DESIDOC Journal of Library & Information Technology, Vol. 32, No. 3, May 2012, pp. 214-219

Trends in Indian Patent Filing in Chemical Sciences: An Analysis

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ABSTRACT

The paper analyses the trends in Indian patents filed in the area of chemical sciences during 1995 to 2008. It highlights the importance of patent literature in scientific developments and global trends in patent filings. A result of Indian patent filing analysis indicated that filing in India is increasing in the past few years and many public and private organisations are filing patents in India and in other countries for protecting the inventions. Among India patent filing activities, chemical and pharmaceutical sciences are the prominent areas. Individual inventors and assignees from private and public organisations are filing patents, but in India, Council of Scientific & Industrial Research (CSIR) is leading patent filer.

Keywords: Chemical sciences, pharmaceutical sciences, patent filing trends, Indian patent filing, global patenting trends

1. INTRODUCTION

Intellectual property rights (IPR) initiatives are developing fast all over the world. Patent system has received importance in R&D sector. Patent rights play an important role in global economy. Patents give legal rights to patent owners for their inventions for tenure of twenty years[1].

Bowman[2] emphasising the importance of patent literature in R&D states that it constitutes an important department in an organisation providing technical support in the achievement of goals and objectives of the parent organisation. The major function of any research department is to identify technical opportunities for the development of innovative ideas and maintaining existing technology. More importantly, its function is to ensure that the products of the organisation get into the hands of the customers. Patent information is a significant source of information. It is a major source in process evaluation, product development, and marketing of technical services. So, although peer-reviewed journal articles are rated very highly as sources of technical, scientific and research reading, the patent literature equally occupies its place of distinction in promoting creative and innovative research.

Since 2000 there has been an increase in patent filing at the global level. The Organisation for Economic Cooperation and Development (OECD) report[3] indicated that between 1992 and 2002 the number of patent applications filed in Europe, Japan, US and elsewhere increased by more than 40 per cent. The growth in patent filings is due to increased awareness in protecting inventions and technology transfers. In 1992, about 6,00,000 patents were filed, and by the end of 2002, the number grew to 8,50,000. It reached mark of 18,00,000 by 2006. In 1995, patent filed in India were 7036 and it reached to 24505 at the end of 2006, i.e., rise of 248.28 per cent is observed from the study of annual reports of Indian Patent Office[4] (IPO). Further by the end of 2008, the growth in patent filing is reported as 35218 (increased by 400.54 per cent). This indicates the growing importance of patent literature globally.

Patents are being filed in all sectors; however the chemicals, pharmaceuticals, drugs, and cosmetics sciences are taking lead in patent filing area. They are closely followed by electronics and general subject patent filings. Since 2000, there has been a great demand for the IPR and patenting inventions are being given top priority. Patent filing in a country is progress indicator in the area of knowledge. Databases are made available for

Received 09 December 2011, online published 18 May 2012

searching patent information and relevant data. Statistical data indicates that every year there is an addition of about 2 lakh patents globally with more than 50 million patents being made available to researchers all over the world.

World Intellectual Propert Organisation[5] (WIPO) defined patent as "It is an exclusive right granted for an invention may be product or process which gives new way of preparing and providing solution to a problem". It is a territorial protection and can be sold or licensed. Patent protection implies that inventions cannot be commercially made, used, distributed or sold without the patent owners consent. A patent owner has rights to decide who may or may not use the protected invention for the period in which the invention is protected. Patent provides incentive to the creator for his invention. Filing of patent application to patent office is mandatory. A patent is granted by a national patent office or regional patent office on the basis of application.

Every country has its own patent office and its own patent law for the protection of innovative ideas. Rights given by the patents are monopoly rights which prevent others from making, using or selling the creators invention for a specified period of time. Patents are issued for inventions which are solutions to specific problems in the field of technology. Invention may be related to a product or a process. In order to get a patent for an invention, the invention has to be patentable[6] (Novel, non obvious, inventive step, utility, etc.) and application must be filed in the patent office. Patent document is published as an application and later granted by the patent office as a patent. Patents are granted for the inventions related to process, products, apparatus, and industrial applications.

