

Indian policies to promote local production of pharmaceutical products and protect public health



IP
Intellectual
Property and Trade

R&D
Innovation

TF
Technology
Transfer

IA
Improving Access

FI
Financing

MR
Monitoring and
Reporting



European
Commission



World Health
Organization

Indian policies to promote local production of pharmaceutical products and protect public health



European
Commission



World Health
Organization

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Abbreviations and Acronyms

ABLE	Association of Biotechnology Led Enterprises
API	active pharmaceutical ingredient
BIG	Biotechnology Ignition Grant Scheme
BIPP	Biotechnology Industry Partnership Programme
BIRAC	Biotechnology Industry Research Assistance Council
CDSCO	Central Drug Standards Control Organization
CPSE	central public sector enterprise
CRAMS	contract research and manufacturing services
CRO	contract research organization
CRS	Contract Research and Services Scheme
CSIR	Council of Scientific and Industrial Research
DIPP	Department of Industrial Policy and Promotion
DoP	Department of Pharmaceuticals
EC	European Commission
EMA	European Medicines Agency
EML	essential medicines list
FDA	Food and Drug Administration
FDI	foreign direct investment
FPP	finished pharmaceutical product
FTZ	free trade zones
GATT	General Agreement on Tariffs and Trade 1994
GMP	good manufacturing practice
GPA	WTO Agreement on Government Procurement
GSPA	Global Strategy and Plan of Action
GST	goods and services tax
HIC	high-income countries
ICMR	Indian Council of Medical Research
IDMA	Indian Drug Manufacturers' Association
IPA	Indian Pharmaceutical Alliance
IP	intellectual property
IPR	intellectual property right
IT	information technology

JNPC	Jawaharlal Nehru Pharma City
LDC	least-developed countries
LMIC	low- and middle-income countries
MAT	minimum alternate tax
MPP	Medicines Patent Pool
MNC	multinational corporation
MRP	maximum retail price
NIH	National Institutes of Health
NIPER	National Institute of Pharmaceutical Education and Research
NPPA	National Pharmaceutical Pricing Authority
OECD	Organization for Economic Cooperation and Development
OPPI	Organization of Pharmaceutical Producers of India
OTC	over-the-counter
Pharmexcil	Pharmaceuticals Export and Promotion Council of India
PHI	Public Health, Innovation and Intellectual Property
PSUs	government-run pharmaceutical facilities
PTR	price to retailer
RMSC	Rajasthan Medical Services Corporation
REZ	regional economic zone
R&D	research and development
SEZ	special economic zone
SME	small and medium enterprise
SPV	special purpose vehicle
SSI	small-scale industry
TNMSC	Tamil Nadu Medical Services Corporation
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UHC	universal health care
US PTO	United States Patent and Trademark Office
USP	United States Pharmacopeia Convention
VAT	value-added tax
WHO	World Health Organization
WTO	World Trade Organization

INDIA REPORT

Acknowledgements

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Executive Summary

Many developing countries seek to enhance local production of pharmaceuticals and the transfer of related technology. Such countries benefit from the study of policies and measures of countries such as India, which have successfully developed local production capacities.

In the 1960s, Indian policy-makers identified distortions in the domestic pharmaceutical market, and in 1970 decided to eliminate pharmaceutical product patent protection. Local scientists were able to reverse engineer pharmaceutical compounds manufactured in industrialized countries. Local entrepreneurs built manufacturing facilities; refined manufacturing technologies; and produced and sold increasingly large volumes of pharmaceutical products that were subject to patent protection elsewhere.

The success of India's pharmaceutical industry is attributable to more than elimination of patent protection. For example, India has a population of approximately 1.25 billion people, representing a large, built-in internal market. This allowed local manufacturers to achieve economies of scale before they sought to enter export markets.

In the 1950s and 1960s, publicly-owned pharmaceutical manufacturing facilities were established, as well as research institutes, which provided a technological foundation for Indian innovation. The Government subsequently established special economic zones or manufacturing clusters for chemical (including pharmaceutical) producers, which included infrastructure and tax incentives. India had (and still has) a strong commitment to education, including technical education, providing local industry with a capable workforce.

Pharmaceutical manufacturers initially exported to other developing country markets, where regulatory barriers to entry were comparatively modest. However, Indian manufacturers recognized an opportunity to export generic products to more heavily-regulated markets in high-income countries. In the early 1980s, when the United States adopted legislation intended to accelerate entry of generic products, Indian companies seized the opportunity to enter the US market. Exporting to high-income markets required major Indian producers to implement strict product quality standards. By doing so, certain manufacturers were able to compete – and in many cases to out-perform – counterpart companies based in high-income settings.

With the entry into force of the World Trade Organization (WTO) *Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)* in 1995; and the mandatory introduction (in 2005) of pharmaceutical product patent protection other than for least developed countries (LDCs), policy space to forgo patent protection has been eliminated. Thus, with the exception of LDCs, developing countries may no longer emulate the launch trajectory of the Indian pharmaceutical industry.

Part of India's advantage has been the integrated nature of its industry, which has included large-scale active pharmaceutical ingredient (API) production capacity. Local sourcing of low-cost APIs, combined with efficient production of finished pharmaceutical products (FPPs), created advantages. In addition, as the industry expanded, the range of local equipment and service providers grew. This created a pharmaceutical sector 'ecosystem' making it highly cost-effective to produce in India. This ecosystem remains in place and related advantages persist today.

The Indian pharmaceutical industry, nonetheless, faces challenges. China has emerged as a major competitor in the pharmaceutical export sector, thus far mainly in terms of APIs, where it has overtaken India in terms of export volume. Indian manufacturers have become dependent on imports of at least commodified APIs from China. Indian policy-makers are grappling with whether and how to address this shift in API production in favour of China. Some knowledgeable Indian private sector entrepreneurs view this as part of a normal evolution, wherein Indian manufacturers focus more on high-value 'specialty' APIs and on FPPs. Other entrepreneurs and policy-makers are worried, however, that heavy dependence on a single foreign country for supplies may create future constraints and that India, in any case, must continue to maintain an integrated industry so that it remains a leader in relevant areas of science.

The Indian pharmaceutical industry includes well-known companies that participate in exports to high-income markets. These companies maintain rigorous quality controls, are subject to inspection by the US Food and Drug Administration (FDA), the European Medicines Agency (EMA) and other foreign regulatory authorities, and they are not primarily acting on compliance mandates from the Indian Government drug regulatory authority. However, there are also a large number of small- and medium-sized manufacturers producing principally for the India market. These companies are not subject to inspection by foreign regulatory authorities. The central government regulatory authority, the Central Drug Standards Control Organization (CDSCO), faces capacity constraints in terms of human resources and budget. Perhaps more problematic, regulatory authority is shared with the state-level regulatory authorities, which have principal responsibility for inspections. The state authorities do not have the capacity of the central authority. In consequence, there is continuing concern within India regarding the quality of products placed on the market by small- and medium-sized manufacturers.

Indian pharmaceutical companies (and government policy-makers) are interested in developing new drugs that can be protected by patent and sold at higher prices than generic products. However, the Indian private sector has a relatively modest history of committing large-scale investment to research and development (R&D). Indian companies are not as heavily capitalized as major multinational originators. This makes it difficult to break into the higher value market for new drugs. One potential solution is partnering with multinational originator companies on R&D ventures.

Indian companies have significant capacity to develop 'biosimilar' drugs, and are pressing to enter both the Indian and foreign markets with such products. However, in this regard they confront regulatory barriers, including restrictions based on marketing exclusivity, which may be reinforced by international trade agreements such as the Transpacific Partnership (TPP) (if and when it enters into force).

This report addresses the dichotomy between India's successful local pharmaceutical manufacturing sector and the situation regarding access to medicines among poorer parts of India's population. The India Government allocates a relatively small proportion of its budget to health care in general, and to medicines procurement in particular. While medicines may nominally be free of charge to the poor, they are not necessarily available. Most medicine-related purchases in the country involve out-of-pocket expenses for patients. Some state governments, such as in Tamil Nadu for example, have universal health care programmes that appear to be performing well in terms of providing access to

medicines. But these successful state programmes are exceptions. This report notes that there is not necessarily a direct correlation between successful local manufacturing and public access to medicines, and in the case of India the Government should be doing more in terms of commitment of resources to providing medicines for the poorer parts of the population. Nevertheless, a successful local industry has certainly proven of great benefit to individuals in other developing countries to which India has exported low-priced generic versions of medicines that were simultaneously subject to patent in high-income countries. While opportunities for export of off-patent versions of medicines patented elsewhere are today more limited, Indian manufacturers continue to produce and distribute medicines when corresponding patents are not in force in India, as well as under license through the Medicines Patent Pool, for example, again providing a substantial benefit to individuals in low- and middle-income countries (LMICs) around the world.

This report provides details of the specific policies and measures that have been adopted and implemented in India that have impacted local production of medicines. It concludes with a summary of those policies and measures. One important element of India's pharmaceutical policy involves the creation of special economic zones to enable common use of infrastructure resources, and to confer other industry-specific benefits. This report concludes by suggesting that countries in Africa might consider the establishment of a regional economic zone dedicated to pharmaceutical manufacturing to take advantage of this type of industrial policy and infrastructure measure.

Indian policies to promote local production of pharmaceutical products and protect public health

I. Statement of objective

In response to request by Member States, WHO is preparing guidance to assist developing countries improve their capacity to develop, manufacture and distribute pharmaceutical products. Several large 'emerging economy' countries have established, or are in the process of establishing, dynamic pharmaceutical sectors (development and production) to address public health and industrial policy interests. As more countries pursue similar objectives, it will be important for their policy-makers to have reference to the successful models or systems that have been put in place in countries. To this end, the Programme on Public Health, Innovation and Intellectual Property in the World Health Organization (WHO) Department of Essential Medicines and Health Products (EMP) has undertaken a study of the pharmaceutical sector in India, with a view to identifying policy options and what may be 'best' or 'better' practices that might be employed elsewhere. In addition to examining the policies specifically aimed at improving the performance of the pharmaceutical production sector, this study examines links between the local pharmaceutical production sector and domestic access to medicines.

The selection of India as target of this study was based on a number of factors. India is the source of a substantial volume of active pharmaceutical ingredients (APIs) and finished pharmaceutical products (FPPs), and distributes these products worldwide. For several decades, India has served as a principal supplier of generic pharmaceutical products to the developing world. While India's pharmaceutical sector has been the subject of a number of studies and reports, including by WHO, there has not been a recent systematic effort to describe and analyse the Government policies used to promote the interests of that sector, nor has there been a recent effort to link the pharmaceutical sector to the public health situation in India.

II. Research methodology

Research for this study was conducted using three approaches. First, a review of available literature regarding incentive programmes was undertaken. Second, the author of the study interviewed a number of individuals in India with expert knowledge of the way the Indian pharmaceutical sector is regulated in terms of government incentives. This included interviews with senior members of the India Government, executives and employees of private sector companies, as well as members of the Indian press who regularly cover pharmaceutical matters. Third, the author analysed the information presented in the interviews in light of government documents and policy announcements, as well as data available from the literature.

Appended to this study is an indicative list of questions that were raised with interviewees in India.¹ Also appended is a list of the Government interviewees.

III. Policies and programmes in India

a. Governance in the pharmaceutical sector

Central government

Department	Online resources
Department of Health and Family Welfare, Ministry of Health and Family Welfare	http://www.mohfw.nic.in/
Central Drug Standards Control Organization (CDSCO), Ministry of Health and Family Welfare	http://www.cdscoc.nic.in/forms/Default.aspx
Department of Commerce, Ministry of Commerce and Industry	http://commerce.nic.in/MOC/index.asp
Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry	http://dipp.nic.in/English/default.aspx
Controller General of Patents, Designs and Trademarks, DIPP	http://www.ipindia.nic.in/
Department of Pharmaceuticals (DoP), Ministry of Chemicals and Fertilizers	http://pharmaceuticals.gov.in/
Department of Biotechnology, Ministry of Science and Technology	http://www.dbtindia.nic.in/
Council of Scientific and Industrial Research (CSIR)	http://www.csir.res.in/
Indian Council of Medical Research (ICMR)	http://www.icmr.nic.in/
Pharmaceuticals Export and Promotion Council of India (Pharmexcil) ²	http://www.pharmexcil.com/
National Pharmaceutical Pricing Authority (NPPA)	http://nppaindia.nic.in/
Ministry of Finance	http://finmin.nic.in/index.asp
Bureau of Pharma PSUs of India, Jan Aushahi	http://janaushadhi.gov.in/index.htm

1 The specific questions or issues discussed with interviewees varied depending on the position of the individual interviewee. Moreover, the subject matter of the interviews was not “fixed” and covered matters of interest expressed by the interviewees. Except as specifically noted in certain footnotes, the identities of private sector interviewees are not included in the report. As they were not necessarily presenting positions of their companies, individual business sector interviewees considered anonymity important to permitting them to openly share views.

2 See especially: Pharmexcil, Indian Biopharmaceutical Industry: Important guidelines and incentives available to exporters of pharmaceuticals, biologicals, biopharma and bioservice sectors, 2015, fourth edition (updated).

Private Sector

Organization	Online resources
Organization of Pharmaceutical Producers of India (OPPI)	http://www.indiaoppi.com/
Indian Pharmaceutical Alliance (IPA)	http://ipa-india.org/
Indian Drug Manufacturers' Association (IDMA)	http://www.idma-assn.org/
Association of Biotechnology Led Enterprises (ABLE)	http://www.ableindia.in/

b. Key documents

Consolidated FDI Policy (Effective from 1 April 2014), Department of Industrial Policy and Promotion.

Annual Report 2014–15. Department of Pharmaceuticals.

Drugs (Prices Control) Order, 2013. Department of Pharmaceuticals (To be published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) dated 15th May 2013).

Guidelines on Similar Biologics: Regulatory Requirements for Marketing Authorization in India. Department of Biotechnology and Central Drugs Standard Control Organization (2012).

XIIth Pharmaceutical Plan Report (2012–17); Working Group Report. India Planning Commission.

National Manufacturing Policy. Press Note No. 2 (2011 SERIES), File No. 10 (6) I 2010 – MPS Dated: 4th November, 2011.

Indian Biopharmaceutical Industry: Important Guidelines & Incentives Available to Exporters of Pharmaceuticals, Biologicals, Biopharma and Bioservice Sectors (2015, 4th ed (Updated)). Pharmexcil.

Planning and Management of Industrial Parks (Dr P. P. Lal Krishna). Ramky Pharma City (India) Ltd.

Specialized Financing Programmes for Pharmaceutical Industry. Export-Import Bank of India (16 April 2012).

c. Incentive policies

India has been among the most successful countries in terms of fostering the emergence of a dynamic pharmaceutical manufacturing sector. There are a number of factors, including government policies and business incentives, that help to explain the evolution of the Indian pharmaceutical sector. The policies that fostered development of the Indian pharmaceutical sector in its earlier days are probably not the same policies that would be recommended for other countries today. Nevertheless, there are certain ideas and lessons that are potentially useful in other settings.

One key point should be identified at the outset: India has a very large population (approximately 1.25 billion), including a large segment of individuals living on low incomes.

China's situation is not so dissimilar (approximately 1.4 billion).³ The factors that may be relevant to establishing a successful pharmaceutical sector in a country with a very large population and a developing market may be different from the factors relevant to a smaller country and/or one experiencing different economic circumstances. It was continually stressed by interviewees in India that the India Government must pay attention to a large and differentiated human constituency, and that policy decisions could not be dictated by commercial or industrial interests.

While India has developed a successful local pharmaceutical industry through policies and practices that might well serve as a model for other developing countries, Central Government commits a relatively low portion of its total budget to health care, and there are significant problems in terms of access to affordable medicines among large parts of its population.⁴ There are, it should be noted, several state governments that have implemented universal health care (UHC) approaches that appear to be improving access to medicines for the poor. Nonetheless, it is difficult to see how the access situation in India can be remedied without a redirection of Central Government resources toward health care in general, and medicines procurement and distribution specifically.⁵ This study suggests that there is not necessarily a direct correlation between the successful development of local pharmaceutical manufacturing capacity, on the one hand, and access to medicines among the local population on the other. From a WHO standpoint, the access to medicines situation must be urgently brought into harmony with the success of the local pharmaceutical industry. It is not enough for industrial policy to succeed in isolation.

Nevertheless, the success of the India pharmaceutical industry has certainly been of benefit to patient populations throughout the developing world, who have relied on India's export of low-priced generic medicines, including generic versions of drugs subject to patent in high-income countries.⁶ In that respect, India's successful industrial policy must be viewed as a global public good that has played a significant role in achieving positive health outcomes, as promoted by WHO.

A government-interventionist beginning

Those with long experience often express the view that Government policy played a major role in the successful emergence of the India pharmaceutical sector.⁷ In the 1950s and 1960s, the government took an active role in creating a local manufacturing base, establishing publicly-owned pharmaceutical enterprises that manufactured APIs, both

3 India has witnessed the emergence of a substantial and growing middle-class with at least modest disposable income that can be used to purchase medicines. There are, however, about 800 million individuals with very modest income who, as a practical matter, can afford only the cheapest products, if any.

4 Sudip Chaudhuri. *The Gap Between Successful Innovation and Access to Its Benefits: Indian Pharmaceuticals*. European Journal of Development Research, 19(1):49–65, Mar. 2007 [hereafter "Chaudhuri 2007"].

