India's Manufacturing Competitive Advantages in the Chemical Industry

(with a special focus on Reliance Industries)

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Executive Summary:

This report comprehensively analyses and delves into the global chemical industry, beginning with its background, the global market, and India's position. Global trends and influential factors are discussed, after which the focus shifts to India and its position in the global market.

In further sections, the report explores competitive advantages driving India's chemical industry growth, while also identifying traditional challenges and looking into the future. Lastly, the report focuses on Reliance Industries Limited (RIL) in the chemical sector. Its position is analyzed and potential opportunities for expansion or new ventures are suggested.

A. The Global Chemical Industry:

A.1 Macro Perspective:

The production of chemicals plays a crucial role in modern life. Chemical products are a major part of the global economy, due to the widespread use of chemicals in everyday items and the extensive variety of chemical products available. Nearly every product used daily, from toothpaste to smartphones to pens, contains manufactured chemicals.

The chemical industry transforms raw materials such as oil, metals, and minerals into a wide range of products. The industry employs a diverse range of professionals, including chemical engineers, chemists, and lab technicians. This long-established sector is currently experiencing transformative changes due to environmental laws and climate change, specifically regarding circularity, decarbonsation and sustainability *(PricewaterhouseCoopers, n.d.).*

While the performance of the chemical industry in the short-term may be challenging for many countries (such as India), the long-term growth of this industry is optimistic. Demand for chemicals in 2023 was lower than anticipated. The economic recession in Europe caused a reduction in consumer spending as economic activity slowed. At the same time, inflation in the United States further suppressed consumer spending, as high prices eroded purchasing power (*Gilfillan, 2023*).

A.2 Key Segments:

There are three primary segments when looking at the chemical industry: Petrochemicals (PetChem), Specialty Chemicals, and Inorganic Chemicals.

Petrochemicals are derived from hydrocarbons obtained by refining crude oil or natural gas. These organic chemicals are thus the building blocks for plastics, synthetic fibers, and various industrial chemicals, playing a vital role in the manufacturing of everyday items such as packaging materials and automotive components.

Specialty Chemicals encompass a diverse range of high-value-added products with specific and unique functions. These chemicals contribute to innovations in electronics, pharmaceuticals, agriculture, and other industries; India is particularly successful in this segment.

Lastly, Inorganic Chemicals involve compounds that do not contain any carbon-hydrogen bonds, including minerals, metals, acids, and salts. They are largely employed in sectors like construction and agriculture, playing essential roles as fertilizers, catalysts, and materials for infrastructure development.

A.3 Performance of the Global Chemical Industry through the years:

According to data published by CEFIC, in 2022, global sales of chemicals stood at €5,434Bn, with China accounting for 44% of sales (€2,390Bn), folloed by Europe with €973Bn and USA with €606Bn. Asia was the largest driver for sales in 2022, with a total of €3,491Bn, accounting for over 64% of global trade (*Facts & Figures 2022 - the Profile of the Industry, 2023*). This is demonstrated in Fig.1 below.

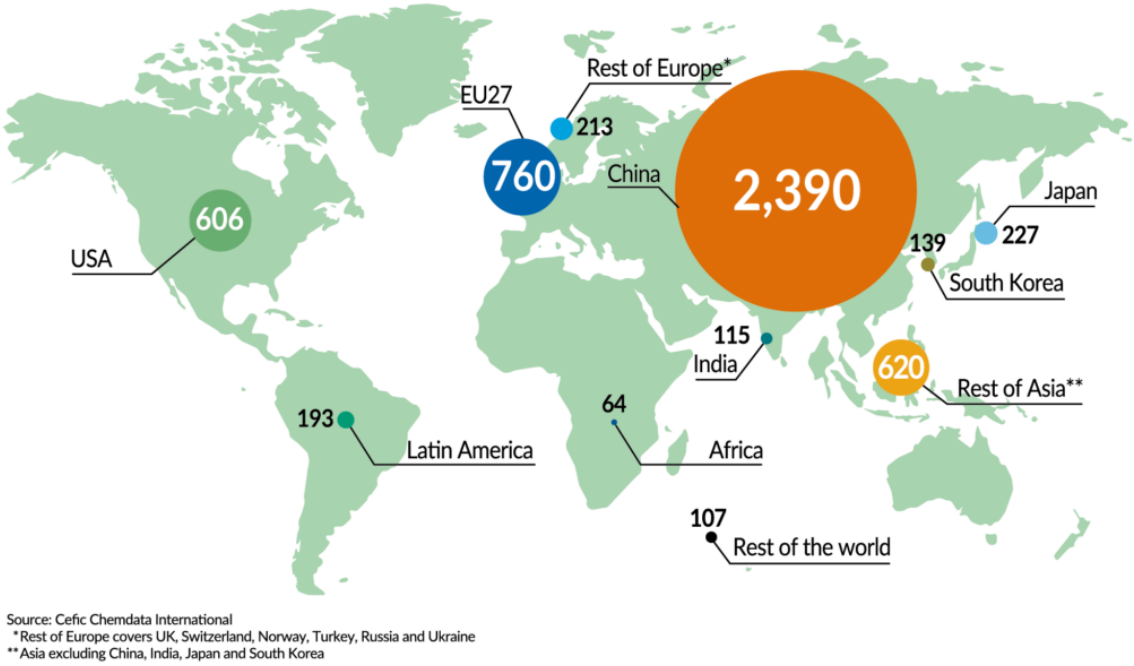


Fig. 1: Global Chemical Industry, CEFIC

A.4 Key Trends:

There exist 3 key trends in the current global chemical industry: a visible shift towards sustainability due to concern for climate change, digitization with impact of AI, and increased M&A activity (*Deloitte Development LLC, 2023*).

