FROST & SULLIVAN

INDEPENDENT MARKET REPORT

India Chemicals and Specialty Chemicals Market

A Frost & Sullivan Report

15 March 2022

Contents

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VIII. Abbreviations

AMRUT: Atal Mission for Rejuvenation and Urban Transformation

APAC: Asia Pacific

Bn: Bn

CAGR: Compound Annual Growth Rate

COP: Conference of the Parties

EODB: Ease of Doing Business

EU: Europe

EUR: Euro

INR: Indian Rupees

LATAM: Latin America

MEA: Middle East and Africa

Mn: Mn

NA: North America

USD: United States Dollar

EU27: Nations included are Belgium (BE), Denmark (DK), France (FR), Germany (DE), Greece (EL), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Portugal (PT), Spain (ES), United Kingdom (UK), Austria (AT), Finland (FI), Sweden (SE), Cyprus (CY), Czechia (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Slovakia (SK), Slovenia (SI), Bulgaria (BG) and Romania (RO)

Foreign exchange average rate for 2021: USD TO INR: 73.68

Global & India Macro-Economic Overview

1.1Macroeconomic Overview – Global

1.1 Gross Domestic Product (GDP) Growth

In early 2020, COVID-19 pandemic had hit the World and paralysed the economies of the World. Now in 2021, the global economy is poised to stage its most robust post-recession recovery in 80 years. But the rebound is expected to be uneven across countries, as major economies look set to register strong growth even as many developing economies lag. While IMF suggested the economic growth to bounce back at 6%, the United Nations on responded to the rebounding Chinese and US economies by revising its global economic forecast upward to 5.4% growth for 2021, but it warned that surging COVID-19 cases and inadequate availability of vaccines in many countries threaten a broad-based recovery. With successful pandemic control and a faster vaccination process, the global growth could accelerate to above 5% is what the World Bank suggests.

The global economy is going through the most robust post-recession recovery in 80 years in 2021, a year and a half since the onset of the COVID-19 pandemic. With successful pandemic control and a faster vaccination process, the global growth could accelerate; IMF expects the global economic growth to bounce back to 6.0% in 2021 and 4.4% in 2022, with emerging markets and developing economies growing at 6.7% in 2021 and 5.0% in 2022.

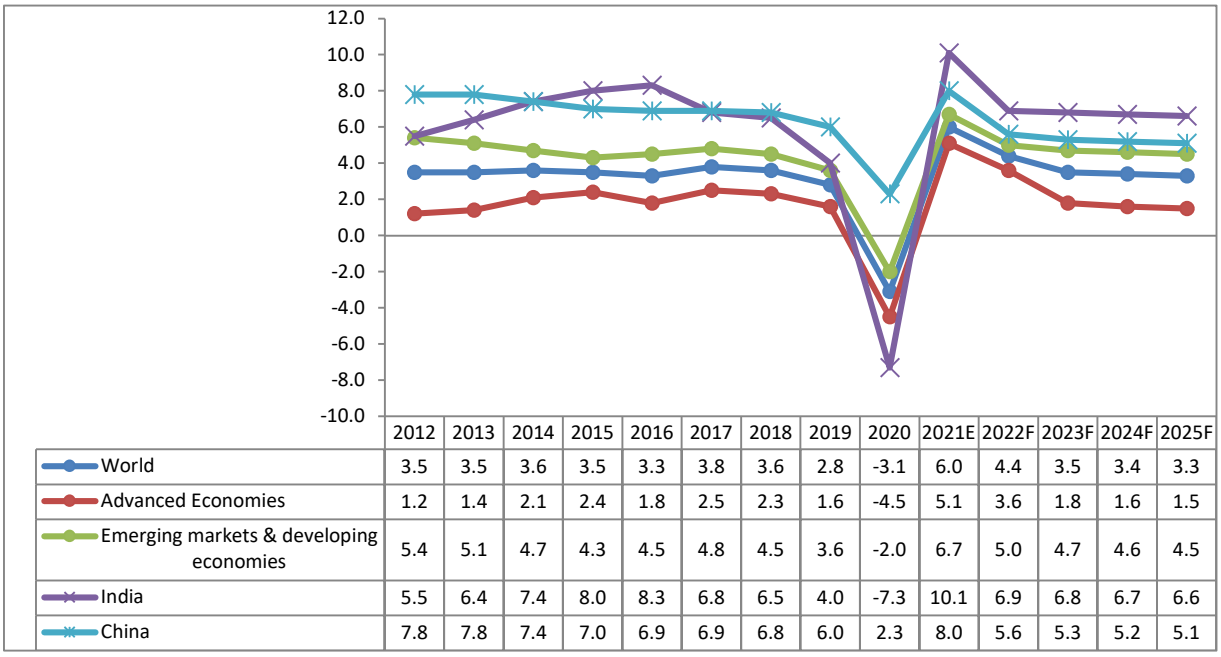
In raising its projection from January 2021 of 4.7% growth, the U.N.'s mid-2021 World Economic Situation and Prospects report pointed to the rapid vaccine rollout in a few large economies led by the US and China and an increase in global trade in merchandise and manufactured goods that has already reached its pre-pandemic level. But the U.N. cautioned that this will unlikely be sufficient to lift the rest of the world's economies.

Compared with the synchronized nature of the global economic slowdown in the first half of 2020, the global economy showed signs of a two-track recovery that began in the third quarter of 2020 with developed economies experiencing a nascent recovery, but economic growth in developing economies lagging behind. A resurgence in infectious cases in Europe, Russia, the United States, Japan, Brazil, India, and various developing economies renewed calls for lockdowns and curfews and threatened to weaken or delay a potential sustained economic recovery into mid to late 2021. Since the beginning of 2021, developed economies have made strides in vaccinating growing shares of their populations, raising prospects of a recovery in those economies and, in turn, the broader global economy. However, a surge in diagnosed cases in developing economies and resistance to vaccinations among some populations in developed economies might slow the speed and the strength of an economic recovery over the near term.

With the growth in the COVID-19 pandemic, the economic damage is already evident and represents the largest economic shock the world has experienced in decades. Prospects for the world economy have brightened, but the recovery is likely to remain uneven. Public health strategies, the speed of vaccine rollout, fiscal and monetary support, and the importance of hard-hit sectors, are driving the differences between countries. While advanced economies are expected to benefit from quicker access to vaccines and strong fiscal support, some countries with large tourism revenues like Iceland and Spain face a longer route to achieving recovery.

Asia-Pacific countries like China and Australia implemented effective containment measures and will continue to recover as they vaccinate. In Latin America, Chile's rapid vaccine rollout and an increase in export prices are fuelling one of the fastest economic rebounds among emerging-markets, while high unemployment, stagnant wages and inflation are expected to prolong Argentina's recovery. Emerging economies face the most challenges coping with COVID-19 outbreaks because of lower resource capacity and slower vaccine rollouts. As long as a large proportion of the world's population is not vaccinated and the risk of new outbreaks remains, recovery will remain vulnerable to fresh setbacks.

Exhibit 1.1: Real GDP Growth (%) 2012- 2025F



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021E	2022F	2023F	2024F	2025F
World	3.5	3.5	3.6	3.5	3.3	3.8	3.6	2.8	-3.1	6.0	4.4	3.5	3.4	3.3
Advanced Economies	1.2	1.4	2.1	2.4	1.8	2.5	2.3	1.6	-4.5	5.1	3.6	1.8	1.6	1.5
Emerging markets & developing economies	5.4	5.1	4.7	4.3	4.5	4.8	4.5	3.6	-2.0	6.7	5.0	4.7	4.6	4.5
India	5.5	6.4	7.4	8.0	8.3	6.8	6.5	4.0	-7.3	10.1	6.9	6.8	6.7	6.6
China	7.8	7.8	7.4	7.0	6.9	6.9	6.8	6.0	2.3	8.0	5.6	5.3	5.2	5.1

Source: World Economic Outlook, International Monetary Fund Estimate, Moody's Outlook, Frost & Sullivan

The baseline forecast envisions a ~6.0% growth in global GDP in 2020. 2020 experienced downfall of nearly -3.1% in Global GDP. Using market exchange rate weights—this has been the deepest global recession in decades, despite the extraordinary efforts of governments to counter the downturn with fiscal and monetary policy support. The collapse in global economic activity in 2020 is estimated to have been slightly less severe than previously projected, mainly due to shallower contractions in advanced economies and a more robust recovery in China. In contrast, disruptions to activity in the majority of other emerging market and developing economies were more acute than expected. The deep recession triggered by this pandemic is expected to have short-term repercussions like low investments with the erosion of human capital and fragmentation of the global trade linkages. However, the medium-long term health of the economy will be healthy, with the demand expected to soar back to its pre-COVID levels. This is expected to be driven by the increased government investments and incentive schemes.

The advanced economies are projected to recover slowly as compared to the global average. Every country is subject to a substantial downgrade growth of GDP in 2020. As per IMF, The United States of America and Canada witnessed a downward growth of -3.4% and -5.3% respectively. The

European countries also witnessed a slide of -5.6% and that of UK slide by -9.8%. In the Asian continent, Japan is experienced a downfall to -4.6%.

The emerging market and developing economies will be buffeted by the economic headwinds from multiple quarters: pressure on the weak health care systems, the loss of trade and tourism, dwindling remittances, the subdued capital flows, and the tight financial conditions amidst the mounting debt. The exporters of energy and industrial commodities were particularly hard hit. The pandemic and efforts to contain it have triggered an unprecedented collapse in oil demand and a crash in oil prices. The demand for metals and transport-related commodities such as rubber and polymers used in the manufacture of vehicle parts also tumbled. Trade restrictions and supply chain disruptions raised food security issues in some places in spite of growing agricultural markets.

Emerging market and developing economies are forecast to expand 6.4% this year, as per IMF, supported by higher demand and elevated commodity prices. However, the recovery in many countries is being held back by a resurgence of COVID-19 cases and lagging vaccination progress, as well as the withdrawal of policy support in some instances. China is expected to rebound by a more modest 8%. The recovery among emerging market and developing economies is forecast to moderate to 5.1% in 2022, as per IMF. Even so, gains in this group of economies are not sufficient to recoup losses experienced during the 2020 recession. Per capita income in many emerging market and developing economies is also expected to remain below pre-pandemic levels, and losses are anticipated to worsen deprivations associated with health, education and living standards. Major drivers of growth had been expected to lose momentum even before the COVID-19 crisis, and the trend is likely to be amplified by the scarring effects of the pandemic.

Growth in low-income economies this year is anticipated to be the slowest in the past 20 years other than 2020, partly reflecting the very slow pace of vaccination. Low-income economies are forecast to expand by 2.9-3.1% in 2021 before picking up to ~4.7% in 2022.

Despite a decline over the past 15 years, trade costs remain almost one-half higher in these countries than in advanced economies, in large part due to higher shipping and logistics costs. Efforts to streamline trade processes and clearance requirements, to enable better transport infrastructure and governance, encourage greater information sharing, and strengthen competition in domestic logistics, retail, and wholesale trade could yield considerable cost savings.

Another important feature of the current landscape is the historic collapse in oil demand and oil prices. In 2020, the oil price visited the negative territory when the yearly price dropping the lowest to -USD 19.78 in April 2020 while the average annual prices dropped to USD 41.96. However the prices have recovered following end of 2020 with The Brent crude oil prices averaged USD 65 per barrel (/b) in March 2021. The low oil prices are likely to provide an initial temporary support to the growth of the countries once the restrictions to economic activities have been lifted. The low oil prices offer an opportunity to oil producers to diversify their economies. In addition to this, the recent oil price plunge may provide further momentum to undertake the energy subsidy reforms and deepen them once the immediate health crisis subsides.

Although the global economy is growing again after a 3.1% contraction in 2020, the pandemic has caused a heavy toll of deaths and illness, plunged millions into poverty, and may depress economic activity and incomes for a prolonged period. Top near-term policy priorities are controlling the spread of COVID-19 and ensuring rapid and widespread vaccine deployment. To support economic

recovery, authorities also need to facilitate a re-investment cycle aimed at sustainable growth that is less dependent on government debt.

The near-term outlook remains highly uncertain, and different growth outcomes are still possible, as a section of the report details. A downside scenario in which infections continue to rise and the rollout of a vaccine is delayed could limit the global expansion to 1.6% in 2021. Meanwhile, in an upside scenario with successful pandemic control and a faster vaccination process, global growth could accelerate to nearly 6%.

Policymakers need to continue to sustain the recovery, gradually shifting from income support to growth-enhancing policies. In the longer run, in emerging market and developing economies, policies to improve health and education services, digital infrastructure, climate resilience, and business and governance practices will help mitigate the economic damage caused by the pandemic, reduce poverty and advance shared prosperity. In the context of weak fiscal positions and elevated debt, institutional reforms to spur organic growth are particularly important. In the past, the growth dividends from reform efforts were recognized by investors in upgrades to their long-term growth expectations and increased investment flows.

Central banks in some emerging market and developing economies have employed asset purchase programs in response to pandemic-induced financial market pressures, in many cases for the first time. When targeted to market failures, these programs appear to have helped stabilize financial markets during the initial stages of the crisis. However, in economies where asset purchases continue to expand and are perceived to finance fiscal deficits, these programs may erode central bank operational independence, risk currency weakness that de-anchors inflation expectations, and increase worries about debt sustainability.

Having said this, several sectors have witnessed a growth during the pandemic and have successfully weathered the storm over this duration. Sectors like ITeS, E-Commerce, pharmaceuticals, chemicals, diagnostics, consumer goods and durables, agrochemical and fertilizers have benefited owing to the pandemic. The crisis has increased the demand in medical supplies and care.

India, which has been a leader in supplying affordable drugs to the world, and has now, deployed its capacities in the field of vaccines to help fight the global COVID-19 pandemic. Besides the neighbouring countries, Brazil and South Africa too have reached out to India seeking vaccines to deal with the COVID-19 crisis in their countries. The Serum Institute of India (SII) which is considered to be the world's largest vaccine manufacturer and the drug major AstraZeneca vaccine have partnered for the supply of the vaccine to India and other countries; the vaccine has been developed with the University of Oxford less than a week after launching the world's largest inoculation drive, India - shipped tens of thousands of free doses of Covid-19 vaccines to neighbouring countries in what is being widely described as **"vaccine diplomacy". Similar to SII there are other Indian companies that are involved in manufacturing of vaccine such as Bharat Biotech that is producing COVAXIN®. Recently the company announced Capacity Expansion to Support vaccination campaigns in India and Worldwide. Capacity expansion has been implemented across multiple facilities in Hyderabad and Bangalore, to reach ~ 700 Mn doses / year, one of the largest production capacities for inactivated viral vaccines worldwide.** Currently 4 vaccines have been approved for use in India; Oxford/AstraZeneca's AZD1222, Gamaleya's Sputnik, SII's Covishield, and Bharat Biotech's Covaxin. India also has 13 vaccines under clinical trials. EU had not made Covishield eligible for EU's digital green certificate. India put pressure on EU that it will not recognise an EU

vaccine pass for travellers unless the bloc does the same for India's own vaccine certificate. So far, Austria, Germany, Slovenia, Greece, Iceland, Ireland, Spain and Estonia have confirmed accepting Covishield. Switzerland also allows Covishield for Schengen state.

1.2 Medium - Long term: Robust Recovery Expected

Given the nature of the COVID-19 shock, a self-imposed reduction in social mobility has been designed to contain the spread of a virus, generating dramatic effects on the economic activities. The short-term economic growth is expected to be comparatively muted. However, given the series of steps taken by the governments and industries across the globe, the medium and long term global economy is expected to remain robust.

US: The infection rates have been declining in the states hit first, however, they continue to rise in the south and the west. All the states have reopened their economies beginning with construction, manufacturing, and limited retail, although at differing speeds. In the labour market, jobs increased in May and the unemployment rate became better (13.3% from 14.8%). Owing to the on-going labour market and small and medium enterprises (SME) stress, in addition to the pressure on the state budgets an additional fiscal support is expected. The GDP is expected to rise sharply to ~6% by 2021 and gradually showcase a stable growth of ~2% over the next few years.

Europe: With the virus curve flattening across the continent, Europe has embarked toward a steady recovery. The 19 countries European countries that share the euro currency will collectively register 4.2% growth in 2021 after seeing economic output crater 6.1% in 2020. The rollout of Covid vaccines in European Union (EU) countries is picking up speed, with more than 300 Mn jabs administered. As of 20 June 2021, nearly half of the EU's adult population have had at least one dose, while 28% have been fully vaccinated. Earlier this year, the rollout was hit by delays in production and distribution and vaccine hesitancy in some countries. In the week to 20 June 2021, Germany administered an average of 1 dose per 100 people a day, with Italy and France close behind on 0.9 doses per 100 people - all higher than the UK's 0.6 per 100. Hungary - which is using Russian and Chinese vaccines as well as the EU-approved ones - has fully vaccinated 46% of its population, the same proportion as the UK. In France, children who are 12 and over can be vaccinated, with parental consent. The government is hoping to avoid class closures when schools reopen after the summer holidays. The EU authorised the use of the Pfizer vaccine in children aged 12-15 at the end of May. Germany said it would give it to those aged 12-17 with pre-existing conditions while a number of other EU countries said they would vaccinate children before the start of the next academic year.

A range of indicators from traffic patterns to health stringencies show the activities are normalizing faster in Germany as compared to nations like Spain which is bouncing back slowly. The financial conditions show a V-shaped recovery with the liquidity normalizing accompanied by a strong increase in loans to corporations, driving a strong credit impulse. The governments have launched a series of actions to support SMEs, the labour market (over one-quarter of the Eurozone labour force has been benefitting from the short-term working scheme) and the most-hit sectors like tourism and the automotive industry. Liquidity has normalized and there is a strong increase in loans to corporations, driving a strong credit impulse. These relaxations and improvements were possible following the flattened curve in May 2020. However European nations witnessed the second wave of COVID-19 infections in October 2020 and most countries tightened curbs.

Asia Pacific: China was infected first with the virus; however, it has also been the first to recover from the pandemic. In general, the infection curves have remained flat and the policy support is working for China. China has proved to have recovered faster with their technology and manufacturing sectors performing better than services. The SME sector, however, has been a little slow to respond. It is estimated that the situation has been nearly back to the pre-COVID-19 level. China is expected to experience a growth of 8% in 2021 and around 5% in 2022-2023 after eking out a 2.3% increase in 2020. Japan saw a contraction in economy of 4.6% in year 2020; however the country will rebound to 2.4% in 2021 and ~3% by 2022 driven by its robust domestic demand growth.

India: India went through an early lockdown in March2020 which led to the slowdown of many sectors; however, the chemical industry was comparatively less affected. India also started manufacturing PPE kits and in a span of less than 2 months became the world's largest producer. India is slowly opening up with most sectors coming back to normalcy. Although India witnessed a significant downturn in 2020, it is expected to rebound to ~9.5% according to IMF (after it had previously suggested India to recover at 12.5%); however, Oxford Economics and RBI suggest the growth rate in the range of 10-11% for India in 2021. IMF gave India a huge upgrade due to the fast recoveries at its factories and farms. India is expected to experience the fastest recovery among major countries with a huge turnaround from 2020's decline of ~7%. Despite lock down there are several economic indicators which brings good news, in terms of e-way bills, electricity, and registrations of cars and two-wheelers, container traffic have risen up. Moreover, the capacity utilisation at factories has increased to over 70% as migrant labourers return. April 2020's GST collection was at 28% of that collected in April 2019 which progressed to August 2020 collection at 88% of the August 2019 levels. The GST collections touched a new high of nearly INR 1.2 lakh crores in January 2021, indicating a sharp recovery post lockdown and better compliance manifested in record returns of INR 90 lakh. The numbers based on December sales, with returns filed in January show that revenue from imports went up by 16%. The country's GST collection is growing gradually indicating that economy recovery is in sight.

India is strengthening the entire ecosystem to achieve Prime Minister Narendra Modi's dream of becoming a USD 5 trillion economy by 2025 through rapid structural reforms. Addressing the Pravasi Bharatiya Diwas conference, the Commerce and Industry Minister said: "We are working simultaneously to bring about a quantum leap in our quality, in our productivity, in our efficiency, so that Indian Industry can truly expand our export basket, making it bigger, better and broader." New markets are being explored aggressively to enhance the reach of Indian products globally. The Indian diaspora living abroad have more familiarity with consumer markets as India has insights into consumer behaviour and can guide Indian Industry to develop customised products for foreign markets.

The government has taken credit for the growth of India's personal protective equipment (PPE) sector and for research, development and manufacture of COVID-19 vaccinations – "Made in India vaccines are a symbol of Atmanirbhar Bharat". Like many other countries India also fast-tracked regulatory clearance conveying the impression that Covishield and Covaxin reflect the country's manufacturing success. However, the real glitch was that even as the Modi government projected India as the world's vaccine factory, it erred in its strategy on rapidly mass producing Covishield and Covaxin. The government failed to pre-order the right quantities to expeditiously vaccinate its population. Now even the private sector is asking the government for adequate vaccine supply to

vaccinate their staff as stocks run dry. At the current rate of vaccination, the country will take at least two years to vaccinate 70% of its population. Economists have said that mass vaccination is the biggest economic stimulus. Domestic mass vaccination is a major component of economic revival. And its focus on exports is also botched up. India exported more than 66 Mn doses of COVID-19 vaccines worldwide in the past year but it failed to anticipate the scale of the coronavirus. The government should have halted the exports of pharmaceuticals and oxygen, rather than prematurely declaring a victory over COVID-19. Against the backdrop of a massive increase in the number of critically impacted COVID-19 patients the demand for oxygen has shot up across India. While this is the need of the hour, the large scale diversion of oxygen from industrial units to hospitals poses more challenges to the already struggling manufacturing sectors like steel, cement and mining, which stand dependent on oxygen for moulding, fabrication, etc.

Recently Maruti Suzuki shut down its factories in Haryana to make oxygen available for medical needs. During the first wave of COVID-19 last year, the overall demand for medical oxygen in India had increased four times, making it amply clear that oxygen was critical for COVID-19 patients. Despite this, tenders floated for oxygen generation plants by the central government are yet to be realised.

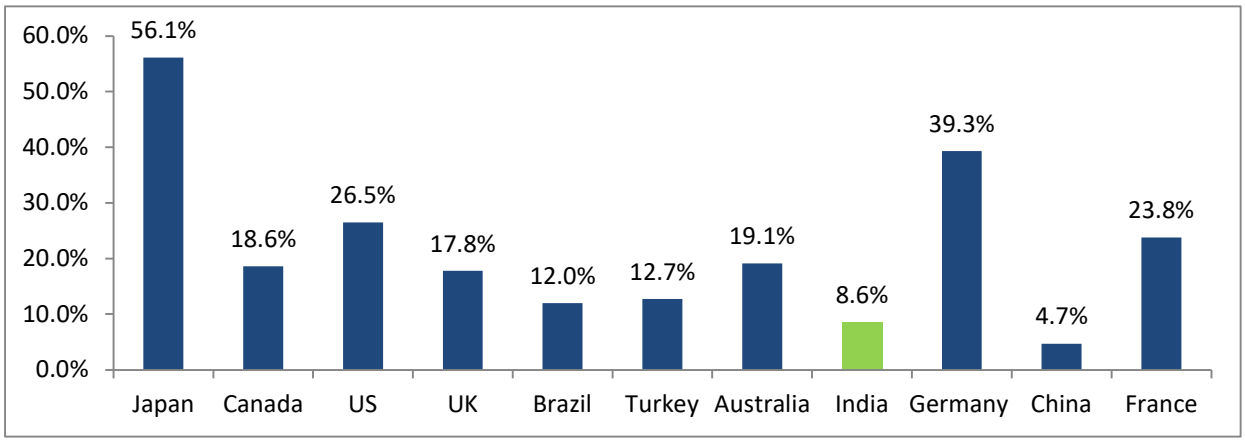
COVID-19 will remain for several months now, with projections of a third wave in India. Meanwhile, retail outlets selling non-essentials are temporarily closed and seller and buyer mood is bleak as they grapple with uncertainty. For the manufacturing sector, especially, there is an even higher degree of uncertainty. It will take a massive effort and huge financial incentives on the part of the government, industry, and all key stakeholders to ensure that the manufacturing recovers on operational mode.COVID-19 fiscal stimulus packages in G20 countries.

In order to address these issues, most of the large global economies have announced several stimulus packages to revive demand.

1.3 COVID-19 fiscal stimulus packages in G20 countries

In order to address these issues, most of the large global economies have announced several stimulus packages to revive demand.

Exhibit 1.2: COVID-19 fiscal stimulus packages in G20 countries, % of Real GDP as on May 2021



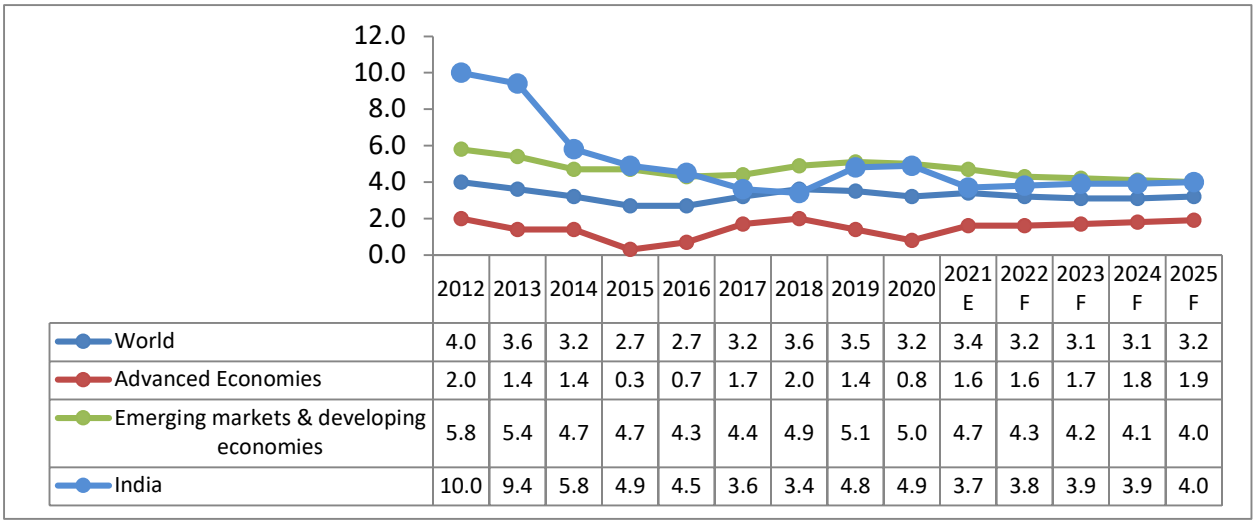
Source: IMF

1.4 Inflation Rate Growth in India vs. World

The consumer price pressures appeared to ease down starting May 2020 with both food and beverages, and fuel and light becoming cheaper month-on-month. The Reserve Bank of India's (RBI) target range for CPI inflation is 2.0% to 6.0% for 2021. The consumer price inflation is expected to average at 3.7% in 2021.

The global inflation curve has by large been on the downward curve since 2012 this is largely because the global commodity prices. Commodity prices fell sharply in this period following fall in prices of Brent crude by ~18%. The fall in the prices of the commodities came as a result of slackening demand from China, the single largest commodity consuming country. At the start of this decade, data shows GDP growth and industrial productions have fallen to 3-year lows in China. Another factor affecting global commodity prices was uncertainty in the Euro zone. Business confidence in Germany had dropped to a two-year low, US manufacturing declined and China's factory sector contracted. As a result crude oil and copper post their biggest declines. Following these factors, growth in early start of this decade, in the global economy remained very bleak which resulted in reduced commodity prices thereby lowering inflation.

Exhibit 1.3: Inflation Rate (end of period consumer prices) (%) 2012 – 2025F



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 E	2022 F	2023 F	2024 F	2025 F
World	4.0	3.6	3.2	2.7	2.7	3.2	3.6	3.5	3.2	3.4	3.2	3.1	3.1	3.2
Advanced Economies	2.0	1.4	1.4	0.3	0.7	1.7	2.0	1.4	0.8	1.6	1.6	1.7	1.8	1.9
Emerging markets & developing economies	5.8	5.4	4.7	4.7	4.3	4.4	4.9	5.1	5.0	4.7	4.3	4.2	4.1	4.0
India	10.0	9.4	5.8	4.9	4.5	3.6	3.4	4.8	4.9	3.7	3.8	3.9	3.9	4.0

Source: World Economic Outlook, International Monetary Fund Estimate-April 2021, Frost & Sullivan

Inflation rate in India is in the range of 4.9% as of 2020, as per the Indian Ministry of Statistics and Programme Implementation. This represents a modest reduction from the previous half decade. Inflation rates in India are usually quoted as changes in the Wholesale Price Index (WPI), for all commodities. Many developing countries use changes in the consumer price index (CPI) as their central measure of inflation. In India, CPI (combined) is declared as the new standard for measuring inflation (April 2014).

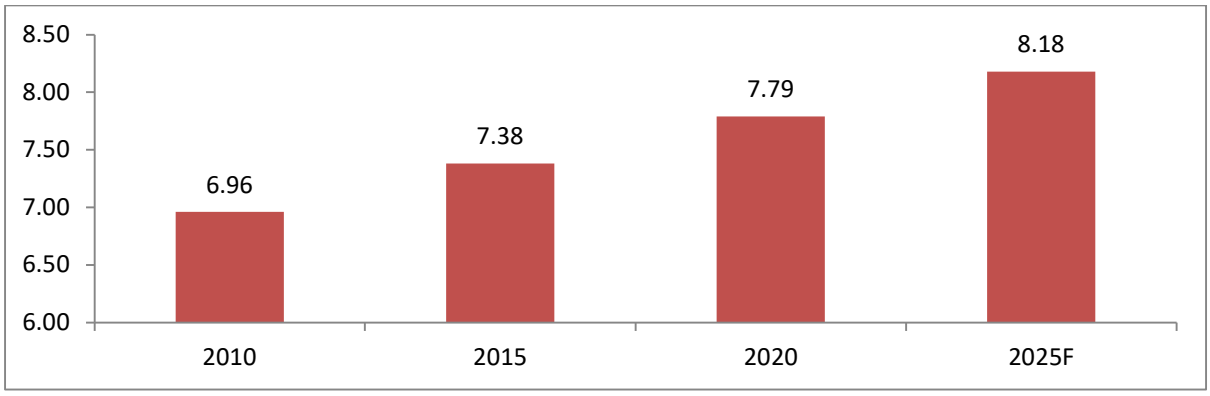
Many economists believe that the inflation-targeting regime had been instrumental in lowering India's inflation rate but India being an open economy its inflation trajectory is really driven largely by global commodity price movements. Back in 1990s when India was a more autarchic country, domestic factors — especially food-related supply shocks — drove inflation. But since India liberalised, inflation is largely driven by global commodity prices. The decline in inflation came about

because global commodity prices fell in 2014-15, and had very little to do with the introduction of inflation targeting. Inflation has risen again in 2019 because global commodity prices rose in 2017/2018, and we are seeing them pass through into domestic prices. The availability of covid-19 vaccine, could now unleash a pent-up demand, bringing along inflation. A return to pre-pandemic lives may bring a surge in spending, which may poise inflation for a comeback. Even in United States, with a Republican-led Senate, Biden will get a stimulus bill, though smaller, passed early next year. Unlike the Global financial crisis where new money creation went to banks and financial institutions, this time the massive monetary policy easing and never seen before government relief packages seems to be trickling fast to the real economy. The monetary inflation is resulting in a weaker dollar. A weaker dollar and high liquidity could result in higher commodity prices as well and therefore could be inflationary. The Federal Reserve has announced that it will adopt an average inflation target going forward that will allow inflation to run above 2% post vaccine announcement, to support the pandemic-struck economy.

Rising chemical prices around the world may be helping to stoke inflation in downstream industrial production and consumer goods. Since the pandemic hit in early 2020, a series of events have disrupted supply of chemicals to global markets amid strong demand, leading to record prices in some value chains. Demand has also surprised on the upside, driven initially by products to fight the coronavirus as well as plastics for packaging. Since the second half of 2020 there has also been a strong rebound in demand from big end use sectors such as automotive and construction, battered by lockdowns in the early months of the pandemic. China led the recovery, followed by the US and Europe. Demand for chemicals is booming globally, led by a recovery in industrial production. In markets starved of material, there has been panic buying by downstream industries desperate to maintain security of supply. In these circumstances, availability has become more important than price, leading to record prices in many products. Increase in commodity and chemical prices globally has the potential to feed into CPI/ WPI.

1.5 Global Population Growth Trend

Exhibit 1.4: Global Population Growth Trend: 2010-2025F, Bn



Source: World Bank, UNICEF

The total population has more than doubled since the 1950s, and continues to increase. Populous middle-income countries account for a considerable share of the growth in world population between 2010-25. Just five nations – China, India, Indonesia, Pakistan and Nigeria – are expected to account for around 859 Mn births till 2025 from 2010. If the current trend continues, the majority of the next Bn is destined to be born in low- and middle income countries. A lot of pressure is thus on

key sectors and care industries like Agriculture, Pharmaceuticals, Healthcare etc. to support this growing population.

Macroeconomic Overview of India

1.6 Gross Domestic Product (GDP) Growth and Outlook

An already-slowing Indian economy has been derailed from its growth track after a stringent shutdown was imposed in March 2020 to halt the spread of Covid-19. India's GDP contracted to 7.3% in 2020 – the first time in four decades.

The health shock of COVID 2.0 seems to be seeping into the economic domain and attenuating the pace of our V-shaped recovery. After coping with the first wave of the pandemic, the economy finally showed some signs of recovery from Q3 FY-21. The second COVID-19 wave has now hit the country hard, pushing more than half of the Indian states into lockdown. This brings major headwinds to the economic recovery and downside risks to the possible green shoots. The Indian economy turned a corner this month and began regaining momentum in June 2021, ultra-high frequency data indicate, though subdued consumer sentiment is expected to limit the pace of recovery in Asia's third largest economy. This comes as states gradually ease curbs on business activity, keeping in mind the decline in the number of fresh Covid cases. The week ended June 13 was at least the third consecutive week in which economic activity sequentially gained momentum, according to three data trackers by research agencies using a range of data available on daily or weekly basis. Economically, in June, India will see activities pick up signalling recovery during the gradual unlocking process. The NCAER report has stressed on a strong positive push to restore the growth process after the Covid-19 waves India has seen. This, combined with a strong expansionary macroeconomic policy thrust, could help revive normal growth.

Economists are now speculating about how India will dig itself out of that hole once the second wave's economic damage is fully realized. They estimate that the latest outbreak has pushed back India's economic recovery by three to six months, depending on the virus's trajectory and the nation's preparedness for a possible third wave. Since hitting a peak above 400,000 daily cases in early May, the infection rate has dropped to 152,734 per day, and the number of deaths has fallen to around a four-week low of 3,128 daily. Economists believe that the delay in economic recovery would be limited to just about a quarter, provided the COVID's second wave is not allowed to last much beyond June. The economic recovery would depend on the pace of vaccination and government policy interventions in the coming weeks and months. India's Health Minister, Harsh Vardhan, has pledged to vaccinate at least all of the adult population by the end of the year, notwithstanding a current supply shortage.

An already-slowing Indian economy had been derailed from its growth track after a stringent shutdown was imposed in March 2020 to halt the spread of Covid-19. India's GDP contracted to 7.3% in 2020 – the first time in four decades.

With industries, transport, shops, and malls shut, the economic activity came to a grinding halt in India toward the end of March 2020. The domestic consumption, which makes up around 57% of GDP, was almost wiped out. Pay cuts and layoffs across the country completely eroded the demand. The Indian government's decision to remove most of the restrictions has provided the much-needed relief to the large as well as the small businesses. Despite this, the demand scenario remained weak

in 2020. The revival in consumption, meanwhile, will be driven by discretionary as well as non-discretionary spending. The non-discretionary spending refers to groceries and other essential items. Expectedly, this category remained largely unscathed during the lockdown. The recovery in 2021 is expected to be in double digit following a better start to the year as compared to 2020. Near-term prospects are favourable but second covid wave is a risk to recovery.

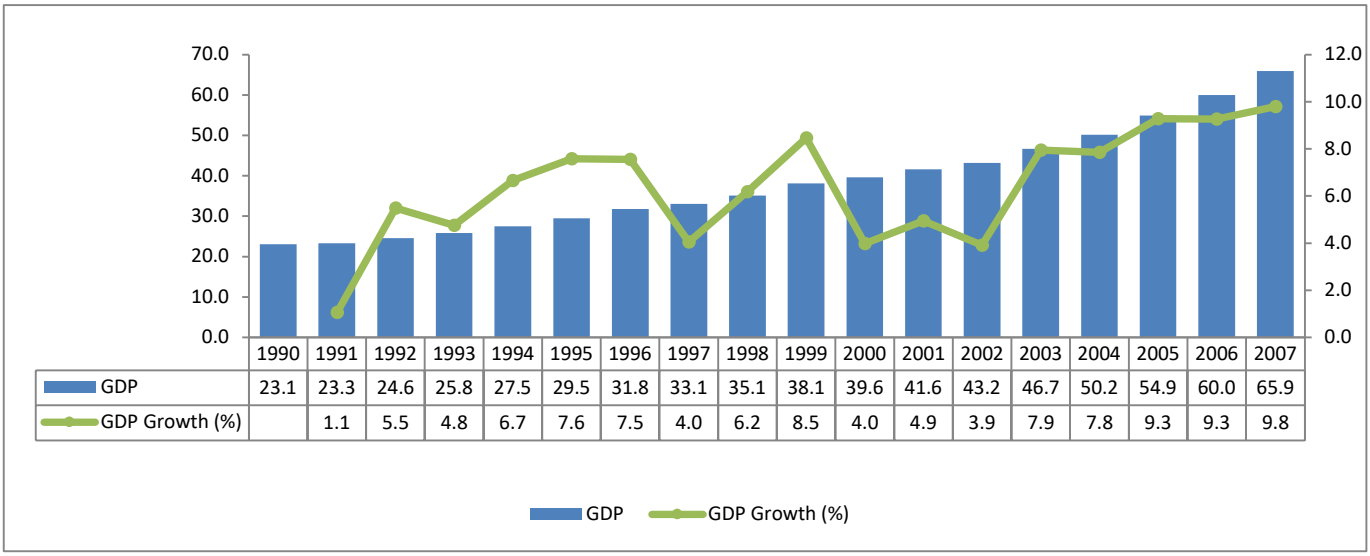
However, the medium term growth outlook is expected to improve and record a growth rate of ~6.6% by CY2025F, on an account of the strong macroeconomic fundamentals which include moderate inflation, the implementation of key structural reforms and the improved fiscal and monetary policies. Meanwhile, the recent moves by the government to improve balance sheets of state-owned banks, through an augmented re-capitalization plan worth INR 2110 Bn for public sector banks spread over two years, is expected to support the capital shortages of the public sector banks that have hindered the bank's lending capacity.

From CY2012 to 2016, the market-friendly policies safeguarded India from the subdued global economy; the improved macroeconomic fundamentals and robust capital inflow strengthened the economic growth from 5.5% in 2012 to 8.2% in 2016. However, in 2017 the GDP declined to 6.8% from 8.2% in 2016 due to the external vulnerabilities such as global slowdown, impact of demonetization and the transitory effect of goods and services tax (GST) implementation.

The economic growth of India slipped further in 2019 as a result of the lingering effect of demonetization and the other political reforms. The growth has remained relatively slow due to the prolonged on-going stress among non-bank financial institutions (NBFIs), obstructing the overall credit provision of the financial system.

Due to Covid-19, the GDP of FY21 declined by 8.0% at INR 1,34,08,882 Cr as compared to INR 1,45,69,268 Cr for the same period last year.

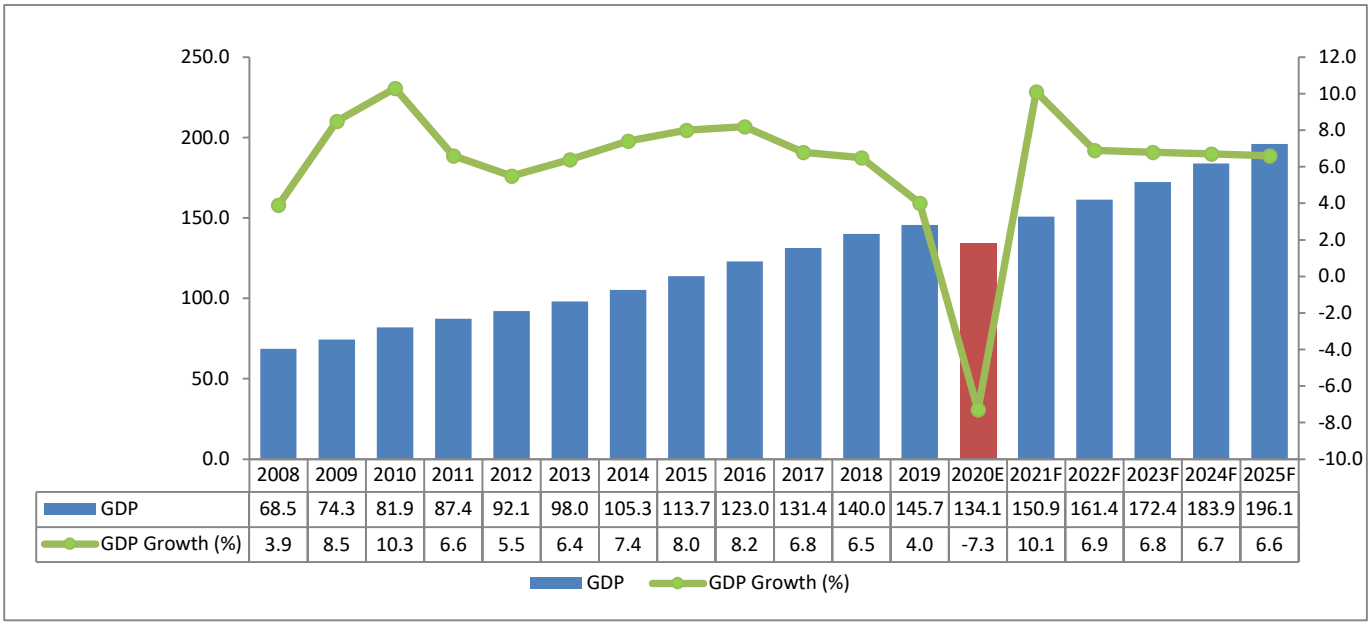
Exhibit 1.5(A): Real GDP Value, at constant price (INR 000'Bn) and Growth %, India, 1990 to 2007



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
GDP	23.1	23.3	24.6	25.8	27.5	29.5	31.8	33.1	35.1	38.1	39.6	41.6	43.2	46.7	50.2	54.9	60.0	65.9
GDP Growth (%)		1.1	5.5	4.8	6.7	7.6	7.5	4.0	6.2	8.5	4.0	4.9	3.9	7.9	7.8	9.3	9.3	9.8

Source: Moody's Outlook, Moody's press release 2020, International Monetary Fund Estimate, Dun and Bradstreet, Frost & Sullivan

Exhibit 1.5(B): Real GDP Value, at constant price (INR 000'Bn) and Growth %, India, 2008 to 2025F



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020E	2021F	2022F	2023F	2024F	2025F
GDP	68.5	74.3	81.9	87.4	92.1	98.0	105.3	113.7	123.0	131.4	140.0	145.7	134.1	150.9	161.4	172.4	183.9	196.1
GDP Growth (%)	3.9	8.5	10.3	6.6	5.5	6.4	7.4	8.0	8.2	6.8	6.5	4.0	-7.3	10.1	6.9	6.8	6.7	6.6

Source: Moody's Outlook, Moody's press release 2020, International Monetary Fund Estimate, Dun and Bradstreet, Frost & Sullivan

Exchange Rate Trends

Over the long term, the rupee's overvaluation and structurally higher inflation relative to the US would exert downside pressure on the currency. Most analysts have revised forecasts for the rupee to average INR 75.00/USD in 2020 and INR 77.00/USD in 2021, versus INR 73.00/USD and INR 75.00/USD previously.

Indian rupee being an emerging market currency with structural fundamental vulnerabilities such as its twin deficit (current account and fiscal account), make the currency susceptible to sell-off during periods of risk-offs. The extended lockdown in 2020 also added to the woes of the rupee, ensuring a slide in the first quarter of the new financial year.

However, the rupee has witnessed an uptick recently driven by –

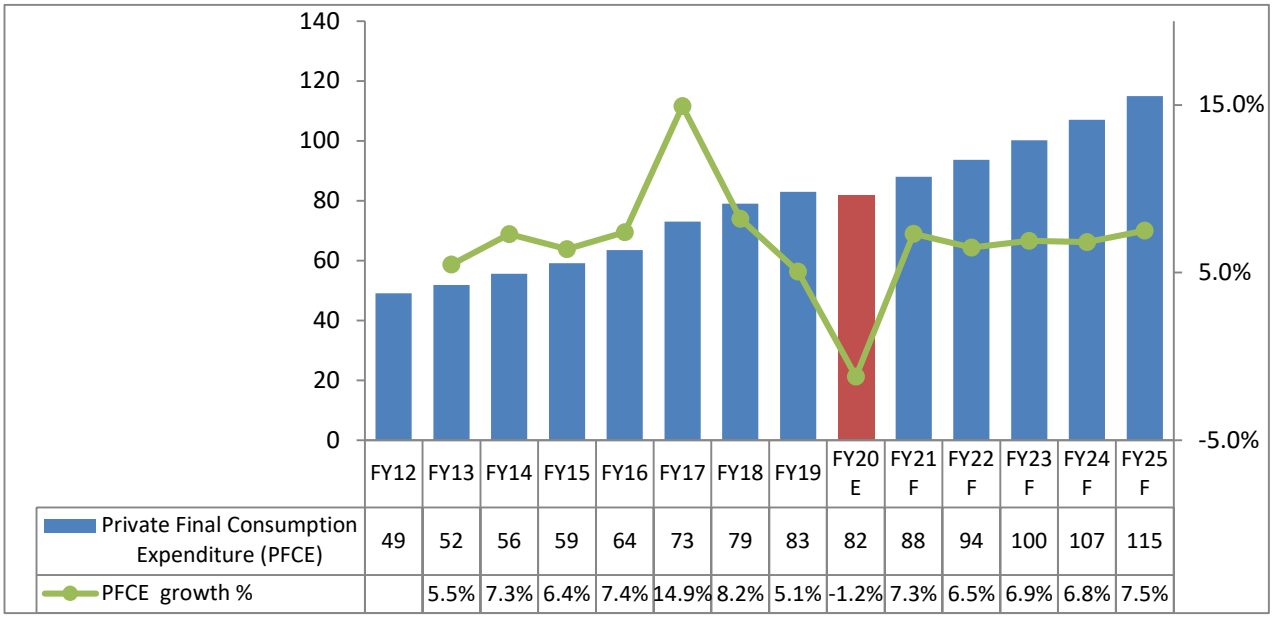
- **FPI Inflows:** The foreign portfolio investors have purchased over INR 1.6 lakh crores in India equities in 2020. In 2020, India was the only country that had significant inflows from foreign investors, while other emerging markets saw major outflow this year. As per National Securities Depository (NSDL) data, FPIs invested a record INR 150,000 crores in Indian markets in the last three months of 2020.
- **Weak Dollar:** The Indian rupee was seen recovering against a weak dollar overseas and optimism of higher growth projection. However, a concern surrounding fiscal deficit will likely keep a check on the local unit. Also, the rupee is trading in a narrow range as traders remained cautious ahead of the Reserve Bank of India (RBI) monetary policy that was scheduled in February. Besides, continued faith by foreign investors into the domestic market is also supporting the Indian currency.

1.7 Private Final Consumption Expenditure (PFCE) growth in India

The Private Final Consumption Expenditure has been showing a subdued growth over past couple of years. However, the PFCE growth decelerated in 2019 due to the reduced rural and urban income growth, the waning Pay Commission effect and the NBFC (Non-Banking Financial Company) crunch.

In 2019-20, Private Final Consumption Expenditure (PFCE) had a share of ~57% in India's GDP. PFCE growth collapsed to 2.7% in the March 2020 quarter, with the year average estimated to be as low as -1.2% - the lowest since June 2006. Real private final consumption expenditure (PFCE) is expected to decline by 1.2% owing to the impact of covid-19 pandemic during 2020-21 but likely to record 7.3% growth during FY21. Going ahead, PFCE is expected to stabilize between 6.9% - 7.5% through 2023-25.

Exhibit 1.6: Private Final Consumption (INR 000'Bn) and Growth (%), India, FY12 to FY25F



	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20 E	FY21 F	FY22 F	FY23 F	FY24 F	FY25 F
Private Final Consumption Expenditure (PFCE)	49	52	56	59	64	73	79	83	82	88	94	100	107	115
PFCE growth %		5.5%	7.3%	6.4%	7.4%	14.9%	8.2%	5.1%	-1.2%	7.3%	6.5%	6.9%	6.8%	7.5%

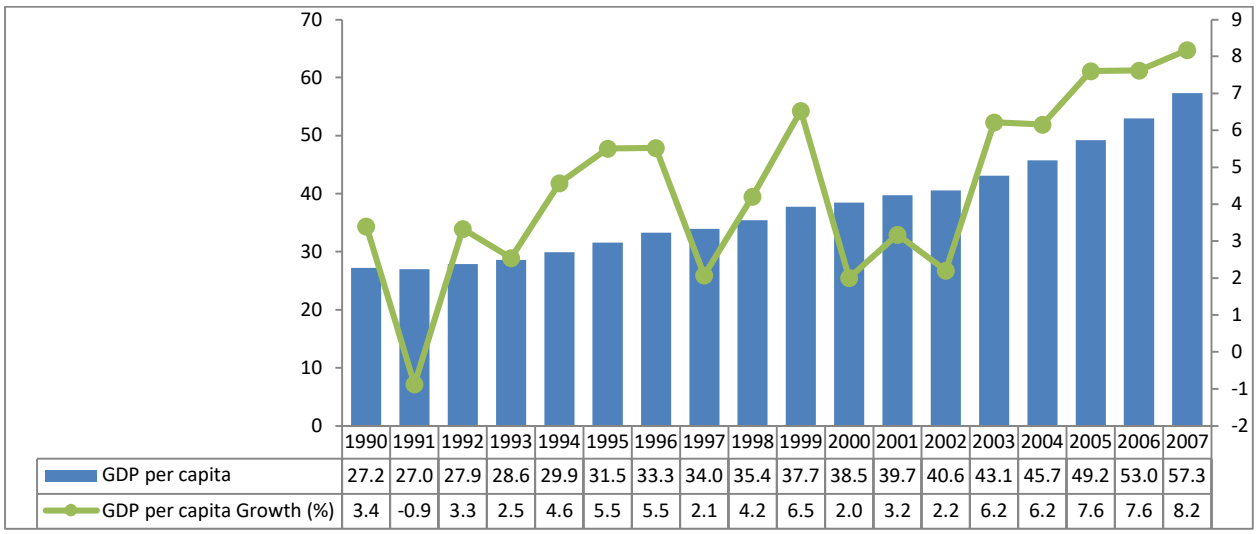
Source: MOSPI - Second Advance Estimates of National Income, 2019-20, at 2011-12 prices; Revised outlook based on covid-19 not published by MOSPI

1.8 GDP Per Capita

The GDP per capita at constant prices in India remained low until 2012 during the economic downturn. Thereafter, the growth gradually picked up for GDP per capita till 2016 where it reached 6.8%. However, it slumped during 2017-2018 as a result of demonetization and implementation of GST.

The GDP per capita in 2020 is expected to witness its lowest growth rate since 1990 at -5.4%. However, with the economy getting back on track slowly, the GDP per capita growth is expected to increase and plateau at around 6.1% in 2025F.

