

Patent or Perish: Is the Indian Pharmaceutical Sector Geared up for the New Stronger Patenting Regime?

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Abstract: The Uruguay Round of Trade Negotiations in April 1994 and the establishment of the World Trade Organization (WTO) in January 1995, raised many questions regarding India's participation in the world trade, its integration with the world economy and the likely costs and benefits from this integration. In the light of this, the present paper tries to assess India's patenting activities in relation with many developed countries and China, a new emerging economy. It also tries to analyze the growth rates of Patenting in pre- Trade Related Intellectual Property Rights (TRIPS) period and Post-TRIPS period. Assessing R&D Investment in pre-TRIPS period and Post-TRIPS period is also a must to visualize the changing scenario. All this helps in providing a picture that is Indian economy geared up for the new stronger patenting regime.

Key words: World Trade Organization (WTO), Trade Related Intellectual Property Rights (TRIPS), Patents, Pharmaceutical sector, India.

INTRODUCTION

The WTO, the lethal and Institutional foundation of multilateral trading system was established on January 1, 1995 by Marrakesh Agreement signed at Marrakesh, on April 15, 1994. The largest ever agreement in history, was signed by trade ministers of 123 countries. The WTO came into existence to administer agreements covering a wide variety of matters ranging from agriculture to textiles and from services to government procurement of Intellectual Property with the main objective of liberalization of the world trade. The WTO operating trading system incorporates three Uruguay Round (1986-94) Agreements; 1) The General Agreement on Tariffs and Trade (GATT), 2) The General Agreement on Trade in Services (GATS), and 3) the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). GATT and GATS covers international trade in goods and services and GATS and TRIPS is an agreement on Intellectual Property. TRIPS is an important component of WTO. Agreement on TRIPS sets minimum standards of protection to be adopted by member countries in respect of a) Patents, b) Copyrights and related issues, c) Industrial Designs, d) Graphical Indicators, e) Trade Marks, f) Layout Designs of Integrated Circuits, and g) Undisclosed Information (Trade Secrets). Intellectual Property embodies products or creations of mind, and Intellectual Property Laws aim at safeguarding creators/inventors and other producers of Intellectual goods and services by granting them exclusive rights to control the use made of these productions. The three most common vehicles for protecting intellectual property are patents, trademarks, and copyrights. In this paper the focus will be on patents only.

Patent, a type of Intellectual Property is granted to inventions in all fields of technology. To qualify for a patent right relating to invention of products, such as medicines, machines etc, the following three conditions need to be fulfilled. The invention has to be: Novel, Non-obvious and of practical use. The inventor has to produce something, which didn't exist earlier. The patent right endows its holder a time-bound monopoly in a given product by stopping others from making, using or selling the invention without the permission of the inventor. The term period for the patent in TRIPS Agreement is 20 years. Earlier it was 5 years from the date of sealing of the patent or 7 years from the date of patent, whichever is shorter, for an invention, claiming the method or process of manufacture of a substance, where the substance is intended or capable of being used as a drug, medicine or food, and 14 years from the date of patents for other inventions.

It is a territorial right. There is no Global or World Patent. For obtaining patent rights in different countries, one has to submit separate patent applications in all the countries of interest. If the country of interest is a member country of Patent Cooperation Treaty (PCT), one can file through PCT and mention the name of the countries of interest as Designate Computer Softwares are not Patentable but copyrightable items in India. However, these are Patentable abroad.

Changes in Patent Laws:

Until now, the Indian manufacturing has been greatly shaped by the provisions of the Patents Act of 1970, whereby Indian patent law only permitted patenting for processes and product patents. This was a key driver in

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the growth of the generics market in particular, but also had significant implications in other major growth industries like software, food, pharmaceuticals and agrochemicals. Many companies were set up to reverse engineer new drugs patented in other countries and develop a new method of production. The drugs could be produced cheaper rates.

India's patent protection was weak and had adverse effects on international pharmaceutical and chemical firms. It is estimated that annual losses to the US pharmaceutical industry due to piracy are \$450 million, but Indian authorities have a different point of view. India's patent earlier prohibited product patents for any invention intended for use or capable of being used as a food, medicine, or drug or relating to substances prepared or produced by chemical processes. Consequently, many drugs invented by foreign companies are widely reproduced.

