

A Comparative Study of India's Pharmaceutical Sector: Pre and Post COVID-19

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Abstract:

The objective of this study is to conduct a thorough examination of the Indian pharmaceutical sector, with an emphasis on its performance both before and after the COVID-19 pandemic, and to understand the sector's contribution to economic growth, its global reputation, and competitive advantages.

The study employs quantitative methods to examine the performance of the pharmaceutical sector of India. Secondary data has been used for this study. The study conducted compound annual growth rate (CAGR), market share, regression analysis, and the revealed comparative advantage (RCA). These measures are used to assess the sector's growth and competitiveness. The study shows that the Indian pharmaceutical industry has gained strong competitiveness in the global market and plays a significant role in making generic drugs and vaccines. During the pandemic period, the competitiveness of India has increased at the global level due to a surge in demand for the COVID-19 related products. The findings demonstrate that the Indian pharmaceutical sector has achieved remarkable revenue growth; nevertheless, fluctuations in the growth rate indicate the need to reassess its strategy to sustain momentum.

Keywords: Indian pharmaceutical industry, economic growth, pre-COVID-19, post-COVID-19, global competitiveness, generic drugs, vaccines, CAGR, Revealed Comparative Advantage.

Introduction

India's pharmaceutical industry has an important role in contributing to the healthcare sector, not only at the national level but also at the international level. Throughout its century-long history, India's pharmaceutical industry has grown from a small, domestically focused sector to a major global player recognized for producing high-quality vaccines, active pharmaceutical ingredients (APIs), and generic medications (EximBank, 2016). Active Pharmaceutical Ingredient (APIs) is an essential part of the pharmaceutical industry in India, as they help maintain stability in the supply chain of pharmaceutical products worldwide. (Deloitte, 2020).

In the early twentieth century, the Indian pharmaceutical sector was dominated by a limited number of companies that mostly supplied over-the-counter drugs and basic formulations to the domestic market. However, following independence, things began to change dramatically, particularly after the Patents Act of 1970, which eliminated pharmaceutical product patents. This critical measure increased domestic production capabilities by allowing firms to reverse-engineer copyrighted pharmaceuticals and manufacture low-cost generic copies (Chaudhuri, 2005).

With the liberalisation and globalisation of the Indian economy in 1990s, Indian pharmaceutical companies started to expand. Indian firms began exporting generic pharmaceuticals and APIs to global markets, leveraging their low-cost manufacturing capabilities and compliance with international quality standards (Lalitha, 2002). Sector growth was fueled by large investments in research and development, leading to the production of advanced generics and biosimilars (KPMG, 2016).

India is known as the "Pharmacy of the World" because it supplies 25 percent of total drugs in the UK, 40 percent of the demand in the USA, and more than 50 percent of the world's vaccine demand (IBEF, 2021). The pharmaceutical industry in India provides several crucial drugs to the global healthcare sector, making this sector more accessible and affordable to everyone (WHO, 2017).

India's Pharmaceutical Sector: On the Rise

The Indian pharmaceutical sector is projected to achieve a market share of around 65 billion USD by 2024 and approximately 130 billion USD by 2030, according to forecasts (Business

Today, 2023). The Indian pharmaceutical industry is currently valued at approximately 50 billion USD, out of which more than 25 billion USD of this value is export value. India satisfies approximately 20 percent of the world demand for generic drugs (IBEF, 2023).

India is one of the top 12 biotechnology destinations in the world and the 3rd largest biotechnology destination in the Asia Pacific. In 2022, biotechnology in India increased to approximately 80.12 billion USD (IBEF, 2023). It shows the competitiveness of the industry due to the development in biopharmaceuticals, bioagriculture, bioindustry, and bioinformatics.

The pharmaceutical industry in India, as IBEF (2023) states, has grown considerably over the recent years. This sector will likely propel innovation, cost-cutting, and quality improvement and should take up more than 13% of the pharmaceutical markets worldwide. The key contributors to growth include stringent regulation, high investment in research and development, and qualified workforce.