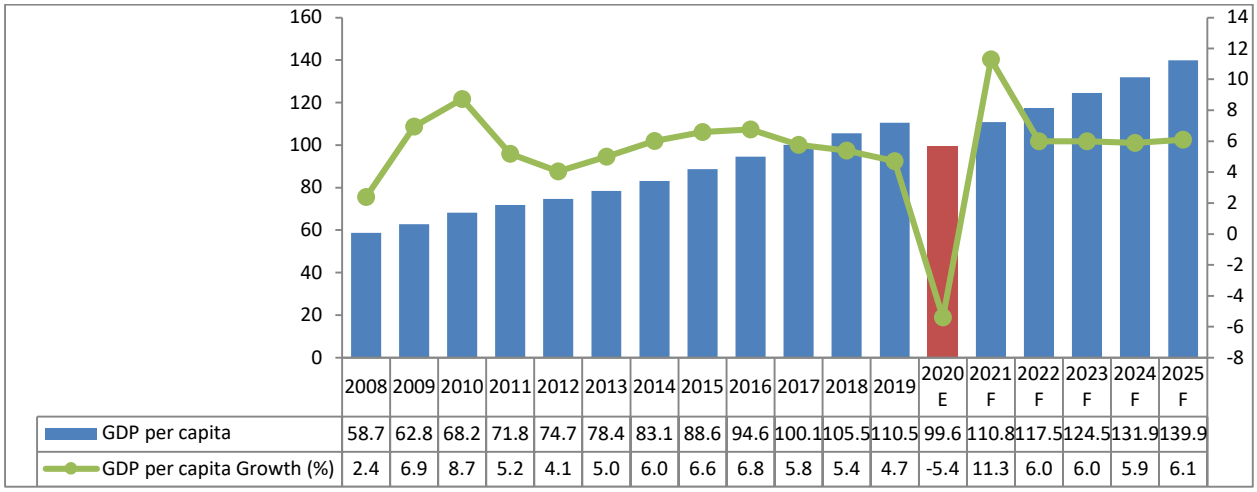
Exhibit 1.7(A): GDP per Capita Value, at constant price (INR'000) and Growth %, India, 1990 to 2007



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
GDP per capita	27.2	27.0	27.9	28.6	29.9	31.5	33.3	34.0	35.4	37.7	38.5	39.7	40.6	43.1	45.7	49.2	53.0	57.3
GDP per capita Growth (%)	3.4	-0.9	3.3	2.5	4.6	5.5	5.5	2.1	4.2	6.5	2.0	3.2	2.2	6.2	6.2	7.6	7.6	8.2

Source: World Economic Outlook, International Monetary Fund Estimates-April 2021, Frost & Sullivan

Exhibit 1.7(B): GDP per Capita Value, at constant price (INR'000) and Growth %, India, 2008 to 2025F



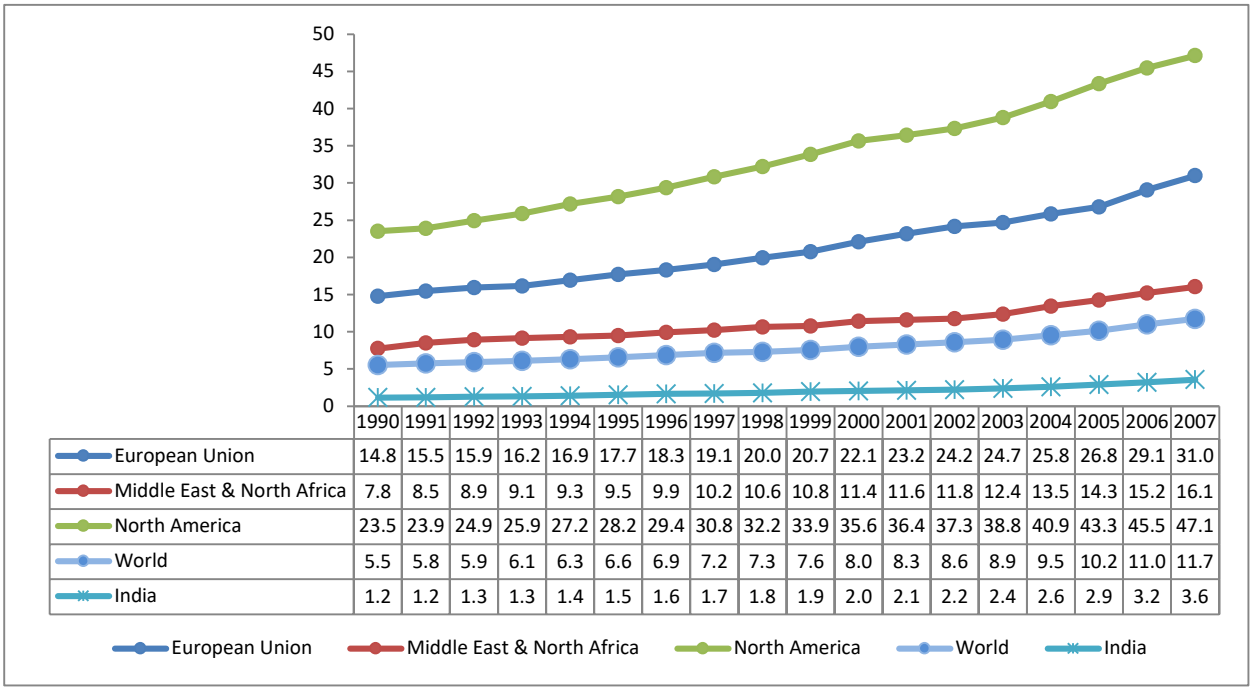
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 E	2021 F	2022 F	2023 F	2024 F	2025 F
GDP per capita	58.7	62.8	68.2	71.8	74.7	78.4	83.1	88.6	94.6	100.1	105.5	110.5	99.6	110.8	117.5	124.5	131.9	139.9
GDP per capita Growth (%)	2.4	6.9	8.7	5.2	4.1	5.0	6.0	6.6	6.8	5.8	5.4	4.7	-5.4	11.3	6.0	6.0	5.9	6.1

Source: World Economic Outlook, International Monetary Fund Estimates-April 2021, Frost & Sullivan; Outlook for 2021 and onwards is based on IMF data published in April 2020. Covid-19 impact not registered in the outlook 2021 onwards

1.9 GDP per capita PPP in India

India is projected to become fourth-largest economy of the world by 2026. Due to its large population, India is at the 145th position in term of GDP (nominal) per capita.

Exhibit 1.8(A): GDP per capita, current prices ('000 USD) (PPP; international $) 1990 - 2007



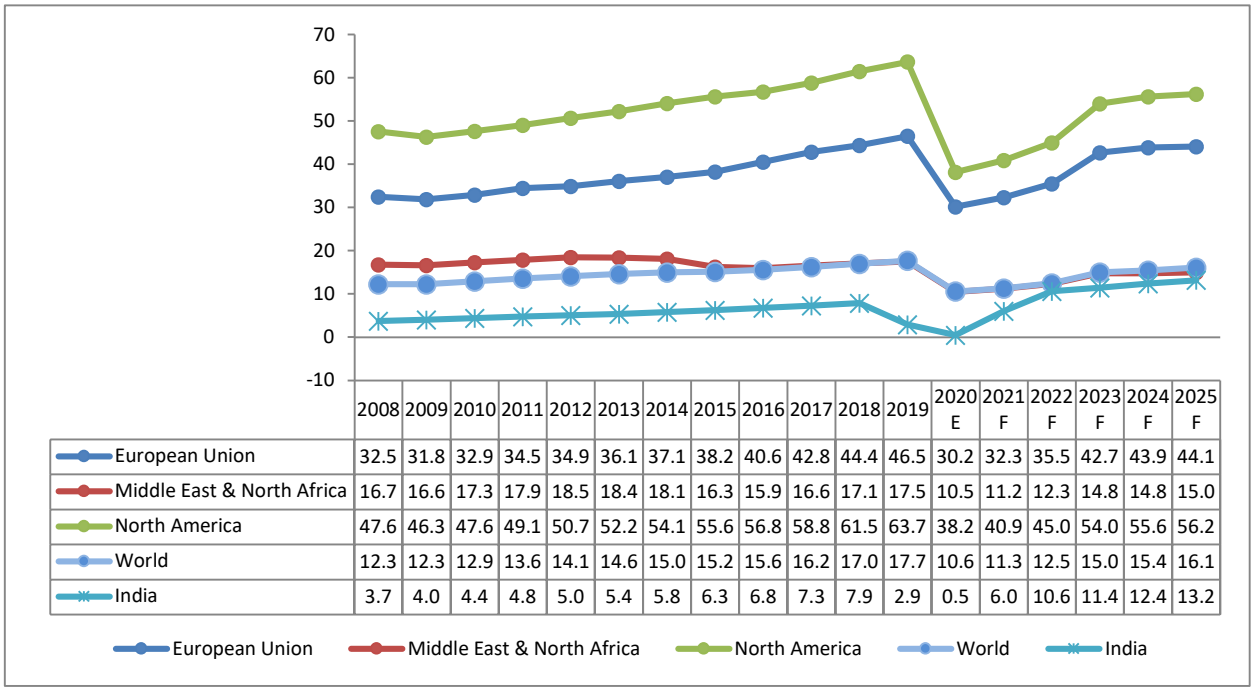
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
European Union	14.8	15.5	15.9	16.2	16.9	17.7	18.3	19.1	20.0	20.7	22.1	23.2	24.2	24.7	25.8	26.8	29.1	31.0
Middle East & North Africa	7.8	8.5	8.9	9.1	9.3	9.5	9.9	10.2	10.6	10.8	11.4	11.6	11.8	12.4	13.5	14.3	15.2	16.1
North America	23.5	23.9	24.9	25.9	27.2	28.2	29.4	30.8	32.2	33.9	35.6	36.4	37.3	38.8	40.9	43.3	45.5	47.1
World	5.5	5.8	5.9	6.1	6.3	6.6	6.9	7.2	7.3	7.6	8.0	8.3	8.6	8.9	9.5	10.2	11.0	11.7
India	1.2	1.2	1.3	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.4	2.6	2.9	3.2	3.6

Source: World Economic Outlook, International Monetary Fund Estimate-June 2020, World Bank, Frost & Sullivan

Forecasts are pre-covid and haven't been updated post Covid from World Bank

Exhibit 1.8(B): GDP per capita, current prices ('000 USD) (PPP; international dollars per capita)

2008 – 2025F



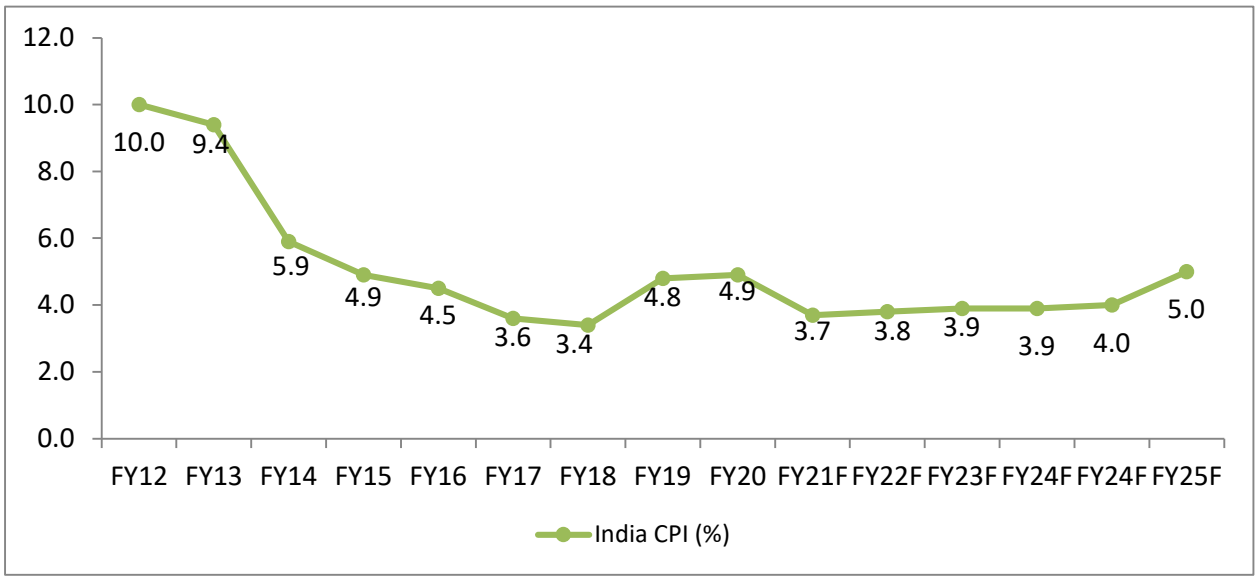
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 E	2021 F	2022 F	2023 F	2024 F	2025 F
European Union	32.5	31.8	32.9	34.5	34.9	36.1	37.1	38.2	40.6	42.8	44.4	46.5	30.2	32.3	35.5	42.7	43.9	44.1
Middle East & North Africa	16.7	16.6	17.3	17.9	18.5	18.4	18.1	16.3	15.9	16.6	17.1	17.5	10.5	11.2	12.3	14.8	14.8	15.0
North America	47.6	46.3	47.6	49.1	50.7	52.2	54.1	55.6	56.8	58.8	61.5	63.7	38.2	40.9	45.0	54.0	55.6	56.2
World	12.3	12.3	12.9	13.6	14.1	14.6	15.0	15.2	15.6	16.2	17.0	17.7	10.6	11.3	12.5	15.0	15.4	16.1
India	3.7	4.0	4.4	4.8	5.0	5.4	5.8	6.3	6.8	7.3	7.9	2.9	0.5	6.0	10.6	11.4	12.4	13.2

Source: World Economic Outlook, International Monetary Fund Estimate-June 2020, World Bank, Frost & Sullivan

Forecasts are pre-covid and haven't been updated post Covid from World Bank

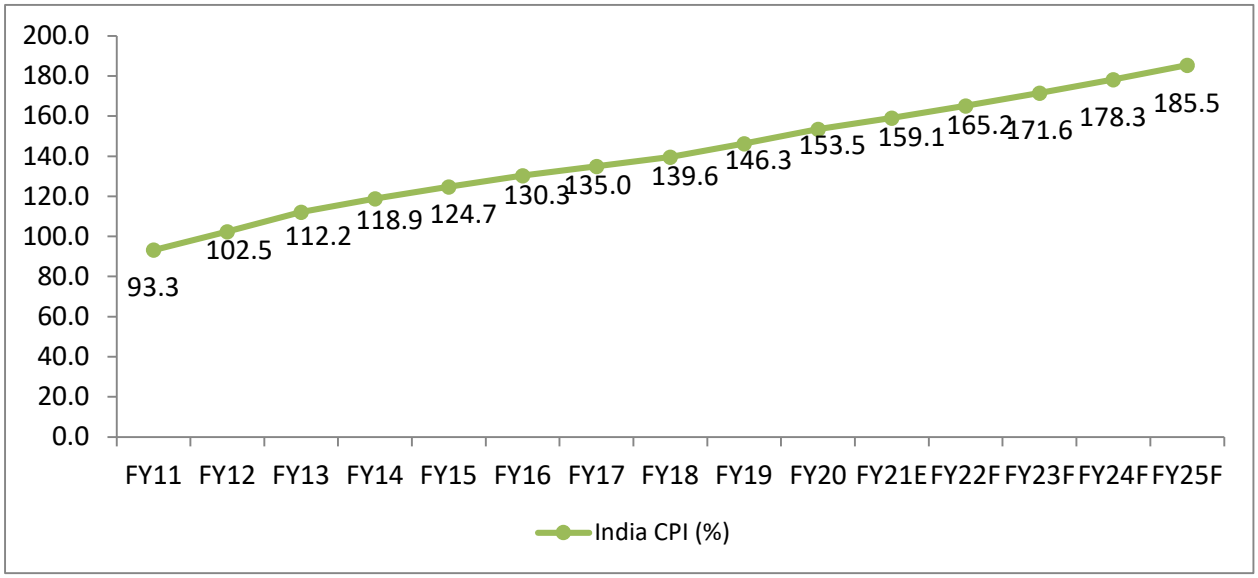
India's per capita income is approximately ~2.5 times lower than the world's average. This figure is over 50 times lower than the richest country of world and ~10 times greater than the poorest country. India stands at the 33rd position in the list of Asian countries.

Exhibit 1.9(A): Inflation (end of period consumer prices) (%) FY2012 – FY2025F



Source: World Economic Outlook, International Monetary Fund Estimate-June 2020

Exhibit 1.9(B): Inflation (end of period consumer prices – index value annual) FY2011 – FY2025F



Source: MOSPI, IMA

Persistent supply chain disruptions seem to have more than offset the impact of weak demand. Food cargo movement was restricted owing to re-instatement of lockdowns in many cities and heavy rains in agrarian states.

While food inflation remained the dominant factor, rising transport costs due to higher domestic taxes on petroleum products also contributed to the inflationary trends. A more favourable food inflation outlook may emerge in the coming months with bumper Rabi harvest and improving food

surplus management possibly easing prices of cereals. Price stabilisation in crude and retail fuels is also likely to ease incremental pressures on headline inflation.

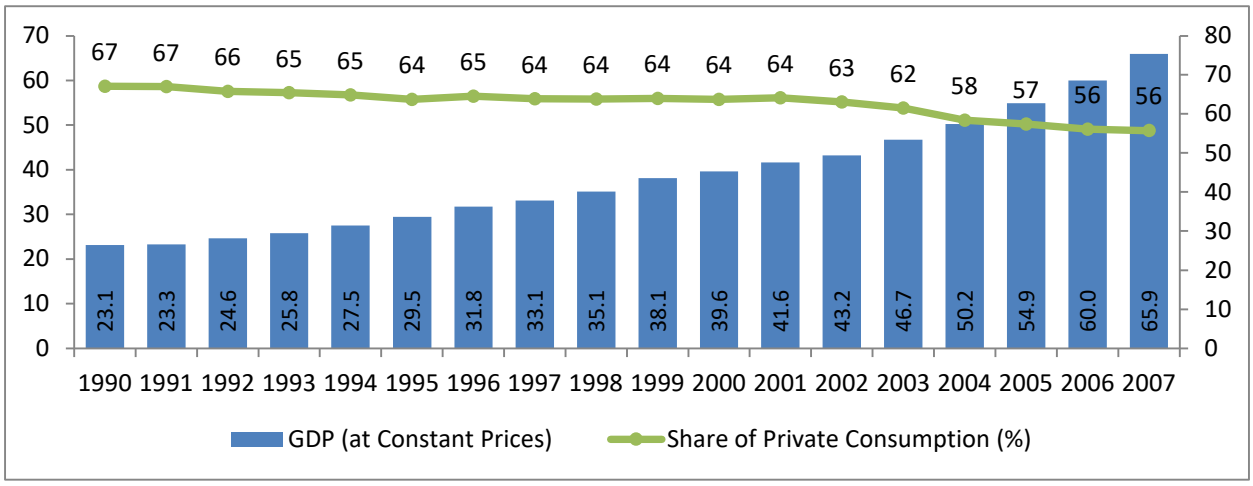
India's retail inflation has spiked sharply to 6.3% in May 2021 after easing to 4.23% in April 2021, as per data released by the government. Retail inflation, measured by the Consumer Price Index (CPI), has jumped primarily due to higher food and fuel prices. It has breached the Reserve Bank of India's target range of 2-6% for the first time in five months. Food inflation rose to 5.01% in May, compared to 2.02% in April. The core inflation in May stood at 6.6%. Wholesale price-based inflation data released indicated that it had surged to a record high of 12.94% in May due to rising prices of crude oil and manufactured goods. Experts have expressed concern about higher inflation and the second wave of the Covid-19 pandemic, which has severely impacted lower and middle income families. Several reports have highlighted how prices of several commodities have been rising for the past few months. It may be noted that the prices of petrol and diesel, edible oil and other FMCG products have sharply increased in May.

Overall, the yearly average Consumer Price Index (CPI) rate is expected to be ~3-4.5%, showcasing a significant drop as compared to FY20 (ending on March 2020), albeit owing to the significant demand slowdown from March to June 2020.

1.10 Share of household consumption as % of GDP

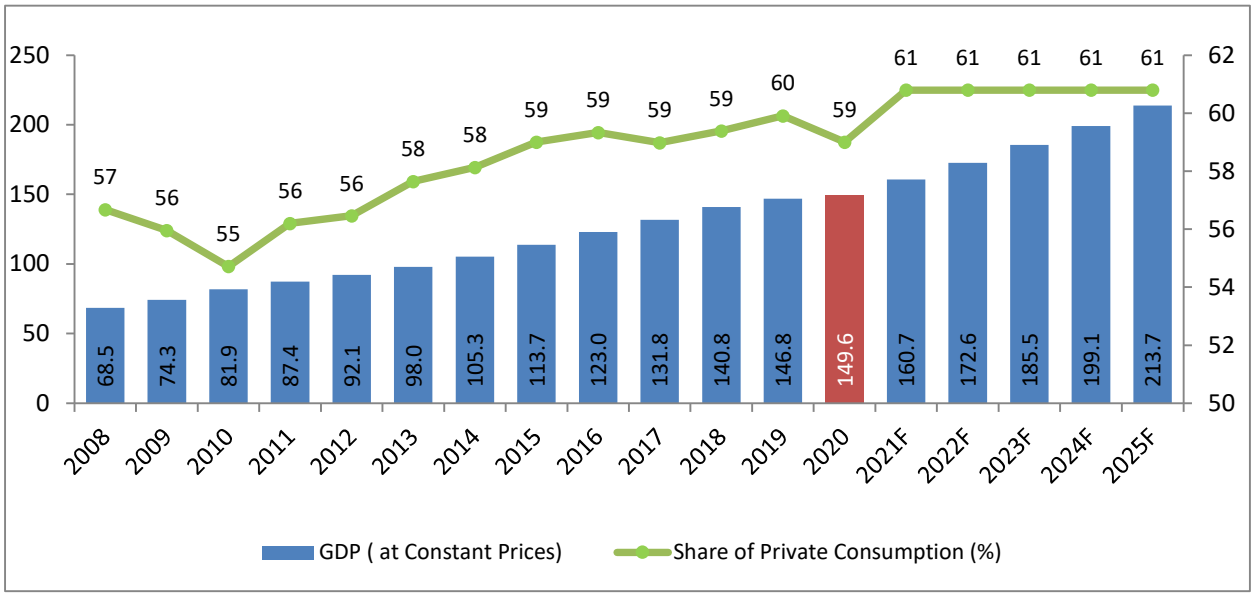
India Private Consumption accounted for 57.9 % of its Nominal GDP in Sep 2020, compared with a ratio of 57.1 % in the previous quarter. India Private Consumption contribution to Nominal GDP ratio is updated quarterly, available from Jun 1996 to Sep 2020, with an average share of 59.1 %.

Exhibit 1.10(A): Household consumption, % of GDP (INR 000'Bn) and Growth %, India, 1990 to 2007



Source: World Bank, International Monetary Fund Estimate-June 2020, Frost & Sullivan

Exhibit 1.10(B): Household consumption, % of GDP (INR 000'Bn) and Growth %, India, 2008 to 2025F



Source: CEIC, World Bank, International Monetary Fund Estimate-June 2020, Frost & Sullivan

In the latest reports, India GDP contracted 23.9 % YoY in Jun 2020. India Nominal GDP reached USD 635.2 Bn in Sep 2020. Its GDP deflator (implicit price deflator) increased 3.8 % in Sep 2020. India GDP Per Capita reached 2,140.4 USD in Mar 2020. Its Gross Savings Rate was measured at 31.4 % in Mar 2020. For Nominal GDP contributions, Investment accounted for 28.3 % in Sep 2020. Public Consumption accounted for 11.9 % in Sep 2020.

1.11 Demographic Overview of India

Population Growth

With a population of 1.35 bn in 2019, India is the second largest populated country in the world. The population is estimated to grow at a CAGR of 1.3% during 2019-2025F replacing China and making it the most populous country in the world.

The country has a relatively young demographic profile, with an average median age of 26.7 years in 2019 and is estimated to be 28.2 years in 2020; one of the lowest globally for 2020 as compared to 37.2 years in the US, 45.8 years in Japan and 36.3 years in China.[1]

[1] Print Week

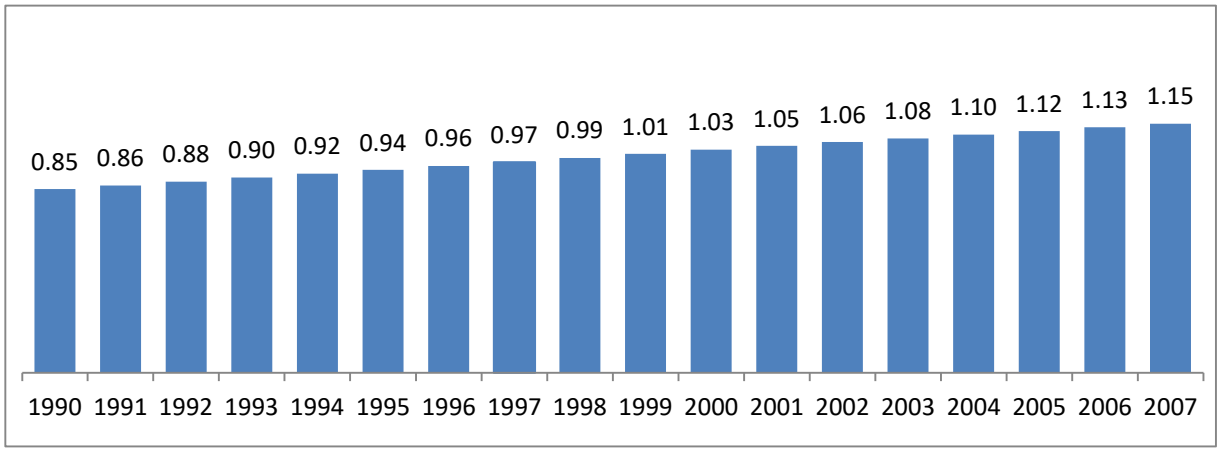


Exhibit 1.11(A): India Population in Bn, Historical and Projected, 1990-2007

Source: World Bank: Health Nutrition and Population Statistics: Population estimates and projections,
International Monetary Fund

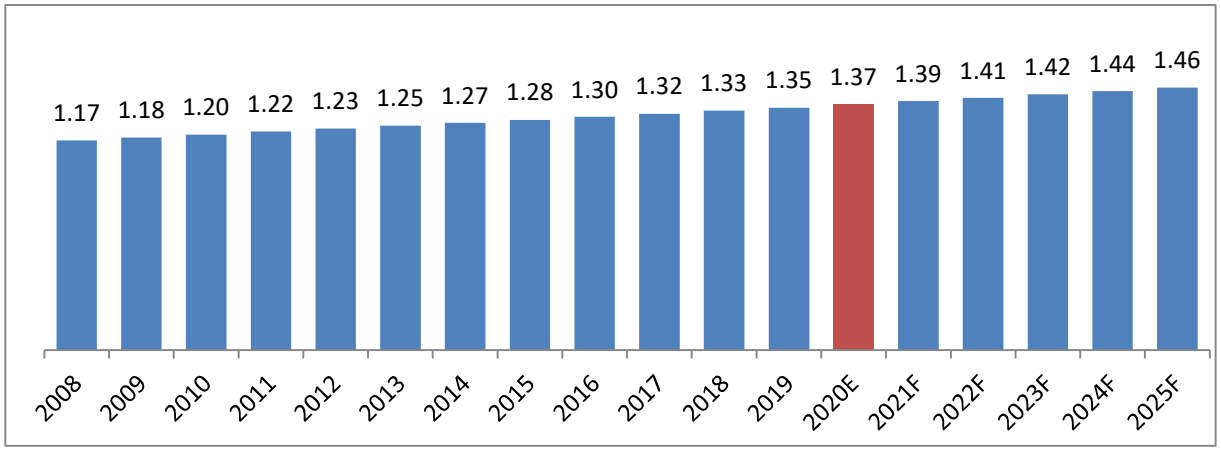


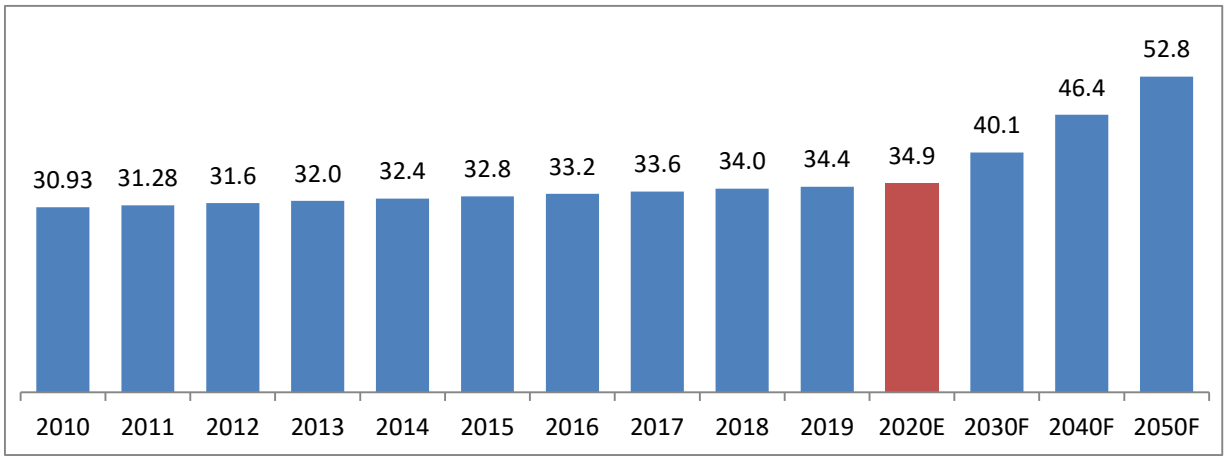
Exhibit 1.11(B): India Population in Bn, Historical and Projected, 2008-2025F

Source: World Bank: Health Nutrition and Population Statistics: Population estimates and projections,
International Monetary Fund Estimates-June 2020

1.12 Urbanization

The growing urban population of India has led to an increase in the urbanization of the country. There has been a drastic increase in urban towns and cities in the country over the past few years. There are almost 10 million people migrating to cities and towns every year. India's urban population has increased from 27.8% in 2001 to 32.8% in 2015 and is expected to further increase to 34.9% in 2020.

Exhibit 1.12: India Urban Population (%), 2010-2020E, Forecast 2050



Source: World Bank: Health Nutrition and Population Statistics: Population estimates and projections

The high economic growth, higher standard of living and increasing opportunities in the cities have led to urbanization, which has further added pressure on these cities in terms of infrastructure and housing. This has resulted in disordered urbanization and disparity in the market owing to the demands of the growing population. However, in order to cope up with this scenario the government has been working on planned urbanization, providing affordable housing to the poor by developing innovative housing finances.

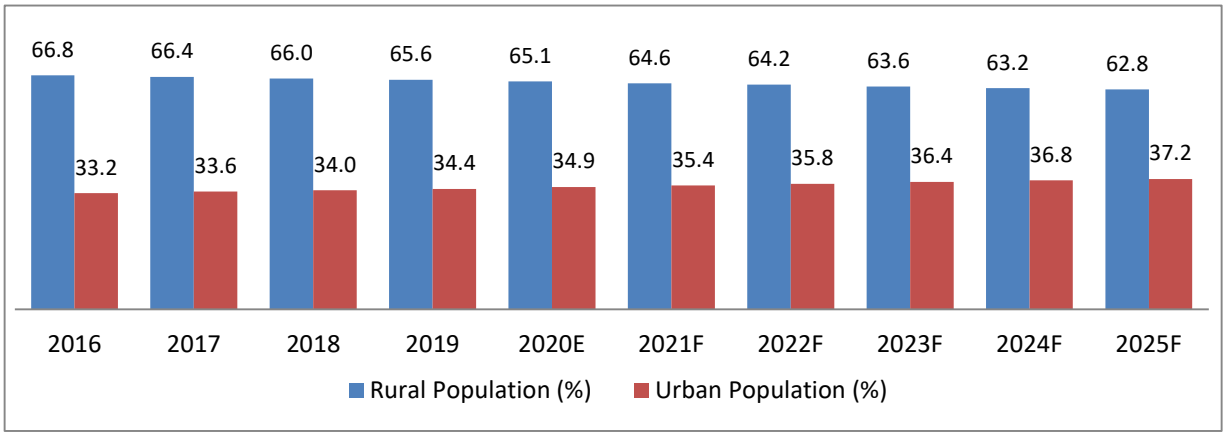


Exhibit 1.13: Rural vs. Urban Population, India Outlook (%), 2016-2025F

Source: World Bank: Health Nutrition and Population Statistics: Population estimates and projections, UN household size and composition database

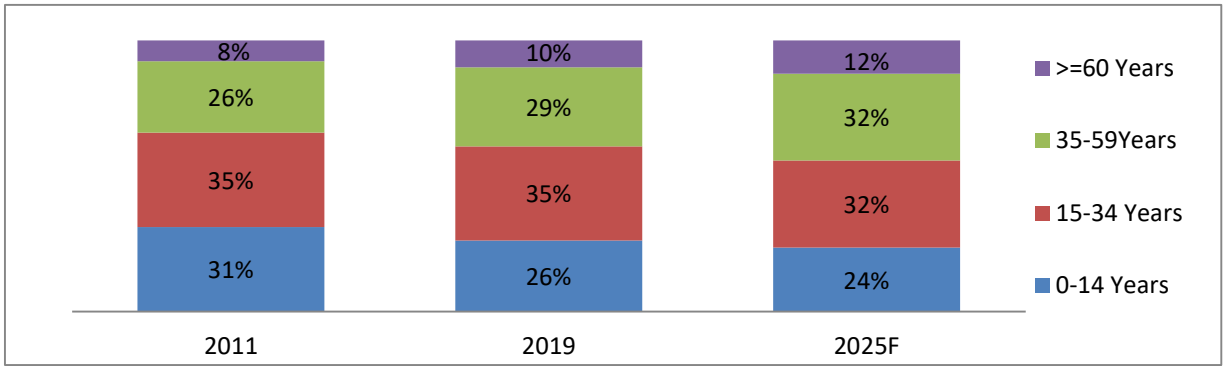
1.13 Demographic dividend

The demographic dividend is considered to be an important factor for the economic growth as the working age population is usually more productive. India is set to witness a considerable increase in the working population over the next decade. The median age in India will be 28.2 years by 2020 and 31.4 years by 2030.

The Indian economy has a potential to grow at a rapid rate as the working age population (15-59 years) comprises almost 64% of the total Indian population in 2019. Moreover, the youth (15-34 years) make up majority of the working-age population.

The demographic dividend can accelerate the development of the nation if implemented with effective policies.

Exhibit 1.14: Age Group Classification of the India Population, 2011-2025F



Source: World Bank: Health Nutrition and Population Statistics: Population estimates and projections

The Indian Government is serious about utilizing the potential of the demographic dividend and has introduced the National Skill Development Corporation (NSDC) which will be contributing significantly (about 30%) to the overall target of skilling/up skilling 500 Mn people in India by 2022[2], by encouraging private sector initiatives in skill development programmes and providing funds.

1.14 Sectoral Share of GVA

In terms of the contribution of various sectors to India's Gross Value Added in FY20, the service sector is the dominant sector with a revenue share of 55%, followed by industry at 31% and agriculture at 14%. The key industries in the country are textiles, chemicals, steel, cement and food processing. The government is working towards increasing the share of the manufacturing sector, a sub-component of industry. The government's 'Make in India' campaign aims at increasing the contribution of the manufacturing sector from 18% in FY20E to 25% by FY25F.

Although agriculture has a low share at 14%, it employs 49% of the labour force. The key agricultural products include rice, wheat, oilseed, cotton, jute, tea, sugarcane and lentils

The services sector is the largest sector of India. Gross Value Added (GVA) at current prices for the services sector is estimated at INR 96.54 lakh crores in 2020-21. The services sector accounts for 53.89% of total India's GVA of INR 179.15 lakh crores. With GVA of INR 46.44 lakh crores, the Industry sector contributes 25.92%. While Agriculture and allied sector share 20.19%. At 2011-12 prices, the Agriculture & allied, Industry, and Services sector's composition is 16.38%, 29.34%, and 54.27%, respectively. Share of primary (comprising agriculture, forestry, fishing, and mining & quarrying), secondary (comprising manufacturing, electricity, gas, water supply & other utility services, and construction), and tertiary (services) sectors have been estimated as 21.82%, 24.29%, and 53.89% respectively.

The service sector employs almost 29% of the labour force and includes key sectors such as financial services, telecommunication, tourism and insurance. Within the service sector, the financial sector continues to dominate in terms of contribution to the economy with a share of 22% in FY20E.

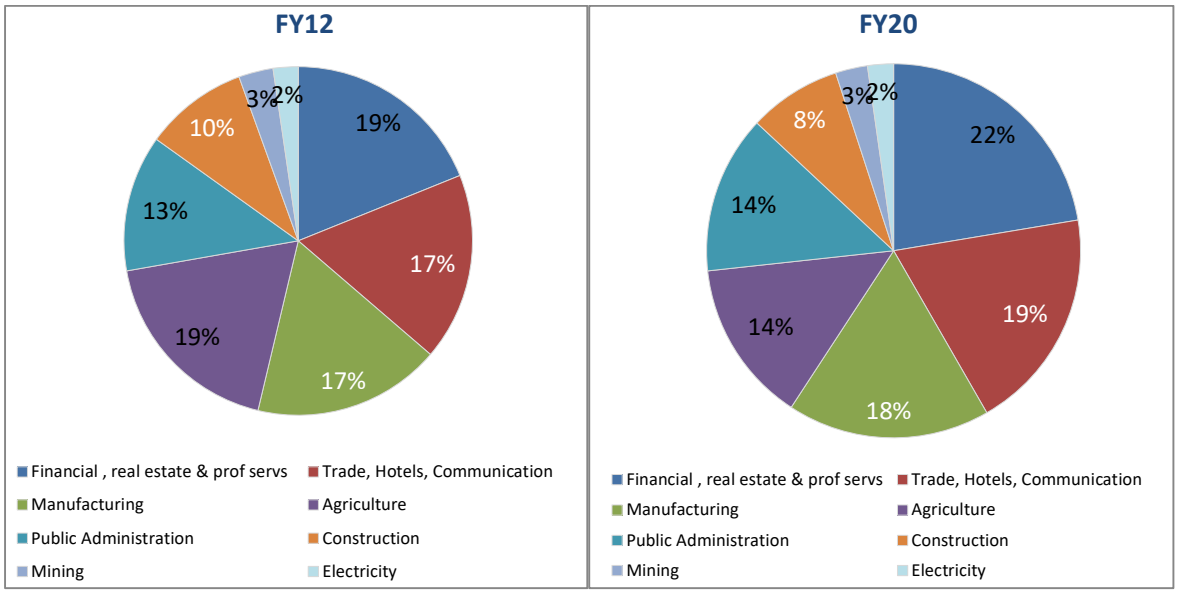
[2] Livemint

The Indian economy saw a recovery in the January-March quarter of 2021, before the second wave of the pandemic disrupted activity again. While gross value added in the final quarter of the fiscal year grew at a stronger pace than in the third quarter, the gross domestic product growth was subdued on account of past subsidy dues paid out in the fourth quarter.

Agriculture sector grew at 3.1% in fourth quarter compared to 4.5% in third quarter. The sector grew 3.6% for the full year. The mining sector contracted by 5.7% in fourth quarter compared to a contraction of 4.4% in the previous three months. Mining contracted by 8.5% annually. Manufacturing grew by 6.9% in fourth quarter compared to 1.7% in the previous three-month period. For the full year, the sector contracted by 7.2%. Construction grew 14.5% in fourth quarter compared to 6.5% in the preceding quarter. The sector contracted by 8.6% in the full year. Trade, hotel, transport, communication contracted by 2.3% in fourth quarter compared to their contractions of 7.9% in the previous quarter. Contraction for the full year was at 18.2%. The financial services sector grew at 5 .4% compared to 6.7% in the previous quarter. For the full year, the sector contracted by 1.5%.

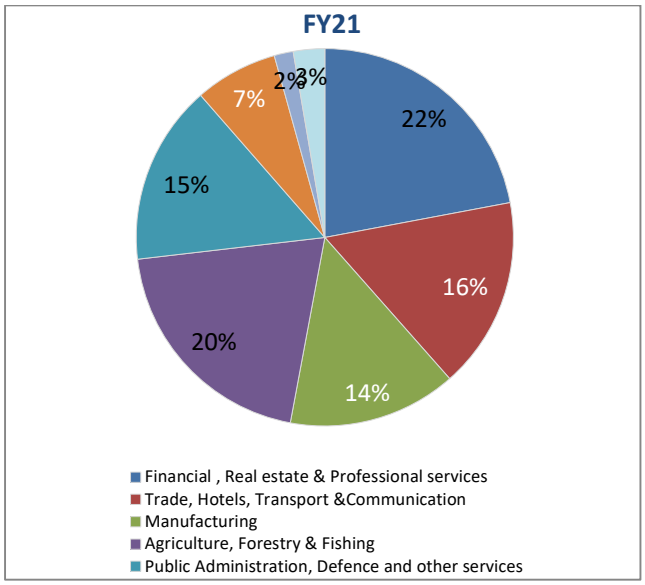
Source: BloombergQuint

Exhibit 1.15(A): Sectoral Share of GVA; (%), India, FY12 and FY20



Source: MOSPI – Second Advanced Estimates of National Income 2020-2021, at 2011-12 prices

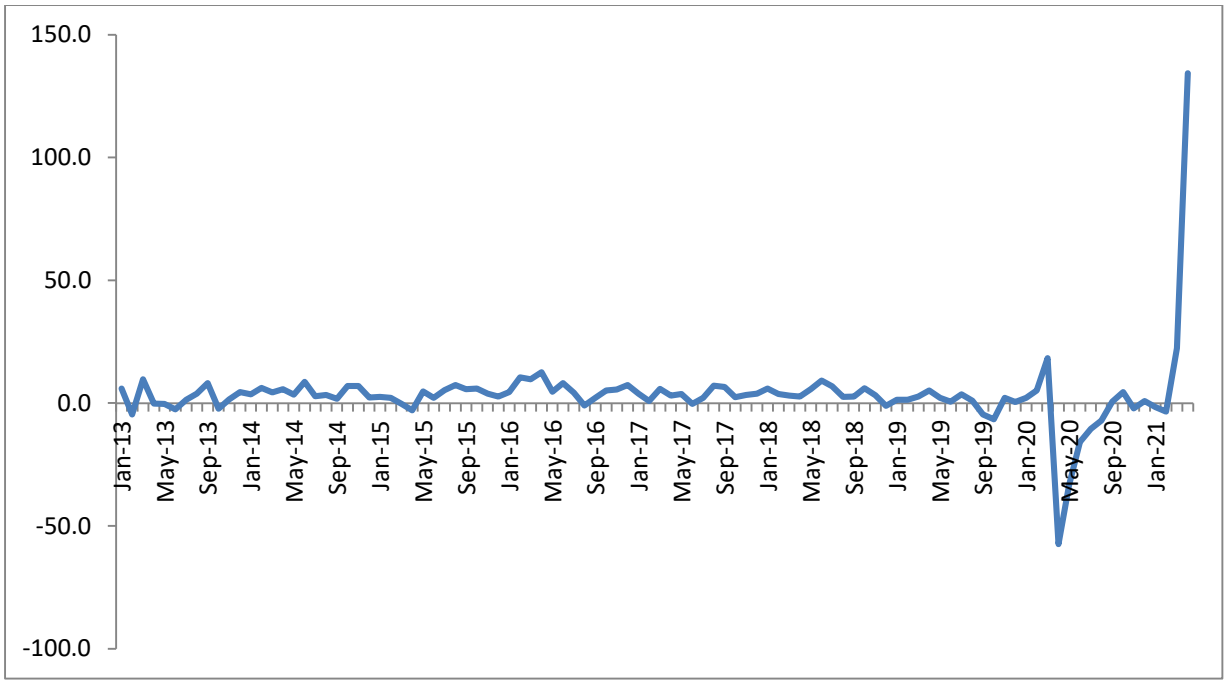
Exhibit 1.15(B): Sectoral Share of GVA; (%), India, FY21



Source: MOSPI – Second Advanced Estimates of National Income 2020-2021, at 2011-12 prices

1.15 Index of Industrial Production (IIP)

Exhibit 1.16(A): IIP Growth (%) – 2013 – 2020E



Source: MOSPI

IIP Growth (%)					
Jan-13	5.9	Oct-15	5.9	Jul-18	6.8
Apr-13	-0.2	Jan-16	4.5	Oct-18	6.1
Jul-13	1.4	Apr-16	12.6	Jan-19	1.4
Oct-13	-2.3	Jul-16	4.2	Apr-19	5.1
Jan-14	3.6	Oct-16	5.2	Jul-19	3.6
Apr-14	5.6	Jan-17	3.8	Oct-19	-6.6
Jul-14	2.8	Apr-17	3	Jan-20	2.2
Oct-14	6.9	Jul-17	2.2	Apr-20	-57.3
Jan-15	2.5	Oct-17	2.4	Jul-20	-10.5
Apr-15	-3	Jan-18	5.9	Oct-20	4.2
Jul-15	5.3	Apr-18	2.7	Jan-21	-1.6
				Apr-21	134.4

Source: MOSPI

The country's index of industrial production (IIP) surged **134.4%** year-on-year to 126.6 in the month of April primarily due to a low base in the previous year, according to the data released by the Ministry of Statistics & Programme Implementation (MoSPI).

India's industrial production contracted in January 2021 to -1.6% from 2.2% in January 2020, underscoring the flattening of the recovery trend seen in Oct-Dec quarter. The fall also marked a weak start to the calendar year 2021. India had imposed a lockdown on March 25, 2020 to curb Covid-19 and began lifting restrictions in stages from May, sparking an uptick. However, many states imposed shutdowns in July to curb outbreaks, undermining the recovery. The Centre further eased restrictions since September 1 and has taken steps to discourage local lockdowns.

The high-frequency indicators suggest that the economy picked up pace toward the end of August 2020 even though Covid-19 cases continued to rise again. The cases started to rise in India by May 2020 which reached a peak in September 2020 which started to flatten by December 2020. Second wave of Covid started in March-end of 2021. The new surge is taking place despite a year of awareness about the crying need to follow Covid-appropriate behaviour.

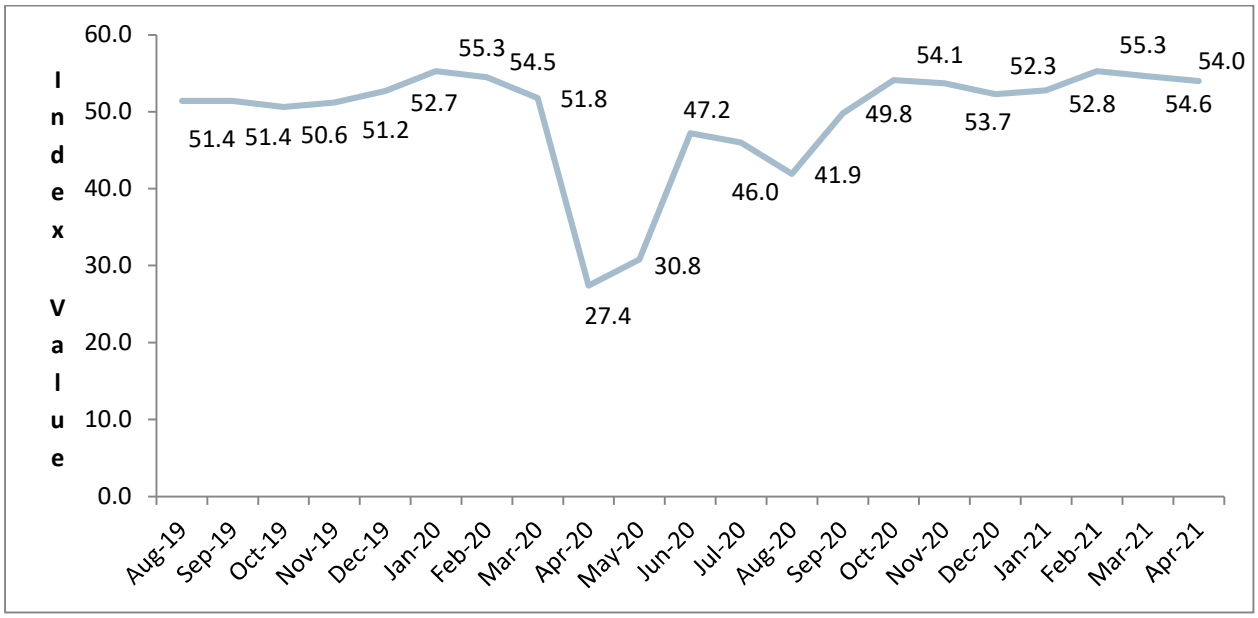
- The sales of passenger vehicles in India have reduced by over 2% in FY 2020-21. Passenger vehicle wholesales declined by 2.24%. The industry registered sales of 27,11,457 units as compared to 27,73,519 units in 2019-20.
- Two-wheeler dispatches also declined in the same time period. Sale of units from manufacturer to dealer reduced by 13.18%. In FY 19-20, the industry provided 1,74,16,432

units to dealerships, whereas in FY 20-21 the industry only registered wholesale of 1,51,19,387 units.

- The weightage of Manufacturing, Mining and Electricity production in overall Index of Industrial Production (IIP) is 77.6%, 14.3% and 7.9% respectively. The overall Index of Industrial Production for the month of February 2021 stands at 129.4 and January 2021 stands at 136.2 as compared to December 2020 (135.9), November 2020 (126.1) and October 2020 (129.2). The Indices of Industrial Production for the Mining, Manufacturing and Electricity Sectors for the month of February 2021 stand at 116.5, 129.3and 153.9 respectively.
- The net sales of consumer electronics and appliances industry grew by 23.5% y-o-y in Q3FY21 to INR 14.2 thousand crores from INR 11.5 thousand crores during the same period last year. Further, the net sales of players in this industry improved on a yearly basis from a decline of 54.7% in Q1FY21 to a growth of 23.5% in Q3FY21. This growth was primarily driven by pent up demand and festive season in Q3FY21 in particular aided the growth. Consumer electronics and appliances industry witnessed sharp contraction in demand in Q1FY21 due to the outbreak of Covid-19 and subsequent restrictions. However, demand has been improving from Q2FY21 till Q4FY21 due to ease in restrictions and is backed by pent up demand.
- Amid the GDP performance of all sectors, by clocking the 3.4% growth in FY21, agriculture achieved the bright spot. The growth was driven largely by a bumper Rabi harvest and facilitated by relaxation in lockdown. The gross value added (GVA) at current prices for agriculture and allied sectors rose by 3.4% in FY21 as against 4.0% Y-o-Y growth in FY20 vs. FY19. All other sectors (except Electricity and gas) had recorded a negative Y-o-Y growth in GVA. Electricity sector grew by 2.9% making Agriculture as the fastest growing segment

1.16 Purchasing Manager's Index (PMI)

Exhibit 1.17(B): India Purchasing Manager's Index – 2019 - 2021



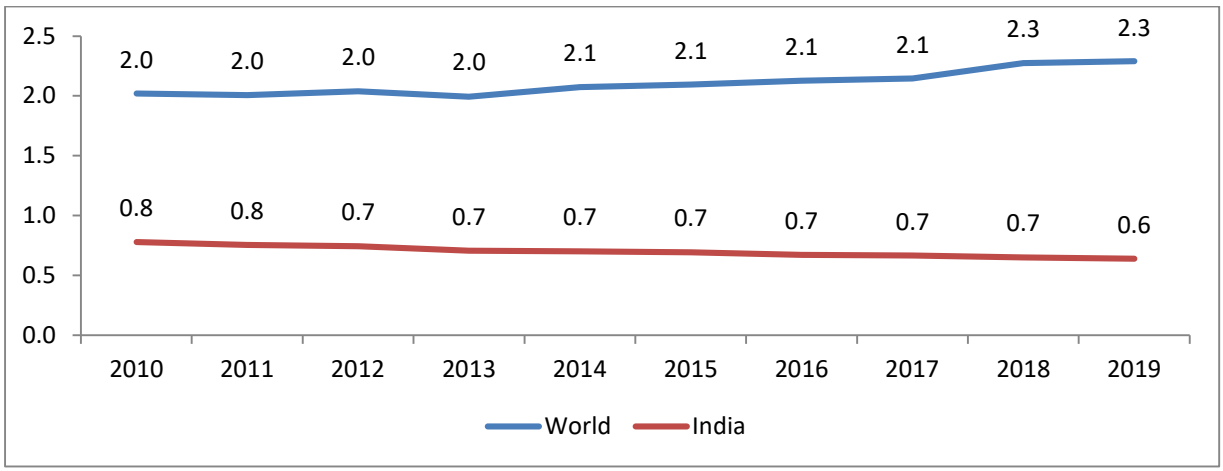
Source: MOSPI

A PMI reading over 50 or 50% indicates growth or expansion of the manufacturing sector as compared to the previous month, while a reading under 50 suggests contraction. A reading at 50 indicates that the number of manufacturers reporting better business is equal to those stating business is worse.

