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Discussing India-China Relationships with Focus on Specialty Chemicals and Pharmaceuticals

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***Abstract*: With growing political and economic tension between nations combined with the COVID-19 threat, new challenges arrive that must be addressed for future growth – and one such challenge is the economic impact of India-China relations. Trade tensions between the US and China have also impacted Indian industries, amongst many other factors. The pandemic has increased economic dependence of other nations on India and China, although trade relations between the two growing economies reflects a wide deficit in the favour of Chinese industries. The objective of this study is to analyse the US-China trade war as well as India-China relations and its impact on Indian industries, specific to Pharmaceuticals and speciality chemicals, in order to ascertain the key pain-points and consequences on future growth. Using both existing research and empirical data, it was found that both the pharmaceutical and speciality chemicals industries in China held more prominent international presence with Indian industries being dependent on China most notably for raw materials in the same markets. This was despite evidence that showed India's growing trade presence and a significantly longer list of approved internationally traded drugs, reflecting growing presence but continual dependence and lower traded volume in international markets.**

***Keywords*: India, China, trade, relations, chemicals, pharmaceutical.**

1. Introduction

India-China trade relations have for many years impacted Indian industries and concerns, starting less than two decades ago. The liberalization of Indian markets and the opening of countries to globalization through the World Trade Organization's dismantling of trade barriers in the beginning of the century contributed in a major way to the sudden change in export-import numbers between India and China. In 2004-05, India's trade deficit was $1.5 billion; today, it is close to $47 billion. This can be attributed not only to the phenomenal growth of both economies, but also the increasing global domination of the Chinese economy. When India's basket of the top 50 items imported from and exported to China are studied, 44 from the import list are products for which China is India's largest foreign supplier. In the export list, in 31 of the 50 items, China is India's largest foreign market. A higher concentration of the products imported by India are predominantly from China whilst this concentration is halved when the same is seen on China's list of items imported from India.

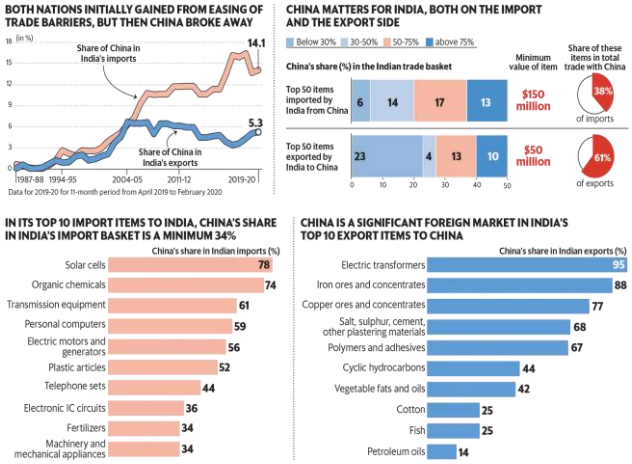

Fig. 1. India and China import and export percentages and comparisons
Source: RBI, Department of Commerce, April 2019-February 2020.

These numbers tell a story of dependence – India relies to a large extent, from toys to technology, on China for its domestically and industrially traded products. Most of India's top 10 imported products from China hold more than 50% of the export numbers; in China, these numbers vary from 95% of a single product being imported from India only, to less than a quarter of a product being imported from India. Not only does this signify a growing gap between the two countries that causes dependence on Chinese trade for Indian concerns, but also a dependence on Indian business in China (Dalal, 2020).

Conflicts such as the recent border tensions and other domestic tussles do nothing but hinder the issue. Even with growing stress between the two countries, however, the trade deficit between Indian and Chinese markets grows in value. This is, however, accompanied by growing export orders - by as much as 4% in the last financial year – in China that has increased hope for a gap that can be bridged (Suneja, 2021). Moreover, domestic tensions leading to the public calls for boycotting of Chinese goods have proved an equal dependence of China on India for import business that proves a cause of concern on both sides of the border.

These numbers only prove a strong trade relation and interdependence that can hurt many domestic concerns on both ends, and increases cause for developing a stronger raw material and manufacturing base in India to reduce a gaping distance in trade. With pharmaceuticals, drug producers in India

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are dependent on APIs imported from China amongst other raw materials, and this has been an issue highlighted more due to the problems COVID-19 has brought about. Finally, with speciality chemicals, this dependence, albeit existing in a lesser extent, has caused the Indian chemicals industry to be comparatively held back even though recent years have shown that there may be hope yet for the industry to take over its Chinese counterpart. Through this study, both industries are examined in detail along with the trade relations between the two economic giants so as to fill in the gap of analysis on both countries and two of their key industries.

2. Review of Literature

The United States' new sanctions are based on the assumption that Chinese companies are using inhumane and unethical labour practises to import their products. Another major concern was the chronically large trade surplus China held over the US, which is negatively impacting job creation in the US (Liu and Woo, 2018). These sanctions have also brought into question China's controlled economic growth and its impact on global trade with the financial power it holds (Lukin, 2019). The restrictions apply only to China's Xinjiang autonomous zone, which produces approximately 80 to 85 percent of the country's total cotton production. Several Indian apparel exporters have already held discussions with their US counterparts and other big foreign buyers in order to increase their sourcing from India, and have seen an increase in orders as a result. This rise may also be due to the fact that Indian textiles were already well-known in many parts of the world, including Europe (Export news, 2021). Corporate branding, industry consolidation through mergers and acquisitions, backward alignment with manufacturers, and channel management in the form of sales and distributor training were the top four pillars of specialty chemical marketing. Cosmetic chemicals, food additives, and factory cleaners have fared well in difficult economic times. New product requirements and environmental regulations have the potential to increase specialty chemical use, especially in emerging markets with growing customer bases. (Chauhan and Surve, 2015).