India has the potential of producing generic quality drugs at competitive prices in the world. India has a lower cost of production compared to other countries such as USA and Europe. It renders India the top generic supplier in the world.

The importance of the pharmaceutical industry has increased during this COVID-19 period, as India's pharmaceutical products played a crucial role in meeting the world's supply requirements for drugs and vaccines. According to McKinsey & Company (2020), "The pandemic increased the demand for major drugs while also triggering major supply chain disruptions. The reliance of the industry on imported APIs proved to be a major weakness, which resulted in decreased supply and the rise in prices."

The study attempts to analyse the performance of the Indian pharmaceutical industry before and after the COVID-19 pandemic. The paper examines the competitiveness of the pharmaceutical products in India, both at the national and international levels across different product categories.

The objectives of the study are:

1. To examine the export competitiveness of the pharmaceutical sector of India in the world.
2. To study the impact of COVID-19 on the performance of this sector.
3. To examine the competitiveness of this sector in various product categories in the pre- and post-pandemic period.

4. To analyse the comparative position of India and China in the world.

Review of Background Literature

The pandemic has had a significant impact on the pharmaceutical industry of India and the world. The literature review of previous studies examines the impact of the pandemic on the pharmaceutical sector of India, both pre and post-pandemic period, with a focus on the industry's potential and challenges.

Pre-Pandemic Overview of the Indian Pharmaceutical Sector

Prior to the pandemic, the pharmaceutical industry of India was growing rapidly and accounted for a large share of the global pharmaceutical production. Effective manufacturing methods, a skilled staff, and a high export potential of the sector contributed to its success. As a result, India has become a major provider of generic medicines in the world (Chaudhuri, 2018).

The Central Drugs Standard Control Organization (CDSCO) has developed strict quality and compliance guidelines in India, thus maintaining a strong regulatory system. Bhatt and Patel (2019) found that Good Manufacturing Practices (GMP) is an essential requirement of the domestic and international market, which helps to maintain the reputation and reliability of the Indian pharmaceutical industry in the global market.

The capacity of India to produce pharmaceuticals was impressive in terms of quantity and efficiency. According to the Ministry of Commerce and Industry (2018), “India produced more than half of the global demand for various vaccinations, as well as a major share of generic drugs for markets such as the United States and the United Kingdom.” However, the supply chain was more susceptible to disruption because it was mostly dependent on Chinese imports of active pharmaceutical ingredients (APIs) (Jha, Raghbendra, and Sharma, Ashok, 2020).

The Impact of COVID-19 on the Global Pharmaceutical Industry

The pandemic has had far-reaching and diverse repercussions on the worldwide pharmaceutical sector. It had adversely affected the global supply chains, disrupted the production and transportation of pharmaceutical raw materials and finished goods. Lockdowns, transit limitations, and labor shortages caused delays and shortages in the provision of critical pharmaceuticals (McKinsey & Company, 2020).

The pharmaceutical sector was instrumental in manufacturing COVID-19 vaccines. Public and private investors significantly increased funding for healthcare and pharmaceutical research to support the development of COVID-19 treatments and vaccines. (Balaguru L, et.al. 2022).

The pandemic also pushed the use of digital technologies in the pharmaceutical industry. Companies have adopted virtual clinical trials, telemedicine, and digital collaboration tools to ensure business continuity and research and development activities. These digital developments have simplified operations and improved the efficiency of drug development processes (PwC, 2020).

Post-COVID Pharmaceutical Sector

Though the pandemic caused a large disruption in the pharmaceutical sector, it also encouraged research and development in the Indian pharmaceutical industry. Das, R. L., Haque, S., & Patowary, B. (2022) explored the post-pandemic effects on India's pharmaceutical industry. Over the past five decades, the Indian pharma sector has experienced remarkable growth in both domestic and international markets. The government's major initiative to boost the pharma industry aims to reduce India's dependency on raw material imports from China, which are extensively used in domestic drug production. Nearly half of India's pharmaceutical output, by volume and value, is exported to countries like the USA, UK, South Africa, and Russia. The COVID-19 pandemic has presented an opportunity for the Indian pharmaceutical industry to produce Active Pharmaceutical Ingredients (API) and intermediates.