The transition to a sustainable economy is a gradual process, with the Chemical Industry at its forefront. This is primarily driven by shifting consumer preferences to green and environmentally-friendly products, due to recent spread of information and awareness regarding climate change. Consumers are willing to pay higher prices for these products, which leads to a general increase in demand at all prices. This transition in consumers' minds has a ripple effect on the free market, where consumer preferences influence suppliers to alter production methods themselves, which shows their voluntary commitment to sustainability fueled by responsible investments. This circular economy has a positive long term effect on the environment.

Digital advancements, along with the rapid rise of AI have started to transform the chemical industry. Chemical companies are incorporating new technologies as part of their demand planning, pricing and organizational/management systems. These result in large cost savings, which then enables producers to increase their output with the same amount of financial capital, increasing productive capacity and efficiency of the market.

Lastly, increased mergers and acquisitions have pushed comparatively advantageous global firms to capture greater market share and strengthen their position, while also preventing the smaller businesses of being driven out of the market. This trend has resulted in better quality output, considering global M&As place themselves in geographically optimal positions in order to have access to the best quality raw materials. The overall trend of M&As has prevented wastage of redundant resources and improved market efficiency.

B. The Indian Chemical Industry

B.1 Past Situation and Impact of COVID:

Since 2011, China has been the largest revenue generator and exporter in the chemical industry. However, in 2013, the China+1 strategy emerged, where firms in various countries tried to diversify their supply chain and manufacturing locations, India and Vietnam proving to be popular locations.

After the pandemic, the strategy grew even more popular, when countries realized they cannot completely rely on a country as unpredictable and monopolistic as China. This led various global chemical companies to shift their primary manufacturing location to India, resulting in the initial stages of India as a chemical manufacturing hub.

B.2 Current Performance of Market:

The Indian chemical and petrochemical (CPC) industry has grown significantly in the last 75 years, demonstrating its importance for the growth of the agricultural and industrial sectors. Today, India ranks sixth globally and fourth in Asia in terms of global sale of chemicals, accounting for 2.5% of the world's global chemical sales. More than 80,000 varieties of chemicals and petrochemicals are manufactured in the country and the industry employs over two million people (*Briefing, 2023*). The chemical industry in India brings with it huge investment and employment opportunities, being a knowledge and capital intensive industry.

As per India Brand Equity Foundation (IBEF), The Indian chemicals industry stood at US$ 178 billion in 2019 and is expected to reach US$ 304 billion by 2025 registering a CAGR of 9.3%. (*Top Chemicals Exporters | Chemical Industry Exports from India, n.d.).* India has traditionally been a world leader in generics, biosimilars and major Indian vaccine manufacturers, contributing to more than 50% of the global vaccine supply. Chemical and petrochemical demand in India is also expected to boost in the near future *(Budde et al., 2020)*, as seen in Fig. 2 below.

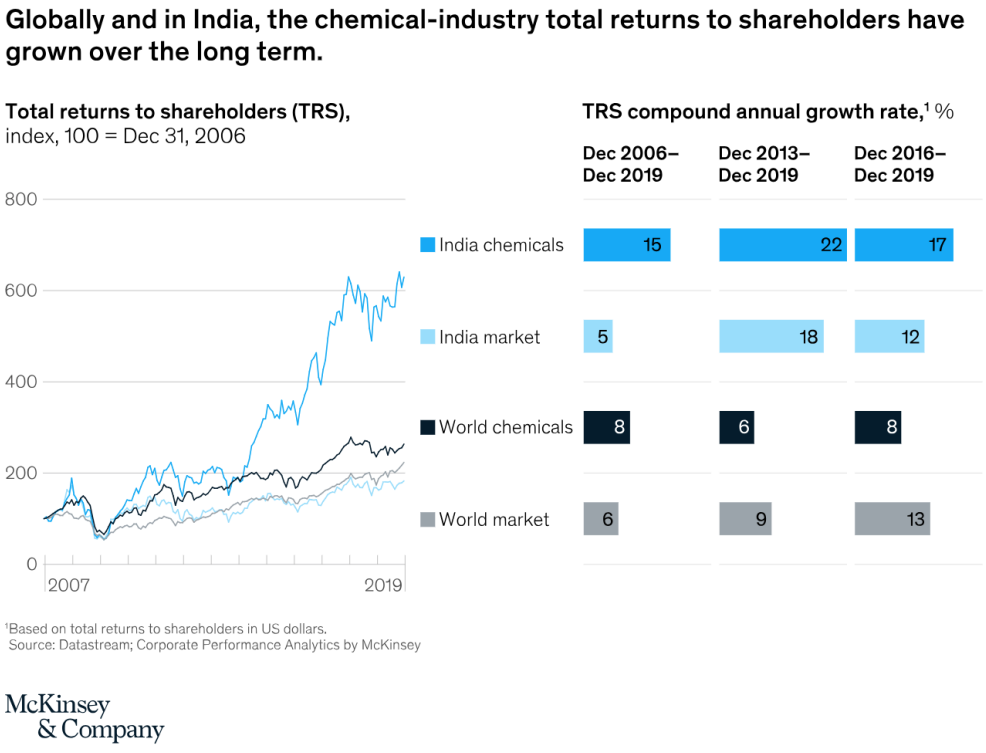


Fig. 2: TRS Growth in chemical-industry, McKinsey & Co.

