



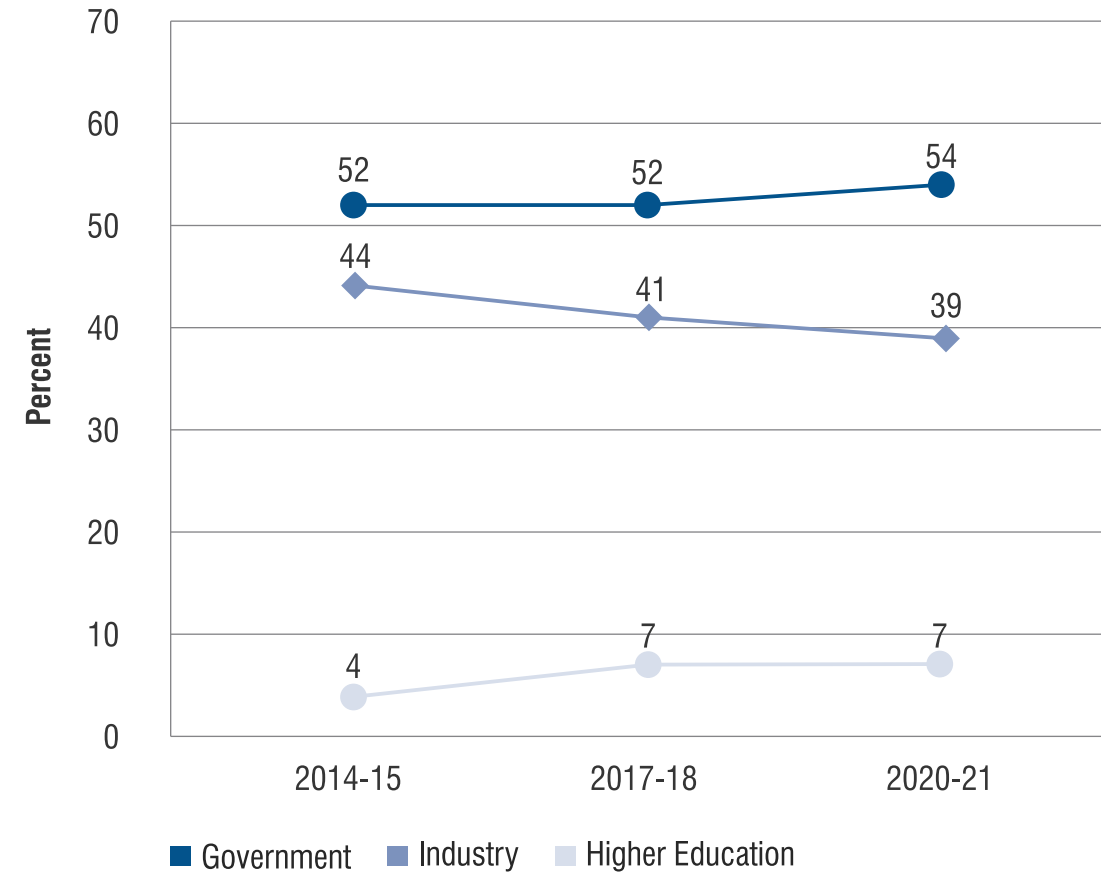
The CTIER Industry snapshot is the first of a series intended to provide the reader data on innovation in Indian industry drawing on the work presented in our biennial publication, the CTIER Handbook: Technology and Innovation in India.

It provides comparative data on the structure of industrial R&D both in India and globally, provides data on the intensity of R&D spending of select Indian firms in comparison with the global average R&D intensity for a particular sector and importantly showcases a unique compilation of the top 100 R&D spenders in the country. While the current snapshot uses data from our 2023 Handbook, we would urge the reader to glance through our earlier Handbooks to see the evolution of the top spenders since 2018 as well as the structural shifts being seen in global R&D spending over the same period.

Ultimately this snapshot is intended for policymakers to identify the current strengths when it comes to industrial R&D while identifying and devising policies for newer sectors and opportunities. For industry leaders, it is an opportunity to benchmark their R&D spending against other leading firms in the country while also thinking about how to build capability and make the right investments in technology to increase their firm's innovation output.