2. NEED FOR PATENTS

It is clearly realised that in recent days, intensity and complexity of technology competition has led to emergence of new ways of extracting information required for better decision-making in different organisational levels. Following are the factors that justify the need for patents in research areas:

- Patents are excellent source of technical and legal information
- More than 80 per cent of information in patents is not published elsewhere
- Patents are commercially exploited; substantial benefits to the inventors or their assignees are gained
- Patents give enforceable exclusive legal rights to the inventors for a limited period of time to reap monetary benefits out of the invention
- The rights awarded to the inventors are enforceable against anybody within the jurisdiction of the Government
- Patents play an important role in development of technology by helping in planning research and excluding the chances of repetitions
- Patents play an important role in transfer of technology, which in turn results in economic growth
- Patents are used to identify experts in a particular area
- Patents are used to find out which companies are working in a particular area.

3. IMPORTANCE OF PATENTS IN SCIENCE

Patent literature is more useful to researchers working in R&D institutes, public undertaking organisations, private industrial organisations, business houses, marketing and production units including planners, patent attorneys, research scholars, inventors and licensors, etc. The intellectual content of patent literature helps in developing innovative concepts and also protects the current invention. It is a good tool for technology transfer too. Patents are filed in countries where the inventor wants to protect his invention. A patent is the only source of information which is scientific, technical, and legal.

Due to globalisation, during the past few years the use of patent literature is largely increasing and it is considered as one of the prime sources for scientific development and mapping research activity. It is with this assumption that a detailed study of patent literature in respect of its importance, need, role in science and technological development, is gaining momentum. Such studies will provide better understanding of patent literature in general. Patent information has a special place in chemical industries and R&D organisations as it provides nascent (reported for the first time) details about an invention. It also provides solution to technical problems. Due to these special features, patent literature is used extensively in S&T.

3.1 Growth of Patents in Science

The WIPO[7] patent report 2007 gives the statistical information on worldwide patent activities and reports the growth and development of the patent literature. According to this report, at the end of 2005 there were approximately 5.6 million patents in force worldwide. The patents granted worldwide have increased at an average rate of 3.6 per cent and reached to about 6,00,000 patents in 2005. Among the 5.6 million patents in force in 2005, 49 per cent patents were owned by the applicants from countries like Japan and USA, then followed by the European countries. Asian economies were main factors responsible for highest recorded patent growth in 2007 with China, Japan, and South Korea accounting for more than a quarter of new registrations.[8] China saw a 38.1 per

cent rise in the number of new patents over the year 2006. The US remains the world's leader, with an estimated 52,280 patents recorded in 2007, followed by Japan with 27,731. On a global basis, the number of new patents reached a record of 156,100 (increase by 4.7 %) from 2006. India came up with 6354 new patents in 2007 compared to 840 in 1999. The top 20 patent offices, according to the total number of fillings in 2005, were Japan, USA, China, Korea, EPO, Germany, Canada, Russia, Australia, UK, India, France, Brazil, Mexico, Hong Kong, Singapore, New Zealand, Poland, Thailand, and Israel. The largest number of patents granted worldwide originates from residents of Japan, USA, Korea, Germany and France. These accounts for 74 per cent of patents granted worldwide in 2005.In 2005, from the 5.6 million patents in force worldwide, 90 per cent are accounted from the patent offices of USA, Japan, Germany, Republic of Korea, UK, France, Spain, China, Canada, Russia. From this information it is found that Japan, USA, Germany, UK, France, Russia, Korea/China are the main countries contributing to patents. The statistical information of patents is very alerting and hence this area is very popular for carrying out research studies to find the development in chemical sciences and compare the various aspects of patent as a prominent information resource to the researchers.

3.2 Importance of Patents in Chemical Sciences

Patents are filed in all areas of applied science and technology, and inventions range from simple mechanisms to complex chemical compounds. Research is an inventing process, new developments are constantly reported, and users need to get the information about new practices through the literature published by the researcher. Patent literature plays an important role in disseminating the nascent ideas to users and hence it is a unique source of delivering scientific information. Further, patents identify the unfamiliar technical areas where one can apply concepts for solution to a problem. The patent literature assists in indicating growth of different technical fields and trends among them. Patents help in tagging the inventors and the investors to develop new products. Thus, patent has immense value to R&D users, scientists and researchers. Identification of trends in research discipline is the main focus. Patents are very useful to research students, engineers, planners, economist, R&D managers, innovators, business and marketing personalities, patent attorneys, etc.