The pharmaceutical industry in India showed remarkable flexibility after the outbreak. According to Deloitte (2021), the recovery and growth of the sector are marked by a step toward independence, creativity, and diversification. At a compound annual growth rate (CAGR) of 8% to 12.3%, the industry is projected to grow from 2020-2030. The post-COVID regulatory landscape has witnessed major adjustments aimed at improving domestic manufacturing capabilities and ensuring quality compliance. Bharat Biotech and Serum Institute of India emerged as key players in vaccine development and distribution in the world (Chavda VP, et. al. 2022).

The pharmaceutical industry is becoming more dependent on technology in the post-pandemic period. In the supply-chain management, research and development, and manufacturing, the use of digital technologies has grown significantly. The rise of telemedicine and e-pharmacies

revolutionized patient care in India during the pandemic through digital health advancements (Bhaskar, S. et.al., 2021).

The literature review sheds light on the adaptive and transformative path of the Indian pharmaceutical industry in the pandemic period. This period caused both serious disruptions and also opened new opportunities, which resulted in drastic changes in market dynamics, regulatory frameworks, production capabilities, and R&D funding.

The review of the above studies found significant gaps in the existing literature. More empirical research studies are needed to investigate the pre- and post-COVID dynamics of the pharmaceutical industry and to determine how governmental policies influence its development. This study examined the performance of pharmaceutical sector in the pre and post pandemic period and also studied the competitiveness of pharmaceutical products at the aggregate and disaggregate level in various product categories, both national and international level.

Major Findings of the Study

The pharmaceutical industry of India ranks third in terms of production capacity and is renowned for its expertise in the production of generic drugs and affordable vaccines (Department of Pharmaceuticals, 2022-23). In the financial year 2020-21, the pharmaceutical sector contributed about 1.3 percent to gross value added (GVA) at 2011-12 prices. In the financial year 2021-22, the Pharmaceutical Industry recorded an annual turnover of ₹ 3,44,125 crore (USD 42.34 billion) (Department of Pharmaceuticals, 2022-23). The sector consists of several major segments, including generic drugs, over-the-counter (OTC) drugs, bulk drugs, vaccines, contract research and manufacturing services (CRAMS), biosphere, and biotechnology.

India is a leading player in the global vaccine market, particularly in the production of DPT, BCG, and measles vaccines. It is one of the leading suppliers of affordable vaccines worldwide, accounting for 60% of global vaccine production. India meets 40 percent to 70 percent of the World Health Organization's (WHO) demand for Diphtheria, Tetanus, and Pertussis (DPT) and Bacillus Calmette–Guérin (BCG) vaccines, and notable 90% of the WHO's demand for the measles vaccine (Department of Pharmaceuticals, 2022-23).

According to Department of Pharmaceuticals (2022-23), “India is a significant producer of ‘Active Pharmaceutical Ingredients (APIs)’, accounting for around 8 percent of the worldwide API market and hosting around 500 firms. India supplies 20 percent of the world's generic drugs, producing around 60,000 generic brands across 60 therapeutic categories.” (Department of Pharmaceuticals, 2022–23).

India's pharmaceutical industry has made a significant impact on HIV treatment by providing affordable medications, which is considered one of the major successes in modern medicine. Indian pharmaceuticals are highly preferred worldwide and continue to experience substantial growth due to their cost-effective and high-quality products (Department of Pharmaceuticals, 2022-23).

Pharmaceutical Sector Performance: Insights and Analysis

The pharmaceutical sector of India plays a vital role by providing millions of people with affordable and accessible generic medications in the world. As India has the most US FDA-approved pharmaceutical factories outside of the USA, the industry guarantees cost-effectiveness without sacrificing quality. Additionally, many factories and facilities comply with the ‘Good Manufacturing Practices’ (GMP) established by the World Health Organization (WHO) and authorized by national regulatory bodies. (IBEF, 2025)

Table 1 shows the turnover and growth rate of the pharmaceutical sector from 2017 to 2022. It indicates a consistent increase in turnover for the Pharma sector of India over five fiscal years, from Rs. 226,423 crore in 2017-2018 to Rs. 344,125 crore in 2021-2022.

