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Data Section

INDIAN PATENT STATISTICS - AN ANALYSIS

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Importance of patents

The Intellectual Property Rights (IPR) have assumed considerable importance and this warrants the protection of inventions arising from research and development (R & D) efforts by patents. It is a known fact that patent serves as one of the important output indicators of R & D efforts like another vital output indicator namely publications. These two indicators together can provide a fairly good measure of the productivity of R & D.

There are two types of valuable information contained in a patent document namely the bibliographic details and technological disclosure about the invention. These information can be used not only for technology assessment, management and forecasting in various fields but also for the selection of the technologies. In this paper, a comprehensive statistical analysis of patents published in India during the last 20 years is presented and such analysis brings out not only the trend/growth of patents in the country but also indirect reflection on the state of R & D and invention intensity of the country. An analysis of patents data overtime helps to understand the past, current and future trends in the technological development in the country.

In India, the Controller General of Patents, Designs and Trade Marks provides yearly data regarding the patents applications filed, accepted (or published) and sealed (or granted) in India. The Patents Unit of Council of Scientific and Industrial Research (CSIR) maintains a computerised data base on patents in India using the periodical data available from the Controller General of Patents, Designs and Trade Marks. The data base of CSIR helped to undertake detailed analyses of the patents statistics.

+ The views expressed in this paper are those of the author.

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Patents applications filed in India

Patents application filed by Indians and foreigners residing abroad form two components of all the patents filed in India. As patents filed by foreigners residing in India is not significant, this is combined with those filed by foreigners residing abroad for the purpose of analysis. Similar is the basis of analysis on the patents published in India.

On an average, about 3500 patent applications are filed annually in India in the period 1985–1992, much lower than the number of patents filed by developed and even by some newly industrialising countries like China and South Korea. Among the patents filed, the share of foreigners is almost double that of Indians. A declining trend in the number of applications filed especially by foreigners was observed during 1970–81 and the main reason could be due to the fall in filing of food and drug patent applications by foreigners after the coming into force of Patents Act, 1970. Due to this decline in the foreign patent applicants, there was a decline in the total patent applications from 5100 patents filed in 1970–71 to about 3500 in 1991–92. Table 1 may be seen for more details.

Table 1
Patent applications filed in India

Year	Indians		Foreigners		Total	
	Number	%	Number	%	Number	%
1970–71	1116	22	4026	78	5142	100
1975–76	1129	38	1867	62	2996	100
1980–81	1159	39	1795	61	2954	100
1985–86	999	28	2527	72	3526	100
1990–91	1180	31	2584	69	3764	100
1991–92	1293	36	2260	64	3552	100

Source: The Controller General of Patents, Designs and Trade Marks.

As mentioned earlier, analyses of the data on patents applications filed can be used to draw some indicators on the inventive capacity of a country, by working out relevant ratios as proposed by OECD. These are detailed in a tabular form for some selected years as under:

Year	Dependency ratio	Auto sufficiency ratio	Inventiveness coefficient	Coverage ratio
1970-71	3.6	0.2	0.02	NA
1975-76	1.7	0.4	0.02	NA
1980-81	1.5	0.4	0.02	0.25
1985-86	2.5	0.3	0.01	0.22
1990-91	2.2	0.3	0.01	0.57
1991-92	1.7	0.4	0.01	NA

Note: 1. The ratios as defined by OECD are as under:
i) Dependency Ratio = Foreign Patent Applications/Domestic Patent Applications.
ii) Auto sufficiency Ratio = Domestic Patent Applications/National Patent Applications.
iii) Inventiveness Coefficient = Domestic Patent Applications per 10000 population.
iv) Coverage Ratio = Technology Balance of Payments (Receipts)/Technology Balance of Payments (Payments).
2. Domestic Patent Applications are those made within the country by Residents of the country concerned.
3. Foreign Patent Applications are those made within the country by non-residents of the country.
4. National Patent Applications = Domestic + Foreign Patent Applications.
5. NA = Not available.