Furthermore, chemicals are a significant part of India's overall trade flow, consistently ranking third in imports and fourth in exports for the past five years. India's chemical industry has been a global outperformer in demand growth and shareholder wealth creation over the last decade, as visible in the chart in Fig. 3 below:

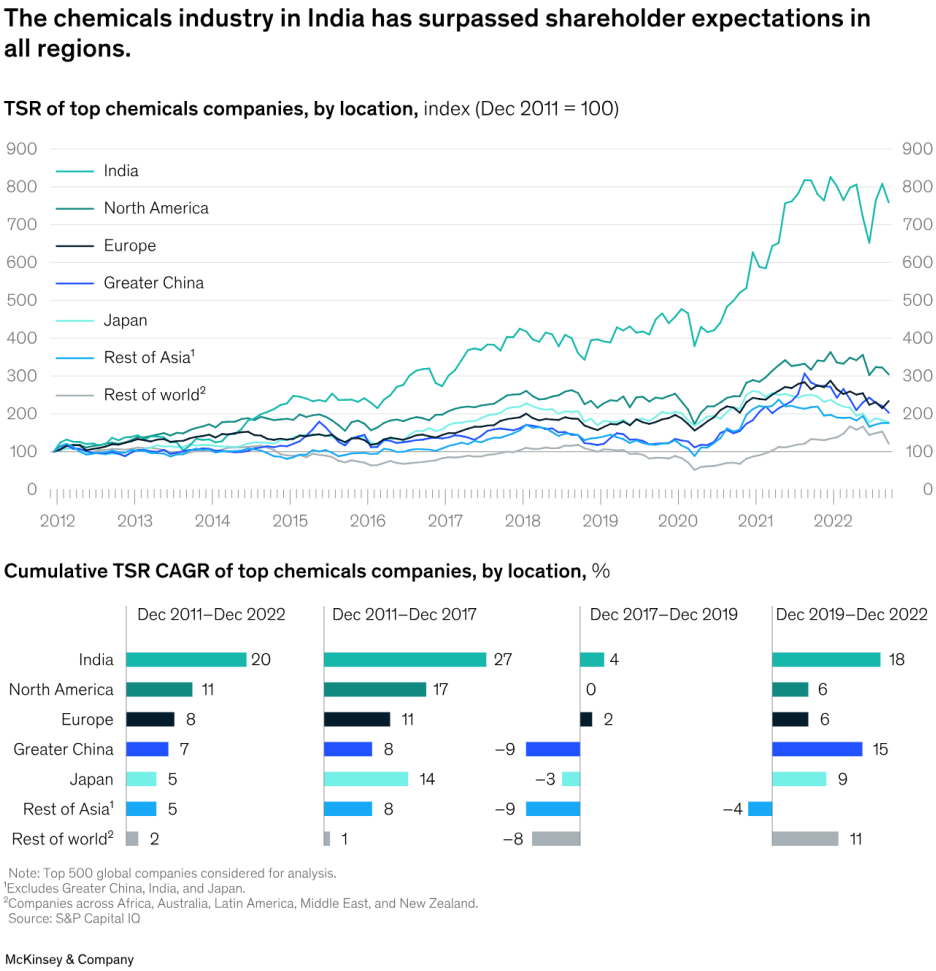


Fig. 3: Chemical industry and shareholder growth, McKinsey & Co.

B.3 Current Focus of the Indian Government:

According to FICCI, the Indian Government has four primary goals (*FICCI, Federation House, n.d*):

1. Focus on Safety: The government aims to institutionalize 'Process Safety and Employee Training' and obtain 'Responsible Care'.
2. Pursue Cost Competitiveness: Firms are to take advantage of economies of scale and partake in 'Continual Process Optimization'.
3. Source Locally: This will support the 'Atma Nirbhar Bharat' campaign aiming to make India more self-reliant. It will also promote the 'Make in India' industrial policy to boost domestic demand.

4. Invest in R&D: The government aims to increase R&D spending to 3-5% of their total revenue, and collaborate with research institutes.

Furthermore, the government has given additional incentives:

1. It has set a corporate tax rate of 17% for new manufacturing firms, which is lower than the 30% for domestic firms as of January 2022. This lowers firms' costs of production, and automatically results in an increase in supply and efficiency.
2. It has also permitted product mix changes as environmental load remains unchanged. This gives firms a significantly higher level of freedom, reducing their costs of production. Furthermore, effort taken in monitoring firms from the government's side also significantly falls; this improves their budget position, allowing investment in other key industries, such as healthcare and education.

C. Traditional Challenges Faced by India

In the past, India has faced various traditional challenges, namely: lack of feedstock capacity, lack of R&D, infrastructural problems, lack of MnA opportunities, and an overall fragmented chemical industry (*India: The Next Chemicals Manufacturing Hub, 2023*).

C.1 Lack of Feedstock Capacity:

In chemistry, a feedstock is a chemical used to support a large-scale chemical reaction, usually referring to an organic substance. India is deficient in C1, C2, C3, and C7. Due to the country's geographical position, it does not have immediate, close access to crude oil and gas in the ground. Alternatively, its competitors such as the United States and UAE have easily accessible cheap crude oil and gas withing their respective borders. This not only puts them at an advantage, but also further weakens India's position, as they are forced to import basic chemicals at high prices. These issues with cost competitiveness limit the country's production levels.