5 This is not to suggest that lack of adequate public financing is the sole determinant of insufficient access to medicines because there are other gaps in the system, including problems with quality control, market regulation and procurement practices, but it is the primary factor. As Chaudhuri observes: "If the health policy objective of ensuring accessibility of drugs for all is to be satisfied, the state needs to play a much more active and pervasive role. It is too critical a matter to be left to the market and private sector. The state needs to regulate the manufacturers, to exercise bargaining power to influence prices and to fund directly or indirectly the health care expenses of those who need care but cannot afford it." Chaudhuri 2007.

6 *Ibid.*

7 Interview with Dr P.V. Appaji, Director General, Pharmexcil, 11 June 2015. For many years, Dr Appaji served as a member of the Indian civil service in various roles relating to the pharmaceutical sector. Sudip Chaudhuri, *The WTO and India's Pharmaceutical Industry 60* (2005) [hereafter "Chaudhuri"].

synthetic chemicals and antibiotics, as well as FPPs.⁸ It has been noted that the founders of many of the successful private sector Indian pharmaceutical companies began their careers at state-owned enterprises.⁹

Between the early 1970s and the 1990s, the Government mandated that private enterprises intending to formulate drugs also commit to manufacture of APIs. At one stage, there were different levels of mandated API commitment depending on whether a company was purely domestic, partially owned by foreign nationals, or fully foreign owned.¹⁰

Mandating API production is distinct from the approach most other governments, including the India Government, follow today. India does not currently mandate API production as a condition of manufacturing FPPs, and there are no significant limits on the percentage of foreign ownership of companies in the Indian pharmaceutical sector.¹¹ However, as discussed below, the India Government is now confronting a situation of significant decline in the extent to which APIs are produced and sourced within India, and of substantial reliance on imported APIs, particularly from China. This gives rise to questions regarding how local API production may be reinvigorated, presumably (though not necessarily) without mandating such production.

In the 1950s and 1960s, the Government also established public research organizations¹² and a publicly-owned plant for the manufacture of surgical items.¹³

From the early 1980s onward, the Government controlled drug prices based on 'cost-plus' formulas, including assessing whether enterprises were making efficient use of inputs.¹⁴ Price controls remain today for certain categories of products, but are calculated using market-based reference price averaging formulas that are viewed more favourably by the

8 In the 1950s and early 1960s, the Government established two public pharmaceutical manufacturing units. Recognizing the importance of fermentation technology, the Government in 1954 started a fermentation plant manufacturing antibiotics in Pune. Hindustan Antibiotics Ltd. (1954), <http://hindantibiotics.gov.in/>. In 1961 a synthetic pharmaceutical chemical plant was established in Hyderabad devoted to production of APIs, Indian Drugs and Pharmaceuticals Ltd (IDPL), <http://www.idpl.gov.in/home.html>, which produced more than 10 basic APIs. These included folic acid, vitamin B, methyl dopa and others. See also Padmashree Gehl Sampath, *Economic Aspects of Access to Medicines after 2005: Product Patent Protection and Emerging Firm Strategies in the Indian Pharmaceutical Industry*, UN University (2005)[hereafter "Sampath"], <http://www.who.int/intellectualproperty/studies/PadmashreeSampathFinal.pdf>.

9 See Chaudhuri; see also K. Anji Reddy, *An Unfinished Agenda: My Life in the Pharmaceuticals Industry* (2015).

10 Interview with Dr Appaji. Foreign multinationals had often acted solely as importers of APIs, with local formulation, leading the Government to impose specific requirements on foreign manufacturers with respect to API production.

11 CUTS International, *Government Procurement in India: Domestic Regulations & Trade Prospects 210* (2012). According to Dr Appaji, activist Government intervention policies in the pharmaceutical sector were continuously diluted, in 1986, in 1995 and in 2005.

12 In terms of technology, India established two institutions, the Indian Institute of Chemical Technologies (1954), [http://www.iictindia.org/\(S\(jfwa42nzqkngbcvqlrq0z55\)\)/GProfile.aspx?opt=iict](http://www.iictindia.org/(S(jfwa42nzqkngbcvqlrq0z55))/GProfile.aspx?opt=iict) and the National Chemical Laboratories (1950), <http://www.ncl-india.org/files/AboutNCL/Default.aspx>, both under the Council of Scientific & Industrial Research (CSIR), <http://www.csir.res.in/>. See also William Greene, U.S. International Trade Commission, *The Emergence of India's Pharmaceutical Industry and Implications for the U.S. Generic Drug Market*, Working Paper No. 2007-05-A (2007) (hereafter "Greene").

13 In addition, the Government established a plant for surgical items in Chennai. IDPL (TN) Ltd, Chennai (1965), no longer operational, http://www.idpl.gov.in/chennai_plant.html.

14 According to Dr Appaji, who worked in the price control office, margins were in some cases 100% and in other 60%. For extensive historical details, see Chaudhuri.

industry (see discussion in section III.C.2.c below).¹⁵ Notwithstanding price controls, the growth rate of the domestic industry is about 14% per annum.¹⁶

With respect to intellectual property rights (IPRs), in 1970 the India Government legislated to eliminate pharmaceutical product patent protection, maintaining process patent protection.¹⁷ This allowed Indian domestic producers to lawfully reverse engineer and produce drugs protected by patent in other markets. Indian manufacturers developed first-in-class production process technologies, enabling them to supply generic drugs to the domestic and international markets at low prices. In 1995, India adhered to the World Trade Organization (WTO) *Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)*, thereby accepting an obligation to introduce pharmaceutical product patents, subject to a 10-year transition. Marking the end of the 10-year transition period, in 2005 new Indian legislation implementing pharmaceutical product patent protection entered into force. The era of patent-free reverse engineering drew to a close.¹⁸

Another factor that contributed to the initial growth of the domestic manufacturing sector was the opportunity presented by high prices charged in the Indian market by multinational pharmaceutical companies in the 1950s and 1960s. These multinational companies imported APIs from foreign factories and formulated them in local Indian plants.¹⁹ Indian nationals who acted as ‘indenting’ agents facilitating the importation of APIs observed the large differential between API prices and finished products.²⁰ The multinationals were selling drugs at 20 to 30 times the price of imported materials. The local agents concluded they could import APIs for their own accounts and formulate finished products, selling the finished products at substantially lower margins. The local companies began to formulate and sell at 10 times the price of the imported materials. That still left a large profit margin.²¹ Dilip Shah notes that opportunities to take advantage of spreads such as that which propelled the early development of the Indian pharmaceutical sector are not present in today’s global pharmaceutical market. Margins on most generic drugs are very low in virtually all markets, and there is little room for local producers to find pricing ‘gaps’.

The early Indian entrants into the ‘branded generics’ markets successfully established the quality of their products among the public. This was a cash business, with good receivables and pricing, and the drugs were affordable to the local population.

The next step was exporting to the less stringently regulated markets in South East Asia, Latin America and other parts of the developing world. Although profits were lower, this was less difficult than entering other, more heavily regulated markets.

The final step was exporting to the stringently regulated markets, which required significantly more investment in manufacturing facilities to comply with rules of the US Food and Drug Administration (FDA), the European Medicines Agency (EMA) and other

15 For essential medicines, for companies with more than 1% market share per IMS, prices are set as the average fixed price.

16 See e.g. India Planning Commission, *XIIth Pharmaceutical Plan Report (2012–17), Working Group Report*, at http://planningcommission.gov.in/aboutus/committee/wrkgrp12/wg_pharma2902.pdf (hereafter “Working Group Report”).

17 This history is well chronicled in Chaudhuri.

18 Greene.

19 Chaudhuri; Chaudhuri 2007.

20 The local companies were, e.g., predecessors of Sun and Torrent Pharmaceuticals.

21 Interview with Dilip Shah, Secretary-General of Indian Pharmaceutical Alliance (Mumbai, 7 June 2015).

foreign regulatory authorities and other strict regulatory regimes. Indian companies could not charge the prices secured by the innovator companies holding patents. But, Italian and Spanish generics producers had previously served these markets, and Indian companies were able to successfully compete.²²

One thing that has distinguished Indian local producers from their US and European counterparts is that the Indian companies have remained largely family-controlled businesses, notwithstanding public securities offerings. At least until recently, this has given them greater leeway in terms of where to commit investments because they are less answerable to short-term demands from investors in publicly-traded securities. There is an ongoing trend of merger and acquisition of Indian pharmaceutical firms by foreign enterprises, raising the question of whether family control will continue.

Common use of the English language within India is a substantial advantage for India as an investment destination, and the Indian export industry benefits from English-language skills as it deals with regulatory matters and distribution in foreign markets.

The current era

Total revenues for India's domestic pharmaceutical sector were approximately US\$31.9 billion in fiscal year 2013. Domestic revenues for the Indian pharmaceutical industry were approximately \$16.4 billion.²³ Pharmaceutical exports from India in the 2013 fiscal year totalled approximately \$15.6 billion, with United States accounting for approximately 26% of India's pharmaceutical exports.²⁴

a. APIs and clusters

i. The transition away from API manufacturing

Indian domestic producers historically produced the active pharmaceutical ingredients (APIs) (usually referred to as "bulk drugs" in India) used in their manufacturing operations, and formulated those APIs into final pharmaceutical products (FPPs). Although Indian producers continue to manufacture newer more sophisticated APIs, often for their own internal use in formulation, they have come to rely on Chinese manufacturers of raw materials, intermediates and APIs more generally. Today, Indian manufacturers are heavily reliant on Chinese suppliers of APIs.²⁵

22 Interview with private sector interviewee.

23 See iimjobs.com, *Pharmaceutical Sector in India, India Sector Notes*, June 2014, PowerPoint, Slideshare, slides 5–7, sourcing data from Directorate General of Commercial Intelligence and Statistics (DGCI&S), Kolkata; D&B report; Aranca analysis, <http://www.slideshare.net/iimjobs/indian-pharmaceuticals-industry-report-june-2014>. Also see India's pharmaceutical exports up 10.5% in April, *Economic Times (India)*, 12 May 2014, http://articles.economictimes.indiatimes.com/2014-05-12/news/49795064_1_pharma-exports-india-ratings-research-pharmaceuticals-export-promotion-council.

24 *Ibid.*

25 See, e.g., Working Group Report: While the Indian bulk drug industry is catering to around 70% of the requirements of the Indian Pharmaceutical Industry there is growing dependence on China with low import costs. This dependence is particularly more in fermentation-base APIs such as penicillin, erythromycin, etc. where it is almost 100% dependent on China. This issue has been voiced at various fora, including by the Ministry of Health and Family Welfare, as being of strategic concern. In fiscal year 2012, India imported \$4.6 billion in APIs and intermediates, mainly from China. See iimjobs.com, slide 8, supra note 20, sourcing data from DGCI&S, Kolkata; Department of Pharmaceuticals annual report 2011–12; Business Standard; The Economic Times; Aranca analysis.

The Government of India has taken note of this fairly recent development and has concerns.²⁶ First, supplies of APIs from China are subject to interruption for any number of reasons. The shutdown of Chinese raw material and API production leading up to and during the 2008 Summer Olympics is used to illustrate the type of problems that may arise. If Indian manufacturers are entirely reliant on Chinese supplies, this interruption might have serious negative consequences for the Indian industry.

Second, India has a large population and must be prepared to deal with public health emergencies that might, for example, require the availability of large quantities of antibiotics in a short timeframe. A foreign supplier or suppliers of APIs may not be as responsive to immediate public health demands as local producers. More generally, India has a large population and consequently a large volume demand for essential medicines. The inability to procure certain medicines could lead to a national health crisis.²⁷

Third, India has national security concerns arising from reliance on a single foreign supplier of APIs which may not always have India's best interests in mind.²⁸ There is some history of tense relations between India and China, and a major Indian industry that is substantially dependent on supplies from China could provide economic leverage in favour of China.

Fourth, while API production tends to be a relatively low margin business, it is nevertheless a source of export revenue, and sales from China cut into India's export revenues.

Fifth, it is important for India to maintain the scientific and technological base necessary to excel in the pharmaceutical sector. Without a significant API production capacity, there is a lack of employment opportunities for individuals interested in the basic chemistry of pharmaceuticals, and this could lead to a corresponding lack of interest in the underlying science. This might have negative repercussions for India's technical leadership in pharmaceutical production over the longer term.

The movement of producers out of commodified APIs can be attributed to a number of factors. Perhaps primary among them is that API production is a low profit margin business, even though APIs are often produced in significant quantities so that gross revenues from their sale may be substantial. Government price controls restrict the profitability of APIs. Until recently, controlled prices were calculated in a manner that did not reflect actual production costs, and did not allow improvements to be reflected in higher profit margins.²⁹ While some price controls remain, there have been changes to the way that prices are calculated, creating more room for profitability.³⁰ Nevertheless, profit margins on formulated products are substantially greater. Particularly for companies with shares on public securities markets, the inclusion of a large stream of revenues with low profitability reduces the overall rate of return on invested capital of the company, typically reducing the stock market value. From the standpoint of appearing attractive to securities markets, it is preferable to reduce exposure to low margin businesses, such as production

26 The Working Group Report refers to the situation in fairly dire terms: Stiff competition from China on the cost front has led to the Indian Bulk Drug Industry particularly the Fermentation industry, to a stage of closure due to various factors including subsidized power and finance costs in the competing country. As a result, no company in India is manufacturing antibiotics like Penicillin and Erythromycin etc.

27 *Ibid.*

28 *Ibid.*

29 Email from Dilip Shah, Sec. Gen. of Indian Pharmaceutical Alliance, 10 September 2016.

30 See *infra*.

of commodified APIs. This might be referred to as the 'Wall Street problem' with attention continually focused on short-term profitability.

There is also substantial infrastructure cost associated with API production, including costs relating to pollution controls, and ongoing energy consumption expense. As discussed below, there is a widely held belief in the Indian private sector that the Chinese Government substantially subsidizes energy prices for Chinese manufacturers of APIs, allowing them to produce at lower effective costs than Indian producers. This is an unbalanced playing field, which makes competition difficult.

ii. Commodified versus specialty APIs

Not all Indian private sector companies view the Government's concerns on APIs as a key issue. They note that countries such as the United States and those within Europe outsourced much of their API production because it is a relatively low margin business that requires substantial investments in environmental controls. India is merely following a path previously taken by the more advanced countries toward allocating this commodified low margin business to China.

Also, in this view, the major Indian generic companies still produce APIs in house for their important specialty products, and have essentially out-sourced 'commodified' APIs to China. This can be verified by looking at the *Drug Master Files* at the US FDA for higher margin new products and noting that the APIs tend to come from India. Product formulation is typically substantially more profitable than API production.

iii. The API-specific 'cluster' concept

The Indian Government is today in the process of developing new policy instruments to address the API situation. One mechanism most prominently under discussion is establishment of API-specific manufacturing clusters.

The fundamental reason for establishing a manufacturing cluster dedicated to a specific product area is to reduce unit costs by employing economies of scale and facilitating development of a close-knit ecosystem that can provide necessary inputs into the process. In addition, with respect to API manufacturing in particular, the basic concept includes locating nearby to an existing petrochemical complex to make it easier to obtain raw material inputs through a dedicated pipeline, thereby reducing transport costs and time of delivery. The reprocessing and/or disposal of chemical waste is a significant aspect of API production. The cluster concept involves the possibility of joint efforts at waste reprocessing and/or disposal. The location of a chemical/API manufacturing cluster on a relatively isolated undeveloped tract of land would avoid potential conflicts with local residents. Typically there is opposition to the construction of API facilities based on environmental and/or health concerns.

A new API manufacturing cluster might entail also the construction of additional power generation facilities. However, if such a cluster is situated near an existing petrochemical complex, there may already be significant energy generation capacity available. Part of the cluster concept involves reduction or elimination of specific energy-related taxes or fees otherwise payable, so as to improve competitiveness with Chinese manufacturers that receive low-cost energies supplies.

At least in one version of the concept proposal, the Government will arrange for the construction of buildings and basic infrastructure, and lease out premises at favourable rates to enterprises that commit to undertaking production. The lessees would be given some period of time to commence production (e.g. three years), failing which the leases would revert to the government, for further leasing to new occupants.

iv. The alternative of geographic distribution

API-specific clusters within India are not the only policy option under consideration. Some of the reasons why the India Government wishes to encourage API production are to reduce reliance on a single supplier (i.e. China), which creates public health and economic vulnerabilities. As an alternative to local production of APIs within India, there is discussion of diversifying the geography of API suppliers, including by assisting other countries in Asia or elsewhere to develop API capacity. Although this would not address all of the concerns (e.g., employment opportunities for Indian scientists), it may be a way to undertake production in a more cost-competitive way.

v. Special economic zones (SEZs)

The basic idea of special economic zones or clusters devoted to particular areas of economic activity is not a new one in terms of Indian policy (or that of other countries).³¹ There are pharmaceutical manufacturing-related and R&D parks or clusters supported by state and Central Government incentive programmes.³²

The main initiative in this area took place in the 1970s with the setting up of a chemical complex in Ankleshwar in Gujarat. Several multinational and domestic companies set up API and formulation facilities in Ankleshwar. It has become one of the largest chemical complexes in Asia.³³ As the Ankleshwar tax incentive period came to an end in the 1980s, the pharmaceutical industry set up new formulation units in Goa.³⁴

More recently developed pharmaceutical clusters include Jawaharlal Nehru Pharma City (JNPC) located in Vizag.³⁵ This is a joint venture of the Ranky Group (a private company) and the Government of Andhra Pradesh. A substantial number of foreign³⁶ and domestic pharmaceutical companies³⁷ have located facilities within the industrial zone. It features a common water treatment plant, a hazardous waste management facility, an incineration system, a power distribution network, a common solvent recovery plant, as well as providing a variety of services for employees. Pharma City was established as a sector-specific special economic zone (SEZ). According to the organizers, the incentives provided from the SEZ include duty-free import and domestic procurement of capital goods, raw materials,

31 There are a substantial number of existing special economic zones (SEZs)/clusters in India which are tied to tax, customs duty and other manufacturing and export incentives.