India has good consumption demography, stable reformist political leadership and good entrepreneurial zeal, which have created great companies, so far, with better English language proficiency than China. India's ease of doing business ranking is improving and FDI capital flows are robust vs. Asian peers, but bureaucracy needs to buckle up policy-wise to attract MNCs. This will provide employment to the India's labour force and the technological skills for innovation. Depressed oil acts as a cherry on the cake, as India imports 85% of its crude requirements. Investors could see three scenarios post this crisis – discretionary spending to come under immense pressure, the survival of the strongest companies and focus on localisation (Singh, 2020). Patent drugs have largely replaced traditional drugs in recent years, paving the way for patent drugs to enter the international market. Intellectual property rights gave prescription drugs a distinct identity not only in the United States, but also around the world. The pharmaceutical industry is currently dominated by Asian nations, with Africa, Europe, Latin America and the Caribbean, North America, and Oceania losing power over the last five years due to China's rapid development in pharmaceutical application status (Benny, 2020). Emerging markets, especially the BRIC countries, are enticing not only for investment, but also for outsourcing because of the profits, the availability of human resources, and low-cost wages in these countries. Manufacturing, research, and development costs are increasing. Clinical trials in developing countries are less expensive and can reduce drug development costs considerably, making it possible to lower prices while sustaining gains, according to studies (Tannoury and Attieh, 2017). With regards to manufacturing concerns in the pharmaceutical industry, the process has for decades held a lower price tag than other wealthy counterparts, despite there being a lack of implementation of modern, technology-heavy production methods (Mukhopadhyay, Dwivedy, and Kumar, 1998).

The Government of India, in line with the goals formulated in Atma Nirbhar Bharat, extended the Production Linked Incentive (PLI) Scheme for the pharmaceutical manufacturing sector. This scheme has been present in the electronics sector but in order to reduce India's dependency on China for import of API's, it has been extended to the pharmaceutical sector. The PLI scheme was extended with the intention of reducing dependency and increasing self-dependence for purchase materials within the industry, boosting future growth (Oxford Analytica). The prevailing economic conditions need to allow investors and market players to develop a positive value structure for India's manufacturing and expansion. This is a continuous process which shall help the API manufacturing sector to grow given that the strategic steps on the part of policy makers are taken and implemented efficiently (Vora et al., 2021). India is among the most significant pharmaceuticals beginning markets, and competition in these markets is critical for producing high-quality drugs at reasonable prices for customers. Holding the position for third in quantity in the global market, India plays an imperative role in pharma, despite Intellectual Property (IC) shortcomings stemming from WHO's joining protocol (Grace, 2004).

Regulatory interventions in the pharmaceutical industry by antitrust legislation are critical in combating anticompetitive problems and maintaining competitive markets. The Indian pharmaceuticals industry grew at a CAGR of 17.46 percent from US$6 billion in 2005 to US$55 billion in 2015, with a CAGR of 15.92 percent forecast by 2020 (Chitra and Kumar, 2020). When China was sparsely populated from international trade, the country's pharma industry grew. The pharmaceutical manufacturing industry in China met the needs of the Chinese people. The industry expanded rapidly as the country's economy shifted from centrally planned to market-based, aided by the government's use of special industrial or economic zones and other incentives. China has risen to the top of the global API supply chain in terms of volume in a relatively short period of time (World Health Organization, 2017). As the second largest producer of pharmaceutical products, the country has gained an upper hand by increasing barriers of entry for outside firms as well as developing a strong domestic system and

supply of health care products so as to increase international focus and viewpoint (Wu and Hsu, 2018).

Though India has an increasing domestic market to help with the Make in India initiative, export promotion will be critical in achieving both goals (attracting foreign investment in the manufacturing sector and import substitution). It is therefore critical for India to be able to take advantage of sufficient trade opportunities, and the recent US tariff imposition on China provides India with just such an opportunity. The US-China tussle may prove detrimental to global markets but provides benefits in the form of trade deflection for India (Misra and Choudhry, 2020). Based on their past results, Indian pharmaceutical exports have a fair chance in the US market. Just six goods are considered to be competitive in the US market based on the six metrics (Chakraborty, Maheshwari, and Parashar, 2018).