C.2 Lack of R&D Talent:

Only about 1,400 chemical engineers graduate from India's top 25 to 30 universities every year (*Department of Chemical Engineering, IIT Kanpur*). From this limited pool, most pursue higher studies or switch streams. This scarcity of skilled R&D talent in India adversely affects domestic innovation, lowering international competitiveness and allowing other countries to overtake the country's global standing. Furthermore, R&D is crucial in the process of discovering efficient methods of production. Without it, the Indian market will grow to becomes inefficient with high

costs and low revenue. This heavily impacts the country's position as one of the world's best global chemical manufacturing hubs.

C.3 Lack of M&A Opportunities:

M&As can take large advantage of economies of scale as well as do away with redundant resources, resulting in greater efficiency. The number of sizeable acquisition candidates in India is very low; this limits MnA opportunities. This is due to high fragmentation of the Indian chemical industry, where majority of companies have sales <$300Mn per year, see Fig. 4 below (*Goyal et al.*). There are no viable buyers and sellers in order to make any MnA activity successful. While this results in wasteful use of resources, it is important to note that it may promote efficiency and reduce unemployment.

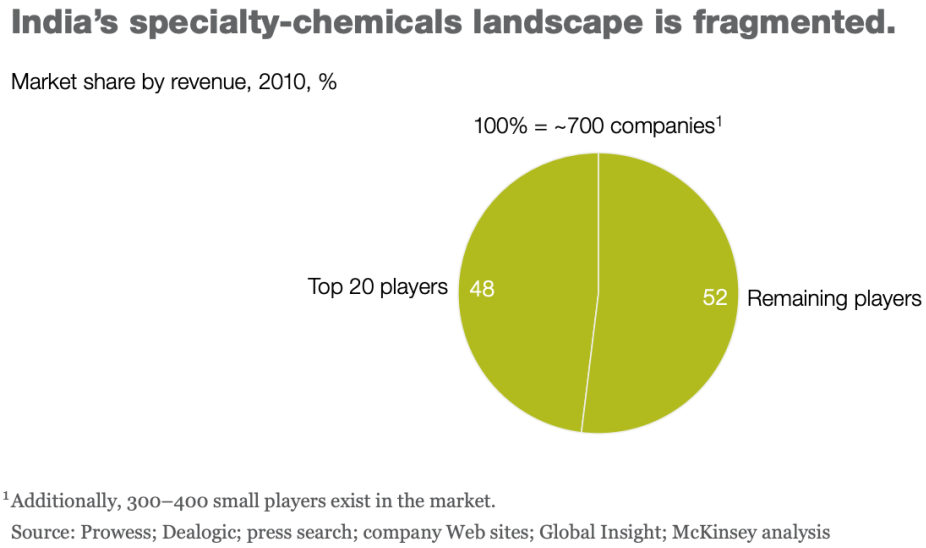


Fig. 4: India's fragmented specialty-chemicals landscape, McKinsey & Co.

D. Recent Growth of the Indian Chemical Industry

In recent years, India experienced tremendous growth of the domestic chemical industry. Not only has overall economic growth and increase in GDP contributed to this, but the chemical industry in specific has experienced recent expansion. This is seen in the increasing CAGR of the Indian chemical industry.

D.1 Growth of Indian Economy and GDP:

A major trend visible in India recently is rising overall domestic consumption. This increase in consumption has resulted in suppliers scaling up production, eventually leading to higher overall

output. This is causing rapid economic growth. Due to this high economic growth, average household income is rising; therefore, the standard of living and quality of life has risen as well. This results in the country having a rising middle class, where the number of consuming households is increasing. This means that the consumer base in India is growing, automatically increasing demand across products, including chemicals. Since the chemical industry is so fundamental to the manufacturing process of all other products as well, it experiences a larger growth.

D.2 Growth of Chemical Sector in India:

Apart from rising overall domestic consumption, the chemical industry specifically also experiences this to a larger extent (as stated above). India is expected to account for more than 20 percent of incremental global consumption of chemicals over the next two decades. Moreover, domestic demand is expected to rise from $170 billion to $180 billion in 2021 to $850 billion to $1,000 billion by 2040 (*India: The Next Chemicals Manufacturing Hub, 2023*).

Furthermore, changes in China's economy serve as a perfect opportunity for India to capture a greater share of the global market and scale up exports. India's share in global chemicals trade by value is 3%. India is particularly strong in the manufacture of specialty chemicals, which are cost competitive and possess market attractiveness. With a net trade surplus, by 2040, its net exports are expected to rise by around ten times, from about USD 2 billion in 2021 to USD 21 billion (*India: The Next Chemicals Manufacturing Hub, 2023*), as seen in Fig. 5 below.