32 See Usha Sharma, *Clustering for comfort*, Express Pharma, 3 July 2014, for a listing of existing cluster projects within India, and detailed critiques of aspects of the programmes, including changes of terms by central and state governments. <http://archivepharma.financialexpress.com/sections/cover-story/4066-clustering-for-comfort>.

33 See TERI. 2012 Cluster Profile Report–Ankleshwar Chemical Cluster New Delhi: The Energy and Resources Institute pp.[Project Report No. 2012IE03]. There are over 1200 production facilities in the Ankleshwar Cluster.

34 *Why Goa is becoming a hub of generic pharmaceutical manufacturing*, Indian Pharma Jobs, 30 July 2014, <http://indianpharmajobs.in/pharma-companies-go/>. Email from Dilip Shah, 10 September 2016.

35 <http://ramky.com/jnpc/index.html>.

36 Including Eisai (Japan) and PharmaZell (Germany).

37 Including Smilax Laboratories, Glochem, Orchid and Emmennar Biotech.

office equipment and other materials; domestic sales of finished products is allowed on payment of applicable customs duties; 100% income tax exemption for five years and 50% exemption for two following years, and exemption from minimum alternate tax (MAT);³⁸ 100% foreign investment automatic approval; various exemptions from finance charges; service tax incentives; various employment-related incentives; with the state government providing value-added tax exemptions for supplies within the SEZ, and exemptions from payments of stamp duties.³⁹

JNPC appears to be sufficiently successful that there is substantial demand for the establishment of a second pharma city in Andhra Pradesh, including interest from bulk drug (API) manufacturers. There is indication from the Andhra Pradesh Government that it intends to proceed with this second pharma city.⁴⁰

Another major pharmaceutical cluster is situated at Baddi in Himachal Pradesh. Already by 2010, about 300 pharmaceutical companies had set up operations in Himachal Pradesh, with Cipla, Torrent, Panacea, Dr Reddy's and Zydus Cadilla specifically situated in Baddi.⁴¹ The Central Government authorizes special incentives for lesser-developed Indian states, of which Himachal Pradesh is one.⁴²

There are diverse pharmaceutical-related clusters in India in terms of geography, infrastructure, investment incentives, management and so forth. It is difficult to assess the overall impact of the programmes. Nonetheless, there does appear to be significant interest among domestic producers in locating in pharma-specific SEZs, while at the same time expressing interest in a more consistent government approach (e.g. in relation to tax) with respect to these clusters.

vi. Contract research and manufacturing services (CRAMS)

At least in part due to the introduction of pharmaceutical product patent protection and limitations on the ability to reverse engineer and produce drugs patented in other countries, there has been significant growth in participation of Indian manufacturers as contract manufacturers for multinational pharmaceutical companies, as well as serving as

38 Note that in the discussion of tax in section III.C.2.e below, it appears that the exemption for payment of MAT has expired, and this is an issue discussed in footnote 69 below.

39 <http://ramky.com/jnpc/sezpharma.html>.

40 See Swati Rathor & Manish, *Drug makers seek land for 2nd pharma city in AP*, Times of India, Mar. 20, 2015.

41 See India Brand Equity Foundation, *Business Opportunities Himachal Pradesh*, November 2010 (PowerPoint), slides 57–61, http://www.ibef.org/download/Himachal_pradesh_190111.pdf.

42 See New Industrial Policy and other concessions for the state of Uttaranchal and the state of Himachal Pradesh, No.1(10)/2001-NER, Government of India, Ministry of Commerce & Industry, (Department of Industrial Policy & Promotion), New Delhi, dated 7th January, 2003 (Office Memorandum); Anand Sharma to Inaugurate Industrial Infrastructure Upgradation Scheme Cluster at Baddi Tomorrow, 7 May 2010, New Delhi, Press Release, Department of Commerce, Ministry of Commerce & Industry, India, http://commerce.nic.in/pressrelease/pressrelease_detail.asp?id=2591. According to a Department of Commerce Press Release:

A Central grant up to 75 percent subject to maximum rupees 60 crore is provided under this scheme, whereas remaining 25 percent is financed by other stakeholders of the respective cluster with a minimum industry contribution of 15 percent of total project cost. The Central grant under IUS is provided for creation/upgradation of infrastructure like common facility centre, quality certification and bench marking centre, R&D infrastructure, Information & Communication Technology and upgradation of physical infrastructure like transport, road, water, common captive power generation units, transmission and distribution infrastructure, common effluent treatment plant, solid waste management etc. The scheme is implemented through a Special Purpose Vehicle (SPV) at the individual cluster level so as to ensure that the infrastructure upgradation / development is user-driven. So far Rs. 929 crore has been released to various SPVs in the country.

In 2015 exchange-rate terms, 929 crore is approximately USD\$150 million.

contract researchers.⁴³ This trend is expected to continue.⁴⁴ As the Working Group Report notes, the policies designed to strengthen the Indian pharmaceutical sector generally, such as improved good manufacturing practice (GMP) compliance and regulation, are likely to foster growth of contract manufacturing. India's strong education system and technical capacity in the pharmaceutical sector generally supports this activity. Improvement of India's pharmaceutical sector-related infrastructure encourages multinational industry to engage the contract services of the Indian local industry.⁴⁵

b. Biotechnology

There is a significant trend in the global pharmaceutical industry toward R&D of biotechnology-based drugs, or 'biologicals'. Biologicals are produced using different technology than small molecule synthetic chemical drugs. Small molecule drugs are produced starting from chemicals that usually (but not always) are common to the petrochemical industry, involve significant issues of environmental control (including waste), large energy requirements, and so forth. Biologic drugs are produced in reactors where biological materials replicate under strictly controlled conditions. The process of producing biologicals is more complex and costly than producing small molecule drugs, but the process does not require the same level of external infrastructure support in terms of chemicals and electricity.⁴⁶ In this regard, the incentive support requirements for the biotech industry are different than the incentive support requirements for the small molecule industry.

Established Indian pharmaceutical companies have the capability to manufacture biological drugs.⁴⁷ And, there are Indian companies with the capacity to create biosimilar replicants of originator biological drugs.⁴⁸ The main obstacles to successful marketing and sale of biosimilar drugs are regulatory and intellectual property based.⁴⁹ The major markets for these drugs are heavily controlled from a regulatory standpoint, and highly protected from an IPR standpoint.⁵⁰

43 See Working Group Report and Greene.

44 According to the Working Group Report:

Contract manufacturing is estimated to grow US \$ 30 Billion, whereas contract research is estimated to reach US \$ 6-10 Billion and this is paving way for new job opportunities being created in the Indian Pharmaceutical market. This sector is expected to grow at a rate 17.2% in 2011.

45 *Ibid.*

46 Guilbert Gates & Vu Nguyen, *Growing Biologic Drugs*, From Vial to Vat, NY Times, 11 June 2007, http://www.nytimes.com/ref/business/20070611_VAT_GRAPHIC.html.

47 See Chaudhuri.

48 Per the Working Group Report:

India's biotechnology sector is growing fast and is in the early stages of development with initial emphasis on vaccines and bio-services. The industry currently has around 340 companies which employ more than 25,000 technologists. The Indian Bio-Pharma industry has already a strong global presence, producing the fourth largest volume of products in the world. India's vast pool of skilled manpower, huge patient base and relatively low costs drives many global biotech giants to partner, acquire or outsource to Indian companies. Likewise, some of the larger Indian companies have even begun acquiring foreign entities in the United States and Europe, to retail their products and expand product offerings.

49 This presents a problem even with India where the regulatory authority and rules for approval of biological generics remain somewhat uncertain. *Ibid.*

50 Per the Working Group Report:

Key factors that will be important for determining blockbuster success within the biologic markets include the ability to gain first-mover advantage within a given indication, the subsequent horizontal expansion across disease stages and indications, and the creation of high barriers to competition through the accumulation of clinical safety and efficacy data.

The development of new biological drugs is a far more challenging matter, and one to which the Indian Government is paying attention in terms of providing support.⁵¹ This includes a number of programmes established under the Biotechnology Industry Research Assistance Council (BIRAC), an Indian public sector company.⁵² These include the Biotechnology Ignition Grant Scheme (BIG), which provides up to approximately 100 000 US\$ support for research projects with commercialization potential,⁵³ and is administered through various research partners, including incubator parks such as the IKP Knowledge Park in Hyderabad.⁵⁴ BIRAC also has a Biotechnology Industry Partnership Programme (BIPP), under which grants may be paid to support pathbreaking research “for high risk futuristic technologies and mainly for viability gap funding”.⁵⁵ According to the scheme documents, newly developed intellectual property will be jointly owned by the recipient of funds and the Government, unless determined otherwise.⁵⁶ Under BIRAC there is also a mechanism for funding translational research by industry on academic research projects (Contract Research and Services Scheme (CRS)).⁵⁷

While India is funding biotechnological research, it is useful to compare the United States funding by the National Institutes of Health (NIH), which shows a biotechnology funding budget of 5.925 billion US\$ for fiscal year 2015 and 6.046 billion US\$ for 2016.⁵⁸ The Indian budget for funding biotechnology research is at a much lower order of magnitude.⁵⁹

c. Price controls

Another key issue in India is the presence of price controls on essential drugs.⁶⁰ When these price controls were initially established, they were based on a ‘cost plus’ formula. Private sector companies uniformly indicate that cost-plus formulas are anathema to improvements in efficiency and quality control because when improvements are achieved

51 Per the Working Group Report:

India at this point is ahead of China in chemistry but the impression in many countries is that India is weak on biology front. It is found that India’s strength in biology sector is very limited especially in genetically modified animals, biochips and basic molecular biology. The biology capabilities are mainly in government institutes with a handful of companies having skills in molecular biology and protein expression. However, only a handful of GLP labs exist and the availability of clinical investigators and clinical pharmacologists are negligible in comparison to other countries in the field.

See also PriceWaterhouseCoopers, *Global pharma looks to India: Prospects for growth* (2010).

52 <http://www.birac.nic.in/index.php>.

53 Biotechnology Ignition Grant Scheme (BIG), http://www.birac.nic.in/desc_new.php?id=83. To date, 18 “Innovators” have been awarded the BIG grant, out of which 12 are startup companies and 6 are individual entrepreneurs, with a total of \$1.6 million in grants approved. Through a Bio Incubator programme, BIRAC states that it has been able to create approximately 124,000 square feet of functional bioincubation space, and has supported around 180 startups/entrepreneurs. http://www.birac.nic.in/desc_new.php?id=92.

54 <http://www.ikpknowledgepark.com/>, describing itself as follows:

Overview

IKP Knowledge Park (IKP) nestles in a 200-acre pollution free zone in Genome Valley, Hyderabad. The master plan of the Park mirrors its objective of nurturing an environment for innovation and the expected growth in life sciences and related fields. It has a mix of ready-to-use multi-tenanted modular wet laboratory blocks (Innovation Corridors) with in-built flexibility around some common, shared facilities and support services, as well as developed land, for customised R&D facilities.

Currently, the 140,000 sft. Innovation Corridor 1 with 84,000 sft. of wet laboratory space is operational.

Around 35 acres of land has been developed with utilities for customised R&D centres.

55 http://www.birac.nic.in/desc_new.php?id=76.

56 http://www.birac.nic.in/webcontent/BIPP_Scheme_Document_11_feb_15.pdf.

57 http://www.birac.nic.in/desc_new.php?id=104.

58 Estimates of Funding for Various Research, Condition, and Disease Categories (RCDC), Feb. 5, 2015, http://report.nih.gov/categorical_spending.aspx.

59 See Working Group Report.

60 Regarding the history of Indian price control rules, see Chaudhuri; Sampath.

any savings are incorporated in the cost-plus calculation, reducing the fixed price of the medicine.⁶¹ The objective of the producer is to increase its margin by lowering its costs while maintaining or increasing prices (i.e. increasing the spread). With a cost-plus formula there is no incentive to improve. According to some private sector manufacturers there is a financial disincentive to investing in improvements.

Over the past several years, the Government has responded to the concerns of the private sector by moving away from a cost-plus formula, to a reference-price formula based on the average of companies having at least 1% market share, and precludes retailers from charging over that reference price within a retail price margin.⁶² According to the National Pharmaceutical Pricing Authority:

“Under the market-based approach, the ceiling price of a scheduled drug is determined by first working out the simple average of price to retailer (PTR) in respect of all branded generic and generic versions of that particular drug formulation having a market share of 1 percent and above, and then adding a notional retailer margin of 16 percent to it. The maximum retail price (MRP) for that particular drug formulation must not exceed the notified ceiling price plus applicable local taxes.”⁶³

Under the *1995 Price Control Order*, 74 out of about 500 commonly used APIs and all formulations containing any of these APIs were under statutory price controls.⁶⁴ Under the *2013 Price Control Order*, 348 APIs and about 652 specified formulations of these APIs are under price control.⁶⁵

Some private sector companies have also indicated that it would be preferable from the government standpoint to focus on competitive bidding for supplies of product as a means to control costs.

There was considerable discussion regarding the difference between India and China on the subject of price controls. China has recently announced the elimination of price controls on a wide range of pharmaceutical products.⁶⁶ However, there was a general perception that China has not substantially controlled prices in the past. Also, Chinese hospitals have funded themselves by charging a margin to patients/consumers above the procurement price, so that end-user prices are substantially higher than procurement prices.⁶⁷

61 According to Dilip Shah: India had cost-based price control. Only in 2013 was it changed. If a company improved its API production process to reduce costs, the cost price formula would simply be passed through and lower the price of the end product. The manufacturer could not retain anything. This was a disincentive to improving processes and lowering cost.

62 Drugs (Prices Control) Order, 2013, Department of Pharmaceuticals (To be published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section(ii) dated 15th May 2013). Calculation methodology can be found in the Prices Control Order 2013, and are discussed more generally under Frequently Asked Questions (FAQs) on the National Pharmaceutical Pricing Authority web site, <http://nppaindia.nic.in/>. Also, email from Dilip Shah, Sept. 10, 2016.

63 Compendium of Notified Ceiling Cap Prices of Scheduled Drugs-2015, NPPA.

64 According to the National Pharmaceutical Pricing Authority: “All formulations containing these bulk drugs either in a single or combination form fall under price controlled category. However, the prices of other drugs can be regulated, if warranted in public interest.” *ibid*.

65 Email from Dilip Shah, 10 September 2016.

66 *NDRC Issues New Policy for Drug Price Reform, Abandoning Price Control on Most Drugs*, Pharma China Web Edition, 5 May 2015.

67 James J. Shen, *NDRC Abandons Government Pricing Setting, By No Means Letting Go of Control*, Pharma China Web Edition, 22 May 2015, and *NHFPC Issues New Implementation Document for Centralized Public Hospital Drug Purchase*, Pharma China Web Edition, 19 June 2015.

Interviewees suggested that China's relatively open pricing model is a major factor contributing to the attractiveness of the Chinese market to foreign investors. Multinational companies have high margins in China at the moment.

d. Regulatory controls

The Central Drug Standards Control Organization (CDSCO) has responsibility to approve new drugs for entry onto the India market throughout the country. Such approval may include the manufacturing process by which the drugs will be made. Once such approval is granted responsibility for enforcement is in the hands of the state authorities. This means that GMP inspectors for manufacturing facilities are usually employees of state governments. The reality is that there is CDSCO oversight of the state regulators, but it is a complicated matter. The CDSCO is in the process of adding staff. It is also in the midst of a major push to undertake a large number of inspections to allay domestic and international concern over the quality of Indian manufacturing.

Private sector company representatives indicate that the major companies are largely responsive to US FDA regulations and inspectors, and that meeting the requirements of the strict regulatory authorities makes the presence of the Indian regulators largely redundant. This may well reflect the reality for the major Indian producers who are active in supplying markets within Organization for Economic Cooperation and Development (OECD) countries. Some of the major manufacturers believe they may even be going "overboard" in trying to allay concerns of the FDA, spending more and hiring more employees than necessary.

On the other hand, there is a large group of Indian manufactures that are producing largely for domestic consumption, and therefore not concerned about US FDA rules or inspectors.⁶⁸ As a consequence, there is a major bifurcation among the producers. Sentiment was expressed that even the smaller producers take their obligations to create quality products seriously, even if they do not meet strict GMP standards. There are a relatively small number of "deliberately bad" operators who need to be weeded out. A private sector interviewee noted that drugs produced by small and medium operators at less than FDA standards may still be safe and effective, and cost-effective for members of the Indian public.