Processes for making drugs were patentable, but the patent term was limited to the five years from the grant of patent or seven years from the filing date of the patent application, whichever was shorter. Product patents in other areas were granted for 14 years from the date of filing. As per the obligations under WTO Agreement, the Patents (Amendments) Act 1999 was passed in March 1999 to provide for exclusive marketing rights. The Patents (Second Amendment) Bill 1999 to further amend the patent Act 1970 and make it TRIPS compliant, was introduced in Upper House on December 20, 1999. On December 27 2004, the Indian government announced amendments to its Patents Act—just in time for the January 1 2005 deadline previously set for meeting their TRIPS (Trade Related Aspects of Intellectual Property Rights) obligations to the World Trade Organization (WTO). If we have accepted the globalisation of the Indian economy as a policy and political reality, we should not hesitate to accept concomitant obligations. Hence India has introduced a comprehensive system of product patents in Jan, 2005. Bill Gates, the chief executive officer of Microsoft Corporation, considers India as a most promising base for software development. If such an IPR-conscious business leader like Gates is of this opinion, one can only conclude that India's IPR scene is no deterrent to foreign companies.

Theoretical Framework:

Many researchers consider strong intellectual property rights are having a positive influence on patenting and performance of pharmaceutical sectors. A crux of some important studies is provided to get a deeper insight into the issues related to TRIPS and pharmaceutical Industry.

Lanjouw (1998) opines that strong intellectual property rights may make the Indian environment more appealing to MNCs as a location for R&D, it is unlikely that it will make a dramatic difference in their choices. Although strong IPRs are important for multinational corporations in deciding where to locate R&D facility, even after product patenting has been introduced there does not seem to be any compelling reason for them to locate in India. Further, MNC's have increased their local subsidiaries to do developmental work. Thus, Lanjouw is a little apprehensive of this change. On the other hand Salazar, Falconi, Komen, and Cohen, (2000), are of the opinion that the increased push for IPR protection for the research institutions will provide an impetus to commercialization of their technologies and products. Similar Thought is advocated by Grace (2004), who believes that the prospects of changing intellectual property on pharmaceutical industry are extremely positive for the future of the Indian industry. The study shows that one third of all FDA applications came from India in 2003 and this number is expected to be one half in 2004. MNCs have been interested in working with Indian firms for some time, attracted by lower cost structure.

Lalitha (2002), study is based on a SWOT analysis of the Indian pharmaceutical industry in the WTO period reveals that the much applauded IPI's expertise in process development skills were achieved by positive amendments made to the Indian Patents Act 1970. This strength should be utilized to the get to the benefit from opportunities that arise from vertical disintegration of research, clinical trials and manufacturing by the multinationals. IPI faces threats in the form of competition from other Asian giants, particularly China. The IPI should adopt various strategies like producing off-patented products, new patented products by acquiring compulsory licensing or cross licensing, collaborate with multinationals not only in R&D and manufacturing, but also in marketing new patented products and improving the standards of production to widen the export market.

Moving further there have been studies reporting improvement in patenting and R & D. Dhar and Gopakumar (2006) provide analysis to indicate the performance of the firms in the Indian pharmaceutical industry following the changes in the patent regime necessitated by the "Agreement on TRIPS". The study shows that the R&D spending of some of the leading firms has shown increase in Post- TRIPS period and hence R&D intensities of the firms have improved significantly. The results of the study by Pradhan's (2003) indicate that the observed R&D intensity of domestic firms is 2.6 percent and is three and half times than that of foreign firms, which is only 0.74 percent. Mani (2006) in his working paper undertakes a detailed mapping out of the sectoral system of innovation of India's pharmaceutical industry. The study shows that the TRIPS compliance of the intellectual property right regime has not reduced the innovation capacity of the domestic pharmaceutical industry which has visualized an increase in both research budget and patenting. According to Reddy (2006) the growth in R&D for SME and large scale pharmaceuticals is greater than the growth for the general

pharmaceutical sector. Pharmaceuticals have huge resources to devote more investment for R&D and can afford to think about the future.

Chaturvedi and Chataway (2006), highlight that Indian firms are adapting to the changing environments. R&D is recognized as the 'survival kit' in the post-TRIPS scenario. The paper observed that Indian firms are investing in R&D not only for new drug discovery but for developing capabilities to assimilate and exploit knowledge available externally. They are also positioning themselves as a partner of choice for technology savvy national and multinational firms. As Srinivasan (2006) reports, industrial Drugs and Chemical increased their share in global exports; therefore, the observed decline in value added and employment remains unexplained. Small and medium enterprises employ more than 100 employers and generate employment.