The inventiveness co-efficient i.e. patents applications filed by Indians in India per 10000 population of the country decreased from 0.02 to 0.01 over 1970–1991. This shows that there is only one patent application for every million population. The dependency ratio though came down from 3.6 in 1970–71 to 1.7 in 1991–92, still it is much more times higher than the inventive coefficient. Auto efficiency ratio is stagnant around 0.3. The country was able to cover only 57% of payments made to foreign technology in 1991 which showed an improvement over 25% coverage ratio in 1980. Another indicator namely rate of diffusion measured as the ratio of external patent applications by the residents of the country concerned i.e. applications made abroad and domestic patent applications is almost zero since the residents of India hardly filed patents abroad. So, this ratio is not included in the above tabulation.

Patents published – overall

Since all patents filed are not necessarily accepted, the true indicator of technology development and inventible capability of a country can be gauged by the patents actually accepted and published. So, the rest of the sections analyse in detail about the patents published.

Table 2
Distribution of patents published in India

Year	Indians		Foreigners		Total	
	Number	%	Number	%	Number	%
1972-73	NA		NA		1688	100
1973-74	531	21	2025	79	2556	100
1974-75	478	19	2027	81	2505	100
1975-76	446	18	2080	82	2526	100
1976-77	706	25	2105	75	2811	100
1977-78	759	30	1752	70	2511	100
1978-79	553	27	1512	73	2065	100
1979-80	477	37	818	63	1295	100
1980-81	329	33	683	68	1012	100
1981-82	409	35	775	66	1184	100
1982-83	453	29	1138	72	1591	100
1983-84	335	23	1113	77	1448	100
1984-85	709	22	2510	78	3219	100
1985-86	445	30	1049	70	1494	100
1986-87	488	28	1230	72	1718	100
1987-88	692	24	2254	77	2946	100
1988-89	543	23	1844	77	2387	100
1989-90	337	19	1422	81	1759	100
1990-91	472	22	1702	78	2174	100
1991-92	365	18	1690	82	2055	100
Total	9527	24	29729	76	40944	100

Source: CSIR Patent Unit.
Note: NA = Not Available.

A total of 40944 patents were published in India during the last two decades 1972–1992. Table 2 may be seen. Annually, about 2000 patents are published which amounts to about 5% of total patents published in the 20 years period. In fact, compared to seventies, the patents published continued a declining trend even though R & D expenditure in absolute terms increased over the last two decades. It may be noted that all patents published were not from Indians. On an average, only 500 patents were published annually by Indians with a declining trend over time. It is not at all a very happy situation especially when R & D expenditure in absolute term at current prices increased about 11% per annum. The patents published by foreigners are four times that of Indians and this showed that many applications of patents filed by Indians were not published in comparison to those by foreigners. Roughly, 28% of

patent applications filed by Indians and 75% of patent applications filed by foreigners were accepted and published. Out of the total number of patents published in the last two decades, 24% were by Indians and 76% were foreigners that is patents by foreigners were more than three times that of Indians. This situation continue to remain the same for many years, unless scientists/technologists and R & D institutions in India increase their patenting activity by increased innovation and research work. Simultaneously, the simplification of patent law and procedures and facilities for education/training related to it should be expanded.

Patents published by foreigners by country

Table 3
Country-wise distribution of patents published by foreigners from 1974-75 to 1991-92

Country	Patents published	
	Number	Percentage
USA	9445	34
West Germany	3757	14
U.K.	3106	11
France	1897	7
Japan	1541	6
Switzerland	1303	5
Italy	989	4
Former USSR	850	3
Netherlands	771	3
Sweden	447	2
Others	3598	13
Total	27704	100

Source: CSIR Patent Unit.

It is useful to analyse the patents published by foreigners by their country of citizenship. Table 3, Table 4 and Table 5 give detail data. USA, West Germany and United Kingdom accounted for 60% of the patents published by foreigners in India during the two decades 1972–92 with percentage share of 34%, 14% and 11% respectively. Other participating countries are France, Japan and Switzerland accounting together 18%. The six countries in essence accounted for nearly 80% of the total patents published. These six countries continue to lead the number of patents

published by foreigners even if one analyses the data on yearly basis. As reported earlier, the patents published by foreigners was highest during the year 1976–77 and declining subsequently but increased to another peak in 1984–85. In recent times, Australia, Austria and Canada are taking patents in India while Hungary and former East Germany almost stopped taking patents. Due to unification of East and West Germany, there may not be separate patents data for East Germany hereafter. The data on patents published by ten leading countries for some selected years as also during five yearly periods since 1975–76 are provided and these may be seen in Table 4 and Table 5. The data did not show any change in the inter se ranking of these countries either on yearly or five yearly basis. So, it may be inferred that USA, West Germany and U.K. continue to dominate in patenting in India.