India PMI Index dropped drastically during the month of April 2020 to 27.4 which stayed at this level for about a quarter. PMI numbers from Q4 of FY 2020-21 looked promising with the index jumping all the way up to 54 in March 2021 from 27.4 in April 2020. The shift in PMI numbers suggest positive outlook of the Indian economy.

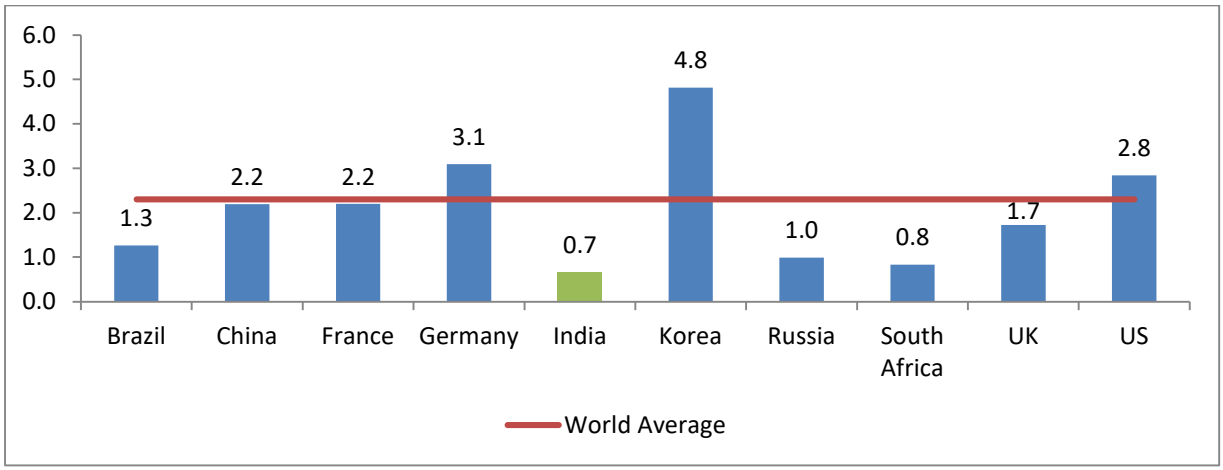
1.17 India's expenditure on R&D

Exhibit 1.18: World vs. India's Expenditure on R&D as a % of GDP; 2010 – 2019



Source: World Bank

Exhibit 1.19: World vs. India's Expenditure on Research and Development as a % of GDP; 2018



Note: Brazil and South Africa values are dated to 2017 as the World Bank has not updated the 2018 numbers; World average is 2.3%

Source: World Bank

Investment in research and development (R&D) is an important parameter manifesting data-driven and research-backed policymaking. It also supports creation of intellectual property rights and competitiveness. As a part of the Sustainable Development Goals, countries have pledged substantial increase in public and private spending in research and to also increase the number of researchers by 2030. Investment in research and innovation in India, which in FY 2021 stands at about 0.65% of GDP as compared to about 4.3% of GDP in a small country like Israel, needs to be significantly enhanced. India has witnessed a stagnant range of 0.6% to 0.7% of GDP in the last two decades; India will need to allot at least 2% of GDP to Research and Development.

In Covid-19 times, India has witnessed the importance of indigenous research in different sectors; like agriculture, healthcare, IT or manufacturing. The National Research Foundation (NRF), meant to fund, mentor and build quality of research in India, will indeed give a boost to the society and community relevant research as envisaged in the NEP, and also Atmanirbhar Bharat programme.

India is now focussing on increasing the R&D spend to bring India on par with the other countries as it is significantly lower than the top 10 economies' spend of 1-3%.It remains low despite the Centre's higher contribution to GERD (gross domestic expenditure on R&D). **Ramping up investment in research and development (R&D) will be the key for India to become the third largest economy, and increased investment from the private sector will be vital for this.** India must now focus on improving its performance on institutions and business sophistication innovation inputs. These are expected to result in higher improvement in innovation output.

1.18 Strong Growth Path

India's growth story was largely positive based on the strength of domestic absorption and the economy was registering a steady pace of economic growth pre-Covid. Moreover, its other macroeconomic parameters like inflation, fiscal deficit and current account balance had exhibited distinct signs of improvement. Though the pandemic has led to a short-term slowdown of the economy, the medium-long term fundamentals are sound and India is expected to witness the revival of its economy soon.

The government has taken several measures to revive the economy and to return to a normal to high growth trajectory. As the monetary and fiscal stimuli work their way through, India can expect an economic turnaround soon. In addressing the current slowdown, India has several advantages and comforting factors including the following:

- **Aatmanirbhar Bharat Abhiyan:** Prime Minister Narendra Modi on May 12, 2020 announced the Aatmanirbhar Bharat Abhiyan which combined relief, policy reforms and fiscal and monetary measures to help businesses and individuals to cope with the situation created by the pandemic and helps transform India into a self-reliant economy. Government seized the crisis to push forward long-pending industrial and other economic reforms in a least political resistant atmosphere.
    - This campaign is especially expected to benefit the Specialty chemicals sector, with several players hoping to position themselves as an alternative to China as the coronavirus crisis prompts companies to diversify their supply chains.
    - Government announced a production linked incentive (PLI) scheme for the promotion and manufacturing of pharmaceutical raw materials in India. The government's move is aimed to boost domestic manufacturing and cut dependence on imports of critical Active Pharmaceutical Ingredients (APIs). Further, the government has also decided to develop three mega bulk drug parks in partnership with states. These schemes will likely appeal more to the smaller players and should foster more investments. The government is soon planning to roll out such a scheme for the chemicals sector as well.
    - The government is also in the process of launching a production-linked incentive (PLI) for the chemical sector to increase self-reliance in the country. This move is to reduce country's dependency on imports of basic chemicals. The PLI scheme will help the sector to identify import-dependent chemicals and work towards producing them within the country.
    - Specialty chemical companies will look at import substitution along with export opportunities to further drive their business. Historically, domestic consumption has been the driving metric for Specialty chemicals manufacturing in India, with exports playing a much smaller part – owing to reduced raw material availability, higher utility tariffs and a stricter regulatory structure. However, owing to the current geo-political issues, India's focus on being a manufacturing hub for exports of specialty chemicals will increase, subsequently increasing the share of exports in the overall market.
- **Preferred Destination for Foreign Investment:** Lately, India has become an attractive destination for foreign investment owing to its large and rapid growing consumer market in addition to a developed commercial banking network, availability of skilled manpower and a package of fiscal incentives for foreign investors
- **Strong and Diversified Industrial and Infrastructural Base:** India has established a strong and diversified manufacturing base for the production of a wide variety of basic and capital goods to meet the requirements of various sectors; and systematically rolled out a public-private partnership (PPP) programme for the delivery of high-priority public utilities and infrastructure.

- **Burgeoning Foreign Exchange (Forex) Reserves:** Foreign exchange reserves of India totalled USD 477 Bn as on March 20, 2020. This figure stood at USD 581 Bn as on December 25, 2020, recording a whopping increase of USD 104 Bn in a relatively short period of around 9 months. The forex kitty had surged by USD 3.074 Bn to record a high of USD 608.081 Bn in the 2nd week of June 2021. Sliding from a lifetime high, the country's foreign exchange reserves declined by USD 4.148 Bn to reach USD 603.933 Bn for the week ended 18 June 2021 due to a fall in gold and currency assets, the Reserve Bank of India (RBI) data suggested. India's foreign exchange reserves however, provide confidence in the country's ability to manage the balance of payments.

- **Demographic Dividend:** Presently, India is one of the youngest nations in the world with more than 62% of its population in the working age group (15-59 years), and more than 54% of its total population below 25 years of age. Its population pyramid is expected to bulge around the 15-59 age groups over the next decade. This poses a formidable challenge as well as a huge opportunity.

- **Aatmanirbhar Bharat Abhiyan- 02:** These announcements were made on 12th Oct 2020:

– Rs. 25,000 crores provided as additional capital expenditure to Ministry of Road Transport and Ministry of Defence

– 11 States were sanctioned Rs. 3621 crores as interest free loan towards capital expenditure

- **Aatmanirbhar Bharat Abhiyan- 03:**

– Prime Ministers Rozgar Protsahan Yojana (PMRPY) was implemented up to 31.3.2019 to incentivize formalization and creation of new employment

– Total benefit of Rs. 8300 Crores has been given to 1,52,899 Establishments covering 1,21,69,960 Beneficiaries under PMRPY

Indian Government Initiatives and Policies for Manufacturing Sectors: Prime Minister of India, Mr Narendra Modi, launched the 'Make in India' program to place India on the world map as a manufacturing hub and give global recognition to the Indian economy. Government aims to create 100 Mn new jobs in the sector by 2022. With the help of Make in India drive, India is on a path of becoming the hub for hi-tech manufacturing as global giants such as GE, Siemens, HTC, Toshiba, and Boeing have either set up or are in process of setting up manufacturing plants in India, attracted by India's market of more than a Bn consumers and an increasing purchasing power.

According to the United Nations Conference on Trade and Development (UNCTAD), India ranked among the top 10 recipients of Foreign Direct Investment (FDI) in South Asia in 2019, attracting USD 49 Bn, a 16% increase from the previous year. Cumulative Foreign Direct Investment (FDI) in India's manufacturing sector reached USD 89.4 Bn during April 2000 - March 2020. In May 2020, the Government of India increased FDI in defence manufacturing under the automatic route from 49% to 74%. India has become one of the most attractive destinations for investment in the manufacturing sector. Some of the major investments and developments in this sector in the recent past are:

- In November 2020, the National Small Industries Corporation (NSIC) signed a Memorandum of Understanding (MoU) with Dun & Bradstreet Information Services

India to create an ecosystem to encourage, finance and promote growth of micro, small and medium enterprises (MSMEs)

- In October 2020, Japan Bank for International Cooperation (JBIC) agreed to provide USD 1 Bn (INR 7,400 crores) to SBI (State Bank of India) for funding the manufacturing and sales business of suppliers and dealers of Japanese automobile manufacturers and providing auto loans for the purchase of Japanese automobiles in India
- In October 2020, Tata Group announced plans to invest INR 5,000 crores (USD 673.20 Mn) to set up an Apple phone component plant in Hosur, Tamil Nadu
- In October 2020, Grinntech, an investor-backed start-up specialising in lithium-ion batteries for EVs and energy storage systems, signed a MoU with the Tamil Nadu government to establish a battery and battery management system manufacturing facility in the state
- In October 2020, five international electronics manufacturing applications from companies such as Foxconn, Wistron, Pegatron, Samsung and Rising Star have been approved by the Government of India to set up production worth INR 9 Trillion (USD 122.5 Bn) over the next five years
- In October 2020, five Indian manufacturers such as Micromax, Lava, Padget Electronics, UTL Neolyncs and Optiemus Electronics have been cleared by the Government of India to set up handset production
- In September 2020, Pegatron, the second-largest manufacturer of Apple after Foxconn, began its India operations. The move is a precursor for the Taiwanese electronics maker to set up a manufacturing base in India.

Government Initiatives

The Government of India has taken several initiatives to promote a healthy environment for the growth of manufacturing sector in the country. Some of the notable initiatives and developments are:

- In November 2020, the Ministry of Skill Development and Entrepreneurship begun skill training of 3 lakh migrant workers from the identified 116 districts across Uttar Pradesh, Bihar, Rajasthan, Odisha, Madhya Pradesh and Jharkhand. The initiative aims to empower migrant workers and rural population in the post-COVID-19 era through demand-driven skilling and orientation under the centrally sponsored and centrally managed (CSCM) component of the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 2016-20.
- In March 2020, the government approved the Production Incentive Scheme (PLI) for Large-scale Electronics Manufacturing. The scheme proposes production-linked incentive to boost domestic manufacturing and attract large investments in mobile phone manufacturing and specified electronic components including Assembly, Testing, Marking and Packaging (ATMP) units.
- In May 2020, Government increased FDI in Defence manufacturing under the automatic route from 49% to 74%

- In March 2020, the Union Cabinet approved financial assistance to the Modified Electronics Manufacturing Clusters (EMC2.0) Scheme for development of world class infrastructure along with common facilities and amenities through Electronics Manufacturing Clusters (EMCs)
- Under the Pradhan Mantri Kaushal Kendras, 73 lakh people were trained during 2016-20 while 723 Pradhan Mantri Kaushal Kendras were established till Jan 2020
- As of August 2020, there were about 15,000 Industrial Training Institutes (ITIs) in India
- In August 2019, the Government permitted 100% FDI in contract manufacturing through the automatic route
- Under the Make in India initiative, Government aims to increase the share of the manufacturing sector to country's GDP to 25% by 2025.
- Under the Mid-Term Review of Foreign Trade Policy (2015-20), the Government of India increased export incentives available to labour intensive MSME sectors by 2%. In April 2020, Government extended FTP for one more year, up to March 31, 2021.

Source: IBEF

Across India, the recent revision of Market Access Initiative by the Ministry of Commerce and Industry aims at benefiting the small to mid-segment newer industry players which do not possess global sales and marketing reach. As a result of the revised MAI policies, the robust growth in Contract Research & Manufacturing Services (CRAMS) industry in India will support newer economies such as Myanmar, Cambodia to collaborate with the local Indian players beneficial for the overall growth of the Asian economy. Moving forward, with a total of over 300 USFDA approved manufacturing sites, the country can become the global leader in the CRAMS industry with the implementation of mandates including Schedule M (Good Manufacturing Practices (GMP) for Premises & Materials and Requirements of GMP in Plant and Equipment)outlining various requirements for manufacturing good quality drugs and pharmaceuticals, by applying Current Good Manufacturing Practice (CGMP) guidelines.

India is an attractive hub for foreign investments in the manufacturing sector. Several mobile phone, luxury and automobile brands, among others, have set up or are looking to establish their manufacturing bases in the country.

The manufacturing sector of India has the potential to reach USD 1 trillion by 2025. The implementation of the Goods and Services Tax (GST) will make India a common market with a GDP of USD 2.5 trillion along with a population of 1.32 Bn people, which will be a big draw for investors.

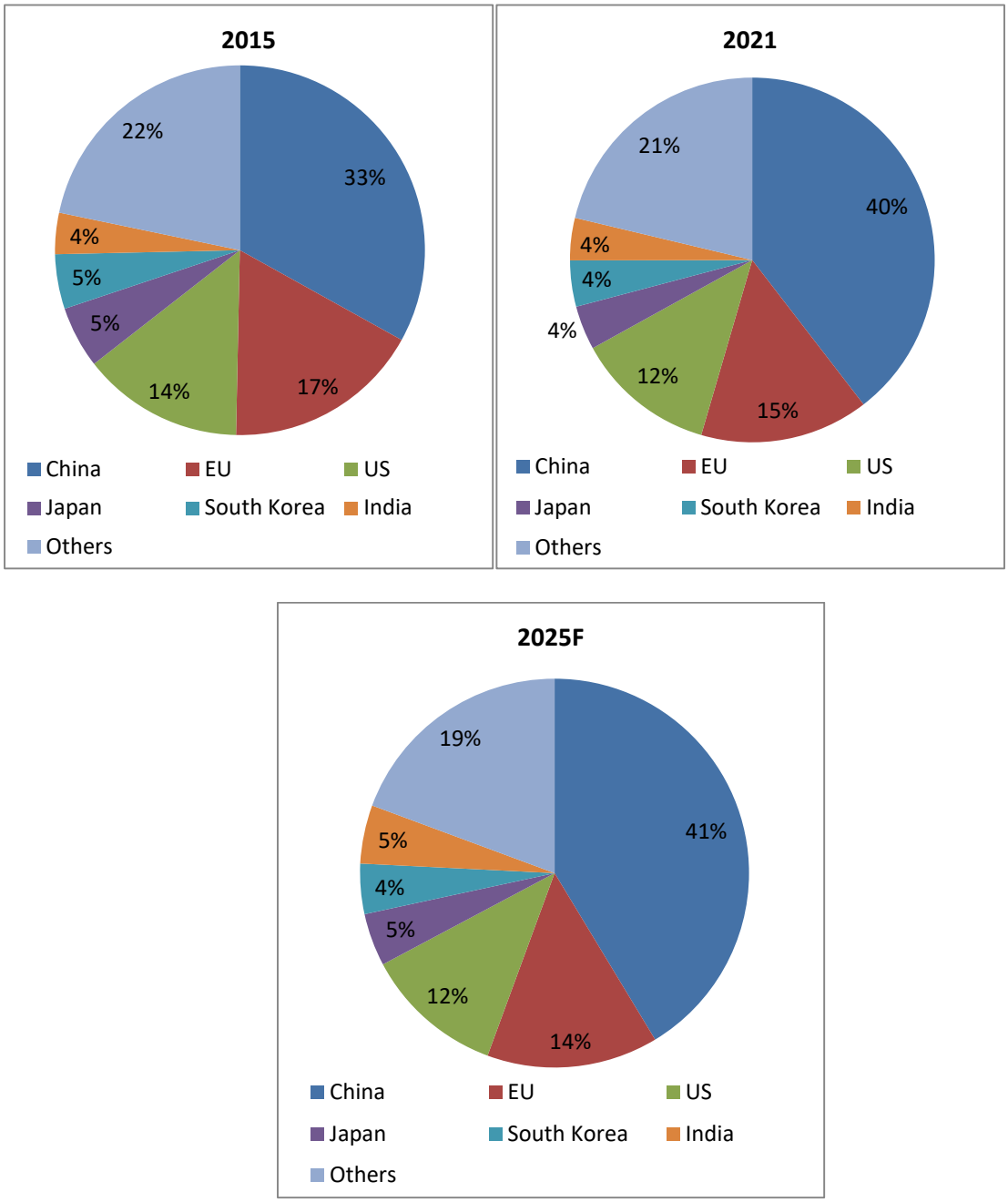
With impetus on developing industrial corridors and smart cities, the Government aims to ensure holistic development of the nation. The corridors would further assist in integrating, monitoring and developing a conducive environment for the industrial development and will promote advance practices in manufacturing.

Chemicals and Specialty Chemicals Market

2.1. Global Chemical Industry Overview

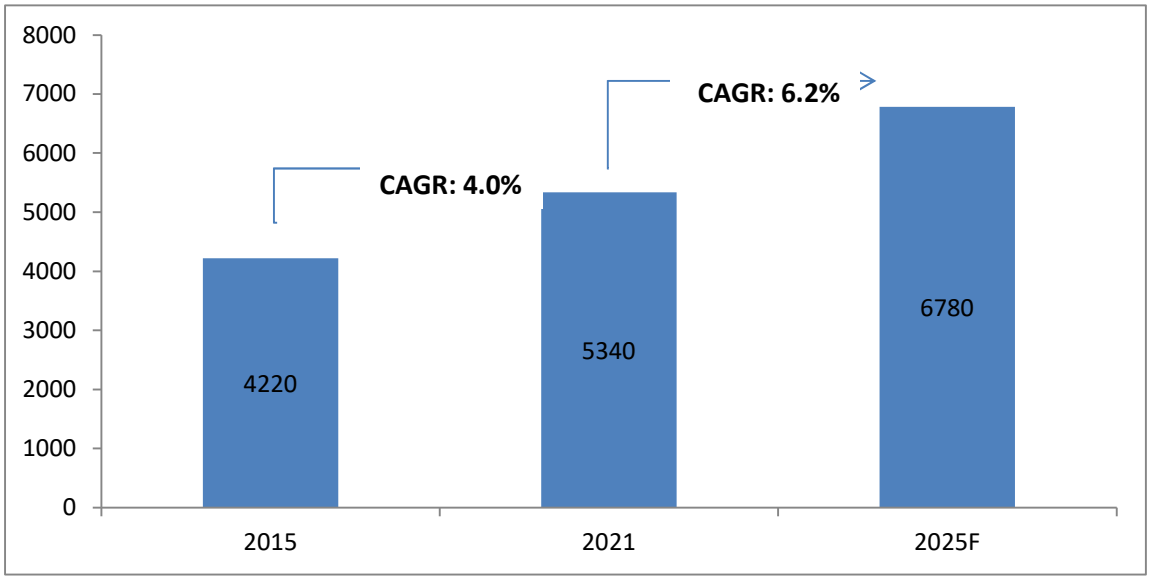
The global chemicals market is valued at around USD 5,340 Bn with China accounting for major market share (40%) in the segment followed by European Union (15%) and United States (12%). India accounts for ~4% market share in the global chemicals market. The global chemicals market is expected to grow at 6.2% CAGR; reaching USD 6,780 Bn by 2025. Going forward the APAC is anticipated to grow at the fastest rate of 7-8% during the forecast period (2021-25F). The chemicals markets in Western Europe, North America, and Japan are relatively mature and hence would record slow growth rates of around 3-4%.

Exhibit 2.1: Global chemicals market, 2015, 2020 & 2025F, USD 4,227, USD 5,340 Bn & 6,780 Bn



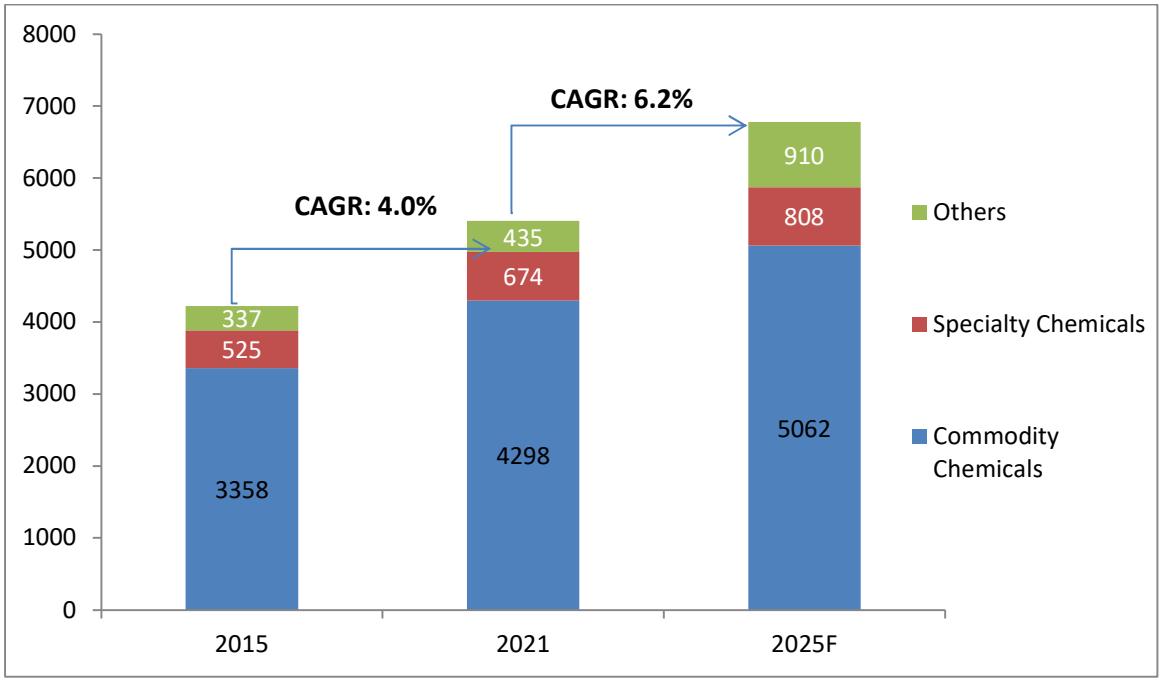
Source: Frost & Sullivan

Exhibit 2.2: Global chemicals market, 2015, 2021 and 2025F (USD Bn)



Source: Frost & Sullivan

Exhibit 2.3: Global chemicals market, 2015, 2021 and 2025F (USD 4220 Bn, USD 5,340 Bn and USD 6780 Bn) along with segment wise CAGR growth



	Commodity Chemicals	Specialty Chemicals	Other Chemicals
2015-20	4.20%	4.26%	4.35%
2020-25F	3.33%	3.69%	15.90%

Source: Frost & Sullivan

Note: Others mainly include Biotech chemicals.

Commodity Chemicals: The commodity chemicals market includes companies that manufacture basic chemicals in large volumes. These include basic chemicals like caustic soda, chlorine, bromine, polymers and plastics, synthetic fibres, films, certain paints and pigments, explosives, and petrochemicals. There is limited product differentiation within the sector; products are sold for their composition. The commodities market is highly fragmented. The leading companies, The Dow Chemical and BASF SE, account for less than 5% of the total market each in 2021. Other industry leaders include Bayer AG, DuPont de Nemours, and AkzoNobel. More than 85% of the market share, however, is accounted for by a mix of other companies. The end user markets include other basic chemicals, specialties, and other chemical products; manufactured goods such as textiles, automobiles, appliances, and furniture; and pulp and paper processing, oil refining, aluminium processing, and other manufacturing processes. Markets also include some non-manufacturing industries. The sector is presently valued at ~USD 4,298 Bn and is expected to grow at ~4% globally in the next five years.

- **Petrochemicals** are derived from crude oil, crude products, or natural gas. Petrochemicals are used in the manufacture of numerous products such as synthetic rubber, synthetic fibres (e.g., nylon and polyester), plastics, fertilizers, paints, detergents, and pesticides. It is the basis for most organic chemistry. The global petrochemicals market size was predicted at ~USD 498 Bn in 2021 and is anticipated to witness a CAGR of 5%-6% over the forecast period. The growth of the market for petrochemicals will be driven by rising demand for downstream products from end-use industries and capacity additions in the base chemical industry.

Specialty Chemicals: The specialty chemicals market is characterized by high value-added, low volume chemical production. These chemicals are used in a wide variety of products, including fine chemicals, additives, advanced polymers, adhesives, sealants and specialty paints, pigments, and coatings. The specialty market is extremely fragmented. The consolidation of companies has been a major trend, and is expected to continue. Similar to the commodity sector, the specialty sector is affected by high costs of energy and feedstock. Intangible value issues include heightened emphasis on research, customer migration to alternative products, and the impact of regulations on products. The overall market stood at ~USD 674 Bn in 2021, and is expected to showcase a growth between 5-6% till 2025.

- **Agrochemicals & Fertilizers:** The global Agrochemicals & Fertilizer Market is expected to garner revenue of ~USD 250-260 Bn by 2025 with a CAGR of 5.5-6% during the forecast period of 2020-25 from present ~USD 206 bn. The major chemicals used in agriculture to regulate plant growth are synthetic fertilizers, pesticides, and hormones, amongst others. The growth of agriculture in the emerging markets such as South America, Africa, and the Middle East is paving the way for several profitable opportunities for the market players. Additionally, a strong focus of agrochemical manufacturers on product innovation is expected to render a higher competitive advantage to them over their rivals. The market of agrochemicals & fertilizers in China and India is expected to grow significantly owing to the increase in consumption and production of fertilizers, such as nitrogen based, potassium based fertilizers, in these countries. China and India are the major exporters of agrochemicals & fertilizers in the Latin America, Asia Pacific and other regions. These factors are expected to create a robust platform for the growth of the China and India market. A key

success factor for the crop protection chemicals in the market is extensive R&D capabilities of a company to develop new molecules satisfying the government norms and stringent environment regulations (possibly having higher pesticide biodegradability index). Emergence of bio-pesticides are making a splash in the existing crop protection market, however product features in these green pesticides are so limited that it has not gained popularity as much as traditional crop protection chemicals. Although it remains a challenge as of now, to introduce (equally effective) 100% sustainable pesticide, transition to hybrid pesticides is seen as future solution for the sustainable agriculture. This essentially ensures a robust growth trajectory for traditional crop protection chemicals in high-volume-high-growth centres like India. Following are some of the critical success factors for the players involved in crop protection chemicals –

1. **Backward integration of technical active ingredients** – Many formulators' needs to have backward integration of its technical AI's (Active Ingredients) in order to succeed in gaining high profit margins in the market.

2. **Comprehensive product portfolio** – 'One stop solution' for farmers of all the agrochemical needs surely drives the success of one firm over another

3. **Strong distribution network** – Distribution network plays vital role in reaching at the fragmented farmers' base across the world also enabling excellent feedback mechanism & deep customer relations.

World chemicals sales were valued at USD 5027 Bn in 2020. China is the largest chemicals producer in the world, contributing to about 39% of global chemical sales in 2020. With 15%, the EU27 chemical industry ranked second in total sales and United States ranked third with 13%.

Worldwide, the competitive landscape has changed significantly over the last ten years. Today, next to the EU 27, US and Japan mostly emerging countries from Asia rank in the top 10 in terms of sales. The BRICS countries (Brazil, Russia, India, China and South Africa) accounted for about 48% of global chemical sales in 2020. Together with the EU27 and the USA the BRICS accounted for more than three quarters of global chemical sales, in 2019. The remaining quarter of global chemical sales were generated mainly by emerging countries in Asia, including the Middle East.

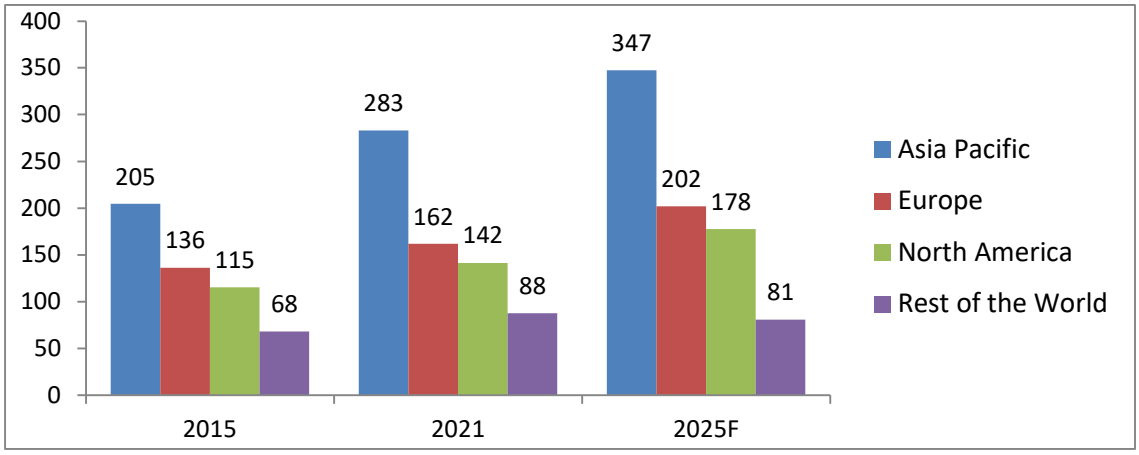
The global landscape of the chemical industry is changing rapidly. China is taking its chemical industry to the next stage of development and is looking to move from "following the lead" to "taking the lead" and from a "big country" to a "great power" of the petroleum and chemical industry, leading in technology innovation and trade, and prevailing in international markets.

2.2. Global Specialty Chemicals Market

Specialty chemicals are low-volume and high-value products which are sold on the basis of their quality or utility, rather than composition. Thus, they may be used primarily as additives or to provide a specific attribute to the end product. Specialty chemicals are more likely to be prepared and processed in batches. The focus is on value addition to the end-product and the properties or technical specifications of the chemical.

Rapid industrialisation in India and China is expected to drive demand for specialty chemicals. The Asia Pacific (APAC) dominates the market across the world, with a share of 42%, owing to the huge customer base, leading to high demand for specialty chemicals, increasing industrial production, and robust growth of the construction sector in the region. APAC is followed by Europe and North America.

Exhibit 2.5: Global Specialty Chemicals Market by Geography, 2015, 2021, 2025F Value (USD 525 Bn, USD 674 Bn, USD 808 Bn)



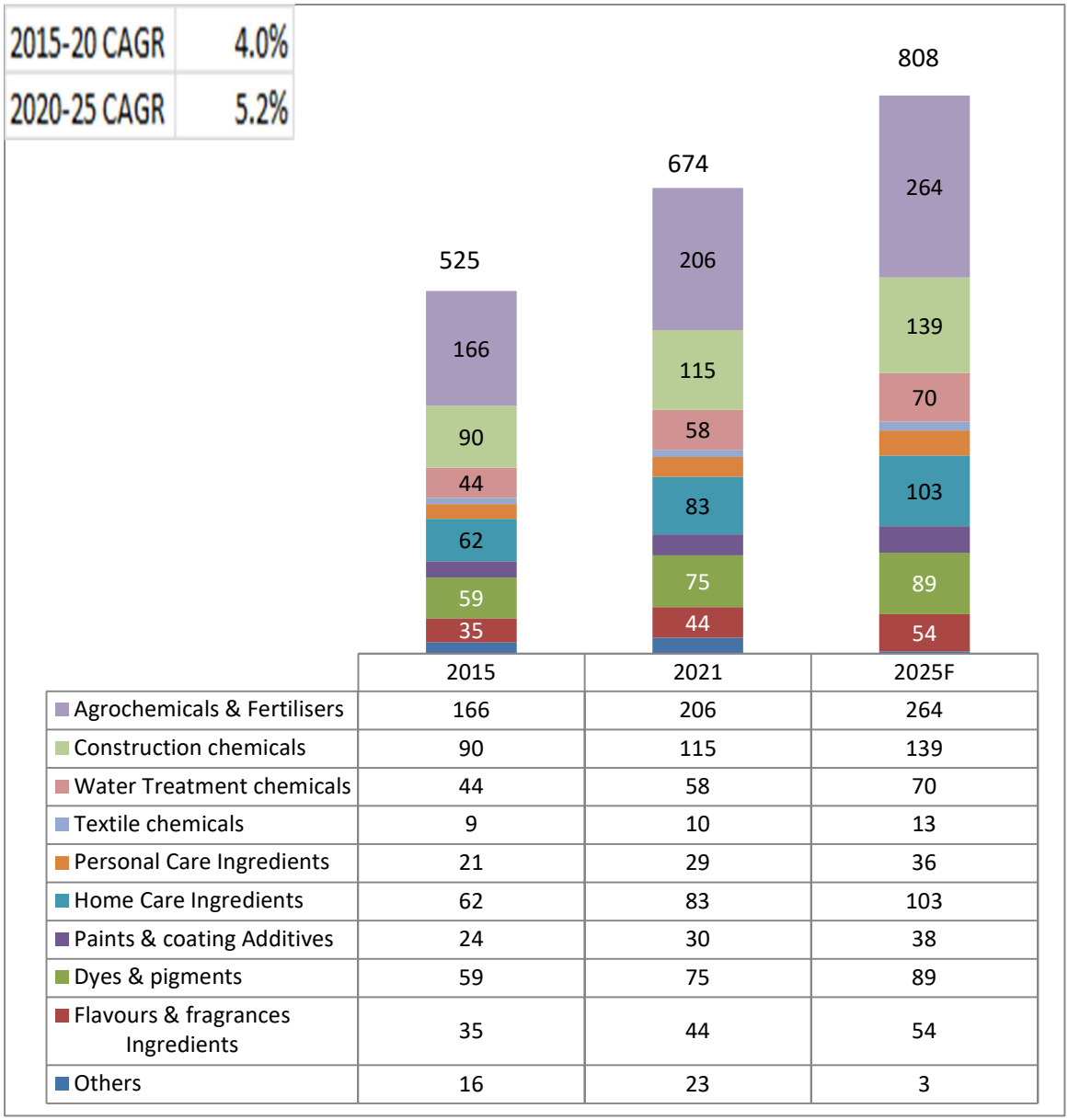
Source: Frost & Sullivan

With a high population base and majority of countries being underdeveloped or developing nations in Asia Pacific (APAC), there is high rate of construction activities resulting in higher demand for construction chemicals and paints & coatings additives. Embracing modern practices in the fields, agrochemicals have seen tremendous growth particularly for pesticides and fertilizer consumption. The consumption of pesticides in Asia-Pacific recorded the fastest growth rate on a global basis and from ~525 KT in 2015 reached a projected volume of ~635 KT in 2020. China, India and Japan represent the largest agrochemicals markets of the Asian continent. Currently, China is leading the market with its developing agricultural sector along with the need for its ever growing population. Globally, China is not only the largest producer but also the largest consumer of fertilizers.

2.3. Market Segmentation – by Industry and Application Type

Specialty chemicals industry can be categorised into a mix of end-use driven segments and application-driven segments. In terms of attractiveness, the various segments across specialty chemicals differ in competitive intensity, margin profiles, defensibility against raw material cost movements, and growth.

Exhibit 2.6: Global Specialty Chemicals Market, Value (USD Bn), 2015, 2020 and 2025F

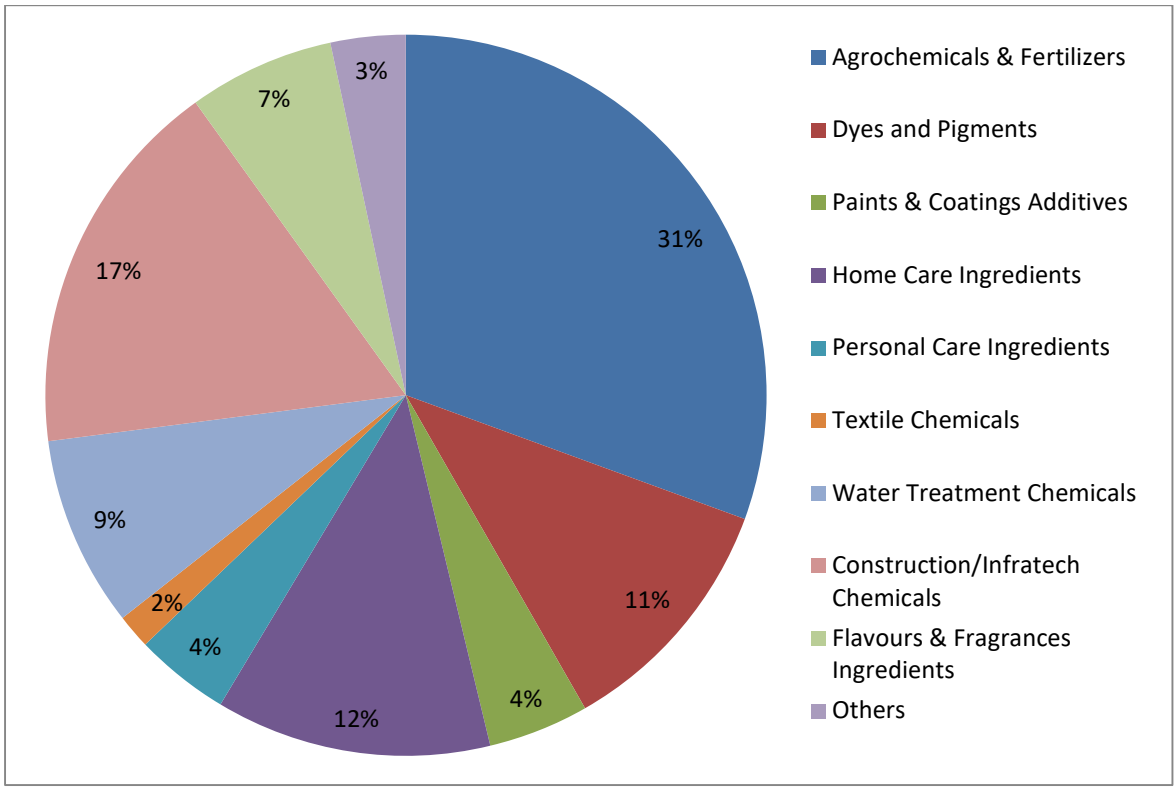


	2015	2021	2025F
Agrochemicals & Fertilisers	166	206	264
Construction chemicals	90	115	139
Water Treatment chemicals	44	58	70
Textile chemicals	9	10	13
Personal Care Ingredients	21	29	36
Home Care Ingredients	62	83	103
Paints & coating Additives	24	30	38
Dyes & pigments	59	75	89
Flavours & fragrances Ingredients	35	44	54
Others	16	23	3

CAGR	Agrochemicals & fertilizers	Dyes and Pigments	Paints & Coatings Additives	Home Care Ingredients	Personal Care Ingredients	Textile Chemicals	Water Treatment Chemicals	Construction	Flavours & Fragrances Ingredients
2015-21	3.7%	4.3%	4.0%	5.2%	5.3%	2.4%	4.6%	4.3%	4.0%
2021-25F	5.7%	4.3%	5.0%	5.4%	6.2%	3.8%	5.0%	4.8%	5.23.4 %

Others include: Sealants and Adhesives, Polymer Additives etc. Source: Frost & Sullivan

Exhibit 2.7: Global Specialty Chemicals Market, Industries & Applications, 2021, Value (USD 674 Bn)



Source: Frost & Sullivan

The COVID-19 pandemic has had an unprecedented impact on the global economy. Chemical companies in North America and Europe have specifically started focusing on operational efficiency, asset optimization, and cost management. On a short term basis, most companies are considering to implement a series of targeted, strategic initiatives across major functional areas such as R&D and technology. Companies are also keen on addressing long-term opportunities like investing in innovation, emerging applications, adopting new business models that generate sustained growth, analysing temporary vs. permanent customer buying behaviour patterns across geographies.

The industry is expected to see the following trends in the next 2-5 years:

- Companies will try and shift their focus towards new value streams and growing end markets, such as health care and electronics
- Most governments have announced policy proposals related to regulation, trade, and sustainability which could prove beneficial in shifting the dependence of the industry from China
- Chemical companies are now experiencing significant changes in the way they operate and serve their customers by leveraging on remote and digital sales channels

5 year growth forecast split by key industries highlighting key factors driving growth

Segments	Key Growth Drivers	(2020-25 CAGR)
Agrochemicals & Fertilizers	Increasing global population, Decreasing arable land, and consequent requirement to improve crop yields. New demand for agricultural products would also be created by the use of agricultural products for industrial applications such as in fuel blending and polymer manufacturing, opening up new avenues of applications for agrochemicals Strong growth in food demand (in proportion with the growing world population) is expected to exhibit a strong growth. Conversely, as a result of increasing urbanisation levels, available arable land is expected to decrease. Hence fertilizers to play a key role in increasing the average crop yields per hectare. Contract farming is also expected to create a positive impact on fertilizer usage where multinationals & large contractors help farmers improve yield of their crops by providing technological as well as training assistance/support.	5.7%
Construction Chemicals	Rise in construction projects across emerging markets and increased adoption of construction chemicals for improvement in quality of projects	4.8%
Home Care Ingredients	Growth in Household and Industrial & Institutional Cleaners market. Growing consumption of Environmentally Friendly Products	5.4%
Personal Care Ingredients	Growth in demand for personal care products is driven primarily by emerging markets in the Asia-Pacific region, particularly China and India which are expected to grow at around 9-10% CAGR. USA and Europe are expected to grow at ~4% primarily driven by the shift towards natural active ingredients.	6.2%

Paints & Coatings Additives	Demand driven by growing automotive industry, increasing urban population, rising household consumption expenditure and improving economic conditions	5.0%
Water Treatment Chemicals	Strengthening environmental regulations and rising water quality standards for municipal consumption in matured markets of North America and Europe In emerging markets, strong economic growth resulting in greater municipal and industrial spending in water treatment effort will drive growth of this segment.	5.0%
Textile Chemicals	Increasing demand for finishing chemicals that allow a variety of beneficial properties like anti-microbial properties, wrinkle-free properties, stain-resistance, etc. to be imparted to the textile	3.8%
Flavours and Fragrances Ingredients	Strong growth in low-fat and low-carbohydrate foods and beverages in North America Higher consumer willingness to experiment with new flavours and fragrances Increased production of processed foods in developing countries causing a spurt in the demand for flavours A shift in perception of fragrance from being a nonessential attribute to an indispensable part of personal care	5.2%
Dyes and Pigments	Growth is demand for high performance pigments (HPP) which are highly durable pigments, resistant to UV radiation, heat and chemical Use of eco-friendly colorants such as low impact dyes is emerging	4.3%

In addition to the above factors, a lot of emphasis is laid upon green chemicals. With an increasing awareness of the ill-effects of certain chemicals on humans and the environment, there is a growing trend in the chemicals industry to shift towards what is known as “green” chemicals or more accurately sustainable chemistry. These are products which are bio-degradable and which show a significant reduction in environmental impact when applied – this can be either through reducing energy and water consumption in the process or reducing the chemical and biochemical oxygen demand of the waste generated which reduces treatment costs and is kinder to the environment.

The classification as green or sustainable is measured across the life cycle of any chemical product, including its design, manufacture, application, and disposal. The products can be used for various applications such as food ingredients, home and personal care products, water treatment, and industrial cleaning products. The demand for green chemicals is particularly high from the textile industry which is one of the major end-users of chemicals. The evolution of green chemistry in the chemical industry will be a critical trend fuelling the growth of the green chemicals market. The Global Green Chemicals market is expected to grow by ~40-50 Bn by 2025 at a CAGR of 10.5% from ~29 Bn in 2021.

2.4. Impact of COVID 19

Many leading chemical manufacturers have reduced capital and operational expenditure to address the crisis. Capacity utilizations had scaled down to 40%-60% capacity during May-Aug 2020 due to labour shortages and disruptions in the supply of raw material since March 2020, however companies have ramped back to pre-Covid levels. The supply chains are being reconfigured as competitive order of chemicals producers in the US, Middle East, China and Europe has changed. The demand for chemicals for automotive, transportation and consumer products sectors have fallen by ~20%-30% with the automotive industry almost coming to standstill in April-May 2020. However, given strong fundamentals the market is expected to recover between 2021-22.

The Government has implemented enterprising initiatives and schemes such as Make in India, Aatmanirbhar Bharat Abhiyan and the Production-Linked Incentive (PLI) Scheme with the objective of improving the competitiveness of domestic manufacturing, attracting investments and enabling exports. These initiatives are expected to boost domestic production and also increase the demand for chemicals and petrochemicals. Such significant measures are expected to transform India into a global manufacturing hub for chemicals and petrochemicals

Given that global companies are now transitioning their operations away from China to other geographies like India, Vietnam among others, the overall capacity utilization and labour issues are also expected to be resolved. India's strategic advantage in this regard has been elaborated in the ensuing section. Most companies in the chemical industry have stepped up to produce raw materials for sanitization and safety products which have been the need of the hour. The companies are also looking at innovations around 3D printing, polymer recycling, green hydrogen as a source of energy, bio-based products etc. to have better sustainability and higher margins.

With Covid-19, China is facing an unprecedented global backlash and many companies are not considering it the first preferred location for setting up factories. Companies are considering migrating to countries like India, Vietnam and others. China's weakened position is a blessing in disguise for India. Taking advantage of this situation, the Indian government has taken policy interventions to attract companies looking to shift their manufacturing base to India in the post COVID-19 scenario.

Global manufacturers have initiated talks with Indian firms to explore the possibility of shifting a part of their supply chains from China as they seek to diversify their operations following the covid-19 outbreak. First of the lot are companies interested in sourcing automobile components and electronic products from India. In the chemicals sector, India could become global specialty chemical export hub. The key growth accelerator would be our readiness in responding to the strong demand

of key global markets to de-risk their supply chain by diversifying their base beyond China. In a way China's loss is India's gain. The tightening of environmental protection norms in China since January 2015 resulting in increase in operating costs, closure and relocation of manufacturing facilities along with rising labour costs and the recent trade dispute between China and United States have reduced Chinese exports and resulted in shifting the source of key raw materials from China to India. Indian companies were also heavily reliant on China which, over the years, has emerged as a manufacturing powerhouse. These companies suffered huge losses as bulk of the supplies from China was staled owing to pandemic making Indian companies adopt the strategy of local sourcing. Local sourcing and global companies shifting base to India is expected to boost manufacturing sector of India. In a nutshell, India is on a growth trajectory with Indian companies opting for local sourcing and bulk of Global companies shifting their base to India.

2.5. Key regulations

Ban on Hazardous Chemicals: Across the globe, the governments are tightening the regulations on the use of hazardous chemicals. Recently Hydroquinone was banned in US. In India, The Union Cabinet in October 2020 ratified the ban on seven chemicals that are hazardous to health and environment listed under the Stockholm Convention. Following such strict regulatory changes, the demand for green chemicals is expected to increase in the next decade.

GHS, REACH, and OSHA: The Real Implications

Global readiness for evolving industry standards includes operating according to the Global Harmonized System of Classification and Labelling of Chemicals (GHS); Registration, Evaluation, Authorization and Restriction of Chemical Substances (REACH); and the regulatory Occupational Safety and Health Administration (OSHA) in the U.S., which has recently aligned with GHS. Product labelling regulations mandated by governments can mean the difference between market entry and exclusion. Global and regional standards and regulatory compliance has become a basic necessity for any chemicals manufacturer.

In the European Union (EU), the Classification, Labelling and Packaging Regulation (CLP) has also been aligned to GHS as well. Failure to label according to the new rules does not simply result in a sternly worded letter suggesting that an organization improve its practices; it results in significant regulatory barriers to on-going business operations.

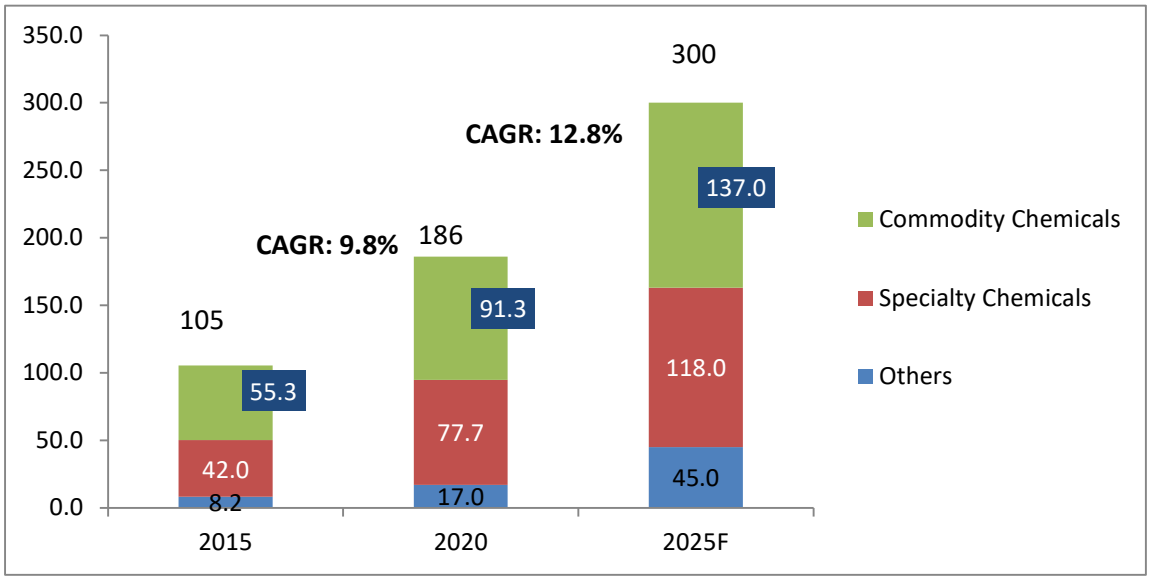
Chemicals and Specialty Chemicals Market

3.1 India Chemical Industry Overview

The Indian chemicals market is valued at USD 169 Bn in year 2020 (~4% share in the global chemical industry) with the commodity chemicals accounting for almost 50%. It is expected to reach ~USD 300 Bn in the next 5 years, with an anticipated growth of ~12% CAGR.