With the growing COVID-19 threat, the global economy has had to depend more and more on both Indian and Chinese medicine manufacturers. With close to 50% of the world's vaccines being supplied by Indian manufacturers and many other generic drugs being produced in India – almost 60% of the bulk drugs produced are exported, mainly to the US and Russia – India is a leading country in pharma with many other economies being dependent on the country's drug producers (Basu et al., 2020). India-China relations also directly impact multiple industries within both countries and the global pharmaceutical industry itself, as markets had reflected with the border conflict between India and China. Although both have seen different tracks of rapid economic growth, the result of economic domination has been the same. Due to aggressive price strategies and a lowering of industrial trade barriers to attract FDI, China has for decades seen fast-paced economic growth, with fast-growing industrial and service industries being responsible for India's growth (Bosworth and Collins, 2008). There is an extensive trade short-fall and wide deficit between the two countries, with Indian industries and markets leaning to a high degree on Chinese manufacturing concerns. The current government is still on the slow road to fixing this by developing key industries from the raw materials base till manufacturing and finishing stages (Talla, 2019). Heavy machinery, home appliances, electronics, and telecom are just some of the product groups and markets that India is overly dependent on China for with regards to imports. Even as relations continue to become tense between the two economic powerhouses, industries in India continue to be dependent, specifically with raw materials such as APIs in the pharmaceutical industry, on China for a wide range of products and materials (Singh, 2008). One of the major disadvantages in the ongoing trade tensions is the domestic dependency – due to a public health system that cannot reach those with low purchasing power easily, the pharmaceutical market in India has many flaws in and of itself despite growing exports and economic dominance (Archana, 2020).

Speciality chemicals, with multiple industrial uses and wide market demand, have also seen growth in the era of COVID-19, and it has been suggested that the industry may surpass China's in the coming decade. Due to increased restrictions in China and growing tensions with other countries, India stands to benefit as a supplier of speciality chemicals. The past year has seen a surge in the sale of such chemicals, owing to the US-China trade disagreements as well as pandemic-related demand boosts (Sharma and Jain, 2020). Factors such as increased prices and supply chain disruptions were already causing chemical producers to shift their eye from China to India. With the essential role speciality chemicals play across industries, shifts can be negated and growth expected, however, India is increasingly seeing the need to address problems such as regulations and environmental impacts that can hinder future growth of the speciality chemicals industry (Mandal, 2020). Although both the pharmaceutical and speciality chemicals industries are seeing rapid growth in India, India-China trade relations and a burgeoning trade dependence on China may start impacting pharmaceutical industries in India adversely – especially since manufacturers are dependent on China for raw materials, which have recently seen major price spikes – and the chemicals industry, being still at a growing stage, may need more domestic support and regulation before it can overtake the Chinese market (Narayanan and Thomas, 2020).

3. Research Methodology

A. Research Gap

Although existing research covers many singular aspects of this study, such as India-China trade relations, impact on Indian industries, pharmaceutical and speciality chemicals industries, etc., there are limited studies that examine the two interconnected industries and the role India-China relations play in the global scope and reach of these important sectors. Lesser still examine current scenarios, specifically growing tensions and global trade wars accompanied by the COVID-19 pandemic, therefore this paper provides a detailed and updated outlook on the interconnected topics.

B. Research Objectives

The main objective of this paper is to study existing data on India-China trade relations, US-China relations and the impact on Indian industries, the pharmaceutical and speciality chemical markets of both India and China, and the future implications of current scenarios and growth tracks. The objective is the interconnection between these singular and independent elements, to be established and analysed.

C. Data Collection

This study primarily relies on existing sources and data across different sources to establish cross-connections and other factors. Secondary sources used throughout this study are:

- Case studies from qualified sources
- Statistics, research, and data from global sources such as the WTO, Department of Commerce (India), and many others.
- Published research papers from reputed journals on JStor, T&F, Emerald, etc. platforms
- Census data and published year-on-year government studies.

- Articles from reputed news sources and web-based platforms.

4. Data Analysis

India and China have seen many similarities in economic growth and circumstances – up till 2004-2005, both countries were on a similar path to economic success. That period of time saw the aggressive lowering of trade barriers by the Chinese government, causing increased foreign direct investment into China – the country saw an opportunity for rapid globalization and improved trade, and has benefited by large bounds since (Dalal, 2020). From the year 2015 till 2018, China's share in Indian imports grew rapidly from $58.2 to $74.9 billion dollars, with imports in key sectors such as home appliances, electronics, raw materials across industries, chemicals, etc. increasing by leaps. From 2018 – 2019 the cumulative figure of imports dropped by 2.5%, and from 2019 – 2020 this figure dropped by an additional 19.8%, reflecting a lowering but still significant trade deficit between the two economies. Exports to China from India, meanwhile, have generally fluctuated – being at the lower end in the beginning of the year, and higher in the latter part. Some aspects of the trade fluctuations can be blamed on the uncertainty of specific situations in the last few years, most recently the COVID-19 pandemic, and other aspects are due to changing political tensions not just between the two economies, but also between others that have indirect impacts on the trade dynamics between India and China. Within the last 5 years, changing political scenarios have brought much attention to the international relations between India and China. One of the most significant such scenarios has been the trade war between China and the United States, which has had incendiary, indirect impacts on Indian trade. As a bystander to this conflict, India has gained increased economic momentum through trade deflection from multiple countries owing directly to political tensions.