It was also noted that the media, particularly in India, does not always distinguish between regulatory issues that involve serious or potentially serious defects in manufacturing, and more or less routine regulatory notices. For example, FDA issues so-called '483 notices' of noncompliance. These may address serious issues of GMP noncompliance. But they may also address matters that are not serious, though need to be addressed, and are routinely taken care of and responded to by the subject companies.⁶⁹ The Indian media sometimes construes these notices as evidence of a serious lack of quality control, without regard to the specific subject matter of the notices, which may involve fairly routine matters that FDA inspectors want to see addressed. The media reports can have significant consequences in financial markets, which in part explains why the companies are perhaps over-attentive today to quality control in the sense of over-investing in personnel, etc. Reference is made here only to the major companies with already strong quality control systems.

⁶⁸ According to the Working Group Report:

...the Industry is quite fragmented and comprises of nearly 10,500 units with majority of them in unorganized sector. Of these, about 300-400 units are categorized as belonging to medium to large organized sector with the top 10 manufacturers accounting for 36.5% of the market share.

Regarding structural segmentation of the Indian pharmaceutical sector, see Sampath; Greene.

⁶⁹ See, e.g. FDA Form 483 Frequently Asked Questions, <http://www.fda.gov/ICECI/Inspections/ucm256377.htm>.

Training for quality control inspection is largely an in-house matter as there are few public programmes available to train for this work. The WHO and FDA have, however, initiated training programmes in cooperation with the CDSCO so this situation is changing.⁷⁰

The Indian drug regulatory situation is undergoing a transformation. The CDSCO is significantly expanding its inspection capacity. In 2008 there were only about 50 inspectors at the central government level. Today there are approximately 375. The office is in the process of hiring an additional 200 inspectors, so in the near future there should be 500+ inspectors acting on behalf of the CDSCO.⁷¹ Most of the new hires are coming out of university and require training, which is being addressed.

The state regulatory system is challenged. One aspect is that India is a very diverse country with different levels of development. The model is not so dissimilar from that of the European Union, where there are different levels of capacity, but a certain minimum standard that needs to be applied.

The CDSCO does not want to see the quality, safety or efficacy of drugs compromised at any stage.

There are more than 500 US FDA-approved facilities operating in India. Thus, at the high-end, India is now looked to as a model for production facilities. But, the situation is different for small- and medium-sized enterprises. As a democratic state, India must also address the concerns of the smaller businesses. The Government is suggesting to small- and medium-sized enterprises that rather than act as manufacturers they should move into providing services to the better equipped companies. The situation is dynamic, constantly changing.⁷²

Currently, the CDSCO is responsible for approval of biologicals in India, supervising research institutes that are doing that work. But, this is a matter under discussion, whether there should be a separate track for biologicals, perhaps under the Department of Biotechnology. CDSCO is of the opinion that everything should be kept under the same roof.

Formerly, Indian regulators and private industry were very sceptical about the motivations of the US FDA. That has changed. The presence of FDA regulators is now welcome and is strengthening the technical capacity of Indian industry. With the backing of the current government, CDSCO is now able to rapidly implement new technical ideas coming from the FDA.

According to the Drugs Controller General, the CDSCO is committed to following the rule of law in implementing pharmaceutical regulation, and is not susceptible to pressure from industry or other government departments. Drugs must meet the proper standards of quality, safety and efficacy to be approved.

70 See, e.g. CDSCO organises five-day workshop on 'Basic GMP using Quality Risk Management Approach', Pharmabiz.com, Mumbai bureau, Dec. 20, 2014, <http://www.pharmabiz.com/NewsDetails.aspx?aid=85752&sid=1>; and CDSCO-WHO Workshop for GMP strengthening of State Regulatory Inspectorate, Jan. 27–Feb. 5, 2014, <http://cdsco.nic.in/writereaddata/ADV%20GMP%20workshop%20repo4.pdf>. See also Department of Pharmaceuticals 2014 2015 Annual Report, at p. 7, including cooperation with FICCI.

71 Interview with Dr G.N. Singh, Drugs Controller General (India), Ministry of Health and Family Welfare, 17 June 2015.

72 The Drugs Controller General observed India has substantial excess capacity in the pharmaceutical sector, but does not have the domestic market to absorb that capacity. Some of that excess capacity could be channelled into research and development. Medical devices and biomechanical inventions will become increasingly important.

e. Taxes

India basically uses a value-added type taxation system, which applies tax assessment throughout the manufacturing chain, and which may involve federal, state and local taxes of various kinds. Some private sector companies argue in favour of a simplified tax arrangement that would, for example, involve payment of a goods and services tax (GST) on a simplified model that would involve payment to a single entity, even if still by each participant in the chain.⁷³

As in the United States, Indian states compete with each other to attract business investment, including by providing relief from state (and local) taxes. And, as part of efforts to encourage development in lesser developed states, the Central Government may also provide tax relief for a period of years. These efforts may not be well coordinated, because among other reasons the central and state governments may be run by different political parties.

The Indian central and state governments have adopted a variety of tax incentives directed toward encouraging the establishment of manufacturing facilities, especially (though not exclusively) in the disadvantaged states, and a variety of tax and related customs incentives relating to export promotion.⁷⁴ There are tax incentives generally available for investments in new plant and equipment.⁷⁵ A number of incentive programmes are tied to investments (including by establishing manufacturing facilities) in SEZs located throughout the country. As of September 2014, there were 185 operational SEZs.⁷⁶ Concerns have been raised by Indian industry generally regarding the elimination of certain tax benefits (e.g., exemption from the MAT) applicable to the SEZs.⁷⁷

73 A general Industry White Paper states, for example:

The Goods and Services Tax (GST) is a significant step in indirect tax reforms, eagerly awaited by the industry. The initiatives being taken by the Centre to forge a consensus with the States on various issues surrounding the Constitutional amendment, required for implementation of the GST, are commendable. The industry hopes that the discussions with the States will culminate into a good and progressive tax system for the country.

All the issues currently under debate, including the amendments to the Constitution, the design of GST, the GST rate and the rules for implementation of the GST are very significant and need a thorough debate and consideration before they are finalised and implemented ...

See EY-Confederation of Indian Industries, *Enabling 'Make in India' through effective tax reforms* (2014) (hereafter "Industry White Paper"), [http://www.ey.com/Publication/vwLUAssets/EY-cii-whitepaper-17-dec/\\$FILE/EY-cii-whitepaper-17-dec.pdf](http://www.ey.com/Publication/vwLUAssets/EY-cii-whitepaper-17-dec/$FILE/EY-cii-whitepaper-17-dec.pdf).

74 See, e.g. EY, *Tax incentives in India*, August 2014 (PowerPoint), [http://www.ey.com/Publication/vwLUAssets/EY-tax-incentives-in-india/\\$FILE/EY-tax-incentives-in-india.pdf](http://www.ey.com/Publication/vwLUAssets/EY-tax-incentives-in-india/$FILE/EY-tax-incentives-in-india.pdf); EY, *India Tax Workshop 2014* (PowerPoint),

75 See Industry White Paper, stating:

Investment allowances

The Finance Act 2013 has introduced a provision to incentivize substantial investments in plant and machinery by providing a deduction of 15% of the actual cost of plant or machinery acquired and installed between 1 April 2013 and 31 March 2015 by a company engaged in the business of manufacture or production of any article or thing provided the value of plant and machinery exceeds INR 1 billion. The Finance Act 2014 extended the benefit of this provision for companies, which acquire and install new plant and machinery during any financial year (FY14–15 to 2016–17) for amount exceeding INR 250 million.

76 See *India Tax Workshop 2014, Strategic Tax Incentives* 11–13 September 2014, [http://www.ey.com/Publication/vwLUAssets/EY-india-tax-workshop-2014-strategic-tax-incentives/\\$FILE/EY-india-tax-workshop-2014-strategic-tax-incentives.pdf](http://www.ey.com/Publication/vwLUAssets/EY-india-tax-workshop-2014-strategic-tax-incentives/$FILE/EY-india-tax-workshop-2014-strategic-tax-incentives.pdf).

77 See Industry White Paper, stating:

Minimum Alternate Tax (MAT) on SEZ profits at the time of instituting the SEZ Act, the Government had promised investors that MAT would not be applicable on SEZ units. However, the exemption on payment of MAT is no longer available to SEZ units. Further, post withdrawal, activities in development of SEZ and units in SEZ has considerably slowed down. Recently the Government has expressed its desire to make India a manufacturing hub by launching the "Make in India" campaign. Reinstating the exemption will immensely boost non-resident investors in manufacturing goods in an SEZ providing fillip to the "Make in India" campaign. It may also be noted that according to the Press Release dated 13 August 2014 issued by the Ministry of Commerce and Industry (Department of Commerce), the Ministry has already recommended the restoration of the original exemption of DDT and MAT.

There are specific tax incentives available for investments in research and development (R&D), including a 200% deduction from income for approved R&D investments. In order to take advantage of these deductions, R&D investment programmes must be approved by the Ministry of Science and Technology.⁷⁸

For pharmaceutical manufacturers engaged in export, there are provisions for effectively duty-free import of inputs that are processed into final exported products, as well as relief from various domestic taxes. These benefits are available for operations from SEZs, and to a certain extent from other locations.⁷⁹

For India, taxes were not mentioned by interviewees as a major factor, as compared for example with price controls or the API situation. However, it was noted that there are currently 'tax inversion' deals transpiring in the pharmaceutical sector in which US-based companies are transforming into Europe-based companies to take advantage of modest changes in overall tax rates. So, as a general matter, taxes appear to be a very important issue for pharmaceutical companies. Apparently, at the moment, this is not a major issue within India.

In India, the normal tax rate on business is 34%. In the SEZs the effective rate is reduced to 20% (or a 14% reduction). This is because of relief from value-added taxes, and because of export credits.⁸⁰

f. R&D

The Indian pharmaceutical industry has long been an innovator in terms of process technologies. The development of new and more efficient methods of producing APIs and FPPs made India the supplier of generic medicines to the developing world. Although India did not permit patenting of pharmaceutical products between 1970 and 2005, it did permit patenting of new pharmaceutical processes.

Manufacturing and sale of generic pharmaceutical products is a relatively low margin business when compared to the manufacture and sale of patented originator products. Thus, while global pharmaceutical industry annual revenues in 2015 will exceed 1 trillion US\$, revenues from the sale of generic products will be in the order of 300 billion US\$, despite the fact that the volume of generic medicines placed on the market will far exceed the volume of patented originator products.

⁷⁸ *Ibid.*, arguing:

Expenditure on scientific research

Currently, as per the provisions of the [Finance] Act, weighted deduction of 200% is available for expenditure incurred for scientific research on in-house R&D facility approved by DSIR. In order to remove any unintended ambiguity and to expand the scope of the present provision, the following issues need to be considered:

- To boost the overall manufacturing sector, the benefit of weighted deduction should also be extended to expenditure incurred on "building and infrastructure" exclusively used for R&D.
- It is recommended that to encourage increased in-house R&D activity, the ambit of eligible revenue expenses should also be increased to include:
 - Expenditure on outsourced R&D activities including clinical/trial field
 - Lease rent paid for research farms or research labs.

⁷⁹ See *Tax Incentives in India (2014)*, [http://www.ey.com/Publication/vwLUAssets/EY-tax-incentives-in-india/\\$FILE/EY-tax-incentives-in-india.pdf](http://www.ey.com/Publication/vwLUAssets/EY-tax-incentives-in-india/$FILE/EY-tax-incentives-in-india.pdf).

⁸⁰ Formerly, this took the form of a rebate of taxes paid; but today there is an exemption from payment. (Private sector interviewee).

Strictly from a mercantile perspective (and leaving aside public health interests for the moment), Indian pharmaceutical companies are interested in developing their own patented original products in order to improve their profitability.⁸¹

The introduction of pharmaceutical product patent protection in 2005 may, to a certain extent, facilitate the development of an R&D-based industry within India, but local patent protection is not a pre-condition of conducting R&D locally. Researchers in countries without pharmaceutical product patent protection may file and obtain patents in the markets they wish to exploit at higher prices. They do not need to obtain local patents. That said, because India is a large and growing market for the sale of more expensive patented medicines, the availability of patent protection in India may be important to the development of original products within the country.

India has a substantial scientific research community in the public health area, and there is no reason why Indian researchers will not be successful in developing new chemical entities and/or biological products for introduction as medicines.⁸² The principal obstacle appears to be the relative absence of a corporate culture interested in the type of risk involved in developing wholly new drug products. The risk of failure is significant, and realistically a company needs to invest in a portfolio of potential new drugs to spread its risks.

The Government is aware of the lack of venture capital funds directed to the pharmaceutical sector in India, and a proposal has been made for the Government itself to establish a venture capital fund for pharmaceutical R&D.⁸³ This plan has not been brought into effect. Although state-sponsored or -owned venture capital funds are not uncommon, particularly in higher income countries, problems may arise because of potential adverse public reaction to unsuccessful government investments in private sector companies.⁸⁴

Financing R&D is sufficiently expensive that it is of significant advantage for a company to be heavily capitalized. This gives the existing major originator companies a substantial advantage over smaller companies, including those in developing countries. Moreover, the major originator companies often seek to purchase promising developments from smaller R&D companies before drug development is completed. This both provides a pipeline of potential new drugs, and forestalls the development of competition.

One way the India Government seeks to promote domestic R&D is through government-owned research laboratories. Annex 3 provides a listing of government-funded research institutions working on pharmaceutical research in India.⁸⁵ The Government is currently not providing significant subsidies for private sector R&D on new drugs; unlike, by way of comparison, the US NIH.

81 According to the Working Group Report:

The product patent now permitted following the 2005 amendment in the Patent Act 1970 has further encouraged the now reasonably prepared Indian pharmaceutical companies to move from its expertise in process chemistry which has served it well for generics products to more complex skills in drug molecule Research and Development. Thus R&D investments of the top 15 Indian manufacturing companies have increased from 3% of sales in 2000 to some 8.68% of sales in 2010.

82 For a discussion of strengths and weaknesses of Indian R&D capacity in the pharmaceutical sector prior to entry into force of the TRIPS Agreement, see Sampath.

83 Working Group Report.

84 This may be especially true in India where the media is constantly searching for government misadventure.

85 From Annexure-1, Report of Pharmaceuticals Working Group for the XII five-year plan.

India is contemplating the introduction of legislation that will permit individual researchers to obtain patents based on government-funded projects, along the lines of the US Bayh-Dole legislation, but adapted to Indian circumstances. India circumstances include the large number of poor in India who require low-cost medicines (public or private). This means that an Indian Bayh-Dole solution is likely to include more Government control over the ultimate pricing and availability of products than is currently evident in the United States model.

There is a strong belief among members of the government that the Indian pharmaceutical industry must move into the area of new drug development, both to be globally competitive, but also to solve public health problems domestically and abroad.⁸⁶

The area of greatest R&D interest today is biologicals. Here, part of the challenge for India is a comparatively small biologicals manufacturing sector, which in turn limits opportunity for entrepreneurship.

g. Intellectual property

There is no doubt among leaders of the Indian pharmaceutical industry that the absence of pharmaceutical patent protection from 1970 until 2005 facilitated the successful development of the generics sector.⁸⁷ Prior to elimination of product patent protection 1970, foreign companies largely imported (and/or formulated) drugs in India, and charged high prices for them. India policy from 1970 until 2005 is widely regarded as having been successful from both a mercantile and public health perspective.

The introduction of pharmaceutical product patent protection in 2005 is influencing the way that Indian domestic companies do business. They are no longer able to manufacture and sell drugs newly developed by foreign companies, except pursuant to license.

One consequence is that Indian companies are active in challenging patents that are applied for or secured by originator companies. This has led to a number of high profile cases in which patents have been successfully challenged, at least at early stages of

86 According to the Working Group Report:

... now that India is poised for a greater role in the global economy in general and also in the pharma sector for reasons discussed earlier in terms of the growth, drivers, the weakness in the system of poor R&D is quite evident. The industry's total R&D budget is comparatively very small as compared to the global competitors. Thus, individual R&D budgets of many US companies probably amount to much more than the cumulative R&D budgets of all the companies in India (in 2009, Pfizer spent around 18% of its sales turnover of US\$9.9 Billion). This is further manifest in some new areas like pharmacogenomics leading to personalized medicine as the basis of therapeutic treatment with drug therapy tailored to individuals. The emerging areas of bio-pharmaceuticals with highly capital intensive high failure features further raises the entry barrier to modern day pharma R&D.

The problem of R&D investment is enhanced by lack of supportive funding from government as has been possible in other competing countries like Israel, Singapore and Malaysia. The R&D is nowhere near the possible funding in developed countries like US under the National Institutes of Health funding programmes. In 10–20 years, India should have reached the level of technical development of the US and Europe, and will be discovering new drugs. India is committed to protecting technological innovation, but as of now it must follow a middle, flexible path.

87 As noted in the Working Group Report:

The emphasis on generics and the existence of process patent only regime between 1970 and 2005 helped the SME sector to grow. It enabled India to source more than 85% of its domestic demand for bulk drugs, drug intermediates and is almost self-reliant in pharmaceutical formulations, chemicals, tablets, capsules, orals and injectables up from domestic production with 20% in 1950s.