Chaudhuri (2006), in his working paper, explores drastic shift in the structure of R&D activities of the Indian pharmaceutical industry after TRIPS came into effect. Primarily the SMEs industries were primarily engaged with the development of new processes for manufacturing drugs, now they are also involved in R&D for new chemical entities (NCE).

Chadda (2006) in her paper has tried to show that Indian firms are spending huge resources to secure non-infringing process patents in foreign countries. After tapping the developing countries, they are trying to access developed countries with drug master filings (DMFs) for bulk actives supply and abbreviated new drug applications (ANDAs) for formulations. The proportion of DMF filings by Indian players has gone up more than three times in the last few years. India has the largest (being outside the US) US FDA approved facilities. Nair (2008) study shows the importance of TRIPS on Pharmaceutical industry. The study emphasizes on the significance of IP that helps in fulfillment of the obligation to comply with TRIPS as well as enforcement of new IP regimes to protect the innovation. The study elaborates the significance of Patents, trademarks, Trade secret, Industrial design, etc. He explains the impact of Post-TRIPS in Indian Pharmaceutical industries with specific reference to International operations.

According to Kiran & Mishra (2009) the period of the 1995-2008, i.e, the post-TRIPS period saw the strongest performance of the Indian pharmaceutical industry on several fronts. production performance by a significant margin. The Pharmaceutical industry turned into a net foreign exchange earner during the Post-TRIPS era. India is fast emerging as a power house of API production.

The industry improved its Pandey (2010), Indian pharmaceuticals is expected to grow over the next five years which is driven by increase in disposable income, an aging population and by improved medical infrastructure. He referred in his study that India is going through major shift in its business model in last few years. He further explains that because of the government intervention Indian pharmaceuticals deliberately indulge into promotion and encouragement of the domestic healthcare industry in producing cheap and affordable drugs. Now Indian pharmaceuticals establish their own standards in pharmaceutical markets. The results of the study highlight an improvement in the perception of Indian firms. Mishra and Kiran, (2012) analyse the perception of the Indian pharmaceutical firms towards stronger product patent regime, as to whether they treat it as an opportunity or they perceive it as a threat. These are some of the issues the present paper tries to answer. With a sample of 100 firms, the study tries to cover the major areas in Northern India which has a combination of excise free zone and non-excise free zone. They are ready for the challenges offered by the post-TRIPS era and are accepting the new opportunities offered by it.

Results and Analysis

A Look at the Patenting Scenario:

As illustrated in data (Table I) given below the patent scenario India still has a long way to go. Mostly the patents are filed in UK, USA and in their own nation. In terms of growth rates, India is much behind USA, Japan, Germany, United Kingdom and France. The Growth rates of China is also more than that of India.

The PCT is the cornerstone of the international patent system and offers a rapid, flexible and cost-effective way to obtain patent protection in the 128 countries that have signed up to the system. The number of international patent applications filed in 2011 using the Patent Cooperation Treaty (PCT) of the World Intellectual Property Organization (WIPO), exceeded 4,992,192 for the third consecutive year, with users from the United States of America topping the list. Applicants from Japan clinched the second place over Germany, for the first time in over a decade. Inventors and industry from the United States of America (35.7% of all applications in 2011), Japan (15.2%), Germany (12.7%), United Kingdom (5.5%), France (4.3%) topped the list of biggest users of the system. Use of the PCT in Japan grew by a record 24% in 2011. The Republic of Korea (15.5% growth), and the Netherlands (4% growth) also showed a significant increase in filings

International patent applications received from developing countries in 2011 saw an 11% increase. The list was topped by Republic of Korea with 2,947 applications, followed by China (1,205), India (611), South Africa (376), Singapore (313), Brazil (221) and Mexico (123). Both India and the Republic of Korea saw a double-digit increase in their use of the PCT, experiencing 27.3% and 15.5% increases, respectively.

An estimated 194,400 PCT applications were filed worldwide in 2012, representing an increase of 6.6% over 2011. With 51,677 filings, the United States Patent and Trademark Office (USPTO) received the top most

rank in PCT applications in 2012, being followed by the Japan Patent Office (JPO) and the European Patent Office (EPO), with 42,787 and 32,593 PCT applications, respectively.

Table I: Number of Patents Granted as Distributed by Year of Patent Grant.