The FDI investment in Indian Chemical sector is also increasing as per Department for Promotion of Industry and Internal Trade (India) from 763 mn USD in FY 2015, it has grown to 1,058 mn USD in FY 2020 (peak was in FY2019 USD 1,981mn). The specialty chemical industry forms ~42% of the domestic chemical market, which is expected to grow at a CAGR of around 11-12%. Agrochemicals and Fertilizers account for 18-20% of the domestic chemicals market and around 47% of the specialty chemicals domain which constitute of various differentiated chemicals used in the agro space including pesticides, herbicides etc.

Exhibit 3.1: Indian Chemicals Market, 2015, 2020 and 2025F (USD Bn) along with growth rates



	Commodity Chemicals	Specialty Chemicals
2015-20	**8.8%**	**10.3%**
2020-25F	**10.7%**	**11.3%**

Source: Frost & Sullivan

Note: Indian chemical industry generally showcases Agrochemicals & Fertilizers outside of Specialty chemicals. In the above graph the specialty chemicals section, however, is inclusive of Agrochemicals & Fertilizers to maintain consistency with the Global section.

The Specialty chemicals industry is driven by both domestic consumption and exports. India's specialty chemical companies are gaining favour with global MNCs because of the geopolitical shift after the outbreak of Covid-19 as the world looks to reduce its dependence on China. Currently China accounts for ~15-17% of the world's exportable specialty chemicals, whereas India accounts for merely 1-2% indicating that the country has large scope of improvement and widespread opportunity. It is anticipated that Specialty chemicals will be the next great export pillar for India.

Home and personal care chemicals, water treatment chemicals, construction chemicals, agrochemicals etc. are areas where Specialty chemicals find applications. The growth of the market is in conjunction with the overall growth of the Indian economy. Aarti Industries, Atul Limited, Vinati Organics, Alkyl Amines, Navin Fluorine are the bigger players prevalent in the Indian Specialty chemicals market.

The "Make in India" campaign is also expected to add impetus to the emergence of India as a manufacturing hub for the chemicals industry in the medium term. Through incentives, subsidies and grants under this campaign, Indian companies could gain further ground as companies would want to reduce dependence on China after the COVID-19 pandemic and shift their supply chains. The decline in raw materials prices could also help the margins and reduce working capital need. However, input costs are a pass through for most companies and benefits could be limited. Overall, the specialty chemicals industry is likely to continue to perform well in the near to medium term and is expected to capitalize on the Make in India benefits to assume leadership position in the market.

The exports are on the rise as India is becoming a central manufacturing hub for such chemicals. Tightening of environmental norms (e.g. REACH Registration, Evaluation, Authorisation and Restriction of Chemicals Regulations) in developed countries and the slowdown of China are contributing to the growth of exports.

China's specialty chemicals market has seen a downturn in recent years due to various factors; most prominent being the introduction of stringent environmental norms. Tightening environmental protection added new business operating costs and led to factory closures in high-polluting sectors, which weighed on industrial production. Stricter environment regulations have negatively impacted industrial output since 2017. Under these circumstances, the growth of the Chinese specialty chemicals market also has been slowing down. In addition, the recent trade friction between the United States and China reduced Chinese exports to the United States by approximately 3% from 20% in 2018 to 17% in 2019.

Stringent environmental norms: The Chinese government started implementing stricter environmental protection norms from January 2015. In 2018, an estimated 40% of the chemical manufacturing capacity in China was temporarily shut down for safety inspections, with over 80,000 manufacturing units charged and fined for breaching emission limits. China's Ministry of Environmental Protection enforced strict penalties on polluting industries, including chemicals.

In 2016, the Government of Jiangsu, China, issued a development plan for the Yangtze River Delta Economic Belt. The pollution in the river has reached dangerous levels with several chemical manufacturers located near the river owing to proximity to ports. As per the plan, the government has set a goal of shutting down or relocating nearly 1,000 chemical plants, which use older technology or are located near the Yangtze River, within three years (2018-2020). By the end of 2020, 134 chemical firms will be shut down, relocated or renovated. No factories will be allowed within 1 km of the river.

Also, the Chinese government has mandated the construction of compulsory effluent treatment plants and imposed green tax on the chemicals industry to combat pollution. As a result, the overall cost of production is likely to go up with capital expenses incurred towards effluent treatment as well rise in compliance cost. The cost is expected to be higher for the smaller non-integrated plants

operated by medium- and small-scale players. This is likely to impact production in the medium term and thereby overall chemical exports.

Rising cost of labour: The labour cost (hourly cost of compensation) in China was lower than that of India till 2007. However, over 2005-2015, the average labour cost in China increased nearly 19-20% CAGR, against 4-5% CAGR in India. In fact, over the last five years, this cost has more than doubled compared with India, rendering Chinese manufacturers' uncompetitive vis-à-vis India in terms of labour cost.

All these factors are pushing the capex and opex costs upwards, making Chinese chemical companies less competitive in the export market.

The pandemic has compounded the situation further as companies across the world are looking for alternate supply solutions. Japan announced that it will offer economic stimulus package to encourage companies to shift manufacturing back to Japan. This further proves that increasing number of countries want to reduce dependence on China and develop either local supply chain or alternative chain. As a result, several Indian players have witnessed order inflows from global chemical players to meet the short-term supply disruptions from China, which is a positive remark for Indian market.

Owing to shutdowns in China and lack of capacity additions in other developed countries, India stands to benefit in the export market. Also supporting the growth in India is its ability to manufacture at a lower price compared with its western counterparts. Moreover, the specialty chemicals consumption in the country is low compared with the global average. The increasing availability of basic chemicals is likely to support investments in the specialty chemicals segment further.

Specialty chemical companies backed by strong chemistry, R&D skillset and economies of scales achieved by the country, will certainly prosper in India. Additionally, India's Environmental and Health Safety practices are much more stringent than other manufacturing centres like China, providing a significant strategic advantage. This is evident from the stock performance of the specialty chemical companies. Stocks of specialty chemical companies have fared better than companies in other sectors. Since the start of 2020, broader indices delivered 15% returns however Nifty Pharma topped the rank among other sectors, growing 60%, followed by an almost 55% rise in the Nifty IT index. Nifty metal grew by 16%, while Nifty FMCG was up 15% since the start of the year 2020. Speciality chemicals is one of the best performing sectors in 2020, even as most other key sectors bore the brunt of the COVID-19 led sell-off in the markets. Known to be a safe bet, it has delivered double-digit returns in the last five years and is expected to witness an increase in demand in the future.

3.2 High Barriers to Entry

Due to the involvement of complex chemistries in the manufacturing of products and complex production processes requiring high levels of technical knowledge and Research and Development capabilities, the Specialty Chemicals industry observes a high barrier to new entrants.

Given the nature of the application of products and the complex processes involved, the products are subject to very sensitive and rigorous product approval systems with stringent impurity

specifications. Typically, the requirement has to be enlisted as a supplier with customers after lengthy qualification for the products, particularly with the customers in industries such as automotive, petrochemical refineries and pharmaceutical industries these norms ensure only the committed players enter and remain in this business. As a consequence of this, approval of any such product typically takes a few years.

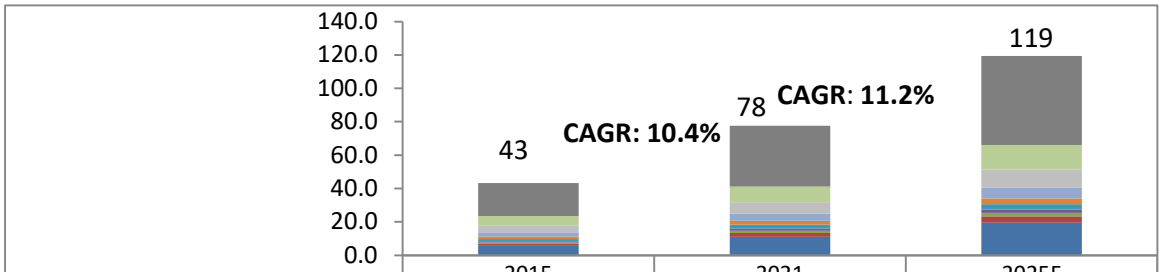
Further, the costs involved of approving any change in suppliers of such products are relatively high, consequently disincentivising any such change in suppliers. Customers typically select suppliers after carefully reviewing them and tend to develop long-term relationships with them as well as limit the number of such suppliers.

The Specialty Chemicals companies enjoy the strong entry barriers in the form of vendor acquisition, lengthy and complex product approval, registration process, customer loyalty among others. These barriers help the companies to ensure sustainable growth. Further, a distinguished and resilient business model is also a unique driver for these companies. Companies specifically catering to FMCG, HPC and food ingredients enjoy strong entry barriers due to their differentiated models and higher levels of product customization. The level of technical skill and expertise that is essential for developing in-house innovative processes, undertaking complex chemistries and handling some of the raw materials and intermediates, requires a significant amount of training that can only be achieved over a period of time thereby creating a further entry barrier for new entrants.

3.3 Market Segmentation– by Industry and Application Type

Traditionally, low cost labour and raw material availability were the advantages enjoyed by Indian manufacturing companies. Increasingly, though, specialty chemicals companies are focusing beyond these traditional cost advantages. Product development capabilities have become progressively more important across various segments and differentiate the top and bottom performers.

Exhibit 3.2: Indian Specialty Chemicals Market, Value (USD Bn), 2015, 2020 and 2025F

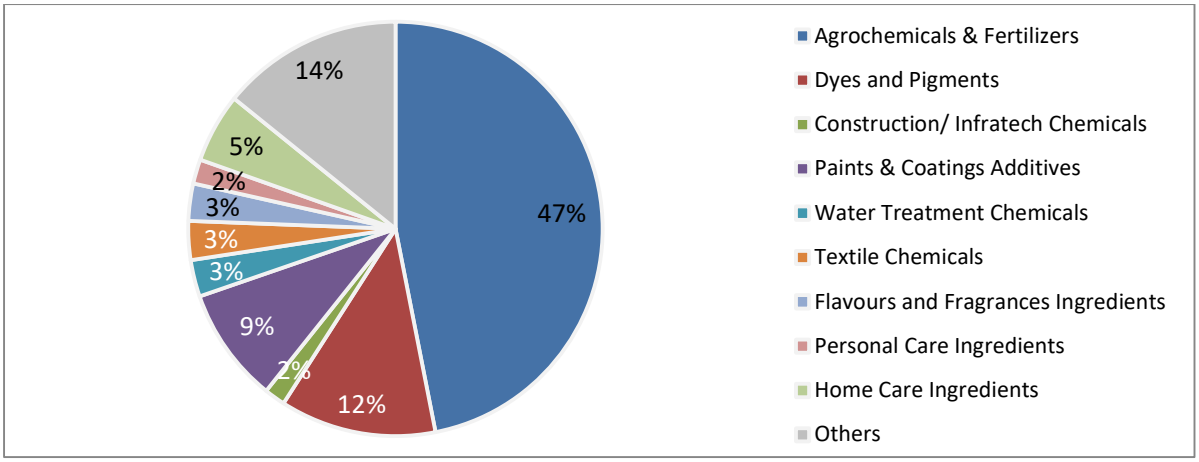


	2015	2021	2025F
Agrochemicals & Fertilizers	19.8	36.4	53.3
Dyes and Pigments	5.7	9.5	14.9
Paints & Coatings Additives	4.1	7.0	10.7
Home Care Ingredients	2.3	4.2	6.5
Textile Chemicals	1.5	2.4	3.5
Water Treatment Chemicals	1.4	2.2	3.1
Construction/Infratech Chemicals	0.7	1.3	1.9
Personal Care Ingredients	0.8	1.5	2.2
Flavours & Fragrances Ingredients	1.2	2.3	3.7
Others	5.7	11.0	19.5

Others include: Sealants and Adhesives, Polymer Additives etc.

Source: Frost & Sullivan

Exhibit 3.3: Indian Specialty Chemicals Market by Industry and Applications, 2021, Value (USD 78 Bn)



Others include: Sealants and Adhesives, Polymer Additives, Flame retardants etc.

Note: Indian chemical industry generally showcases Agrochemicals & Fertilizers and Pharmaceuticals API outside of Specialty chemicals. In the above graph the specialty chemicals section, however, is inclusive of the 2 categories to maintain consistency with the Global section. Agrochemical & Fertilizer and Pharmaceuticals API contribute to more than 55% of the specialty chemical space in India.

Inclusions:

- *Agrochemicals and Fertilizers: Agrochemicals include organic fertilizers, liming and acidifying agents (which are designed to change the pH), soil conditioners, insecticides and pesticides, fungicides, herbicides, and other chemicals like crop-growth regulators. Fertilizers are mainly inorganic compounds of nitrogen like urea or ammonium nitrate, compounds of phosphorous and potassium.*

- *Dyes and Pigments: These are inclusive of Reactive Dyes, Disperse Dyes, Acid Direct Dyes, Azo Dyes, Sulphur Dyes, Solvent Dyes, Vat Dyes, Food Colorants, Organic Pigments, Optical Whitening agents, Inorganic Pigments, Pigment emulsions among others*

- *Construction Chemicals: These are inclusive of concrete admixtures (plasticizers, accelerators, retarders, air enterainers), waterproofing (bitumen, PVC, silicon, SBR and others), protective coatings (epoxy, PUR, PE, alkyl, acrylic and others), concrete repair mortar (cement based and plaster based), plasters, base coats among others*

- *Paints and Coatings Additives: These are made up of insulating paint additives, powder coating additives, catalysts, wetting agents, levelers, clarifier, coupling agents, deflocculants, thinners, thickeners, anti-caking agents and other chemicals.*

- *Water Treatment Chemicals: These are made up of PH neutralizers, algaecides, antifoams (including insoluble oils, silicones, alcohols, stearates and glycols), biocides, boiler water*

chemicals, coagulants and flocculants, corrosion inhibitors, disinfectants, defoamers among others.

- *Textile Chemicals: These are inclusive of coating & sizing agents, colorants & auxiliaries, finishing agents, surfactants, de-sizing agents, bleaching agents, leather chemicals among others.*

- *Flavors and Fragrances: Essential Oils (orange, corn mint, eucalyptus, pepper mint, lemon), Oleoresins (paprika, black pepper, turmeric, ginger, others), Aroma chemicals (esters, alcohol, aldehyde, phenol, others), others.*

- *Home & Personal Care Ingredients: These are inclusive of formaldehyde, glycerols, titanium dioxide, isopropyls, alcohols, dimethicone, sodium lauryl sulphate, parabens, tocopherols benzones, oleochemicals, surfactants, polymers, botanical extracts among others.*

Source: Frost & Sullivan

The rise of environmentally friendly specialty chemicals in India

The concept of Green Chemicals in India is evolving. The rising pollution and harm caused to water bodies owing to emission of harmful chemical effluents into water is leading to rise in concern of sustainability.

The classification as green or sustainable is measured across the life cycle of any chemical product, including its design, manufacture, application, and disposal. The products can be used for various applications such as food ingredients, home and personal care products, water treatment, and industrial cleaning products. The demand for green chemicals is particularly high from the textile industry which is one of the major end-users of chemicals.

The companies in India are still preparing themselves to a larger picture of green and environmentally friendly chemicals starting from raw materials to manufacturing process. Over the years it will gain momentum.

Another challenge is seemingly high initial cost of such products which is a major hurdle in getting service providers and consumers accede and adapt the change towards environmentally friendly chemicals. However green chemicals seem comparatively costlier in the initial stage, but their usage over a period of time has shown a reduction in price by approximately 18-20% thus higher ROI.

However, the green chemical wave is inevitable, and it is just matter of time by when the adoption of these new age products will be mandatory and obligatory. People need to be educated about green tendency, green chemical revolution and the benefit of keeping an eco-friendly environment. Once the product is tested by customers they would continue its usage and eventually the industry will prove to be a boom.

3.4 Trend of evolution of products: R&D and innovation of sustainable products

The pharmaceutical industry was among the first to embrace Green Chemistry (GC) for its significant potential to reduce costs and risks. The market for GC is expected to outpace the growth of overall global chemical market in the coming decades as companies respond to consumer demand for more

sustainable products and tightening regulations on the use and generation of hazardous substances. Green pharmaceuticals as a segment are projected to grow from $27 Bn in 2016 to USD 96.2 Bn in 2026. In recent years generic drug companies, API manufacturers, and smaller R&D Pharma companies' exhibit interest and advances in Green chemistry principles. The industry has taken effort to implement key metrics to keep track of GC which includes E-factor, Process Mass Intensity (PMI), atom economy, number of steps, and carbon foot- print, among others. While E-factor was the first metric used by the industry, recent studies have pointed out PMI as the most preferred metric among "big Pharma". PMI measures the ratio between the mass of all materials used to make a product and the mass of the product.

Indian government bodies such as the Department of Science and Technology, the Ministry of Chemicals and Fertilizers, and the Department of Pharmaceuticals, are beginning to organize various green chemistry initiatives and in some cases to partner with SMEs to partially fund investments in green technology. Generic drug Pharma and Active Pharmaceutical Ingredients (API) manufacturers in India exhibit significant interest and some advances in using GC principles. At the same time, majority (65%) of Indian companies rely on treatment and disposal of wastewater instead of source reduction and one in five (20%) does not use any GC metrics. The study found that generic Pharma is more advanced in adopting GC principles than API manufacturers. Regulatory risk and time pressures to deliver drugs were reported as the two most significant barriers for greater adoption of GC in India, while cost savings and environmental regulations were cited as the top two drivers.

5 year growth forecast split by key industries highlighting key factors driving growth

Segments	Key Growth Drivers	India Market, (2020-25 CAGR)
Agrochemicals & Fertilizers	Increase in awareness levels of farmers Improvement in rural income encouraged by various government schemes Need to improve agricultural yields at a faster pace compared to the growth in demand to be able to meet food sufficiency targets DBT (Direct Benefit Transfer) allows for direct transfer of benefit or subsidy to citizens living below poverty line	10.1%
Construction Chemicals	Growth in Indian construction industry over the next five years, driven by housing and infrastructure projects Increase in adoption of global standards of construction in India will lead to growth of this market	10.4%
Paints & Coatings Additives	Growth in per capita paint consumption in India Strong growth in automotive industry	10.8%

Water Treatment Chemicals	The growing urban population is adding to the demand for water purification and waste water management 'Namami Gange Programme' - an Integrated Conservation Mission, approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of INR 20,000 Crores to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga	8.6%
Textile Chemicals	Driven by domestic demand and exports of high quality textiles	9.8%
Flavours & Fragrances Ingredients	Marketing by FMCG companies has created demand for categories like deodorants, room fresheners and perfumed soaps in rural markets Increasing demand for processed food	12.9%
Home Care Ingredients	Growth in population and per capita income to drive growth in this segment Growth in demand for safety and hygiene in urban as well as rural areas	11.5%
Personal Care Ingredients	Growth in population and per capita income to drive growth in this segment Rapid increase in the adoption of personal care products, especially in rural markets	11.1%
Dyes & Pigments	The current strategy of most European pigment producers is to use their local facilities for high-end performance colorants for new and niche markets and source non-differentiated dye, pigments from low-cost facilities based in China and India	11.4%

The government has started various initiatives such as mandating BIS-like certification for imported chemicals to prevent dumping of cheap and substandard chemicals into the country.

The Indian government recognises chemical industry as a key growth element and forecast to increase share of the chemical sector to ~25% of the GDP in the manufacturing sector by 2025. A 2034 vision for the chemicals and petrochemicals sector has been set up by the government to explore opportunities to improve domestic production, reduce imports and attract investments in the sector. The government plans to implement production-link incentive system with 10-20% output incentives for the agrochemical sector; to create an end-to-end manufacturing ecosystem through the growth of clusters.

In October 2020, the government urged players in the agrochemicals industry to come out with new molecules of global standards for the farmers' benefit, while CropLife India, the industry body, pitched for stable policies and regulatory regimes to boost growth in the sector. 100% FDI is allowed under the automatic route in the chemicals sector with few exceptions that include hazardous chemicals. Total FDI inflow in the chemicals (other than fertilisers) sector reached USD 17.77 Bn between April 2000 and June 2020.

The government has proposed several incentives for setting up a sourcing or manufacturing platform within an Indian SEZ:

- Effective April 1, 2020, 100% Income Tax exemption on export income for SEZ units for the first five years, 50% for the next five years thereafter and 50% of the ploughed back export profit for next five years.

- Single window clearance for central and state-level approvals

3.5 Duty free import/domestic procurement of goods for development, operation and maintenance of SEZ units Impact of Make in India

The chemical industry contributes approximately 6.6% of national gross domestic product and accounted for 15-17% of India's manufacturing sector in FY20. The government permits 100% foreign direct investment (FDI) in this sector under the automatic approval route. The manufacturing of most chemical products inter-alia covering organic/inorganic, dyestuff and pesticides is de-licensed. The factors such as boost to specialty (as well as fine agrochemicals) chemicals due to rapid development in construction and agricultural sector, inadequate per capita consumption and strong demand from paints, textiles and diversified manufacturing base shall aid towards the development of Indian chemicals sector.

Frost & Sullivan's analysis indicates that the major indicators like success of Make in India and governments' permit for 100% FDI is positively impacting specialty chemicals segment; pertaining to competitive manufacturing costs, higher investments in R&D, cheaper raw material availability/transport, strong demand from end-use segments, overall supportive ecosystem, etc. Within the specialty chemicals, manufacturing of fine chemicals (pesticide ingredients as well active pharmaceutical ingredients), flavour & fragrance ingredients, surfactants and colorants will be most attractive segments in the next half decade. This is due to their strong growth potential, highly differentiated products folio and high penetration levels predominantly.

Moreover, India's specialty chemical companies are gaining favour with global multinational corporations because of the geopolitical shift after the new coronavirus outbreak as the world looks to reduce its dependence on China. Increasing tariff levels and changing environmental policies in China along with 'Make in India' initiative and a permit to 100% FDI from India, would add more possibilities of specialty chemicals manufacturing base shifting from China to India. With the rapid globalisation and opening up of the Indian economy, "Intellectual Capital" has become one of the key wealth drivers in the present international trade. Intellectual property rights have become significantly conspicuous on the legal horizon of India both in terms of new statutes and judicial pronouncements. India ratified the agreement for establishing the World Trade Organization (the "WTO"), which contains the Agreement on Trade Related Aspects of Intellectual Property Rights

(TRIPS). Indian Statutes, enforcement provisions and methods of dispute resolution with respect to intellectual property (IP) protection are fully TRIPS-compliant. India has laws covering various areas of intellectual property as Trade Marks, Patents, Copyrights and Related Rights, Industrial Designs, Information Technology and Cyber-crimes, Data Protection among others.

Across India, the recent revision of Market Access Initiative by the Ministry of Commerce and Industry aims at benefiting the small to mid-segment newer industry players which do not possess global sales and marketing reach. As a result of the revised MAI policies, the robust growth in Contract Research & Manufacturing Services (CRAMS) industry in India will support newer economies such as Myanmar, Cambodia to collaborate with the local Indian players beneficial for the overall growth of the Asian economy. Moving forward, with a total of over 300 USFDA approved manufacturing sites, the country can become the global leader in the CRAMS industry with the implementation of mandates including Schedule M (Good Manufacturing Practices (GMP) for Premises & Materials and Requirements of GMP in Plant and Equipment) outlining various requirements for manufacturing good quality drugs and pharmaceuticals, by applying Current Good Manufacturing Practice (CGMP) guidelines.

On the pharmaceutical industry front, realigned government policies to reduce the manufacturing facility approval time with a less than two weeks timeline for receiving NOC for export licenses will support the leading players such as Dr Reddy's Laboratories Ltd, Cadila Pharmaceuticals Ltd, and Cipla Ltd etc. to continue to dominate the API manufacturing in India. Furthermore, with a cost advantage of almost 40-50% as compared to regulated markets and the availability of sufficient R&D infrastructure, India is expected to continue to enjoy a competitive advantage in the region there by assuring a strong CRAMS (Contract Research & Manufacturing Services) industry growth. The Government of India is committed to ensuring the delivery of affordable healthcare in the country as well as ensuring that there is a steady supply of critical drugs. This has resulted in the launch of the Production Linked Incentive Scheme (PLI) for APIs, KSMs and DIs as well as the Scheme for Promotion of Bulk Drug Parks. These schemes have been constructed to incentivize large-scale manufacturing of critical bulk drugs and to build the required infrastructure for developing manufacturing clusters for across India. This aligns with the Government’s mission for self-reliance (atmanirbharat).

In addition to the production linked incentive (PLI) scheme, the Department of Pharmaceuticals (DoP) is planning to allow the industry to import a maximum of 30% of the total value of chemicals/ intermediates. Having categorised Pharmaceuticals as a ‘priority sector’, the government is aggressively working on creating a single-window clearance to expedite FDI and domestic investment in the Pharmaceuticals sector.

The government is also expected to introduce a production-linked incentive scheme for the agro-chemicals sector with incentives of 10-20% output and creating an end-to-end manufacturing ecosystem through cluster development. The sector can progress by adopting a multi-pronged approach by leveraging the reforms in rules and regulations as well as 'Make in India'. Indian government has set up a 2034 vision for the chemicals and petrochemicals sector to seize the opportunities to strengthen domestic manufacturing, reduce imports and attract investment for manufacturing key chemicals in the country. The government has taken initiative to promote and facilitate 'Aatmanirbhar Bharat' (self-reliance India) in the chemicals and petrochemicals sector. The

government might relook at the Pesticides Management 2020 Bill as it does not meet the farmer's requirement; most clauses being redrafted from Insecticides Act 1968 and Rules 1971.

3.6 India – Racing Ahead of China

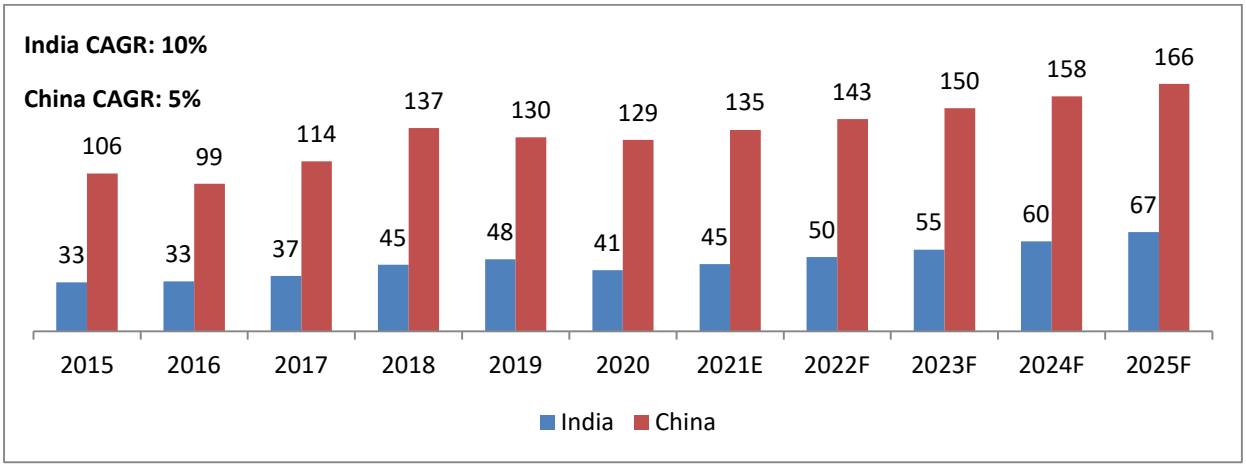
China's specialty chemicals market has seen a downturn in recent years due to various factors. Most prominent amongst these are the recent environmental norms introduced by the Chinese government, which have led to shutdown of a number of chemical plants.

The Chinese government started implementing stricter environmental protection norms from January 2015. With the focus on controlling pollution, the Chinese Ministry of Environmental Protection enforced strict penalties on polluting industries, including chemicals. Some of the major steps taken were:

- Shift towards gas-based power plants from coal-based ones
- Implementation of strict penalties for noncompliance
- Construction of compulsory effluent treatment plants
- Mandatory for all polluting industries to operate from industrial clusters away from habitat
- Small to mid-size chemicals plants to relocate by the end of 2020
- All larger plants must relocate by the end of 2025 and start the process by no later than 2020
- Taxes to be levied on polluting industries based on pollution type, location and severity

As a result of all of the above, the Chinese chemical companies are witnessing a rise in capex and opex costs, making them less competitive in the export market. In 2017, an estimated 40% of the chemical manufacturing capacity in China was temporarily shut down for safety inspections, with over 80,000 manufacturing units charged and fined for breaching emission limits.

Exhibit 3.6: Chemicals Exports Trend – India vs. China (2015 – 19 Actuals, 2020 – 25 Forecast), USD Bn



Source: World Bank, Frost & Sullivan

Note: The forecasted data is not published by World Bank; it has been calculated considering the same CAGRs for both the countries. The actual CAGR for India and China respectively for the period 2015-2019 stood at around 13% and 7%; as World Bank does not forecast the export trends, the same CAGR (10% for India and 5% for China) has been considered for the forecast period 2020-2025.

The domestic chemicals industry in China is also witnessing a slowdown, as a result of slower economic growth. China's economic growth is expected to slow down further in the coming years, thus resulting in reduced domestic demand and several plants shutting down in the last three years. This has also resulted in China's overall exports of chemicals growing at a slower rate than India. **There is an ample replaceable export market for India to capitalize on, and weave a strong growth story for chemicals – led by Specialty chemicals.**

Several global players prefer a "China + 1 offshore strategy", with capacities shifting to cost efficient markets with strong technology capabilities like India. Stringent environmental regulations and increased cost of labor have already stifled growth in China, which contributes 35-40% to the global chemical industry. The pandemic has compounded the situation further as companies across the world are looking for alternate supply solutions. Japan's announcement to offer incentives to companies shifting base from China to India further proves the desperation engulfing countries to reduce dependence on China and develop local supply chains. JVs/ Technology transfers will drive the knowledge wave for the Indian industry, given stronger IP protection rights. The spillover impact of China's declining competitiveness has set the stage for India to intensify its effort to capture larger market share.

Currently Indian companies are experiencing wave of bigger orders from Global companies who previously used to purchase from Chinese counterparts. For instance Vinati Organics, a niche chemicals manufacturer whose clients include Germany's BASF and Dow's chemical subsidiary, witnessed orders for an essential ingredient in the painkiller ibuprofen had surged 25% since February 2020. Many customers have been dependent on China for a long time and they are looking for an alternative and India is their preferred choice. Many small and large companies are experiencing surge in demand form global companies who are shifting their source from China to India.

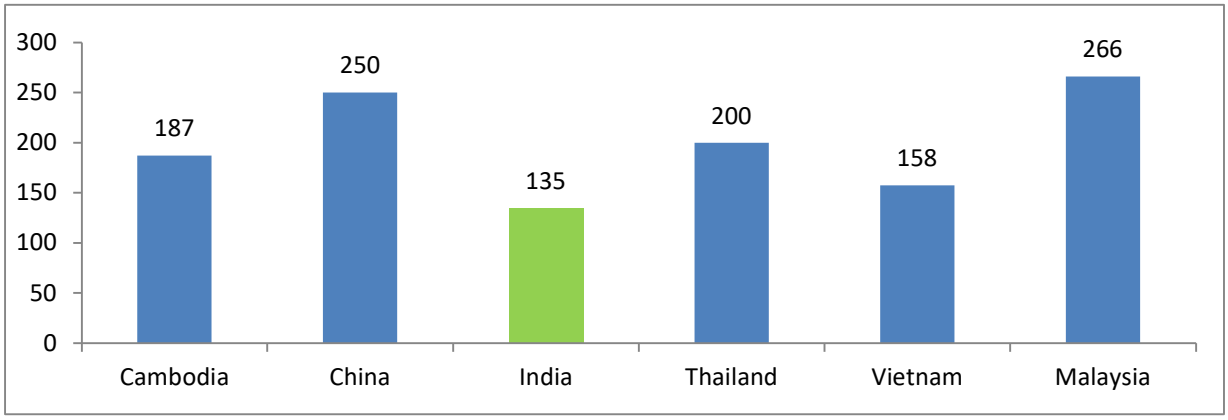
With new regulations in place and the Chinese companies adhering to new norms, they are expected to bounce back with certain level of reforms in the way of operations. Whenever the Chinese companies make a comeback, it would be at a significantly higher cost of production given the significant investment in environmentally compliant equipment and manufacturing practices. India, in the meantime, would have significantly strengthened its position in the global supply chain and would be a very viable alternative for global players looking to de-risk their supply chain, while retaining their sourcing costs. Pharmaceuticals and agrochemicals are some of the key sectors that are particularly set to benefit from this shift in dynamics, wherein the Chinese manufacturers continue to operate at lower capacity levels, given the increased monitoring of safety standards and compliance norms.

The powering trend of de-risking of input procurement from China by global chemical leaders offers great export as well as domestic sales opportunity for Indian specialty chemical industry.

Cost and Availability of Skilled Labour in India and China

Labour represents one of the main costs of manufacturing goods. And importers have watched China's labour costs soar in recent decades, often growing by 10-15% annually. China's minimum wages, which now range from about USD 140 to USD 345 per month in 2020, are set at the provincial level.

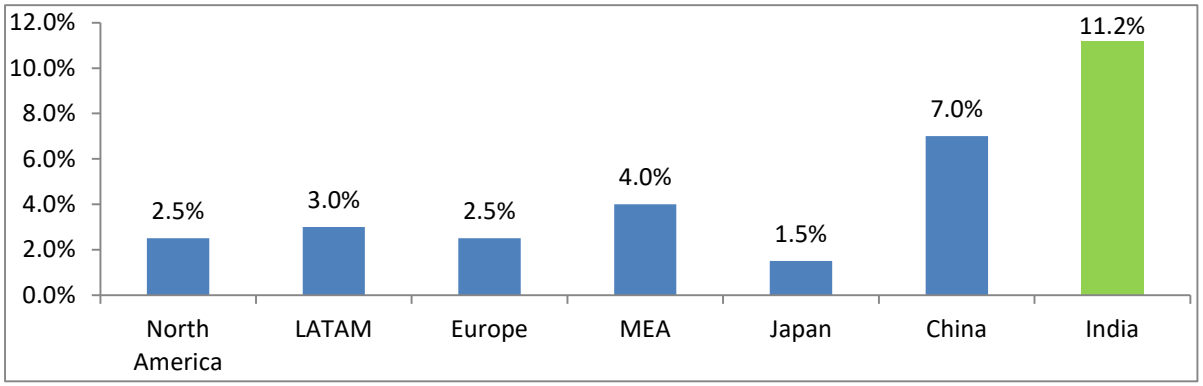
Exhibit 3.7: Average Monthly Minimum Wage (USD), 2021



Source: ASEAN Briefings, tradeeconomics

India's minimum wages similarly vary across states and range from about USD 66 to USD 202 in 2020. Mounting U.S. tariffs on Chinese goods over the past year have only strengthened the case for India as a cost-effective manufacturing alternative. And importers of labour-intensive products, like specialty chemicals, are in the best position to realize cost savings by moving to India.

Exhibit 3.8: Region-wise Specialty Chemicals Growth, 2021-25, %



Source: Frost & Sullivan

In terms of region-wise demand, India's specialty chemicals industry is expected to witness the maximum growth of 11-12% CAGR over the next five years compared with other markets, due to rising demand from end-user industries, coupled with tight global supply on account of stringent environmental norms in China. Markets like Americas, Europe and Japan are expected to clock less than 4% CAGR over the next five years, due to industry saturation in these regions.

The recent downturn observed in China's specialty chemicals industry is serving as an opportunity for Indian manufacturers, who have now gained a cost advantage over their Chinese counterparts.

The changing regulatory and policy environment in China has led global companies to diversify supply risk, thereby improving export opportunities for Indian players. This is because, very few countries, other than India, have the requisite scale, technology, raw materials and government support to capture this opportunity.

The specialty chemicals growth story in China and India has been led by significant contribution from the unorganised segment comprising a multitude of smaller players. The supernormal growth in China had been contributed by large players as well as multiple small players, who were in non-compliance to environmental norms. These smaller plants have shut down in the recent times amid rising environmental concerns. While this has impacted the overall growth story, larger organised players with established markets and compliance certificates continue to operate.

India also faces threat from environmental concerns and tighter norms. However, considering the strict compliance by organised players in the market, this threat is limited to smaller players and shall serve as an opportunity for larger players to capture the market. Most large players are already making investments in Safety health & Environment (SH&E) to ensure plant sustainability.

China is also facing an unprecedented global backlash and many companies are not considering it the first preferred location for setting up factories. Companies are considering migrating to countries like India, Vietnam and others. China's weakened position is a blessing in disguise for India. Taking advantage of this situation, the Indian government has taken policy interventions to attract companies looking to shift their manufacturing base to India in the post COVID-19 scenario.

Global manufacturers have initiated talks with Indian firms to explore the possibility of shifting a part of their supply chains from China as they seek to diversify their operations following the covid-19 outbreak. First of the lot are companies interested in sourcing automobile components and electronic products from India. In the chemicals sector, India could become global specialty chemical export hub. The key growth accelerator would be our readiness in responding to the strong demand of key global markets to de-risk their supply chain by diversifying their base beyond China. In a way China's loss is India's gain. The tightening of environmental protection norms in China since January 2015 resulting in increase in operating costs, closure and relocation of manufacturing facilities along with rising labour costs and the recent trade dispute between China and United States have reduced Chinese exports and resulted in shifting the source of key raw materials from China to India. Indian companies were also heavily reliant on China which, over the years, has emerged as a manufacturing powerhouse. These companies suffered huge losses as bulk of the supplies from China was staled owing to pandemic making Indian companies adopt the strategy of local sourcing. Local sourcing and global companies shifting base to India is expected to boost manufacturing sector of India. In a nutshell, India is on a growth trajectory with Indian companies opting for local sourcing and bulk of Global companies shifting their base to India. India's land reform policies to remove intermediaries to increase in agricultural production and to eliminate all elements of exploitation and social injustice within the agrarian system, to provide security for the tiller of the soil and assure equality of status and opportunity to all sections of the rural population will benefit the agrochemical sector as well.

Lower Corporate tax rate

India is taking initiatives to boost manufacturing sector. To encourage investment in the manufacturing sector, the Indian government has taken proactive steps, including offering competitive tax rates.

In 2019, the corporate tax rate was reduced in India for the first time in three decades, and the manufacturing sector benefited the most from the slashed taxation rate. For manufacturing firms incorporated after October 1, 2019 and beginning operations before March 31, 2023, the corporate tax rate has been slashed from 25% to 15% (this will amount to an effective tax rate at near 17%, including surcharge and cess).

This lower tax rate has allowed India to compete with ASEAN's emerging economies like Vietnam, Thailand, and Indonesia for foreign investment more effectively. India, however, has an edge over these nations due to its larger market, cheap labour pool, and quick availability of labour.

Ease of Business

India's rank in the ease of doing business index has progressed due to the pro-business reforms which has put the country among top 20 'improvers' according to a list by the World Bank on top 20 economies that have improved the most on ease of doing business core. The country's ranking rose to 63 in 2020 from 130 in 2016. It improved its rank in 6 out of 10 indicators with the biggest change in the 'Construction Permits' and 'Trading across Borders'. Five years ago, China ranked 90th in the report. While in 2019, its ranking climbed to 31st.

External Debt

On comparing debt portion of both the countries, India has low amount of debt as compared to Chin and even USA. As of Dec 2019, India owes ~US$ 564 Bn whereas China owes ~USD2 trillion dollars. This indicates India is a more debt-ridden country as compared to China.

Infrastructure developments in India

In Union Budget 2020–21, the Government has given a massive push to the infrastructure sector by allocating Rs. 1,69,637 crores (USD 24.27 Bn) to enhance the transport infrastructure. Government of India allocated Rs. 111 lakh crores (USD 1.4 Tn) under the National Infrastructure Pipeline (NIP) for FY 2019–25. Sectors such as energy (24%), roads (18%), urban (17%) and railways (12%) amount to ~71% of the projected infrastructure investments in India. The Government of India is expected to invest highly in the infrastructure sector, mainly highways, renewable energy, and urban transport.

- In April 2020, the Government set a target of constructing roads worth Rs. 15 lakh crores (USD 212.80 Bn) in the next two years
- In May 2020, Border Roads Organisation (BRO) achieved major milestone by digging up a 440-metre long tunnel below the busy Chamba town on Rishikesh-Dharasu road Highway (NH 94)
- Indian energy sector is expected to offer investment opportunities worth USD 300 Bn over the next 10 years

- NHAI will be able to generate revenue of Rs. One lakh crores (USD 14.31 Bn) from toll and wayside amenities over the next five years
- In the Union Budget 2020–21, the Government has given a massive push to the infrastructure sector by allocating Rs. 1,69,637 crores (USD 24.27 Bn) to develop the transport infrastructure.
- Communication sector has been allocated Rs. 38,637.46 crores (USD 5.36 Bn) to develop post and telecommunications departments
- Indian Railways has received an allocation of Rs. 72,216 crores (USD 10.33 Bn) under Union Budget 2020–21
- Ministry of Housing and Urban Affairs received an allocation of Rs. 50,040 crores (USD 6.85 Bn) under the Union Budget 2020–21

Industrial corridor developments in India

11 industrial corridors are expected to come up by FY25 in India, Delhi-Nagpur industrial corridor project development activities are also expected to begin soon. Western Dedicated Freight Corridor (DFC) has been considered as the transportation backbone for the Delhi Mumbai Industrial Corridor (DMIC) project while Eastern DFC is the backbone for Amritsar Kolkata Industrial Corridor (AKIC) project. For other industrial corridor projects like Chennai Bengaluru Industrial Corridor (CBIC) and Bengaluru Mumbai Industrial Corridor (BMIC), NH-4 has been considered as the backbone. For the East Coast Economic Corridor (ECEC), NH-5 which is part of the Golden Quadrilateral, the Kolkata–Chennai rail route has been considered as the transport backbone.

The proposed North South East-West and East Coast Dedicated Freight Corridors will further supplement the existing transportation backbone for the corresponding Industrial Corridors. State governments have been urged to transfer land to the project SPVs for commencement of project development activities or identify land for conducting the feasibility studies. National Industrial Corridor Development Corporation Ltd is in constant engagement with the States to fructify this development. In a nutshell, industrial corridors are going to get developed with greater pace over the next half decade in the country.

Construction chemicals Industry Overview

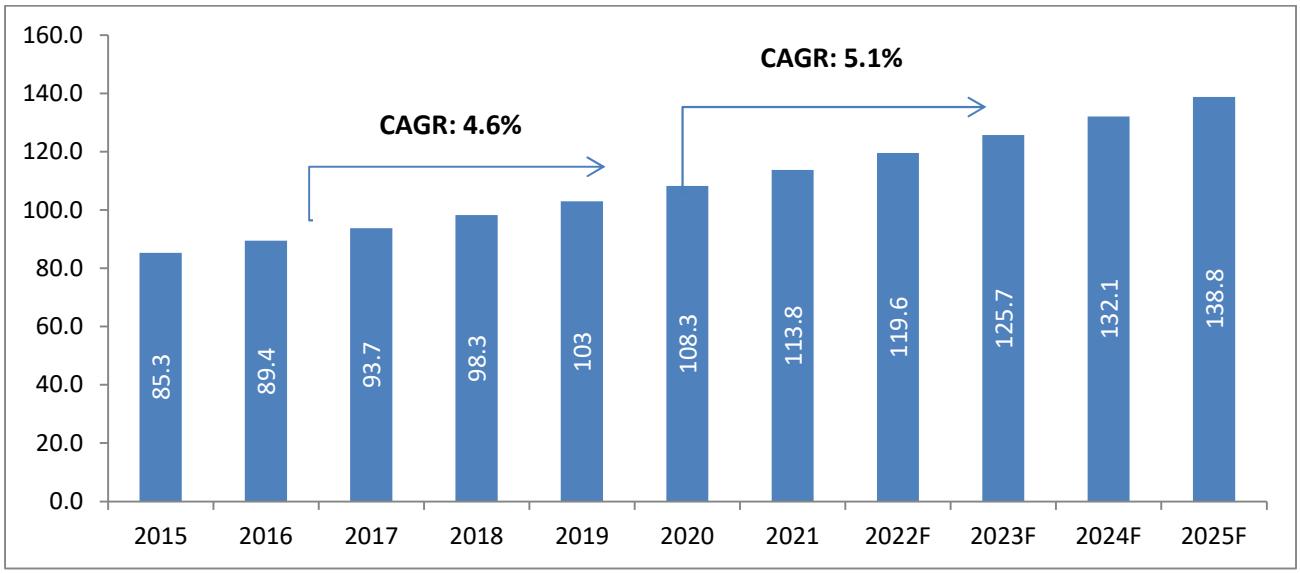
4.1 Global Construction Chemicals industry overview – market size – historical and projected

Construction chemicals and materials used in construction include concrete admixtures, waterproofing compounds, grout and concrete repair, and industrial flooring. Construction chemicals refer to the chemical compounds that are combined with building materials, such as concrete and mortar. These chemicals improve the compatibility of these materials with the building structures they are used with. They also help to improve the overall building performance and protect the structures that they are used in.

The Global Construction Chemicals Market is expected to be worth USD 139 Bn dollars by the end of 2025; growing at a compound annual growth rate of approximately 5.1 % from the year 2020. Shifting customer preference toward high-performance products that meet Construction Products Regulations (CPR) and sustainability norms is likely to boost the revenue of construction chemicals.

The size of the global construction chemicals market is expected to experience substantial growth between 2020 and 2025. The growth will largely be due to the increased demand from several end-user industries, including both residential and non-residential sectors, as well as infrastructure.

Exhibit 4.1: Global Construction Chemicals market, 2015 to 2025F (USD bn)



Source: Frost & Sullivan

Construction chemicals are added with construction materials in order to improve its workability, enhance performance, add functionality, improve chemical resistance or enhance durability of civil structures. Over past few years, increasing infrastructure development activities, investment in commercial and residential housing and renovation activities of historical monuments, water retention structure, bridges and other civil structures have led to significant consumption of Construction chemicals across India.

GPCL is one of the leading manufacturers of Construction chemicals dispersing agent with major contributor to India's Construction chemical requirements.

4.2 Market segmentation by geography – historical and projected

An increased interest on infrastructure development in emerging economies and a rapid change toward urbanization in these countries is expected to drive the expansion of the global construction chemicals market during the forecasted period.

In China, Mexico, Brazil and India, initiatives made by the government are contributing to the increased growth of infrastructure activities, which, in turn, is contributing to the growth of the global construction chemicals market. Additionally, the increasing trend of urbanization in these areas has lead to an increased need for more residential buildings. This is expected to further fuel the growth of the market.

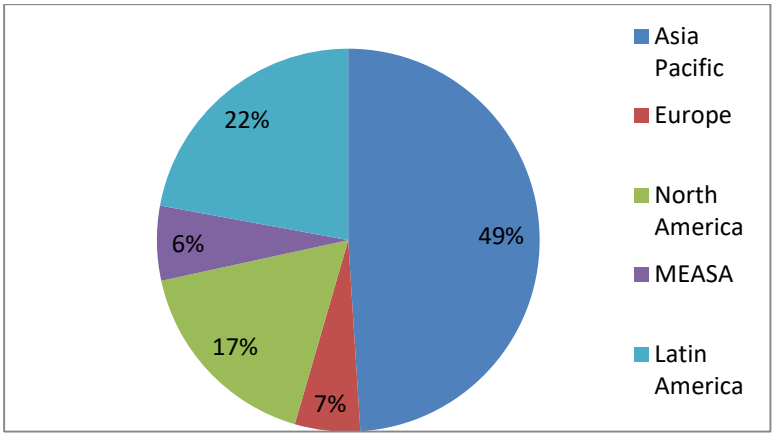
Exhibit 4.2: Mega projects in APAC, 2021

Sr	Project	Investment & End Date
1	Mumbai–Ahmedabad High-Speed Rail Corridor	Rs. 72,000 Crores Completion in October 2028.
2	Hyperloop Project	USD 8-9 bn dollars End 2029
3	Char-Dham Highway And Railway Project	Rs. 43,292 crore End 2022
4	Mumbai-Delhi Expressway	Rs. 98,000 crores Mar 2023
5	Metro Across 20 Cities	Investment not confirmed End 2025

Source: Frost and Sullivan analysis

An increase in the per capita income, combined with strengthened economic policies in developing economies in leading to the expansion of both residential and non-residential sectors. In Asia pacific, foreign investments have grown over the past few years, which is also aiding in the growth of the market.

Exhibit 4.3: Global Construction Chemicals market segmentation by Geography, 2021, USD 115.3 bn

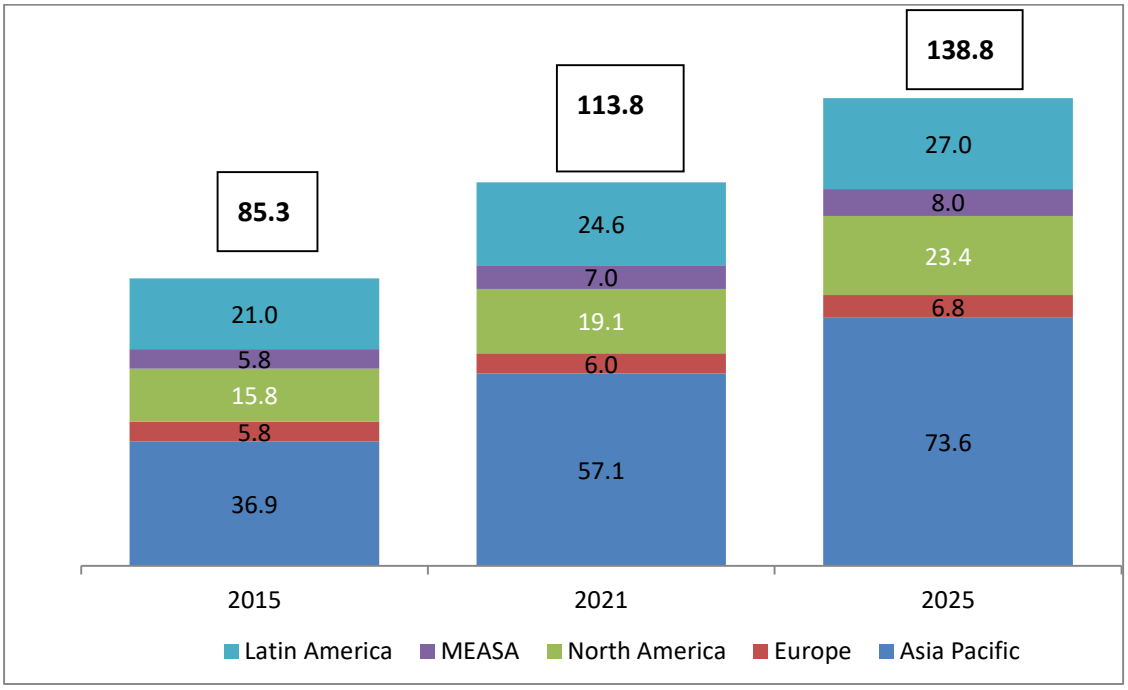


Source: Frost & Sullivan

Due to the rapid industrialization and urbanization of countries such as China, India, and Japan, the Asia Pacific building chemicals market accounted for about half of the worldwide share in 2021. The Asia Pacific region had a GDP of more than USD 38.85 thousand bn in 2021 and is expected to grow at a rate of more than 5.5% CAGR in 2022 due to the rapidly increasing population and rapidly developing economies of China, India, Japan, and other South East Asian countries such as Indonesia, Malaysia, Vietnam, and the Philippines, among others. In the next years, more government investments in infrastructure development will also benefit the industry.

In the future years, the BRICS countries' booming construction industries, driven by China and India, will have a significant impact on the global construction chemicals market. The area construction industry has been bolstered by a rapidly growing population and increasing economy as a result of many government initiatives and private investments.

