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Impact of Global Tariff Wars on the Supply Chain of Pharmaceutical Raw Materials: A Study of Api and Fine Chemical Imports in India

Dr. Kapil Dev Pandey

PhD, MIMA, PGDMM, PGDIBO, MBA, B.PHARM

Mail ID: kdpandey@gmail.com

ORCID ID: https://orcid.org/0000-0002-8951-8855

Abstract

This study investigates the impact of global tariff wars—particularly the ongoing U.S.-China trade conflict—on India's pharmaceutical supply chain, specifically on importing active pharmaceutical ingredients (APIs) and fine chemicals. As India is the largest global supplier of generic medicines, its heavy dependence on Chinese imports for approximately 70% of its APIs poses significant strategic and economic vulnerabilities. Using a mixed-methods approach combining trade data analysis, policy review, and case studies of leading pharmaceutical firms, this research explores how tariffs, protectionist trade policies, and supply chain disruptions have affected cost structures, production timelines, and export competitiveness.

The findings reveal that tariff-induced input cost inflation, shipment delays, and price volatility have placed increasing pressure on India's cost-sensitive pharmaceutical export model, particularly in generics. The study further highlights how Indian firms adapt by investing in domestic API manufacturing, diversifying export markets beyond the United States, and transitioning toward higher-value product segments like biosimilars. Additionally, the paper underscores the importance of proactive trade diplomacy and international cooperation to build long-term supply chain resilience.

This research contributes to the understanding of how geopolitical trade dynamics reshape industrial ecosystems in emerging economies and provides policy-relevant insights for building a more self-reliant and future-ready Indian pharmaceutical sector.

Keywords - *Global tariff wars, pharmaceutical supply chain, Active Pharmaceutical Ingredients (APIs), Fine chemicals, India pharmaceutical industry*

1 Introduction

The ongoing trade conflict between the United States and China has intensified to an unprecedented degree, posing a serious threat to global trade stability and economic growth. The imposition of reciprocal tariffs—some exceeding 100%—has rendered bilateral trade between the world's two largest economies increasingly unsustainable. These protectionist measures have not only disrupted the pricing and flow of goods but have also raised the specter of a broader economic downturn. Analysts and international financial institutions have warned that the prolonged escalation of this tariff war significantly heightens the risk of a recession, not only in the US and China but also across the interconnected global economy.

Early in 2018, the US, under President Donald Trump, initiated massive tariffs on Chinese goods related to the trade imbalance, intellectual property theft, and national security. On April 2 of that year, the US launched a far-reaching regime of tariffs on an extensive Chinese range of exports. Minutes after Trump announced his tariff plan, China retaliated with a tit-for-tat in its own set of tariffs on American goods. In just a week's time, both the countries interwoven it further with additional duties to the tune of 125% on select imports.

The tariffs went very wide. The Chinese products hit by US measures spanned a range of consumer and industrial items from electronics to textile products to toys to machinery. Unlike that, China's retaliation(filePath took place specifically where America’s export sectors hurt such as agriculture (soybeans, pork, corn), the car industry and high tech equipment. These were strategically oriented actions that had targeted politically sensitive industries and regions. Yet this was also one of the quickest and most extensive trade escalations on modern economic record.

This tariff war has ripple effects not only on US China trade but globally as well. The sourcing and manufacturing strategies of multinational corporations have come under pressure by disruptions to supply chains, rising input costs and increased market volatility. Indirect shocks are affecting emerging economies, particularly those that are integrated in global supply chains, over and above the uncertainty in global markets.

But it has not only been a frenetic episode between the US and China but it has also tested the norms of multilateral trade cooperation set up under institutions like the World Trade Organisation (WTO). The tariffs and retaliatory measures have escalated, with no sign of resolution, that are reshaping the business of international trade and forcing nations and industries into a more fragmented and protectionist global trade environment.

The complex global supply chain of the pharmaceutical industry is deeply based on active pharmaceutical ingredients (API) and fine chemicals as critical inputs. India, termed the 'pharmacy of the world,' industrially depends heavily on imports of these raw materials, but mainly from China, which accounts for 50 percent of the global API production (Kumar & Singh, 2023). Nevertheless, a multinational trade battle characterized by successive tariff escalation rounds between the US and China since 2018 has severely disrupted and brought confusion to global supply chains (Lee, 2022). These US-China tariff disputes reverberate beyond the US and China economies to impact third-party economies such as India, which is one of the most significant producers of pharmaceutical goods. The increasing tariffs and multiplying trade barriers facing India's pharmaceutical sector raise the costs of doing business, the length of product supply chains, and the challenge of keeping stable supplies of imported APIs (Sharma & Gupta, 2023). This thesis investigates the effects of the current trade war between the US and China on the supply chain of pharmaceutical raw materials (APIs and fine chemicals) in India.

The US-China trade war that began in 2018 is one of the most high-profile geopolitical and economic stand-offs in recent times and has seen the two countries terrifying hundreds of billions of dollars worth of goods (Bown & Zhang, 2021). This conflict has put a strain on global supply chains generally and, more specifically, in industries that rely on cross-border raw material flows – such as pharmaceuticals. India is highly vulnerable in the age of tariff wars, as China supplies well over 70 percent of India's bulk drug imports (Nair et al., 2022). All of this increases production costs, creates logistical bottlenecks, and forces firms to revisit long-term sourcing plans (Chaudhary, 2023).

To reduce dependence on Chinese imports, India's government has started to take policy responses, like the Production Linked Incentive (PLI) scheme, to promote domestic API production (Department of Pharmaceuticals, 2022). However, efforts by many domestic companies to improve sourcing have not been able to insulate the Indian pharmaceutical supply chain fully from the immediate effects of the US-China trade conflict, which are adding to cost inflation and creating supply uncertainty. In addition, freight costs and lead time have been rising for pharmaceuticals due to global tariff tension (Rana & Mehta, 2024).

The US–China trade war has split the global pharmaceutical supply chains, while countries such as India need to straddle between cheap imports and national security worries, research has shown (Wang & Chen, 2021). Fragmentation of medicine manufacturing increases risks of supply shortages and at its worst can jeopardise drug availability and healthcare outcomes. The constant tariff escalations between these two superpowers have further hastened the trial in India to change API sourcing and enhance indigenous manufacturing capacity (Joshi & Patel, 2023).

This paper contributes to the literature by analyzing how the US-China trade war specifically impacts India’s pharmaceutical raw material imports, offering insights into import volume changes, cost fluctuations, and policy effectiveness. It aims to provide evidence-based recommendations for enhancing supply chain resilience amid ongoing geopolitical trade conflicts.