Origin/Year	Total, U.S. and Foreign origin	subtotal- US origin	Subtotal- Foreign Origin	China P.Rep.	India	Japan	Germany	United Kingdom	France
1995	101419	55739	45680	62	37	21764	6600	2478	2821
1996	109645	61104	48541	46	35	23053	6818	2453	2788
1997	111984	61708	50276	62	47	23179	7008	2678	2958
1998	147518	80289	67229	72	85	30840	9095	3464	3674
1999	153486	83906	69580	90	112	31104	9337	3572	3820
2000	157494	85068	72426	119	131	31295	10235	3667	3819
2001	166037	87605	78432	195	117	33224	11259	3965	4041
2002	167333	86972	80361	289	249	34859	11280	3837	4035
2003	169028	87901	81127	297	342	35517	11444	3622	3869
2004	164290	84270	80020	403	363	35348	10779	3443	3380
2005	143806	74637	69169	402	384	30341	9011	3142	2866
2006	173772	89823	83949	661	481	36807	10005	3581	3431
2007	157282	79526	77756	772	546	33354	9051	3292	3130
2008	157772	77502	80270	1225	634	33682	8914	3087	3163
2009	163349	82382	84967	1655	679	35501	9000	3174	3140
2010	219614	107792	111822	2657	1098	44813	12363	4302	4450
2011	224505	108626	115879	3174	1234	46139	11920	4307	4531
ALL YEARS	4992192	2837050	2155142	12647	7091	852321	346360	141439	129254
Gr. Rates	7.29	7.33	7.21	6.69	6.34	7.22	7.34	7.28	7.19

Growth Rates: Self Calculated

Table 2: Number of PCT Filings by Country of Origin.

Origin Name Year/ Month	2006	2007	2008	2009	2010	2011	2012
Total	1,49,644	1,59,929	1,63,242	1,55,406	1,64,339	1,82,430	1,95,250
United States of America	51,281	54,045	51,644	45,628	45,030	49,109	51,610
(% of total)	34.27	33.79	31.64	29.36	27.40	26.92	26.43
Japan	27,025	27,743	28,760	29,802	32,150	38,875	43,660
(% of total)	18.06	17.35	17.62	19.18	19.56	21.31	22.36
Germany	16,737	17,821	18,855	16,797	17,568	18,852	18,763
(% of total)	11.18	11.14	11.55	10.81	10.69	10.33	9.61
United Kingdom	5,097	5,542	5,467	5,044	4,891	4,848	4,895
(% of total)	3.41	3.47	3.35	3.25	2.98	2.66	2.51
France	6,256	6,560	7,072	7,237	7,246	7,438	7,849
(% of total)	4.18	4.10	4.33	4.66	4.41	4.08	4.02
Netherlands	4,553	4,433	4,363	4,462	4,063	3,503	4,071
(% of total)	3.04	2.77	2.67	2.87	2.47	1.92	2.09
Republic of Korea	5,945	7,064	7,899	8,035	9,669	10,447	11,848
(% of total)	3.97	4.42	4.84	5.17	5.88	5.73	6.07
Sweden	3,336	3,655	4,136	3,568	3,314	3,462	3,587
(% of total)	2.23	2.29	2.53	2.30	2.02	1.90	1.84
Australia	1,996	2,052	1,938	1,740	1,772	1,739	1,707
(% of total)	1.33	1.28	1.19	1.12	1.08	0.95	0.87
Switzerland	3,622	3,832	3,799	3,672	3,728	4,009	4,189
(% of total)	2.42	2.40	2.33	2.36	2.27	2.20	2.15
Canada	2,575	2,879	2,976	2,527	2,698	2,945	2,758
(% of total)	1.72	1.80	1.82	1.63	1.64	1.61	1.41
South Africa	421	406	391	375	295	319	314
(% of total)	0.28	0.25	0.24	0.24	0.18	0.17	0.16
China	3,942	5,455	6,120	7,900	12,296	16,402	18,617
(% of total)							
India	833	903	1,072	961	1,286	1,331	1,312
(% of total)	0.56	0.56	0.66	0.62	0.78	0.73	0.67
Singapore	474	519	586	593	641	661	708
(% of total)	0.32	0.32	0.36	0.38	0.39	0.36	0.36

Data source: WIPO Statistics

In 2012, the US remained the country which was the source of the highest number of PCT applications. However, as shown in Figure I, its share of total PCT filings has been decreasing since the mid-1990s. This is also the case for the share of German filings. Historically, Germany ranked second in terms of PCT filings until

Japan surpassed it in 2003. In Asia Japan accounted for almost 25% of PCT filings in 2012 > china is marching ahead with record no of filings.