Exhibit 4.4: Global Construction Chemicals market by Geography (USD bn), 2015-2025F



Source: Frost and Sullivan analysis

Region	Asia Pacific	Europe	North America	MEASA	Latin America
2015-21 CAGR	7%	2.70%	4.80%	3.20%	3.20%

The European construction chemicals market generated more than USD 6 Bn in 2021, with a relatively modest growth rate of roughly 2.70 % CAGR during the forecast period. Less infrastructure development in the region will reduce demand for asphalt modifiers, which are widely employed in the construction of roads and pavements. The region's abundance of heritage buildings may influence demand for adhesives, sealants, and protective coatings used in maintenance and restoration projects.

With a global market share of 17 %, the building chemicals market in North America is the most dominant in the world. In 2021, the market for NA was valued at USD 19.1 Bn. The region's

construction chemical demand is expected to be driven by the region's rising economy and strong market fundamentals for commercial real estate developments. An increase in state and federal spending for public works and institutional infrastructure, particularly in the United States and Canada, is also predicted to enhance the construction chemicals industry. Furthermore, the expanding population and impending building projects in the pipeline may fuel the expansion of the construction chemicals market.

4.3 Market segmentation by end-user industry – historical and projected

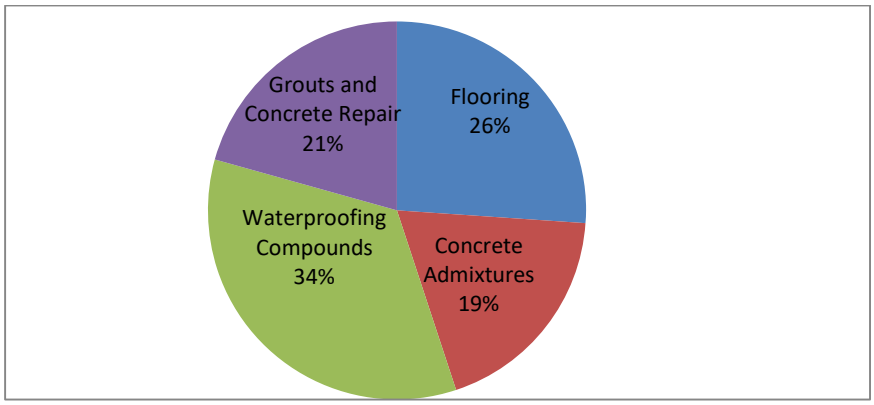
The concrete admixtures sub-segment of the types segment is anticipated to hold one of the leading markets shares by gathering revenue over USD 21 bn in 2020, growing at a CAGR of 4.6% in the forecast period. This is mainly owing to the growing demand for concrete in construction projects across the world. The, it is expected to witness the highest CAGR during the forecast period.

Concrete admixture is defined as a material other than water, aggregates, hydraulic cement, and fiber reinforcement used as an ingredient of concrete or mortar and added to the batch immediately before or during its mixing. The main reasons for use of admixtures are to reduce the cost of concrete production and establish control over the production process and properties of concrete. Concrete admixtures provide several benefits to concrete including:

- Compressive and flexural strength at all ages, decreased permeability
- Improved durability
- Corrosion and shrinkage reduction
- Initial set adjustments
- Increased slump and workability
- Improved pumpability
- Improved cement efficiency and concrete mixture economy

Concrete, being a primary structural material used for residential construction across a majority of European countries, is likely to boost the demand for concrete admixtures. The demand for admixtures in commercial buildings is expected to grow stronger in accordance with expanding commercial construction activity. However, this is expected to vary significantly across regions.

Exhibit 4.5: Global Construction chemicals market by end industry, 2021, USD 113.8 bn



Source: Frost & Sullivan

Waterproofing segment accounts for the largest share in the construction chemicals market at 34%. Waterproofing can be defined as the protection of surfaces or structures to avert the constant or

intermittent infiltration of water in its various forms, such as rain, humidity, snow, and hail. Depending on the source of water ingress, waterproofing products are majorly used in a variety of above- and below-ground applications.

In addition, depending on the type of application, waterproofing products are used across residential, commercial, and infrastructure projects.

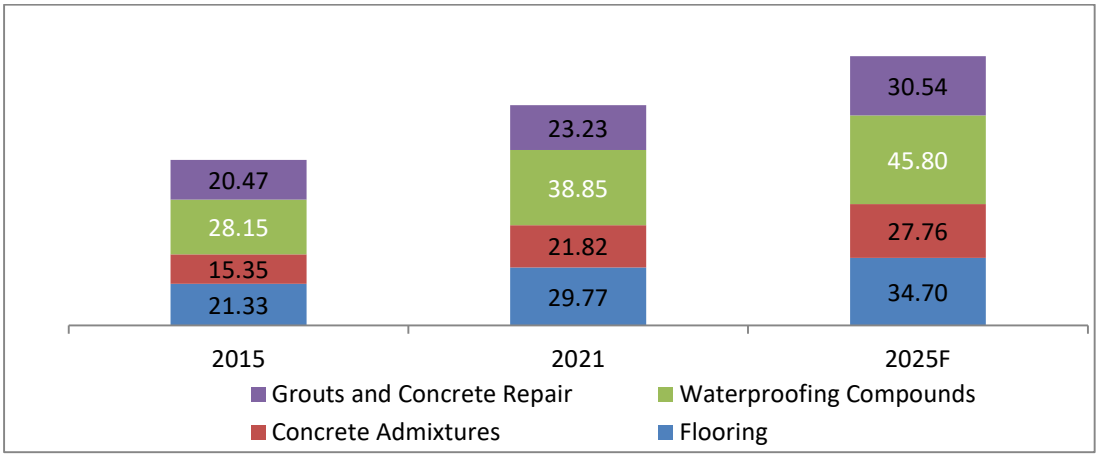
- For above-grade, waterproofing products are used for roofs, walls and decks, and retaining structures such as tanks.
- For below-grade, waterproofing products are used for underground parking decks, foundations, and retaining walls.
- Waterproofing products are available in the market in broadly three types: sheet membranes, liquid-applied and spray-applied membranes.
- For the purpose of this study, waterproofing is mainly segmented into above-grade and below-grade chemicals and membranes

Grout segment accounts for the third largest share in the construction chemicals market at 21%.

Grout is a semi-liquid, flow able plastic material having negligible shrinkage to fill gaps or voids completely, while imparting stability without cracking, delamination, or crumbling. Injection grouting is a process of filling cracks, voids, or honeycombs under pressure in concrete or masonry structural members for repairing cracks and strengthening damaged concrete or masonry structural members. There are different types of grouts used for the repairing and strengthening of concrete in load bearing applications. Selection of the type of grout for a particular application is based on its compatibility with the original building material.

Concrete repair mortars are typically based on a dry-mix formulation using dispersible powder. The selection of the type of concrete mortar is also based on the type of maintenance and repair activities that need to be carried out.

Exhibit 4.6: Global Construction chemicals Industry size by products – forecast - (USD bn), 2015-2025F



Source: Frost and Sullivan analysis

Flooring solutions are typically based on synthetic resin and cementitious systems. Industrial facilities for flooring purposes include manufacturing facilities, warehouses, and food processing, while commercial facilities include supermarkets, laboratories, aviation hangars, and parking decks. Industrial applications require flooring products to possess characteristics such as chemical

resistance, load impact, abrasion resistance, and moisture penetration. Product types available in the market vary significantly on the basis of mechanical properties, safety regulations, slip resistance, anti-static performance, and chemical or fire resistance. The strength of the floor depends on the kind of flooring system, which can vary from a single coat of polymer such as epoxy, PU, aliphatic polyaspartics, or acrylic to a complete build-up, including a screed for leveling purposes

4.4 Demand drivers and restraints

Growth of the Construction Industry

Global spending in construction will account for 17.5 trillion by 2030, triggered by increasing housing and infrastructure needs for growing population and industrial investment, with China, the US, and India leading the way and accounting for 57% of all global growth.

The overall growth of the global construction industry is a major growth driver for the global construction coatings market. The construction industry is expected to register a CAGR of around 1% between 2020 and 2027, registering high growth from 2024 onwards, after a considerable decline in the near term due to the crisis created by the COVID-19 outbreak.

Exhibit 4.7: Global construction spending – forecast - (USD bn), 2018-2030F

Source: Frost & Sullivan Research & Analysis

Global spending in construction will account for 17.5 trillion by 2030, with China, US, and India, leading the way and accounting for 57% of all global growth. More than 60% of global infrastructure investment will be made in emerging economies, particularly in Asia, while the US and Canada will account for approximately 20%.

Growth in sustainable manufacturing processes

Sustainable energy sources are expected to be incorporated in building materials. Algae-infused wall panels are being tested on building facades to regulate heat in buildings using photosynthesis. Global glass manufacturer NSG Group has entered into a joint venture with Ubiquitous Energy to manufacture and integrate the latter's building integrated photovoltaic Clear View power technology into window glass.

Construction chemical manufacturers in Europe and North America will benefit from developing bio-based materials and/or adding them to their portfolios, because regulatory bodies and customers in these regions are demanding more environmentally friendly products. Construction chemical

manufacturers that collaborate with leading research institutes and universities on projects of this type stand to gain an edge in this increasingly competitive market.

Growth in Repainting for Maintenance Purposes in All Types of Construction

The exterior of a typical commercial or industrial building is repainted every 5-to-10 years depending on the external environment of its location. The cycles of repainting are shorter for buildings located in wet and humid areas and highly urbanised cities. Repainting is mostly frequent on masonry and wood surfaces, while metal structure coatings are required to be durable for more than 10-to-15 years.

Repainting on independent residential buildings is a longer cycle and typically happens every 10-to-15 years depending on where the building is located and the preferences of the owners of those houses. Additionally, maintenance of build structures to repair substrate materials or refurbishment of already-built structures will contribute to the growth of construction coatings market. Although the outbreak COVID-19 is likely to delay expenditure on repainting in the short term, the demand from this maintenance market is expected to revive after 2021-22. For instance, a number of historical buildings in Europe that were scheduled to be repainted in 2020 are more likely to have the work done in 2021-22. Moreover, one of the key programmes under the planned EU Green Deal is to renovate existing buildings to enhance their environmental footprint, which is anticipated to create additional demand for construction coatings for repainting of buildings in the region. Additionally, in the US and Europe, commercial buildings constructed in the 1980s and before are being considered for repainting jobs with advanced coatings that have higher thermal efficiencies.

The Drive by Regulatory Authorities to Reduce Volatile Organic Compounds (VOC) Emissions and the Rising Need for Advanced Performance amongst Customers

Volatile Organic Compounds (VOC) is greatly dangerous for human health, as a number of these compounds such as benzene and methylene chloride, are proven carcinogens. In addition, these chemicals are proven to cause physical ailments such as headaches, asthma, or develop allergies to humans exposed to these. Laws and regulations limiting the VOC of most coatings were implemented globally due to concerns over health and atmospheric pollution.

The US EPA has issued guidelines for individual regions, limiting the amount of solvent in coatings on an industry-by-industry basis. With a few exceptions, most industries and shop applicators are required to limit VOC content to 340 g/l of paint as applied, i.e., including thinner. This corresponds to 55%–60% solids by volume.

Similarly, in Mainland China, VOC should be limited to 420 g/l on all coatings manufactured or imported, non-compliance of which results in a 4% consumption tax levied on the invoice value. Additionally, the State Administration for Market Regulation (SAMR) and the Standardization Administration of the P.R.C.(SAC) have released in early 2020, 9 new VOC regulations impacting coatings used in various end industries, including construction. One of those standards, GB 18582-2020, which will come into effect by the end of 2020, mandates new limits for use of harmful substances in architectural wall coatings, both interior and exterior.

The European Union follows the Directive 2004/42/CE when a coating is applied onsite and Directive 1999/13/EC when a coating is applied in shop or off-site facilities. The general enforcement of laws and regulations to reduce the solvent content of coatings used in construction has been promoting

the development of waterborne and powder coatings, which emit negligible VOCs compared to traditional solvent-borne coatings.

Additionally, premium customers of construction chemicals are increasingly preferring higher priced advanced products that provide durable protective, anti-microbial, and mould and UV resistant performance. These trends are expected to promote average price growth with the commercialization and adoption of newer advanced products offered at a higher price point.

Building contractors and architects are moving toward working with sustainable materials, mainly to earn certification and reputation for their projects such as GREET (Singapore) and LGEEP (Australia). The APAC market is also gradually moving toward low-VOC-emitting water-based acrylic adhesives due to increasing customer awareness and stringent regulations in countries such as Singapore

Gradual Growth in Industrial Sector is expected to boost the Demand for Industrial Flooring Products in Europe

The industrial sector in Europe is expanding gradually driven by rising private investment in manufacturing facilities. Lending schemes at low interest rates offer a strong incentive for private companies to invest in manufacturing facilities. In particular, Central European industrial markets continue to grow faster than their developed counterparts in Western Europe. Although a positive outlook is observed throughout the region, annual growth is spearheaded by Germany, Ireland, Sweden and the UK

Growth of Modular and Prefabricated Construction

Frost & Sullivan's analysis suggests that the pandemic will lead to notable changes in the way projects are carried out in the industry. For instance, prefabricated construction, which was already picking up pace in the developed world in both residential and commercial construction, is likely to be explored by more construction companies around the world. This process, aided by digital technologies, such as Artificial Intelligence (AI) and Big Data analytics applied over the design and construction process, could transform the global construction industry in the coming years, driving the demand, especially for metal and wood construction chemicals used on such prefabricated structures

Adoption of PCE-based Admixtures

Globally, PCE-based technology has achieved high penetration in plasticizers and superplasticizing admixtures. In APAC, countries such as Australia and New Zealand have completely transitioned to PCE-based admixtures, due to their high slump retention and superior water-reducing ability at lower dosage rates. However, developing countries such as Thailand and Vietnam are still heavily reliant on lower-cost, traditional naphtha and ligno-based admixtures

Average Price Growth Stemming from the Need to Replacing Titanium Dioxide (TiO2) as a Pigment in the Coatings Used, Especially in the EU

The European Chemicals Agency (ECHA) in 2017, started considering the carcinogenic effects of TiO2 powder to the human beings handling the material. In February 2020, the European Union (EU) formalised under the EU Regulation (EC) No 1272/2008, the classification of TiO2 as category 2 suspected carcinogen by inhalation. The mandate is scheduled to be brought into effect on September 9, 2021. The enforcement of this directive is likely to motivate coating manufacturers to

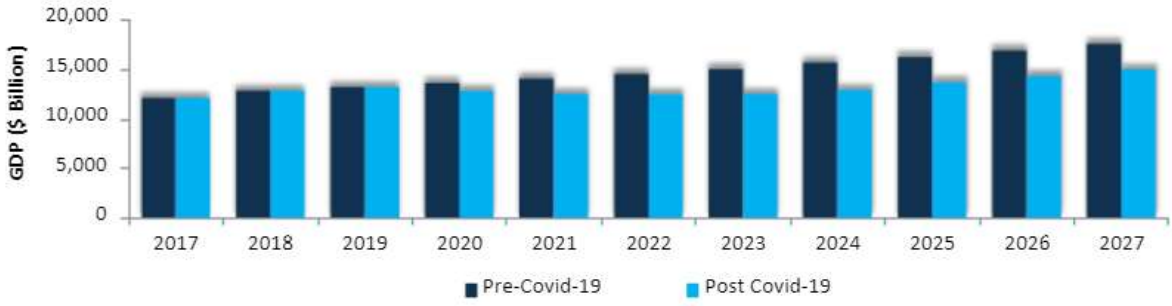
look for alternative pigments (or masterbatches) for coating formulations, which thereby is expected to drive the average prices of those coatings upwards.

Growth Restraint Analysis for the Global Construction chemicals Market

Slowdown in Construction Due to the Outbreak of COVID-19

The construction industry will be greatly impacted by the significant disruption to global economic activity, which is likely to eventually result in considerable reduction in investment along with stalling or delaying of planned projects between 2020 and 2021. The industry is still being challenged by a number of obstacles that are likely to cause a near-negative growth for the industry from 2020 to 2026. Major obstacles include the lack of adequate resources (both material and personnel), cost incurred due to additional measures for health and safety and delays or cancellations of ongoing projects.

Exhibit 4.8: Global GDP from construction – forecast - (USD bn), 2017-2027F



Source: Frost and Sullivan analysis

With the imposition of lockdowns and travel bans from and to China since January 2020, commercial construction companies that rely on materials from China are expected to face a supply crunch and steep price rises

Supply Chain Disruption

With the outbreak of the COVID-19 pandemic, the global supply chains of both raw materials and end products are significantly affected as a result of prolonged lockdowns and travel restrictions imposed in most countries around the world.

Construction coatings companies, especially the small and medium sized ones that do not have a strong presence in every location that they operate in, have been experiencing major disruptions in the supply of raw materials for manufacturing and distribution of coating products to their end customers. In addition, the need for social distancing has been forcing them to impose restrictions on the number of personnel working in their manufacturing facilities at a time and increasing the number of shifts per day to enable adequate production.

The impact of this restraint is expected to be high in the short term and improve thereafter.

Volatility in Crude Oil Prices

Prices of crude oil, a major raw material used for manufacturing formulation resins, have been frequently fluctuating due to a series of disruptive events such as geopolitical and climate-related issues. Such volatile natures of oil prices exert pricing pressure on coating manufacturers. However,

as resins constitute less than 50% of the total volume in solvent and waterborne coatings, this restraint is expected to have a medium impact in the short term and improve thereafter.

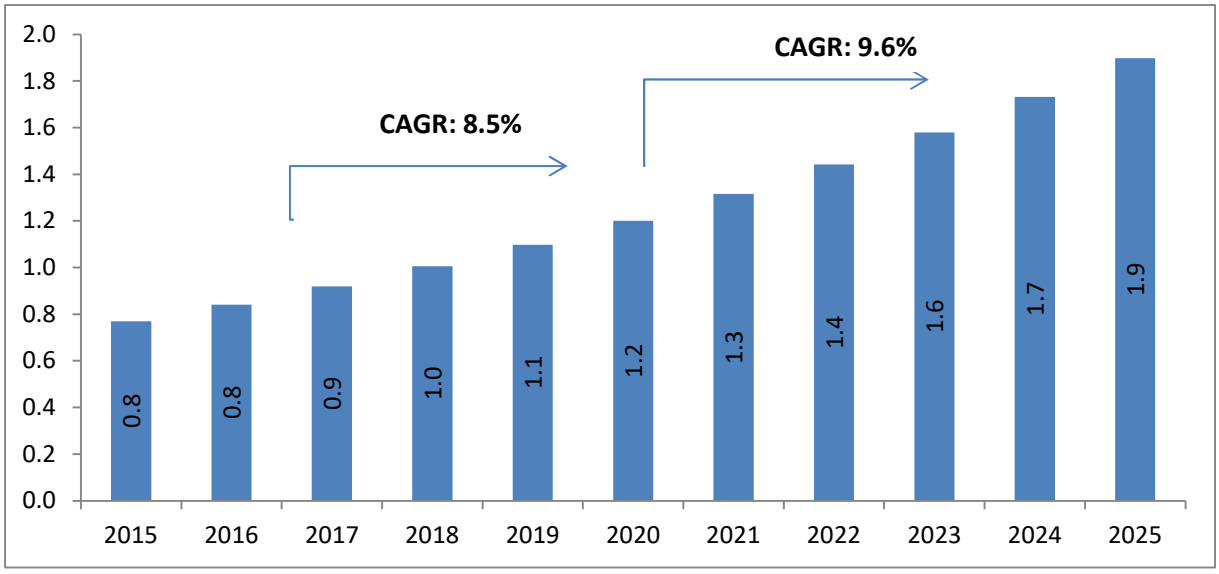
4.5 Overall size of Construction Chemicals market in India

India construction chemical industry revenue stood at USD 1.31 Bn in 2021 and recorded a CAGR of 8.5% during FY'15-FY'21. Concrete admixture dominated the constructions chemical market in India in FY'21 followed by waterproofing, Tile adhesives and others. The market was also observed to be highly dominated by the organized construction chemical companies in India.

The construction chemicals market witnessed a high growth in the past few years which is estimated to increase in the coming years. This growth is largely fueled by the growth of the construction industry, technological advancements, and growing demand in the Asia-Pacific region.

The Indian construction chemicals market is projected to exhibit a CAGR of over 9.6% by 2025

Exhibit 4.9: India Construction Chemicals market, 2015 to 2025F (USD bn)



Source: Frost & Sullivan

Growth in the market can be attributed to increasing construction of residential houses and commercial complexes across the country. Moreover, there is growing investment in the country's infrastructure projects by the government as well as private companies.

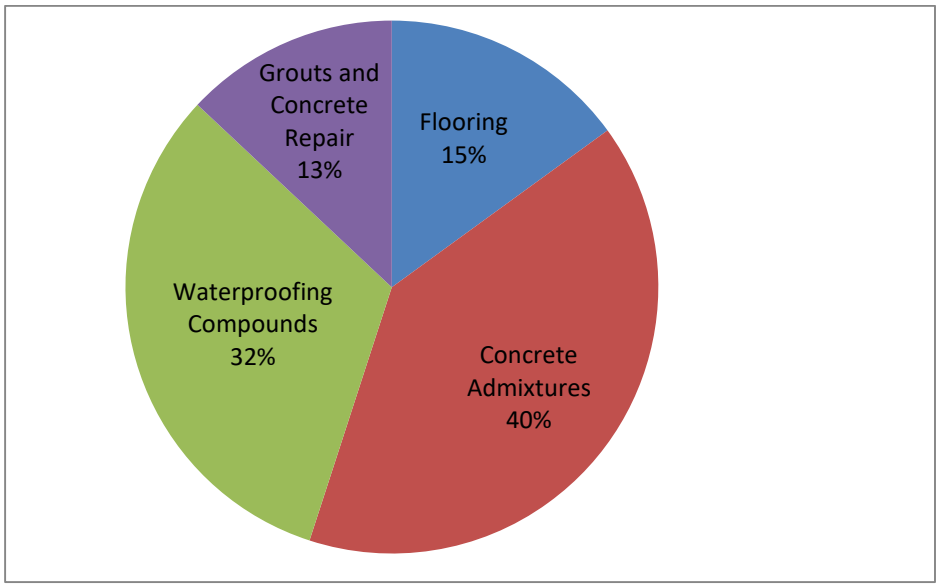
North India currently holds dominance, accounting for over 30% of the India construction chemicals market in 2021. Rising investment in infrastructure projects from the Indian government is creating significant growth opportunities for the years ahead. North India market is expected grow at a CAGR of 13.6% during the forecast period.

4.6 Key end users

Construction chemicals market is largely driven by concrete admixtures, which accounted for 40% of the Indian market in 2021. Flooring and waterproofing chemicals are the next big segments with a share of 14% each. Other segments include sealants, grouts and adhesives which together account for ~18% of the total construction chemicals market. The share of flooring is high in Indian market as compared to developed world while India have low share of Tiling, Sealants and waterproofing.

Indian construction chemical market has >80% business in new built.

Exhibit 4.10: Indian Construction chemicals market by end industry, 2021, USD 1.31 bn



Source: Frost & Sullivan

Admixtures

Cement is a widely used as binding material in construction. For concreting, cement is mixed with crushed rock, sand and water in specific proportion to produce concrete. For getting better results, better workability, more strength, and finishing, cement or mortar admixtures are used. Chemical admixtures are added to the mix immediately before or during mixing.

Infrastructural applications account for more than 63% of the India construction chemicals market. Rising investments and adoption of governmental initiatives such as “Make in India” and “Pradhan Mantri Awas Yojna” support infrastructural and industrial development, in turn creating long-term growth opportunities for construction chemicals market.

Three types of admixtures are most prevalent in the market - Ligno based, SNF (Sulfonated Naphthalene Formaldehyde) & SMF (Sulfonated Melamine Formaldehyde) based and PCE based. Ligno based admixtures were the first generation admixtures and gave lower performance compared to SNF and PCE based admixtures. PCE based admixtures are the 3rd generation admixtures and are usually 3-4 times more expensive than SNF/ Ligno based admixtures. The raw materials for manufacturing of PCE admixtures are not easily available in India and ~80% are imported from Korea, China and Japan.

Waterproofing agents

Water proofing caters to various end use applications with products based on Bitumen, PU and polymers like SBR & Acrylic. These compounds are available in liquid, solid, slurry and two-component coating forms. Water proofing compounds are designed to stop water infiltration. These compounds or membranes can be extremely effective when applied on the exterior of a foundation system. Application of the water proofing compounds can be done by implant treatments i.e. either dipping or spraying or by low-pressure spraying on the surface.

Flooring agents

Flooring compounds are mostly epoxy and polyurethane based. Industrial flooring compounds are used to meet various industrial needs such as abrasion, load impact, chemical attack, moisture penetration, strengthening of damaged floors, as well as improving the aesthetic appeal of the floor. They are also used to provide certain special features such as slip resistance, static resistance, fire resistance, antibacterial properties, and so on.

Flooring compounds are largely used at the finishing stage of the construction. Major commercial complexes and shopping malls prefer such products. Epoxy and floor hardeners constitute the major share of the market followed by PU based flooring agents.

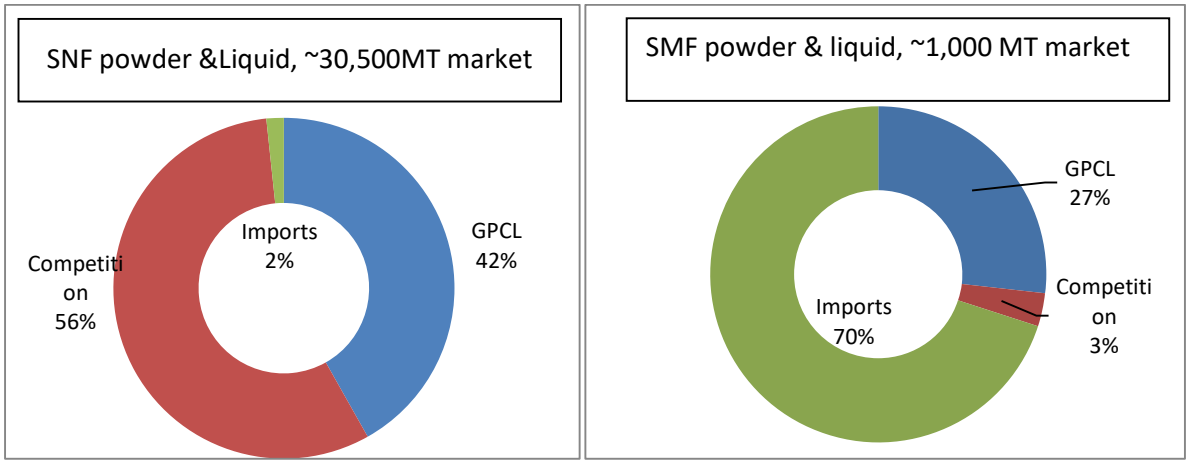
GPCL is amongst leading manufacturer of Construction chemical dispersing agents with sizable contributor of total requirements. The products manufactured by GPCL are efficient, proven, best in quality and unique than others; hence it falls under specialty chemicals and has full command on the business.

Key products Market size India

GPCL manufactures special grade of SNF liquid which is unique and having purity level of more than 99% and its only kind of super plasticizer available in market.

GPCL is manufacturing this product for special requirements for Wall putty and precast. This also goes in tile binders and Paint industry. This capacity is approx. 5,000 MT per annum.

Exhibit 4.11: India SNF Powder & Liquid and India SMF Powder & Liquid Market size MT, FY21



Source: Frost & Sullivan research & analysis

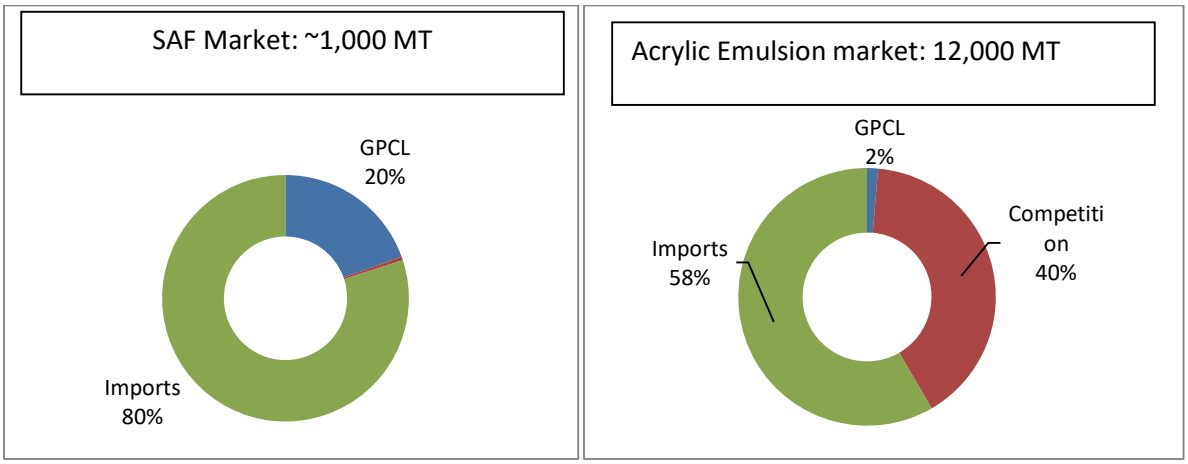
SNF Competition includes Himadri Speciality Chemical Ltd., Trisha Speciality Chemical Pvt. Ltd., LRC Speciality Chemicals Pvt. Ltd., Mangalore Chemicals & Fertilizers Ltd.

SMF Competition includes Kothari Petrochemicals Ltd., LRC Speciality Chemicals Pvt. Ltd. and Imports are mainly from Saudi Arabia

SAF, Acrylic Emulsion

GPCL has Acrylic emulsions product in range to fulfill the requirement of repairs, water proofing and maintenance industry post construction

Exhibit 4.12: India SAF, Acrylic Emulsion market size MT, FY21



Source: Frost & Sullivan research & analysis

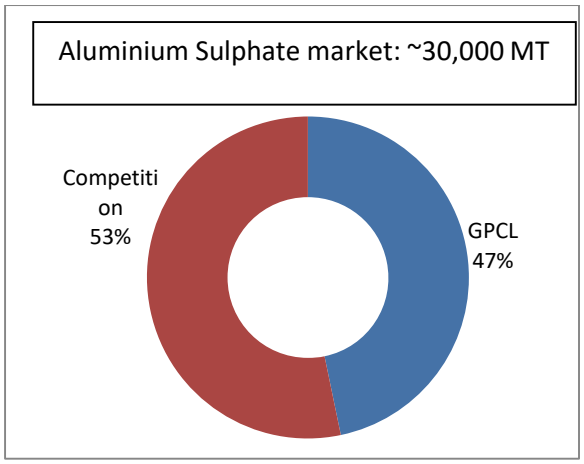
SAF Competition: BASF Imports and Imports from China

Acrylic Emulsion Competition: Rossari Biotech Ltd., Soham Chemicals, Anshika Polysurf Ltd.

Aluminium sulphate powder & Liquid

GPCL is fast growing and longtime player for manufacturing Aluminum sulphate product. They are focused on selling this product as an accelerator for Construction chemical Industry as a specialty chemical and mainly used in application for Road projects, tunnels and underground tanks.

Exhibit 4.13: India Aluminium sulphate powder market FY21



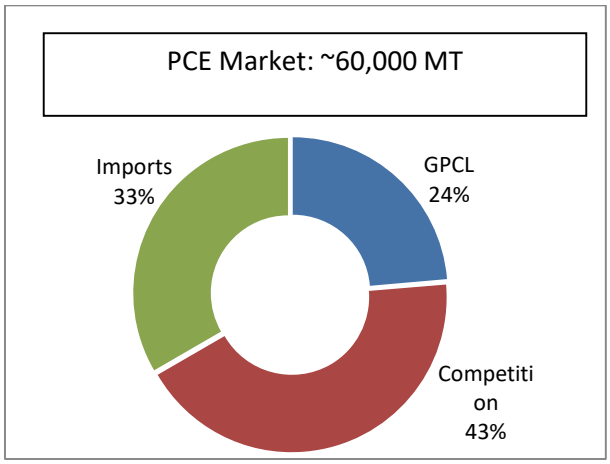
Source: Frost & Sullivan research & analysis

Aluminium Sulphate Competition includes Jai Ambe Industries, Eastern Alum, Ambica Chemicals, Sark International Pvt Ltd, Devam Alum Industries

PCE market

GPCL has most advanced version of super plasticizer i.e. PCE, today available in market for Construction Chemical Industry

Exhibit 4.14: India PCE market size MT, FY21



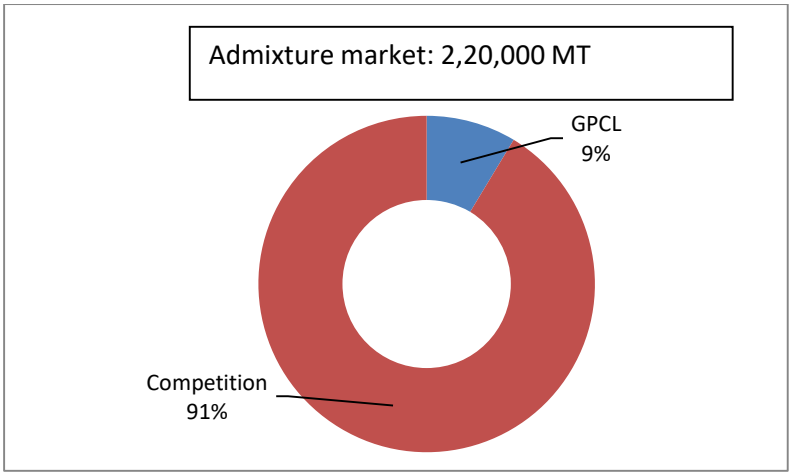
Source: Frost & Sullivan research & analysis

PCE competition includes Himadri Speciality Chemical Ltd., Aezis Global Pvt. Ltd., LRC Speciality Chemicals Pvt. Ltd., Sika India Pvt. Ltd., Kothari Petrochemicals Ltd.

Admixtures

This is a finished product for ready to use by customers at construction site. GPCL is manufacturing this product for key construction chemical suppliers in Industry under their brand name by toll conversion.

Exhibit 4.15: India Admixtures market size MT, FY21



Source: Frost & Sullivan research & analysis

Competition include; Jai Ambe Chemicals, RESIKON

4.7 Demand drivers and restraints

Growth in Indian construction/real estate sector will drive the usage of Construction chemicals products.

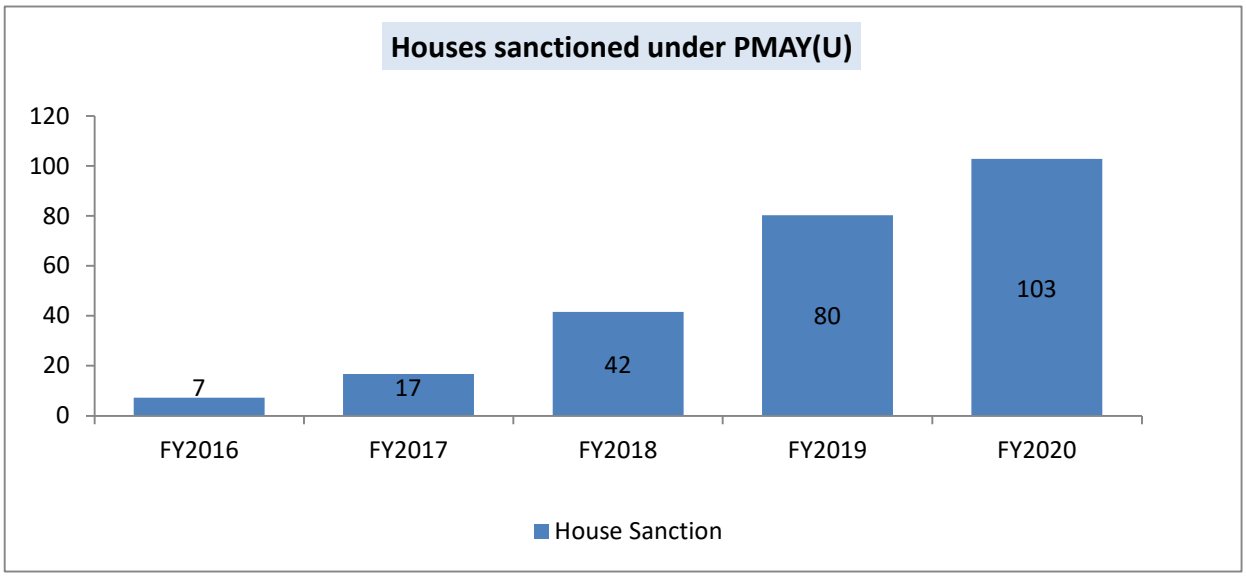
The construction industry is one of the fastest growing sectors in India. Growth in number of infrastructural projects and the resultant rise in spending across all states in the country are thrusting the demand for construction chemicals in the country. Rising government initiatives such

as Smart City, Make in India, and Housing for All, amongst others are creating significant opportunities which will boost the sales of construction chemicals in India.

Pradhan Mantri Awas Yojana (**PMAY**), an initiative by the Government of India ensures affordable house for all in the urban areas with a target of building 20 mn affordable houses by 31 March 2022. It has two components: Pradhan Mantri Awas Yojana (Urban) (PMAY-U) for the urban poor and Pradhan Mantri Awaas Yojana (Gramin) (PMAY-G and also PMAY-R) for the rural poor.

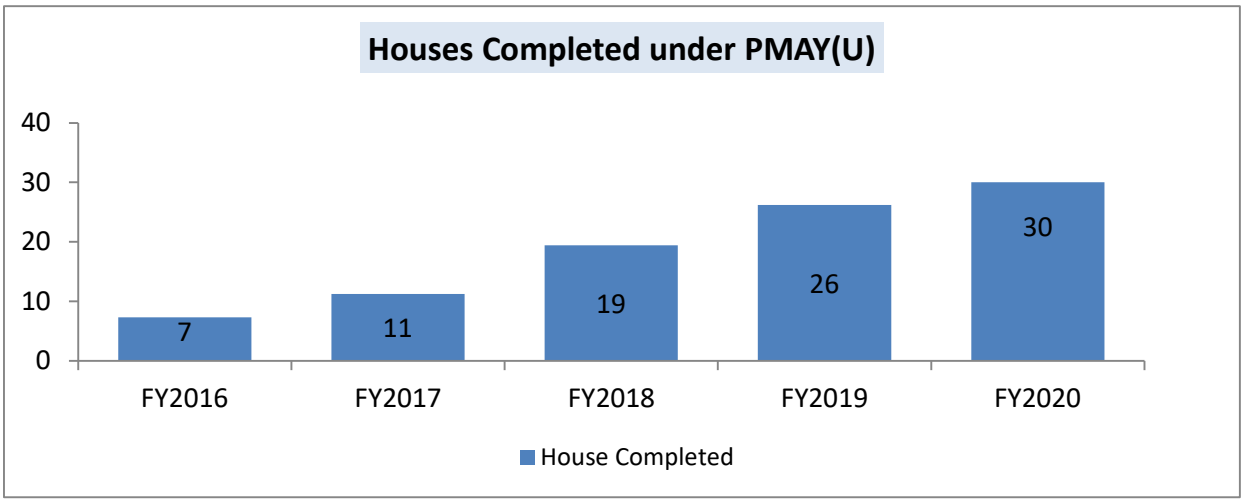
Under the PMAY-U, as per the ministry of Housing & Urban Affairs, a demand of 1.12 Cr houses in urban areas has been validated. In FY20, the total number of houses sanctioned under the scheme had crossed 1 Cr and ~57 lakh houses were in various stages of construction; ~30 lakh of which have been completed. The houses sanctioned under the mission involve an investment of about INR 5,700 bn with Central Assistance of INR 1,600 bn of which INR 600 bn of Central Assistance has already been released.

Exhibit 4.16: Year-on-Year houses sanctioned under PMAY(U), India (lakhs), FY16-FY20



Source: Press Information Bureau, Ministry of Housing & Urban Affairs

Exhibit 4.17: Year-on-Year Houses Completed under PMAY(U), India (lakhs), FY16-FY20



Source: Press Information Bureau, Ministry of Housing & Urban Affairs

The government has identified 305 cities and towns across nine states for implementing this scheme, named, 'Housing for All'. The selected cities and towns are in Chhattisgarh (36 cities/towns), Gujarat (30), Jammu and Kashmir (19), Jharkhand (15), Kerala (15), Madhya Pradesh (74), Odisha (42), Rajasthan (40) and Telangana (34).

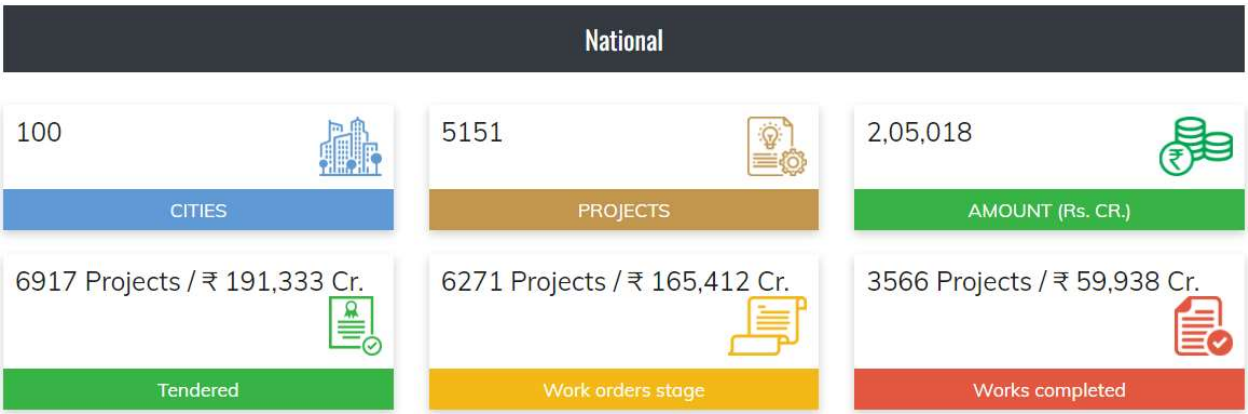
The Ministry has also launched sub schemes like Global Housing Technology Challenge- India (GHTC-India) and Technology Sub-Mission (TSM) to provide the best construction technologies and to facilitate adoption of modern, innovative and green technologies for faster and quality construction of houses. The Government's initiative on infrastructural development will support the states in deploying disaster resistant and environment friendly technologies.

In addition to this, the construction activity under the scheme has had a huge impact on the other sectors of the economy with a multiplier effect in employment generation. Around 1.2 Cr employments have been generated through forward and backward linkages with about 250 auxiliary industries like, steel, brick kilns, cement, paint, hardware, sanitary etc. These factors indicate a positive impact on the paints industry leading to higher consumption expected till the conclusion of the scheme in 2022.

Smart cities

In order to sustain the rapid urbanization in India, the Government of India/Ministry of Urban Development (MoUD) had launched the "Smart City Mission" in 2015. Through the Smart City Mission, the Government of India had announced its intention to develop 109 cities as Smart Cities over the next 5 years. The construction of smart cities would lead to larger number of commercial and residential complexes being created driving the demand for decorative paints.

Exhibit 4.18: Development on Smart Cities in India, 2021



Source: smartcities.gov.in; Frost & Sullivan

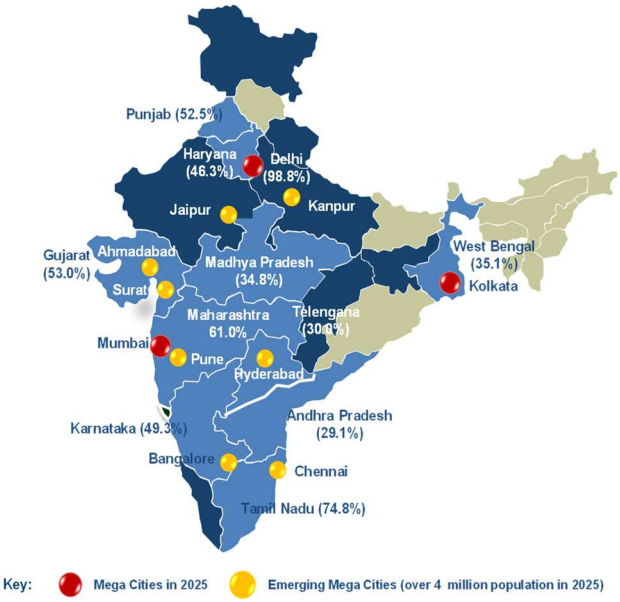
AMRUT - Atal Mission for Rejuvenation and Urban Transformation

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) had been launched by the Government of India with an aim of providing basic civic amenities such as water supply, sewerage, urban transport, parks to improve the quality of life for all, especially to the poor. Under this project the government will undertake the renovation of 500 cities.

Rapid growth of Urbanization

India's trajectory of urbanization has grown well from 25.6% in 1990 to 34.5% in 2019 (34.9% in 2020E). The rise in urbanization, supported by demand for real estate and improved infrastructure, has boosted the paint application. The UN expects that by 2030 ~40% of the population of India will reside in urban areas.

Exhibit 4.19: Urbanization rate of highly Urban states and Mega cities, 2025F



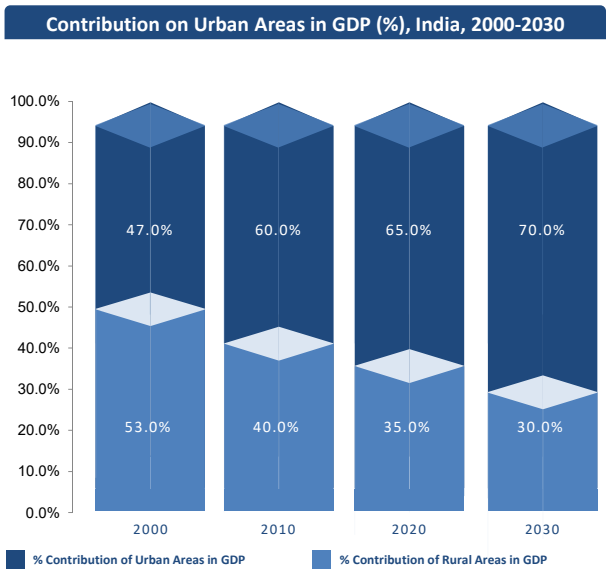
DELHI	28.5 MILLION
MUMBAI	25.8 MILLION
KOLKATA	20.1 MILLION
JAIPUR	4.29 MILLION
CHENNAI	9.9 MILLION
HYDERABAD	9.09 MILLION
AHMADABAD	7.56 MILLION
KANPUR	4.6 MILLION
PUNE	6.79 MILLION
SURAT	5.70 MILLION
BANGALORE	9.57 MILLION

	Urbanization Rate	Contribution to Country's Urban Population in 2025
Highly Urban States	>30%	69%
Medium Urban States	25–30%	24%
Low Urban States	<25%	7%

Note: Mega City is defined as a city with population of over 8 mn and GDP of USD250 bn or more

Source: Department of Economic Affairs, Ministry of Finance, India and Frost & Sullivan, 2011

Exhibit 4.20: Urban Areas contribution to GDP (%), India, 2000-2030F



Predictions

40% Urbanization Rate by 2030

70% Urbanization will contribute to GDP by 2030

87 Cities to population of more than 1 million by 2030

Implications

- Traffic congestion cost $10 billion/year in Delhi
- 26% power wasted in distribution
- 50% water lost in the distribution system
- $90 billion of GDP lost due to power shortages
- 1 doctor for every 1,700 people

Source: smartcities.gov.in, UN Population Database (2017 Revision), Frost & Sullivan

Real Estate Sector Growth

2019 has been a raging year for the Indian economy with the retail inflation soars and the GDP slumping to a six year low. However, the residential real estate sector (Top 7 cities) has remained resilient with sales increasing 6% Y-o-Y despite muted consumption expenditure. The sales have

exceeded the launches for the first time post 2016 demonstrating the growth potential of the sector. However the situation has become difficult in 2020 in India owing to the impact of the on-going pandemic. Q1 2020 witnessed a slump in sales on Y-o-Y basis as the buyers deferred their purchase decisions in light of the impending crisis, which led to the sales dipping by nearly 30% in Q1 2020 on a Y-o-Y basis.

Exhibit 4.21: Residential Sales in Top 7 Cities, 2016-2020

Residential (in Units)	2016	2017	2018	2019	2020	2021
Sales	147,584	96,050	136,273	143,923	1,38,350	2,36,530

Source: Mint Real Estate Intelligence Service (JLL), National Real Estate Development Council, Frost & Sullivan

Note: Top 7 cities include Delhi NCR, Mumbai, Bengaluru, Chennai, Hyderabad, Pune and Kolkata. Mumbai includes Mumbai city, Mumbai suburbs, Thane city and Navi Mumbai.

At a pan India level, the real estate sector in India is expected to reach USUSD 1 trillion by 2030. By 2025, it has been estimated to contribute 13% to the country's GDP. The real estate stock in India was estimated at 3.7 million sq. ft. (msf) in 2019. Emergence of nuclear families, rapid urbanisation and rising household income are likely to remain the key drivers for growth of real estate.

The commercial real estate did well in 2019 but is likely to be affected post the crisis. The demand for commercial real estate won't evaporate completely as the 'Work from Home' model can't be fully adopted as there are multiple jobs that can't be digitized. The demand for the commercial section is expected from Metros and tier I cities and will largely depend on urban conglomerates as tier II demand has not picked up yet and will take long time to sell. Office spaces have been mostly driven by growth in ITeS/IT, BFSI, consulting and manufacturing sectors.

The sector has been performing well; except for the pandemic and is expected to bounce back in 2021-22. A decent growing real estate sector indicates a growth in demand for decorative paints in the future.

Growth Drivers

Rapid Urbanization: Urban Indian population is expected to reach 600 mn by 2030

Affordable Housing Initiative: The government's focus on providing 'Housing for All' will see a growth in affordable houses

Low interest rates: The government is providing low interest rates for affordable housing

Growth of Disposable Income: Increasing urbanization has led to increasing income levels driving the need for houses with affordable amenities

Access to Credit: Government initiatives such as Credit Linked Savings Scheme make credit available for low cost property buyers

Government Reforms Driving the Indian Real Estate Sector

Real Estate Act (RERA) – The Act aims to increase the transparency of transactions and infuse accountability. It also aims to proactive address the concerns of different stakeholders including buyers, developers and investors through a dedicated grievance forum

Goods and Services Tax (GST) – This aims to removes multiple layers of taxation and implement a unified tax economy. It is expected to trim construction costs

Indian Accounting Standard (Ind AS) 115 – This mandates real state firms to move from %age completion methodology to project completion methodology. Under the new rule, developers can show revenue in their books only after the project is complete and the property is handed over to the buyer

Insolvency and Bankruptcy Code (IBC) – This framework enables on time recovery of loans and mandates stakeholders to resolve bad debts which have negatively affected the several leading banks in India

Real Estate Investment Trusts (REITs) – Allows companies to look for alternate source of investments and fund raising avenues. In 2017, SEBI allowed mutual funds to invest in REITs

Currently, there have been fewer options available in the value added sub category and mainly in the premium price ranges; however, with an increasing demand for these products, the companies are likely to launch more specialized products

Increasing compliance with international manufacturing standards

Indian Construction industry is fast adopting the best practices from across the world and implementing consumer standards matching with international standards. This will help increase the current penetration levels of construction chemicals. The following illustrations explain the upcoming trends which are driving the usage of construction chemicals:

Ban on onsite mixing of concrete is aimed at reducing pollution levels and in turn would generate demand for ready-mix concrete admixtures. Self-compacting concrete (SSC) is being preferred over normal-strength concrete as SSC doesn't require external compaction and enhances strength of structure. Increased usage of SSC would drive the growth of special admixtures like plasticizers and retardants.High rise buildings are being developed in cities owing to space constraints. This trend is driving the growth of high performance concrete and increased use of admixtures and related construction chemicals

New Regulatory Norms

New Regulatory Norms and Compulsory Certifications such as Green Building Code, usage of Ready Mix Concrete in Metro Rail Projects in 20+ Cities and Certification for product quality from engineer under RERA has increased usage of construction chemicals in India. Construction sector had to bear the worst impact of COVID 19 as there was a major financial crunch in the market. Construction activities were completely halted and labors migrated. This indirectly impacted the construction chemicals market adversely.