2 Indian pharmaceutical industry

India stands as the world's largest supplier of generic drugs and is widely recognized for producing affordable vaccines and generic medicines. The Indian pharmaceutical industry has transformed into a dynamic sector, growing at a compound annual growth rate (CAGR) of 9.43% over the past nine years, and currently ranks third globally in pharmaceutical Production by volume (IBEF Report, 2024). Key segments of the Indian pharma industry include generic drugs, over-the-counter medications, bulk drugs, vaccines, contract research and manufacturing, biosimilars, and biologics.

India hosts the highest number of pharmaceutical manufacturing facilities compliant with USFDA regulations and houses around 500 Active Pharmaceutical Ingredient (API) producers, contributing approximately 8% to the global API market (IBEF Report, 2024). The country meets over 50% of global vaccine demand, accounts for 40% of the generic drug supply in the US, and supplies 25% of all medicines in the UK. The domestic pharmaceutical ecosystem comprises around 3,000 drug companies and nearly 10,500 manufacturing units.

India holds a prominent position in the global pharmaceutical sector, backed by a strong talent pool of scientists and engineers capable of advancing the industry further. Currently, Indian firms supply more than 80% of the global demand

for antiretroviral drugs used in the treatment of AIDS, reinforcing India's reputation as the "pharmacy of the world" due to its cost-effective and high-quality drug production (IBEF Report, 2024).

The industry ranks third globally in volume and 14th in value, contributing approximately 1.72% to India's GDP (IBEF Report, 2024). According to the EY-FICCI report, there is increasing emphasis on providing innovative therapies, and the Indian pharmaceutical market is projected to reach a value of US$ 130 billion by 2030, while the global pharmaceutical market exceeded US$ 1 trillion in 2023.

India's pharmaceutical and biotechnology industries have emerged as key pillars of the global healthcare ecosystem. These sectors are characterized by large-scale manufacturing capabilities, high export volumes, competitive pricing, and a robust innovation landscape. With strong government backing and a skilled workforce, India has positioned itself as a critical player in the global pharmaceutical supply chain.

The Indian pharmaceutical market has seen impressive growth over the years and is projected to continue on this trajectory. The market size is expected to reach US$ 65 billion by 2024, rise to US$ 130 billion by 2030, and reach US$ 450 billion by 2047 (IBEF, 2024). Government estimates currently value the sector at around US$ 50 billion, with exports contributing over US$ 25 billion (Ministry of Health and Family Welfare, 2024). India also fulfills nearly 20% of global exports of generic medicines, cementing its position as the world's largest provider of generics (PIB, 2024).

India's healthcare delivery infrastructure is also expanding rapidly. The hospital market, valued at US$ 98.98 billion in FY23, is expected to grow at a compound annual growth rate (CAGR) of 8%, reaching US$ 193.59 billion by FY32 (IBEF, 2024). This growth is driven by rising healthcare demand, technological advancements, and an expanding middle class.

The biotechnology sector is another cornerstone of India's healthcare growth. India is one of the top 12 global destinations for biotechnology and ranks third in the Asia-Pacific region. The country holds about 3–5% of the global biotech industry. In 2022, India's bioeconomy was valued at US$ 137 billion and is projected to reach US$ 300 billion by 2030 (PIB, 2024). This includes growth across biopharmaceuticals, bio-agriculture, bio-services, bioinformatics, and industrial biotechnology.

Between FY18 and FY23, the Indian pharmaceutical industry recorded a CAGR of 6–8%, driven by an 8% increase in exports and a 6% rise in the domestic market (CRISIL, 2024). The market saw a 5% year-on-year growth in FY23, reaching US$ 49.78 billion (ICRA, 2024). According to the Indian Economic Survey 2021, the domestic pharmaceutical market is expected to triple over the next decade, indicating strong future potential.

India is also making significant strides in high-growth subsectors such as biosimilars and active pharmaceutical ingredients (APIs). The biosimilars market in India is projected to grow at a CAGR of 22%, reaching US$ 12 billion by 2025. This would account for nearly 20% of the overall pharmaceutical market (IBEF, 2024). Meanwhile, India is the third-largest API producer globally, contributing 8% to the global API market and supplying 57% of the World Health Organization's prequalified APIs (Ministry of Health, 2024).

The medical devices sector, although still developing, is poised for significant expansion. Currently valued at US$ 11 billion, the government has set a target to boost this to US$ 50 billion by 2030. The sector represents 1.5% of the global medical devices market (IBEF, 2024). Additionally, India's medical technology exports are projected to reach US$ 20 billion by FY30 (CII, 2024).

Exports remain a vital strength for Indian pharma. In FY24, India exported drugs and pharmaceuticals worth US$ 27.82 billion—a 9.7% increase over the previous year. In January 2024 alone, exports totaled US$ 2.13 billion, representing 5.8% of the country's total exports (PIB, 2024). Indian drugs are exported to over 200 countries, including highly regulated markets such as the USA, EU, Japan, and Australia.

Foreign direct investment (FDI) has played a crucial role in the industry's growth. Pharmaceuticals are among the top 10 sectors attracting FDI in India. Indian companies hold a substantial share of the US and EU prescription drug markets, supported by the largest number of FDA-approved manufacturing plants outside the US (Indian Economic Survey, 2021).

India is often referred to as the "pharmacy of the world," supplying 20% of the global generic medicine demand and nearly 60% of global vaccine requirements (IBEF, 2024). This global credibility stems from the industry's ability to offer high-quality, affordable drugs at scale.

Revenue growth projections for Indian pharmaceutical companies remain strong, with expectations of 9–11% growth in FY25. This is largely driven by robust performance in critical international markets such as the United States, Europe, and other emerging economies. Additionally, India's healthcare sector as a whole is projected to reach a valuation of US$ 320 billion by 2028, showcasing its comprehensive and integrative growth potential (IBEF, 2024).

A key goal for the pharmaceutical sector is to attain a market size of US$ 130 billion (Rs. 11,08,380 crore) by 2030, while the biotechnology industry aims to reach US$ 300 billion (Rs. 25,57,800 crore) in the same period. Government-led initiatives such as the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) have also gained momentum, with the scheme hitting a sales milestone of Rs. 1,000 crore (US$ 119 million) in October 2024.

Several multinational companies are expanding their footprint in India. Sanofi announced a US$ 435 million investment to scale its Global Capability Center in Hyderabad. The first quarter of 2024 saw 24 mergers and acquisitions in the pharmaceutical sector, totaling US$ 456.3 million. Meanwhile, the Department for Promotion of Industry and Internal Trade (DPIIT) recognized over 2,127 pharmaceutical startups as part of India's growing innovation ecosystem.

There has also been significant movement in public and private collaborations. In March 2024, the Union Minister for Chemicals & Fertilizers inaugurated 27 greenfield bulk drug park projects and 13 medical device manufacturing plants, aimed at enhancing domestic production capabilities. Strategic acquisitions, such as MedGenome's stake in GenX Diagnostics, further demonstrate the consolidation of diagnostic and genomic technologies in India.