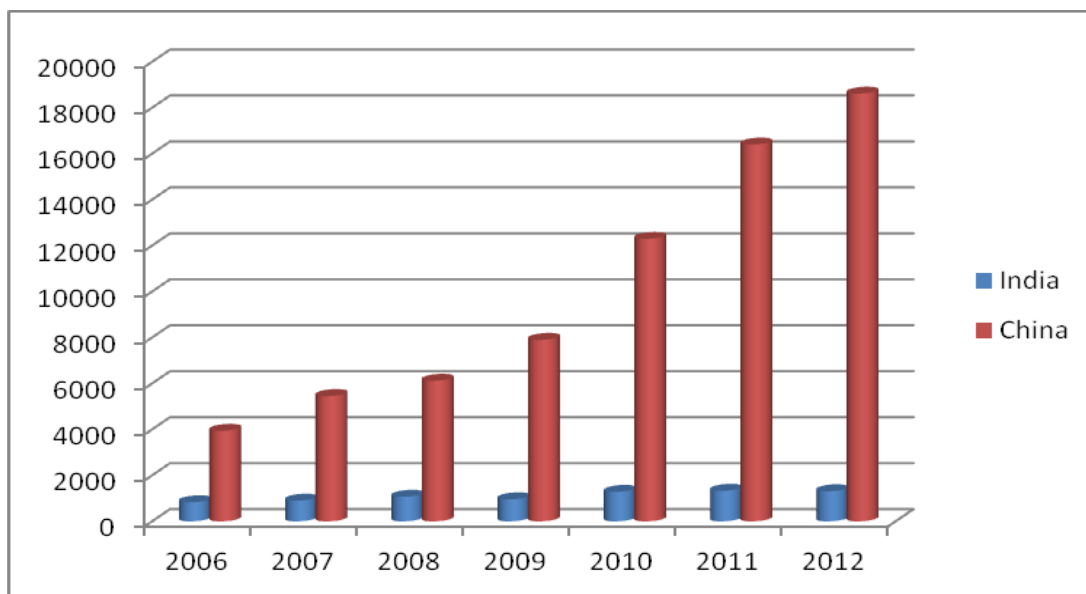


Fig. I: A comparative picture of India and China.

The number of patent applications filed in the Indian Patent Office has risen approximately 150% in 1997-98 from 1993-94, crossed 10,000 mark for the first time in 1997. Patent applications in India in the post-1995 period provide important, if not comprehensive, indicators of the likely impact of the policy reforms. There has been a significant increase in patent applications in India since 1994-95 as a result of the policy changes taking place in tune with the WTO.

Table 3 shows the evolution of Pharmaceutical Industry. It has been categorised in five different phases. In Phase-I, Early years, (1950s–60s), Foreign companies grab more market share as compare to domestic industries and the Indian companies are not organized as well. With the intervention of Indian government, pharmaceuticals industry improved its position and moved to Phase-II (1970s). In this phase Indian Patent Act-1970 was introduced, the Act did not provide for monopoly rights in the area of drugs and agro-chemicals as only process patents and not product patents were recognized, which encouraged the SMEs to innovate new products. This improves the quality of the product as well as capping the price to grab more market share and enjoy profit. SMEs took initiatives and became the essential part of the supply chain for the bigger players in the country. This encouragement leads to the development of the pharmaceutical industries and move on to Phase-III, i.e. Development Phase (1980s). During this phase new processes are invented for R&D, more emphasis is laid on development of infrastructure and exports are also encouraged. Phase-IV (1990-2000), Growth Phase, express the expansion of domestic market and development of International market, via. FDI and MNC. Now the Pharma industry reached on Phase-V (2000), where Patent laws, Trademarks, Industrial design, Trade secret, schedule M etc. are introduced. New inventions take place. Now SMEs are recognised as the strong pillar of the pharmaceutical industry.

Table 3: Indian Pharmaceutical Evolution.

Phase-I	Phase-II	Phase-III	Phase-IV	Phase-V
Early Years	Government control	Development Phase	Growth Phase	Research & Innovation
<ul style="list-style-type: none"> Market share is dominated by Foreign Companies Absence of organized Indian Companies 	<ul style="list-style-type: none"> Indian Patent Act – 1970 Drug prices capped Local companies begin to make an impact 	<ul style="list-style-type: none"> Process development Production infrastructure creation Export initiatives 	<ul style="list-style-type: none"> Rapid expansion of domestic market International market development Research orientation 	<ul style="list-style-type: none"> New IP law Discovery Research Convergence

With the advancement of relative measures taken for the growth and development of SMEs, Pharmaceuticals in India and Government of India the pharmaceutical industry has witnessed several changes. Though, enough literature is not available on the growth of Indian Pharmaceutical industry as limited research has been done on firm wise patent, Copyright, Trademarks, Schedule M, ANDA filings and approvals, DMF filings and approvals with USFDA. Whatever literature is available is in the form of papers/articles published in

pharma magazines and studies showing growth of Indian pharmaceutical industry by taking a few parameters only.