Most leading and internationally acclaimed brands are now available in the country. Indian companies have also started collaborating with foreign partners to deliver products that are on par with the international products. Imported products are available but these are expensive due to the various duties, taxes, and surcharges that they attract. End users still lack enough knowledge on products or their application methods. Though there is an increasing awareness to comply with the

norms and procedures for the use of these products, and matching international standards is likely to require time.

There is also increased environmental concern and the industry is gearing up for processes and products that are less hazardous in nature.

Companies in India have now started investing in R&D for improving their technical prowess. The advent of international participants has forced Indian manufacturers to be more competitive in terms of product quality and cost.

Growth in Indian oilfield industry will drive the usage of Construction chemicals products -

Oil and gas sector is among the eight core industries in India and plays a major role in influencing decision making for all the other important sections of the economy.

India is expected to be one of the largest contributors to non-OECD petroleum consumption growth globally. Crude Oil import rose sharply to US$ 101.4 bn in 2019-20 from US$ 70.72 bn in 2016-17.

Energy demand of India is anticipated to grow faster than energy demand of all major economies on the back of continuous robust economic growth. India's energy demand is expected to double to 1,516 Mtoe by 2035 from 753.7 Mtoe in 2017. Moreover, the country's share in global primary energy consumption is projected to increase by two-fold by 2035.

Crude oil consumption is expected to grow at a CAGR of 3.60% to 500 mn tonnes by 2040 from 221.56 mn tonnes in 2017.

India's oil demand is projected to rise at the fastest pace in the world to reach 10 million barrels per day by 2030, from 5.05 million barrel per day in 2020. Natural Gas consumption is forecast to increase at a CAGR of 4.18% to 143.08 million tonnes by 2040 from 58.10 million tonnes in 2018.

Diesel demand in India is expected to double to 163 million tonnes (MT) by 2029-30.As per preliminary data of gasoline sales, fuel consumption in India registered growth in June 2021 and is expected to further recover by end-2021. Gasoline sales by state refiners stood at 2.12 million tonnes in June 2021, registering an increase of 5.7% YoY.

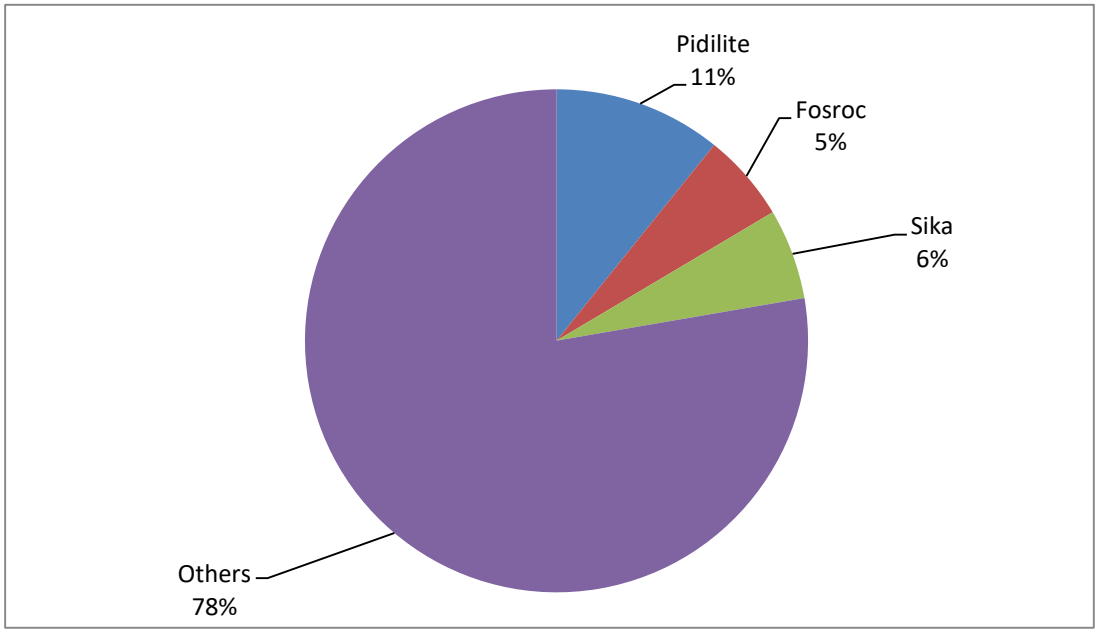
India is set to expand India's natural gas grid to 34,500 kms by adding another 17,000 km gas pipeline. The regasification capacity of the existing 42 MMT per annum will be expanded to 61 MMT per year by the year 2022.

4.8 Key players

India construction chemicals market is controlled by major players, namely GPCL, Pidilite Industries Ltd, Sika India Private Limited, BASF India Limited, Fosroc Chemicals (India) Pvt. Limited, Chembond Chemicals Limited, Dow Chemical International Pvt Ltd,

Construction chemicals industry in India is fragmented with the presence large Indian companies and multinational players as well as of several small single product local companies. Top 5 players account for around 20-30% of the market; there are over 300 local manufacturers that produce low value products.

Exhibit 4.22: Competitve Landscape: Indian construction chemicals industry (USD 1.31 bn) 2021



Source: Company Websites, Frost & Sullivan

Some of the major participants in the Indian construction chemicals market are profiled below

Pidilite Industries Limited

Established in 1959, Pidilite Industries has been a major participant in the field of specialty chemicals including the ones used in the construction industries. In all, it has 40 different brands including the popular adhesive and sealant brands such as Fevikwik, Fevicryl, Pidifix, and Pidiseal. The company has eight manufacturing plants located near Mumbai. After acquiring a huge share of the Indian market, especially for adhesives and sealants, the company has expanded its operations in overseas markets such as Bangladesh, Sri Lanka, Europe, and Africa.

Fosroc Chemicals (India) Pvt. Ltd.

Fosroc International traditionally has expertise in concrete admixtures, industrial flooring, repair and protection, grouts, and anchors. It has always advertised its core competence in concrete, cement, and polymer-based technologies. Fosroc Chemicals (India) Pvt. Ltd. was the first multinational construction chemicals company to start its operations in India in 1981. Since then, Fosroc India has been introducing international products into the Indian market and has been successful in making its mark as a leading participant in the industry.

Choksey Chemicals Pvt. Ltd.

This Indian company has a unique distinction of having strong focus on R&D activities for different products including its construction chemicals range. Its R&D center has also been recognized by the Department of Science and Technology, Government of India. The chemicals products of the company are already approved for use in Government and semi-government organizations catering to some critical defense requirements. The company's product range includes sealants,

waterproofing coatings, water repellants, grouts, tile fixing adhesives, concrete admixtures, coating and hardeners, and other specialty products.

Sika India Pvt Ltd

This is a part of Sika International, a multinational construction chemicals company with about 80 production and marketing centers in 60 countries across the globe. In 1987, the Sika Group started its operations in India with one manufacturing unit in Kalyani, West Bengal. It has now increased its production output with two more units -- one in Goa and another in Gujarat. It became the first Indian company to receive ISO 9001 certification in trade. It offers products in the elastic bonding and sealing, industrial flooring, and waterproofing segments.

CICO Technologies Ltd.

CICO Technologies Ltd. has been in the market for the past seven decades and has a strong presence in the waterproofing segment for its brand CICO especially in the eastern region. CICO Technologies offers a comprehensive range of products for industrial, architectural, and general construction as well as customized solutions for the repair and rehabilitation industry. Having a nation-wide distribution with independent distribution chains, the company has a core portfolio of chemicals for waterproofing, sealants, and admixtures. Their complete range of products include waterproofers and water sealers, concrete admixtures (plasticizers), construction aids, protective coatings/impregnations, grouts and grouting compounds, industrial floorings, shortcrete products, repair compounds, capsules for anchoring/bolting, tile and structural adhesives, sealants, waterproof coatings, and membrane and anticorrosive products. Through numerous franchisees and joint venture manufacturing plants planned in overseas markets, CICO is set to become a global brand.

Ciba Specialty Chemicals (India) Limited

Ciba Specialty Chemicals (India) Ltd. was incorporated in January 1997, following the global merger of Ciba-Giegy Ltd. and Sandoz Ltd. to form the Novartis Group. The specialty business of Ciba-Giegy was de-merged to form Ciba Specialty Chemicals. Currently, the company is one of the leading manufacturers of specialty chemicals in India with products such as adhesives (cyanoacrylate two-pack systems) and specialty products

Global and India Agro Chemicals Overview

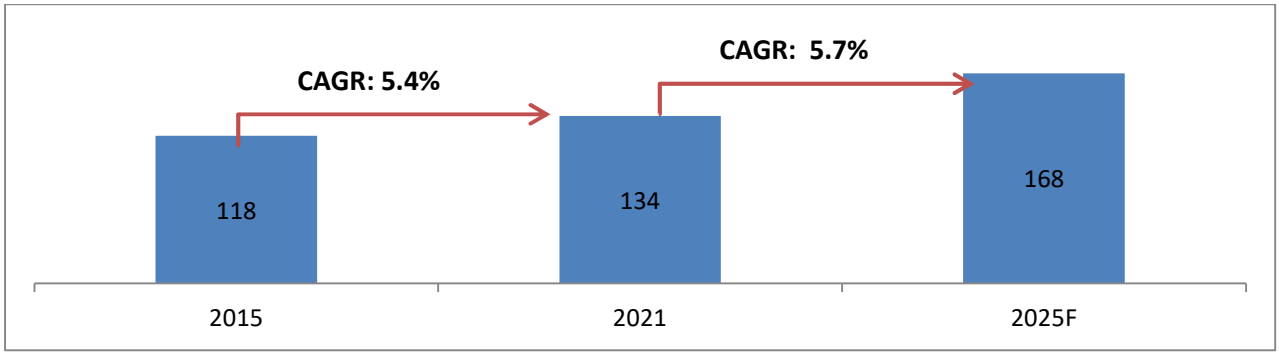
5.1. Global Overview

Global agrochemicals sector is seeing an upward demand trend due to crop protection chemicals, being the backbone of agriculture segment across the world. With the growing population and shrinking arable land, crop yield has gained enormous importance in the current time. World population is already approaching whopping 8 bn people in numbers, which needs 16 bn meals per day, the least. In order to accommodate these many meals, crop protection chemicals play vital role in safeguarding the crops for fulfilling human food security needs.

Crop protection chemicals are primary classified into insecticides, herbicides & fungicides followed by nematicides, rodenticides, etc. This classification is based on the fact that a crop needs protection from insects, herbs, fungus, nematodes or rodents, etc.

The global agrochemicals market was valued at USD 134 bn in 2021 and is forecasted to reach USD 168 bn by 2025 growing at a compound annual growth rate (CAGR) of 5.7%. The rising population across the world, accompanied by rising affluence, is seeing a shift in consumption patterns. There is a need to not just increase production to meet demand but also to ensure that the nutritional needs of an increasingly affluent population are met. The Crop Protection Chemicals & Solutions is a fast developing industry globally, which is open to innovation and is considered as one of the major tools to protect crops and increase yields. The judicious use of crop protection chemicals within the confines of a regulatory framework is the need of the hour. The agrochemical market is an important agriculture support industry, which boosts the agriculture output. There is an increasing need to balance the prudent use of the best chemicals and minimizing the potential adverse impact of that use.

Exhibit 5.1: Global agrochemicals market (in USD Bn)



Source: Frost & Sullivan Research & Analysis

Note: Agrochemical section does not include commodity products such as fertilizers. It only covers crop protection products such as pesticides, herbicides, etc.

5.2. Agrochemicals market value chain

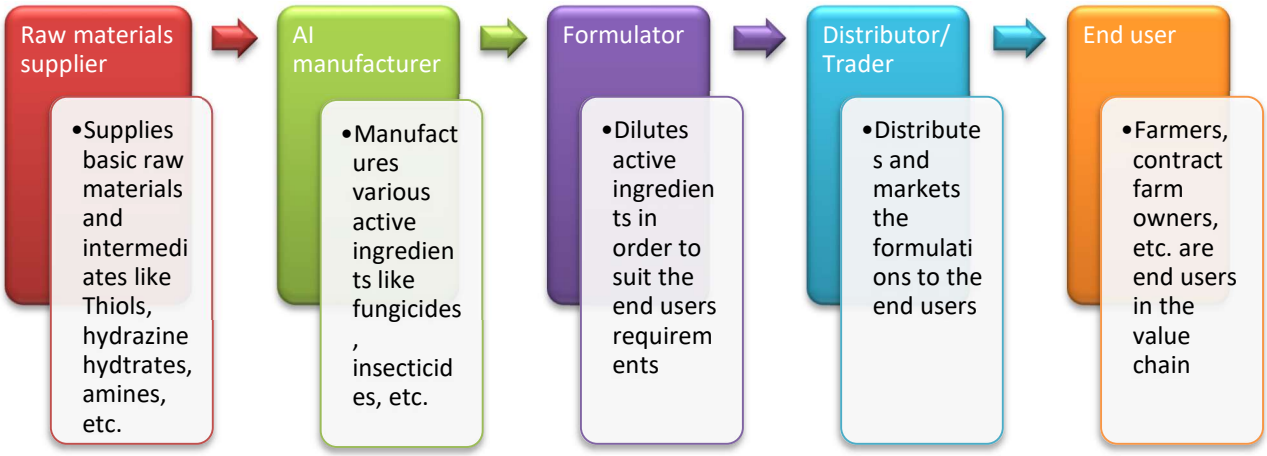
The Global Agrochemical value chain comprises of raw material suppliers (both petrochemical derivatives as well as natural feedstock), Pesticide active ingredient/technical grade manufacturers, and formulators producing the end products, distributors and end use customers.

Raw material supplies to the active ingredient manufacturers constitute of basic chemicals like H2S, Ammonia, etc. which are used for manufacturing intermediates like hydrazine derivatives, thiols,

amines, etc. which are consumed as raw material by pesticide manufacturers. Some of the natural feedstock suppliers provide bio-surfactants like castor oil ethoxylates, Alkyl poly-glucosides, etc. Many multinational oil & gas companies which have downstream operations are involved in the raw material supply to the agrochemical technical producers.

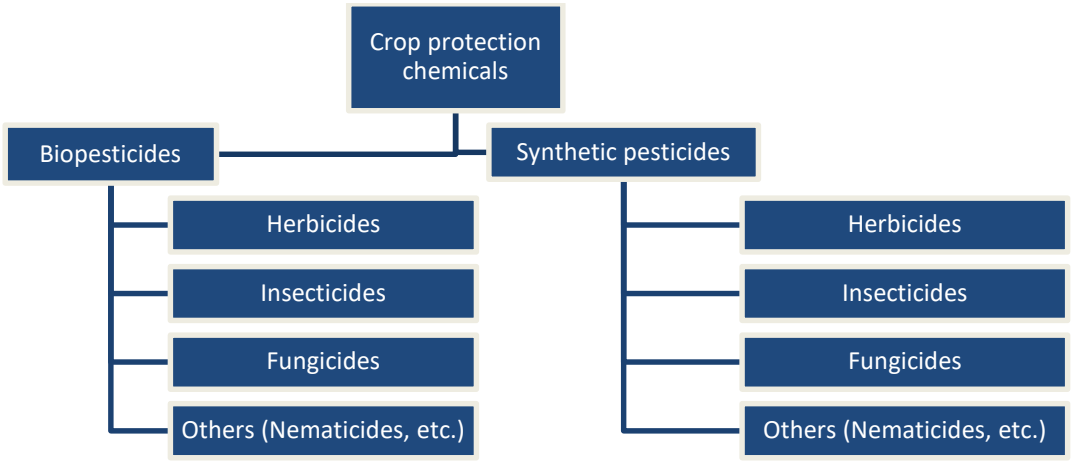
Pesticide manufacturers are involved in active ingredients (AI) synthesis used for formulating various insecticides, rhodenticides, nematicides, fungicides, herbicides, etc. The pesticides (also known as crop protection chemicals) are key technical materials which are used for killing various weeds, fungus, insects, etc. that destroys crop, reducing yield in overall. Pesticide manufacturers have various active ingredients that are either generic or patented. Patented active ingredients can be manufactured by AI producers only with the prior approval or co-operation of the patented molecule provider. Generally, patented molecules come with a validity of patent, which when expires; it can be termed as generic molecule. On the other hand, generic active ingredients are free to manufacture, without any restrictions from the inventor.

Third important entity in the agrochemicals value chain includes formulators. Various formulators of pesticides dilute active ingredients for end-use consumers. Some of the active ingredients manufacturers are also forward integrated in the value chain, formulating pesticides for direct consumption of the customers.



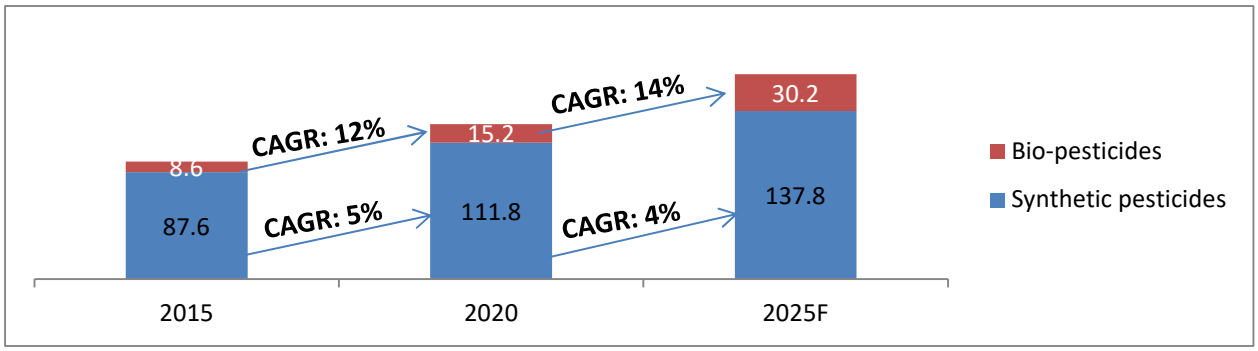
5.3. Market Segmentation – by product type

Crop protection chemicals are segmented based on product types like insecticides, herbicides, fungicides, etc. or depending on the biodegradability index associated with the chemicals.



Globally, synthetic pesticides are consumed widely compared to bio-pesticides which are under developmental phase. The segmentation by product type is as follows –

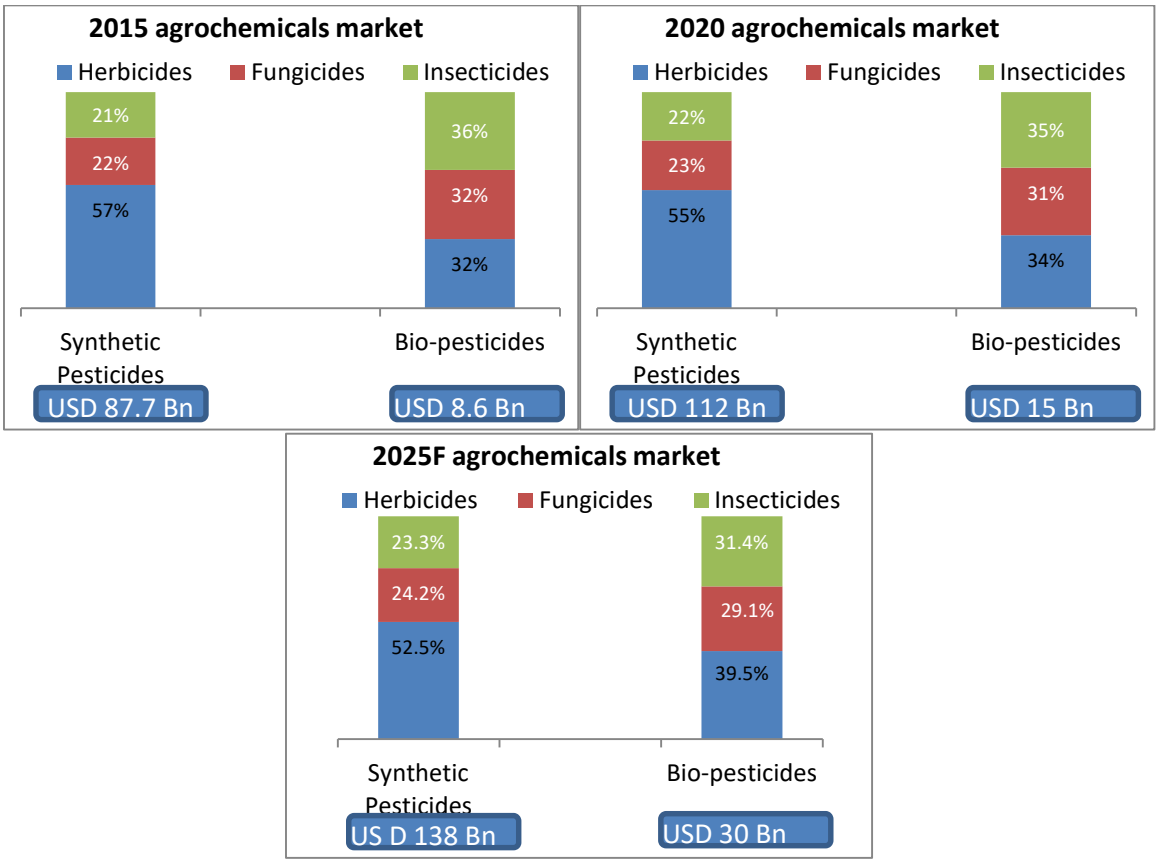
Exhibit 5.2: Global agrochemicals market segmented by nature of pesticide (USD Bn)



Source: Frost & Sullivan Research & Analysis

Global agrochemicals market is segmented into synthetic pesticides and bio-pesticides. Demand for bio-pesticides is picking sharply due to environmental regulations from the government as well as consumer awareness on the improvising long term soil fertility. Bio-pesticides will be growing with 14% growth rate over the next half decade, compared to 4% growth rate recorded by synthetic fertilizers globally.

Exhibit 5.3: Global agrochemicals market segmented by product type (by value)

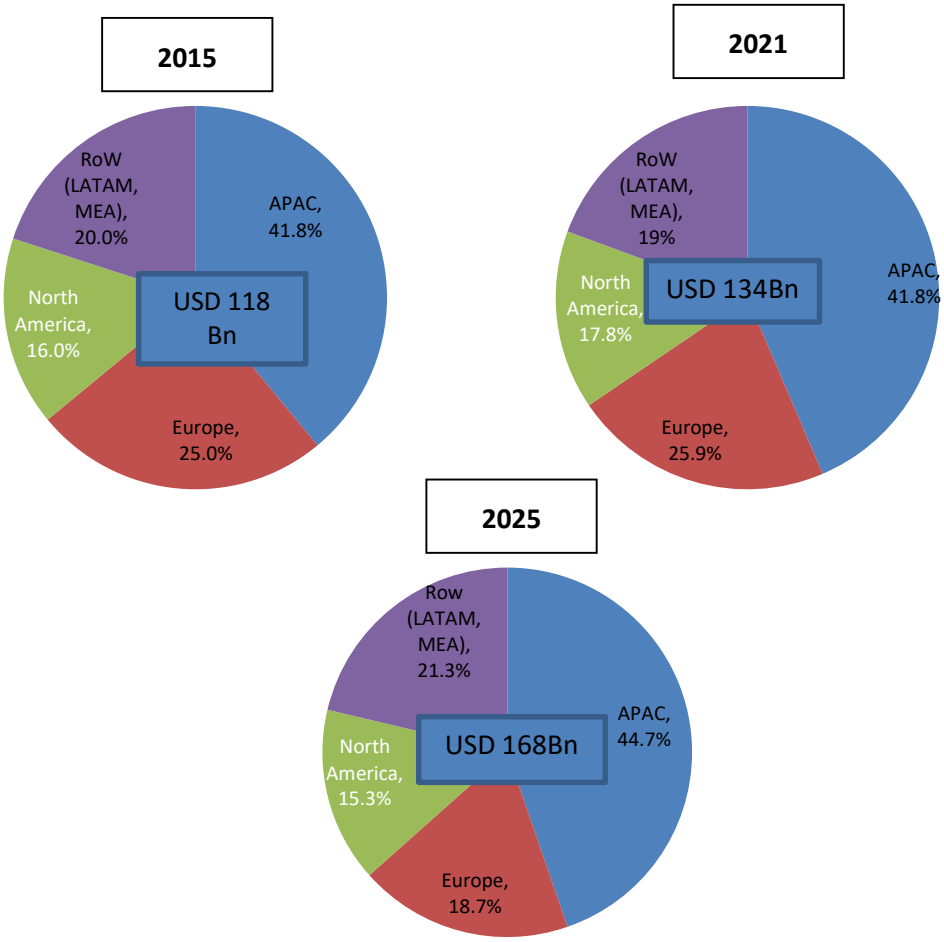


Source: Frost & Sullivan Research & Analysis

Bio-pesticides market will be growing with double digit growth rate in the next five years (2020-25) owing to the strong demand from end use customers. This demand will further stimulate stronger research & development activities in the bio-pesticides space. Pertaining to the stringent environmental regulations in many countries, bio-pesticides will be the future of crop protection chemicals.

5.4. Global agrochemicals market segmentation by geography

Exhibit 5.4: Global agrochemicals market segmentation by geography (Value)



Source: Frost & Sullivan Research & Analysis

APAC dominates the regional demand for agrochemicals due to agriculture consumption needed in order to feed the growing and already higher population. Countries like India, China, Indonesia, Australia, etc. dominate the usage of crop protection chemicals in the APAC region. Europe and North America are also high demand centres for agrochemicals with major imports of active ingredients from China.

5.5. Segmentation by Market players

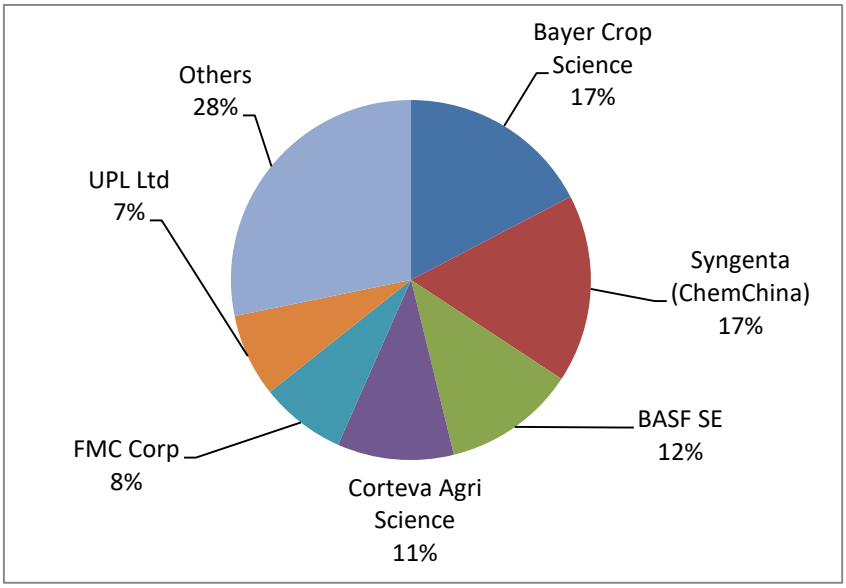
There have been many mergers and acquisitions in the agrochemicals segment in the last 3 years, giving birth to big4 players. The big4 comprise of China National Chemical Corporation Ltd, Corteva Inc., BASF SE and Bayer AG. Other international players having significant global presence include Sumitomo chemicals, AMVAC Chemical Corporation, FMC Corporation, Yara International ASA, etc. The table below showcases major M&A activities materialized globally to form big4 agrochemical firms –

Exhibit 5.5: Key Global agrochemicals M&A activites

Big4 Agrochemical Firms	Combined Entities	M&A	Transaction year
China National Chemical Corporation Ltd	Syngenta AG	Acquisition	2017
Corteva Inc.	The Dow Chemical Company, DuPont de Nemours Inc.	Merger	2017
Bayer AG	The Monsanto Company	Merger	2018
BASF SE	Bayer AG (Vegetable seeds business)	Acquisition	2018

The merger & acquisition activities occurred from 2017 to 2018 and the market share of these bigger firms prior to M&A activities was as follows:

Exhibit 5.6: Global agrochemicals market segmentation by players, 2020

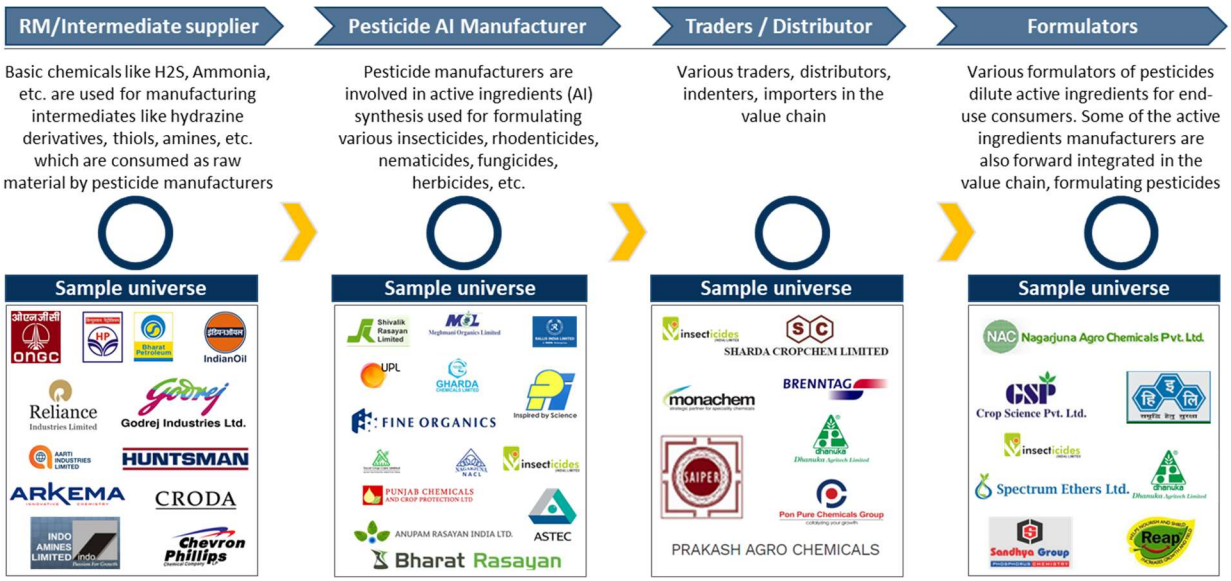


Source: Frost & Sullivan research & analysis

5.6. India Overview

India is a net exporter of agrochemicals and the thirteenth-largest exporter of pesticides and disinfectants. The country's exports have increased on the account of low-cost manufacturing, availability of technically trained manpower, seasonal domestic demand, overcapacity, competitive pricing and strong presence in generic pesticide manufacturing. Rise in demand in the agricultural segment is driving growth of agrochemicals in India. In October 2020, the government urged players in the agrochemicals industry to come out with new molecules of global standards for the farmers' benefit, while CropLife India, the industry body, pitched for stable policies and regulatory regimes to boost growth in the sector.

Exhibit 5.7: India Crop protection chemicals value chain



Source: Frost & Sullivan Research & Analysis

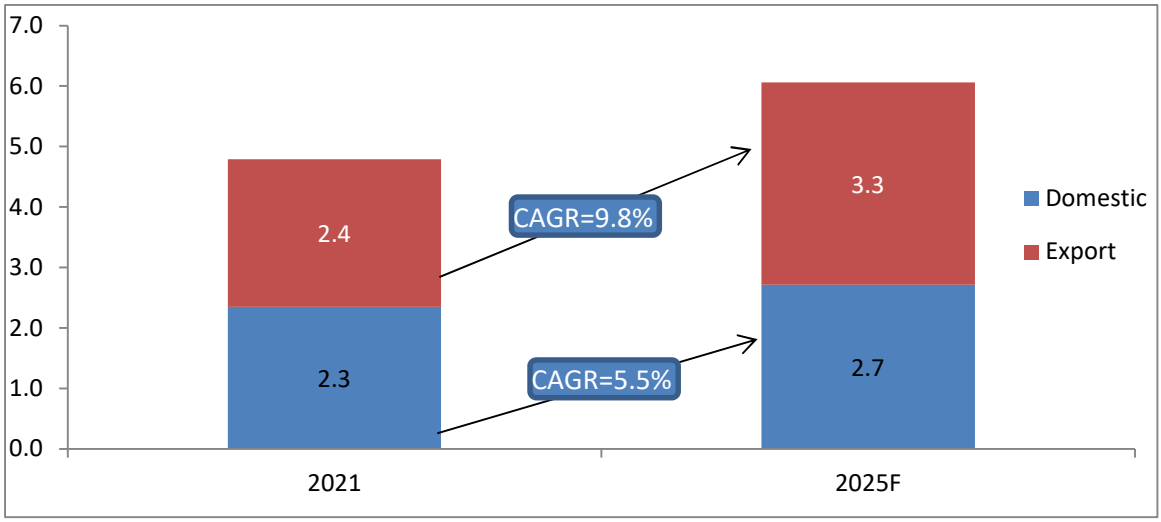
In December 2020, India witnessed unrealized potential for growth in agrochemicals and is focusing on development of new products and judicious use of pesticides.

India Agrochemicals exports have grown with the CAGR of almost 10% during the year 2015-20. The actual export contribution of crop protection chemicals was 50% of total domestic production (by value) in the year 2020. Exports are projected to grow to almost 55% in the year 2025 (by value). This means, USS 2.1 bn was export from India and an equal amount of crop protection chemicals were meeting domestic demand in the year 2020. In the year 2025 exports will grow to USD 2.7 bn contributing 55% of total domestic production which is valued at USD 6 bn.

India ranks 13th in the imports of pesticides globally with Brazil leading the imports of crop protection chemicals having 7% market share in the world imports (2018, by volume). Brazil is followed by France (5%), Canada (5%), US (4%), Germany (4%), Thailand (4%), Australia (3%), Belgium (3%), UK (3%), Nigeria (3%), Spain (3%), Italy (3%) followed by India (2%).

India was world's 3rd largest pesticide exporter by volume in 2018. China leads the exports of pesticides with 27% market share in the world exports followed by Germany (8.3%), India (8%), US, Belgium, France, etc.

Exhibit 5.8: Indian Agrochemical market by exports & domestic consumption (USD Bn)



Source: Frost & Sullivan Research & Analysis

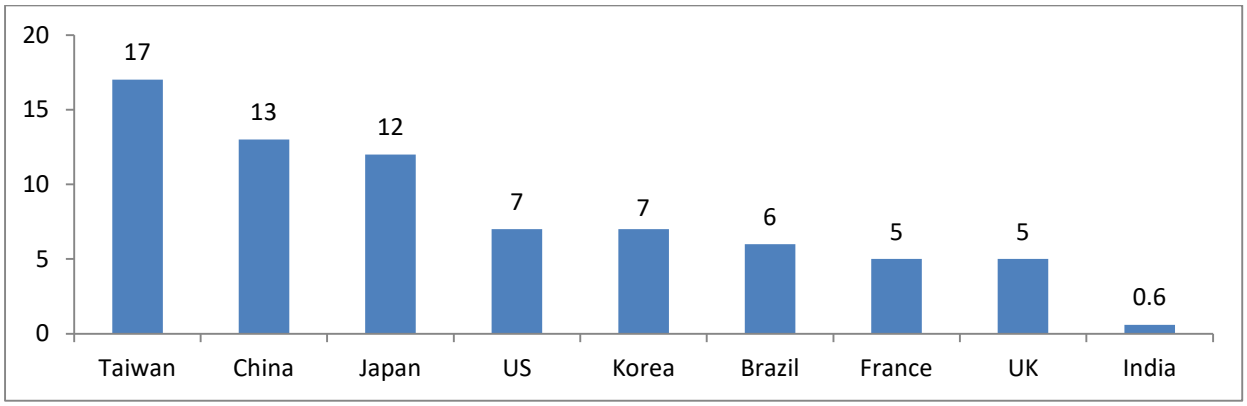
India per capita arable land is decreasing in order to accommodate housing needs for growing population. Although arable land availability is huge compared to some smaller countries like Israel, there have been low crop yield trends seen in India due to low level of mechanisation, erratic climate conditions, huge dependence on monsoon, poor logistics infrastructure, poor post-harvest support, etc.

India has been ranked fourth globally in the production of agrochemicals (crop protection chemicals/ pesticides) after USA, Japan and China. Indian Agrochemicals market is valued at USD 2.1 bn which is anticipated to grow at 4 per cent in the next 5 years to USD 2.6 bn by 2025.

Per hectare crop protection chemicals consumption in India

India has one of the lowest per capita consumption of crop protection chemicals per hectare. This consumption per hectare is way higher in developed nations like United States or Japan. Countries like Taiwan, China, Japan, etc. use double digit kilograms per hectare of crop protection chemicals compared to just 0.6 Kilogram per hectare in India. This suggests, there is tremendous scope of growth for the crop protection chemicals in India, ramping agricultural productivity and compensating the shortage of farm labour by extensive use of herbicides, etc.

Exhibit 5.9: Per hectare crop protection chemicals consumption (in Kg/hectare, 2020)



Source: Care Ratings

5.7. India Agrochemicals market by end users

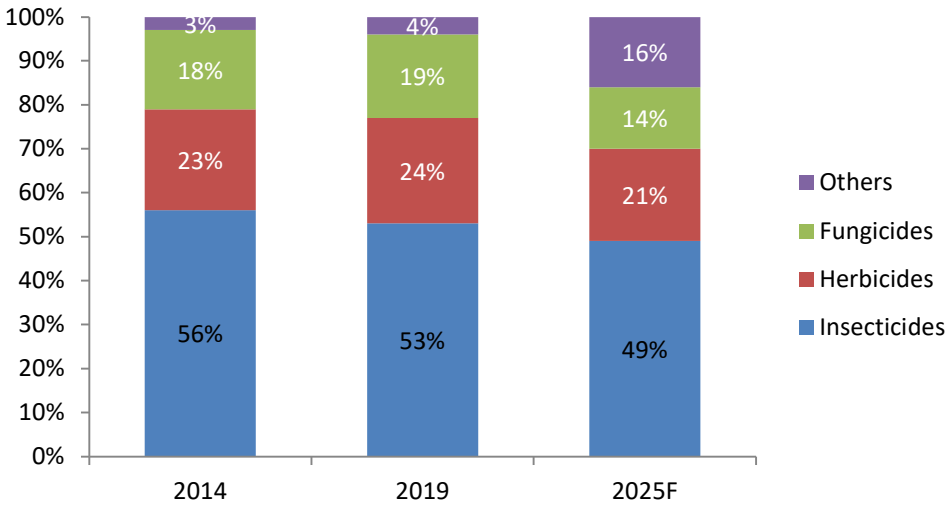
Insecticides contribute highest market share in the Indian crop protection chemicals market accounting slightly more than half of the total market. India has almost 10,000 types plant eating insects. In the agriculture value chain, Agrochemicals are the final external stimulus provided to the plants.

Growth in agricultural formulations

The India agrochemicals market is driven by the rising population within the country, which has led to maintaining sufficiency in agricultural practices, further boosting the use of Indian agrochemical products for farming activities. The industry is positively influenced by the Indianization of the agrochemical industry, which has fuelled the sales of agrochemical products. Other factors affecting the growth of India agrochemical industry include an increase in the population growth, rising need for food production, and economic growth.

As the demand for food products is increasing, the landmass available for agriculture is gradually decreasing due to the heightened effect of urbanisation, which is providing an impetus for the farmers to use different agrochemicals to increase land productivity and maintain soil health. The positive trend and the integrating farming practices in the country are expected to propel the industry growth rate of agrochemicals in India within the forecast period. However, the market may find hindrance due to low awareness of the benefits of agrochemicals among the farming community, and their low acceptance of the modern-day farming practices.

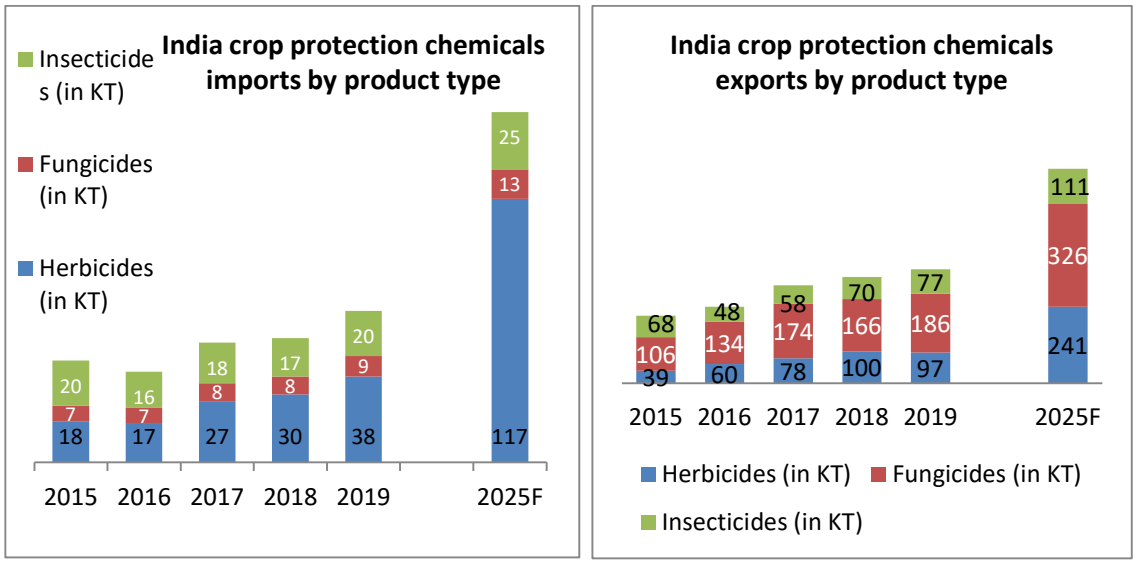
Exhibit 5.10: Indian Agrochemical market segmentation by product type, 2014-25F



Source: FICCI, Industry research

India crop protection chemicals market in 2024 is expected to have higher market share of 'other' crop protection chemicals like bio-pesticides, nematicides, rodenticides, plant growth regulators, etc. Since bio-pesticides are anticipated to grow at higher CAGR during 2019-24, it will have highest market share in the others category.

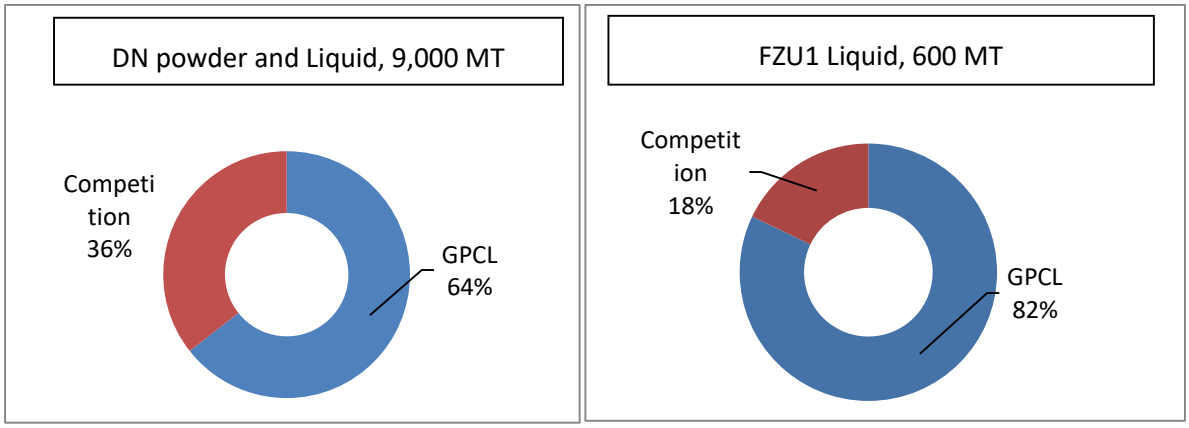
Exhibit 5.11: Indian Agrochemical trade - segmented by product type, 2020



Source: ministry of commerce, GOI

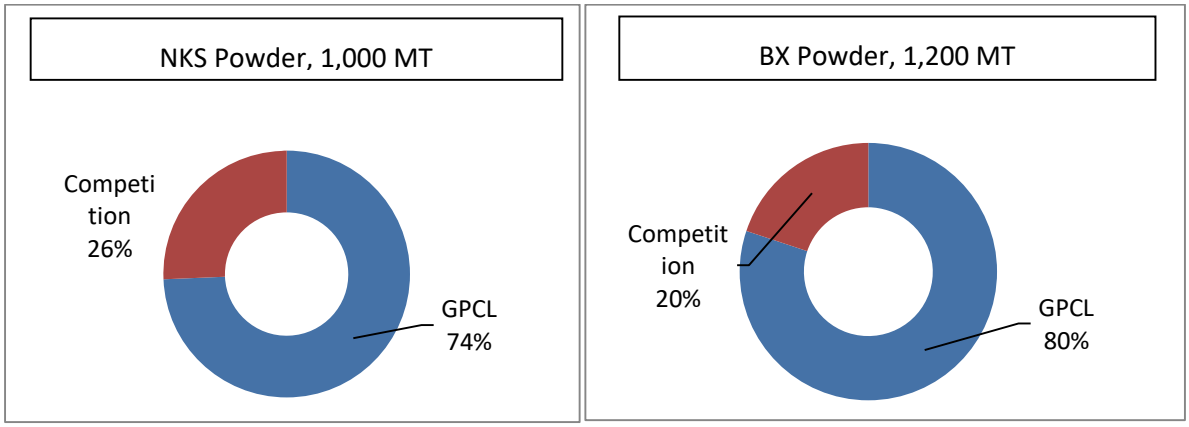
Bio-pesticides will be growing with double digit growth rate in the next half decade occupying more than 10% market share in the next half decade. India will see increased usage of herbicides over coming decade due to extreme farm labour shortage in the country. Herbicides will be compensating as cost effective measure to the farm labours in India, recording decent growth rate till 2030. Bio-herbicides will also be gaining traction over the forecast period.

Exhibit 5.12: India DN Powder & Liquid and FZU1 Liquid Market size MT, FY21



Source: Frost & Sullivan research & analysis

Exhibit 5.13: India NKS Powder, BX Powder market size MT, FY21

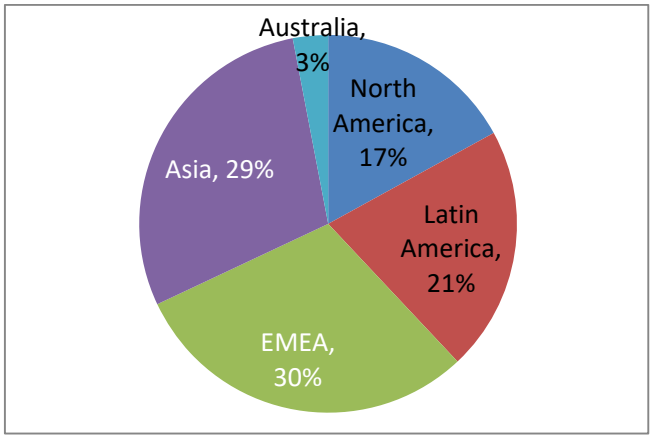


Source: Frost & Sullivan research & analysis

Indian crop protection chemicals market segmentation – by trade

India is a net exporter of crop protection chemicals, with nearly 50% of all its production being exported to other countries. The primary markets of export constitute of US, Brazil, Netherland, France, etc.

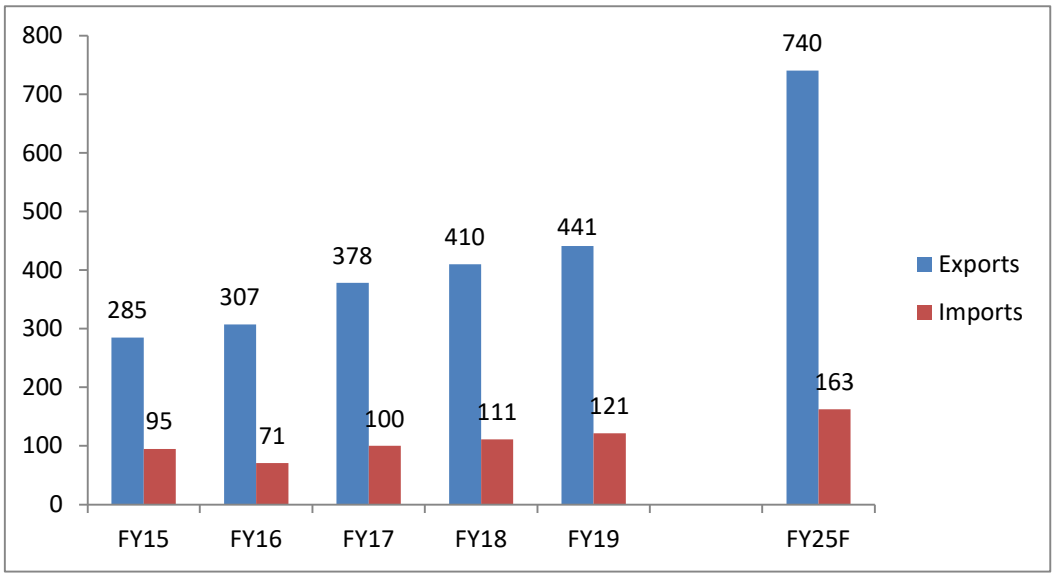
Exhibit 5.14: Indian Agrochemical market – by export destinations, 2020



Source: FICCI, Industry research

The export of crop protection chemicals constitute of both agrochemicals technical also known as active ingredients and formulations. Formulations also contain the inert materials like fillers, etc. which facilitates the active ingredient on the crop. Active ingredient is responsible for killing insect/herb/fungus/etc.

Exhibit 5.15: Indian crop protection chemicals market by exports & imports (in '000 MT)



Source: Ministry of chemicals & fertilizers, Dept of chem & petchem, GOI

Indian crop protection chemicals exports have grown with the CAGR of almost 9% during the year 2015-19. The actual export contribution of crop protection chemicals was 50% of total domestic production (by value) in the year 2019. This will grow to almost 55% in the year 2024 (by value). This means, USD 2.1 bn was export from India and an equal amount of crop protection chemicals were meeting domestic demand in the year 2019. In the year 2024, exports will grow to USD 3.1 bn contributing 55% of total domestic production which is valued at USD 5.7 bn. Below graph shows further bifurcation of India imports-exports by product type like herbicides, fungicides and insecticides.

5.8. India Agrochemicals market by Key players

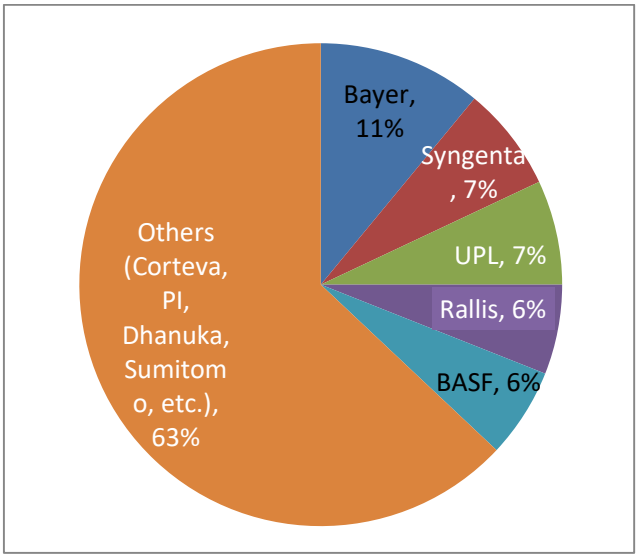
India crop protection chemicals market is fragmented and there are multiple players involved in it. UPL, being a global footprint organization, has been catering to domestic demand along with high growth markets from Latin America. Below growth share matrix shows the competition of players in Indian market.