This growth was in a large measure triggered by the government initiatives in the public sector with the setting up of large plants for manufacturing antibiotics – HAL in 1951, IDPL in 1961 KAPL in 1981 etc. This growth shared a synergy with the growth of the chemicals sector and the whole gamut of chemical based industries provided the basic technology and science skill for drugs manufacture.

litigation.⁸⁸ But, to a certain extent, this is a stop-gap type of approach. Over the longer-term, Indian pharmaceutical companies may find themselves excluded from significant parts of the India (as well as global) market.

One approach for overcoming the obstacles presented by patents is to seek compulsory licenses from the Government. This has been done, for example, by Natco in securing a license allowing it to produce and supply Nexavar to the local market.⁸⁹ Existing India legislation also permits application for compulsory licensing for export further to the WTO 30 August 2003 waiver decision regarding Article 31(f) and (h) of the TRIPS Agreement (now Article 31 *bis*).⁹⁰

While compulsory licensing is lawful under the TRIPS Agreement and other international legal instruments, use of compulsory licensing as a 'standard' policy instrument with respect to overcoming foreign originator patents is likely to create political difficulties with the United States, European Union, Japan and other countries that are home to originator companies. These political difficulties may have consequences in terms of bilateral relations.

Either directly, or through the Medicines Patent Pool, Indian local producers have been the beneficiaries of a number of voluntary patent licenses authorizing the production and sale of antiretroviral medicines, hepatitis C treatment, and other products, upon payment of a modest (e.g. 5%) royalty.⁹¹ This licensing activity is positive from the standpoint of public health, providing low-cost access to essential medicines that might otherwise be unavailable.

When it amended its patent legislation in 2005 to fulfil its TRIPS Agreement commitment to provide pharmaceutical product patent protection, India incorporated a provision in its *Patent Act* intended to make it more difficult for applicants to successfully obtain patents on new forms of known substances, requiring a showing that any such new form demonstrate a substantial enhancement in efficacy.⁹² It was foreseen that Indian companies would face increasing difficulties as a consequence of a proliferation of foreign patents. Section 3(d) of the *Patent Act* was intended to limit the proliferation of patents that would mainly serve

88 See, e.g. *Novartis v. India*, Supreme Court (India), Civil Appeal Nos. 2706–2716 of 2013 (1 April 2013) (Gleevec); *In the matter of Application no. 6087/DELNP/2005 for Grant of Patent*, Patent Office, New Delhi, India, Jan. 13, 2015 (Sofosbuvir); *Roche v. Cipla*, High Court of Delhi, CS(OS) no. 89/2008 and C.C. 52/2008, judgement pronounced Sept. 7, 2012 (patent upheld but not infringed).

89 *Bayer v. India/Natco*, Intellectual Property Appellate Board, Chennai, M.P.Nos.74 to 76 of 2012 & 108 of 2012 in OA/35/2012/PT/MUM, Sept. 14, 2012, and; Balaji Subramanian, *Compulsory Licence Application filed over AstraZeneca's Saxagliptin*, Spicy IP, 5 July 2015, <http://spicyip.com/2015/07/compulsory-licence-application-filed-over-astrazenecas-saxagliptin.html>.

90 India Patents Act, as amended by Act No. 15 of 4 April, 2005, Sec. 92A, and; generally, Frederick M. Abbott, *The WTO Medicines Decision: World Pharmaceutical Trade and the Protection of Public Health*, American Journal of International Law, Vol. 99, pp. 317–58, 2005, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=763224.

91 According to the Medicines Patent Pool with respect to antiretrovirals:

The MPP has also sub-licensed to generic manufacturers, who are already beginning to produce and supply HIV medicines at a lower cost. As of January 2015, the Medicines Patent Pool had signed sub-licensing agreements with ten key generic manufacturers: Aurobindo Pharma Limited, Cipla, Desano, Emcure Pharmaceuticals, Hetero Labs, Laurus Labs, Micro Labs, Mylan, Shasun Pharma Solutions and Shilpa Medicare.

Regarding hepatitis C, see, Gilead Announces Generic Licensing Agreements to Increase Access to Hepatitis C Treatments in Developing Countries (Press Release of Sept. 14, 2014), stating:

The agreements allow the companies – Cadila Healthcare Ltd., Cipla Ltd., Hetero Labs Ltd., Mylan Laboratories Ltd., Ranbaxy Laboratories Ltd., Sequent Scientific Ltd. and Strides Arcolab Ltd. – to manufacture sofosbuvir and the investigational single tablet regimen of ledipasvir/sofosbuvir for distribution in 91 developing countries.

<http://www.gilead.com/news/press-releases/2014/9/gilead-announces-generic-licensing-agreements-to-increase-access-to-hepatitis-c-treatments-in-developing-countries>.

92 India Patents Act, as amended by Act No. 15 of 4 April 2005, Sec. 3(d), quoted in note 95.

a blocking function. The Indian Patent Office has implemented and applied Section 3(d) in a number of cases in which it has rejected foreign pharmaceutical patent applications. The Supreme Court of India has rendered one major decision interpreting Section 3(d) (Novartis/Gleevec), and in that decision the Supreme Court made substantial reference to the background and legislative purpose of Section 3(d).⁹³

The Transpacific Partnership Agreement (TPP) includes a number of provisions that would make it more difficult for countries such as India to introduce generic versions of medicines either under patent or under regulatory marketing exclusivity. The provision for eight years (or five plus three years) of marketing exclusivity for new biological drugs would substantially impact the ability of India's biotech industry to introduce biosimilar products in the TPP region.

While India is under pressure from the United States, the EU, Japan, Switzerland and others to amend its patent legislation, this is not considered a likely occurrence, particularly in view of potential parliamentary resistance. However, India has taken steps to modernize the administrative functioning of its patent office, including by improving electronic access to filings and databases, by hiring new employees, and by taking steps to better coordinate the work of the patent offices located in different states.⁹⁴ The Government is also taking steps to encourage filing of patents by Indian nationals, including from small and medium enterprises.

The coming of the biotechnology age in pharmaceuticals raises new issues with respect to patenting standards in India. For example, Section 3(d) of the *India Patents Act* is intended to address the problem of 'evergreening' by prohibiting patenting of new forms of known substances in the absence of demonstration of a significant enhancement in efficacy.⁹⁵ Taking into account the context provided by the 'explanation', it does not appear that Section 3(d) was drafted to take account of different forms of biological materials that may produce the same result. This may suggest that it is possible to patent different forms of biological materials that will produce the same therapeutic effect; or that it is possible to avoid patent infringement of the originator material by producing a modified version.

h. Financing

In addition to the specific subsidy programmes discussed with respect to R&D and SEZs, the Export-Import Bank of India makes available specialized schemes for the pharmaceutical sector with respect to investments in R&D and for the acquisition of patents, brands and

93 See Frederick M. Abbott, *The Judgment in Novartis v. India: What the Supreme Court of India Said*, Inside Views, Intellectual Property Watch, 4 April 2013. Available at SSRN: <http://ssrn.com/abstract=2250494>.

94 See website of Intellectual Property India at <http://www.ipindia.nic.in/>, including annual reports.

95 India Patents Act, *supra* note 84, provides:

3. What are not inventions.

The following are not inventions within the meaning of this Act:

d) the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant.

Explanation. For the purposes of this clause, salts, esters, ethers, polymorphs, metabolites, pure form, particle size, isomers, mixtures of isomers, complexes, combinations and other derivatives of known substance shall be considered to be the same substance, unless they differ significantly in properties with regard to efficacy.

other intangible assets.⁹⁶ This is in addition to the ordinary export and import financing programmes of the Export–Import Bank, which includes providing lines of credit, loans for import of capital goods and raw materials, and loans for overseas and export projects, including equity investments.

i. General Government issues

Under the Indian Constitution, the states have primary responsibility for assuring public health for their residents.⁹⁷ But the Central Government has certain responsibilities, and as a matter of historical development and the present fact that the Central Government plays a substantial role in supporting public health. The Constitution generally recognizes a duty on the Union as well as the states to improve public health.⁹⁸

One issue with respect to the Indian bureaucracy is that while it may employ some of the brightest people in the country, the embedded practice of shifting bureaucrats from one department to another on a regular basis means that there are few senior bureaucrats in the Central Government who have an in-depth knowledge of the pharmaceutical industry.

The various Central Government ministries do not necessarily see eye-to-eye with respect to issues regarding pharmaceutical policy. For example, while the Ministry of Health has been receptive to the idea of compulsory licensing for essential medicines, the Commerce Ministry has been less receptive.

j. Public access

The ultimate objective for encouraging local production of medicines is to improve availability of treatments and prophylactics to the local population, as well as for export markets. India devotes a substantially lower percentage of its national budget to public health than other countries in comparable circumstances,⁹⁹ and is faulted for this.¹⁰⁰

96 See Letter from Samuel Joseph, Gen. Manager, export-Import Bank of India to Dr P. J. Appaji, Dir. Gen., Pharmexcil, regarding Financing Solutions were Indian Pharma Industry, 28 May 2012, posted at <http://www.pharmexcil.com/useful-information>, and; Export-Import Bank of India, *Specialized Financing Programmes for Pharmaceutical Industry*, PowerPoint presented in Mumbai, 16 April 2012, posted at <http://www.pharmexcil.com/useful-information>.

97 Constitution of India, Seventh Schedule, List II – State List, para. 6. See also Dr Akhilesh Bhargava, *Public Health Care In India*, PowerPoint, Slideshare, published 2 February 2010, <http://www.slideshare.net/akhileshbhargava/public-health-care-in-india>; Dr Divya H M, *Indian Health System – An Overview*, PowerPoint, Slideshare, published 7 May 2010, <http://www.slideshare.net/drdivyahm/indian-healthcare-system-an-overview>. CUTS International indicates:

The Indian Constitution envisages a federal structure with areas of operation divided between the Central and state governments. The seventh schedule of the Constitution of India contains three exhaustive lists of items: the Union List which enlists items which are legislated on by the Centre; the State List which recounts items which fall under the purview of the State Legislature; and the Concurrent List. As per the allocation of items to the authority of the State and the Centre, although some items like public health, hospitals, sanitation, etc. fall in the State list, the items that have wider ramification at the national level like family welfare and population control, medical education, prevention of food adulteration and quality control in manufacture of drugs etc. have been included in the concurrent list. CUTS International, *Government Procurement in India: Domestic Regulations & Trade Prospects* 33 (2012).

98 *Ibid.*

99 See, e.g. WHO Global Health Expenditure Database, HEALTH SYSTEM FINANCING COUNTRY PROFILE: India, 2013, showing government resources allocated to health at below 5% of all government expenditure, and below 2% as a percentage of GDP. Bangladesh allocate about 8% of government expenditure to health, and somewhat more than India is a percentage of GDP. China expends about 12 1/2% of government spending on health, and about 5% as a percentage of GDP. India spends \$61 per capita per year on health, while China spends \$367 per capita per year.

100 See, e.g. Dipika Bansal and Vilok K. Purohit, *Accessibility and use of essential medicines in health care: Current progress and challenges in India*, *J Pharmacol Pharmacother.* 2013 Jan Mar; 4(1): 13–18. doi: 10.4103/0976500X.107642; PMID: PMC364333.

It appears that in the 2015 budget, the Indian Government may have reduced overall expenditures on health care by 17%, including cutting expenditures on a programme announced to increase access to medicines.¹⁰¹ It seems reasonable to conclude that the announced intention of the Government to improve access to medicines through making available low-cost medicines will continue to suffer from a lack of funding,¹⁰² notwithstanding the Government's expressed optimism.¹⁰³

The Indian pharmaceutical industry makes the country self-sufficient in terms of supplying formulations of essential medicines.¹⁰⁴

According to the Secretary of Health of India, drugs are made available free to the local population at public facilities. This general observation was confirmed at the Department of Industrial Policy and Promotion (DIPP). However, it was acknowledged that availability may be an issue. In other words, drugs may be "free", but they may also be in short supply.¹⁰⁵ This is confirmed, for example, by sources such as IMS Health.¹⁰⁶

101 Malathy Iyer, *Budget 2015: Experts slam government for slashing health budget*, TIMES OF INDIA, 28 February 2015, <http://timesofindia.indiatimes.com/budget-2015/union-budget-2015/Budget-2015-Experts-slam-government-for-slashing-health-budget/articleshow/46414052.cms>; Aditya Kalra, *India slashes health budget, already one of the world's lowest*, Reuters Business News, 23 December 2014, <http://in.reuters.com/article/2014/12/23/india-health-budget-idINKBN0K10Y020141223>.

102 <http://janaushadhi.gov.in/>. See note III.C.2.j *infra* regarding Jan Aushadhi Stores Scheme.

103 ET Bureau, *Government to supply 500 low-cost Jan Aushadhi Drugs in local stores from July*, Economic Times (India), 20 January 2015, noting that up until now:

A government commissioned consultancy tasked with preparing a new viable business plan for the project in 2013 estimated that only 84 such shops are functional of the 149 odd that were set up since the scheme's inception in 2008 and despite the mandate to store 319 drugs, only 85 drugs across 11 therapeutic groups were supplied to the stores.

A limited portfolio of medicines coupled with chronic stock-outs has seriously eroded the credibility of these stores as customers desire a one-stop shop for all prescribed drugs, the consultancy found.

http://articles.economictimes.indiatimes.com/2015-01-20/news/58268263_1_jan-aushadhi-85-drugs-generic-drugs.

104 Per the Working Group Report:

India is largely self-sufficient in case of formulations, though some life saving, new-generation-technology-barrier formulations continue to be imported. This is evident from the fact that out of the list of 348 medicines enlisted as "Essential Medicines" in the NLEM 2011, all are manufactured by domestic pharma industry.

105 See, e.g. Singh PV, Tatambhotla A, Kalvakuntla R, et al., *Understanding public drug procurement in India: a comparative qualitative study of five Indian states*. BMJ Open 2013;3:e001987. doi:10.1136/bmjopen-2012-001987, stating:

Figure 1 shows a decreasing trend in the supply of free medicines since 1986 and also a corresponding increase in the number of people not receiving any medicines at all for outpatient care.

Private health expenditure constitutes almost 70% of the total health expenditure of which drugs form a massive component with anywhere between 20% and 65% in India and other transitional economies compared with 18% in Organization for Economic Cooperation and Development (OECD) countries. The burden of purchasing medicines is very high in India, accounting for the second largest bulk of expenditure after food.

The high cost of medicine purchase in India and relatively low public health investment is exacerbating the lack of access to essential medicines. It is now well known, accepted and documented that out-of-pocket (OOP) payment for health care has pushed many people into poverty. Bearing the costs of a single hospitalisation, 35% of people fall below the poverty line and OOP medical costs alone may push 2.2% of the population below the poverty line in 1 year.⁷ Figure 2 below gives a glimpse of the health care spending in India for 2004–2005 across various states.

106 IMS Institute, *Understanding the Role and Use of Essential Medicines Lists*, April 2015, stating:

Funding issues and shortcomings in procurement and distribution systems result in poor supply of essential medicines. Shortages are a particular issue in public health centres, but also affect availability in government hospitals, where patients are sometimes forced to purchase products from alternative sources.

https://www.imshealth.com/imshealth/Global/Content/Corporate/IMS%20Health%20Institute/Insights/IIHI_Essential_Medicines_Report_2015.PDF.

It was also observed that individuals may prefer to purchase drugs in the commercial market rather than obtain them from public health facilities. There is, apparently, a belief that commercially marketed drugs may be 'better' in some sense than the drugs made available by the Government.¹⁰⁷

It is somewhat difficult to reconcile the idea that the Indian public health system makes drugs available free to the local population with the often-made observation that the Indian public pays for drugs 'out-of-pocket' (OOP) rather than through health reimbursement schemes, necessitating that drug prices be maintained low.¹⁰⁸ The most recent edition of the *WHO World Medicine Report* (2011) shows that the Indian public pays a large proportion of its medicines expenditures out-of-pocket: 83% in rural areas and 77% in urban areas.¹⁰⁹

In 2008 the Indian Government announced the Jan Aushadhi Scheme of stores from which members of the Indian public could purchase unbranded medicines at affordable prices.¹¹⁰ It was intended that Government-run pharmaceutical facilities (PSUs) would supply a good part of the medicines. Perhaps remarkably, other than limited start-up costs, this programme was viewed as running on a self-sustaining business model, according to the recently updated plan:

It was envisaged that the Scheme would run on a self-sustaining business model, and not be dependent on government subsidies or assistance beyond the initial support. It was to be run on the principle of "No Profit, No loss".¹¹¹

The initial roll-out of the programme was unsuccessful, being sharply criticized by an independent consultancy report, and in 2013 the Central Government adopted "A New Business Plan" for the Jan Aushadhi Scheme, designed to address the shortfalls of the previous plan. However, given the range of problems suffered during the initial roll-out, and the continued reliance on an essentially self-funding model directed toward very poor parts of the Indian population, it is difficult to see this as a potentially effective mechanism for substantially increasing access to medicines in India.

The allocation of responsibilities in India for the public procurement of medicines is complex. There is no unified national law; responsibility is allocated between the central, state and local governments, and there are a variety of procurement models used.¹¹²

107 *Ibid.*:

The current level of implementation [of essential medicines policy] appears to be poor with factors such as poor medicine supply and distribution systems, insufficient health facilities and staff, low investment in health, the high cost of medicines adversely affecting the availability of medicines, and lack of confidence in the quality of medicines supplied through the public health care system.

108 Singh et al, note 97. CUTS International notes: "Despite the large market size, India's health care spending is lower than the world average of 9.7 cent. It is also lower than that of developing countries like China – this will positively impact the growth of the Government procurement market."