Innovation as a driver of long term economic growth is well-recognised. If India has to see high economic growth of 8 to 10 percent over the next couple of decades, Indian industry would need to lead the way through its investments in R&D and help India realise her R&D and innovation ambitions.

Share of India's R&D Expenditure by Sector of Performance (%)



The government sector in India accounted for 54 percent of total R&D expenditure in 2021, industry accounted for 39 percent and higher education accounted for 7 percent.

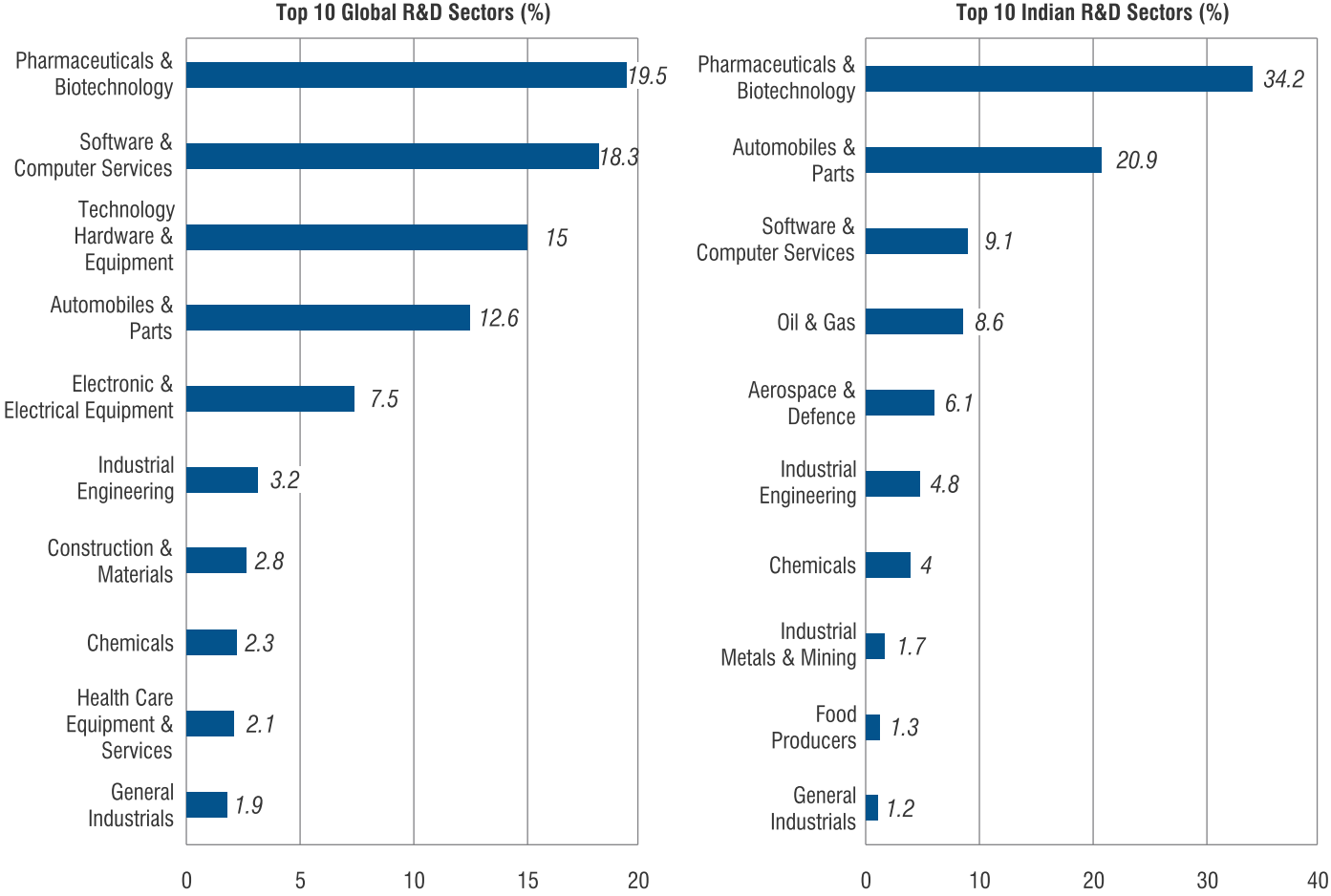
Industry's share in national R&D expenditure has dropped from 44 percent in 2015 to 39 percent in 2021.