Exhibit 5.16(a): List of competitors in crop protection chemicals market, 2020

Multinational Companies	Indian Companies (listed)
China National Corporation Ltd	UPL Limited
Sumitomo Chemicals Co., Ltd	PI Industries Ltd
BASF SE	Jubilant Lifesciences Ltd
Yara International ASA	Gharda Chemicals Ltd
AMVAC Chemical Corporation	Bharat Rasayan Ltd

FMC Corporation	Meghmani Organics Ltd
Bayer AG	Rallis India Ltd
Corteva Inc.	Punjab Chemicals Ltd

Exhibit 5.16(b): India Agro chemicals market, by competitors, 2020



Source: Industry research

India crop protection market is highly fragmented with presence of more than 150 active ingredient manufacturers, 1000+ formulators and 2 lakh plus companies engaged in distribution. The highest market share held in India crop protection chemicals market is by Bayer (11%) followed by Syngenta, UPL and others.

5.9. Indian Agrochemicals market trends & drivers

Key factors driving growth

The primary demand drivers for the crop protection chemicals market are increasing demand for food security in order to meet needs of growing population. Due to instances across the world of increased pest attacks, crop protection chemicals are expected see rapid growth.

Demand inhibitors include increased restrictions and government regulations on usage of pesticides. The banned pesticides like Endosulfan had proven adverse effects on the human health due to its excessive usage in the farms. Hence, the once heavily used Endosulfan has negligible market share across the globe.

The effect of coronavirus outbreak throughout the world has hit the production of crop protection chemicals. Since China is a major exporter of agrochemical products, its production plants located in Zhejiang, Jiangsu, Shandong, Hubei, Sichuan, Inner Mongolia, Shaanxi, Guangdong, Guangxi and other belts have witnessed temporary closure. Although the outbreak has disrupted supply of crop protection chemicals (mainly technical materials) from China, the speedy recovery & subsequent plant start-ups have resumed the production of pesticides in the recent past.

A key success factor for the crop protection chemicals in the market is extensive R&D capabilities of a company to develop new molecules satisfying the government norms and stringent environment regulations (possibly having higher pesticide biodegradability index). Emergence of bio-pesticides are making a splash in the existing crop protection market, however product features in these green

pesticides are so limited that it has not gained popularity as much as traditional crop protection chemicals. Although it remains a challenge as of now, to introduce (equally effective) 100 per cent sustainable pesticide, transition to hybrid pesticides is seen as future solution for the sustainable agriculture. This essentially ensures a robust growth trajectory for traditional crop protection chemicals in high-volume-high-growth centres like India.

Following are some of the critical success factors for the players involved in crop protection chemicals –

1. **Backward integration of technical active ingredients** – Many formulators' needs to have backward integration of its technical AI's (Active Ingredients) in order to succeed in gaining high profit margins in the market.

2. **Comprehensive product portfolio** – 'One stop solution' for farmers of all the agrochemical needs surely drives the success of one firm over another

3. **Strong distribution network** – Distribution network plays vital role in reaching at the fragmented farmers' base across the world also enabling excellent feedback mechanism & deep customer relations.

India is experiencing a slowdown in terms of economic growth due to on-going issues like Coronavirus outbreak, NBFC/liquidity crisis, etc. Although GDP growth has come down in past couple of years, domestic food demand has soared along with increasing population. 100% foreign direct investment (FDI) is also allowed in agriculture in India. Plus, increase in demand for food grains with high emphasis on food grain self-sufficiency is promoted by the government which will drive crop protection chemicals market in India positively. Few of the demand drivers of crop protection chemicals market are as follows:

Government initiative to double farmer's income

Government of India is proactively looking for measures to significantly improve the farmer's income in coming decade. There have been budgetary provisions announced in the recent budget 2020-21 for farmer's welfare where INR 1,42,762 Crore were allocated to the Ministry of Agriculture & Farmer's Welfare. This allocation is 30% higher than the revised estimate for 2019-20. Crop protection chemicals market will have positive impact of huge government spending to protect the crop from losses. Government has decided to hike MSP (Minimum Support prices) on Rabi crops from 50% to 109%, which are to be marketed in RMS (Rabi Marketing Season) 2020-21.

Rabi crops Commodity (Fair Average Quality)	MSP for RMS 2020-21 (Rs/quintal)	MSP for RMS 2021-22 (Rs/quintal)	Cost of production 2020-21	Increase in MSP (Rs/ quintal)	Return over cost (%)
Wheat	1925	1975	960	50	106
Barley	1525	1600	971	70	65
Gram	4875	5100	2866	225	78
Lentil	4800	5100	2864	300	78
Rapeseed & Mustard	4425	4650	2415	225	93
Safflower	5215	5327	3551	112	50

Source: Ministry of agriculture & farmers welfare

Increase in horticulture & floriculture production

Fruits & vegetables contribute almost 90% of the total horticulture produce in India. Government has been promoting export of horticulture products, which will be boosting farmer's income. In order to avoid horticulture crop losses, crop protection chemicals market will be boosted over coming half decade. Horticulture is a higher margin business and thus will contribute more to the growth of crop protection chemicals. Floriculture is another segment which goes hand in hand with horticulture (in terms of providing growth avenues resulting in increased demand of crop protection chemicals in India).

Increasing shortage of labour

Urban population in India will cross 40% by the year 2030, according to a survey conducted by UN department of population. This percentage will further go up to 50% in India by the year 2050. Increasing urbanization has led to shortage of labour in the rural agriculture sector. This has further led to increase in wages for the labour. Due to this change, herbicidal usage will be boosted in order to improve the soil fertility, as against the traditional usage of labour for herb removal from farms.

Increasing food demand due to increasing population

India population is estimated at 1.35 Bn in the year 2019 which is almost 18% of the world population. This population is growing with the rate of 1.32% per year, according to the World Bank sources. For such an increase in population, food security is important. In order to meet the food demand, usage of crop protection chemicals would be boosted in coming half decade.

Shrinking agriculture land

Due to improved urbanization, agricultural land is shrinking. This shrinkage in agricultural land is demanding the improved crop production per hectare. In order to have improved crop yield in the shrinking agricultural land, crop protection chemicals (herbicides, insecticides, fungicides, etc.) will be used extensively.

Increased usage of bio-pesticides

The current market size of Indian bio-pesticides is less than 4% of the total crop protection market in India. This approximately equals to market size of less than USD 84 mn. The bio-pesticide market will witness double digit growth in India in the next five years (2019-24). The Bio-pesticides are pesticides with biodegradable content in it which avoids crop losses by means of not affecting the soil fertility. These bio-pesticides are witnessing the increase in the usage due to large scale awareness and promotion funded by the government.

Pros of bio-pesticides –

- Bio-pesticides are degradable naturally or are less harmful to the environment. Hence are more eco-friendly compared to synthetic pesticides.
- Bio-pesticides decompose quickly. They are equally effective as that of synthetic pesticides with no harm to the ecosystem. These bio-pesticides can be a combination of 100% natural ingredients & synthetic ingredients to enhance the effect in the field.

Future prospects –

Bio-pesticides are rapidly growing pesticides due to their eco-friendly nature. The bio-pesticides demand is growing at the rate of 16% y-o-y and is the matter of preference in the developed countries. These bio-pesticides will not completely replace the synthetic pesticides fleet in coming decade; however its usage will be significant in even developing countries like India. This is due to awareness among the farmers about bio-pesticides which maintains the soil fertility in longer run.

Indian crop protection chemicals market regulatory framework

India Insecticide Board regulates and controls the usage, export, sales, distribution, quality, transport and manufacture of pesticides in India. The board's approval is needed to introduce new molecules in the market or prior to sales or manufacture of any pesticide in India. There are various changes recently incorporated under the purview of board to regulate the pesticides in the country, one of such bill is tabled in the parliament.

Pesticide Management Bill 2020

Pesticides are regulated in present day by the **Insecticides Act** formulated in **1968** which needed immediate rewriting, according to the government sources. The main objective of the bill is to secure the farmer's interest and propagate safe & effective usage of pesticides in the country. This bill is intended to promote the organic pesticides having stringent environmental regulations and sustainable agriculture effects. This bill has received cabinet approval in February 2020 which is tabled in the parliament. After passage of the bill, even advertisements for the promotion of pesticides will be regulated by the government. And there are hefty penalties proposed in the bill for violator entities.

Insecticides Act, 1968

Usage, export, sales, distribution, quality, transport and manufacture of pesticides in India is currently regulated with age old insecticides act formulated in 1968. According to the act, Central Insecticides Board & Registration Committee (CIBRC) has been found which regulates the pesticide usage in the country. Procedure has been laid by the registration committee to register a pesticide in the country, appeal against the non-registration or cancellation of pesticides license, etc.

Regulations on certain pesticides

The regulation on certain pesticides includes increased restrictions and government regulations on usage of pesticides. Banned pesticides like Endosulfan had proven adverse effects on the human health due to its excessive usage in the farms. Hence once heavily used Endosulfan has negligible market share now, across the country. In the similar way, many other insecticides were banned in the country for their adverse effect on the biodiversity.

Integrated pest management

Integrated Pest Management (IPM) is an eco-friendly approach which aims at keeping pest population at below economic threshold levels by employing all available alternate pest control methods and techniques such as cultural, mechanical and biological with emphasis on use of bio-pesticides and pesticides of plant-origin like Neem formulations. The use of chemical pesticides is

advised as a measure of last resort when pest population in the crop crosses economic threshold levels (ETL).[3]

Following are the benefits of integrated pest management –

- Reduced human risk in terms of health & environment/ biodiversity
- Lower health risk to non-target pests/herbs/fungus/rodents/nematodes/etc.
- Less number of pesticides used in the spectrum controlling target pests
- Less pests developing resistance chances from these pesticides
- More organically derived and environmentally sustainable

Ban on 27 pesticides in India 2020

Department of agriculture, cooperation and farmers welfare (Ministry of agriculture & farmers welfare), Government of India has decided to ban 27 pesticides in India for the import, manufacture, sale, transport, distribution and usage citing that several countries have already imposed a ban on these pesticides. These pesticides include insecticides, fungicides and weedicides: 2,4-D, acephate, atrazine, benfuracarb, butachlor, captan, carbendazin, carbofuran, chlorpyriphos, deltamethrin, dicofol, dimethoate, dinocap, diuron, malathion, mancozeb, methimyl, monocrotophos, oxyfluorfen, pendimethalin, quninalphos, sulfosulfuron, thiodicarb, thiophante methyl, thiram, zineb and ziram.

Anupam Verma committee report proposed a list of 66 pesticides that are banned in other countries and 27 of them involves serious risk to human and animal life. These 27 banned pesticides are highly hazardous with potential to cause severe health problems including hormonal changes, carcinogenic, neurotoxic, reproductive and development health effect as well as environmental impacts such as higher toxicity level for bees. Many of these pesticides were already banned in the territorial specific limits in the country like Maharashtra prohibited Monocrotophos & Acephate in 2017, Punjab had sought to review licences and not fresh licences for 2,4-D Amine, Benfuracarb, Dicofl, etc. Many of these pesticides have data deficient for regulatory purposes and better alternatives are available for all of them. Considering ban on these 27 pesticides in developed countries too, exports will not get significantly impacted. Although this market was said to be of INR 12,000 crore domestically, this will get replaced with other alternative pesticides which are less severe to the human/animal/environmental cause.

5.10. GPCL's key competencies in Agrochemical products

GPCL manufactures, the specialty dispersing agents for Agrochemical Industry, which are adsorbed onto the surface of the particles leading to wetting of the particles and coverage of the surface. By adsorbing on newly created surfaces during milling, they reduce interactions and re-agglomeration of the particles. This increases milling efficiency. The resulting small particle size enables a better pesticide intake and since products are finely dispersed, the particles lead to a long term stability of the formulations.

The benefits are a higher biological efficacy and enhanced storage stability of the formulations, even under extreme conditions. Its products can be applied in SC (suspension concentrate) and OD (oil dispersion) formulations. They promote stable dispersions without settling in the dispersing medium. GPCL, products are multi-functional additives often providing also emulsification properties useful in OD formulations.

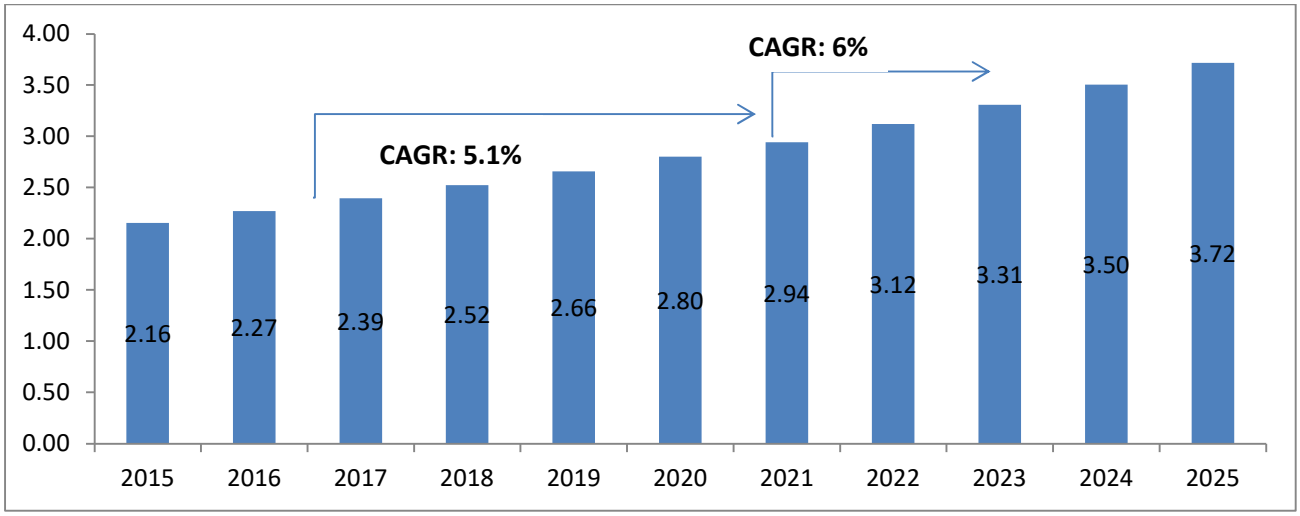
[3] Public Information Bureau, Ministry of Agriculture & Farmers Welfare, Government of India

Global and India Leather Chemicals Overview

6.1. Global Leather Chemicals Market Overview

The global leather chemicals market size was valued at USD 2.94 Bn in 2021, and is projected to reach USD 3.7 Bn by 2025, growing at a CAGR of 6% from 2021 to 2025.

Exhibit 6.1: Global Leather Chemicals market, 2015 to 2025F (USD Bn)



Source: Frost & Sullivan

The leather chemicals market is being propelled forward by increased use of leather chemicals in end-use industries such as footwear and textiles. As a result of more visually acceptable leather footwear and improved leather footwear production, leather chemicals such as syntans, polymers, coloring auxiliaries, and fat liquor have increased in use. Increased mold resistance, smoothness, and adhesiveness are among the benefits of leather compounds, which are driving up global demand.

Tanned leather, on the other hand, produces sulfides and chromium-containing effluent that is detrimental to the environment and employees. This is predicted to be the most major impediment to the global leather chemicals market during the forecast period. Improvements in tanning techniques, on the other hand, are expected to decrease chromium and sulfide accumulation in water, resulting in new revenue opportunities over the forecast period.

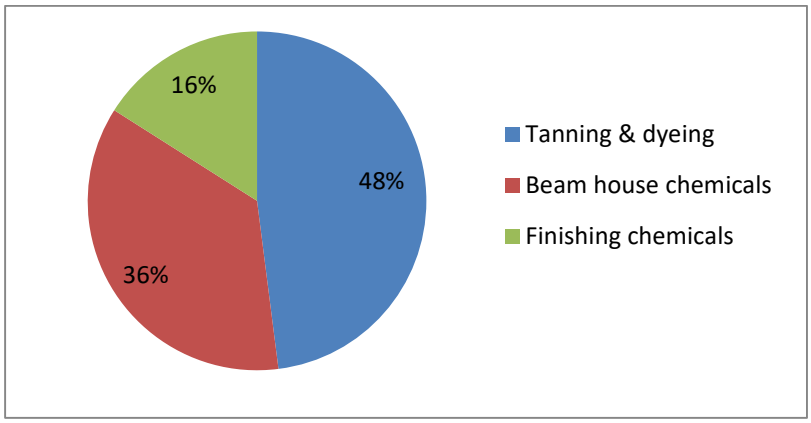
6.2. Global Leather Chemicals Market Segmentation – by Types

Leather chemicals are divided into three categories: tanning and dyeing chemicals, beam house chemicals, and finishing chemicals. Tanning chemicals are chemicals used to transform raw hide into leather. Common tanning agents include vegetable tannin, mineral salts, and animal oil. Depending on the tanning chemicals employed, leather is categorized as vegetable tanned leather, synthetic tanned leather, alum tanned leather, aldehyde tanned leather, and chromium tanned leather. The dyeing chemicals include surfactants, degreasers, sodium formate, sodium bicarbonate, neutralizing syntans, formic acid, and chrome syntans, chromium sulphate.

The tanning and dyeing industry was the largest revenue generator in 2020, and it is expected to grow at a CAGR of 4.6 % during the projection period. The ability of tanning and coloring chemicals to improve the softness and flexibility of leather products was credited with the expansion. Furthermore, because of their structural differences, these dispersion chemicals are becoming

increasingly important in the tanning process, helping to improve the appearance of leather products and complementing the market's growth.

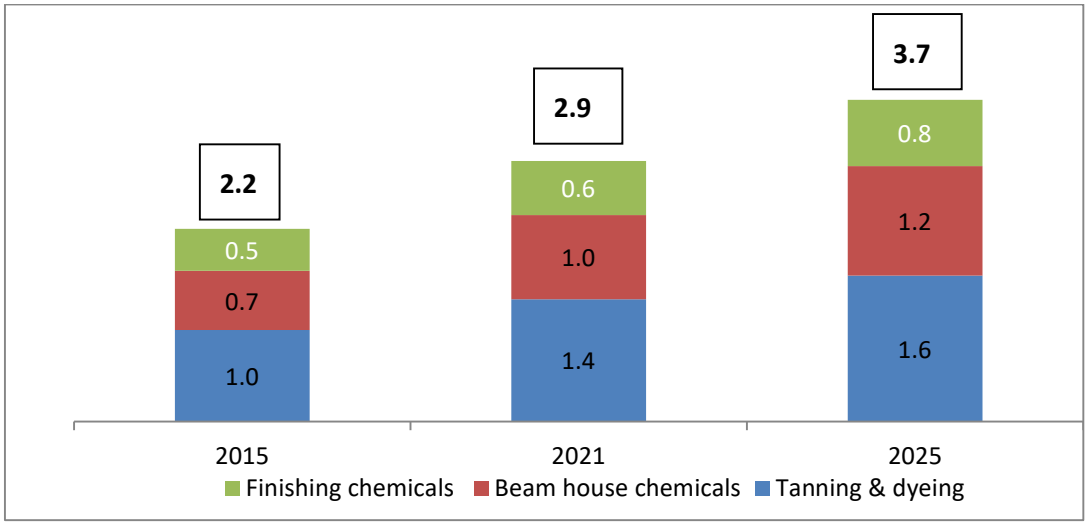
Exhibit 6.2: Global Leather chemicals market segmentation by product type, 2021, USD 2.9 Bn



Source: Frost & Sullivan

In 2021, when industry was rebounding the beam house process was the second-largest category, and it is expected to grow at a CAGR of 6.7 % over the projection period. The beam house process is the first and most important phase in the tanning process, and it uses a lot of leather chemicals for everything from hide and skin preparation to preservation. Hide trimming, soaking, fleshing, and unhairing are all part of the beam house processing. Biocides, surfactants, degreasers, lime, sodium sulfide, formic acid, sulfuric acid, and enzymes are among the chemicals utilized in these processes.

Exhibit 6.3: Global Leather chemicals Industry size by products – forecast - (USD Bn), 2015-2025F



Source: Frost and Sullivan analysis

CAGR	Tanning & dyeing	Beam house chemical	Finishing chemicals
2015-20	4.9%	6.0%	4.4%
2020-25F	4.5%	6.8%	5.1%

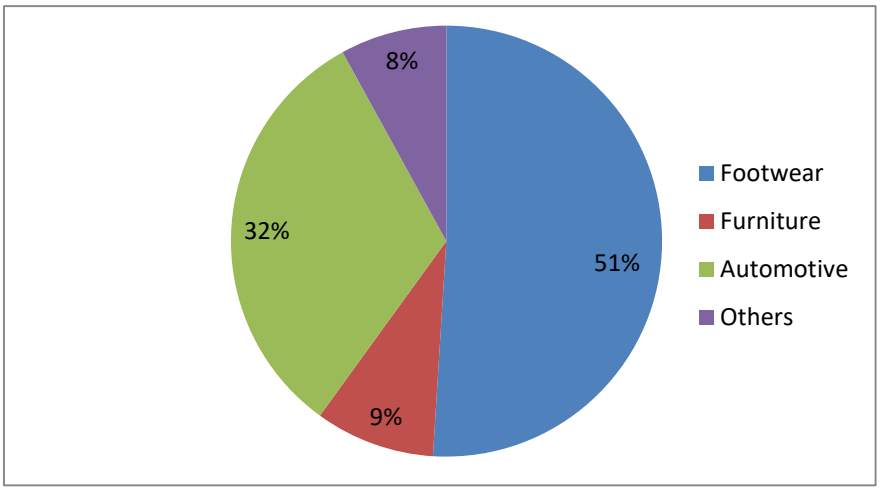
Because dyeing and tanyard operations are the most important stages in the leather-making process, it uses more chemicals for processes spanning from tanning to post-tanning. Over the forecast period, the aforementioned factors are likely to drive demand for tanning and coloring chemicals.

6.3. Global Leather Industry by Key End Use Industries

Footwear - The Global leather chemicals market size for footwear segment was valued at USD 1.43 Bn in 2020, and is projected to reach USD 1.81 Bn by 2025, growing at a CAGR of 4.9% from 2020 to 2025**.** Footwear emerged as the most important end-use segment, accounting for approximately 51% of the market in 2020. Leather is one of the most extensively utilized components in the footwear business, as a result of which the product's consumption is significant. Finishing chemicals are widely used in the footwear industry to improve the product's visual appearance. In the long run, rising demand for luxury footwear will undoubtedly drive up need for finishing chemicals.

The use of leather chemicals on leather for footwear use gives dimensional stability and heat and mechanical action tolerance; this leather is largely utilized in shoe manufacturing. Increased sports activities have boosted the global market for leather chemicals dramatically. Athletic apparel sales have climbed by 61 % internationally since 2007. In the coming years, the end-user segment is likely to increase even more. Furthermore, in recent years, top footwear firms have made significant investments in R&D. Such factors are projected to aid in the reinvention of footwear production, which would in turn enhance the market for leather chemicals, which is expected to rise over the forecast period.

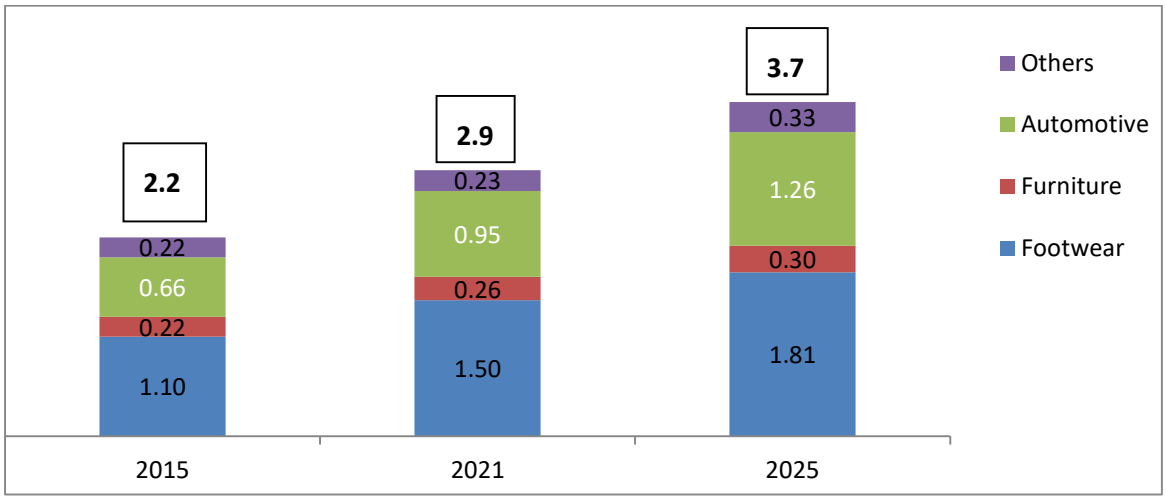
Exhibit 6.4: Global Leather chemicals market segmentation by end industry, 2021, USD 2.9 Bn



Source: Frost & Sullivan

The worldwide leather footwear market was valued at USD 171.2 Bn in 2021, growing with a CAGR of 2.8 % projected from 2021 to 2025. The growing working-class population, rising consumer income, thriving retail e-commerce sector worldwide, and growing fashion trends in business attire are all contributing to the expansion. Leather shoes are popular because they are long-lasting and have an exquisite appearance. The permeable properties of real leather, which can cool the feet and prevent odors, are also propelling the product's expansion in the market.

Exhibit 6.5: Global Leather chemicals market Forecast by end industry, Value (USD Bn), 2015, 2020 and 2025F



Source: Frost & Sullivan

CAGR	Footwear	Furniture	Automotive	Others
2015-20	5.4%	2.8%	6.3%	0.7%
2020-25F	4.9%	3.3%	7.0%	4.3%

Leather wallets, belts, handbags, textiles, and other leather accessories are among the numerous items available. In comparison to other end-use segments, the amount of leather required for such products is quite low. As a result, the leather products segment's manufacturing demand is predicted to expand at a moderate rate. Leather items require a high amount of tanning and dyeing chemicals, followed by finishing chemicals. Over the forecast period, rising consumer inclination toward product aesthetics, combined with rising demand for luxury leather products, is expected to increase demand for leather chemicals in leather goods.

Automotive - The global leather chemicals market size for the automotive category was estimated at USD .9 Bn in 2020, and is expected to increase at a CAGR of 7% from 2020 to 2025, to reach USD 1.26 Bn. Because eco-friendly leather chemicals are used to polish vehicle leather, the automotive segment is expected to grow at the fastest rate over the projection period. Automobile manufacturers are collaborating closely with companies that specialize in leather chemistry.

The global automotive leather upholstery market is expected to grow rapidly over the projected period, owing to an increase in the sale and manufacture of luxury vehicles around the world, which has resulted in a rise in consumer demand for aesthetically beautiful vehicle interiors. This, in turn, is expected to improve leather upholstery output. Artificial leather (PU & PVC faux leather) is becoming more popular, especially in taxi and mid-segment vehicles. Synthetic leather is a type of eco-leather that is also cost-effective, extremely customizable, dirt-resistant, water- and fire-resistant, and temperature-stable.

The increased need for comfort while driving has prompted the use of vehicle seat covers, which improve ride quality. Seat coverings for automobiles give comfort, preserve the interior of the

vehicle, and keep filth, ugly stains, and dirt from soiling the upholstery. This is projected to improve the global demand for automobile leather upholstery.

Furniture - The global leather chemicals market for furniture was valued at USD .25 Bn in 2020, and is expected to increase at a CAGR of 3.3 % from 2020 to 2025, to reach USD .30 Bn.

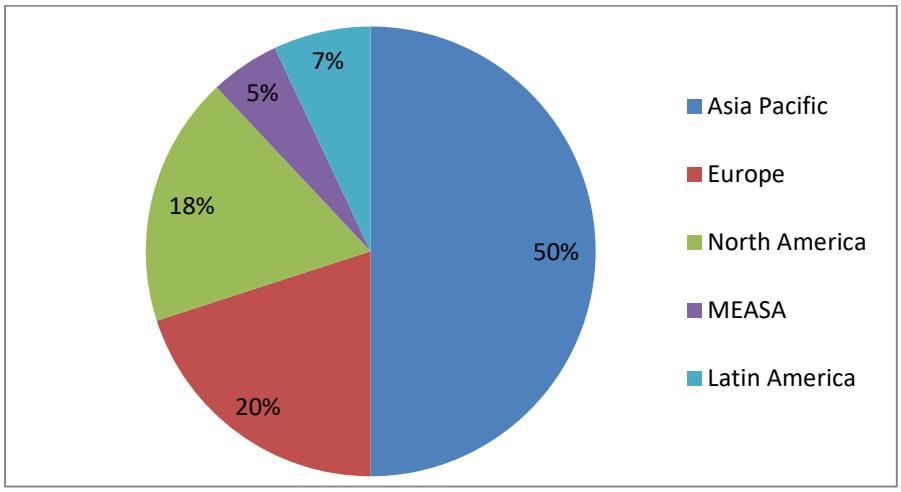
People's increasing disposable income, fast urbanization around the world, the rise of the real estate industry, and changing lifestyles and consumer behavior are all expected to boost the leather furniture market's growth in the projected period of 2020-2025. On the other hand, the expanding number of online retailers, as well as the development of multifunctional furniture, will provide more prospects for the leather furniture market to expand in the coming years.

6.4 Global Leather Industry by Geography – Current and Forecast

The global leather chemicals market is analyzed in terms of North America, Asia-Pacific, Latin America, MEASA and Europe. Due to numerous business methods established by key players, such as entering into international business partnerships and forming boutique units that serve to boost creativity and quality leather products, Europe is expected to have the highest CAGR of 7.1 % over the forecast period.

In 2020, Asia-Pacific leather chemicals held a 50% market share, worth USD 1.4 Bn. The leather chemicals industry trend, such as developments in chrome tanning equipment, is a major component contributing to Asia-greatest Pacific's market share of the global market. The market for leather chemicals in Asia-Pacific is valued at USD 1.4 Bn in 2020 and is expected to increase at a CAGR of 4% over the next half-decade, reaching USD 1.7 Bn by 2025.

Exhibit 6.6: Global Leather chemicals market segmentation by geography, 2021, USD 2.9 Bn



Source: Frost & Sullivan

Due to the presence of well-established leather tanneries and a growth in the consumer base for leather footwear, the Asia-Pacific leather chemicals market dominated the market in 2021 and is expected to continue dominating in the forecast future. China is the world's leading producer of pigskin and pigskin leather, a significant raw material for the manufacture of leather goods. In addition, countries such as Korea, Vietnam, Indonesia, and Taiwan are seeing rapid expansion in the leather sector. Low labor costs and the presence of a significant number of medium- and small-sized tanneries are credited with the increase in demand for leather chemicals in Asia-Pacific.

The market in Asia-Pacific is followed by Europe and North America, owing to rising demand for leather footwear and presence of large number of tanneries.

The leather market in Europe is primarily driven by a rise in the number of working professionals and young millennial. The European countries, mostly driven by the fashion sector, such as Italy and France, are witnessing an extensive reliance on leather goods, from manufacture to commerce, including footwear. In addition, according to a research issued by the European Commission, the leather footwear segment accounts for 41% of total production in the leather industry in Europe hence driving the demand for leather chemicals in the region

Due to increasing consumer spending on leather items, the industry in North America is likely to account for a significant revenue share in the worldwide leather market. North America's leather chemicals market is valued at .5 Bn and is expected to develop at a 6.9 % compound annual growth rate (CAGR) over the next half-decade, reaching USD .8 Bn by 2025. With the region's fashion industry developing, consumers' preferences for diverse leather products are growing. Significant spending capacity and high demand for leather goods such as shoes and bags. The availability of raw materials in huge quantities allows producers to focus on supplying consumers with higher-quality products.

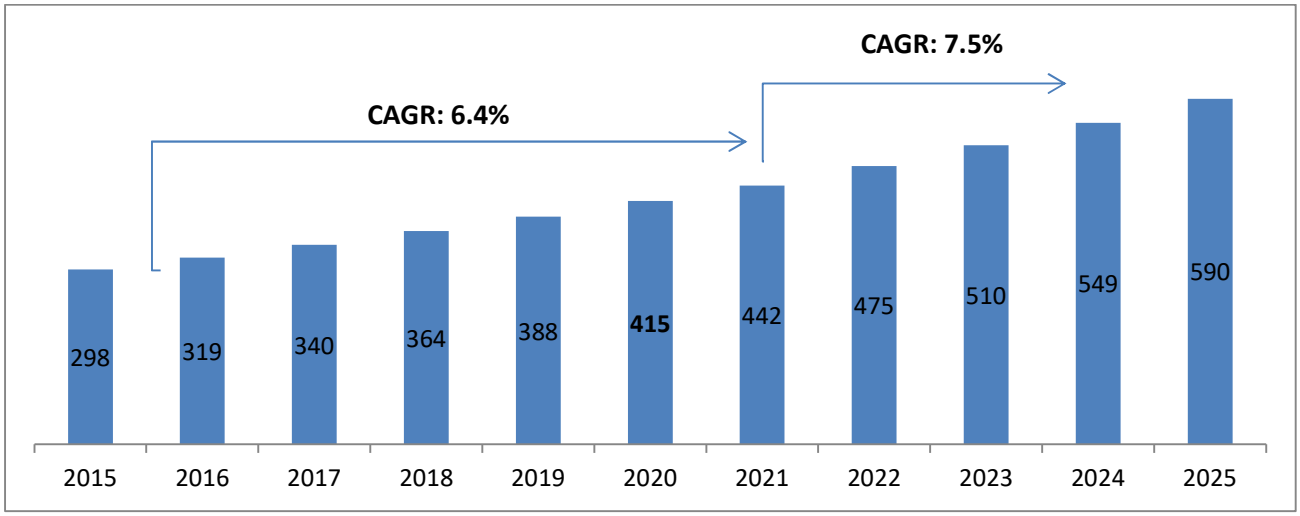
China to Lead the Leather Chemicals Market - China is the largest automotive market in the world. China's automotive sector is mostly driven by domestic demand. China has the world's largest car market. China's automotive sector is mostly driven by domestic demand. China's footwear industry is reaping the benefits of being the world's largest producer and consumer of footwear, thanks in part to the country's enormous market and improving standard of life.

In addition, due to the country's rapid population growth, the textile industry has seen an increase in demand for leather. The textile industry is likely to increase its need for leather. As a result of the aforementioned causes, China's demand for leather chemicals is predicted to rise significantly over the forecast period.

6.5 Indian Leather Chemicals Overview

The Indian leather chemicals market size was valued at USD 442 Mn in 2021, and is projected to reach USD 596 Mn by 2025, growing at a CAGR of 7.5% from 2020 to 2025.

Exhibit 6.7: India Leather Chemicals market, 2015 to 2025F (USD Mn)



Source: Frost & Sullivan

Because of rising demand for leather products in the fashion industry, rising leather exports, and a burgeoning footwear industry, India's leather chemicals market is expected to rise at a rapid rate. Other key growth factors for India include a trend toward environmentally friendly leather chemicals and increased knowledge of the advantages of vegetable tanning versus chromium tanning.

During the projected period, the Indian leather chemicals market is expected to be driven by rising use of leather chemicals in tanneries, as well as expected development in demand for specialty leather chemicals in the wet-end and finishing stages of leather products production. Other drivers driving the market include expanding demand for leather items in the fashion industry, a developing footwear industry, and rising leather exports.

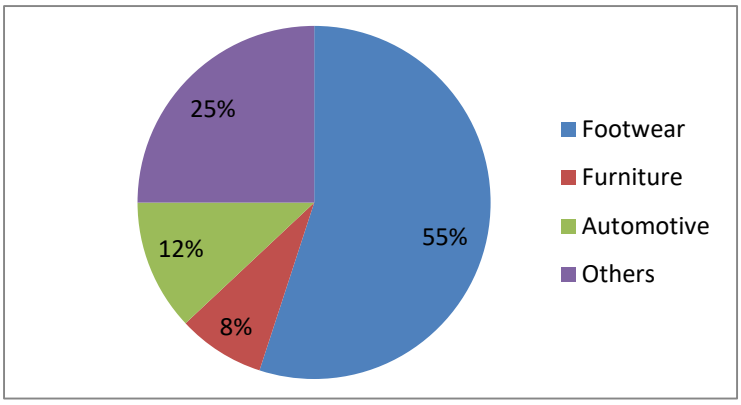
Furthermore, a shift in focus toward the use of environmentally friendly leather chemicals and increased knowledge of the advantages of vegetable tanning over chromium tanning would drive market growth. Additionally, increasing exports of finished leather goods from India is further resulting in growing demand for specialty leather chemicals.

The leather chemicals industry in India is benefiting from rising demand for leather products. Chemicals used in the beam house, tanning, and finishing stages of leather processing are likely to see increased demand over the next five years. However, compliance with international laws such as ISO, REACH, and others will be a crucial determinant of a leather chemical's performance in the Indian market in the coming years. European countries, which account for the majority of Indian leather exports, are well-known for adhering to regulatory requirements. Consequently, Indian leather manufacturers are increasingly using chemicals that comply with the existing European norms, which continue to boost the domestic demand for leather chemicals in the country.

6.6 Indian Leather Chemicals Market by End User – Growth Factors

Footwear applications accounted for more than 55 % of the overall leather chemicals market in 2020, and is expected to grow significantly in the years ahead, owing to improved consumer lifestyles, high demand for worker safety in manufacturing industries, and rising consumer purchasing parity. Over the next few years, the rise of the industrial safety footwear market will also accelerate the leather chemicals sector.

Exhibit 6.8: India Leather chemicals market segmentation by end industry, 2021, USD 442 Mn



Source: Frost & Sullivan

The footwear business in India is a very important component; in fact, it is the engine of growth for the entire Indian leather industry. After China, India is the world's second-largest footwear producer, accounting for 11.63 % of worldwide footwear production of 17.7 Bn pairs.

In 2021, the Indian Footwear market generated USD 5,442 Mn in revenue. The market is predicted to expand by 23.22 % every year (CAGR 2021-2025). Leather Footwear is the market's largest sector, with a market volume of USD 2,800 Mn in 2021.

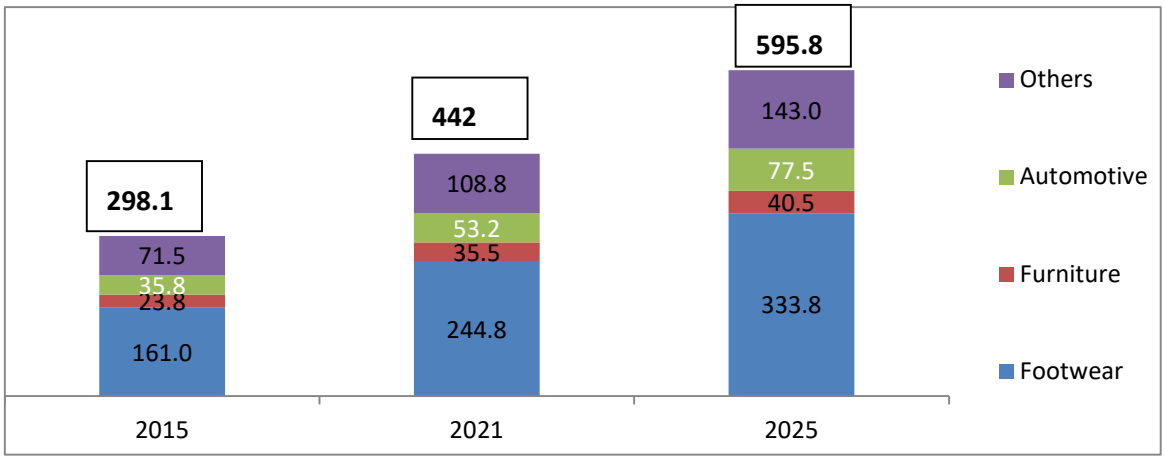
The Indian footwear leather chemicals market size was valued at USD 243 Mn in 2021, and is projected to reach USD 333 Mn by 2025, growing at a CAGR of 7.9% from 2021 to 2025.

India is one of the most important markets for footwear. This can be ascribed to increased demand for formal, casual, sports, and fashion footwear as a result of rising urbanization and industrialization. Aside from that, growing globalization has resulted in the emergence of well-known footwear brands all throughout the country. In addition, the industry is developing due to the increasing adoption of e-commerce retail platforms, which is aided by easy and continuous internet connection. The online shopping experience gives consumers with a wide choice of products to pick from as well as convenient payment alternatives, resulting in a positive market outlook. Furthermore, the rising health awareness, escalating demand for sports and athletic footwear and increasing consumer expenditure capacities are driving the market growth.

The use of leather chemicals on leather for footwear use gives dimensional stability and heat and mechanical action tolerance; this leather is largely utilized in shoe manufacturing. In India, the market for leather chemicals has been bolstered greatly by the rise in sporting activities and athletic apparel sales. In the coming years, the end-user segment is likely to increase even more. Furthermore, in recent years, top footwear firms have made significant investments in R&D. Such factors are expected to aid in the reinvention of footwear production, which would, in turn, enhance the market for leather chemicals, which is expected to rise throughout the forecast period.

Automotive is one of the primary industries where leather chemicals are in high demand. This is due to the fact that these chemicals are required in automobile seat covers, where they are utilized to stabilize the raw hide and prevent further decomposition and foul odor.

Exhibit 6.9: India Leather chemicals market Forecast by end industry, Value (USD Mn), 2015, 2021 and 2025F



CAGR	Footwear	Furniture	Automotive	Others
2015-20	8.7%	8.3%	8.3%	8.7%
2020-25F	8.1%	3.4%	9.8%	7.1%

The automotive sector is currently experiencing a stupendous growth across the APAC region, subject to which leather chemicals market in the Asia Pacific leather chemicals market will witness significant surge over the next decade. With a combined contribution of more than 40% toward APAC leather chemicals industry share, China and India are touted to be the major revenue pockets.

The Indian automotive leather chemicals market size was valued at USD 53.2 Mn in 2021, and is projected to reach USD 77.5 Mn by 2025, growing at a CAGR of 9.8% from 2021 to 2025.

Furniture - Between 2021 and 2025, the Indian furniture industry is predicted to grow at a CAGR of 12.91 %. The global furniture market is projected to be worth USD 1.1 trillion, with India accounting for less than 5% of that. The United States (39.2%), Germany (7.4%), France (6.6%), the United Kingdom (6.3%), the Netherlands (6.0%), and Australia (6.0%) are currently India's main export destinations (2.8 %).

The Indian furniture leather chemicals market size was valued at USD 34.6 Mn in 2021, and is projected to reach USD 40.5 Mn by 2025, growing at a CAGR of 4.1% from 2021 to 2025.

1.1.1 6.6.1. Booming Leather Industry in India

The Leather Chemicals Market is expected to grow at a rapid pace over the next several years, owing to the product's widespread application. Leather chemicals have properties such as weather resistance, smoothness, and aesthetic appearance, and are utilized in the manufacturing process of numerous leather items such as furniture, belts, footwear, furniture, and vehicle interiors, and so on, propelling the leather chemicals market size.

India's leather industry is one of the most important in the world, with Indian leather accounting for up to 13% of worldwide skin production and roughly 10% of global footwear production. Raw hide skins, finished leather, leather items, leather garments (2nd largest), leather footwear component, saddlery & harness are among India's leather exports (3rd largest).

With access to 20% of the world's cattle and buffalo, as well as 11% of the world's goat and sheep population, India has a plethora of raw materials. Added to this are the strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and the dedicated support of the allied industries.

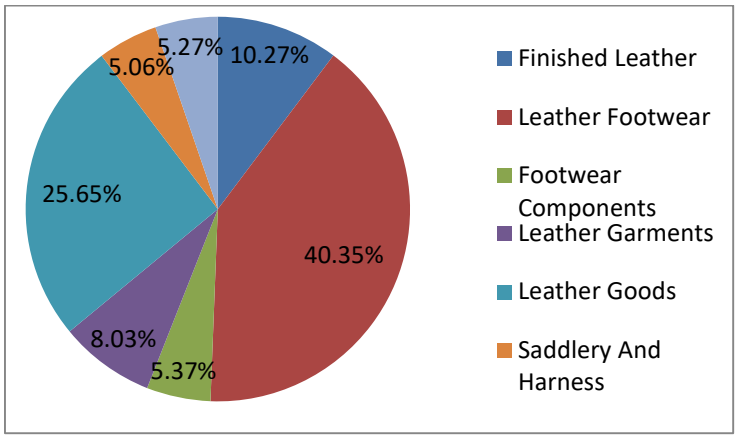
Leather Exports from India

India's leather industry has transformed from a mere provider of raw materials to a value-added product exporter. During the 2020-21 fiscal years, India exported USD 3.68 Bn in footwear, leather, and leather products. India is the world's second-largest exporter of leather goods, third-largest exporter of saddlery and harness, and fourth-largest exporter of leather clothing.

The states of Tamil Nadu — Chennai, Ambur, Ranipet, Vaniyambadi, Vellore, Pernambut, Trichy, Dindigul, and Erode – are the key production centers for footwear, leather, and leather products in India. West Bengal – Kolkata; Uttar Pradesh – Kanpur, Agra, Noida, and Saharanpur; Maharashtra – Mumbai; Punjab – Jalandhar; Karnataka – Bengaluru; Telangana – Hyderabad; Haryana – Ambala, Gurgaon, Panchkula, Karnal, and Faridabad; Delhi; Madhya Pradesh – Dewas; Kerala – Kozhikode and Ernakulam

The Leather and Footwear Sector is one of the 12 Focus Sectors where India may be a Global Supplier, according to the Indian government. With the implementation of various industrial development programs as well as export promotion activities, the Indian leather industry aims to augment its past performance and inherent strengths of skilled manpower, innovative technology, increased industry compliance with international environmental standards, and dedicated support from allied industries.

Exhibit 6.10: India's exports of leather and leather products, 2020, USD 3.68 Bn

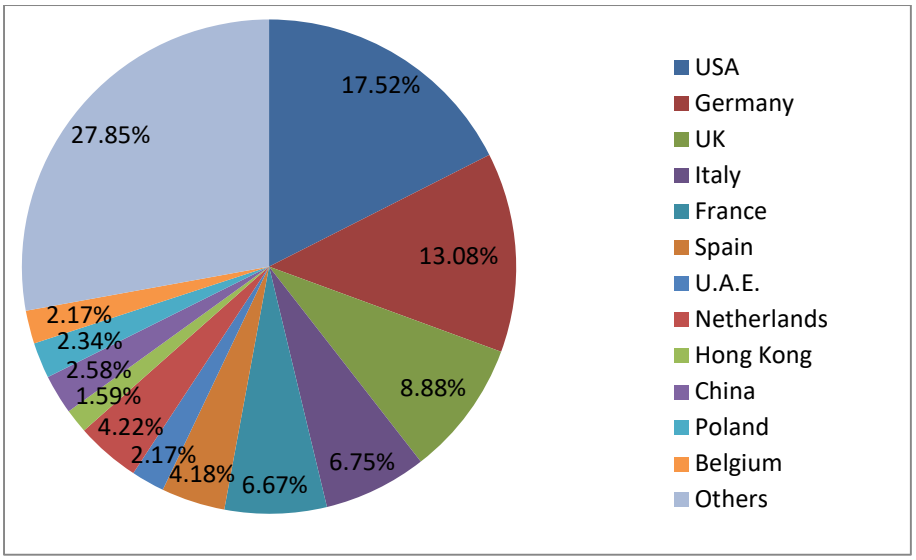


Source: Frost & Sullivan

With a share of 17.52 %, the United States, Germany, 13.08 %, the United Kingdom, 8.88 %, Italy, 6.75 %, France, 6.67 %, Spain, 4.18 %, Netherlands, 4.22 %, United Arab Emirates, 2.17 %, China, 2.58 %, Poland, 2.34 %, Belgium, 2.17 %, and Australia 2.04 % are the major markets for Indian leather and leather products.

Together, the top 12 nations account for almost 72.15 % of India's total leather and leather products exports.

Exhibit 6.11: India's exports of leather and leather products, 2020, USD 3.68 Bn



Source: Frost & Sullivan

6.7 Demand drivers and restraints

Favorable government regulations for leather industry in India

- Under the automatic approach, 100 % FDI is already permissible in the sector. With a budget of Rs.2600 crore, the government is implementing the Indian Footwear, Leather, and Accessories Development Programme (IFLADP), which provides financial support for core areas such as capacity expansion and technological upgradation of production units, upgrading of CETPs, HRD, and the establishment of institutional facilities. As a result, India's leather and footwear industry has become an appealing investment destination due to its large market potential, as well as government backing and ease-of-doing-business initiatives.
- The definition of Micro, Small, and Medium Enterprises (MSME) has been changed, with 98 % of units in the leather, leather products, and footwear sector falling under MSME, compared to 92 % previously.
- DGFT Public Notice No. 15-2015/20, dated September 4, 2020, notified the updated finished leather norms. This will assist the export of new types of leathers that are in high demand on the worldwide market, as well as the export of finished leathers.
- The validity of the Duty Free Import Scheme (DFIS) for the 2019-20 fiscal year has been extended until September 30, 2020 (allowing Basic Customs Duty exemption for notified inputs up to 5% of FOB value of exports in the previous year for footwear and other leather products, and 3% for Leather Garments) (facilitating manufacture of export products in the sector)
- In addition to the aforementioned measures, the government has extended the Foreign Trade Policy (FTP) through March 2021, as well as continued interest equalization on rupee export loan until March 31, 2021.

Favorable government laws encouraging the export of leather goods are helping to drive up demand for leather chemicals in India. Increased use of leather chemicals such as syntans, polymers, dyeing auxiliaries, and fat liquor has increased due to increased demand for superior quality leather, large

quantities of raw materials, an increase in application of leather chemicals in end-use industries such as footwear and textile industries, visually appealing leather footwear, and improved production of leather footwear.

Government to extend incentive scheme IFLADP for leather, footwear industry till FY26

The government is likely to extend the IFLADP incentive scheme for the leather and footwear industry through 2025-26 with a budget of 1,700 crore to stimulate manufacturing, exports, and job creation.

According to the source, the commerce and industry ministry has filed a proposal for the implementation of the Indian Footwear Leather and Accessories Development Programme (IFLADP) with a budget of Rs. 1,700 crore, which will be spent between 2021-22 and 2025-26.

Increasing Exports of finished leather

India is the world's second-largest consumer of footwear, with a market of around USD 12 Bn in leather items and footwear. In addition, India exports over USD 5 Bn in finished leather, leather products, and footwear each year. With its inherent characteristics of a large raw material base, traditional knowhow, qualified personnel, and current technology application, India has established itself as a high-quality goods provider.

Growth in Textile sector in India

The Indian textile sector is estimated to reach USD 230 Bn by 2020, according to IBEF. The government of India is taking a lot of measures because the textile sector is booming in the country.

Furthermore, according to an Indian footwear industry report, the country's footwear manufacturing is approaching 22 Bn pairs each year, accounting for nearly 9.6% of worldwide footwear output. After China and the United States, India is the world's third-largest footwear consumer. Approximately 90% of the footwear made in India is used domestically, with the remainder being exported.

The Indian textiles sector is predicted to reach USD 250 Bn in the future, according to IBEF. India's textiles industry contributes 15% to the country's export revenues and is expected to grow in the coming years.

Growth in Automotive sector in India

According to IBEF, India is predicted to become a global leader in the automotive industry by 2030, opening up potential for electric and commercial vehicles. The increase in demand is attributed to a rise in middle-class income and an increase in the number of young people.

Furthermore, India's automobile sector has grown to become the world's fourth largest, with yearly sales increasing by 8%. As the automotive industry grows, the market for leather chemicals for use in interior and exterior parts is likely to grow.

Some of the recent initiatives taken by the Government for the automotive sector of India are -

- The government adopted the voluntary vehicle scrappage policy in the Union Budget 2021-22, which is expected to promote demand for new automobiles by removing old, unfit vehicles currently on Indian roads.