Table 1: Growth of Pharmaceutical Sector (Current Prices)

Year	Turnover (Crore)	Growth Rate (%)
2017-2018	226423	3.03
2018-2019	258534	14.18
2019-2020	289998	12.17
2020-2021	328054	13.12
2021-2022	344125	4.89
2022-2023	379450	10.8
2023-2024	417345	10.0

Source: DGCIS, Kolkata

Table 1 indicates that the pharmaceutical industry in India has demonstrated a consistent upward trend of growth in its turnover, growing from 2017-18 to 2023-24, nearly doubling in seven years. It is worth noting that the sector recorded significant growth rates of 14.18% in 2018-19, which could have been driven by an increase in global and domestic demand as a result of the COVID-19 pandemic. The growth then slowed to 4.89 percent in 2021-22, which may be due to a post-pandemic economic stabilization and supply-chain adaptations. However, the industry bounced back fast, achieving the growth rates of 10.8% in 2022-23, thus highlighting its resilience and structural soundness. In general, this tendency highlights the growing role of India as a pharmaceutical hub of the world with its consistent growth due to stable exports, the expanding popularity of generic drugs, and the corresponding growth of healthcare requirements.

Trade Performance of the Pharmaceutical Sector

Table 2 lists India's top ten pharmaceutical export and import destinations in the year 2023. The United States is a major export and import destination of the pharmaceutical products of India, which reflects high intra-industry trade between countries.

The exports to the United States amounted to USD 75.48 billion, significantly outpacing the USD 0.49 billion value of imports, thus proving the strong comparative advantage of India in terms of exports, especially when it comes to cheap generic medicines.

Table 2: Top 10 Export-Import Destinations of India in Pharmaceutical products:2023

Exports destination in 2023 (US Dollar thousand)		% Share	Imports destinations in 2023 (US Dollar thousand)		% Share
World	2,12,95,025	100	World	26,07,927	100
United States of America	75,48,399	35.45	United States of America	4,94,376	18.96
United Kingdom	6,36,209	2.99	Switzerland	3,45,521	13.25
South Africa	6,24,634	2.93	Germany	2,32,194	8.9
Netherlands	5,30,835	2.49	Netherlands	2,03,334	7.8
France	5,05,257	2.37	Belgium	1,78,290	6.84
Nigeria	4,50,779	2.12	China	1,66,524	6.39
Canada	4,25,296	2	Denmark	1,47,466	5.65

Australia	4,24,360	1.99	France	1,12,166	4.3
Belgium	4,23,044	1.99	Indonesia	89,269	3.42
Brazil	4,21,912	1.98	United Kingdom	79,656	3.05

Source: International Trade Centre, ITC

Other prominent export destinations include the United Kingdom (2.99%), South Africa (2.93%), and the Netherlands (2.49%), demonstrating a broad global market presence. These five importers collectively represent a strategic distribution of India's pharmaceutical exports, highlighting the country's increasing competitiveness in the pharmaceutical products in the world.

Switzerland and Germany are the next two largest exporters, accounting for 13.25% and 8.90% of imports, respectively. Furthermore, Belgium, China, Denmark, and France contribute to the broad supply chain, underscoring India's goal of sourcing high-quality pharmaceuticals from multiple global markets. The study underscores the importance of global partnerships in strengthening India's pharmaceutical sector, while also indicating areas for potential growth and diversification in import sources.

The pharmaceutical export industry in India is therefore still highly dependent on the United States- largely in terms of generics and bulk drug ingredients- to offer the sector considerable opportunities in terms of the large and consistent demand, whilst posing the sector with considerable risks in case of any regulatory and policy change in the United States.