Sector-wise Global Industrial R&D Expenditure and Country-wise Number of Firms

Sector	R&D Expenditure (US\$, Million)	Total Number of Firms	Number of Firms									
			Select Advanced Economies				Select Emerging/Asian Economies					
			USA	UK	Germany	Japan	Brazil	China	India	Israel	South Korea	Taiwan
Pharmaceuticals & Biotechnology	240519	478	263	18	10	25	0	79	11	1	10	0
Software & Computer Services	225846	336	196	8	6	5	1	73	2	9	2	3
Technology Hardware & Equipment	185628	207	71	1	3	15	0	47	0	3	4	44
Automobiles & Parts	155487	148	28	4	14	25	0	45	5	1	7	1
Electronic & Electrical Equipment	93266	249	41	7	10	30	0	106	0	2	5	24
Industrial Engineering	39481	167	28	4	19	22	1	52	0	0	2	0
Construction & Materials	34863	65	4	0	2	10	0	35	0	0	2	0
Chemicals	28250	114	21	2	8	28	0	33	1	0	5	1
Health Care Equipment & Services	25414	89	46	4	7	6	0	13	0	0	0	0
General Industrials	23106	64	15	1	5	12	0	16	0	1	5	1
Top 3 sectors	651993	1021	530	27	19	45	1	199	13	13	16	47
Top 10 sectors	1051860	1917	713	49	84	178	2	499	19	17	42	74
Total (2500)	1236061	2500	822	95	114	233	4	678	24	22	53	84

There were 24 Indian firms in the list of top 2,500 global R&D spenders in 2021. Indian firms were absent in 6 out of the 10 global industrial R&D sectors, whereas the US and China have firms present in each of the top 10 industrial R&D sectors. The number of Chinese firms in the top 2,500 global R&D spenders has increased from 199 in 2013 to 678 firms by 2021. On the other hand, the number of Indian firms has remained stagnant at around 25 for the same period.

Comparison of the Structure of Global and Indian Industrial R&D (Sector Share of Total Industrial R&D Spending)