- The Delhi government began the process of establishing 100 car battery charging outlets across the state in February 2021 to encourage the adoption of electric vehicles.
- Under the Department of Heavy Industries' production-linked incentive (PLI) plan, the Union Cabinet allocated Rs. 57,042 crore (US$ 7.81 Bn) to the autos and auto components sector.
- India's government wants to make it a worldwide industrial hub and a research and development (R&D) center. Under NATRiP, the Government of India is planning to set up R&D centers at a total cost of US$ 388.5 Mn to enable the industry to be on par with global standards.
- Under the FAME (Faster Adoption and Manufacturing of (Hybrid) and Electric Vehicles in India) scheme, the Ministry of Heavy Industries of the Government of India has shortlisted 11 cities across the country for the introduction of EVs into their public transportation networks. The government will also establish an incubation center for EV-related start-ups.
- The Indian government authorized the FAME-II scheme in February 2019, with a fund requirement of Rs 10,000 crore (US$ 1.39 Bn) for FY20-22.

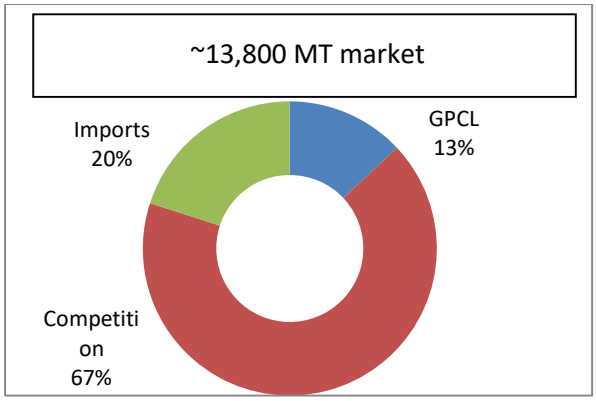
Restraint

Despite India's outstanding performance in the leather industry, the sector faces numerous problems while also providing numerous new prospects.

During the forecast period, factors such as rising operational expenses and tight environmental governing tactics are expected to stifle the leather chemicals market's expansion. Furthermore, tanned leather produces wastewater containing sulfides and chromium, which has a detrimental impact on the environment and employees, and is a major factor that is expected to restrain the global leather chemicals market throughout the forecast period.

6.8 Key players

Exhibit 6.12: India Leather Chemicals Market size MT, FY21



Source: Frost & Sullivan research & analysis

Competition includes Stahl India Private Limited, Tytan Organics Pvt. Ltd., Vishwaat Chemicals Ltd., Henkel Chemicals (India) Ltd., Polson Ltd.

The leather chemicals market is likely to be partially consolidated, with the top companies controlling a substantial portion of the industry. The market for leather chemicals is dominated by the following companies:

Stahl India Private Limited - Stahl India's chemical compounds are utilized by tannery businesses all over India, therefore as the need for leather grows, so does the demand for these chemicals. Chemicals such as Syntan, Fat Liquor, Superplastisicer, Biocides, Acrylic Resin, Urethane Resin, Solvent based blending's, and Water based blending's are produced in this industry. The company's annual manufacturing capacity was **70,800 MT.**

Dadia Chemical Industries Ltd. - DCI is a leather chemical manufacturer with ties to some of the world's most recognizable brands. It is one of India's major leather chemical manufacturers, creating high-performance products based on R&D and cutting-edge technology. DCI is a prominent Leather Chemical Exporter, exporting to over 26 countries and collaborating with premier Indian and international companies. DCI is well-known for their Fat Liquor Technology.

LANXESS - LANXESS India was founded in India on February 20, 2004 and renamed Lanxess India Private Limited on June 30, 2004. With roughly 1000 workers across its operations, Lanxess India Private Limited, a wholly-owned subsidiary of LANXESS Deutschland GmbH, is represented across all of its ten business areas, working out of its registered office in Thane and sales offices in New Delhi and Chennai. LANXESS has production facilities at its Jhagadia facility that are divided into business units. Rubber chemicals, Ion Exchange Resins, Material Protection Products, Rhein Chemie, and high-performance materials have a **10,000 MTPA** production capacity.

6.9 GPCL's key competencies in Leather Chemicals market

GPCL is amongst leading suppliers in the leather chemicals field and has full range of leather chemicals like Wetting agent, Pre Tanning Syntan, Bleaching Syntans, Minerals Tanning Agents, Neutralizing Syntans, Acrylic Syntans, Amphoteric Syntan, Replacement Syntan, Whitening Syntan, Dye Levelling, Filling Syntan, Speciality Syntans, Vegetable Tanning Extracts, Fat Liquors, Natural Oil Base, Lecithine Base, Lanolin Base, Natural and Synthetic Complex Base, Purely Synthetic and Solvent Base, Polymeric and Amide Base Fat Liquors.

Global and India Dyes, Pigments and Textile Chemicals Overview

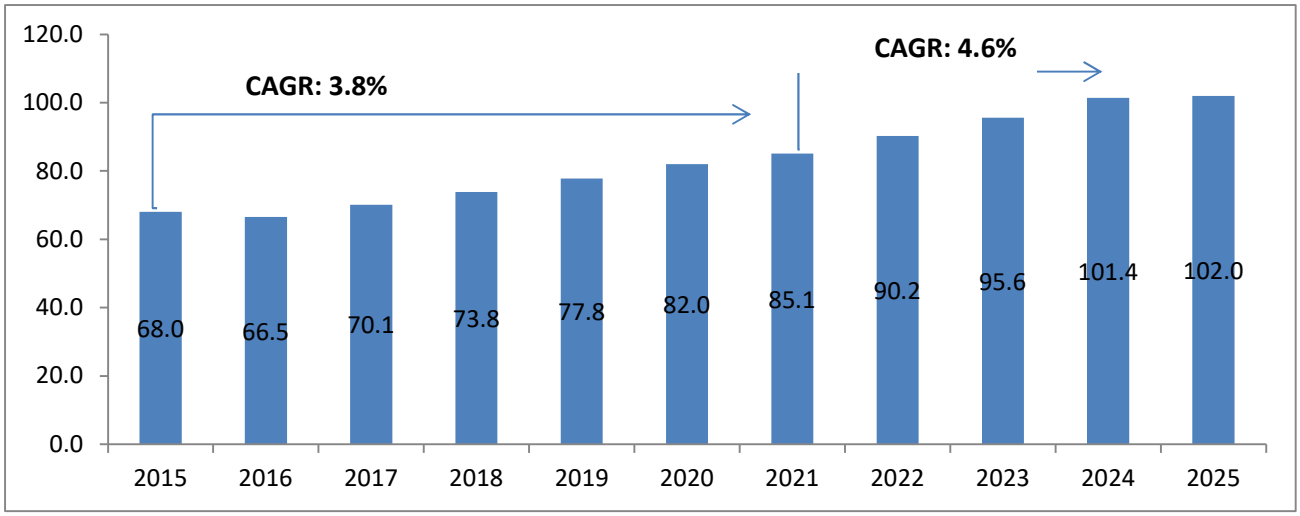
7.1 Global Overview Dyes, Pigments and Textile Chemicals Market overview

Dyes and pigments are substances that are used to impart color to a material. The term colorant is often used for both dyes (also called dyestuffs) and pigments. The major difference between dyes and pigments is particle size. Dyes are much finer than pigments. Pigments and dyes are the key raw materials for various end-user industries, including paint and coating, textile, and plastic.

Textile chemicals are compounds used in the processing and manufacturing of textiles. They enhance the manufacturing process of the textiles with specific properties and desirable look. Home furnishings, apparels, and industrial chemicals are some of the applications of the textile chemicals.

The global Dyes, Pigments and Textile Chemicals Market is projected to surpass USD 102.0 bn by the end of 2025, growing at CAGR of 4.5% during the forecast period (2021 to 2025).

Exhibit 7.1: Global Dyes, Pigments and Textile Chemicals market, 2015 to 2025F (USD Bn)



Source: Frost & Sullivan

7.2 Market Segmentation – by key types

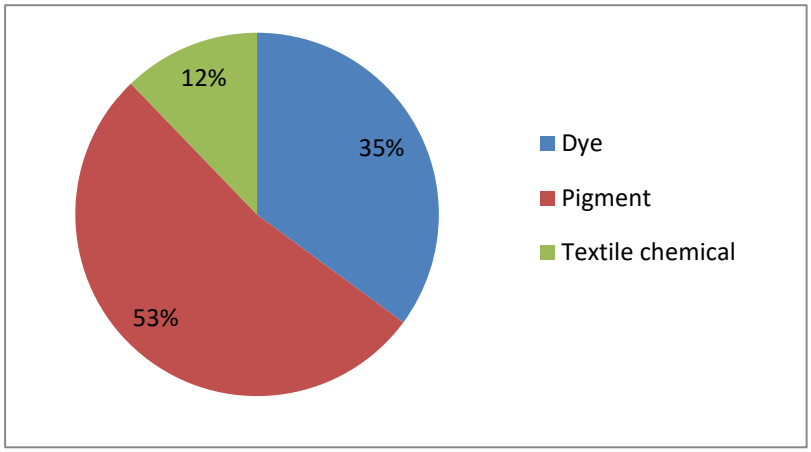
Growth of pigments is primarily driven by the robust demand from end industries along with increasing need for vibrant colors, special effects, and aesthetics across applications

Based on type, the dyes and pigments market is classified into dyes and pigments. Dyes segment is further segmented into reactive, disperse, vat, acid, and others. In terms of demand, reactive sub-segment held the major share of the dyes segment. Reactive dyes are available in a wide range of colors. Vat sub-segment is expected to expand at a rapid pace during the forecast period owing to its wide usage in cellulose fibers. However, vat dyes take an enormous amount of time to dye. Vat dyes are organic compounds that are insoluble and have no cellulose substantively. Disperse dyes are now used for dyeing nylon, cellulose triacetate, and acrylic fibers.

Pigment is further bifurcated into inorganic and organic. Inorganic segment accounted for the primary share of the pigment segment and is likely to expand rapidly. Colors of pigments may be used to paint certain objects by painting them or combining them with the ingredients of the drug. Organic and inorganic pigments are pigment forms which are dependent on their formulation

process. Organic pigments appear to come from plants. Inorganic pigment uses chemical formulae for different applications to achieve the desired properties of the material. Inorganic pigments use compounds derived from inorganic metal compounds and salts such as metallic oxides, chromates, sulphates, etc. Organic pigments consist of carbon rings and coal chains. Inorganic pigments are easier to spread compared with organic pigments and are thus used for different applications.

Exhibit 7.2: Global Dyes, Pigments and Textile Chemicals market segmentation by product type, 2020, USD 85 Bn



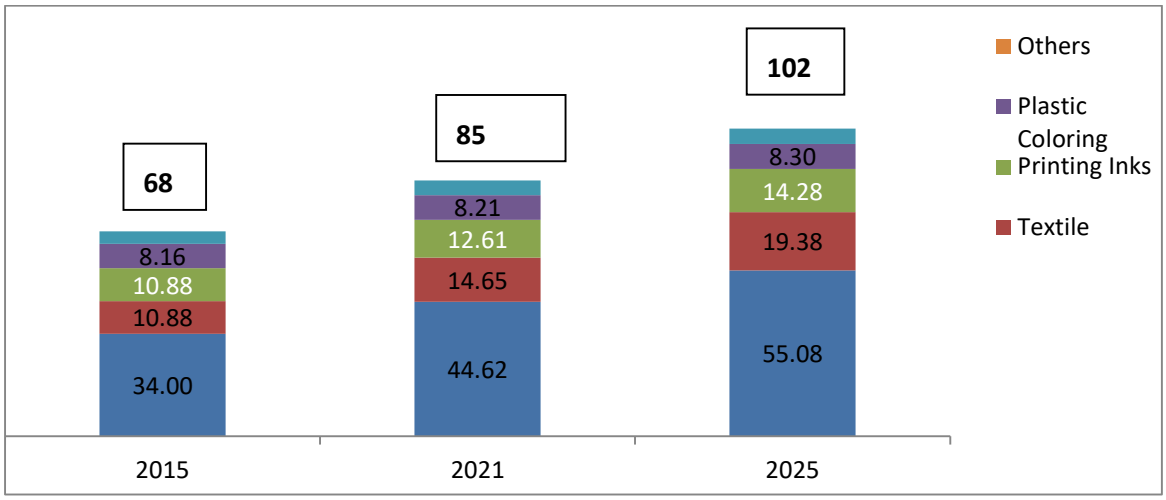
Source: Frost & Sullivan

7.3 Global Dyes, Pigments and Textile Chemicals By key industries

Dyes and pigments find multiple applications in paints & coatings, printing inks, textile, construction, and plastics. The paint and coating industry is witnessing major growth due to growing infrastructure. Major driving factors of the pigments and dyes market are increasing demand for high performance pigments (HPP), increasing usage of environment-friendly products, and application in end-user industries.

Demand for pigment and dye products such as printing ink is driven by several factors such as technological development and increasing demand for digital inks. Increase in end-user preference for environment-friendly products is likely to drive growth of the dyes and pigments market in the near future. Some of the factors restraining growth of the pigments and dyes market are environmental concerns, raw material price volatility and it's global over capacity. Some of the recent trends in the pigments and dyes market are shifting of manufacturing facilities from the U.S. and Europe to India, China, and Taiwan, and the rising preferences for eco-friendly products. Since specialty pigments are eco-friendly in nature, they are expected to increase demand for pigments and dyes .

Exhibit 7.3: Global Dyes, Pigments and Textile Chemicals market Forecast by end industry, Value (USD Bn), 2015, 2021 and 2025F



Source: Frost & Sullivan

CAGR	Paints and Coatings	Textile	Printing Inks	Plastic Colouring	Others
2015-20	4.6%	5.1%	2.5%	0.1%	3.2%
2020-25F	5.4%	7.2%	3.2%	0.3%	0.9%

Paints and coatings account for the largest share of the market and are estimated to be the largest and the fastest-growing end-user industry. Architectural and decorative coatings account for the largest consumption of pigments in their production. Thus, rising construction and infrastructure activities in Asia-Pacific act as the major driver for the dye and pigment market.

In addition, the public-private partnership (PPP) projects have also been increasing in the domestic construction sector. In India, the smart cities mission is a major project undertaken by the government, which will construct more than 100 smart cities all over the country to achieve rapid urbanization in the country. In the 2021-22 budget, the smart cities mission has been given INR 6,450 crore as against INR 3,400 crore in the 2020-21 revised estimates.

In Germany, the increasing migration to the country has been stimulating the current demand for new residential construction. About 3.6 million migrants were expected to arrive in Germany by the end of 2020-2021, which will require at least 350,000 new dwellings per year.

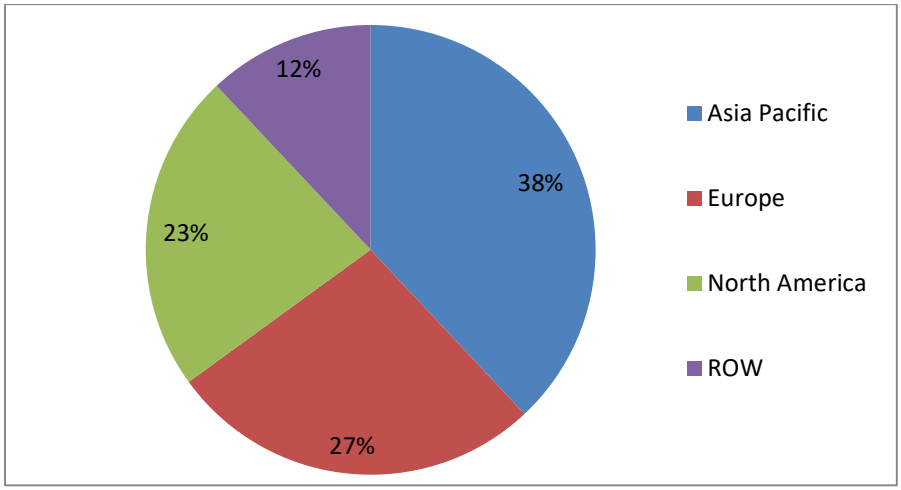
The paints and coatings industry has been expanding vigorously till 2019. However, owing to the pandemic condition, there has been a slump in the production of paints and coatings in 2020 due to the slowdown of the global construction industry. But, the condition is expected to recover in 2021, thereby restoring the growth rate of the market studied. All the aforementioned factors are expected to drive the global market during the forecast period.

7.4 Global Dyes, Pigments and Textile Chemicals by Geography – Current and Forecast

With its emerging economies and quickly growing manufacturing bases, Asia Pacific accounts for the largest market and is likely to remain as the highest growing region in the years to come. Also due to the emerging trend such as shifting of manufacturing facilities from U.S. and Europe to India, China and Taiwan and increasing preference towards eco-friendly products . Asia Pacific is further followed by North America and Europe.

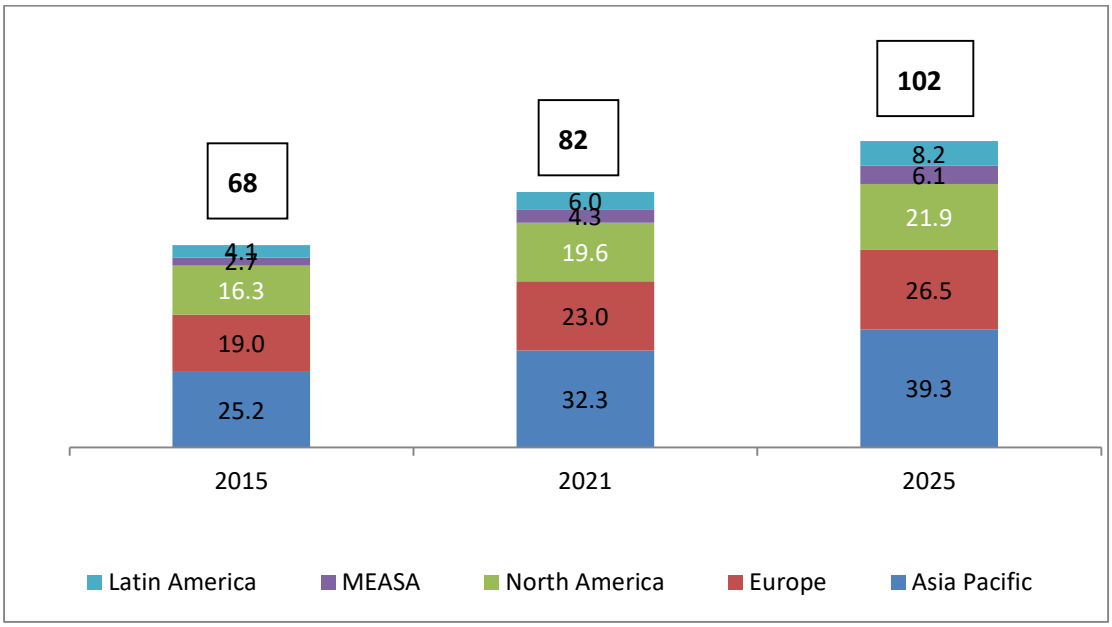
Asia-Pacific was the largest region in the synthetic dyes and pigments market 2020, accounting for 38% of the total. It was followed by Western Europe, North America, and then the other regions. Going forward, the fastest-growing regions in the synthetic dyes and pigments market will be Africa and the Middle East, where growth will be at CAGRs of 9.0%. These will be followed by South America, and Eastern Europe where the markets are expected to grow at CAGRs of 7.5 and 5.3% respectively, during 2020-2025.

Exhibit 7.4: Global Dyes, Pigments and Textile Chemicals market segmentation by geography, 2021, USD 85 Bn



Source: Frost & Sullivan

Exhibit 7.5: Global Dyes, Pigments and Textile Chemicals market size by geography – forecast - (USD Bn), 2015-2025F



Source: Frost and Sullivan analysis

Region	Asia Pacific	Europe	North America	MEASA	Latin America
2015-2! CAGR	4.4%	3.1%	2.9%	8.6%	7.1%
2021-25 CAGR	4.7%	3.7%	3.1%	8.3%	7.3%

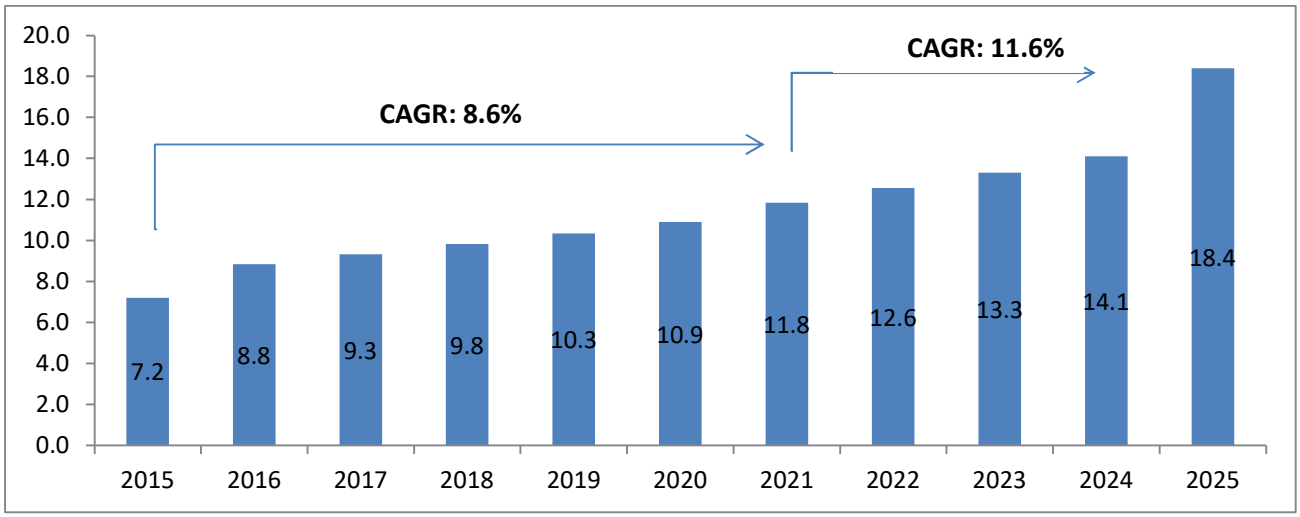
7.5 India Overview

Textile chemicals are compounds used in the processing and manufacturing of textiles. They enhance the manufacturing process of the textiles with specific properties and desirable look. Home furnishings, apparels, and industrial chemicals are some of the applications of the textile chemicals.

Textile chemicals are added during fabric processing to impart specific features such as sweat absorbency, antimicrobial properties, wrinkle resistance, stain resistance, desired texture, and finish to the fabrics. However, emission of harmful substances during the manufacturing process may pose a risk to the environment and human health. Contamination and water shortage caused by a rapidly growing textile industry is expected to result in the imposition of stern regulations on the usage of these chemicals

The India dyes and pigments market is being driven by the growth of the India pigments market. The production value of the pigments industry in India reached a volume of nearly 133.52 mn tons. The India dyes and pigments market accounts for almost a quarter of the global market and is expected to grow at a CAGR of 11% between 2020 and 2025.

Exhibit 7.6: India Dyes, Pigments and Textile Chemicals market, 2015 to 2025F (USD Bn)

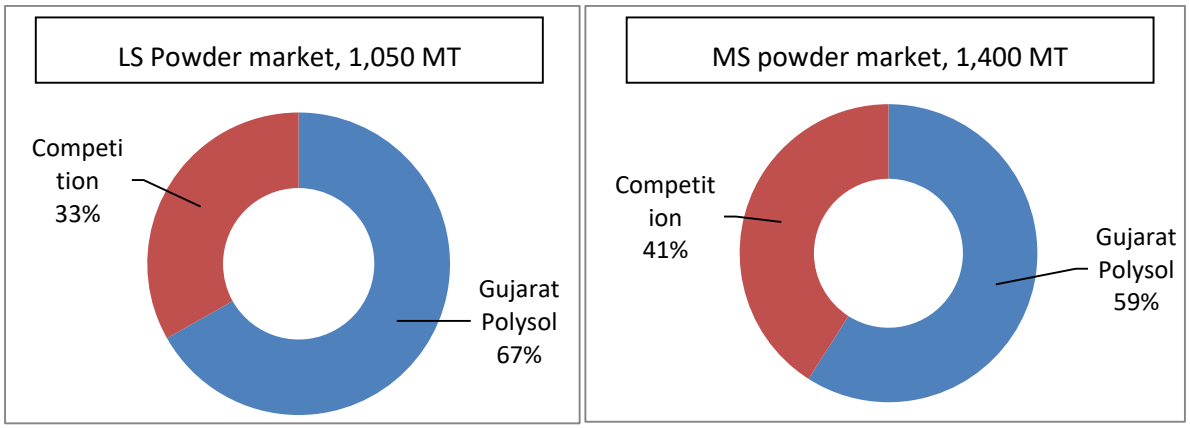


Source: Frost & Sullivan

7.6 India market size of key products

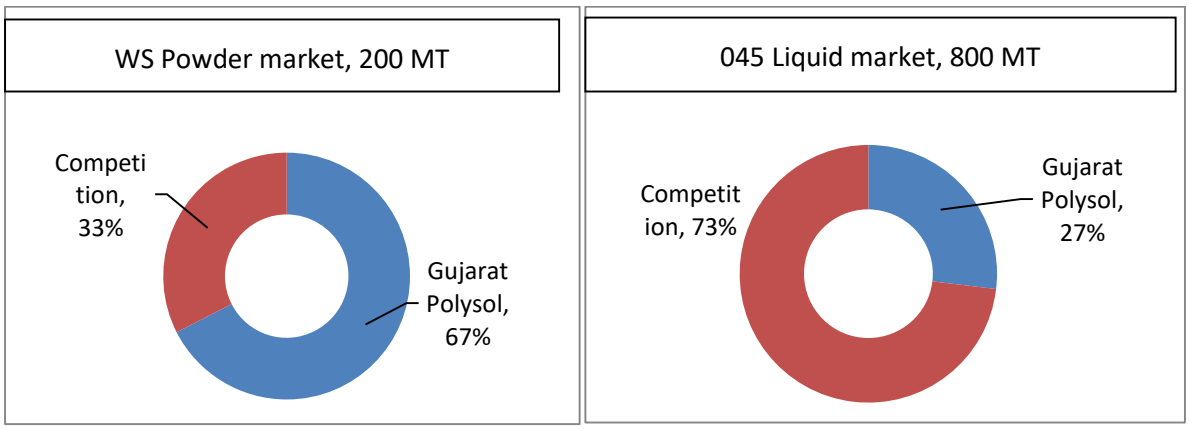
Dispersing and wetting agent, when added to a liquid, reduces its surface tension and increase particle portability thereby increasing its spreading and wetting properties. In the dyeing of textiles, surfactants help the dye penetrate the fabric evenly. They are used to disperse aqueous suspensions of insoluble dyes and perfumes. Dispersants assists in the process of particle size reduction of dye. It enables the dye to be formed in powder form and increase the solubility of disperses dyes in water.

Exhibit 7.7: India LS Powder & Liquid and India MS Powder & Liquid Market size MT, FY21



Source: Frost & Sullivan research & analysis

Exhibit 7.8: India WS Powder & 045 Liquid Market size MT, FY21



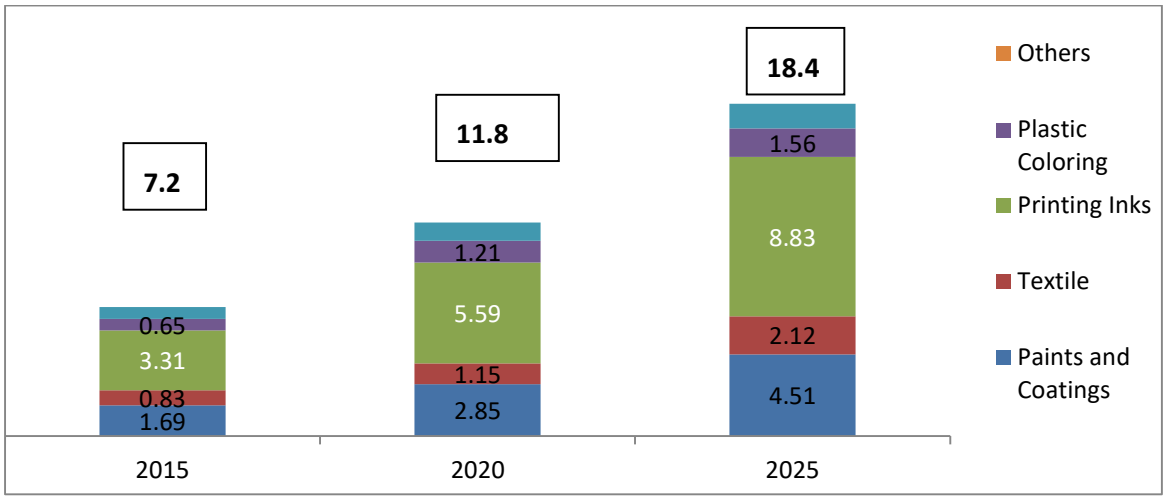
Source: Frost & Sullivan research & analysis

7.7 India Key end users

Due to the rising demand for organic pigments, they are the dominant type of pigments being produced in India, accounting for 58% of the total pigment production in India. The growth of the pigment market is aided by the cosmetic industry growth in the country. Due to improving living standards and evolving lifestyles, the demand for cosmetic products such as skincare, haircare, and perfume is growing rapidly, giving the Indian cosmetics industry a high boost. The cosmetic industry is a major application sector for the pigments market.

The dyes industry in India is expected to witness a steady growth in the coming years due to environmental crackdowns in China, resulting in a shutdown of several domestic dye companies. India is better placed due to the availability of the ecosystem, feedstock, technology, and compliance required for the industry. Thus, the consumer base of China is likely to shift to India due to these reasons in the coming years

Exhibit 7.9: India Dyes, Pigments and Textile Chemicals market Forecast by end industry, Value (USD Bn), 2015, 2021 and 2025F



Source: Frost & Sullivan

CAGR	Paints and Coatings	Textile	Printing Inks	Plastic Colouring	Others
2015-20	9.1%	5.7%	9.1%	11.0%	7.5%
2020-25F	12.1%	16.4%	12.1%	6.6%	8.4%

Printing inks and coatings account for over 70% of consumption of pigments in India. Titanium dioxide is a major raw material used in the manufacture of paints. The paints industry is growing at 13.5% p.a. which has been a major demand driver for pigments.

There are also niche markets in India for special effect pigments such as metallic and pearlescent. These pigments are usually imported into the Indian market, with Sudarshan chemicals being the only domestic manufacturer. Though the volume for these pigments would be very small as compared to other pigment segments, they usually command a premium for the design appeal that they provide to the final product such as automotive coatings and packaging goods.

India has grown significantly as a producer and exporter of organic pigments, particularly phthalocyanine blue, green and some high performance pigments. India is amongst the largest sources of coloured organic pigments, competing with China for a dominant share of the export market

7.8 Demand drivers and restraints

Growth in end user industries

The construction, automotive, and printing sectors remain the largest end markets for pigments. The aforementioned end-user industries are experiencing robust growth, accelerating the demand for pigments in India. Pigments remain a key component of paints and coatings used in construction and automotive, and the growing interest towards color shades and increased aesthetics are expected to accelerate the market for pigments. Automotive production is witnessing robust growth in India fueling the demand for pigments in coating applications

Growth of printing sector

Printing is another key application segment where the demand for pigments is continuously increasing. India has resulted in tremendous growth of labelling and packaging applications. Manufacturers' focus towards marketing activities and enhancing brand value has resulted in increased need for pigments in these segments. Despite the slump in growth across the publishing landscape for publications such as magazines, tutorials, and newspapers owing to the digital boom, this end-user segment is likely to be steered by the demand in packaging applications. Robust growth in end-user markets is, therefore, steering the key applications for pigments such as paints, coatings, and packaging, and, in turn, boosting pigment volumes.

High Performance and Specialty Pigments Demand is Growing

Metallic pigments and dyes are becoming increasingly popular owing to the enhanced visual effect that they offer, especially in plastics, paints, coatings, and inks used in the automotive, construction, and printing markets.

Superior hiding power, brilliant luster along with the ability to offer a wide range of vibrant colors have accelerated the adoption of these specialty pigments, especially in coatings, plastics, and packaging applications. Changing customer preferences across the globe towards attractive color shades and improved aesthetics is likely to boost the demand for these pigments during the forecast period.

The increasing demand for personal care products

The increasing demand for personal care products like cosmetics is driving the India dyes and pigments market. The rising demand for cosmetics and other personal care products is supporting the growth of the pigment industry. The increasing demand for unique effect pigments in personal care products is expected to drive the Indian market. The Indian beauty industry is growing rapidly due to globalisation and the introduction of multiple new brands in India, which is further driving the growth of the dyes and pigments market in India.

The increasing demand from the paints and coatings industries

The major factors driving the industry studied are the increasing demand from the paints and coatings industries. Paints and coatings account for a significant share of the market and are estimated to be one of the fastest-growing application sectors. Architectural and decorative coatings account for a major consumption of pigments. Thus, the rising construction and infrastructure activities in the country act as a significant driver for the market.

Increasing purchasing power of the consumers

Another factor driving the industry is the increasing purchasing power of the consumers and their changing lifestyle. Their interest in innovative and quality products is pushing the industry growth. With urbanization, the competition among the major players is also growing. This has resulted in the availability of a variety of products in the market.

7.9 India Key players

Company	Description	Production statistics
Bodal Chemicals	Bodal Chemicals has capacity of manufacturing up to 25 Dyes Intermediates products. These Dye Intermediates are directly sold as well as consumed captivity for manufacturing different kinds of Dye	Dye Intermediates production was 7,166 MT (and Dyestuffs (powder) production was 4,476 MT
Kiri Industries Ltd (KIL)	KIL is one of the largest players in the Dyes Industry in India. KIL has manufacturing plants for Reactive Dyes with installed capacity of 18000 TPA. KIL has infrastructure to simultaneously take batches in more than 30 vessels with batch sizes going up to 250 KL liquid.	Currently its Basic Chemical Plant's capacity is 180000 MTPA and its Dye Stuff Intermediate plant capacity is around 9600 MTPA, which recently was enhanced to 27600 MTPA, with 18000 MTPA of Vinyl Sulphone.
Rossari Biotech Ltd	Currently, they manufacture over 1,500 products which find applications across the entire textile value chain - Hydrophilic softeners, anti-microbial	Silvassa facility, has an installed capacity of 120,000 MTPA Facility at Dahej, with a capacity of 132,500 MT a year and well equipped

	finishes, micro encapsulated range, water repellents and UV protective textile finishes	with advanced technologies
Archroma	Archroma is a global, diversified provider of specialty chemicals serving the branded and performance textiles, packaging and paper, and coatings, adhesives and sealants markets.	Over 680,000 tons nameplate capacity across 26 manufacturing sites - Globally

Company Name	Net Sales (Rs. Cr.)
Sudarshan Chem	1708.5
Kiri Industries	689.19
Bhageria Industries	399.19
Asahi Songwon	282.94
Vidhi Spec	266.41
Poddar Pigments	260.7
Shree Pushkar	253.76

Company Name	Net Sales (Rs. Cr.)
Dynemic Products Ltd.	205.59
Camex Ltd.	142.53
Jaysynth Dyestuff (I) Ltd.	124.37
Vipul Organics	119.53
Indian Toners	88.27
Ishan Dyes	81.75
AksharChem (I) Ltd.	246.48

7.10 Global and India Dyes, Pigments and Textile Chemicals Overview

GPCL is amongst leading supplier in this field and have full range of dispersing agents for Dyes & Pigments. Also, the company's product goes into Textile processing as auxiliaries chemicals. This business is very stable and growing at consistently.

Key Products -

- Dispersing agent based on Sulphonated Naphthalene formaldehyde condensate
- Wetting cum dispersing agent based on Sulphonated Alkyl Naphthalene condensate
- Wetting cum dispersing agent based on Sulphonated Alkyl aryl formal dehyde condensate
- Wetting agent based on Alkyl ester Sulphonate

Section 8: GPCL’s key competencies

GPCL is amongst the leading chemicals manufacturers for the Infra-tech (Construction), agro, dyes, and leather industries in India. The company is a top supplier of dispersing agents in the construction, leather, dye and pigments, and textile industries and a leading supplier of powder surfactants in India.

8.1 Import Substitution

Import substitution is the concept of replacement or substitution of imports of chemicals/ products by domestically produced chemicals/ products.

Indian government is promoting indigenisation of various chemicals to have self-sufficiency in this field. From a long-term point of view, import substitution should be seen along with the incentive called Production Linked Incentive (PLI) Scheme.

In order to promote investment in the chemical and petrochemicals sector, and make India an important hub for both domestic and international markets, the Government had launched the Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs) policy in April 2007. Now the concept of PCPIR is being redrawn to attract a combined investment of over USD 420 billion through the proposed new PCPIR policy that is set to be implemented between 2020–35.

Domestically produced chemicals are preferred as sources since it reduces the transit time, low cost of logistics, ability to address customised packaging, recover GST incurred on input costs as tax credits and more visibility of supplies.

8.2 Construction Chemicals

India's construction chemicals market has been experiencing significant growth; however, it is still at a growing phase for at least next 10 to 15 years, when compared to other international markets.

Government regulations formulated for promoting the concept of 'Green Revolution', increase in foreign investment, urbanization and growing preference for utilization of ready-mix concrete (RMC) are some of the prominent factors driving growth in the construction chemicals market in India. Infrastructure sector is likely to grow at a faster speed and overall India's construction chemical market with a steady Y-o-Y growth of 25-30%. India is expanding its infrastructure by introducing Metro rail in all major cities, First Bullet Train route is already inaugurated and many more to come, India border road projects, Highway corridor is already approved and work started to join metro cities. GPCL products are approved in all these through its customers and there is huge potential of exponential growth of this business in coming years.

Construction chemicals are added with construction materials in order to improve its workability, enhance performance, add functionality, improve chemical resistance or enhance durability of civil structures. Over past few years, increasing infrastructure development activities, investment in commercial and residential housing and renovation activities of historical monuments, water retention structure, bridges and other civil structures have led to significant consumption of construction chemicals across India.

In the recently concluded Union Budget, several infrastructure spending initiatives (national highway expansion by 25,000 kms) and the incremental capex spending declared. A good boost is given to low-cost housing as a priority development area. All these should aid niche speciality chemical sectors. Construction chemicals & allied areas of coatings, adhesives and sealants should do better in

2022. In parallel it is expected that the coatings industry to do better which would in turn aid several chemicals companies which supply to the coatings industry (solvents, pigments, surfactants).

GPCL is amongst the leading manufacturer of Construction chemical dispersing agents in the Indian market.

GPCL holds its stand in the Indian construction market as an import substitute with more than 50% in SNF and more than 35% in PCE.

The company has customised products manufacturing and superior quality and supportive service, which is visible in long term relationship with customers and 400+ repeated customers. Also the company enjoys long term relationship with suppliers and beneficial support from them in terms of pricing, timely delivery and consistent quality of raw materials.

8.3 CNF/ SNF (Naphthalene Sulphonate Polymer)

GPCL manufactures special grade of CNF liquid which is unique and having purity level of more than 99% and its only kind of super plasticizer available in market. Similarly their SNF liquid has many varieties and is tailor made to customise the individual requirement. They also have a sizable manufacturing facility of more than 35,000 MT per annum.

PCE

GPCL has most advanced version of super plasticizer i.e. PCE, today available in market for Construction Chemical Industry. GPCL has spent two years of research to develop this product and probably amongst few company to successfully develop varieties of grades and customize PCE range. The company has 24,000 MT capacity for this product annually and have potential to double this business in couple of years, looking at India's Infrastructure growth. It produces the product in liquid as well as powder form.

GPCL is amongst the leading manufacturers of PCE liquid in India and only manufacturer of PCE powder in India. GPCL is amongst the few powder manufacturers globally.

SMF (Melamine Sulphonate polymer)

GPCL manufactures this product for special requirements for Wall putty and precast. This product is also used in tile binders and Paint industry. The manufacturing capacity for SMF is 2000 MT per annum.

Aluminium Sulphate

The company has been manufacturing this product for long. GPCL is focused on selling this product as an accelerator for construction chemical Industry as a specialty chemical and mainly used in application for Road projects, tunnels and underground tanks. The company makes special grade of Alum with finest particle size and hence the customers prefer this product for their use. This product is also used in detergents, water treatment plants, softening and other applications. Manufacturing capacity for this product is 24,000 MT per annum.

Acrylic Polymers

Acrylic Polymers are key ingredients to make construction chemicals used in repairs, water proofing and maintenance industry post construction. GPCL manufactures 3,600 MT of Acrylic Polymers per annum and plan to double the production in coming few years.

SNF C1 – C4 / D1 – D4

GPCL makes full range of SNF, of salt content from 0% - 27% to cover demand of customers from all Industry segment such as Construction, Agro, Textile, tiles and Gypsum, etc. Since, the anti-dumping duty is imposed on imports on some relative products, this product gives GPCL an advantage in gaining the market share.

8.4 Admixture

This is a finished product for ready to use by customers at construction site. GPCL manufactures Admixture for key construction chemical suppliers in Industry under their brand name. This product gives GPCL captive market to sell their PCE / CNF / SNF raw material in-house and guarantee the sales volume and business stability in this segment. GPCL makes 20,000 MT of this product annually and the volume will increase faster due to infrastructure growth in India.

8.5 AGROCHEMICAL ADDITIVES

GPCL is amongst the leading manufacturers of Agrochemicals additive like wetting agent, dispersing agents and adjuvant. GPCL supplies its Agrochemical Additives to large pesticide manufacturers.

This is growing business and due to innovation of eco-friendly and biodegradable new pesticides the new range of Surfactants business is growing consistently. GPCL is confident to achieve stable and larger business in this segment in coming years.

GPCL manufactures, the specialty dispersing agents for Agrochemical Industry, which are adsorbed onto the surface of the particles leading to wetting of the particles and coverage of the surface. By adsorbing on newly created surfaces during milling, they reduce interactions and re-agglomeration of the particles. This increases milling efficiency. The resulting small particle size enables a better pesticide intake and since products are finely dispersed, the particles lead to a long term stability of the formulations.

The benefits are a higher biological efficacy and enhanced storage stability of the formulations, even under extreme conditions. GPCL products can be applied in SC (suspension concentrate) and OD (oil dispersion) formulations. They promote stable dispersions without settling in the dispersing medium. GPCL, products are multi-functional additives often providing also emulsification properties useful in OD formulations.

8.6 Range Of Special Grade Dispersant

GPCL manufactures premium range of high-end wetting and dispersing agents and is used by leading Pesticide manufacturers of India in their formulation. GPCL manufactures modified grades of following products:

- Alkyl Naphthalene Sulphonates
- Alkyl Aryl Sulphonates polymers
- Phenol Sulphonates polymers

- Ester base polymers

8.7 New products

GPCL is developing new generation wetting and dispersing agents for global top dispersing agent manufacturers. Recently, they have also introduced a new product - CABS (Calcium Alkyl Benzene Sulphonate), which will take GPCL into a new business segment of agrochemicals of Liquid emulsifier. GPCL is the top supplier for powder surfactants and in near future , GPCL aim to supply full range of surfactants for the Agrochemical Industry including liquid emulsifiers.

List of upcoming products which are expected to be launched in a year's time;

Infra -Tech Chemicals		
Product	**Description**	**End use**
Gujplast PCF-705	Polycarboxylate ether- Water reducer	Construction industry: High Range water reducer in concrete. Water reduction in concrete up to 42 %.
Gujplast PCF-161	Polycarboxylate ether- Slump retainer	Construction industry: A slump retention type of PC super plasticizer with average water reduction rate. It behaves a continuous ability in slump retention.
Gujmol RTD	Cement retarders	Oil Field: Use as a cement retarders in oil well construction
Gujmol DF	Defoamer	Oil Field: Its remove unwanted air from the cement slurry. It's also reduced the apparent viscosity and improves the rheological properties of cement slurry.
Gujmol FLCA	Fluid loss control additive	Oil Field: Its improves fluid loss and provide slight slurry retardation in cement slurry. It's also reduced the apparent viscosity and improves the rheological properties of cement slurry.
Agro Chemicals		
Gujmol SNF-100	Modified Dialkyl maleate powder-Surfactant	Agro industry: It's designed to give the wetting and dispersing powder (WDP) formulation functional properties in pesticide spreading system. It has low foam and low c.m.c value of product that leads to low dosages in order to get desired wettability and suspensibility.

Gujmol SNF-110	Modified DIB-maleate Copolymer-Dispersing agent	Agro industry: It's designed to give the dispersing powder (WDP) formulation functional properties in pesticide spreading system.
Dyes, Pigments and Textile Chemicals		
Gujmol LS (RF)	Dispersing agent based on Refined Naphthalene condensate products	Light colour, Low salt and low molecular weight dispersing agent for dyes, pigment & textile. It's widely used in the SBR Latex and rubber industry as a dispersing agent.
Gujmol LS (QN)	Dispersing agent based on Naphthalene condensate products	Low molecular weight and low foaming dispersing agent for dyes, pigment & textile. It is widely used as a levelling and dispersing agent in leather tannery.
Leather Chemicals		
Gujtan GLX	Syntan based on Dihydroxy diphenyl sulphone with special additives	It will mainly be used as retaining agent for the production of white, lightfast leathers. On the leathers to be dyed, the levelness of the resultant shades and the light fastness of the tanned leather are improved.
Gujtan GIX	Syntan based on Phenol &Naphthalene condensation product with free of free formaldehyde	Replacement tanning agent used in re-tannage of chrome leather and imparts a paler and more uniform appearance to the leather and very good whiteness to the grain.
Leather Binders	Acrylic polymer	Binders used in the leather finishing process

8.8 Strength

With a reputed clientele of 600+ customers and enormous manufacturing capacity, Gujarat Polysol stands strong on the path of consistent growth with a turnover of more than INR 350 Crores in FY21, achieved through sheer perseverance, rich knowledge capital, dedication for innovation, sustainable development and customer centric services. GPCL exports its various products to countries like Indonesia, Hong Kong, Singapore, South Korea, Germany, China, UAE, Bangladesh, Vietnam & Australia expanding its footprint globally.

GPCL is situated in GIDC, Vapi, the industrial belt of Gujarat (India) and is logistically well connected by road and rail. Gujarat Polysol Chemicals Limited, an ISO (9001 / 14001) Certified Company in the field of manufacturing and supply of construction Chemicals, Leather Chemicals, Agro-Chemicals, Textile Chemicals and Dispersing Agents for dyes.

GPCL is amongst the leading chemical manufacturers for Construction, Leather, Agro & Dyes Industries with finished products going mainly the intermediates that work as a raw material for further admixture industries. GPCL is certified company for ISO standards of 9001, 14001, 18001 & 31010.

GPCL has received certification for 'Sulphonated Naphthalene Formaldehyde condensate, sodium salt (Gujmol - earlier knows as Polymol, SNF/LS/MS/NKS/HS/HSP/HM/FBP1, Gujtan - earlier known as Polytan, WS/GTM/HSP & Dadamol NKS)' from the European Chemicals Agency under Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EU REACH Regulation), a regulation of the European Union. Customers in the EU or seeking to sell chemical based products in the EU may only use chemicals from entities that are certified under EU REACH Regulation and, therefore, effectively, every manufacturer of chemical products seeking to sell its products in the EU must obtain such certification. GPCL is into the business since last 31 years and continuously growing at the good pace with stable growth. GPCL is equipped with updated machineries, equipment, technology, research & development and customer centric services with its product quality well approved and accepted across the industries.

With continuous innovation and research & development GPCL manufactures some of the high-end items such as Poly Carboxilate Ether (PCE) which is one of the product being manufactured in India. Majority of the PCE is imported from South Korea & China in Indian chemical industries. GPCL has penetrated the market with best quality and comparative pricing. GPCL manufactures PCE in liquid as well as powder form. GPCL is one of the few manufacturers of PCE powder worldwide and one of the top manufacturers of PCE powder in India. GPCL has captured majority of the market in Western India for PCE. There is a huge market and potential in Southern India and North Eastern India, but due to higher logistics cost they are not able to penetrate the market in Eastern and Southern India. Major requirement of raw materials in those areas are fulfilled by imported products or limited based on other manufacturers. To spread the footprint pan India, GPCL has future planning to set up new manufacturing units in Southern or North Eastern region.

GPCL already exports their products to Indonesia, Hong Kong, Singapore, South Korea, Germany, China, UAE, Bangladesh, Vietnam & Australia.

The products require thorough research and development with heavy investment in terms of plant and machinery and require stringent approval procedure. GPCL already has proven best R&D in this field. GPCL has the required infrastructure in place and expanding continuously ever since entered this business since past 5 years. At present many of the products are under trials/testing and approvals. This pipeline will give a stable and long term business for many years with best margin.

Dispersing Agents for Textile, Dyes and Pigments

GPCL is amongst leading supplier in this field and they have full range of dispersing agents for Dyes & Pigments. Also, GPCL's product goes into Textile processing as auxiliaries chemicals which is very stable and consistently growing business.

Leather Syntan, Fat Liquor Business

GPCL is already into the business of the same chemistry which also goes for processing raw Leather into finished Leather; GPCL has developed full range of Leather chemical business to increase its business.

Ever since, GPCL has developed these chemicals, it increased their business significantly into this segment also and now serving top Leather chemical suppliers of the world.

Oil Field Chemicals

Oil Field Chemicals is a specialty chemicals segment into which GPCL has started its business segment in FY21. The product has been successfully approved and commercialised for world's largest Oil & Gas servicing company. GPCL has started exporting the product and expecting more business in future.

Raw Material Basket Sell

GPCL, is already enjoying very big customer network. GPCL also has a business segment with raw material utilization into many businesses. Hence, many products go into formulation along with its products to the customer. Therefore management decided to enter into the business of basket raw material offering along with the manufactured products. This gives GPCL huge advantage and sizable business with customers.

8.9 Customer Base

Company has a strong customer base of more than 600 customers spread across the globe. Some of the key customers are as follows.

- BASF India Limited
- Sika India Private Limited
- Fosroc Chemicals (India) Private Limited
- Chryso India Private Limited
- MYK Schomburg India Private Limited
- Kunal Conchem Private Limited
- Ado Additives Technologies Limited
- Halliburton Worldwide Limited
- Fairmate Chemicals Private Limited
- Cico Technologies Limited
- Sulphur Crop Care Private Limited
- Sigma Polychem Private Limited
- Lonsen Kiri Chemical Industries Limited
- Bestech Techno Engineering Services Private Limited
- Ecmas Construction Chemicals Private Limited
- Akzo Nobel India Limited
- Sulphur Mills Limited
- Molecules Conchem Private Limited
- Atul Limited
- Coromandel Agrico Private Limited
- Dr. Eberle Clever Chemistry Private Limited
- Clariant Bohai Pigment Preparation (T) Limited
- Indofil Industries Limited
- Meghmani Industries Limited

8.10 Installed Capacity & Utilization for year 2021

Major Categories	Installed Capacity	Utilized Capacity	
	Metric Tons Per Annum	Metric Tons Per Annum	%
Dispersing Agent (Naphthalene & Phenol based)	62,000	42,309	68
PCE Liquid & Powder	24,000	12,352	51
Leather Chemical Syntan	6,000	3,395	57
Water Proofing Polymer & Wetting Agents	3,600	1,394	39
Other Dispersing Agents	10,800	2,741	25
Alumina Sulphate	24,000	14,015	58
TOTAL	**1,30,400**	**76,206**	**58.44**

8.11 Financials of Listed Competitors

While there are no directly comparable listed peers which are engaged in all product segments in which GPCL operates, the entities set out below, though, deal with certain select product segments in which GPCL operates.

All Values in Indian Rupee Crores

Himadri Speciality Chemicals Ltd. (consolidated)	**Mar-21**	**Mar-20**	**Mar-19**
Revenue From Operations [Net]	1,679.46	1,805.80	2,422.38
Profit/Loss Before Tax	64.56	194.14	462.13
Consolidated Profit/Loss	47.26	205.35	324.23

BASF India (Standalone)	**Mar-21**	**Mar-20**	**Mar-19**
Revenue From Operations [Net]	9,558.34	7,594.56	6,025.67
Profit/Loss Before Tax	839.96	9.90	71.86
Consolidated Profit/Loss	552.61	22.87	81.72