Another major episode was the May 2020 border dispute between India and China. The two economic mammoths deflected tensions to trade to a certain extent – the 'boycott China' movement domestically within India took speed fast, and caused more than significant damage on both sides. Rising base prices from the side of Chinese vendors also hurt Indian concerns, and situations following were disadvantageous to both or either sides. Either way, India and China have for years deflected political tensions for the benefit of economic partnerships, with trade relations fluctuating but leading to the same result, a heightened dependence of Indian industries on Chinese trade and material. And in-depth study of both the speciality chemicals and pharmaceutical industries reflect similar but distinct patterns in terms of trade relations and their impact on industrial growth.

A. Case Study A: Specialty Chemicals

Asia's economies are among the world's fastest developing. The increased use of cosmetic and personal care products in Asia has had an especially significant effect on formulating firms, as they too hope to benefit from the region's growth. Performance-enhancing chemicals were regarded as corrective agents for weaker formulations thirty years ago. Emulsifiers, viscosity inhibitors, specialty surfactants, and other additives are now considered essential components of high-performing, low-cost consumer goods. Deregulation in developing markets has resulted in an increase in GDP, which has led to an increase in generic use, which has resulted in an increase in demand for specialty chemicals (Fost, 1997). Asia's share of total specialty chemical demand is expected to rise from around 47% in 2018 to 50% by 2025, fueled disproportionately by China and India. Analysts agree that India has a great opportunity to grab market share from China by utilizing its assets, which includes a stable reformist political leadership, a growing consumer demographic, and a startup culture with higher English language proficiency than its Chinese counterparts (Singh, 2020).

IBEF on behalf of the ministry of Commerce and Industry of India comments that the size of specialty chemicals market in India is poised perfectly for growth. This is no surprise since India is the fastest growing major specialty chemicals market in the world. Chemicals make up a considerable part of India's total trade flow, ranking third in imports and fourth in exports over the past five years. India currently has a $15 billion chemical trade deficit. The country's trade deficit with China fell to $45.91 billion in 2020 from $56.95 billion in 2019 (UN Comtrade Database, 2020; Suneja, 2021). The Indian chemicals industry was valued in 2019 at US$ 178 billion. However, in just the next 5 years by 2025, analysts expect the number to reach US$304 billion at a CAGR of 9.3% fueled by higher consumer demand and also a shift from the currently existing China due to trade wars, pollution laws and motivation to lower dependency aggregation after witnessing complete halt during 2020 pandemic lockdown in global manufacturing due to china being the biggest hub. Out of this, specialty chemicals constitute 22% of the total chemicals market in India and expected to rise 12% CAGR till 2022 (IBEF, 2020). Between 2006 and 2019, the compound annual growth rate (CAGR) in TRS for India's chemical companies was 15 percent—a figure much higher than the global chemical-industry return, with a CAGR of 8 percent, and the overall global equity market, with a CAGR of 6 percent. Even between 2016 and 2019, when India's economy faced headwinds, the chemical industry maintained a CAGR of 17 percent (McKinsey Report, 2021).

Chemical trade value has increased at a faster rate than India's average trade value. Chemical exports increased by 11 percent from 2014 to 2018, compared to just 0.4 percent for India's average exports, implying enormous potential in global markets, while chemical imports increased by 5% in the same period. Despite higher export growth than import growth, India still imports more than it exports, resulting in a USD 15 billion chemical trade deficit (McKinsey Report, 2021). Specialty chemicals are the most important chemical export category in India, accounting for over half (55%) of total chemical export value in 2018. Despite this, they account for just 3% of the overall volume of specialty chemical exports globally, compared to 13% for China, 11% for Germany, and 5% for Japan. There is still scope for improvement (McKinsey Report, 2021). Additional support, in terms of fiscal incentives, such as

tax breaks and special incentives through Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR)s or Special Economic Zones (SEZ)s will enhance production and development of the industry. With this in mind, the government has created a 2034 roadmap for the chemicals and petrochemicals sector to look at ways to increase domestic demand, reduce imports, and encourage investment in the sector (IBEF, 2020).

B. India's Advantages

1) Rising Demand

a) In India's specialty chemicals sector, the demand from end-user industries such as food manufacturing, personal care, and home care is propelling the growth of various segments.
b) Strong demand for specialty chemicals in the automobile, personal care, water treatment, and construction segments is likely to be supported by a growing middle-class population.
c) In the top three specialty chemical export markets – agrochemicals, dyes and pigments, and intermediates for active pharmaceutical ingredients(API) – India already has a good foothold (McKinsey Report, 2021)

2) Opportunities

a) As multinational businesses aim to de-risk their supply chains, which are heavily reliant on China, India's chemical industry has the potential to expand significantly.
b) The imposition of tighter environmental regulations in China, which resulted in the closure of over 40,000 units, could open doors for Indian chemical suppliers to service foreign players. Due to tougher environmental regulations, tighter funding, and restructuring, the architecture of China's chemical industry is shifting.
c) The latest trade wars between China, Europe, and the United States have had an impact on bilateral trade, presenting prospects for Indian players to overcome the supply chain gap.