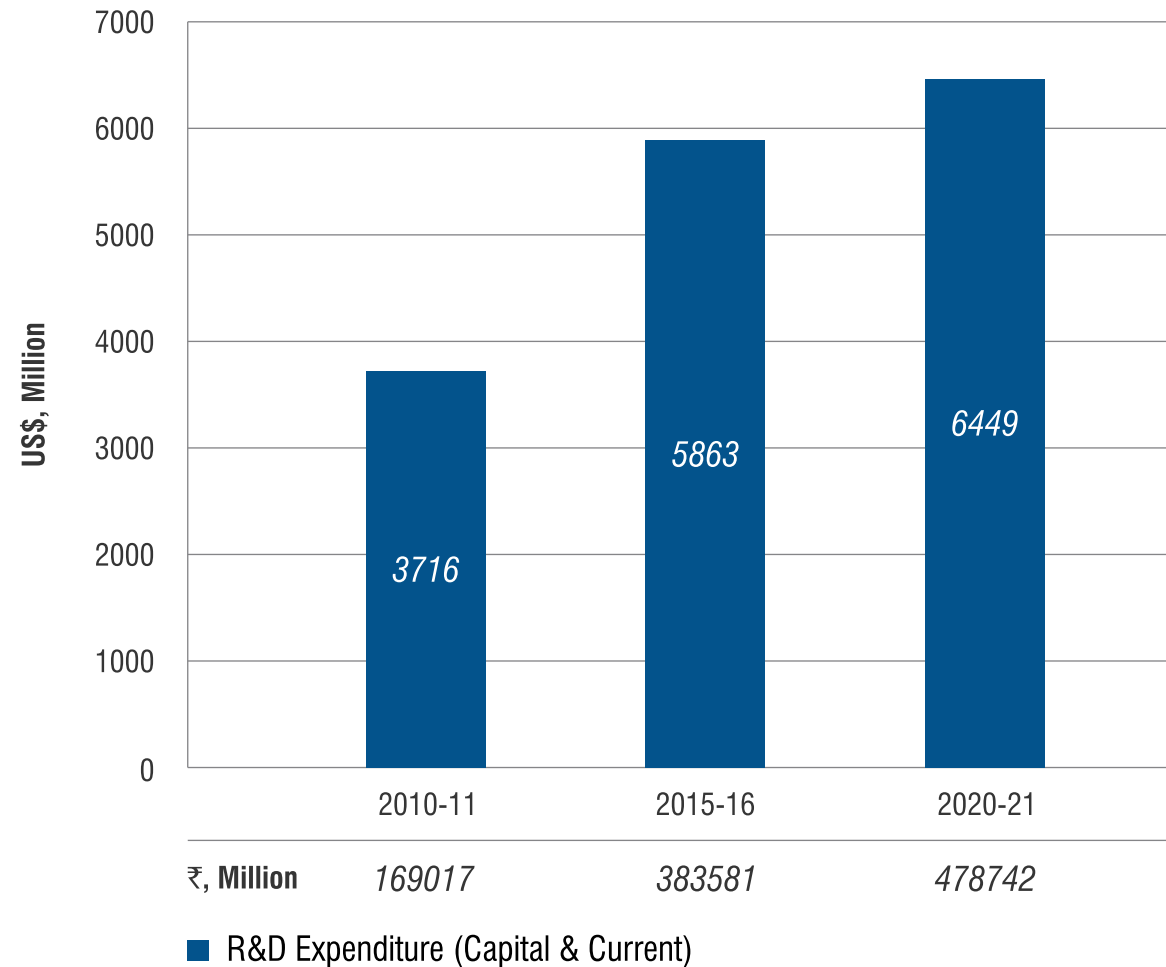


India’s industrial R&D is dominated by the pharmaceuticals & biotechnology and automobiles & parts sectors. These top two sectors contribute to around 55 percent of the total industrial R&D spending in India. Some of the other major sectors contributing to industrial R&D in India include software & computer services, oil & gas and aerospace & defence.

Global industrial R&D on the other hand is dominated by pharmaceuticals & biotechnology, software & computer services, technology & hardware equipment, automobiles & parts, and electronic & electrical equipment. The structure of India’s industrial R&D has 6 sectors in common with the top global sectors of industrial R&D.

Top global sectors such as technology hardware & equipment, electronic & electrical equipment, construction & materials and healthcare equipment & services are absent from India’s top industrial R&D sectors.

Total Industrial R&D Expenditure in India



India's industrial R&D expenditure in 2021 was USD 6,449 million. The expenditure by Indian industry remains low by global standards. Cisco Systems, which is ranked 30 in the list of top 2,500 global R&D spenders, spends nearly as much as all of Indian industry on R&D, while Alphabet, the top global R&D spender, spends almost five times that of all of Indian industry.

The R&D expenditure captured considers capital and current account expenditure on R&D reported by firms in their annual reports. The current account component of R&D expenditure represents around 75 percent of total industrial R&D spending in India.

CTIER's Top 100 Industrial R&D Spenders in India

The CTIER top 100 showcases the R&D spending of leading Indian firms. When CTIER first started tracking the top 100 Industrial R&D Spenders in India in our CTIER 2019 Handbook, the top 5 firms had two pharmaceuticals & biotechnology firms. In the CTIER 2023 Handbook there were no pharmaceuticals & biotechnology firms in the top 5.

In the same period, Reliance Industries more than doubled its R&D expenditure, making it the top Indian industrial R&D spender in 2021 from the 5th largest in the 2016, while Tata Consultancy Services, the largest R&D spender of the software industry, jumped from the 9th place to 4th.