The statistical analysis of patent filings among selected countries was studied to find quantitative trends in chemical sciences. The overall analysis of patent filing has indicated that there is an increase in all the areas of knowledge and the chemical industries are also in leading position and the patent filing trend is progressive[9].

3.3 Growth of Patents in Chemical Sciences

Chemical Abstracts by American Chemical Society (ACS) is the main source for evaluation of growth in chemical sciences. CAS publishes abstracts from scientific literature published throughout the world in the area of chemical sciences from 1907. The historical development of abstracts covered from 1907-2007 is one of the pointers used for finding the developments in patent filing. Hence, CAS information resources were consulted and data of abstracted literature was collected for analysis purpose.

The statistical data recorded by CAS, regarding chemical patent publications, abstracted in CS, reported during the period 1988 to 2007 is given in Table 1.

Table 1. Year wise patent growth in chemistry patents

Year	Patents	Increased by	% Increase	% Increase w.r.t 1988
1988	80795	-	-	-
1989	88099	7304	08.29	09.04
1990	91082	10287	11.29	12.73
1991	95526	14731	15.42	18.23
1992	98505	17710	17.97	21.91
1993	99411	18616	18.72	23.04
1994	107226	26431	24.64	32.71
1995	121214	40419	33.34	50.02
1996	121682	40887	33.60	50.60
1997	125883	45664	36.27	55.80
1998	117815	37020	31.42	45.81
1999	125393	44598	35.56	55.19
2000	146590	65795	44.88	81.43
2001	144498	63703	44.08	78.84
2002	167882	87087	51.87	107.78
2003	164344	83549	50.83	103.40
2004	173669	92874	53.47	114.95
2005	244575	163780	66.96	202.71
2006	248247	167452	67.45	207.25
2007	265637	184842	69.58	228.77

Source: CAS Statistical Summary 2007

The statistical analysis pointed out that the abstracted information in chemical sciences is increasing every year. The growth in patent applications is reported to be 7 per cent to 10 per cent every year. From 1907 to 2001 CAS included about 7000000 patents and the rate of increase per year was more than 50,000 patents per year alone in the area of chemical sciences. Since 2000 onwards growth is continuous and more than 200000 patents are filed per year. However, the growth of patent literature in chemical sciences is also prominent from 1988 onwards. The growth rose from 9 per cent in 1988 to 70 per cent in 2007 (cumulative growth is 228.77 %). Similarly the growth in patent filing in other areas and countries are also reported an increasing trend.

4. TRENDS IN INDIAN PATENT ACTIVITY

In India, efforts are made for the protection of human intellect through patent filings. For this purpose India has become a part of the global patent regime. IPO is creating the awareness among the R&D community regarding the patents and their global benefits. From 18th July 2007, e-filing facility for patent applications initiated for ease in filing of patents. India joined various treaties like Paris Convention and Patent Cooperation Treaty (PCT). India also plays an important role in WTO and WIPO.

The IPO, from October 2007, is recognised as an International Searching Authority (ISA) and International Preliminary Examining Authority (IPEA) by WIPO under PCT. National Institute of Intellectual Property Management has been started in Nagpur on 20 August 2007 for awareness in the area of IP and IPR. PIS, Nagpur is also providing various patent related activities. Patent documents are also uploaded on patent office website http://ipindia.nic.in. International co-operation for improving the patent administration has increased in India by initiating cooperative activities with WIPO. Bilateral Agreements signed with UK Patent Office, France, European Patent Office, USPTO, Japan Patent Office, Switzerland, Germany, by initiating technology and Investment Development Programme. Indian Patent Office has developed its activities by modernising the activities and services. It has initiated the Human Resource Development Programmes and Public Awareness Programmes.

The IP professionals have been trained by organising training programs and workshops, etc. and introduced education and research facilities in IP area. The developments like TKDL to protect the traditional knowledge of India is managed well to protect the Wealth of India in terms of human intellect. Digitisation of records and building databases as well as procurement of different databases in the field of IP are initiated to make ease in developing innovative concepts and help in filing patents[10]. In Asian region, India has performed very well since past few years. The evaluation of patent application filing in chemical sciences and in other areas in India[11] (1995 to 2008) is detailed in Table 2.

The review indicated that among all the areas, chemical sciences are growing fast and if chemical, drug and food sciences are associated to chemical sciences, and about half of the area is covered by chemical sciences alone. Mechanical engineering is also popular and the growth of patents is also alarming in this area. The general class in which all the areas are covered has rising trend in patent filing. However, it is evident that since 2002, biotechnology has been separated and measured individually. This subject area is also very strong in recent years.