109 The WHO World Medicines Situation Report (3d ed. 2011). Working Group Report.

110 See Working Group Report, e.g., at p. 84; Special Correspondent, *Government to re-brand and revamp 'Jan Aushadhi' scheme*, The Hindu, 23 March 2015, <http://www.thehindu.com/business/government-to-rebrand-and-revamp-jan-aushadhi-scheme/article7024579.ece>.

111 Jan Aushadhi Scheme, A New Business Plan, Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, New Delhi, 4/26/2013.

112 See CUTS.

More affirmatively, the Tamil Nadu Medical Services Corporation (TNMSC)¹¹³ and Rajasthan Medical Services Corporation (RMSC)¹¹⁴ supply free medicines under UHC programmes within these states. Their annual budget is approximately INR 350 crore (or approximately 5 215 000 US\$) for TNMSC and INR 250 crore (or approximately 3 725 000 US\$) for RMSC. TNMSC serves 40% of the Tamil Nadu population.¹¹⁵

According to Dilip Shah, the TNMSC and RMSC use open bidding procurement systems, and have had significant success in reducing the cost of medicines purchases.¹¹⁶ Shah viewed this as an alternative preferable to price controls for holding down costs.¹¹⁷ The *WHO World Medicines Situation Report 2011 edition* also refers favourably to the procurement model of Tamil Nadu, and provides a description of the model.¹¹⁸

The Government is a major purchaser of drugs from SMEs. Ninety per cent of the drugs in the Indian market are supplied by domestic production.¹¹⁹

On the whole, there appears to be a significant disconnect between the successful development of India's pharmaceutical industry and access to medicines by the large

113 Available at www.tnmisc.com/.

114 Available at rmisc.nic.in/.

115 According to Dilip Shah, a study by Prayas for RMSC showed that for a recent year for INR 250 crore, RMSC procured medicines worth INR 2,500 crore at the current market prices. Thus, people not only got free medicines, but also saved INR 2,500 crore from out of pocket expenses. Email from Dilip Shah, 10 September 2016.

116 See TNMSC, Best Practices for Improving Access to Health Care, PowerPoint Presentation, 2011, detailing procurement practices (in author's files). According to Dilip Shah, the Indian state Tamil Nadu has been running for 20 years now a successful model in which price reductions are achieved by tendering. There is a private company Tamil Nadu Medical Services Corporation which puts out the tenders to the Indian companies, including multinationals in India, that participate in the tenders. There is a 1 to 10 ratio of the prices paid in that Tamil Nadu tender market compared to prices in the private market. Drugs are much cheaper. The state provides 40% of the funding and the central government provides the remaining funding. The state provides free medicines to everyone, rich and poor, it is universal health care. There are no doctor's fees, and even the most expensive medicines are free. There are two indicators of the success of the model by independent studies. There is a much more favourable opinion of government hospitals, more people are going. IMS health says that Tamil Nadu is one of the fastest growing health care markets, while the rate of growth elsewhere in India has decelerated. This has been successful in Tamil Nadu and Kerala. Another experiment was tried in Rajasthan, which was initially successful but was based on the initiative of its founder, which was not institutionalized. The fall of the government caused the fall of the programme. The central government is being pressed to give the state 50 or 60% of what they spend and let them do it because health care is a concurrent subject. The state is primarily responsible, but the central government has a significant responsibility. (Interview, *supra* note 18). See also, Manavi Kapur, Is Rajasthan's medical scheme past its expiry date?, Business Standard, 21 March 2015.

117 The Working Group Report states:

It is quite encouraging to find that several States have taken the initiative to provide medicines at a much lower price than those in the market. These States include Tamil Nadu, Bihar, Orissa and Rajasthan. For instance, Rajasthan has demonstrated that through tender and negotiations if competition could be activated among different reputed manufacturers, the supplies of medicines could be made available at much more affordable rates and in a viable and sustainable manner. In this regard, if the tender system is meticulously followed and the prices of required medicines are centrally decided at the state level by a single agency, essential medicines of mass consumption can be made available at about one tenth of the printed price. The model does not require government funding or subsidy, unless these are provided free of cost. But the procedures and systems need to be made more transparent for ensuring smooth supplies. This would also re-assure the manufacturers of a continuous and rising demand which would enable them to plan their production programme in advance.

118 *World Medicines Report 2011*.

119 See, e.g. William Greene, U.S. International Trade Commission, The Emergence of India's Pharmaceutical Industry and Implications for the U.S. Generic Drug Market, Working Paper No. 2007-05-A (2007). The United States market is highly consolidated in terms of procurement. There are two or three large pharmacy chains, and three or four purchasing groups, that make all of the decisions. In order to be selected by one of these groups, a supplier must make available something in the order of 90 products. It is difficult to supply single niche products, which accounts for some shortages in the United States.

number of relatively poor individuals in India.¹²⁰ It is difficult to view this as a problem of India's private pharmaceutical sector since the pharmaceutical manufacturers appear quite capable of supplying low-cost medicines to the Indian public. It rather appears to be a lack of Government direction of resources to public health procurement and supply. An already globally low level of funding for public health has been cut, and this presumably will have an adverse impact on the level of funding provided by the Central Government for medicines procurement.

While some state governments are taking significant steps to promote improved access, without a greater financial commitment from the Central Government, it is difficult to see how the medicines access situation will improve. In this regard, it can be suggested that there is not necessarily a direct correlation between the successful development of a local pharmaceutical sector and access to medicines among the poor part of a country's population. In the case of India, the two mechanisms are currently not operating in tandem to produce a good public health result.

A comprehensive report regarding mechanisms to improve access to medicines in India was completed in 2005, and includes a number of important recommendations. This is attached as Annex 4.

Nonetheless, it must be observed that the success of the Indian pharmaceutical industry and its pathbreaking supply of low-cost generic HIV drugs, for example, was a significant boost for global public health, and changed the lives of many people in Africa and elsewhere. This was made possible in large part because of the absence of pharmaceutical patent protection until 2005.

k. Procurement preferences

Government procurement in general constitutes a significant part of Indian gross domestic product.¹²¹ There is no unified public procurement law of India, and procurement may be undertaken at the Central Government, state and local levels.

Preferences in favour of the goods and services of locally-based companies are a common feature of government procurement practices in many countries. As discussed in section III.C.2.r below, such preferences are subject to certain limitations pursuant to international trade rules, but this depends on the circumstances of the particular country and purchasing entity. India is not party to the *WTO Agreement on Government Procurement (GPA)*, and the limitations flow mainly from Article III:8 of the GATT 1994, which provides an exemption for government procurement not for purposes of commercial resale.¹²²

A detailed study of Government procurement in India by CUTS International observes: "Official data detailing the market size of government procurement of drugs and equipment in the health sector is scarce in India."¹²³ It is nonetheless estimated that as

120 Chaudhuri 2007.

121 Between 20% and 30% depending on which data sources are used. See generally, CUTS International, *Government Procurement in India: Domestic Regulations & Trade Prospects* 33 (2012) (hereafter "CUTS").

122 GATT Article III:8 provides an exemption from the general requirements of non-discrimination between locally produced and imported goods of Article III as follows:

8.(a) The provisions of this Article shall not apply to laws, regulations or requirements governing the procurement by governmental agencies of products purchased for governmental purposes and not with a view to commercial resale or with a view to use in the production of goods for commercial sale.

123 CUTS.

of 2012 the Indian public health system spent about 1 billion US\$ (i.e. 6000 crore rupees) purchasing drugs.¹²⁴ In the pharmaceutical sector there is a specific pricing preference applicable to purchases of certain essential medicines from pharmaceutical central public sector enterprises (CPSEs).¹²⁵ In addition, there is a Central Government order that 20% of government procurement should be undertaken from micro and small enterprises, with the target of 20% achieved and mandatory as of 1 April 2018.¹²⁶ A survey of five Indian state procurement mechanisms indicated that four of them provided pricing preferences for small-scale industries (SSIs) as well as public sector enterprises, typically in the range of 10–15% pricing preference, while the fifth limited preferences to reserving a quota of purchases from SSIs at a matching price.¹²⁷

Regarding preferences and procurement more generally, while there do not appear to be specific pricing preferences in favour of Indian national suppliers (other than CPSEs and SSIs), there appears to be an informal preference for procurement from Indian companies.¹²⁸

Private sector executives in India suggested that for a region such as Africa, procurement price preferences are a virtual necessity if local production is going to be successful. But, the system must be transparent. So, for example, local producers get a 15% discount on the tender price, without adjustments. Once you start adding conditions, possibilities for corruption and mismanagement enter the picture.

I. Ecosystems

One of the main points made by private industry participants is that India has developed an ecosystem for pharmaceutical manufacturing that makes it cost-effective for companies to do business within the country. For example, manufacturing line test equipment needs to be periodically validated by the manufacturer of the equipment. The major pharmaceutical equipment companies have local representatives in India who will go to the plant and validate the equipment. This is a much less costly endeavour than bringing in manufacturing representatives from Europe or elsewhere.

The ecosystem basically extends to all areas of manufacturing, including computer software support, equipment repair, packaging materials and transportation.

124 *Ibid.*

125 Department of Chemicals & Petrochemicals OM No.50013/1/2006-SO(PI-IV) dated 7 August 2006.

126 Ministry of Micro, Small and Medium Enterprises Office of Development Commissioner (MSME)(India), Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012. http://eprocure.gov.in/cppp/sites/default/files/ordersandcirculars_contents/ORD_DOC_NO_4/imsme_FinalPressorder.pdf.

127 Singh et al, note 105.

128 CUTS states:

Purchase Preference Policy

While the GFR 2005 Rules seem to be the principal regulation with respect to government procurement, there are other departmental orders dealing with the purchase of drugs and other medical devices. Moreover, different states (and also different programmes) appear to have their own procedures of public health procurement. Deserving special mention is a Central Government order issued by the Department of Chemicals & Petrochemicals, granting purchase preference exclusively to Pharma Central Public Sector Enterprises (CPSEs) and their subsidiaries in respect of 102 specified medicines manufactured by them has been dealt with in detail in Box 4.2. Interviews with the relevant stakeholders confirmed that there exists a preference policy in favour of Indian companies (PSUs or Indian MNCs). For example, if A (Indian company) manufacturers the drugs/medicines and bids for its supply in the GP market, it will be preferred over company B (foreign company) for identical medicines. This practice curtails competition in the GP market and reduces the benefits that could otherwise be relayed to the consumers.

From the perspective of the more sophisticated Indian manufacturers, other countries seeking to establish local production face a challenge in developing the kind of ecosystem present in India, making it difficult for them to compete.

m. Education

Industry participants stressed that India has an excellent public education system that is highly competitive and which produces graduates with strong technical expertise. India has also put in place the National Institute of Pharmaceutical Education and Research (NIPER) educational institutions, which are primarily devoted to post-graduate education specifically directed toward the pharmaceutical industry.¹²⁹ Without doubting the importance of NIPERs, some industry experts noted that the number of graduates from NIPERs is small in comparison to the needs of the India pharmaceutical sector, so that greater reliance is actually placed on the broader public education system, including its premier technical institutions.

It was also noted that a substantial number of Indian scientists had trained in the United States, including at the most prestigious institutions, and had returned to India. Particularly in the area of advanced biotechnological research, it is a challenge to compete with the educational and R&D infrastructure of the United States.

n. Information technologies

Both Amazon and Google recently announced large-scale expansion of their operations in Hyderabad with very significant plans for employment.¹³⁰ A visitor to Hyderabad must be struck by the dynamic expansion of the information technology (IT) sector in what has been considered a 'pharmaceuticals town'.¹³¹ The Pharmaceuticals Working Group for the XIIth five-year plan¹³² took note of a relatively underdeveloped IT infrastructure with respect to the pharmaceutical sector, including with respect to R&D, and encouraged attention to this area, though without recommending a specific plan.¹³³

129 See, e.g. National Institute of Pharmaceutical Education and Research (NIPER), <http://www.niper.ac.in/> (Nagar) and <http://www.niperhyd.ac.in/> (Hyderabad).

130 See, e.g. *Google, Amazon to go ahead with expansion plans in Hyderabad*. Times of India, 10 September 2014, <http://timesofindia.indiatimes.com/tech/tech-news/Google-Amazon-to-go-ahead-with-expansion-plans-in-Hyderabad/articleshow/42164092.cms>.

131 The author of this report visited in June 2015, having previously visited Hyderabad several times in prior years and was struck by the scale of the construction of new buildings housing IT companies.

132 Refers to the XIIth five-year plan of the Department of Pharmaceuticals; part of the Ministry of Chemicals and Fertilizers (<http://pharmaceuticals.gov.in/about-department>).

133 The Working Group Report states:

(6) IT in Pharma R&D

There is a growing importance of IT in the pharma industry. Thus, even though the pharma industry is a life-saving products and health care industry, it has been a slow and late implementer of IT tools. Use of IT can help in:

- i. Data analysis for molecular screening
- ii. Clinical research data management (CDM)
- iii. Animal modelling
- iv. Biomarkers for safety and effectiveness
- v. Bio-statistics
- vi. Bio-informatics
- vii. Genome research
- viii. Process implementation in terms of ERPs, Regulatory submissions.

Development of tools for these and other activities is a continuous and expensive process particularly for the SME sector. At present DIT, DBT, DST, etc do not have any scheme to assist SMEs for capacity building and IT tools deployment for better, newer and cheaper drugs. This is especially important in the bio-pharma industry where Indian pharma industry needs to develop skills as good as in medicinal chemistry to take the next generation drug revolution leadership globally. In this context it may be useful to consider a scheme for filling this gap and ensure capacity building and technology enhancement of the pharma industry to make it globally more competitive.

The dynamic development of the India IT sector, including the large number of individuals being employed, suggests that the integration of IT and drug development, as well as IT and pharmaceutical manufacturing process, is a candidate for further strengthening India's competitiveness in the pharmaceutical sector, as well as potentially unlocking important discoveries with public health implications. Companies such as Google have moved into the bioinformatics arena, and the integration of big data with new drug development is already an important trend, certainly in the United States. In addition, the India Government would benefit from improved integration of its own IT infrastructure in respect to the pharmaceutical sector.

All of this suggests that there is room for coordinated attention to bringing together India's IT resources to further the development of the pharmaceutical industry, both in the context of R&D and manufacturing.

o. Unfair trading practices

India and China are major competitors in the pharmaceutical sector, and that competition is likely to intensify. Particularly with respect to APIs, participants in the Indian pharmaceutical sector are concerned that China is providing 'non-market' advantages to its producers, especially with respect to subsidization of energy costs. Electricity is a major input in the API production process, and Chinese API producers appear to be securing electricity at half the price of Indian manufacturers.¹³⁴

Part of the problem for the Indian manufacturers is that energy is subject to government fees or taxes, raising the prices above the commodity price. The manufacturers have suggested that the Government reduce or eliminate those fees as a form of encouragement for the API sector.

p. Export promotion

The Government of India, in cooperation with the private sector, has established a pharmaceutical promotion body, Pharmexcil, which plays a very active role in support of the export sector of the country.¹³⁵ Pharmexcil consults extensively with a 4000-member domestic constituency, and works to promote the interests of the constituency with the Government, bringing issues of policy concern to attention. In addition, Pharmexcil works on problem-solving with export destinations, such as by resolving issues relating to regulatory requirements.

Pharmexcil works to facilitate learning about the India industry by prospective foreign purchasers, and by foreign government officials, by hosting visits to India and conducting missions abroad. It conducts training sessions for domestic and foreign industry, and government participants, on matters such as compliance with regulatory requirements. It also publishes information regarding doing business in India.¹³⁶

Pharmexcil organizes and participates in trade shows inside and outside of India, including by sponsoring the participation of SMEs at international trade shows.

134 Interview with Dilip Shah, note 21.

135 Pharmaceuticals Export Promotion Council of India, <http://www.pharmexcil.com/>.

136 See, e.g., Pharmexcil, Guidance document for import of Drugs and Pharmaceuticals from India, and; Pharmexcil, Indian Biopharmaceutical Industry: Important guidelines & incentives available to exporters of pharmaceuticals, biological, biopharma and bioservice sectors (4th ed. 2015).

Pharmexcil notes that the India Government does not provide significant financial support to the private sector pharmaceutical industry, principally because that industry is financially healthy, and other areas of the Indian economy require greater financial attention.

q. Technology leap-frogging

It is important to note that new technologies are being introduced for the production of pharmaceuticals, even as the possibility for their wide adoption must be demonstrated. For example, 'continuous flow' processing is a new technology that eliminates the segmentation of the production process, and provides for an 'end-to-end' single-line that is entirely automated.¹³⁷ There is a great deal of cost associated with converting an existing plant from 'batch' to continuous flow processing, and it may be that this technology will not prove viable for most manufacturers. Moreover, for countries where there is substantial employment in the pharmaceutical sector, it may be more cost effective to maintain the existing batch processing arrangement than to introduce continuous flow processing.¹³⁸ Nonetheless, as in other fields, the possibility that 'disruptive' technologies will be introduced should be noted, and that newly introduced pharmaceutical manufacturing facilities may be able to achieve advantages over existing facilities, providing opportunities for developing countries that are late entrants to the pharmaceutical manufacturing arena.

r. Potential issues concerning world trade rules

The principal set of rules governing multilateral trade is found in the agreements of the WTO. Specifically with respect to the pharmaceutical sector, rules regarding tariffs and quotas, government procurement, technical standards, protection of IPRs, and regarding dumping and subsidies measures are especially relevant.