CTIER's Top 100 Industrial R&D Spenders in India

Rank	Company Name	Sector	R&D Spending (₹, Million)	R&D Spending (US\$, Million)	Share in Total Top 100 R&D Spending (%)
1	Reliance Industries Ltd.	Oil & Gas	25720	352.9	6.9
2	Mahindra & Mahindra Ltd.	Automobiles & Parts	21600.8	296.3	5.8
3	Tata Motors Ltd.	Automobiles & Parts	20820	285.6	5.6
4	Tata Consultancy Services Ltd.	Software & Computer Services	18450	253.1	4.9
5	Hindustan Aeronautics Ltd.	Aerospace & Defence	16874	231.5	4.5
6	Lupin Ltd.	Pharmaceuticals & Biotechnology	13477.5	184.9	3.6
7	Dr. Reddy's Laboratories Ltd.	Pharmaceuticals & Biotechnology	13104	179.8	3.5
8	Sun Pharmaceutical Inds. Ltd.	Pharmaceuticals & Biotechnology	10374.1	142.3	2.8
9	Intas Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	9288.7	127.4	2.5
10	Cadila Healthcare Ltd.	Pharmaceuticals & Biotechnology	9184	126	2.5
11	Bharat Electronics Ltd.	Aerospace & Defence	9015.5	123.7	2.4
12	Aurobindo Pharma Ltd.	Pharmaceuticals & Biotechnology	8404.6	115.3	2.2
13	Cipla Ltd.	Pharmaceuticals & Biotechnology	8254.9	113.3	2.2
14	Bharat Heavy Electricals Ltd.	Industrial Engineering	7264.9	99.7	1.9
15	Alembic Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	6944.3	95.3	1.9
16	Maruti Suzuki India Ltd.	Automobiles & Parts	6259	85.9	1.7
17	Wockhardt Ltd.	Pharmaceuticals & Biotechnology	6217.8	85.3	1.7
18	Oil & Natural Gas Corpn. Ltd.	Oil & Gas	5541.3	76	1.5
19	Hero Motocorp Ltd.	Automobiles & Parts	5400.2	74.1	1.4
20	Infosys Ltd.	Software & Computer Services	5120	70.2	1.4
21	Indian Oil Corpn. Ltd.	Oil & Gas	5089.5	69.8	1.4
22	H C L Technologies Ltd.	Software & Computer Services	4730	64.9	1.3
23	Alkem Laboratories Ltd.	Pharmaceuticals & Biotechnology	4298.7	59	1.1
24	Bosch Ltd.	Automobiles & Parts	4286	58.8	1.1
25	Bajaj Auto Ltd.	Automobiles & Parts	4244.7	58.2	1.1

Rank	Company Name	Sector	R&D Spending (₹, Million)	R&D Spending (US\$, Million)	Share in Total Top 100 R&D Spending (%)
26	Ashok Leyland Ltd.	Automobiles & Parts	4095.7	56.2	1.1
27	Sun Pharma Advanced Research Co. Ltd.	Pharmaceuticals & Biotechnology	3950.8	54.2	1.1
28	Glenmark Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	3769	51.7	1
29	Edgeverve Systems Ltd.	Software & Computer Services	3739.7	51.3	1
30	Torrent Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	3711.2	50.9	1
31	Wipro Ltd.	Software & Computer Services	3703	50.8	1
32	Steel Authority Of India Ltd.	Industrial Metals & Mining	3633.1	49.8	1
33	T V S Motor Co. Ltd.	Automobiles & Parts	3313.4	45.5	0.9
34	Eugia Pharma Specialities Ltd.	Pharmaceuticals & Biotechnology	3312.7	45.4	0.9
35	Macleods Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	3280.6	45	0.9
36	Serum Institute Of India Pvt. Ltd.	Pharmaceuticals & Biotechnology	3030	41.6	0.8
37	Eicher Motors Ltd.	Automobiles & Parts	2991	41	0.8
38	Hindustan Petroleum Corpn. Ltd.	Oil & Gas	2956.6	40.6	0.8
39	Tata Steel Ltd.	Industrial Metals & Mining	2310.4	31.7	0.6
40	Force Motors Ltd.	Automobiles & Parts	2205.4	30.3	0.6
41	Biological E. Ltd.	Pharmaceuticals & Biotechnology	2153.1	29.5	0.6
42	P A R Formulations Pvt. Ltd.	Pharmaceuticals & Biotechnology	2070.7	28.4	0.5
43	N T P C Ltd.	Electricity	1857.8	25.5	0.5
44	Laurus Labs Ltd.	Pharmaceuticals & Biotechnology	1840	25.2	0.5
45	Apollo Tyres Ltd.	Automobiles & Parts	1819.2	25	0.5
46	Natco Pharma Ltd.	Pharmaceuticals & Biotechnology	1596	21.9	0.4
47	U P L Ltd.	Chemicals	1530	21	0.4
48	Mankind Pharma Ltd.	Pharmaceuticals & Biotechnology	1437.6	19.7	0.4
49	Aricent Technologies (Holdings) Ltd.	Software & Computer Services	1436	19.7	0.4
50	I T C Ltd.	General Industrials	1433.4	19.7	0.4