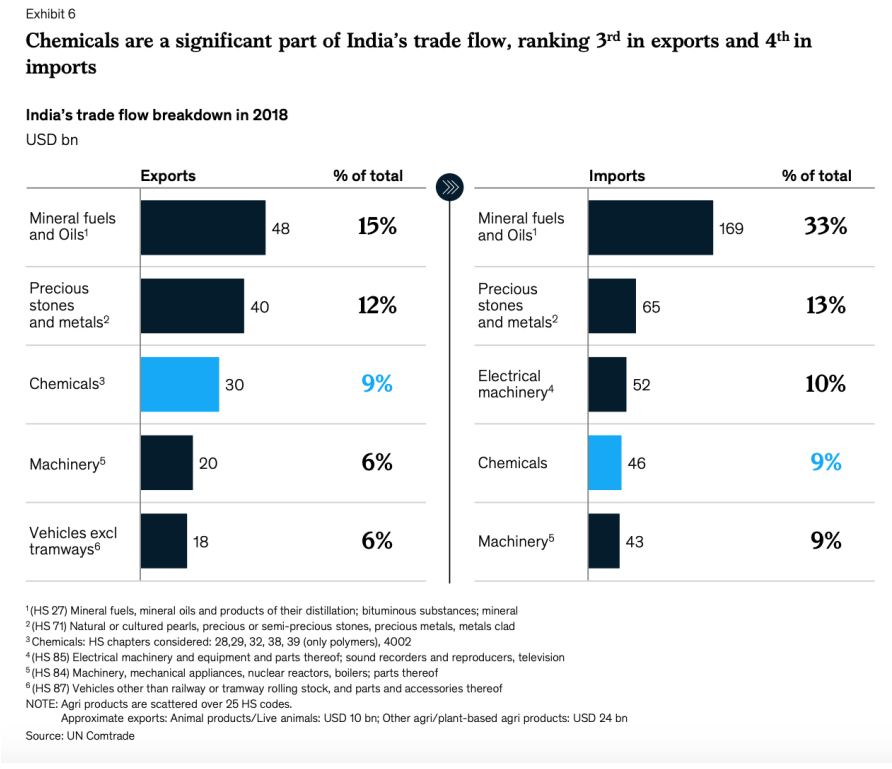
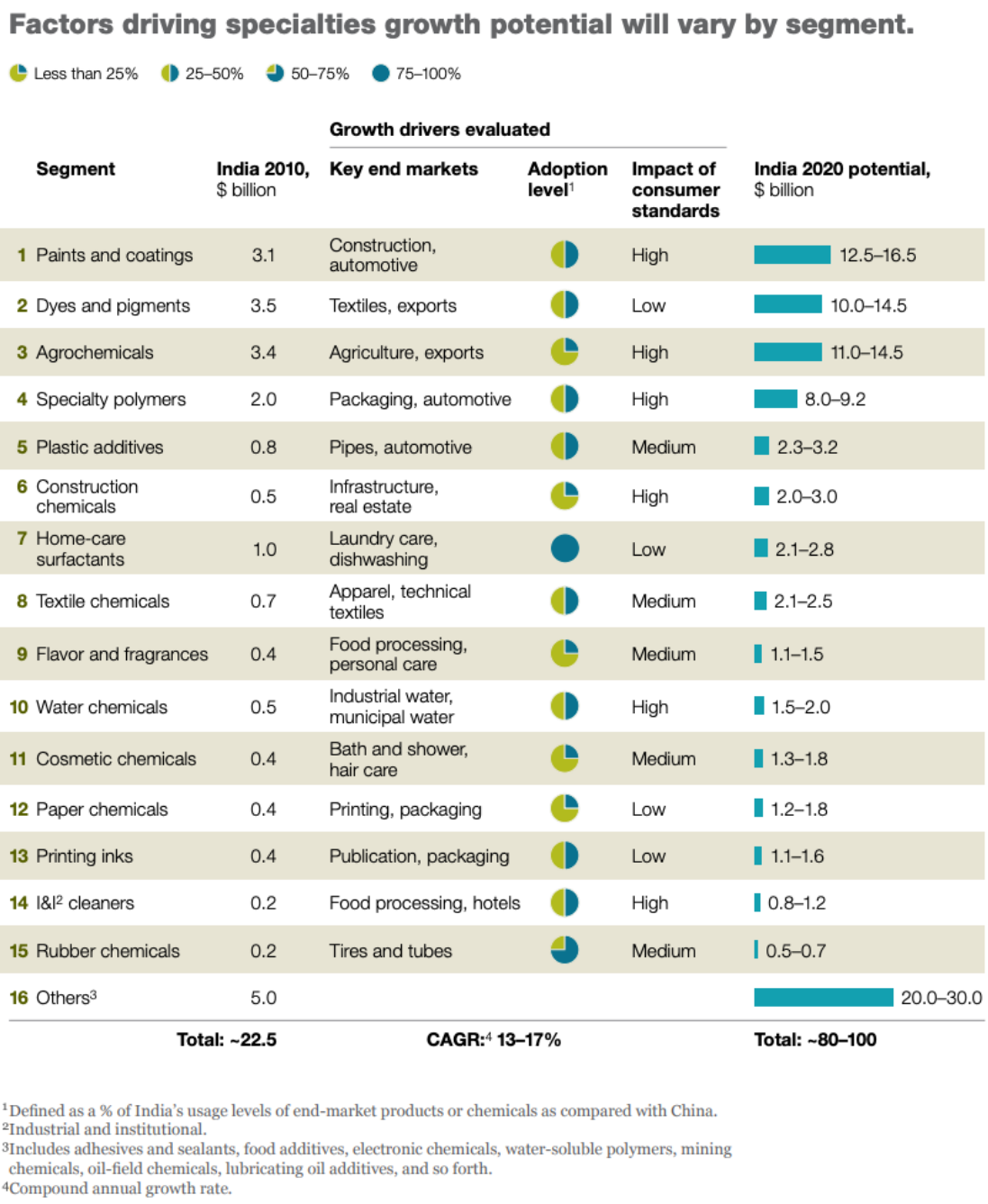


Fig. 5: Chemicals and India's trade, McKinsey & Co.

Fig. 6 below illustrates the various factors driving specialty chemicals growth in India:



Factors driving specialties growth potential will vary by segment.