Another development reflected in IPO patent awarding system is that since 2004 a separate area for computers and electronics is detailed separately as an individual entity. Thus it is observed that the patent system in India is well protected and there is an increase in patent application filing every year. This is an indication that the developing countries like India are also leading in patenting activity due to globalisation and collaboration. In India growth as compared to 1995-96 (3038) rose by 257.96 per cent in 2007-08 (10875) in these areas.

The patent filing trend in Indian Patent Office was initially high but eventually it has declined over the years (1971-85). Since 1986, it is indicating growth and from

Table 2. Patent applications filed in various subjects in India during 1995 to 2008[11]

Year/Subject	Chemical Science	Drugs	Food science	Electrical	Mechan-ical	Comp/ Electro.	Biotech-nology	General	Total
1995-96	1934	1000	0104	1131	1599	-	-	1268	07036
1996-97	1969	1124	0121	1677	1656	-	-	2015	08562
1997-98	2221	1481	112	2264	1760	-	-	2317	10155
1998-99	2023	1555	0140	1778	2125	-	-	1333	08954
1999-00	0840	1000	0107	0877	1187	-	-	0544	04555
2000-01	0787	0883	0096	0921	1106	-	-	0546	04339
2001-02	0778	0879	0110	0731	1174	-	-	0569	04241
2002-03	0776	0966	0119	0690	1257	-	0046	0562	04416
2003-04	2952	2525	0123	2125	2717	-	0023	2148	12613
2004-05	3916	2316	0190	1079	3304	2787	1214	2659	17466
2005-06	5810	2211	0101	1274	4734	5700	1525	3150	24505
2006-07	6354	3239	1223	2371	5536	5822	2774	1621	28940
2007-08	6375	4267	0233	2210	6424	4842	1950	7110	35218

Source: Ganguli, P.[11]

2000 onwards, it is increasing steadily. The number patents granted by Indian Patent Office is increasing every year. Since 2005, it is increasing steadily as compared to previous years. This clearly indicated that growth factor is positive. The trend in patent filing from 2005 to 2007 shows 65.36 per cent growth. However, from 1997 to 2007, the trend in patent filing shows 237.32 per cent growth.

4.1 Top Patent Assignees in India

The ranking of top patent assignees from 1968 to 2004 in Indian patents filing as illustrated by Stemberg[12] from INPADOC file are Council of Scientific Industrial Research (3083), Hindustan Lever Ltd (946), Hoechst (766), Siemens AG (685), Union Carbide Corporation (365), Procter and Gamble (377), ICI PLC (308) and for the period 2005-2007 top Indian patent filers are reported as CSIR (1523), Qualcomm (1431), Bayer (1311), Phillips Electronics (1272), Hindustan Unilever (1088), Honda (960), Microsoft (908), Samsung (901), Pfizer (895), BASF (865), etc.[13]

4.2 Highlights of Patenting Activity in India

The major developments taken place in IPO are:

- More than 35,000 patent applications were filed at IPO during 2007-2008. This indicates 281.82 per cent rise from 1995 to 2008.
- Approx 21 per cent annual increase in the patent applications is observed during 2007.
- During the last six years there is approximately three times growth in patent filings at IPO.
- Under the PCT filing route, around 60 per cent applications filed with IPO are national phase filings and around 80 per cent of patent applications are filed by foreign residents.
- Most active patent filing areas in IPO are chemicals, pharmaceuticals and drugs (33 %), computer/ electronics (23 %) and mechanical (19 %).
- From 2004-2005 to 2005-2006 there is an increase in number of patent filings in computers/electronics (105 %), only chemicals (48 %) and mechanical (43 %)
- There is an exclusive web site giving the details of patenting activities in India. (http://ipindia.nic.in/ipr/ patents/htm)

4.3 Trends in Patent Filing

The analysis of statistical data published by CAS[14], a division of ACS, covering articles, patents and books supports the growing trend in filing patents in the chemical sciences all over the world. This data analysis from 1997 to 2007 indicates that periodical literature abstracted in CA has increased by 39.39 per cent, whereas patent literature has increased by 111.01 per cent. The data published by Thomson Reuters[15] in World IP Today analyses overall global scenario in patent filing, and reports that there is a 21 per cent increase in patent filing since 2002, with Japan, US, China as the leading countries.