Chart 1: Total Exports and Imports of India in Pharmaceutical Products (in crores)



The pharmaceutical sector of India holds a strategic position in terms of global trade and has maintained a trade surplus. Table 3 shows the trade balance of India in pharmaceutical products from 2016-17 to 2023-24. The trade balance in India's pharmaceutical sector was positive during this period, indicating robust growth in exports relative to imports.

Table 3: Trade Balance in Pharmaceutical Products

(Values in US \$ Million)

Year	Exports	Imports	Trade balance
2016-2017	12,930.48	1,717.51	11,212.97
2017-2018	13,255.62	1,898.38	11,357.24
2018-2019	14,754.07	2,083.49	12,670.58
2019-2020	16,289.25	2,334.67	13,954.58
2020-2021	19,384.02	2,552.52	16,831.50
2021-2022	19,396.24	3,441.35	15,954.89
2022-2023	19,861.86	2,616.87	17,244.99
2023-2024	22,105.49	2,608.69	19,496.80

Source: International Trade Centre, ITC

India had a positive trade balance throughout the period 2016–2017 to 2023–2024, showing India's growing competitiveness in pharmaceutical products in the world. The trade surplus increased from \$11.2 billion in 2016–2017 to \$12.7 billion in 2018–2019 due to the rising

production of drug products in India. The steady increase in global demand for Indian pharmaceutical products during this period reflects the increase in the competitiveness of Indian pharmaceutical products at the global level.

The trade balance increased to \$16.8 billion in 2020–2021. India began exporting more drug products, becoming a major player globally. It also indicates the world's growing dependence on pharmaceutical exports from India for vital COVID-19 treatments and vaccinations, as India produces 60 percent of the total global vaccine.

As the post-COVID-19 trade balance continued to improve, the surplus increased to \$19.5 billion in the 2023–2024 period. The post-pandemic improvement in the trade balance is a result of both a regulated rise in imports and a sustained high performance in pharmaceutical exports. This suggests that the Indian pharmaceutical industry not only bounced back from the pandemic but also took advantage of the increased demand for drugs around the world, solidifying its position as a top exporter.

Table 4 shows the results of the regression analysis of India's Pharmaceutical exports.

Table 4: Regression analysis of Exports of Pharmaceutical Products

Dependent Variable: Exports			
Variable	Coefficient (β)	p-value	Model Summary Value
Intercept (β_0)	11125	0.000	R ² : 0.956
Year (β_1)	1360	0.000	Adjusted R ² : 0.949

$$Export = 11,125 + 1,360(Year)$$

A strong upward tendency is indicated by the coefficient for the 'year' variable, which is 1,360 million USD, indicating that exports rise by roughly \$1.36 billion annually. The model shows a good fit, explaining about 95.6% of the export variability with an R-squared value of 0.956. The observed increase in exports is statistically significant and not the result of chance.

Table 5 demonstrates that throughout the pre-COVID-19 Period (2015-2019), the Indian pharmaceutical business showed consistent growth in the majority of categories. The steady worldwide demand for "Medicaments consisting of mixed or unmixed" was reflected in the steady growth of exports, which increased from 11,521 million USD in 2015–2016 to 13,281 million USD in 2018–2019. The increasing rise in "Human, Animal, Blood from Medicinal

Use" also suggests that there is a growing need for preventative healthcare measures on a global scale. Other categories, such as "Dried Glands and Other Organs For Organotherapeutics Uses," displayed erratic patterns, with exports declining somewhat.

The COVID-19 pandemic caused a drastic increase in the demand for pharmaceutical products in the world. Due to the pressing need for COVID-19 vaccines and associated therapies, exports of immunological products and vaccines jumped dramatically from 1,050 million USD in 2019–2020 to 1,228 million USD in 2020–2021. "Dried Glands and Other Organs For Organotherapeutic Uses" increased from 45 million USD in 2015-16 to 74 million USD in 2020-21. As a result of the increased need for drugs to control the pandemic, the demand for "Medicaments consisting of mixed or unmixed" also increased. The ability of the Indian pharmaceutical sector to increase production and respond to international health emergencies was demonstrated during this time.