CTIER's Top 100 Industrial R&D Spenders in India

Rank	Company Name	Sector	R&D Spending (₹, Million)	R&D Spending (US\$, Million)	Share in Total Top 100 R&D Spending (%)
51	Escorts Ltd.	Industrial Engineering	1428.9	19.6	0.4
52	Philips India Ltd.	General Industrials	1428	19.6	0.4
53	Ajanta Pharma Ltd.	Pharmaceuticals & Biotechnology	1418	19.5	0.4
54	Tata Advanced Systems Ltd.	Aerospace & Defence	1399.6	19.2	0.4
55	Watson Pharma Pvt. Ltd.	Pharmaceuticals & Biotechnology	1371	18.8	0.4
56	Daimler India Commercial Vehicles Pvt Ltd.	Automobiles & Parts	1370	18.8	0.4
57	P I Industries Ltd.	Chemicals	1368	18.8	0.4
58	Micro Labs Ltd.	Pharmaceuticals & Biotechnology	1365	18.7	0.4
59	U S V Pvt. Ltd.	Pharmaceuticals & Biotechnology	1349.3	18.5	0.4
60	B E M L Ltd.	Industrial Engineering	1326.6	18.2	0.4
61	Unichem Laboratories Ltd.	Pharmaceuticals & Biotechnology	1322.9	18.1	0.4
62	Kirloskar Oil Engines Ltd.	Industrial Engineering	1291	17.7	0.3
63	Biocon Pharma Ltd.	Pharmaceuticals & Biotechnology	1286	17.6	0.3
64	Ipca Laboratories Ltd.	Pharmaceuticals & Biotechnology	1267	17.4	0.3
65	Larsen & Toubro Ltd.	Construction and Materials	1262.8	17.3	0.3
66	Sutherland Global Services Pvt. Ltd.	Software & Computer Services	1255.3	17.2	0.3
67	Emcure Pharmaceuticals Ltd.	Pharmaceuticals & Biotechnology	1250.7	17.2	0.3
68	Brahmos Aerospace Pvt. Ltd.	Aerospace & Defence	1245	17.1	0.3
69	Biocon Ltd.	Pharmaceuticals & Biotechnology	1237	17	0.3
70	Biocon Biologics Ltd.	Pharmaceuticals & Biotechnology	1237	17	0.3
71	Sterlite Technologies Ltd.	Technology Hardware & Equipment	1233	16.9	0.3
72	Gland Pharma Ltd.	Pharmaceuticals & Biotechnology	1219.6	16.7	0.3
73	Piramal Pharma Limited	Pharmaceuticals & Biotechnology	1214.1	16.7	0.3
74	Bharat Biotech Intl. Ltd.	Pharmaceuticals & Biotechnology	1210.3	16.6	0.3
75	Tejas Networks Ltd.	Technology Hardware & Equipment	1182.8	16.2	0.3