The academic innovations during this period have increased to 25 per cent in China and Russia. WIPO too reports the steady growth in patent filing and ranks Japan as the top patent filing country with 17.5 per cent growth, followed by Germany, Korea, France, China, UK, Netherland, Canada, and Australia[16]. Dunn[17] indicated that patents are treated as an important source of information and also contributes to the growth of S and T along with other sources of information. In chemical sciences patent literature plays a significant role as it discloses current research ideas for the first time in the form of patent application to the patent office.

4.4 Global Trends in Patent Filing

The growth in filing patents is prominent among scientific disciplines like biotechnology, environmental sciences, chemical, pharmaceutical and drug sciences. These types of industries are mainly concerned with consumer products. The growth in chemical, pharmaceutical sciences is more as compared to other industries as it has a prominent place in human life. The industrial growth and patent filing growth is continuous in this area as new innovative products, preparation, properties or uses are brought to the notice via patents. In all branches of sciences, almost all countries are filing patents but considering the output in the form of patent filing, few countries like USA, UK, Germany, Japan, China, France and Korea are leading. It is noticed that major industries file more than 500-600 patents in a year. e.g. Bayer Germany, Dupont USA, etc.

It is found that the growth of patents in all subject areas is prominent and also gaining importance day by day due to IPR policies. Patents are found in every area of applied science and technology, and inventions range from simple mechanisms to complex chemical compounds. Research is an inventing process, new developments are constantly reported, and users need to get the information about new practices through the literature published by the researcher. Patent literature plays an important role in disseminating the nascent ideas to users and hence it is a unique source of delivering scientific information.

5. CONCLUSIONS

It is noticed that IPO is developing its activities fast and now compatible with the international patent searching authority. The trends from various statistical

analyses reveal that there is a visible ascendency in the process of patent filing both at the national and international levels. This clearly reflects the healthy growth of scientific innovations and inventions. This has been observed in the enhanced growth and development of scientific and technological institutions and also increased growth of research and development funds all over the globe.

REFERENCES

1. McLeland, L. What every chemist should know about patents. American Chemical Society, Washington, 2002.
2. Bowman, W.H. Importance of patents and information services to research workers. *J. Chem. Inf. Comp. Sci.*, 1978, **18,** 81-82.
3. Organisation for Economic Cooperation and Development. Patents and innovation: Trends and policy changes. OECD, France, 2004. http://www.oecd.org/dataoecd/48/12/24508541.pdf (accessed on 25 February 2009).
4. Indian Patent Office. Annual Reports. 1995-2007. IPO, New Delhi.
5. WIPO. About patents. http://www.wipo.int/patentscope/en/patents/ (accessed on 25 February 2009)
6. Pressman, D. Patent it yourself. Ed. 10. Nolo, Berkley, 2004
7. WIPO. International patent filing data, 2008. www.wipo.org (accessed on 22 October 2009).
8. WIPO. International patent filing data, 2007. www.wipo.org (accessed on 22 October 2009).
9. Toussant, M.J. Trends and impacts in chemical patent information. *In* Symposium on Impact of American Inventors Protection Act (AIPA), 9 April 2002, CAS, 2002. http://acscinf.org/docs/meetings/223nm/prsentations/223nm48.pdf (accessed on 21 February 2010).
10. Saluja, N. Patenting trends in India: Facts and figures, 2008. http://www.wvwluserve.com (accessed on 12 December 2009).
11. Ganguli, P. Gearing up of patents: The Indian scenario. University Press, Hyderabad, 1998. pp. 12-13.
12. Stemberg, B. Innovation in India. *Scientific Newsletter,* November 2007. http://scientific.thomsonreuters.com/news/200711/8418387/ (accessed on 12 December 2009)
13. Mashelkar. *The Business World,* May 2003.
14. Chemical Abstracts Service. CAS Statistical Summary. Columbus, CAS, 2008.
15. Thomson Reuters. World IP today. Thomson Reuters, London, 2007.
16. WIPO. International patent filing data, 2008. www.wipo.org (accessed on 22 October 2009).
17. Dunn, H. Bibliometric analysis of patents literature and its relationship to the scientific literature. Doctoral dissertation, Case Western Reserve University (School of LIS), 1979.

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