Table 4: Patenting scenario in the post-TRIPS period.

Year	Patents granted to drugs and pharmaceuticals (1)	Total patents granted (2)	1 as % of 2
1994-95	232	1759	13.19
1995-96	132	1533	8.611
1996-97	71	907	7.828
1997-98	291	1844	15.78
1998-99	150	1800	8.333
1999-00	307	1881	16.32
2000-01	276	1318	20.94
2001-02	320	1591	20.11
2002-03	312	1379	22.63
2003-04	419	2469	16.97
2004-05	453	3021	14.99
2005-06	457	4320	10.58
2006-07	798	7539	10.58
2007-08	1469	15261	9.62
2008-09	1790	17975	9.95
Growth Rates*	6.16	6.01	

Source: Indiatat database *self calculated

Patenting scenario in India is improving as in terms of Patents granted to drugs and pharmaceuticals out of total patents granted is growing at a rate of 9.95 percent.

The present growth rate of Indian pharmaceutical industry is \$ 4.5 billion and is expected to be a US\$ 20 billion industry by the year 2015. The Indian Pharmaceutical sector ranks 14th and is expected to be among the top ten in world pharmaceutical market in the next few years. The sales of the patent drugs would rise in the Indian Pharma market.

Drug Master Filings (DMF Filings) by Pharmaceutical Industry:

Drug master filing at USFDA is one of the parameters that helps in knowing the potentiality of a country in the field of pharmaceuticals. Filing a drug master file at USFDA implies that the company is claiming manufacturing drug and facility suitable for USFDA rules and regulations. DMF filing is required if the manufactures want to sell active pharmaceutical ingredients (APIs) in the US. Indian pharmaceutical companies started filing DMFs in the US around the 1980s. But until the late 1990s, only a few DMFs were filed. Since then the rate of filing has accelerated. DMFs filed from India as a percentage of total DMFs filed with the United States Food and Drug Administration (US FDA) has increased steadily especially in the period 2000 to 2007 (IBEF, Market overview, December 2008). Table 5 indicates not only the present level of patenting activity in Indian pharmaceutical industry but commitment (pipeline) for the future as well as has been indicated by a steady rising share of Indian pharmaceutical companies in total DMF filings with USFDA.

Table 5: India's share in the total DMFs filed with the US FDA.

Year	Total DMF filings with USFDA	DMF filings from India	India's share in global DMF filings (%)
2000	227	33	14.5
2001	280	52	18.6
2002	288	63	21.1
2003	404	124	30.7
2004	517	193	37.9
2005	688	274	39.8
2006	706	306	43.9

Source: Ernst & Young , 2009

Table 5 shows that R&D expenditure of the Indian pharmaceutical sector, which was Rs. 293 millions during 1981-82, has increased to Rs. 1250 millions by 1993-94. In the later years, R&D expenditure of the industry increased further to reach a level of Rs. 14305 millions by the end of 2006-07. The growth rate of R&D has been 3.88 percent per annum in pre-TRIPS period (1981-82 to 1993-94) and 5.07 percent per annum in post-TRIPS period (1994-95 to 2006-07). These results show that growth of R&D of the industry as a whole is more in the latter period i.e., post-TRIPS period.

R&D investment plays a crucial role in the growth of any industry (Fig III). As the pharmaceutical industry is knowledge intensive, the role of R&D assumes greater significance. Though the product patent was introduced from 2005, many pharmaceutical companies realized the need of increasing their R&D efforts much earlier.