Less than 25% | 25–50% | 50–75% | 75–100%

Segment	India 2010, $ billion	Growth drivers evaluated: Key end markets	Adoption level[1]	Impact of consumer standards	India 2020 potential, $ billion
1 Paints and coatings	3.1	Construction, automotive		High	12.5–16.5
2 Dyes and pigments	3.5	Textiles, exports		Low	10.0–14.5
3 Agrochemicals	3.4	Agriculture, exports		High	11.0–14.5
4 Specialty polymers	2.0	Packaging, automotive		High	8.0–9.2
5 Plastic additives	0.8	Pipes, automotive		Medium	2.3–3.2
6 Construction chemicals	0.5	Infrastructure, real estate		High	2.0–3.0
7 Home-care surfactants	1.0	Laundry care, dishwashing		Low	2.1–2.8
8 Textile chemicals	0.7	Apparel, technical textiles		Medium	2.1–2.5
9 Flavor and fragrances	0.4	Food processing, personal care		Medium	1.1–1.5
10 Water chemicals	0.5	Industrial water, municipal water		High	1.5–2.0
11 Cosmetic chemicals	0.4	Bath and shower, hair care		Medium	1.3–1.8
12 Paper chemicals	0.4	Printing, packaging		Low	1.2–1.8
13 Printing inks	0.4	Publication, packaging		Low	1.1–1.6
14 I&I[2] cleaners	0.2	Food processing, hotels		High	0.8–1.2
15 Rubber chemicals	0.2	Tires and tubes		Medium	0.5–0.7
16 Others[3]	5.0				20.0–30.0
	Total: ~22.5	CAGR:[4] 13–17%			Total: ~80–100

[1]Defined as a % of India's usage levels of end-market products or chemicals as compared with China.
[2]Industrial and institutional.
[3]Includes adhesives and sealants, food additives, electronic chemicals, water-soluble polymers, mining chemicals, oil-field chemicals, lubricating oil additives, and so forth.
[4]Compound annual growth rate.

Fig. 6: Specialty Chemicals Growth in India, McKinsey & Co.

E. India's Competitive Advantages

E.1 India's Position compared to Other Countries:

India is studied against six countries (China, Germany, Indonesia, Saudi Arabia, South Korea, and Vietnam) across 24 variables. Fig. 7 below shows that though other countries have a competitive edge over India in a few crucial aspects, India is more or equally competitive on most counts.

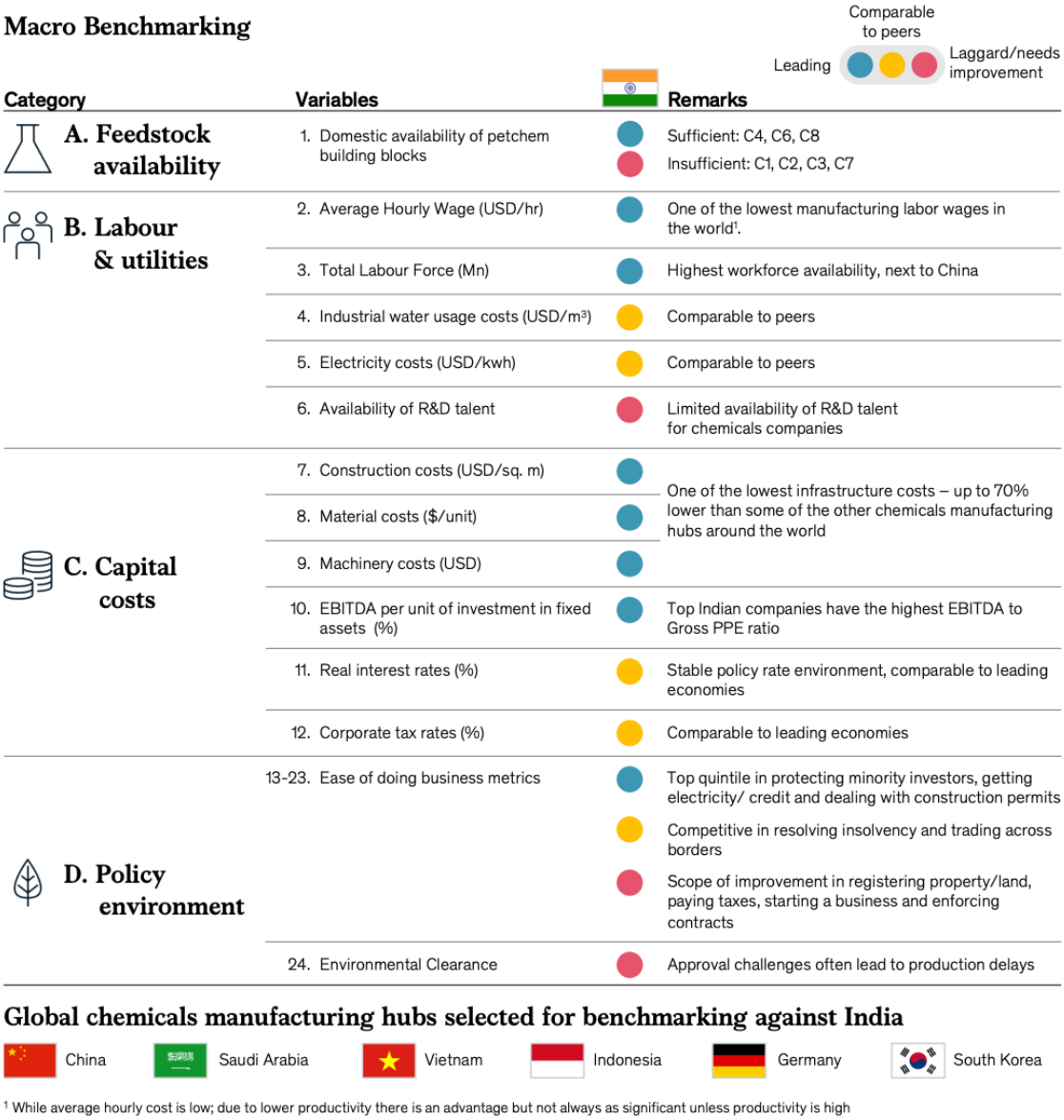


Fig. 7: Macro Benchmarking of India vs Other Countries, McKinsey & Co.