Major Indian pharmaceutical companies continue to innovate. Cipla received approval to market plazomicin, a novel antibiotic for complicated urinary tract infections. Glenmark introduced new diabetes and chemotherapy drugs, while Emcure launched Orofer FCM 750 to combat iron deficiency anaemia. Several other companies, including Sun Pharma, Dr. Reddy's, and Lupin, have introduced specialized and first-to-market treatments in fields ranging from oncology to respiratory care.

Government policies continue to support industry growth. The Production-Linked Incentive (PLI) scheme approved 26 applicants for manufacturing medical devices with a total outlay of US$ 411.01 million. Foreign Direct Investment (FDI) has also played a crucial role; up to 100% FDI is permitted through the automatic route for greenfield projects, and up to 74% for brownfield projects. Between April 2000 and September 2024, the pharmaceutical sector received Rs. 2,01,347 crore (US$ 23.04 billion) in FDI inflows (Ministry of Commerce & Industry, 2024).

There have been notable government efforts to promote traditional and modern medicine alike. The Ministry of Minority Affairs and the Ministry of Ayush have collaborated to advance the Unani system, while the Indian Pharmacopoeia has gained recognition in countries like Suriname, reflecting international confidence in Indian drug standards. Prime Minister Narendra Modi also announced plans to increase the number of Jan Aushadhi Kendras from 10,000 to 25,000, further increasing access to affordable medicine.

In addition, the Department of Pharmaceuticals is launching the Scheme for Promotion of Research and Innovation in Pharma (PRIP) and MedTech sectors, with a budget of Rs. 5,000 crore (US$ 604.5 million) for the period 2023–28. India's medical devices market, currently valued at US$ 11 billion, is expected to reach US$ 50 billion by 2030, growing at a CAGR of 15%.

Other recent product innovations include BDR Pharmaceuticals' launch of Apatide for prostate cancer, Glenmark's introduction of Akynzeo I.V. for chemotherapy-induced nausea, and Entod Pharmaceuticals' ocular aesthetic range. Japanese pharmaceutical firms are also being encouraged to invest in India to stabilize global supply chains for APIs and medical devices.

Other than manufacturing drugs, Indian pharma companies are also in global markets exclusively through their tie - ups and formation of new drug formulations. Some of sector's reach outside the country includes Sun Pharma's takeover of Concert Pharmaceuticals, Dr Reddy's marketing Lenalidomide Capsules in the US and Cipla's tie up with DNDi to roll out a paediatric HIV treatment in South Africa.

Digital healthcare infrastructure has been a focus area in India too. The National Digital Health Blueprint is expected to bring in around US$ 200 billion in additional economic value over the next decade as digital systems created under the blueprint will establish connexions between hospitals, pharmaceutical companies and public health programmes.

India's pharmaceutical industry is experiencing revolutionary growth fueled by large investments, a conducive government policy, partnership with the best in the industry & relentless & innovative zeal. As India moves ahead in emphasising affordability, accessibility and quality in the pharma sector, it is well set to establish itself as an even greater global pharmaceutical leader.

Finally, India's pharmaceutical and biotechnology industries are poised to occupy an ever more commanding place in the global realm of healthcare. India is meeting current global health needs thanks to its strong domestic infrastructure, high quality exports and strategic focus on innovation and is well positioned to lead the next generation of medicine and biotechnology.

3 Government Initiatives in the Indian Pharmaceutical and MedTech Sectors

The Indian Government has taken a holistic and multi-pronged strategy to grow the pharmaceutical and medical technology (MedTech) industries in the country. The importance of these sectors to India's healthcare landscape and as a provider of affordable, high quality medicines to India and globally are undeniable. Because of the strategic importance of this, the government has come forward with targeted policies, negotiable budget allocations, digital health initiatives and research and innovation support.

Promotion of Research and Innovation in Pharma MedTech (PRIP) scheme is one of the programmes through which we aim to promote a culture of innovation and advanced research in the sector. This scheme has been formulated with an outlay of Rs. 720.97 crore (US$ 82.5 million) and seeks to foster greater public-private collaboration through contributions to private sector's R&D projects on a milestone basis and creation of Centres of Excellence at National Institutes of Pharmaceutical Education and Research (NIPERs) (PIB, 2024). The aim of this initiative is the pipeline generation of innovative pharmaceutical and MedTech products for the international market.

In the Union Budget 2025–26 too, a major financial support to the sector was seen as the Department of Pharmaceuticals (DoP) was given Rs. 5,268.72 crore (US$ 602.90 million), a 28.8% increase over FY25 Budget Estimates (Ministry of Finance, 2024). Likewise, the government in the Interim Budget 2024–25 has allocated Rs. 1,000 crore (US$ 120 million) for the promotion of bulk drug parks for promoting local manufacturing capacities of Active Pharmaceutical Ingredient (API).

Further allocations included Rs. 1,300 crore (US$ 156.5 million) for the overall development of the pharmaceutical sector and Rs. 150 crore (US$ 18 million) for the promotion of medical device parks. To strengthen industrial infrastructure, Rs. 40 crore (US$ 4.1 million) was earmarked for aiding medical device clusters by developing shared facilities (PIB, 2024).

Affordable healthcare remains a core focus, and the **Jan Aushadhi Scheme**, which provides generic medicines at lower prices, received a considerable funding boost. The budget for this scheme rose from Rs. 110 crore in FY24 to Rs. 284.5 crore (US$ 34 million) in FY25, allowing for the expansion of affordable drug access across underserved regions (IBEF, 2024).

The government has also focused on public health challenges through targeted missions. The **Union Budget 2023–24** introduced a mission to eliminate **sickle cell anaemia** by 2047. This includes raising awareness, conducting mass screenings of around 70 million individuals in tribal regions between ages 0 to 40, and providing counselling and treatment (Ministry of Health and Family Welfare, 2023). This mission is an example of how the government is combining health policy with social justice and preventive care.

To support healthcare infrastructure, the same budget also announced the establishment of **157 new nursing colleges**, to be co-located with existing government medical colleges. This move aims to address the shortage of skilled nursing staff and improve the quality of healthcare delivery, particularly in rural and tier-2/3 cities.

In line with the goal of becoming a global hub for medical devices, the **National Medical Devices Policy, 2023**, was approved by the Union Cabinet in April 2023. This policy focuses on ensuring the orderly growth of the MedTech sector with a framework built around access, affordability, quality, and innovation (PIB, 2023). It encourages domestic manufacturing, regulatory simplification, and investment in R&D.