3) Policy support

a) The government intends to implement a production-linked incentive (PLI) scheme to encourage domestic agrochemical manufacturing with 10-20% performance incentives.
b) The Department of Chemicals and Petrochemicals received Rs 218.34 crores (US$ 28.97 million) in the Union Budget 2020-21.
c) With a few variations, such as toxic substances, the automatic route allows 100 percent FDI in the chemicals industry.
d) Between April 2000 and September 2020, total Foreign Direct Investment (FDI) inflows into the chemicals (other than fertilisers) market totaled USS 18.06 billion.
e) Make in India: Two major initiatives exist under Make in India that can help specialty chemicals:
   i. PCPIRs are clusters created by the Indian government to provide investors with a transparent and investment-friendly policy and facility framework. PCPIRs have world-class infrastructure and a competitive environment that makes it much easier to set up a business. The total expenditure needed to fully realise PCPIRs is estimated to be INR 7.63 lakh crore.
   ii. *CPDS:* The Chemicals Promotion Development Scheme (CPDS) aims to promote and expand the chemical and petrochemical industries by providing financial resources for lectures, workshops, exhibits, undertaking studies/ consultancies, and analysing important issues concerning the chemical and petrochemical industries (Make in India, 2020).

4) Increasing Investments

a) Specialty chemical companies in India are expanding their capacity to meet growing demand from both international and domestic markets. PCPIRs are projected to draw US$ 104.36 billion in investments.
b) Trade agreements reflect this change in interest from China to India. Strategic investors, led by Japan, Korea, and Thailand, have shown a strong interest in Indian companies in the sector since November 2020, as they look for diversification avenues for their supply chains, away from China. This included major transactions in FY 2020, such as Carlyle's US$ 210 million acquisition

Table 1
Indian export of chemical products (in US$ Million)

Product	2018-19	2019-20	Y-O-Y Growth	% Share in Total Exports from India (2019-20)
Essential Oils	171.8	204.96	19.3	0.07
Other Miscellaneous Chemicals	929.62	1,055.16	13.5	0.34
Drug Formulations, Biologicals	14,388.80	15,940.40	10.78	5.09
Residual Chemical and Allied Product	5,259.64	5,620.26	6.86	1.79
Fertilizers Crude	11.85	12.65	6.7	0
Agro Chemicals	3,156.57	3,350.21	6.13	1.07
Dyes	2,538.45	2,687.28	5.86	0.86
Chemicals & Related Products	43,761.32	45,012.89	2.86	14.37
Cosmetics and Toiletries	1,671.95	1,709.33	2.24	0.55
Bulk Drugs, Drug Intermediates	3,911.14	3,885.84	-0.65	1.24
Inorganic Chemicals	1,072.88	1,036.88	-3.36	0.33
Paint, Varnish and Allied Products	790.33	755.13	-4.45	0.24
Graphite, Explosives and Accessories	124.34	115.48	-7.13	0.04
Organic Chemicals	9,326.52	8,341.90	-10.56	2.66
Fertilizers Manufactured	136.84	104.81	-23.41	0.03
Dye Intermediates	270.59	192.59	-28.82	0.06
Source: Ministry of Commerce and Industry				

of SeQuent Scientific Ltd and KKR's $414 million purchase of JB Chemicals and Pharmaceuticals Ltd.

The top segments in India under the specialty chemicals segment are textile chemicals, agrochemicals, specialty polymers and surfactants. Other segments expected to grow rapidly are flavouring and fragrance agents, cosmetic chemicals, adhesives, water management chemicals and food additives. All these are banking on growth fueled by forecasts of rising market demand and shift from outsourcing to import aligned with make in India movement (McKinsey Report, 2021).

With these insights in mind, current scope for growth:

Table 2
Scope for growth – speciality chemicals segment
China has a much greater presence than India in top specialty chemicals segments traded globally

Segments where India can penetrate deeper Potential whitespace opportunities for India

Top segments in specialty chemicals exports	Global Market CAGR 2018–23, Percentage	Global specialty chem exports USD bn	China Global specialty chem exports, Percentage	India Global specialty chem exports, Percentage	Key insights
Intermediates for APIs	6-7%[1]	77	11%	4%	China's export value in top 3 segments is **2.7x** that of India's • India can aim for deeper market penetration in these segments
Agrochemicals	2-3%	72	17%	6%	
Dyes and Pigments	2-3%	66	12%	5%	
Plastic additives	3-4%	15	8%	1%	China's export value in the next 6 segments is **12x** that of India's • These segments provide new opportunities for India to explore
Electronic chemicals	4-5%	15	22%	0.02%	
Food/Feed additives	2-3%	12	19%	2%	
Nutraceuticals	4-5%	10	46%	2%	
Rubber chemicals	2-3%	5	27%	2%	
Flavours and Fragrances	3-4%	5	46%	12%	

Source: IHS Chemicals, IHS Global Insights

As data suggests, in the top 3 global segments namely API Intermediates, Agrochemicals and Dyes and Pigments, China's export value is 2.7 times higher than India's and thus has potential for India to seek deeper penetration into these high volume segments. In the other segments where China's export value is 12 times higher than India's, there room for India to explore how to break into these product segments especially in Nutraceuticals and Flavours & Fragrances segments where China holds a whopping 46% market share in both while India only has 2% and 12% export value share, respectively. Getting a foothold in these segments will lead to immense value creation specifically for the reasons of other global players trying to de-risk from Chinese supply chains.

