- CO_2 to fuel
- Direct air capture
- Novel point-source capture
- CO_2 pipelines and transport
- CO_2 capture infrastructure

Carbon markets, offsets, financing
- Offset project design, development, and supply
- Marketplaces and exchanges
- Carbon credit brokers and retailers

Source: Expert interviews

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This talent gap could be overcome in a few ways. To train the blue-collar workforce, companies could direct part of their corporate social responsibility budgets to support apprenticeships at industry and technical institutes, such as industrial training institutes (ITIs). The government could also help set up more ITIs near chemical belts and encourage private players to participate in public-private partnerships. Technical institutes could introduce relevant courses such as chemical processes, reaction engineering, and equipment selection, while implementing SLAs and quality checks to bring in competent faculty.

Bridging the R&D talent gap would require supporting students with crucial industry connections. For example, exchange programs or internships in sunrise segments including operational data analytics and industrial biochemistry could be added. Directing private fund investments to institutes for upgrading research labs and hiring PhD-qualified professors would also strengthen the R&D ecosystem. Setting up labs and application development centers in global chemical hubs could help

companies boost their holistic talent profile. Since a lack of strong leadership and a robust middle-management layer can act as a bottleneck and hinder growth, companies could hire top global sales, technical, and management teams across geographies and maintain a global leadership team.

Creating awareness about the industry's commitment to growing end markets and working to address the world's sustainability problems could be an asset. It could help to attract and retain top talent that has the most relevant knowledge and skills, and give that talent a platform to innovate and get greater exposure. As companies scale, strengthening the middle-management layer could build a pipeline of strong leadership to navigate tough macroenvironments.

Chemical companies in India could navigate the recent headwinds with a focus on overall growth, protecting margins, and securing competitiveness. The priorities proposed here—building functional excellence, going global, accelerating innovation, pursuing sustainability best practices, and nurturing the best talent—could be pivotal to withstand the ongoing challenges. They could also enable the chemical industry to regain its global position as a high performer in the long term.

February 2024

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