Table 4
Countrywise distribution of patents published by foreigners

Year/Country	1975–76	1980–81	1985–86	1990–91	1991–92	Total 1974–75 to 1991–92
USA	666	212	388	620	561	9445
West Germany	264	104	108	209	254	3757
U.K.	251	73	127	148	165	3106
France	157	52	60	132	126	1897
Japan	122	29	77	111	92	1541
Switzerland	101	32	46	92	86	1303
Italy	80	30	47	44	52	989
Former USSR	58	24	26	50	65	850
Netherlands	56	22	40	49	51	771
Sweden	26	14	17	29	26	447
Others	299	91	113	218	212	3598
Total	2080	683	1049	1702	1690	27704

Source: CSIR Patent Unit.

Table 5
Countrywise patents published during selected five year periods (Number)

Country/Period	1975–76 to 1980–81	1980–81 to 1985–86	1985–86 to 1990–91	1986–87 to 1991–92
USA	2892	2412	3506	3679
West Germany	1306	974	1195	1341
UK	1121	778	930	968
France	535	485	734	850
Japan	383	439	617	632
Switzerland	397	365	438	478
Italy	385	261	278	283
Former USSR	281	233	281	320
Netherlands	261	228	237	248
Sweden	147	117	167	178
Others	1242	976	1118	1215
Total	8950	7268	9501	10142

Source: CSIR Patent Unit.

Patents published by type of organisation

Table 6
Distribution of patents published in India by type of organisation during 1974–75 to 1991–92

Organisation Type	Indians		Foreigners		Total	
	Number	%	Number	%	Number	%
1. Teaching and Research	198	0.5	376	1	574	1.5
2. Research and Development	2039	5.6	455	1.2	2494	6.8
2.1 Public	1782	4.9	369	1	2151	5.9
2.2 Private	257	0.7	86	0.2	343	0.9
3. Industry	3432	9.4	24901	67.9	28333	77.3
3.1 Public	417	1.2	404	1.1	821	2.3
3.2 Private	3015	8.2	24497	66.8	27512	75
4. Individuals	3274	8.9	1784	4.9	5058	13.8
5. Others	53	0.1	188	0.5	241	0.6
Total	8996	24.5	27704	74.5	36700	100

Source: CSIR Patent Unit.

By analysing the data in Table 6 of the total patents published in India by types of organisation during the 17 years period 1974–1991 showed that industry's share was 77.3%, private sector industry with 75% and public sector industry with 2.3%. This was followed by individuals with 13.8% and R & D organizations with 6.8%. Among the R & D organizations, government R & D institutions accounted for 5.9% and the rest 0.9% by private R & D organizations. It is possible that patents published by inhouse R & D units of industry may be in the name of industry itself. It is worth noting that 67.9% of patents published in India were from industries abroad. This means that inhouse R & D of Indian industry published only 9.4% of patents. Therefore, one notes a large percentage of patents published in the name of industry rather than their R & D units. The teaching-cum-research institutions accounted only 1.5% patents published. In case of R & D organizations, 5.6% of patents published were from India and 1.2% from abroad. Among individuals who published patents, 8.9% were from India and 4.9% from abroad. Even in teaching-cum-research institutions, 1% were from abroad and 0.5% from India out of the total of 574 patents published in the last two decades. By any standards, the performance of Indian organizations publishing patents in India is quite dismal as compared to foreign organizations publishing patents in India. Moreover, Indian organizations/individuals publishing patents abroad is understood to be negligible though data on the same are not available. This again stress the earlier point made that the growth in R & D expenditure over time in India did not appear to have positive relationship with patents published. But, the Indian private industry though spent only 13% to 15% of the total national R & D expenditure has taken more patents. Moreover, Government R & D organizations are not taking significant number of patents even though Government R & D expenditure is always around 80% of the total national R & D expenditure. Though there may not be much change in the inter se share of patents published by various types or organizations from year to year, it is still useful to analyse the data at different points of time. Analyses of data in Table 7, Table 8 and Table 9 have drawn the attention to the following inference. While private industry dominates the scene as expected over different time points, R & D organizations did not show much growth in the patents published from year to year and it is varying around 150 per annum. In fact, there was steep decline in mid-eighties with the number of patents published per annum was less than 100. Teaching-cum-research institutions in India almost stopped patenting with total number of patents published annually is in single digit. One has to compare this insignificant patenting activities with roughly 25000 faculty members on the roll in the various S & T faculty of universities and institutions of national importance. The situation is much more glaring if one analyses year to year data on