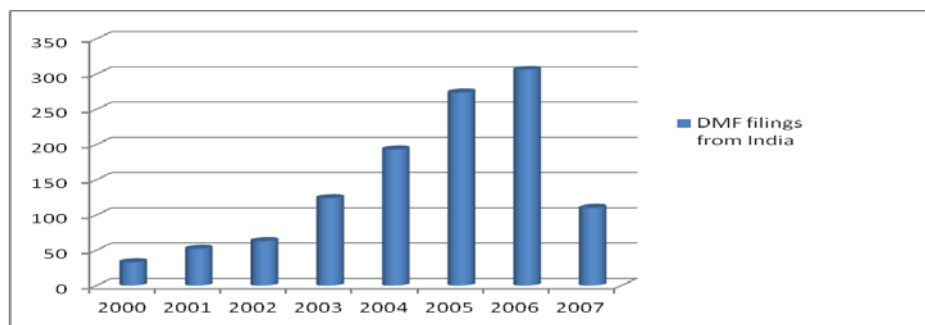


Fig. II: DMFs filed from India with the US FDA.

R&D in the Pharmaceutical Industry:

Table 6: R&D expenditure of pharmaceutical industry (Rs Million).

S No	Year	R&D expenditure	S No	Year	R&D expenditure
1	1981-82	293	14	1994-95	1405
2	1982-83	322	15	1995-96	1607
3	1983-84	400	16	1996-97	1859
4	1984-85	426	17	1997-98	2203
5	1985-86	480	18	1998-99	2604
6	1986-87	508	19	1999-00	3209
7	1987-88	514	20	2000-01	3703
8	1988-89	540	21	2001-02	4351
9	1989-90	561	22	2002-03	6721
10	1990-91	606	23	2003-04	10543
11	1991-92	805	24	2004-05	11243
12	1992-93	952	25	2005-06	12352
13	1993-94	1250	26	2006-07	14305
Growth Rates (%)*					
Period I Pre-TRIPS		3.88	Period II Post-TRIPS		5.07
Entire Period		6.05			

Source: Indiastat database *self calculated

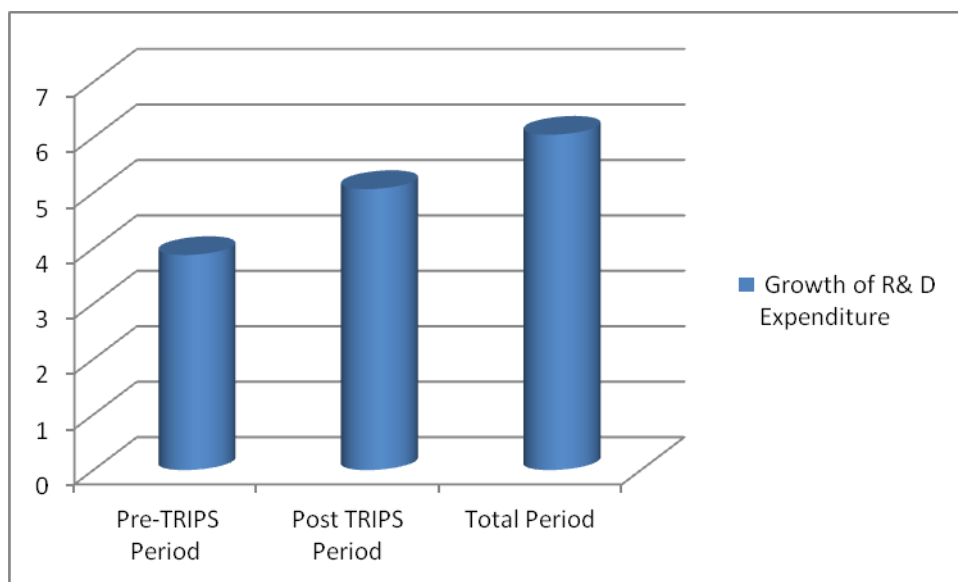


Fig. III: R&D expenditure of pharmaceutical industry.

Conclusion:

In the present days of increased economic interdependencies, technology becomes the key driver in the knowledge world and Trade Related Intellectual Property Rights (TRIPS) assumes the center stage in the evolution of techno-societies. New global rules giving value to technology matter more in the present times. New rules endorsed by all countries have brought tighter Intellectual Property protection worldwide. They raise the market value of technology, increasing incentives to invest in research and development. Patenting scenario

in India is improving as in terms of Patents granted to drugs and pharmaceuticals out of total patents granted is growing at a rate of 9.95 percent. Patents granted to drugs and pharmaceuticals grew at a rate of 6.16 against 6.06 rate of total patents granted. Another change witnessed in India is that after TRIPS, the rate of filing has accelerated. DMFs filed from India as a percentage of total DMFs filed with the United States Food and Drug Administration (US FDA) has increased steadily indicating India's commitment for the future as well.