On the digital front, the **Ayushman Bharat Digital Mission (ABDM)** represents a transformative step toward integrated, technology-driven healthcare. Under ABDM, citizens can create unique Ayushman Bharat Health Account (ABHA) numbers that link their medical records across various health service providers. This initiative improves clinical decision-

making, supports evidence-based care, and reduces duplication of diagnostics. As of September 2023, over **450 million ABHA numbers** had been created, with registrations from more than **224,000 doctors** and **218,000 healthcare facilities** (NHA, 2023).

The second big push comes in from Production Linked Incentive (PLI) Scheme which supports domestic manufacturing of 41 Critical Bulk Drugs. The total outlay towards this initiative over the 2020–2030 period is Rs. 6,940 crore (US$ 838.16 million). Through the PLI scheme, India hopes this will reduce the reliance on imports, improve domestic API production and establish the resilience of India's pharmaceutical supply chain (IBEF, 2024).

In an attempt to build support for various pharmaceutical segments, it launched the Scheme for Development of Pharma Industry – Umbrella Scheme to consolidate support from different pharmaceutical segments. This includes several sub-schemes such as

- *Assistance to Bulk Drug Industry for Common Facilitation Centres*
- *Assistance to Medical Device Industry for Shared Infrastructure*
- *Pharmaceutical Promotion and Development Scheme (PPDS)*
- *Pharmaceutical Technology Upgradation Assistance Scheme (PTUAS)*
- *Cluster Development Programme for Pharmaceuticals Sector (CDP-PS)*
- These programs are designed to build collective infrastructure, encourage export-oriented growth, and upgrade technological capabilities (Department of Pharmaceuticals, 2023).

Further, Rs. 500 crore (US$ 665.5 million) was allocated to the Strengthening of Pharmaceutical Industry (SPI) Scheme for the period of FY22–F Y26, issued in March 2022. This goal is to support the MSMEs, promote Good Manufacturing Practises (GMP) and help in building the resilience in small pharmaceutical units (PIB, 2022).

Thus, we can conclude that the Indian Government has maintained consistent and strategic long term commitment in the transformation of India's pharmaceutical and medical technology industries. Focused policies, greater financial outlays, innovation focused programmes and a sound digital health framework are helping position India not only as a service provider of healthcare to its citizens but also as a trusted global partner in the pharmaceutical value chain.

4 Significance of Pharmaceutical Raw Materials

Pharmaceutical raw materials, particularly **active pharmaceutical ingredients (APIs)** and **fine chemicals**, are the foundational components in drug manufacturing. For India's pharmaceutical sector, which is globally recognized for its generic drug production, the availability and affordability of these raw materials are of strategic importance.

APIs are the biologically active components in medications, while fine chemicals refer to complex, pure chemical substances used as building blocks during synthesis. Together, they determine not only the **quality and efficacy** of final pharmaceutical products but also influence **cost structures and competitiveness** in both domestic and international markets (Patel & Sharma, 2022).

India's pharmaceutical industry relies heavily on APIs to produce a wide range of formulations that are exported to more than 200 countries. Generic drug exports form the backbone of India's pharma economy, and APIs serve as the **critical input** for this large-scale manufacturing. Approximately **65–70% of India's API requirements** are currently met through imports, with China alone supplying nearly **70% of these imports**, creating a major supply dependency (Nair et al., 2022).

This import dependency poses **significant strategic and economic risks**, especially during periods of global trade disruptions, as seen during the COVID-19 pandemic and the ongoing US-China trade conflict. Any interruption in the supply of APIs can cause shortages in essential medicines, delay production cycles, and lead to sharp cost escalations (Chaudhary, 2023).

In response, the Indian government has emphasized reducing import reliance and enhancing domestic Production of APIs and intermediates. The **Production Linked Incentive (PLI) scheme** and the **Scheme for Promotion of Bulk Drug Parks** aim to revive India's API manufacturing capacity, which had declined in past decades due to cost competition from China (Department of Pharmaceuticals, 2022).

Regulatory importance also attaches to APIs and fine chemicals whose quality has to be consistent for drugs to be approved for use in regulated markets such as US and EU. Manufacturers must comply with stringent standards such as Good

Manufacturing Practices (GMP), and the ability to produce APIs domestically enhances India's reputation for regulatory reliability and supply chain resilience (Reddy & Mehta, 2023).

In short, APIs and fine chemicals are the chemical backbone of India's pharma sector and central to India's economic security, global competitiveness and public health stability. India's position as a global power of the pharmaceutical industry depends on a dependable and self sustaining supply of these raw materials.

Table-1 India's role in the global pharmaceutical supply chain

Metric	Value (Latest Available)	Global Standing/Share
Pharmaceutical industry size	$58 billion (2024)	3rd by volume, 14th by value
Projected industry size (2030/2047)	$120-130B (2030), $400-450B (2047)	
Pharma exports (FY25)	$30.5 billion	11th globally by value
Share of global generics	>20%	1st
Share of global vaccine demand	~60%	1st
US generic market supplied by India	40%	1st
UK medicines supplied by India	25%	1st
Africa's generic demand supplied	50%	1st
FDA-approved manufacturing plants	650+	Highest outside US

India has come in focus as a core force in providing pharmaceutical supply chain globally and has earned the sobriquet of the 'pharmacy of the world.' India has the world's third largest pharmaceutical industry in volume and the fourteenth largest in value; its output valued at approximately $58 billion in 2024 (Singh & Kaur, 2023) and its cost–effective manufacturing model make it an attractive place for setting up manufacturing research sites. Despite this volume–value discrepancy, India occupies an essential place in (1) guaranteeing the availability and affordability of essential medicines globally.

The significance of India's pharmaceutical sector is not limited to its current standing; the industry's growth projections reveal its expanding influence. In the coming 15 years, India's pharma industry is expected to grow to $120–130 billion by 2030 and rise to $400–450 billion by 2047 (Kumar & Agarwal, 2023). However several factors are responsible for driving such ambitious forecasts such as rising domestic demand, growing healthcare awareness, s positive government policies and expanding export markets. In addition, this trajectory implies a possible shift from focus on volumes strategy towards biosimilar and complex generics from more valuable perspective.

By FY2025, India's pharmaceutical exports are likely to be $30.5 billion, making it the 11th largest exporter by value globally (Reddy and Sharma 2023). While this export value may seem modest compared to its production scale, it reflects the price-sensitive nature of India's products, which are primarily generic medications. The country's contribution to the global generic drug market is particularly noteworthy—**over 20% of global generics are supplied by India**, making it the **leading exporter of generics worldwide** (Patel & Mehta, 2022).

In the field of **vaccines**, India holds an unparalleled position. It produces and supplies approximately **60% of the global vaccine demand**, underscoring its indispensable role in public health, particularly in low- and middle-income countries (Chaudhary, 2023). The **Serum Institute of India**, among other manufacturers, played a critical role during the COVID-19 pandemic, reinforcing India's importance in vaccine security and distribution.