patents published by types of organization as there is an overall declining trend irrespective of the types of organizations. In the case of patents published by foreigners by types of organization, the data on year to year basis showed somewhat an inconsistent picture with declining and increasing trend at different points of time.

Table 7
Number of patents published in India by type of organization

Organization Type/Year	1974–75	1976–77	1980–81	1985–86	1990–91	1991–92	1974–75 to 1991–92
1. Teaching-cum-Research	37	44	13	30	16	15	574
2. Research & Development	160	193	94	76	191	155	2494
2.1 Public	146	171	82	56	173	142	2151
2.2 Private	14	22	12	20	18	13	343
3. Industry	2001	2075	698	1119	1661	1620	28333
3.1 Public	34	61	33	30	28	22	821
3.2 Private	1967	2014	665	1089	1633	1598	27513
4. Individuals	301	464	177	261	303	255	5058
5. Others	6	35	30	8	3	10	241
Total	2505	2811	1012	1494	2174	2055	36700

Table 8
Number of patents published in India by Indians by type of organization

Organization Type/Year	1974–75	1976–77	1980–81	1985–86	1990–91	1991–92	1974–75 to 1991–92
1. Teaching-cum-Research	13	15	3	14	4	8	198
2. Research & Development	142	157	76	62	121	82	2039
2.1 Public	134	142	64	49	109	73	1782
2.2 Private	8	15	12	13	12	9	257
3. Industry	132	205	122	179	171	148	3432
3.1 Public	1	18	19	14	27	19	417
3.2 Private	131	187	103	165	144	129	3015
4. Individuals	187	328	118	190	176	127	3274
5. Others	4	1	10	-	-	-	53
Total	477	705	327	445	472	365	8996

Table 9
Number of patents published by foreigners in India by type of organization

Organization Type/Year	1974-75	1976-77	1980-81	1985-86	1990-91	1991-92	1974-75 to 1991-92
1. Teaching-cum-Research	24	29	10	16	12	7	376
2. Research & Development	18	36	18	14	70	73	455
2.1 Public	12	29	18	7	64	69	369
2.2 Private	6	7	-	7	6	4	86
3. Industry	1869	1870	576	940	1490	1472	24901
3.1 Public	33	43	14	16	1	3	404
3.2 Private	1836	1827	562	924	1489	1469	24497
4. Individuals	114	136	59	71	127	128	1784
5. Others	3	35	22	5	3	10	188
Total	2028	2106	685	1049	1702	1690	27704

Source: CSIR Patent Unit.
Note: Nil.

Patents published by major scientific agencies/departments

As mentioned earlier, since Government is more or less funding to the tune of 80% of total national R & D expenditure, it is worth examining in a little more detail the patents data of government funded R & D institutions though the situation may not be very different than what was mentioned already. In the government sector, the R & D institutions of the major scientific departments/agencies account about three fourth of the total government R & D expenditure or more than half of the total national R & D expenditure. If this is so, one should reasonably expect atleast a major share of patents published were by these agencies. For the 17 years period from 1974-1991, these agencies accounted for only 1588 patents published in India which worked out to be 17% of that published by Indians in India and a mere 4% of the total patents published by both Indians and foreigners in India. The data on the patents published by these agencies on year to year basis showed decline as shown in Table 10. The average number per annum is below 100 even though the number of scientists and engineers working directly on R & D in these agencies was around 30000. In other words, it means that one out of every three hundred R & D personnel designated as scientists and engineers has a patent publication. By any standard, this is very meagre. There could be several reasons for this low patenting activities such as R & D funding is

deployed by and large to maintain recurring expenditure accounting mainly for salaries but not innovation/projects, patenting procedures being so complex that scientists would rather publish papers rather applying patents, the innovative ability itself rather low and so on. In the context of changing scenario of IPR, Indian scientific agencies/departments being the large R & D spender should accord utmost priority for accelerating patenting activities.