Regardless, India has multiple competitive advantages that give it an edge in chemical manufacturing on a global scale. Amongst these are optimal geographic location, low-cost labor, and advantageous capital costs.

E.2 Geographic Location:

Some regions of India are at a huge manufacturing advantage due to geographic location, which offers certain specific edges in the chemical manufacturing landscape.

For example, Odisha, located on the east coast of India, has exceptional port connectivity. This greatly reduces costs for performing trade in India, incentivizing the country to reserve a larger output for exports. Furthermore, Odisha, being on the east, is very well positioned to serve the South

East Asian market, whose previous option was only China. This makes it far easier for them to adopt a China+1 policy, with India being close by and readily available to export.

E.3 Low-Cost Labor:

Furthermore, not only are local workers in the region of Odisha are skilled, productive, and disciplined; but also low-cost. This gives Odisha a large regional labor advantage, and is the case for many other manufacturing regions in India as well. Workers are industrial and productive, promoting efficiency in the regional market. This increases sellers profit margins, resulting in an increase in quality and standard of living in the long run. Increased production efficiency also makes products more internationally competitive, and contributes to economic boom in the country.

E.4 Capital Costs:

Lastly, India's infrastructure costs, across construction, material, and machinery, are up to 50% lower in comparison with other countries (*Agarwal, 2023*). India also has low costs on basic utilities such as water and electricity, which are vital for any manufacturing process. This can significantly reduce cost of production, and incentivize producers. They will scale up production due to efficient resource allocation, and the industry will grow to become more financially stable.

Overall, the competitive advantages India has not only made its chemicals more internationally competitive and contribute to economic growth, but they also make India a more attractive location for future investors and MNCs. This lands India in a virtuous cycle of economic activity, where rapid growth and success is the country's best friend.

F. A special look into RIL (Reliance Industries Limited)

RIL India, Reliance Industries Limited, is already the market leader in the chemical industry in India. The firm has grown about 16-17% in the past year, with their profits increasing to almost 40-45%. The firm could also seize opportunities and set un new manufacturing plants, and work towards more sustainable chemical production. An interview with Mrs. Divya, Head of HR at RIL, offered insights into RIL's stance in the Indian and Global Chemical Industry. Based on the conversation, increasing demand could be extremely beneficial to RIL. Below are a few more prudent suggestions.

F.1 Increasing Demand:

Urbanization and increase in middle-income households are among the few factors impacting domestic demand in India, as stated previously. Furthermore, RIL is already improving their carbon footprint by shifting to solar panels and green hydrogen. The firm looks to reach net-zero emissions in the near future. These shifts will help gain more consumer support and will push more consumers to purchase from RIL, increasing demand.

Given that, it seems highly profitable for RIL to take advantage of the increase in domestic demand to capture a larger market share and increase their environmental standing. This will allow the firm to expand and take advantage of various economies of scale, such as buying raw materials in larger quantities at a discounted price, among other regional advantages. Moreover, this will support the firm's growth and thus encourage M&A activity, which will increase efficiency and profitability.

This will not only help in the short run, but will also support the firm's exports, where a higher reputation permits the firm to mark up their products without compromising on quantity demanded.

F.2 Setting up new Manufacturing Plants:

Given the various competitive advantages associated with India's location, it is very viable to RIL to strategically set up new manufacturing plants at advantageous locations.

One possible location for this is Odisha (reasons specified above) and regions nearby, given they would have similar manufacturing environments.

However, a more beneficial option would be setting up more international plants. These should be strategically placed, in locations such as UAE and the United States, which have access to low-cost feedstock. This would help overcome issues involving cost competitiveness, because transporting the chemicals would be borne as an internal cost, removing the burden of high tariffs.

Additionally, expansion of plants internationally helps reach a wider global market. Currently, RIL is concentrated primarily in India. For example, underdeveloped countries in continents such as Africa do not have a wide use of chemicals. Setting up domestic plants in these countries can lead to a surge in demand and thus sales.

F.3 Entry into Sustainable Chemical Products:

It is important to note that RIL has already entered the field of sustainable chemical products, with its shift to green hydrogen and circular polymers. It is very important for the firm to continue to do so, given changing consumer preferences to sustainable products.

Reliance Industries is poised to tap the growing demand for circular polymers and anticipates continued market growth. In Dec 2023, the company spearheaded the circular economy focus by dispatching its initial batch of International Sustainability & Carbon Certification (ISCC)-Plus certified Circular Polymers, CircuRepol (Polypropylene) and CircuRelene (Polyethylene). With this new development, RIL aims to reach an overall capacity of 1 million metric tons (MMT) through all its sustainability initiatives by 2030.