India's reach extends into some of the most regulated and advanced pharmaceutical markets. For instance, the country supplies **40% of the generic drugs used in the United States**, the largest pharmaceutical market in the world (Joshi & Desai, 2023). Also, 25% of medicines used in the United Kingdom and half (50%) of generic demand in Africa is sourced from India (Nair et al, 2022). India's regulatory compliance capabilities coupled with production scale and reliance of the world on India's pharmaceutical exports are depicted in these figures.

A key indicator of India's quality assurance and manufacturing credibility is the number of facilities approved by the US Food and Drug Administration (FDA). India, with more than 650 FDA approved manufacturing plants, has the most such facilities anywhere outside of the United States (Rana & Mehta, 2024). This demonstrates not only the technical wherewithal of Indian pharmaceutical companies but also their ability to consistently conform to global standards making for smooth foray into mature markets.

India's pharmaceutical sector has achieved remarkable things, but it still has problems. One of the big concerns is that about 70 percent of the active pharmaceutical ingredients (APIs) used in the country, as well as key starting materials, are imported from China (Nair et al., 2022). The dependency, however, makes the supply chain vulnerable (especially so) where geopolitical tensions and global trade disruptions occur. In response, the Indian government has taken various strategic policies including that of Production linked Incentive (PLI) scheme and the promotion of Bulk Drug Parks to build the domestic API production base by limiting API import dependence (Department of Pharmaceuticals, 2022).

Finally, India's pharmaceutical sector forms an important pillar of the world stage as a drug supplier, most notably in generics and vaccines. India has robust manufacturing capacity, is internationally compliant and has an aggressive export strategy such that it has a potential to further grow in the ranks of the global pharmaceutical hierarchy. Nevertheless, strategic efforts to broaden into higher worth pharmaceutical areas and to keep up and reinforce this management through increases in domestic uncooked material manufacturing strike root.

Table-2 Strengths and Strategic Challenges

Aspect	Details
Global nickname	“Pharmacy of the World”
Generic drug supply	>20% of global volume
Vaccine supply	~60% of global demand
Export value (FY25)	$30.5 billion
Top export markets	US, UK, Brazil, France, South Africa
API dependency	70% imported from China
Manufacturing capacity	10,000+ facilities, 650+ US FDA-approved plants
Key challenges	API import reliance, export value gap, regulatory and infrastructure needs

The pharmaceutical industry of India has secured a sine qua non position in the world health systems. India, in many cases, are called as the world’s ‘Pharmacy’ as they play an important role in supplying cheap and remarkable medicines for Low and middle-income nations (Singh & Kaur, 2023). In addition to the scale of its operations, it is also aligned with its potence to provide superior quality low cost generic drugs and vaccines to the international markets.

India supplies over 20% of the world’s generic medicines (Patel & Mehta, 2022) and is the largest supplier of generics in the world. Hence, this leadership is important to ensure low unit costs of treatment throughout continents. However, also India represents almost 60% of the global vaccine supply and institutions like the Serum Institute of India are main actors in vaccine supply especially during healthcare emergency (Reddy & Sharma, 2023). The scale and reliability have made India the go to reliable pharma partner to both the developed and developing nations.

Pharmaceutical exports by India are expected to reach as high as $30.5 billion by FY2025, putting it into the club of the top global exporters, but value wise it holds low position (Kumar & Agarwal, 2023). The UK, US, Brazil, France and South Africa are its top export destinations and thus demonstrate the extent of its entry into regulated markets as well as its central role to the global healthcare supply chains (Nair et al., 2022).

A vast manufacturing infrastructure backs up this export strength with over 10,000 pharmaceutical production facilities sprinkled throughout the country. It is worth noting that Indian plants have far more than 650 plants approved by the US Food and Drug Administration (FDA) than any country outside the United States (Rana & Mehta, 2024). This demonstrates India’s capability to meet stringent international regulatory standards and operate at a global scale.

However, India's pharmaceutical sector is confronted with major structural problems. One of the major issues is that it relies on a large extent on China for Active Pharmaceutical Ingredients (APIs) as around 70% of India's API needs meet through Chinese imports (Nair et al. 2022). Because this dependency renders the industry exposed to supply chain interruptions during crises of geopolitical tensions or public health such as the COVID 19 pandemic.

In addition, India does not rank high in terms of the value of its export (again, the fact that India is a volume leadership production country whilst its export value does not match its leadership in Production, can imply a lag in Production of pharmaceuticals, biologics, patented drugs and specialty formulation, to name a few value added products). The export value gap tells India that it is good at mass production but has to put more benefit in innovation, R&D investment and regulatory modernization to produce value added output (Chaudhary, 2023).

Regulatory 374pitomizes374on, infrastructure modernization and improving logistics efficiency are among the challenges that India also faces. To keep its competitive edge, maintain quality compliance and accelerate to market (especially in high value, heavily regulated markets) these areas need to be strengthened.

India's pharmaceutical sector 374pitomizes the world's health, as vast generics and vaccine supply, immense manufacturing capability and firm regulatory reliability makes the sector brim with industry opportunity and competition. Still, for India to stay and scale its global leadership, India must reduce its dependency on APIs, bridge the value gap in exports and build infrastructure and innovation. India has the potential to move from being the world's pharmacy to being a leader in pharmaceutical innovation and in high value manufacturing, with strategic reforms.

Table-3 Challenges and Strategic Dependencies in India's Pharmaceutical Sector

Challenge/Dependency	Details
API Dependency	70% of Active Pharmaceutical Ingredients (APIs) are imported from China,
Key Materials	Over 90% of some essential antibiotics' APIs are sourced from China.
Vulnerability	Disruptions in Chinese supply (e.g., COVID-19, geopolitical tensions) impact production and exports.
Export Value Gap	Despite volume leadership, India ranks 11th globally in pharmaceutical export value.

India's pharmaceutical industry is the dominant player in the global generic drug supply as well as vaccine production. But, these successes mask the existence of a complex web of strategic dependencies and vulnerabilities for which the industry's short term sustainability and long term resilience are at risk. Chief among these is the country's heavy reliance on imports of active pharmaceutical ingredients (APIs) and key starting materials, particularly from China.

Another huge stumbling block is India's dependence on China for APIs, the vital ingredients that go into finished pharmaceutical products. As of 2024, China currently meets around 70% of India's API requirements, making India dependent on that supply chain which would be extremely vulnerable (Nair et al., 2022). In particular, it is proving especially critical to the Production of antibiotics and the other important medicines, as 90% or more of some of the critical APIs such as cephalosporins, penicillin and others are bought directly from Chinese suppliers (Reddy & Sharma, 2023).