Table 10
Patents published by major scientific agencies/departments (Number)

Agency/ Year	BARC	CSIR	DRDO	ICAR	ICMR	ISRO	NRDC	Total
1974-75	-	124	4	-	-	-	2	130
1975-76	-	98	5	2	1	-	-	106
1976-77	3	104	7	5	3	-	-	122
1977-78	1	173	10	2	6	2	4	198
1978-79	2	93	9	1	1	-	3	109
1979-80	1	43	3	-	-	2	-	49
1980-81	2	50	3	-	-	-	-	55
1981-82	1	27	2	-	-	1	-	31
1982-83	2	63	5	-	-	1	2	73
1983-84	-	27	2	-	-	-	-	29
1984-85	4	129	9	1	-	2	-	145
1985-86	-	36	3	-	-	-	2	41
1986-87	1	63	4	-	-	-	7	75
1987-88	1	114	14	4	-	-	-	133
1988-89	2	68	5	1	-	2	-	78
1989-90	1	57	1	-	-	1	-	60
1990-91	2	84	-	1	-	3	-	90
1991-92	-	56	-	-	-	3	5	64
Total	23	1409	86	17	11	17	25	1588

Source: CSIR Patent Unit.
Note: 1. - Nil.
2. BARC: Bhabha Atomic Research Centre; CSIR: Council Of Scientific And Industrial Research; DRDO: Defence Research and Development Organization; ICMR: Indian Council of Medical Research; ISRO: Indian Space Research Organization; NRDC: National Research and Development Corporation.

Patents published by Indians by region

It is perhaps interesting to analyse the regional distribution of patents published by Indians in India and as an example, the data for the latest year 1991-92 are analysed as this will not be very different for other years. Table 11 may be seen. Out of 365 patents published in that year, three states - Maharashtra, Delhi and West Bengal in that order accounted for 72.4% of the total. The reason could be that the number of private industry are more in the two states of Maharashtra and West Bengal as also the share of patenting by industry is more. These two states accounted for 170 out of 365 patents as most of them may be from industries. Since the headquarters of the scientific agencies are situated in Delhi, they may be accounting for 73 patents out of 94 patents published from Delhi since their research laboratories file patents in the name of their agencies.

Table 11
Statewise distribution of patents published during 1991-92

State	Number	Percentage
Andhra Pradesh	8	2.1
Assam	3	0.8
Bihar	9	2.5
Chandigarh	1	0.3
Delhi	94	25.8
Goa	1	0.3
Gujarat	13	3.6
Haryana	1	0.3
Karnataka	19	5.2
Kerala	8	2.1
Madhya Pradesh	4	1.1
Maharashtra	112	30.7
Orissa	6	1.6
Rajasthan	2	0.5
Tamil Nadu	17	4.7
Uttar Pradesh	9	2.5
West Bengal	58	15.9
Total	365	100

Source: CSIR Patent Unit.

Patents published by IPC classification

Patents are classified according to International Patent Classification (IPC) and under this, all technological fields are classified into eight broad sections comprising together 64000 sub-fields. It is necessary to understand the subject coverage of various IPC classifications and these are given in a tabular form below:

IPC section	Broad subject covered
A	Health and medicinal chemistry, agriculture articles of domestic use together termed as Human Necessities.
B	Chemical and physical processes and their apparatus, mechanical metal working, machine tools, handtools, printing and transportation together termed as Performing Operations and Transporting.
C	Chemistry and Metallurgy
D	Textiles and Paper
E	Fixed Constructions comprising construction of roads, railways and bridges, foundations, hydraulic engineering, building, earthdrilling and mining
F	Mechanical Engineering including lighting, heating, weapons and blasting
G	Physics
H	Electricity
I	Not specified

Since IPC classification was adopted by India in late 1975, it was not possible to classify patent data until then. The distribution of patents published by IPC classifications for various periods namely 1976-77 to 1981-82, 1982-83 to 1986-87, 1987-88 to 1991-92 as also for the entire 15 year period 1976-77 to 1991-92 were used to analyse the intensity of patents published in different IPC fields. Such analyses are done separately for patents published in India by Indians, foreigners as also for all patents. Table 12 may be seen for details.