C. Case Study B: Pharmaceutical Industry

The global pharmaceutical industry, post 2010, witnessed a shift from the US and European countries towards the emerging economies (especially in Asia). E7 countries, which include Brazil, China, India, Indonesia, Mexico, Russia, and Turkey have a higher percentage of private health expenditure when compared to the G7 countries (Canada, France, Germany, Italy, Japan, United States, and the United Kingdom) as per the World Health Organization. The sales growth estimates for these countries for the period 2015-20 also stood at a higher percentage, BRIC-MT (Mexico and Turkey) countries ranked first with a 9.3% sales growth. Pharmaceutical markets in Canada, France, Germany and Italy showed a growth not exceeding 5% in 2011 and therefore these markets exhibited stagnation. The US market, during the same period, regressed (Tannoury and Attieh, 2017).

During 2013 - 2017, the world total of pharmaceutical patent applications increased by 19.45% from 79,371 to 94,809 (See below table). From 2015, patent offices in Asia on an average received more than 60,000 pharmaceutical patent applications every year. The share of Asian countries in worldwide pharmaceutical patent applications grew from 48.50% in 2013, to 59.60 % in 2017, led by the aggressive growth in patent filing in China, Japan and Republic of Korea which in total accounted for two-thirds of the patent applications in Asia (Tannoury and Attieh, 2017).

Table 3
Region wise status of patent application in the pharmaceuticals sector
Region wise status of Patent Application in Pharmaceutical Sector

Region	Total Number of Patent Application in Pharmaceutical Sector				
	2013	2014	2015	2016	2017
Africa	1035	1044	534	342	231
Asia	38499	48075	61626	62446	56513
Europe	9914	9726	9727	11102	11540
Latin America and the Caribbean	4378	4981	5728	6732	4436
North America	13379	14220	13735	14251	11219
Oceania	3225	2688	2108	1913	776
World	79371	90372	102015	106704	94809

Source: WIPO Database, August 2019

Active pharmaceutical ingredients (API) production is a truly global industry. However, the industry is very dynamic in nature as the demands from the drug industry fluctuate due to strict cost and regulatory enforcement. This further influences the international API supply chains. India and China both enjoy a significant market share in the pharmaceutical industry. While India is one of the leaders in export of formulations or generic medicines, China is the leading country in the world for exporting of raw materials, intermediaries and APIs. India itself imports 70% of its requirements for APIs and intermediaries from China. As of 2018-19, India imported $2.5 billion worth of APIs and bulk drugs from the Chinese manufacturers (Vora et al., 2021).

1) China

China has risen to the top of the global API supply chain in terms of production. While China's API manufacturers are major exporters, finished pharmaceutical products (FPPs, also known as formulations) have a smaller market share. Currently, generic drugs account for roughly 97 percent of drugs sold by local Chinese producers. Approximately 80% of drugs sold on the Chinese domestic market are generic, with foreign-owned firms supplying nearly all patent-protected products. The Chinese government is promoting TCM (Traditional Chinese Medicines) as an export opportunity since these medicines occupy a significant share in the domestic market (World Health Organization, 2017). In 2014, Chinese exports of FPPs (pharmaceutical formulations) totalled around 3 billion US dollars, while API exports totalled around 26 billion US dollars. Formulations had the highest net profit growth of the three

major groups (APIs, biological, and FPPs) in 2014, at 16.07%. Pharmaceutical formulations accounted for 26.51% of Chinese pharmaceutical industry sales in 2015, representing a 10.23 percent annual increase in FPP revenue. FPP sales for that year totalled 695 billion Yuan, or just over 100 billion dollars. China imported approximately 12.8 billion US dollars in FPPs, with patented overseas originator goods accounting for the majority of the volume. In 2015, China imported 8.5 billion US dollars' worth of APIs and 4.9 billion US dollars' worth of biochemicals. Imports of Western drugs totalled $26.2 billion USD. (17)

In 2015, China's foreign trade in healthcare and medical commodities totalled 98 billion US dollars, with 55 billion US dollars in exports and 43 billion US dollars in imports. Western medicine exports (including APIs) increased to 31.4 billion US dollars in 2014, with FFPs accounting for 2.94 billion US dollars of that amount. Plant extract exports totalled 1.8 billion dollars. In 2014, imports of Western drugs totaled $26.2 billion US dollars. With 20 billion dollars in exports and 15.8 billion dollars in imports, medical products made up the rest of the trade (World Health Organization, 2017).

2) India

The Government of India's Department of Pharmaceuticals initiated 'Pharma Vision 2020' aims at placing India among the top pharmaceutical manufacturers of the globe by making the country a major hub for end-to-end drug discovery via investment in infrastructure, R&D and introduction of PPP (Public Private Partnership) models to give a boost to innovation capabilities. In terms of volume, India is responsible for approximately one-tenth of the world's pharmaceutical production and has a ranking of 4th. Whereas in terms of the value of production, India ranks at 13 and contributes 1.4% to the world's value of production. During the period of April 2000 to February 2104 India received a cumulative Foreign Direct Investment equity inflows of US$ 11.6 billion in the pharmaceutical sector which made this sector the fifth largest FDI recipient in India and accounts for 5% of the total FDI equity inflows into the nation (Chitra and Kumar, 2020).