Section III.C.2.g above discusses the relevance of WTO TRIPS Agreement rules to Indian law and policy in the pharmaceutical sector.

137 See, e.g., Bernard Trout and Walter Bisson, *Continuous Manufacturing of Small Molecule Pharmaceuticals*, MIT/Novartis PowerPoint (2009), <http://www.qbd-dtc.com/wp-content/uploads/continuous-manufacturing.pdf>; James Bruno, *Manufacturing in the 21st Century: Continuous Flow Chemistry has Arrived*, Nov. 21, 2014, Am. Pharm. Rev. <http://www.americanpharmaceuticalreview.com/Featured-Articles/169309-Manufacturing-in-the-21st-Century-Continuous-Flow-Chemistry-has-Arrived/>; Cynthia Challenger, *The Main screening of Continuous Flow API Synthesis*, 38 *Pharmaceutical Technology*, Issue 7, 2 July 2014, <http://www.pharmtech.com/mainstreaming-continuous-flow-api-synthesis>.

138 Dilip Shah discussed this transition, also from the perspective of potential adoption in Africa, indicating that: Most companies, including Indian companies, today use 'batch' processing. The US FDA is looking into continuous flow processing where you move all the way from APIs to tablets or capsules with one machine. This would involve a transition from batch processing. This would be a big challenge even for Indian manufacturers. It involves a huge potential investment and would cut employment. In continuous flow processing there is no human intervention. It would be a huge challenge for a country to go from not having a significant manufacturing base to this type of processing. If you look in an Indian domestic plant you will see 50 to 100 HTLC machines which do quality control analysis. Each machine cost Rs.3.5 million. This is for quality assurance. The machines need to be validated periodically in case of a malfunction. With continuous flow processing testing on steps does not exist. You go from input to output. Where do you check quality? South Africa is more advanced in manufacturing than other developing countries in Africa, and there is some possibility there. India has all of the ancillaries to the suppliers set up. If someone needs an expert to recalibrate a machine or validate it, they are based locally, they do not need to fly in from London. This type of support system may not be available in Africa. With continuous flow there is only one machine. The FDA is looking at this from a GMP standpoint. What do you recall if there is a problem? Individual batches are not identified, and the machines have a huge volume. Africa does not need this huge volume. Maybe some antiretrovirals. In principle South Africa could supply the region. A 10% price preference would have to be funded by the government.

In adopting government incentives with respect to an area of production, WTO rules regarding subsidies may become relevant. Subsidies are governed under the WTO by an *Agreement on Subsidies and Countervailing Measures* (Subsidies Agreement), which is grounded in Article XVI of the *General Agreement on Tariffs and Trade 1994* (GATT). As a general proposition, the Subsidies Agreement prohibits WTO Members from adopting and implementing “export” subsidies. In general, “export” subsidies are payments or bounties that are (i) expressly contingent on the export of products; or (ii) granted to a specific industry or group of industries, and cause material harm to another Member.

So-called ‘free trade zones’ (FTZs) or ‘special economic zones’ (SEZs) are a common feature among members of the WTO.¹³⁹ These areas may be created by a legal fiction so as to be outside the ‘customs territory’ of the country, so that ordinary rules of tariffs and local taxation may not be applied. Typically, FTZs/SEZs allow tariff-free importation, working of inputs, and exports without payment of local duties or taxes. The legal status of FTZs/SEZs as a matter of WTO law is complex. There appears to be general agreement that exemption of exported products from import duties, indirect taxes, taxes connected with consumption of goods in production process, exemptions connected with export of production waste, for storage, and “nonspecific” subsidies are permissible. Other types of subsidies may either be prohibited, or assessed on a case-by-case basis. In order to facilitate compliance with WTO rules, the authors of a World Bank study recommend removing requirements to export, as well as permitting importation of goods manufactured in FTZs/SEZs into the national customs territory without any restrictions other than the application of import duties and taxes.¹⁴⁰

It appears that India has taken steps to encourage conformity of its pharmaceutical cluster policies with applicable WTO rules, and this report does not attempt to make a specific assessment of Indian cluster policy in relation to WTO law. It notes, however, that in terms of models for best practices, governments must be attentive to the rules of the WTO Subsidies Agreement (and there are waivers that may be applicable for least-developed countries).

Another area where caution must be exercised is with respect to preferences for local industry connected with government procurement of medicines. India is not party to the *WTO Agreement on Government Procurement*,¹⁴¹ and has not committed to be bound by rules with respect to avoidance of preferences in purchasing for government noncommercial use. It thus enjoys freedom from the principle of non-discrimination under GATT Article III provided by GATT Article III:8 for this limited purpose. Procurement of medicines for supply to public hospitals of medicine either free or “not for profit” almost certainly comes within the GATT Article III:8 exemption. Extension beyond this type of purchasing and distribution may be subject to restrictions based on GATT rules, although such restrictions may be overcome by public health exemptions (e.g. under GATT Article XX(b)).

As a general principle, the objective of GATT and WTO rules is to limit discrimination among imported and domestically-produced products so as to facilitate free movement of goods and services. Government programmes intended to protect local industry at the expense of foreign industry tend to be the objects of WTO rules.

139 See, e.g. Stephen Creskoff and Peter Walkenhorst, *Implications of WTO Disciplines for Special Economic Zones in Developing Countries*, Policy Research Working Paper 4892, World Bank (April 2009).

140 World Bank.

141 https://www.wto.org/english/tratop_e/gproc_e/memobs_e.htm.

IV. Summary of the Indian model

A knowledgeable Indian executive noted that it is difficult for some to see the importance of local production, but it is in the national interest to have local capacity from a scientific and security perspective, as well as a developmental perspective. The India Government recognizes the importance of local production.

India's local pharmaceutical manufacturers have been very successful in developing their businesses up until now. Indian industry sells into strictly regulated overseas markets, earning substantial revenues. Indian manufacturers supply the large part of medicines consumed in the Indian domestic market. Yet this study also shows that there is not necessarily a direct correlation between a successful local pharmaceutical sector from a business or industrial development standpoint and improvements in access to medicines within a country. The latter type of improvement requires a financial commitment by the Government to procure and distribute medicines to individuals without the ability to pay, and while there is some positive momentum among a few state governments, at the moment the India Central Government is reducing an already low health care budget. From the standpoint of modelling for other developing countries, it is important to stress the importance of adequate overall funding for health care.

The objective of this study is to identify policies and practices adopted by the India Government that may provide useful learning for other developing countries (in particular) in promoting local production of medicines and related R&D.

1. The historical development of India's pharmaceutical sector involved forgoing pharmaceutical product patent protection, establishment by the Government of public manufacturing facilities and financial opportunities for local producers based on large differences between prices charged by multinationals and local producers for finished products. Although LDCs may forgo pharmaceutical product patent protection, other developing countries are now bound by WTO TRIPS Agreement rules that mandate such protection. Also, the spread between prices of generic products supplied by multinationals and local producers does not provide the type of opportunity that existed at the initial phase of India's pharmaceutical industry development.
2. The success of India's pharmaceutical sector today seems largely grounded in dynamic private companies seeking to take advantage of market opportunities. A major driver of revenue growth has been export of generic formulated products to high-value developed country markets, particularly those of the United States and Europe. The revenues from exports have allowed the major Indian generic producers to invest in upgrading of plant and equipment so as to allow conformity with strict regulatory requirements, enabling export expansion.
3. The Indian domestic market for pharmaceuticals is divided among the major producers and a large number of SMEs. The latter are supported by procurement of essential medicines by state governments and the Central Government. Because the SMEs have not upgraded plant and equipment to meet strict regulatory requirements, they do not engage in exports to high-value markets.
4. There have been questions raised regarding the quality of medicines on the Indian domestic market, and in response the Government is substantially expanding the number of central government inspectors. Training programmes are being initiated

for those inspectors. In addition, operators of small enterprises are being encouraged to move to providing services to the larger operators because the small operators do not have the financial capacity to substantially upgrade their plants and equipment. It is important to coordinate central and state government regulatory controls on manufacturing facilities since, at present, once a medicine is approved by the central authority, the responsibility for inspection of plants is mainly in the hands of the state government regulators. The India state central authority views cooperation with the US FDA as a positive development.

5. The India Government has promoted the concept of the pharmaceutical cluster, which provides exemption from import duties for products that are exported, and from local taxes (depending on the state government). The net benefit from producing in a cluster from a tax standpoint appears to be about 14% (the ordinary 34% corporate rate is reduced to 20%).
6. Recognizing that Chinese pharmaceutical companies have made significant inroads into India's production and export of APIs, the India Government is actively studying proposals for the creation of API-specific clusters situated nearby to existing petrochemical complexes that will enable Indian API producers to exploit lower costs. This would involve the establishment of common infrastructure support (which exists already for certain pharmaceutical clusters), including pipelines to carry chemicals such as solvents from the petrochemical complexes. As a corollary to the establishment of API-specific clusters, the Government is also studying Chinese practices with respect to energy costs, which some believe may be inconsistent with WTO dumping and/or subsidies rules.
7. The India Government is anxious to promote transition to R&D on new pharmaceutical products, both small molecule/synthetic chemistry and biological products. Potential revenues and profits from sales of patented original pharmaceutical products are substantially greater than those from generic products. While the major Indian pharmaceutical companies have begun to invest significant amounts in R&D, this is not yet half (as a percentage of revenues) of the equivalent percentage of OECD originator companies (8% India versus 16–20% foreign multinational companies). Also, the base of revenues of the Indian companies from the sale of generic products is substantially lower than that of the multinational originators, so the aggregate amount invested in R&D is relatively quite low.
8. Looked at from the standpoint of rupee/dollar amounts, India Government programmes to encourage domestic R&D are very modest in comparison with those of the United States, for example.
9. The Government of India has promoted exports through establishing and supporting Pharmexcil. Pharmexcil provides information to its member companies regarding export opportunities, and supports participation in international trade shows. Pharmexcil advocates for the interests of Indian companies in foreign markets, such as when regulatory issues arise. It hosts visitors from foreign enterprises seeking to procure medicines from Indian companies.
10. The Government of India is interested in promoting biotechnological invention as well as the production of biosimilar products. It has established a programme for subsidizing future technologies, and in connection with that provides for joint ownership of inventions with the private sector. At this time, India does not have legislation

providing for private ownership of patents arising out of government-sponsored research more generally, but is studying such legislation. India recognizes that it does not have a venture capital risk-taking tradition in respect to biotechnological R&D investments, and has contemplated the creation of a government-sponsored venture capital fund.

11. India has an excellent educational system in terms of developing and promoting scientific talent. It has a number of high-level public education institutions with entry based on competitive testing. In addition, India has established a network of pharmaceutical industry-specific educational institutions, principally for post-graduate research, referred to as NIPERs. Top Indian students also received post-graduate training at educational institutions in the United States and Europe. In general, the availability of scientifically trained personnel is a strength of the Indian pharmaceutical industry.
12. While the India Government is supportive of the private pharmaceutical sector, and promotes its interest in multinational and regional fora, it does not make a substantial financial contribution to promotion of that sector. This is largely explained by virtue of the fact that the private sector has been successful, and there are many areas within India that need government financial support.
13. One of the key features of India's current success in the pharmaceutical sector is the evolution of a robust 'ecosystem' of supporting infrastructure, suppliers and service industries. Such an ecosystem may develop as a natural consequence of dynamic economic activity around a particular industry. The cluster concept in part may be a way to facilitate the development of an 'artificial ecosystem' (i.e. one that evolves on the basis of government policy).
14. The transition to a pharmaceutical product patent protection regime in India is creating a new environment under which local producers are no longer automatically able to produce and supply the newest pharmaceutical products without infringing third-party patents. As a consequence, there is a good deal of local activity in challenging patent applications and grants at the Indian Patent Office and in the courts. This is creating tensions with home countries of originator companies, including those based in the United States, Europe and Japan. It is also leading the United States, Europe and Japan to seek to 'ring fence' India's pharmaceutical industry and prevent penetration of foreign markets through negotiation of restrictive free trade agreements, such as the Transpacific Partnership Agreement.
15. To protect the interests of the public, the India Government has issued one compulsory license with respect to a patented pharmaceutical product. Such licensing generates tensions with the home countries of affected patent owners, and is bound to be a source of continuing dialogue.
16. The Government seeks to protect the interests of the local population by maintaining a system of price controls on essential medicines that today uses market-based reference pricing to establish benchmarks for pharmaceutical products. This is viewed by industry as a major improvement over the former system that was based on cost-plus formulas. While industry is generally satisfied with the transition to market-based reference pricing controls, there is also advocacy for open tender-based procurement intended to drive down prices through market forces.

17. A combination of central and state government programmes are intended to provide essential medicines to the public free of charge, yet availability of such free medicines is a major continuing issue. The Central Government has recently cut a public health budget that is already comparatively low by international standards. The Central Government must commit to more significant expenditure on health care in general, and medicines in particular, if the situation regarding local access to medicine is going to change.

V. Extending the cluster concept to other geographies

The population of India (approximately 1.25 billion) and the population of the African continent (1.1 billion) are roughly equivalent, implying a roughly equivalent pharmaceutical market in terms of overall demand. Because the cost of pharmaceutical production is substantially dependent on economies of scale, there is an apparent logic to considering the establishment of pharmaceutical clusters to serve the continent of Africa.

Traditionally, the concept of regionalized production facilities has been difficult to implement because of differences among national government authorities regarding the location of such facilities. Each country in the region has an interest in increasing employment opportunities, income generation, tax assessment, etc., within its national territory. One possibility for addressing this traditional stumbling block is the creation of a new 'regional economic zone' (REZ) somewhere on the continent, and disassociated from a particular national government, but instead under authority of a regional organization like the African Union. If the basic concept of the REZ is to allow low-cost manufacture of pharmaceuticals for export around Africa, it may not be necessary to collect and allocate taxes, assuming that relief from traditional tax obligations might be a feature of the zone. The zone could also have its own tariff policies that could be adjusted depending on the requirements for local manufacture (with details to be considered under WTO rules).

Another potential stumbling block regarding the concept of an REZ is competition with national economies if overlap with existing national producers is permitted. It is possible that highly efficient, low-cost REZ-based manufacturers would undercut the prices charged by existing national producers by such an extent that the latter would become non-competitive.

Since Africa does not currently produce a material quantity of APIs, a regional manufacturing zone devoted to APIs should not affect local African producers. Displacement would be of imported products. Trade-related objections might be foreseen from foreign producers (e.g. China), either because their imports are displaced, or if Africa started exporting from the REZ to non-African markets. This is an area that would need to be evaluated under WTO and other international trade rules.

Annex 1: Series of questions for India in preparation of this report

There is a tremendous interest today, in Africa and other developing regions, in promoting the local pharmaceutical industry, particularly production. WHO has been working to provide some guidance, and this is part of that effort. The objective is to look at a country that is known for having fostered a successful pharmaceutical sector and to see if policies and practices adopted in that country might be useful elsewhere. While we are, of course, interested in the challenges confronting the Indian pharmaceutical sector specifically, the main objective here is to focus on what has worked, and what might be transposed to other developing countries.