Multiple external shocks have exposed pharmaceutical sector to India's dependence on a single dominant supplier for important raw materials. In early 2020, outbreak of COVID-19 and the Chinese lockdowns disrupted a global movement of pharmaceutical raw materials. Geopolitical tensions (the US–China trade war, strained India–China relations) can also cause similar disruptions. Chaudhary (2023) says these factors can delay shipments, increase the price of raw materials and create short supplies of critical drugs to undermine both domestic supply and export commitments.

The second challenge for India structurally is the relative lack of balance between export volume and value. India is the world's largest provider of generic medicines by volume, its not market share reflecting up to 26% of the world's generic medicines (Patel & Mehta, 2022)), but only 11th in the league of leading pharmaceutical export value. This gap also represents India's relatively price sensitive export model which while geared toward making products affordable, tends to shy away from product innovation or premium product development. Though this approach has brought global health access to the fore, especially in low and middle income countries, it has curtailed India's potential to ramp up in competing for high margin products such as biosimilars, novel biologics and patented medicines.

To mitigate these challenges, the Indian government has launched a range of initiatives aimed at **enhancing domestic manufacturing of APIs and reducing import dependency**. These include the **Production Linked Incentive (PLI) scheme**, the **establishment of bulk drug parks**, and other policy measures designed to build **self-reliance in pharmaceutical raw materials** (Department of Pharmaceuticals, 2022). However, addressing the export value gap will require a parallel focus on **research and development (R&D)**, intellectual property creation, and capability building in complex and specialty drug manufacturing.

India's pharmaceutical sector, though globally dominant in terms of production volume and accessibility, is structurally constrained by its **heavy reliance on Chinese API imports**, **exposure to external shocks**, and a **relatively low export value rank**. Addressing these issues is critical for building a **resilient and globally competitive pharmaceutical ecosystem** capable of withstanding future crises and moving up the global value chain.

5 Impact of Global Tariff Wars on Pharmaceutical Raw Material Supply Chains in India

India's pharmaceutical supply chain faces significant vulnerabilities due to global tariff conflicts, particularly its heavy reliance on Chinese imports for Active Pharmaceutical Ingredients (APIs) and fine chemicals. Below is a structured analysis of how tariff wars disrupt this critical sector.

India imports 70% of its APIs from China, including essential ingredients for antibiotics, antivirals, and chronic disease medications. For critical drugs like paracetamol and penicillin, dependency exceeds 90%

Table-4 Key Dependency Metrics

Key Dependency Metrics	Details
API imports from China	70% of total API demand
Antibiotic API dependency	>90% (e.g., penicillin, erythromycin)
Fine chemical imports	~60% sourced from China

India's pharmaceutical sector, while globally dominant in generic drug production, remains structurally dependent on foreign sources for key raw materials, particularly **active pharmaceutical ingredients (APIs)** and **fine chemicals**. This reliance on imports—especially from China—poses a critical vulnerability in the supply chain that can affect both domestic healthcare delivery and international pharmaceutical commitments.

A major concern is India's **heavy reliance on China for APIs**, with **approximately 70% of its total API demand met through imports from Chinese manufacturers** (Nair et al., 2022). APIs are the biologically active compounds that form the foundation of finished pharmaceutical products. Despite India's robust drug formulation capabilities, this dependency creates a bottleneck in the upstream supply chain. Any disruption in the flow of Chinese APIs—whether due to political tensions, trade barriers, or logistical breakdowns—can lead to cascading effects on production schedules, cost structures, and medicine availability (Chaudhary, 2023).

This dependency is even more acute in the case of **antibiotic APIs**, such as **penicillin and erythromycin**, where India imports **more than 90%** of its supply from China (Reddy & Sharma, 2023). The situation is particularly alarming because these antibiotics form the backbone of essential medicines used for common infections in both hospital and community settings. India's lack of domestic production capacity for such critical APIs has historical roots, dating back to the late 1990s when cost competition from China led to the closure of many Indian bulk drug manufacturing units. The result is a structural vulnerability in the health system's ability to withstand supply chain shocks for life-saving drugs.

The problem extends beyond APIs to **fine chemicals and drug intermediates**, which are used as precursors in the synthesis of APIs. Around **60% of India's fine chemical requirements** are imported from China (Patel & Mehta, 2022). Fine chemicals are essential in the early stages of pharmaceutical Production and are typically high-purity compounds required for consistency and compliance with international regulatory standards. Interruptions in the supply of these chemicals can delay API manufacturing and, by extension, drug production and delivery.

These dependencies raise serious concerns not just about economic costs, but also **national health security**. With growing geopolitical tensions and trade volatility, the risk of sudden supply disruptions has increased. Recognizing this,

the Indian government has launched the **Production Linked Incentive (PLI) scheme** and other initiatives aimed at **reviving domestic API and chemical manufacturing** (Department of Pharmaceuticals, 2022). However, establishing full-scale API and fine chemical production infrastructure will require long-term investment, technology upgrades, and regulatory reforms.

India’s pharmaceutical sector is critically dependent on China for APIs, antibiotic raw materials, and fine chemicals, creating significant vulnerabilities in the supply chain. Addressing these dependencies is essential for safeguarding public health, maintaining export reliability, and ensuring the long-term sustainability of the country's pharmaceutical leadership.

India's pharmaceutical industry is a global leader in the Production and export of generic medicines. Recognized as the "pharmacy of the world," India supplies over 20% of the global generic drug volume and plays a crucial role in ensuring the availability of affordable medicines, especially in low- and middle-income countries. A key market for Indian pharmaceutical exports is the United States, where Indian firms account for approximately 40% of the generic drugs consumed (Joshi & Desai, 2023). This impressive market share is the result of India's cost-efficient manufacturing ecosystem, compliance with stringent US Food and Drug Administration (FDA) standards, and well-established regulatory expertise.

However, this deep integration into the US pharmaceutical supply chain also exposes India to several strategic risks. The evolving global trade environment—shaped by the U.S.-China trade war and rising protectionist sentiment—poses considerable challenges. Tariff wars, regulatory tightening, and domestic production incentives in the West could all undermine India's cost advantage and disrupt the continuity of its pharmaceutical exports.

One of the most direct and immediate consequences of global tariff conflicts has been the increase in the cost of importing active pharmaceutical ingredients (APIs) and fine chemicals, particularly from China. India relies on China for approximately 70% of its API requirements and around 60% of fine chemical imports (Nair, Menon, & Desai, 2022). Tariff hikes and trade restrictions have significantly raised the landed cost of these raw materials. In addition to cost increases, Indian manufacturers are facing logistical challenges including shipping delays, port bottlenecks, and regulatory hold-ups, all of which contribute to supply chain instability and production delays (Chaudhary, 2023; Reddy & Sharma, 2023).

These disruptions have also introduced price volatility into the procurement process, complicating production planning and cost forecasting for pharmaceutical companies. The situation is particularly precarious for generic drug producers, who operate on thin profit margins, typically between 5–10% (Kumar & Agarwal, 2023). Marginal increases in input costs due to tariffs or shipping delays can rapidly erode profitability, particularly in global markets where competition is fierce and pricing is a critical differentiator.