Rank	Company Name	Sector	R&D Spending (₹, Million)	R&D Spending (US\$, Million)	Share in Total Top 100 R&D Spending (%)
76	V E Commercial Vehicles Ltd.	Automobiles & Parts	1131.9	15.5	0.3
77	S R F Ltd.	Chemicals	1105	15.2	0.3
78	M R F Ltd.	Automobiles & Parts	1095	15	0.3
79	Fresenius Kabi Oncology Ltd.	Pharmaceuticals & Biotechnology	1083.9	14.9	0.3
80	Strides Pharma Science Ltd.	Pharmaceuticals & Biotechnology	1074.5	14.7	0.3
81	Baxter Pharmaceuticals India Pvt Ltd	Pharmaceuticals & Biotechnology	1064.4	14.6	0.3
82	Rubicon Research Pvt Ltd.	Pharmaceuticals & Biotechnology	1051	14.4	0.3
83	Ceat Ltd.	Automobiles & Parts	1049	14.4	0.3
84	Enzene Biosciences Ltd.	Pharmaceuticals & Biotechnology	1030	14.1	0.3
85	Mahindra Electric Mobility Ltd.	Automobiles & Parts	998.7	13.7	0.3
86	Grasim Industries Ltd.	General Industrials	987.5	13.5	0.3
87	Saint-Gobain India Pvt. Ltd.	Construction and Materials	984.9	13.5	0.3
88	Syngenta India Pvt. Ltd.	Chemicals	984.7	13.5	0.3
89	Jubilant Generics Ltd.	Pharmaceuticals & Biotechnology	975.6	13.4	0.3
90	Oil India Ltd.	Oil & Gas	958.1	13.1	0.3
91	Havells India Ltd.	Electronic & Electrical Equipment	955.9	13.1	0.3
92	Sanofi Healthcare India Pvt. Ltd.	Pharmaceuticals & Biotechnology	950.2	13	0.3
93	C N H Industrial (India) Pvt. Ltd.	Industrial Engineering	939	12.9	0.3
94	International Tractors Ltd.	Industrial Engineering	913	12.5	0.2
95	Comstar Automotive Technologies Pvt. Ltd.	Automobiles & Parts	903.6	12.4	0.2
96	Sahajanand Medical Technologies Ltd.	Healthcare Equipment & Services	881.6	12.1	0.2
97	J K Tyre & Inds. Ltd.	Automobiles & Parts	872.5	12	0.2
98	Aarti Industries Ltd.	Chemicals	866.8	11.9	0.2
99	Bharat Petroleum Corpn. Ltd.	Oil & Gas	866.4	11.9	0.2
100	Secure Meters Ltd.	Electronic & Electrical Equipment	829.3	11.4	0.2

Comparison of Select Indian Firms' R&D Intensity with Respective Sector Global Average R&D Intensity