Furthermore, targeting circularity, RIL is actively involved in transforming its O2C business assets into a sustainable model targeting circularity and Net Carbon Zero . The company is progressing to deploy committed capital of Rs. 75,000 crore towards building energy manufacturing ecosystem; enabling it to accelerate giga-scale production for round-the-clock power, large-scale green hydrogen production for green chemical manufacturing, and green mobility. Besides enhancing brand image, green assets can also help RIL capitalize on growing the green chemicals market globally.

Overall, the shift towards sustainability has been ‘trending’ in the global market, and gives firms a large advantage in consumers’ eyes. Their preferences are changing, and will prompt an increase in demand at all prices. Consumers are willing to pay a higher price for products that are environmentally friendly or have clean production.

G. Future Outlook

The global chemical industry is expected to reach USD 197.4 million by 2030, reflecting large potential (*Herrmann et al., n.d.*).

Moreover, as per McKinsey, the chemical sector in India is projected to grow by 11-12% during 2021–27 and by 7-10% during 2027–40, tripling its global market share by 2040 (*Goyal et al.*). Furthermore, FICCI predicts that Indian Chemical and PetChem sectors can contribute $300B by 2025 (*FICCI, Federation House, n.d.*).

With the high demand trends in recent years, investment boom is also expected in the near future, with multiple multibillion dollar capital investments. For example, global firms such as Saudi Aramco have announced plans to invest in Indian petrochemical manufacturing. These together project India to gain high economic standing in the global market.

H. Conclusion:

In conclusion, the global chemical industry, despite short-term challenges, exhibits optimistic long-term growth, fueled by sustainability initiatives, digital transformation, and increased mergers and acquisitions.

Despite traditional challenges involving cost of feedstock and lack of R&D talent, India boasts competitive advantages, including optimal geographic location, low-cost labor, and advantageous capital costs. Regions like Odisha showcase manufacturing advantages, positioning India as an attractive investment destination.

With how the chemical industry in the country has been progressing, RIL has some important opportunities and implications, with sustainability, setting up new manufacturing plants in different locations, and expanding demand being key.

The future of the industry globally as well as in India looks promising, bringing with it success and opportunities.

I. References

1. Agarwal, V. (2023, July 26). Transforming India's Infrastructure: A Futuristic Roadmap through Budget 2023-24. *KPMG*. https://kpmg.com/in/en/blogs/home/posts/2023/07/transforming-indias-infrastructure-a-futuristic-roadmap-through-budget-2023-24.html
2. Briefing, I. (2023, June 12). *India's chemical industry expected to reach US$304 billion by 2025*. India Briefing News. https://www.india-briefing.com/news/indias-chemical-industry-expected-to-reach-us304-billion-by-2025-29206.html/
3. Budde, F., Dattaray, P., Dave, T., Goyal, A., Kotecha, S., & S, K. K. (2020). India's chemical industry: Unleashing the next wave of growth. In *McKinsey & Company*. https://www.mckinsey.com/industries/chemicals/our-insights/indias-chemical-industry-unleashing-the-next-wave-of-growth
4. Deloitte Development LLC. (2023). *Global chemical industry mergers and acquisitions outlook 2023*. https://www.deloitte.com/content/dam/Deloitte/de/Documents/energy-resources/gx-global-chemicals-ma-outlook-2023.pdf
5. *Facts & Figures 2022 - the profile of the industry*. (2023, December 8). cefic.org. https://cefic.org/a-pillar-of-the-european-economy/facts-and-figures-of-the-european-chemical-industry/profile/
6. FICCI, Federation House. (n.d.). *FICCI : Study details*. https://ficci.in/api/study_details/23807
7. Gilfillan, R. (2023, January 18). *Global challenges weigh on downstream chemical markets in 2023 | Wood Mackenzie*. Wood Mackenzie. https://www.woodmac.com/news/opinion/chemicals-2023-outlook/
8. Goyal, A., Gautam, Y., Weihe, U., Lorbeer, C., Nathani, N., Jain, R., & Ezekoye, O. (2023). Securing competitiveness in India's chemical industry. In *McKinsey & Company*. https://www.mckinsey.com/industries/chemicals/our-insights/securing-competitiveness-in-indias-chemical-industry
9. Goyal, A., Jr., Kotecha, S., Krishnamurthy, S., Mundra, N., & Weihe, U. (2012). Winning in India: The specialty-chemicals opportunity. In *McKinsey on Chemicals* (Issue Number 4, pp. 30–31). https://www.mckinsey.com/~/media/mckinsey/industries/chemicals/our%20insights/solving%20the

%20puzzle%20of%20indias%20petrochemical%20intermediates%20shortfall/mck_on_chemicals_winning_in_india.pdf

10. Herrmann, I., Suresh, P., & Struwe, S. (n.d.). *The chemical industry outlook for 2023 and beyond*. Oliver Wyman. https://www.oliverwyman.com/our-expertise/insights/2023/jan/chemical-industry-outlook-for-2023-and-beyond.html
11. India: The next chemicals manufacturing hub. (2023). In *McKinsey & Company*. https://www.mckinsey.com/industries/chemicals/our-insights/india-the-next-chemicals-manufacturing-hub
12. PricewaterhouseCoopers. (n.d.). *Sustainable chemicals*. PwC. https://www.pwc.com/gx/en/issues/esg/the-energy-transition/sustainable-chemicals.html
13. *Top Chemicals Exporters | Chemical Industry Exports from India*. (n.d.). India Brand Equity Foundation. https://www.ibef.org/industry/chemical-industry-india
14. *Welcome to Department of Chemical Engineering, IIT Kanpur*. (n.d.). https://iitk.ac.in/che/