Table 12
Distribution of patents published in India during 1976–77 to 1991–92 by International Patent Classification (Number)

IPC Classification/Year	1976–77 to 1981–82			1982–83 to 1986–87			1987–88 to 1991–92			Total (1976–77 to 1991–92)		
	Indian	Foreign	Total	Indian	Foreign	Total	Indian	Foreign	Total	Indian	Foreign	Total
Human Necessities	355	514	869	285	570	855	336	731	1067	976	1815	2791
Performing Operations and Transporting	677	1779	2456	462	1732	2194	407	2025	2432	1546	5536	7082
Chemistry and Metallurgy	817	2650	3467	738	1896	2634	797	2579	3376	2352	7125	9477
Textiles and Paper	168	339	507	120	400	520	96	407	503	384	1146	1530
Fixed Constructions	175	261	436	117	267	384	126	306	432	418	834	1252
Mechanical Engineering	433	926	1359	358	1033	1391	298	1269	1567	1089	3228	4317
Physics	277	344	621	152	326	478	177	565	742	606	1235	1841
Electricity	289	740	1029	183	783	966	156	1001	1157	628	2524	3152
Not Specified	36	98	134	14	34	48	16	29	45	66	161	227
Total	3227	7651	10878	2429	7041	9470	2409	8912	11321	8065	23604	31669

Source: CSIR Patent Unit.

It was observed that in the area of chemistry and metallurgical field, the Indian contribution progressively increased over the years i.e. 25.3% during 1976–77 to 1981–82 to 33.1% during 1987–88 to 1991–92, while the proportion of patenting by foreigners in the same field during the same periods decreased from 31.9% to 29%. But, for the whole 15 year periods, this field accounted for 30% of the total patents filed in India and also same for those filed by Indians and foreigners. A comparison between patents filed in India by Indians and by foreigners under various IPC classifications for 15 year periods is as under:

IPC classification	Patents filed in India during 1976–77 to 1991–92 (%)	
	Foreigners	Indians
A	7.7%	12.1%
B	23.5%	19.2%
C	30.2%	29.1%
D	4.8%	4.8%
E	3.5%	5.2%
F	13.7%	13.2%
G	5.2%	7.5%
H	10.7%	7.8%
I	0.7%	0.8%
Total Number (%)	23604 (100%)	8065 (100%)

The three dominant fields accounting for most of the patents published whether by Indians, foreigners or combined are chemistry and metallurgy, chemical and physical processes and mechanical engineering, accounting together for more than 60% of the total. For different periods also, more or less the same trend among different IPC classifications was observed.

Patents published by types of industry

Directorate General of Technical Development (popularly called DGTD) under Ministry of Industry in India classified all industries into 39 groups based on their products. But patents as mentioned already are classified into 64000 technological subfields based on International Patent classification. So, for convenience of analysis, five or more patents published annually since 1976–77 in different subfields are grouped under 39 industrial classifications. This by and large covered 20561 patents published accounting roughly two third of the total of 31669 published patents during 1976–1992. The rest of this section analyses the data given in Table 13 and Table 14.

Table 13
Distribution of Patents Published in India by DGTD Classification (Number)

Industry/Year	1976–77	1980–81	1985–86	1990–91	1991–92	Total 1976–77 to 1991–92
Metallurgical industries	143	28	48	114	116	1343
Fuels	32	7	22	47	44	504
Boilers and Steam Generating Plants	6	0	0	0	0	101
Prime movers (other than electrical operators)	20	22	0	27	16	377
Electrical Equipment	196	72	92	169	161	2159
Telecommunications	13	6	9	23	15	236
Transportation	135	43	48	88	72	1311
Industrial Machinery	132	22	92	133	97	1949
Machine Tools	7	7	19	6	12	217
Agricultural Machinery	0	0	0	0	0	0
Earth-moving Machinery	24	15	12	23	31	417
Misc Mechanical and Engineering Industries	55	0	7	36	27	448
Commercial Office and Household Equipment	20	7	7	12	0	176
Medical and Surgical Appliances	43	15	24	23	33	423
Industrial Instruments	0	0	0	0	0	0
Scientific Instruments	24	6	15	15	40	372
Mathematical Surveying and drawing instruments	0	0	0	0	0	0
Fertilisers	0	0	0	0	0	0
Chemicals (other than fertilisers)	771	177	235	453	455	6676
Photographic raw film and paper	17	0	0	0	0	43
Dye-stuffs	56	22	18	45	42	553
Drugs and Pharmaceuticals	29	7	41	57	43	491
Textiles	95	17	30	68	45	880
Paper and Pulp including Paper Products	0	0	0	6	0	20
Sugar	6	0	0	6	0	18

Table 13 (cont.)