Table 5: Category-wise Exports of Pharmaceutical Products of India

(Values in US \$ Million)

HSCode	Commodity	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	CAGR
3001	Dried glands and other organs for organo-therapeutic uses, whether or not powdered; extracts ...	45	38	37	26	45	74	129	107	106	11.33%
3002	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera ...	783	740	798	875	1050	1228	1463	1469	1682	10.03%
3003	Medicaments consisting of two or more constituents mixed tgthr for therapeutic or prophylactic .	330	351	337	312	315	355	424	385	353	0.86%
3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put ...	11521	11565	11827	13281	14613	17419	17083	17580	19631	6.89%
3005	WADDING, GAUZE, BANDAGES AND SIMILAR ARTICLES	47	46	50	56	57	61	59	80	72	5.38%
3006	Pharmaceutical preparations and products	184	190	206	204	209	247	238	241	261	4.47%

Source: DGCIS

Export patterns adapted to the new normal in the post-pandemic period. Most of the categories showed a robust increase; exports of the product category "Dried Glands and Other Organs for Organotherapeutic Uses" peaked at 129 million USD in 2021–2022, then fell to 106 million

USD in 2023–2024. The product category "Human, Animal, Blood From Medicinal Use" category increased with compound annual growth rate of 10.03 percent and stood at 1,682 million USD in 2023–2024, demonstrating ongoing international efforts in immunization and healthcare readiness. Exports of "Medicaments consisting of mixed or unmixed" increased to 19,631 million USD in 2023–2024, demonstrating the continued high demand for these goods. During the outbreak, other categories, like "Wadding, Gauze, Bandages" and "Pharmaceutical preparations and products," also saw fluctuations, reaching a peak before leveling down.

All things considered, Table 5 shows a strong increase in India's pharmaceutical exports, especially in the "Dried Glands and Other Organs for Organotherapeutic Uses" categories, which reflects the sector's growing importance in international markets.

Competitiveness of Pharmaceutical Products at the Global Level of India

India has achieved high competitiveness in the pharmaceutical industry in the world by mass production of generic drugs. This competitiveness is supported by the fact that India has strong research and development capabilities, as has been demonstrated by the fact that new drug applications are on the rise every year and this can be attributed to the fact that India has been responsive to the quality standards set by international regulatory bodies, such as the U.S. Food and Drug Administration (FDA).

Table 6: India's Pharmaceutical products Export share in the World

HSCode	Commodity	2019	2020	2021	2022	2023
30	Pharmaceutical products	2.63%	2.71%	2.35%	2.34%	2.55%
3001	Dried glands and other organs for organo-therapeutic uses, whether or not powdered; extracts ...	0.69%	1.43%	1.98%	1.89%	2.04%
3002	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera ...	0.50%	0.47%	0.42%	0.43%	0.51%
3003	Medicaments consisting of two or more constituents mixed together for therapeutic/prophylactic .	3.38%	3.47%	4.60%	3.23%	2.50%
3004	Medicaments consisting of mixed or unmixed products for therapeutic/prophylactic uses.	3.92%	4.13%	4.06%	3.89%	4.16%
3005	Wadding, gauze, bandages and the like, e.g. dressings, adhesive plasters, poultices, impregnated ...	0.69%	0.68%	0.63%	0.80%	0.68%
3006	Pharmaceutical preparations and products	1.30%	1.49%	1.33%	1.22%	1.28%

Source: DGCIS

Table 6 shows the export share of India in the Pharmaceutical products and its various product categories in the world in the pre- and post-pandemic period. In the pre-pandemic period, India maintained a strong global position in ‘Medicaments Consisting of Mixed or Unmixed Products’ with 2.63 percent share in 2019. During the pandemic period, total export share of pharmaceutical products increased to 2.71 percent in 2020, due to a significant increase in the exports of the product category ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’. In 2021, total share of pharmaceutical products slightly decreased to 2.35 percent, but ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’ increased to 1.98 percent. In the post-COVID-19 period (i.e. 2022-2023), the overall share of pharmaceutical products increased to 2.55 percent in 2023, with outstanding growth in ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’, underscoring India's ongoing strong performance and its capacity to adapt and maintain a strong global market presence through the pandemic recovery.