Even in term so R& D, the pre- TRIPS period rate of Growth was only 3.88 per cent, while post- TRIPS growth rate is 5.07 per cent. These findings are corroborated by Dhar and Gopakumar (2006) and Sunil (2006). These study shows that the TRIPS compliance has increased both research budget and patenting in India. This once again indicates that the Indian economy geared up for the new stronger patenting regime. The path may be long, but the dawn of consciousness about patenting has arrived. Although in terms of developed countries, India is still lagging behind.

REFERENCES

Chadda, A., 2006. "Destination india - the right choice for the pharmaceutical industry", Delhi Business Review, 7(1): 1-8.

Chaturvedi, K. and J. Chataway, 2006. "Innovation In The Post-Trips Regime In Indian Pharmaceutical Firms: Implications For Pharmaceutical Innovation Model", International Journal of Business Innovation and Research, 1(1-2): 27-50.

Chaudhuri, S., 2006. Industrial Policy, Globalisation and India's Pharmaceutical Industry, conference on Post Liberalisation Constraints on Macroeconomic Policies, organized by IDEAS and UNDP, Muttukadu, Chennai, 27-29.

Dhar, B. and K.M. Gopakumar, 2006. Post-2005 TRIPS Scenario in Patent Protection in The Pharmaceutical Sector: The Case of the Generic Pharmaceutical Industry in India, the UNCTAD/ICTSD Project on Intellectual Property Rights and Sustainable Development.

Grace, C., 2004. The Effect of Changing Intellectual Property on Pharmaceutical Industry Prospects in India and China: Considerations for Access to Medicines, DFID Health System Resource Centre: London 2004

Kiran, Ravi and Mishra, Sunita, 2009. "Changing Pragmatics of The Indian Pharmaceutical Industry in Pre and Post-TRIPS Period" International Journal of Business & Management, 4(9): 206-220.

Lalitha, N., 2002. Drug Policy 2002: Prescriptions for Symptoms," Economic and Political Weekly, 37(30): 3102-3104.

Lanjouw, J., 1998. The Introduction of Pharmaceutical Product Patent in India: Heartless Exploitation of the Poor and Suffering? NBER Working Paper No.6366, retrieved from <http://www.nber.org/papers/w6366>.

Mani, Sunil, 2006. 'The Sectoral System of Innovation of Indian Pharmaceutical Industry', Working Paper Series 382, Trivandrum: Centre for Development Studies.

Mishra, S. and R. Kiran, 2012. "Perception of the Indian pharmaceutical firms towards stronger product patent regime: a case study of North West region," Int. J. of Intellectual Property Management, 5(3/4): 266-282.

Nair, G., 2008. "Impact of TRIPS on Pharmaceutical Industry," Journal of Intellectual property Rights, 32(3): 432- 441.

Pandey, Shivanand, 2010. "India's Pharmaceutical Industry on Course for Globalization: A Review," IJPLS, 1(3): 133-140.

Pradhan, J.P., 2003. Liberalization, Firm size and R&D Performance: A Firm level Study of Indian Pharmaceutical Industry, RIS-DP 40/2003.

Reddy, S., 2006. "The Costs to India of Complying with World Intellectual Property Rights: Effects on the Pharmaceutical Industry and Access to Drugs" Economics Thesis, May 2006.

Salazar, S., C. Falconi, J. Komen, J. Cohen, 2000. The Use of Proprietary Biotechnology Research Inputs at Selected Latiin American NAROS. The Hague: International Service for National Agricultural Research.

Srinivasan, S., 1999. How Many Aspirins to the Rupee?, Economic and Political Weekly, 34(9): 514-518.

WIPO, 2009. World Patent Report: A Statistical Review, World Intellectual Property Organization.

WIPO, 2012. World Intellectual Property Indicators, World Intellectual Property Organization.

Origin Name Year/ Month	2008	2009	2010	2011	2012
United States of America	51,643	45,628	45,027	49,051	
Japan	28,760	29,802	32,150	38,874	
Germany	18,855	16,797	17,568	18,852	
United Kingdom	5,467	5,044	4,891	4,848	
France	7,072	7,237	7,246	7,438	
Netherlands	4,363	4,462	4,063	3,503	
Republic of Korea	7,899	8,035	9,669	10,447	
Sweden	4,136	3,568	3,314	3,462	
Switzerland & Liechtenstein	3,799	3,672	3,728	4,009	
Canada	2,976	2,527	2,698	2,929	
China					

India	1,072	961	1,286	1,330	1312
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Rank applicant's name origin PcT applications change compared 2010 2011 2012 to 2011

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