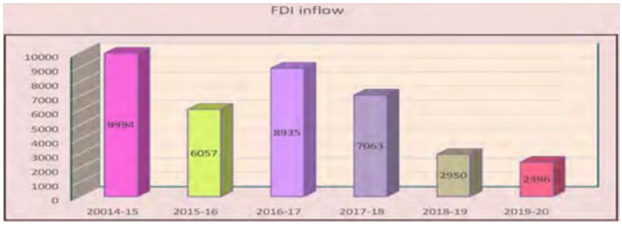

Fig. 2. FDI Inflow in Pharmaceutical Sector since 2014-15 (15)
Source: DPIIT/RBI (Figures for 2019-20 being up to December 2019)

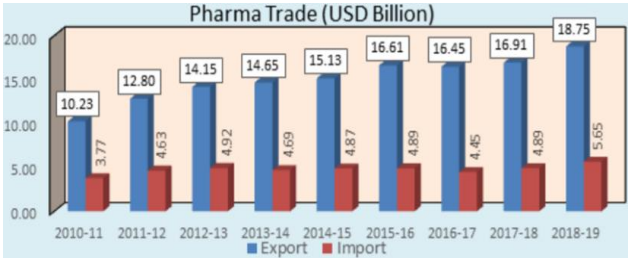

Fig. 3. Export and Import in Pharmaceutical Sector since 2010-11 (15)

According to the data from the Ministry of Commerce and Industry, India has also directed its lead over China in pharmaceutical exports with a year-on-year extension of 11.44 percent to US$ 12.91 billion in FY 2015-16.

In FY 2019-20, export of Drug formulations and Biologicals reported a growth of 11.27% and is the top performing category in pharmaceutical products. Export of other categories witnessed a decline. Bulk Drugs & Drug Intermediates declined slightly by 0.32%, Ayush and Herbal Products by 4.04% and Surgical exports contracted the most by 21.32%.

Table 4
India's Category wise export of Pharmaceutical products since 2017-18
(value in USD Million)

Category	2017-18	2018-19	2019-20	Growth%
Drug formulations & Biologicals	12747.9	14223.5	15826.64	11.27%
Bulk Drugs & Drug intermediates	3525.65	3895.14	3882.87	-0.32%
Surgicals	552.16	569.77	448.29	-21.32%
Aysuh and Herbal Products	456.12	446.12	428.09	-4.04%
Grand Total	17281.81	19134.49	20585.89	7.59%

Source: DGCIS, FY 2019-20

India exports 3.5 percent of all pharmaceuticals worldwide. Despite these achievements, India continues to import some critical raw materials, such as bulk drugs, APIs, medical equipment, and so on. Bulk drugs and APIs are primarily imported into India for economic reasons. When compared to domestic goods, pharmaceutical raw materials manufactured in China are 25-30% cheaper on average. However, India's vulnerabilities in this region have been revealed by the recent Covid-19 pandemic and escalation at the border. In line with Prime Minister Narendra Modi's AtmaNirbhar Bharat mission, Sadananda Gowda, Minister of Chemicals and Fertilizers, has launched four new initiatives to contribute to India's self-reliance mission by developing 53 important Active Pharmaceutical Ingredients (APIs) or Key Starting Materials (KSMs) and medical devices. A drug protection committee set up by the Department of Pharmaceuticals compiled information on APIs imported into the country and listed 53 APIs for which the country is heavily reliant on imports. The country's drug security is measured by its ability to ensure an adequate inventory of regular bulk drugs and APIs, as well as its ability to increase production to meet demand in emergency situations. As a result, self-sufficiency in drug manufacturing is critical for the nation. On March 20, 2020, a scheme called "Production Linked Incentive (PLI) Scheme" was launched in India to promote domestic manufacturing of raw materials needed in the pharmaceutical industry, namely Key Starting Materials (KSMs), Drug Intermediates (DIs), and Active Pharmaceutical Ingredients (APIs), with the goal of achieving self-reliance and reducing import dependency on essential APIs (Vora et al., 2021).

Initiatives taken by the Government of India in order to increase their global market share in the pharmaceutical industry (Chitra and Kumar, 2020):

1. Government of India has allowed government funding in the pharmaceutical sector through a Public-Private Partnership (PPP) model. India is therefore expected to rank among the top five global pharmaceutical discovery hubs by 2020.

2. The Indian Pharmaceutical Association (IPA) intends to formulate data integrity guidelines that will aid in measuring and benchmarking the efficiency of Indian firms against their global counterparts.
3. The Indian government intends to provide incentives to bulk drug manufacturers, both state-owned and private, in order to promote the 'Make in India' initiative and mitigate the reliance on imports of Active Pharmaceutical Ingredients (API), of which China accounts for nearly 85%.
4. The Department of Pharmaceuticals has established an inter-ministerial coordination committee to evaluate, organise, and promote the understanding of the issues and constraints confronting Indian pharmaceutical companies on a regular basis.
5. India plans to set up a nearly Rs. 1 lakh crore (US$ 1.3 billion) fund to boost companies to manufacture pharmaceutical ingredients domestically by 2023 (IBEF, 2021).