Table 7: Comparative Position of India and China in the World in 2023

HSCode	Commodity	India's Share in the World	China's Share in the World
30	Pharmaceutical products	2.55%	1.35%
3001	Dried glands and other organs for organo-therapeutic uses, whether or not powdered; extracts ...	2.04%	21.05%
3002	Human blood; animal blood prepared for therapeutic, prophylactic, or diagnostic uses; antisera ...	0.51%	0.24%
3003	Medicaments consisting of two or more constituents mixed together for therapeutic or prophylactic .	2.50%	7.14%
3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put ...	4.16%	1.24%
3005	Wadding, gauze, bandages, and the like, e.g. dressings, adhesive plasters, poultices, impregnated ...	0.68%	19.44%
3006	Pharmaceutical preparations and products	1.28%	3.74%

Source: ITC

Table 7 shows the comparative position of India and China in the world's export of pharmaceutical products. A comparative analysis shows the percentage share in the world's exports of various pharmaceutical products in 2023. In total pharmaceutical products, India's

share in world export (i.e. 2.55 percent) was higher than China (1.35 percent), indicating a stronger position in the global pharmaceutical trade. However, China dominates the market in specific categories, such as ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’, ‘Wadding, Gauze, Bandages and the like, e.g. dressings’, ‘Medicaments Consisting of Two or More Constituents’, and ‘Pharmaceutical Preparations and Products’. However, India surpasses China in the export of ‘Medicaments consisting of Mixed or Unmixed products for therapeutic or prophylactic Uses’. Both countries have relatively low shares in the export of ‘Human Blood and Animal Blood prepared for therapeutic uses’, with India slightly ahead (0.51% vs. China's 0.24%). Overall, while India excels in certain categories, China's dominance in specialized and high-demand segments underscores its targeted production and export strategies.

Table 9: Revealed Comparative Advantage of India in Pharmaceutical Products

HC Code	Product	2019	2020	2021	2022	2023
30	Pharmaceutical products	1.53	1.72	1.32	1.28	1.37
3001	Dried glands and other organs for organo-therapeutic uses, whether or not powdered; extracts ...	0.40	0.91	1.11	1.03	1.10
3002	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera ...	0.29	0.30	0.24	0.23	0.27
3003	Medicaments consisting of two or more constituents mixed together for therapeutic or prophylactic .	1.96	2.20	2.58	1.77	1.35
3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put ...	2.28	2.63	2.28	2.13	2.24
3005	Wadding, gauze, bandages and the like, e.g. dressings, adhesive plasters, poultices, impregnated ...	0.40	0.43	0.36	0.44	0.37
3006	Pharmaceutical preparations and products	0.76	0.95	0.75	0.67	0.69

Table 9 shows India's revealed comparative advantage (RCA) in pharmaceutical products. India shows a strong comparative advantage in total pharmaceutical products throughout the period, as the value of RCA index was greater than one.

In the pre-COVID-19 period (2019), India had a strong position with significant comparative advantage in the product categories ‘Medicaments Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic uses’ (RCA= 2.28) and ‘Medicaments Consisting of Two or More Constituents Mixed Together for Therapeutic or Prophylactic uses’ (RCA= 1.96).

However, in the pre-pandemic period, India did not show any comparative advantage in the product categories like ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’, and ‘Human blood; animal blood prepared for therapeutic, prophylactic’ as the RCA Index was less than one.

During the COVID-19 period (2020-2021), India experienced an increase in comparative advantage in ‘Dried Glands and Other Organs for Organo-Therapeutic Uses’ (RCA=1.11), and ‘Medicaments Consisting of Two or More Constituents Mixed Together for Therapeutic or Prophylactic uses’ (RCA=2.58), indicating increased competitiveness by growing global demand.

In the post-COVID-19 period (2022-2023), total pharmaceutical products and all product categories experienced a slight decline in competitiveness, as the RCA index dropped across all categories. This was due to a fall in demand for COVID-related products in the post-pandemic period.