Industry/Year	1976–77	1980–81	1985–86	1990–91	1991–92	Total 1976–77 to 1991–92
Fermentation Industries	0	0	0	0	0	0
Food Processing Industries	10	0	6	25	24	147
Vegetable Oils and Vanaspathi	0	0	0	0	0	0
Soaps, Cosmetics and toilet Preparations	6	0	23	26	33	212
Rubber Goods	0	0	0	0	0	0
Leather, Leather Goods and Pickers	0	0	0	0	0	10
Glue and Gelatin	0	0	0	0	0	0
Glass	25	0	9	16	19	181
Ceramics	0	0	0	11	7	31
Cement and Gypsum Products	24	6	9	35	41	327
Timber Products	0	0	0	0	6	26
Defence Industries	0	0	0	0	0	14
Miscellaneous Industries	0	0	0	0	0	44
Others	74	17	40	42	34	853
Total	1963	496	806	1506	1413	20561

Source: CSIR Patent Unit.

Table 14

Distribution of Patents Published in India by Indians by DGTD Classification during 1976-77 to 1991-92 ((Number)

Industry	Indians		Foreigners		Total	
	Number	%	Number	%	Number	%
Metallurgical industries	59	3	1284	7	1343	7
Fuels	10	0	494	3	504	2
Boilers and Steam Generating Plants	0	0	101	0	101	0
Prime movers (other than electrical operations)	19	1	358	2	377	2
Electrical Equipment	157	7	2002	11	2159	11
Telecommunications	0	0	236	1	236	1
Transportation	84	4	1227	7	1311	6
Industrial Machinery	75	3	1874	10	1949	9
Machine Tools	40	2	177	1	217	1
Agricultural Machinery	0	0	0	0	0	0
Earth-moving Machinery	6	0	411	2	417	2
Misc Mechanical and Engineering Industries	0	0	448	2	448	2
Commercial Offices and Household Equipment	91	4	85	0	176	1
Medical and Surgical Appliances	42	2	381	2	423	2
Industrial Instruments	0	0	0	0	0	0
Scientific Instruments	42	2	330	2	372	2
Mathematical Surveying and drawing instruments	0	0	0	0	0	0
Fertilisers	0	0	0	0	0	0
Chemicals (other than fertilisers)	1015	45	5661	31	6676	32
Photographic raw film and paper	7	0	36	0	43	0
Dye-stuffs	39	2	514	3	553	3
Drugs and Pharmaceuticals	154	7	337	2	491	2
Textiles	59	3	821	4	880	4
Paper and Pulp including Paper Products	0	0	20	0	20	0
Sugar	0	0	18	0	18	0
Fermentation Industries	0	0	0	0	0	0

Table 14 (cont.)

Industry	Indians		Foreigners		Total	
	Number	%	Number	%	Number	%
Food Processing Industries	18	1	129	1	147	1
Vegetable Oils and Vanaspathi	0	0	0	0	0	0
Soaps, Cosmetics and toilet Preparations	130	6	84	0	214	1
Rubber Goods	0	0	0	0	0	0
Leather Goods and Pickers	0	0	10	0	10	0
Glue and Gelatin	0	0	0	0	0	0
Glass	0	0	181	1	181	1
Ceramics	0	0	31	0	31	0
Cement and Gypsum Products	113	5	214	1	327	2
Timber Products	0	0	26	0	26	0
Defence Industries	0	0	14	0	14	0
Miscellaneous Industries	6	0	38	0	44	0
Others	90	4	763	4	853	4
Total	2256	100	18305	100	20561	100

Source: CSIR Patent Unit.