In addition to rising production costs, India's export competitiveness is under threat. The supply chain fragility revealed by recent global events—most notably the COVID-19 pandemic—has led many countries to reconsider the security of their pharmaceutical imports. Policymakers in the US and European Union have begun promoting localization of pharmaceutical manufacturing through subsidies, tax incentives, and trade restrictions. This has created a shift in buyer preferences, with pharmaceutical firms in developed markets seeking alternative suppliers closer to home, even at higher costs, to reduce dependence on offshore sources (Chaudhary, 2023). India's traditional price advantage is now challenged by the strategic allure of geographic proximity and reduced geopolitical risk, especially from suppliers in Eastern Europe and North America.

The cumulative effect of these pressures underscores the fragility of India's reliance on the US pharmaceutical market and on Chinese raw material imports. To navigate this volatile environment, Indian pharmaceutical companies and policymakers must adopt a multi-pronged strategy. Diversifying export destinations beyond the US is critical. Emerging markets in Africa, Southeast Asia, and Latin America offer growing demand for cost-effective generics and relatively less political and regulatory volatility (Suthar, 2025). By expanding their global footprint, Indian firms can reduce dependence on a few high-stakes markets and insulate themselves from unilateral trade disruptions.

Furthermore, Indian manufacturers must shift toward value-added product segments such as biosimilars, specialty formulations, and complex generics. These products, though more demanding in terms of research and regulatory compliance, offer higher margins and face less price erosion compared to commodity generics. Investments in research and development (R&D) and biopharmaceutical innovation will be essential for maintaining long-term competitiveness in a market increasingly shaped by quality differentiation and therapeutic complexity.

In response to API supply vulnerabilities, the Indian government has launched the Production Linked Incentive (PLI) scheme to revive domestic Production of APIs and key starting materials. The goal is to reduce API import dependence by 35% by 2030 through the development of bulk drug parks, tax incentives, and support for new manufacturing infrastructure (Biospectrum India, 2024). These efforts, while promising, will require sustained funding, regulatory streamlining, and public-private coordination to yield tangible results.

In terms of strategy, too, India must step up its global trade forum engagement. India can help ensure that its pharmaceutical exports do not get penalty by way of tariff or non-tariff barriers, by being more active in participating in the World Trade Organisation (WTO) as well as in bilateral negotiations. In a forward looking trade policy (Policy Circle, 2025) it is critical to be advocating for the provision of exemptions on essential medicines, streamlining regulatory harmonisation and ensuring market access by way of mutual recognition agreements.

At the end of the day, with the Indian pharmaceutical industry at the cross roads. Unquestionably, it leads the world in generic medicines, but the twin pressures of API dependence and export concentration in volatile markets such as the United States represent major strategic risks. A challenging external environment has been created by rising tariffs, input cost inflation and changing buyer preferences. To retain its leading position globally, India needs to put money into supply chain resilience and product diversification as well as flourish diplomatic trade engagement. Therefore, by responding in a strategic and adaptive manner, the country will stay in a position globally to help craft access to affordable and high–quality healthcare.

6 Mitigation Strategies and Industry Response

In the first place, the Indian pharmaceutical sector is at a crossroads. A critical, under appreciated facet of the industry in particular is that, because India is known as the ‘pharmacy of the world’ thanks to its dominance in generic drug and vaccine exports, the industry remains deeply vulnerable to supply chain shocks and external trade dependencies. At the same time, the sector relies too much on Chinese imports of active pharmaceutical ingredients (APIs), a trend which, with the advent of a global protectionist trend, for is urgent and concerted mitigation. Given this, the Indian government, in concert with stakeholders from its industry, has stepped up the momentum on a multi pronged strategy aimed at reducing strategic vulnerabilities, enhancing indigenous capabilities and preserving global competitiveness.

A cornerstone of India's pharmaceutical resilience plan is the revival of domestic API and key starting material (KSM) production, a sector that once flourished but declined due to aggressive pricing by Chinese suppliers in the late 1990s and early 2000s. In order to minimise the strategic risk of reliance on a single country for crucial drug inputs, the Indian government backpedalled into Production Linked Incentive (PLI) scheme, through which domestic API manufacturers are offered targeted subsidies and financial incentives. According to government projections, the PLI scheme is expected to reduce API imports by 35% by 2030, thereby re-establishing India's bulk drug independence (Biospectrum India, 2024).

The scheme includes the development of **bulk drug parks** with world-class infrastructure, common utilities, and shared testing facilities to enhance cost-efficiency and quality control. Over 40 critical APIs have been identified under the initiative, including those for antibiotics, antivirals, and cardiovascular drugs. By nurturing domestic manufacturing ecosystems, India aims to **de-risk its pharma supply chain**, create jobs, and promote innovation in chemical synthesis and fermentation technologies.

India’s pharmaceutical industry exports to more than 200 countries, but a significant portion of export revenue is concentrated in a few key markets—particularly the United States. Currently, India supplies **around 40% of the generics consumed in the U**S, making it highly susceptible to any changes in US trade policy, including tariffs, regulatory delays, or supply chain localization trends (Joshi & Desai, 2023). To counter this dependence, the industry has intensified efforts to **diversify its export portfolio**, with growing focus on **Africa, Latin America, and Southeast Asia**—regions where demand for affordable generics is rapidly expanding (Suthar, 2025).

These emerging markets not only offer new growth opportunities but also allow India to **expand its influence in global health access**. In Africa alone, India already supplies about **50% of the continent’s generic drug demand**, and further engagement through capacity building and local partnerships can cement its leadership. Export diversification thus functions as a **hedge against geopolitical risk**, regulatory unpredictability, and currency volatility in traditional markets.

Alongside domestic capacity building and market diversification, India is engaging in **proactive trade diplomacy** to protect its pharmaceutical interests in a shifting global trade landscape. With rising protectionism and trade bloc formation,

Indian officials have **advocated at the World Trade Organization (WTO)** for pharmaceutical exemptions from tariffs and non-tariff barriers, particularly for essential and life-saving drugs. Bilateral trade negotiations with the European Union, Australia, and several Latin American countries also include specific provisions to streamline regulatory approvals and safeguard market access for Indian pharmaceuticals (Policy Circle, 2025).

Inclusion of intellectual property rights (IPR) provisions, data exclusivity clauses, and mutual recognition agreements in trade deals is crucial to ensuring that Indian pharmaceutical exporters retain a competitive edge while maintaining compliance with evolving international norms. These diplomatic engagements underscore India's broader strategy to **balance economic interests with public health commitments** on the global stage.