D. China vs. India

Just 18 Chinese drugs are on the WHO's list of prequalified drugs, opposed to 355 from India. Because of the low profit margins associated with APIs (excluding 'complex' APIs), manufacturers in China are shifting away from API manufacturing and toward FPPs. API plants in China are increasingly being forced to close down temporarily stringent environmental regulations (World Health Organization, 2017). Registration of an FPP for sale, especially in 'high value' economies such as the United States, Europe, and Japan, can be difficult, not least because the manufacturing plant for export (for example, in China) must be examined and authorized by importing country authorities. Furthermore, language may be a significant obstacle. Most Chinese manufacturers lack adequate English proficiency, despite the fact that English is the first or second language in many of the high-value markets. With the distinct advantage of English, India's generic FPP manufacturers were able to establish themselves in these high-value markets such as the United States. Despite the fact that high-value export markets have become an immediate target for Chinese FPP producers, 79 of these firms realise that the competition in US, EU, and Japanese economies is already cutthroat (World Health Organization, 2017).

Table 2 shows that the US Trade Representative's tariffs on China are distributed through ten HS chapters. The number of products counted at a disaggregated level under the 10 HS chapters, as well as the list of Indian export goods, are mentioned in the table. The third column depicts the degree of similarity between US anti-China initiatives and potential Indian export products. A higher number indicates more prospects for Indian exports to the United States, as the comparable Chinese goods face higher import duties. For each of the HS chapters, the percentage share of India in global exports is stated in the last column (Chakraborty, Maheshwari, and Parashar, 2018).

Table 5
Count of sanctioned products

HS Code	Description	Count of total Make in India Products	Count of tariff-facing Chinese Products	Percent of Affected Products (%)	India's Percent Share in World Exports (%)
28	Inorganic chemicals	273	4	1.5	1.2
29	Organic chemicals	1111	38	3.4	3.1
30	Pharmaceuticals	59	45	76.3	2.5
73	Articles of Iron and Steel	254	44	17.3	2.3
76	Aluminum and articles thereof	72	27	37.5	1.7
85	Electrical machinery and equipment	641	241	37.6	0.4
86	Railway and locomotives	32	17	53.1	0.5
87	Vehicles and auto-components	218	47	21.6	1.1
88	Aircraft, spacecraft, and parts thereof	17	16	94.1	1.2
89	Ships, boats and floating structures	22	11	50.0	2.9

Source – Lukin, 2020

Fig. 4 depicts India's and China's share of US pharmaceutical imports in the last decade. Throughout the time, it has been found that India's penetration of the US market for this segment has been greater than China's. Though China's share has remained stable at around 1.5 percent since 2013, India's share has increased from a meagre 2.9 percent in 2008 to 6.5 percent in 2017, despite a decline in 2016-17. The graph shows that Indian pharmaceutical products are becoming more well-known in the United States, resulting in increased demand (Chakraborty, Maheshwari, and Parashar, 2018).

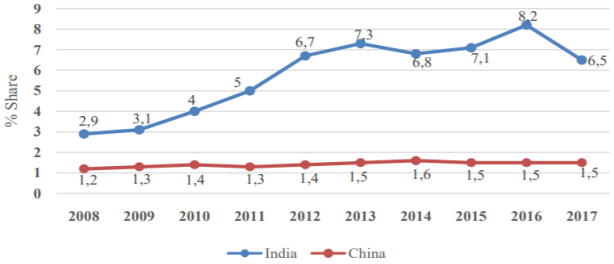

Fig. 4. Percent share in US Pharma imports (by value)
Source: Chakraborty, Maheshwari, and Parashar, 2018

Despite increased emphasis on the sector in recent times, the results reflect modestly on the absolute output of Indian pharmaceutical exports in the US market. As a result, the situation poses a significant challenge for the Indian pharmaceutical industry. Two broad factors may have influenced the moderate performance expectation. First, rather than proprietary drugs, India is a major exporter of generic goods. Given the pharma sector's limited R&D scenario, the situation is unlikely to change dramatically. Incentives from the government to encourage pharmaceutical research may be critical in this regard. Second, while Indian firms have implemented the Good Manufacturing Practices (GMP) guidelines, adherence to the US Food and Drug Administration's (USFDA) changing requirements will continue to be critical. Over the last decade, the USFDA has rejected numerous Indian goods, including medications. As a result, establishing a mechanism to ensure uniform equivalence with the United States is critical for increasing Indian pharmaceutical exports.

5. Conclusion

India-China trade relations have global implications and consequences, and so do China's relations with other countries – such as the US – in terms of indirect impacts on India. A study of these trade relations causes certain distinct patterns to

emerge, such as the benefits of trade deflection on India due to relations and the dependency on Chinese imports for certain key products and materials. Although the pharmaceutical industry in India has seen major success, it still leans on the import of key APIs and other raw materials from China, similar to an extent in the speciality chemicals sector. Though both are seeing growing economic significance globally, a strong base of domestically sourced raw materials and other related capacity products is required for reduced dependency, and a shift to proprietary rather than majorly generic pharmaceutical drugs.

One major limitation in this study observed is the lack of supporting primary data in the form of a study of Indian concerns and small manufacturing/service set-ups that could support conclusions drawn and provide a grassroots study of this impact, amongst many other potential primary studies. There is also wide scope for further research, in terms of an in-depth study of both industries including supporting empirical evidence as well as a studied interconnection between other key and non-significant sectors of both countries to ascertain the real impacts of India-China trade relations on both domestic and international markets.

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