20561 patents published for which DGTD classification available were from all types of organizations – industry, R & D, teaching, individuals etc. though major share of patents published was accounted by industry. 32% of patents published were from chemical industry followed by 11% by electronic equipment, 9% by industrial machinery, 7% by metallurgical industry and 6% by transportation. Five or more patents published annually during 1976–77 to 1991–92 under 39 different industry groups by Indians in the country accounted for only 2256. By industry groupwise, 45% of the Indian patents published by Indians were accounted by chemical industry, 7% each by electrical equipment and drugs, pharmaceutical industries, 6% by soaps and cosmetics and 5% by cement and gypsum products. Almost one half of 38 industry groups was not even represented in the analyses. By industry groupwise, the analyses of patents published by foreigners during 1976–92 showed that 31% was accounted by chemical industry followed by electrical equipment (11%), industrial machinery (10%), metallurgical industry (7%) and transportation (7%). While patents taken by foreigners cannot establish a correlation between them and Indian R & D efforts, the patents taken by Indians show correlation between R & D expenditure in industries like chemical and electrical equipment and patents published by these industries. It is also true that patenting activity is totally absent in a number of Indian industry groups, though these industry groups do put in R & D resources both financial and manpower. Both chemical and electrical equipment industries shared between 42% to 50% of patents published whether they were from foreigners, Indians or combined. These two industries appear to be taking large number of patents, demonstrate greater inventive capacity as also putting higher R & D resources termed as R & D intensive industries.

International comparison of patent applications

An international comparison of trend in patent applications filed by selected countries including India showed some useful information. Data on patents filed for the year 1991, the most recent available for the industrialised countries – USA, UK, Japan, France, Canada, Italy, Australia, Germany and developing/newly industrialising countries such as South Korea, China and India indicate that India is filing the lowest number of patents only of the order of 3500 annually while Japan filed 380000, followed by USA 177000 with Australia lowest among developed countries filing 27000 patents and South Korea with 28000 and China 50000 patents filed during the year 1991. It is worth noting that China has substantially increased its patenting activity in the recent times, besides accelerating patent related activities by increasing facilities, training infrastructure etc. The share between domestic and

foreign patent applications filed by different countries has shown that Japan has 88% of domestic and 12% of foreign patents filed, USA has 50% each of domestic and foreign patents applications, China has 91% of domestic and 9% of foreign patents and for all other countries, the share of patent applications from foreigners was much higher than those filed by their nationals.

As mentioned earlier, the four ratios – dependency ratio, auto sufficiency ratio, inventiveness coefficient and coverage ratio are worked out for different countries for the year 1991 and the same is presented below:

Country	Dependency ratio	Auto sufficiency ratio	Inventiveness coefficient	Coverage ratio
India	1.75	0.36	0.01	0.58
Australia	2.50	0.29	4.49	0.79
Canada	15.95	0.06	0.83	1.05
France	4.95	0.17	2.24	0.71
Germany	1.89	0.35	4.12	0.72
Italy (1985)	17.23	0.05	0.36	0.60
Japan	0.13	0.88	27.08	0.94
United Kingdom	3.52	0.22	3.73	1.01
United States	1.00	0.50	3.49	4.47
China	0.10	0.91	0.39	NA

The above ratios were already explained. The inventiveness coefficient i.e. domestic patent applications per 10000 population is the lowest for India and in fact many times lower than other countries. This along with higher dependency ratio and low coverage ratio show that Indian patenting activity is much lower than the countries under comparison. It is worth noting that even China with larger population than India, has much higher inventiveness coefficient than India.

Final remarks

The paper put together the patent data of India of the last two decades hitherto either not available or not analysed the same from different angles by cross tabulations. The inference is that Indian patenting activity is pathetically low when compared to any of the resource factors of the country such as the stock of scientific and technical personnel, their deployment in R & D activities, the resources input to R & D activities, vast R & D infrastructure, the large population. This calls for corrective action especially in the context of new economic policy, liberalisation and growing

importance of IPR. Detailed data and analyses on patents should be undertaken on a continuous basis based on a well structured patent data base and information system. Simultaneously, actions should be initiated to impart training and information to active scientists and engineers the need to patenting on a large scale.

References

1. Annual Reports of the Controller General of Patents, Designs and Trademarks, India.
2. Project Report on Compilation and Analysis of Indian Patent Data - Sponsored by Department of Science and Technology to Patents Unit, CSIR (1994).
3. Japan, 1995 An International Comparison.
4. China Science and Technology Statistics Data Book, 1993.
5. OECD in Figures, 1994.
6. OECD, STIID Data Bank and various National Sources.