Strategic Initiatives to Strengthen India's Pharmaceutical Sector

The Government of India launched a set of programmes aimed at development in the pharmaceutical industry of the country including the provision of infrastructure, the technological advancement of the industry, and the provision of affordable access to medications. The Strengthening of Pharmaceutical Industry (SPI) programme is a significant intervention that will help to improve the infrastructure of the sector. The programme has a budget of 500 crore (or 64.5 million USD) to upgrade the facilities and modernize technology as per the international standards (Department of Pharmaceuticals, 2022).

The Government of India established the Production -Linked Incentive (PLI) scheme in September 2020 to drive investment and support infrastructure. The initiative is expected to yield an incremental sales volume of 294,000 crores (= USD 37.09billion) in 6 years, between the 2022-2023 and 2027-2028 fiscal years, focused on bulk drug parks, medical devices and key starting materials (KSM). The

incentive mechanism through the PLI can attract foreign and domestic capital, hence improving the competitiveness of the Indian pharmaceutical products in the local and international market.

In order to enhance the development of the Indian pharmaceutical sector, the scheme Pharmaceutical Promotion and Development Scheme (PPDS) was created in 2017. This programme provides financial assistance to major industry conferences, seminars, trade fairs, and foreign missions (Department of Pharmaceuticals, 2022). Through the support of such activities, PPDS helps to create awareness about the Indian pharmaceutical industry, promote the growth of the industry, and promote international cooperation.

‘Pharmaceutical Technology Upgradation Assistance Scheme (PTUS)’ provides significant technical and financial support to small and medium-sized enterprises (SMEs) to improve product quality and reform production techniques. This program aims to support them in complying with the strict ‘World Health Organization-Good Manufacturing Practices’ (WHO-GMP) criteria, thereby improving SMEs' competitiveness in the global market (Department of Pharmaceuticals, 2022).

The ‘Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP)’, initially known as the "Jan Aushadhi Scheme," was established in 2008 to provide the people with economical and high-quality generic medications (Department of Pharmaceuticals, 2021). The program aims to open Jan Aushadhi Kendras (stores) across the country, making basic medicines more accessible and affordable, and addressing public health concerns.

Conclusion and Implications

The Indian pharmaceutical sector experienced robust revenue growth with some fluctuations in the growth rate. It indicates the need to reconsider strategies to sustain momentum. The pharmaceutical sector of India not only recovered from the pandemic but also capitalized on the global demand for pharmaceuticals, reinforcing its position as a leading exporter in the global market.

From 2016 to 2024, India had a positive trade balance, which indicates growing competitiveness in pharmaceutical products in the world. India experienced a higher export share of pharmaceutical products than China, showing the competitive position of India in the world. According to regression analysis, exports increase by around \$1.36 billion every year. During the pandemic, India earned a competitive position in 'Dried Glands and Other Organs for Organo-Therapeutic Uses' and 'Medicaments Consisting of Two or More Constituents

Mixed Together for Therapeutic or Prophylactic Uses,' suggesting enhanced competitiveness due to increasing worldwide demand.

In the post-pandemic period, the competitiveness of total pharmaceutical items and all sub-product categories decreased slightly. This was due to a fall in demand for COVID-related products in the post-pandemic period. The results of the research are consistent with the available literature, which highlights the resiliency and flexibility of the sector during global disasters.

The Government of India has taken many initiatives to increase the performance of this sector. The GOI introduced the Strengthening of Pharmaceutical Industry (SPI) plan, Production Linked Incentive (PLI), Pharmaceutical Promotion and Development Scheme (PPDS), Pharmaceutical Technology Upgradation Assistance Scheme (PTUAS), and the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) to boost the performance of the pharmaceutical sector.

To enhance competitiveness at global level, the industry should focus on developing new concepts and enhancing its offerings. This study provides valuable insights into the growth and competitive dynamics of the Indian pharmaceutical industry by closely examining its performance over time. By demonstrating the sector's strength and strategic importance in the global pharmaceutical market, it contributes to the body of knowledge.

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