Given the fluid nature of global trade and pharmaceutical supply chains, India's mitigation strategies must be evaluated against plausible future scenarios. These can be summarized as follows:

Table-5

Scenario	Outcome
Continued API reliance on China	Persistent supply chain fragility, dependence on volatile geopolitical dynamics, and frequent input cost fluctuations.
Successful domestic API push	Lower long-term production costs, enhanced self-reliance, global pricing leverage, and improved national health security.
Escalating US tariffs	Forced transition to high-value segments such as **biosimilars**, **biologics**, and **specialty drugs**, increasing R&D investments and industry sophistication.

If India **fails to reduce API dependence**, its supply chain will remain fragile and exposed to recurring shocks, as observed during the COVID-19 lockdowns in China and during the Galwan Valley border tensions. Conversely, a **successful domestic API manufacturing revival** will not only enhance India's pharmaceutical sovereignty but also allow it to offer consistent, cost-competitive exports across global markets. Additionally, if **US tariffs escalate**, Indian firms may accelerate their shift from commodity generics to **high-margin, differentiated products** such as monoclonal antibodies and complex injectables, which require advanced capabilities but promise better profitability (Chaudhary, 2023).

India's pharmaceutical sector stands at a crossroads. While it remains a global leader in generic medicine supply, the **over-reliance on Chinese APIs**, **exposure to tariff-driven export risks**, and **market concentration in the U**S necessitate a strategic course correction. The combination of domestic capacity building, market diversification, and assertive trade diplomacy offers a clear path forward. If effectively implemented, these mitigation strategies will not only safeguard India's global pharma leadership but also transition it toward **value-based, innovation-driven growth** that aligns with its long-term health and economic security goals.

7 Opportunities and Long-term Implications for India's Pharmaceutical Sector

Global trade tensions and tariff conflicts pose serious challenges to India's pharmaceutical industry, but they also provide a new set strategic opportunities and long term implications to India's global positioning. Ultimately India's ability to navigate the dynamics of a US shift in policy off the continent will hinge on how it responds with agility, foresight and international engagement.

An important opportunity seems to be in the relative gains (compared to higher tariffed competitors) in the possibility of some selected global markets for India. In light of recent Western economic practices targeting Chinese pharmaceuticals with punitive terms like tariffs, especially in the context of trade disputes or supply chain decoupling initiatives, India may be poised to serve as the most attractive alternative supplier thanks to its fairly established base of manufacturing, coupled with comprehensive adherence to global regulatory standards (Suthar, 2025). Indian pharmaceuticals, already well established in Africa, Latin America and Southeast Asia, may find these regions an even greater customer for affordable supplies of reliably available drugs, as Chinese products will become more costly or politically difficult.

However, this potential advantage comes with **significant competitive risks**. A major concern is the **dumping of Chinese pharmaceutical products** into emerging markets, where oversupply and price undercutting can erode India's market share. As Chinese firms respond to diminished access in the US and EU, they may **divert surplus capacity** into price-sensitive

regions, leading to **intense price wars** that threaten the sustainability of Indian exports (Patel & Mehta, 2022). This downward pressure on prices, combined with rising input and logistics costs due to global uncertainty, could compromise the already narrow margins that define the generic drug sector.

The long-term stability of the global pharmaceutical supply chain will thus increasingly depend on **international cooperation and transparent trade frameworks**. Fragmentation of global trade through unilateral tariffs, export restrictions, or domestic subsidy races risks creating supply bottlenecks, inconsistent access to medicines, and duplication of capacity. For a country like India, which plays a central role in the **global health architecture**, aligning with international partners to advocate for **predictable, transparent, and rules-based trade systems** is critical (Policy Circle, 2025). Forums such as the **World Trade Organization (WTO)**, as well as regional trade agreements like the **India-EU FTA** and **Indo-Pacific partnerships**, will be instrumental in institutionalizing norms that support equitable pharmaceutical trade.

Moreover, India's leadership in global health diplomacy—reflected in its COVID-19 vaccine distribution under initiatives like COVAX—positions it to champion **resilient and inclusive global health supply chains**. By investing in **bilateral cooperation**, **mutual recognition of standards**, and **joint ventures in strategic markets**, India can move from being a reactive player to a **norm-setting actor** in global pharmaceutical governance.

In summary, while trade tensions and competitive pressures introduce near-term volatility, they also create **openings for India to enhance its strategic role** in global pharmaceuticals. By reinforcing domestic manufacturing, maintaining cost leadership, engaging diplomatically, and avoiding a race to the bottom in pricing, India can transform current disruptions into a foundation for long-term, sustainable growth in global health supply chains.

8 Conclusion

India's pharmaceutical industry, known for its global leadership in generic medicines and vaccine production, plays a critical role in ensuring affordable healthcare access worldwide. However, this position of strength is increasingly challenged by **structural dependencies and geopolitical disruptions**, most notably the country's **heavy reliance on China for APIs and fine chemicals**, and its **export concentration in the US market**. With nearly **70% of APIs** and **60% of fine chemicals** imported from China (Nair, Menon, & Desai, 2022), and **40% of US generic drugs** supplied by Indian firms (Joshi & Desai, 2023), India remains highly vulnerable to **tariff shocks, trade disputes**, and **supply chain disruptions**.

The **US-China trade war**, combined with rising global protectionism and post-pandemic localization trends, has raised input costs, delayed shipments, and introduced volatility in raw material procurement (Chaudhary, 2023). These factors have put significant pressure on Indian firms operating in low-margin segments, threatening export competitiveness and production stability. Furthermore, the possibility of **dumped Chinese products** in emerging markets and shifting buyer preferences in regulated economies further complicates India's position (Patel & Mehta, 2022).

In response, India has taken strategic steps to **mitigate risks** and **build resilience**. The **Production Linked Incentive (PLI) scheme** aims to reduce API import dependency by **35% by 2030**, while efforts to **diversify exports** into Africa, Latin America, and Southeast Asia aim to reduce over-reliance on the US (Biospectrum India, 2024; Suthar, 2025). Simultaneously, Indian policymakers are pursuing **trade diplomacy** at forums like the WTO and through bilateral negotiations to advocate for fair, transparent trade policies (Policy Circle, 2025).

Looking ahead, the **future of India's pharmaceutical supply chain** will depend on the country's ability to shift from volume to **value-driven growth**. This includes investing in **biosimilars, complex generics**, and **R&D-intensive formulations** that are less susceptible to commoditization and global price pressures. Strengthening domestic infrastructure, enhancing regulatory harmonization, and securing strategic supply partnerships will be essential to adapt to the **fragmented, uncertain global trade landscape**.

India is well-positioned to not only withstand current challenges but also redefine its role in global health supply chains. By transforming vulnerability into opportunity through **policy reforms, innovation, and global cooperation**, India can evolve from being the pharmacy of the world to becoming a **strategic pharmaceutical powerhouse** in both affordability and innovation.

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