1. With respect to India, I read the report of the Pharmaceutical Working Group prepared in connection with the 12th Five Year Plan, and thought it was fairly comprehensive. I thought I could use that, along with the 2011 National Manufacturing Policy for this comparative study, without needing to pay a visit. But, I was told by several leading industry people and scholars that the reality was not consistent with the written reports or aspirations, and that I needed to talk with people about what is happening "on the ground". If these individuals are correct, what accounts for the difference between the aspirations and the reality?
2. There is a substantial international press covering the pharmaceutical industry. Most of the reporting concerns activity generated in and by the private sector. To the extent that government is involved, there are two main areas. First is the general area of regulation in terms of GMP and new drug approval. Second, which is largely focused on the United States, concerns the programmes of the National Institutes of Health, such as the new Alzheimer's joint research programme, and the new Center for Translational Research. And, of course the NIH funds close to \$30 billion a year in R&D in a broad sense. These two broad headings would be basically quality and safety regulation, on one hand, and stimulation of R&D on the other. Is there a broader role for government, or is the pharmaceutical sector one that is best incentivized and operated by the private sector?
3. China recently announced that it was removing a large part of its generic medicine supply sector from price controls so as to encourage greater investment in that area. At the same time, my impression is that India has been increasing the number of drugs subject to price controls. For India, is there some reason to believe that the industry will react in a different way, i.e. continue to invest in low-priced generics?
4. Pharmaceutical production has become an increasingly competitive industry sector in terms of cost reductions, and the location of production is continuously shifting. What countries do you see as the primary centres of competition for the Indian pharmaceutical sector?
5. With respect to the countries that you perceive to be actively competing, to what extent do you think the source of industry success is dependent on government policy? Are there any specific policies or practices you look to in these other countries as being particularly effective?
6. It is a common impression that Indian pharmaceutical companies have been very successful in penetrating developed country import markets, but at the same time the

- low-income Indian consumer is not well served in terms of medicines needs. How does the India Government reconcile the positive side of export performance with the weak performance in terms of the Indian public?
7. In India and outside the attention of the R&D-based pharmaceutical industry is turning sharply toward biologic drugs, and research based on manipulating genetic code. In short, the future appears to be in biologics, not small chemical drugs. What policies is the Indian government following to promote R&D on biologics? Presumably Indian companies will also seek to become manufacturing centres for biologic drugs. What policies is the government following to promote that?
 8. Is the Government trying to draw a correlation between disease patterns in India and incentives to the pharmaceutical sector? For example, diabetes is a disease that particularly affects a large part of the Indian population. Does the government have targeted incentive programmes to specifically encourage R&D and production in this area?
 9. I was particularly interested to see in the 2011 National Manufacturing Plan a focus on the development of National Investment and Manufacturing Zones. This would seem to have particular attraction for India, and for the pharmaceutical industry, because of the notorious difficulties in land acquisition and use, and the possibilities for concentrated investment in infrastructure of potential utility to the specific sector. Has there, in fact, been movement toward development of such manufacturing zones? I note, for example, reports from the Middle East of the creation of special sectors for pharmaceutical manufacturing.
 10. India apparently now imports a significant part of its APIs from China, which has become a source of national concern here in India. I found in Brazil when preparing a similar study some seven years ago that there was in effect a perverse tariff and tax policy that imposed greater burdens on local API producers than importers. As it happens, the primary concern at that time was low-cost API imports from India, whereas I expect today it would be from China. (And, I am told that Brazil has fixed its discriminatory tax and tariff situation.) Nonetheless, is the shift to API imports from China in some way being facilitated by Indian tax and tariff policies?
 11. Shifting focus, African governments as evidenced by the Manufacturing Plan for Africa, have been concentrating on plans to develop local pharmaceutical manufacturing. A few Indian companies, such as Cipla and Zydus-Cadila, have invested in and/or partnered with African companies. Indian industry, for example, plays a significant role in the South African market. Do you perceive a conflict between African aspirations to develop local production and Indian interest in domestic manufacturing? Or, is there the possibility for “mutual advantage”, such as through joint venturing? Technology transfer will, of course, play a major role in that.
 12. At a broad level, do you think that government policies for promoting local production as a general matter are sensible if a country like India or China (or Israel) is very highly specialized in this area and can export quality products at low prices? Is there a rational basis for countries in other regions to encourage their own local production? National security is often mentioned, but as a practical matter with a highly integrated global economy and few countries capable of manufacturing along the value chain, the possibilities to be self-sufficient are fairly remote. Does a national manufacturing policy make sense, except for a few countries where production might be centred?

13. I am familiar with the NIPERs programme, which appears to be somewhat unique to India; that is, centres of higher education specifically directed to the pharmaceutical industry. How would you characterize the success or weakness of that programme? Does India suffer from a 'brain drain' once students have graduated? Do they seek to move abroad?
14. My colleague has proposed the idea of Centres of Excellence for Africa. What do you think of the idea of Indian NIPERs cooperating to establish CEOs?
15. A good deal is written now about advances in pharmaceutical manufacturing technology, both in the small molecule sector (e.g. continuous flow) and in biologic-based manufacturing, such as through the use of bio-engineered enzymes to produce APIs. The Big Pharma companies appear to be investing substantially in new production facilities in order to take advantage of these technologies. Do Indian manufacturers have the financial base to allow them to compete in this way? Are there government programmes specifically designed to encourage new investment in manufacturing facilities?
16. The draft national IPR policy (December 2014) is an ambitious document obviously intended, at least, to satisfy USTR and the Special 301 process. Taken more at face value, it proposes that India will be better off if it shifts to a society that better identifies and commercializes IP assets. This is consistent with broad global trends toward valorization of ideas, which affects virtually all fields of endeavour. How practical is the carrying out of the agenda laid out in that document? Is the funding available for training a large cadre of administrative personnel? Do you expect that Pfizer and Novartis will make larger investments in Indian technology if patent protection is strengthened? And, where is the current weakness? Surely not in the Supreme Court's decision in the Novartis case. And, why would Novartis be investing in China as compared with India? Is it because China has a better IP system? Probably not. Perhaps it is because China is paying more attention to training PhD level scientists. And because China, paradoxically, is more of a free market in terms of ultimate sales.
17. The most prominent trend with respect to India and its pharmaceutical sector are acquisitions by foreign-owned enterprises; which is also a phenomenon affecting the global pharmaceutical industry as a whole. India's original transition to rejecting product patents was because of foreign dominance of the local pharmaceutical industry. Does India have concerns about this more recent trend toward concentration of foreign ownership? Is there a correlation between "Make in India" and Make in India under Indian control? Does it matter?
18. US Special 301 report focuses on Section 3(d) and language from Supreme Court in Novartis case that pharmaceutical subject to an additional standard, without noting that WTO panel in Canada-generics case authorized differential treatment was justifiable; and certainly a standard for modifications of pharmaceutical products qualifies. Note that the US Supreme Court has rejected software patenting without a physical transformation and unmodified genetic information, each of which are specific to a subject matter. USTR refers to high-quality patents, while there is no doubt that the USPTO issues many low-quality patents. So, is there a double standard at work?
19. The 2013–14 report of the Department of Pharmaceuticals indicate that there is a good deal of activity taking place at the governmental level, particularly in the area of establishing and enforcing price controls for essential medicines. The government

is apparently providing financial support to at least the government-sponsored manufacturing plants to meet WHO-GMP standards. But, there is not a great deal of evidence that the very ambitious programmes contemplated by the 2011 National Manufacturing Plan are being carried out, such as the creation of dedicated manufacturing zones and infrastructure. This may have been stymied by land-use restrictions. In that report, there is no discussion of tax policy. There is a mention that the building up of bulk product capacity, particularly for small- and medium-sized enterprises is important. But, the amount of funding allocated is very small. Finally, there is almost no discussion of biotechnology.

20. A manufacturing zone appears to make a good deal of sense when talking about APIs. But in Africa, for example, where most manufacturing would be formulation, would this still yield significant benefits?
21. For South Africa, India is the largest component of imported FPPs; but China is way ahead in APIs. What is the significance of this?
22. What do you see as the link between local production and public health? For example, in India there is today considerable concern about dependence on API production in China. Is there a correlation to public health? Should it be the same for Africa?
23. In the view of at least some NGOs and public health departments, price is the only relevant factor in making drug purchases, assuming appropriate quality. Are there factors relating to local production that may justify price preferences for local manufacturers? Does it depend on the context?
24. Does the Government compile a specific document or documents laying out the incentives provided for undertaking local production within the country? In India, for example, the incentives granted to investors may be at the state government, or local government, levels. Are you aware of any compilation of these incentive programmes?
25. In the United States there is legislation (Bayh-Dole) that permits private-sector recipients of government subsidies to file for and obtain patents in their own names, and to exploit those patents (leaving certain residual rights to the government). Is there such legislation in your country, or is such legislation being considered?

Annex 2: List of Government interviewees

Government of India

Rajiv Aggarwal, Joint Secretary, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry.

Dr P.V. Appaji, Director General, Pharmaceuticals Export and Promotion Council of India (Pharmexcil).

Raina Chandni, Director, Department of Industrial Policy and Promotion, Ministry of Commerce & Industry.

J.S. Deepak, Additional Secretary, Department of Commerce, Ministry of Commerce & Industry.

Navreet Singh Kang, Additional Secretary & D.G. (CGHS), Ministry of Health and Family Welfare.

Amitabh Kant, Secretary, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry.

Rajeev Kher, Secretary, Department of Commerce, Ministry of Commerce & Industry.

Sudhanshu Pandey, Joint Secretary, Department of Commerce, Ministry of Commerce & Industry.

Professor K Vijay Raghavan, Secretary, Department of Biotechnology, Ministry of Science and Technology.

G.R. Raghavender, Director, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry .

B P Sharma, Secretary, Ministry of Health and Family Welfare.

Dr G.N. Singh, Drugs Controller General (India), Central Drugs Standard Control Organisation, Ministry of Health & Family Welfare.

K. K. Sinha, Industrial Advisor, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry.

Piyush Srivastava, Director, Department of Commerce, Ministry of Commerce and Industry.

Dr V K Subburaj, Secretary, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers.

Annex 3: Indian Government Institutions engaged in Pharma R&D

A. Under CSIR:

1. Institute of Integrative and Genomic Biology (IIGB), Delhi
2. Institute of Microbial technology (IMTech), Chandigarh
3. Central Drugs Research Institute (CDRI), Lucknow
4. Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow
5. Indian Institute of Toxicological Research (IITR), Lucknow
6. Indian Institute of Integrative Medicine (IIIM), Jammu
7. Institute of Himalayan Bioresource Technology (IHBT), Palampur
8. Indian Institute of Chemical Technology (IICT), Hyderabad
9. Centre for Cellular and Molecular Biology (CCMB), Hyderabad
10. Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar
11. National Chemical Laboratory (NCL), Pune
12. Indian Institute of Chemical Biology (IICB), Kolkata
13. North East Institute of Science and technology (NEIST), Jorhat

B. Under DBT:

1. National Institute of Immunology (NII), New Delhi
2. National Institute of Plant Genome Research (NIPGR), New Delhi
3. Indian Vaccines Corporation Limited (IVCOL), Gurgaon
4. National Agri-Food Biotechnology Institute (NABI), SAS Nagar
5. Bharat Immunologicals and Biologicals Corporation Limited (BIBCOL), Bulandshahar
6. National Centre for Cell Sciences (NCCS), Pune
7. Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad
8. Institute of Life Sciences (ILS), Bhubaneswar
9. Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram
10. Institute of Bioresources and Sustainable Development (IBSD), Imphal
11. Biotech Consortium India Limited (BCIL), Delhi

C. Under Department of Health Research

1. National Institute of Malaria Research (NIMR), Delhi
2. National Institute of Pathology (NIOP), Delhi

3. National Institute of Medical Statistics (NIMS), Delhi
4. Institute of Cytology and Preventive Oncology (ICPO), Noida
5. National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMOD), Agra
6. National Institute for Research in Environmental Health (NIREH), Bhopal
7. Desert Medicine Research Centre, Jodhpur
8. National Institute for Research in Reproductive Health (NIRRH), Mumbai
9. National Institute of Immunohaematology (NIIH), Mumbai
10. Enterovirus Research Centre (ERC), Mumbai
11. National institute of Virology (NIV), Pune
12. National AIDS Research Institute (NARI), Pune
13. Regional Medical Research Centre, Bhuvaneshwar
14. Regional Medical Research Centre, Dibrugarh
15. Regional Medical Research Centre, Jabalpur
16. Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), Patna
17. Regional Medical Research Centre, Belgaum
18. National Institute of Cholera and Enteric Diseases (NICED), Kolkata
19. National Institute of Occupational Health (NIOH), Ahmedabad
20. Tuberculosis Research Centre (TRC), Chennai
21. National Institute of Epidemiology (NIE), Chennai
22. National Institute of Nutrition (NIN), Hyderabad
23. Centre for Research in Medical Entomology (CRME), Madurai
24. Vector Control Research Centre (VCRC), Puducherry
25. Regional Medical Research Centre, Port Blair

Annex 4: India Pharmaceuticals Working Group Report Summary (pages 87–91 of report) of Dr Sen’s report on access

Dr Pronab Sen recommendations

The Task Force under Dr Pronab Sen (Report dated 20 Sept 2005) made certain important recommendations:

- i. In the case of proprietary drugs, particularly anti-HIV/AIDS and Cancer drugs, the Government should actively pursue access programmes in collaboration with drug companies with differential pricing and alternative packaging, if necessary.
- ii. Public Sector Enterprises (PSEs) involved in the manufacture of drugs should be revived where possible and used as key strategic interventions for addressing both price and availability issues. Arrangements may need to be made to ensure their continuing viability.
- iii. Availability of essential medicines through public health facilities should be ensured both through bulk purchases by government agencies, cooperatives or consumer bodies, through public–private partnerships if necessary.
- iv. Insurance companies should be encouraged to extend health insurance to cover medicines.
- v. A process of active promotion of generic drugs should be put in place and all public health facilities should be required to prescribe and dispense generic drugs, except where no generic alternative exists.
- vi. All patented drugs and their formulations could be brought under price negotiations prior to the grant of marketing approval. The reference prices to be used for such negotiations could be based on the premium enjoyed by the drug in the lowest priced market abroad compared to its closest therapeutic equivalent in that same country. This premium can then be applied to the corresponding price of the same therapeutic equivalent prevailing in the domestic market to determine the reasonable price in Indian conditions.
- vii. A centralized agency can be created for negotiation of prices of patented medicines and to ensure its availability by comparing prices based on (i) same active ingredient; (ii) drugs in a pharmacological class; and (iii) drugs with similar therapeutic effect.
- viii. In the Indian context, it could also be possible to draw from the Canadian model and some of the practices in European countries.
- ix. Price controls should be imposed not on the basis of turnover, but on the “essentiality” of the drug and on strategic considerations regarding the impact of price control on the therapeutic class. This must be a dynamic process.
- x. Price controls should be applied only to formulations, i.e. the medicine actually used by the consumer, and not to bulk drugs. Intra-industry transactions should not be controlled unless there are compelling reasons for doing so.

- xi. The ceiling prices of controlled drugs should normally not be based on cost of production, but on readily monitorable market-based benchmarks.
- xii. All other drugs should be brought under a comprehensive price monitoring system with appropriate market based reference prices and with mandatory price negotiations, if necessary.
- xiii. The National List of Essential Medicines (NLEM) should form the basis of drugs to be considered for intensive price monitoring, ceiling prices and for imposition of price controls, if necessary.
- xiv. In the case of drugs not contained in the NLEM, intensive monitoring should be carried out of all drugs falling into a pre-specified list of therapeutic categories. Any significant variation in the prices would be identified for negotiation.
- xv. Over a period of time more effective price monitoring needs to be adopted. All non-controlled drugs could be brought under a comprehensive price monitoring system with appropriate market based reference price and with mandatory price negotiations, if necessary. The ceiling prices of controlled drugs could be based on readily monitorable market-based benchmarks.

General recommendations of the Pronab Sen report

- i. There is a need to balance the interests of consumers and pharmaceutical industry. Pricing of drugs should neither affect the pharma industry, nor the patients. Hence, State intervention through schemes like the National Rural Health Mission (NRHM) is important.
- ii. India, being a very large market, over the years more and more patent protected drugs will be launched here at which point of time the impact on pricing could be large; hence, the Government/regulator would have to implement proper checks and balances/price approval mechanism for patent protected products.
- iii. Under the new patent regime, the transition of the domestic companies from generic to innovative with the ultimate focus on the original research is taking place. The Government needs to support the R & D effort on original research.
- iv. The greater push for TRIPs plus Intellectual Property Rights (IPR) regime needs to be addressed. India should restrict to existing provisions of TRIPs.
- v. The option of using compulsory licensing could be explored in certain cases, thereby allowing third parties (other than the patent holder) to produce and market a patented product without the consent of the patent holder. This would ensure better availability of the medicine.
- vi. The focus could be shifted to an essentiality criterion as suggested by the Ministry of Health & Family Welfare. They suggested that if it is difficult to include the 348 drugs and their formulations under DPCO with the same trade margins; there could be a graded system of trade/profit margins for different categories.
- vii. New drugs developed through indigenous R&D having product patent under the Indian Patent Act 1970 may be exempted from price regulation for a period of ten years. Also products of New Drug Delivery System (NDDS) developed through indigenous R&D may be exempted from price regulation for a period of five years.

- viii. Lack of proper infrastructure, particularly health infrastructure, and poor delivery mechanism are major hindrances for distribution. Hence, the key to health care is not necessarily pricing control but could be better achieved through an improved delivery mechanism, public funding and promotion of the pharma industry.
- ix. Affordability does not mean low cost drugs only. Through promotion of the industry including assistance to quality standards, more units would be set up (including SSI units) resulting in higher production of medicines. This will enhance availability.
- x. There is a need to ensure access of common man (poorer section) to medicines through public hospitals etc. The success of distribution/procurement system of the Tamil Nadu Medical Services Corporation is worth replicating.
- xi. The success of PPP models in health sector like outsourcing ambulance services etc. to private NGOs as done in certain States could be studied in other States also. PPPs in India may help in covering primary and specialty healthcare, including clinical and diagnostic services, insurance, telemedicine, hospitals and medical equipment.
- xii. Allocating resources from national welfare schemes towards health coverage could also be considered. For example, from the funds allocated for MNREGS, some portion could be made available for paying for health coverage of the labourers engaged in such works.
- xiii. Promotion of unbranded generics through Jan Aushadhi Stores (JAS) needs to be explored. JAS could be developed as a brand. Increasing provision of unbranded generics through JAS and public health programmes can also augment availability.
- xiv. The availability of medicines and health facilities in the hilly, tribal and inaccessible areas are either absent or inadequate. Therefore, such areas need to be given special treatment in a mission-mode approach, through which the health services and medicines are provided at affordable rates/prices. The Jan Aushadhi Scheme needs to be expanded to cover these areas.
- xv. In the case of proprietary drugs, particularly anti-HIV/AIDS and cancer drugs, the Government should actively pursue access programmes in collaboration with drug companies with differential pricing and alternative packaging, if necessary.
- xvi. Public Sector Enterprises (PSEs) involved in the manufacture of drugs should be revived wherever possible and used as key strategic interventions for addressing both price and availability issues. Arrangements need to be made to ensure their continuing viability.

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