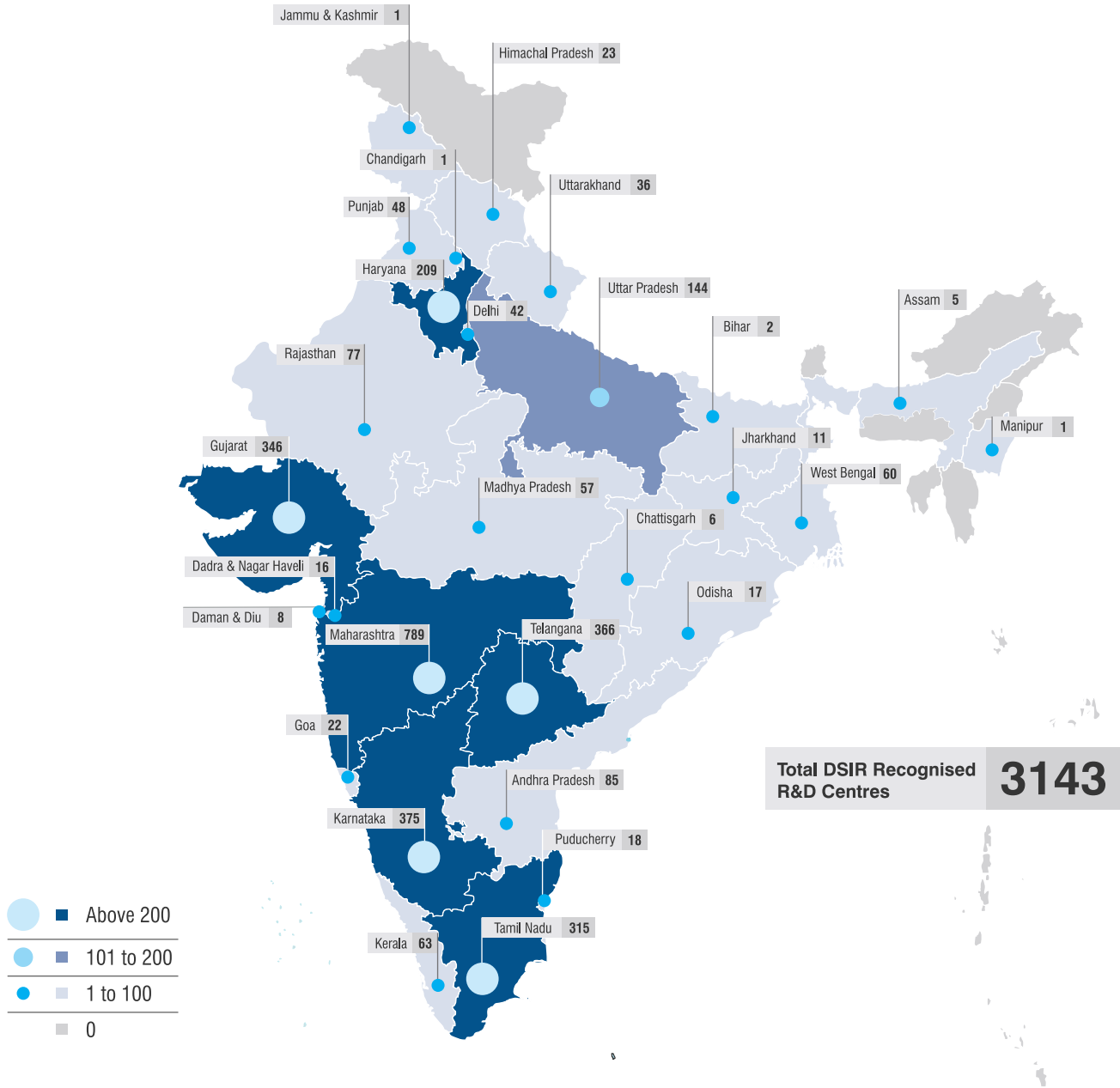
Sector	Company	R&D Intensity (%)	Top 2500 Global Average R&D Intensity (%)	Sector	Company	R&D Intensity (%)	Top 2500 Global Average R&D Intensity (%)		
Pharmaceuticals & Biotechnology	Lupin Ltd.	12.2	16.5	Industrial Engineering	Bharat Heavy Electricals Ltd.	4.2	3.5		
	Dr. Reddy's Laboratories Ltd.	9.8			Escorts Ltd.	2.1			
	Sun Pharmaceutical Inds. Ltd.	8.1			B E M L Ltd.	3.7			
	Intas Pharmaceuticals Ltd.	8.8			Kirloskar Oil Engines Ltd.	4.8			
	Cadila Healthcare Ltd.	11.8			C N H Industrial (India) Pvt. Ltd.	2.7			
Automobiles & Parts	Mahindra & Mahindra Ltd.	4.8	5.1	Chemicals	U P L Ltd.	1.3	2.9		
	Tata Motors Ltd.	4.4			P I Industries Ltd.	3.2			
	Maruti Suzuki India Ltd.	0.9			S R F Ltd.	1.6			
	Hero Motocorp Ltd.	1.8			Syngenta India Pvt. Ltd.	2.3			
	Bosch Ltd.	4.4			Aarti Industries Ltd.	1.8			
Software & Computer Services	Tata Consultancy Services Ltd.	1.4	12.5	Industrial Metals & Mining	Steel Authority of India Ltd.	0.5	1.5		
	Infosys Ltd.	0.6			Tata Steel Ltd.	0.4			
	H C L Technologies Ltd.	1.3			J S W Steel Ltd.	0.1			
	Edgeverve Systems Ltd.	13.5			Food Producers	Mahyco Pvt. Ltd.		8.4	1.4
	Wipro Ltd.	0.6				Venco Research & Breeding Farm Pvt. Ltd.		5.3	
Oil & Gas	Reliance Industries Ltd.	1	0.4	Nestle India Ltd.	0.3				
	Oil & Natural Gas Corpn. Ltd.	0.8		Seedworks International Pvt. Ltd.	10.2				
	Indian Oil Corpn. Ltd.	0.1		General Industrials	I T C Ltd.	0.3	3		
	Hindustan Petroleum Corpn. Ltd.	0.1			Philips India Ltd.	2.9			
	Oil India Ltd.	1.1			Grasim Industries Ltd.	0.8			
Aerospace & Defence	Hindustan Aeronautics Ltd.	7.4	4		3M India Ltd.	2			
	Bharat Electronics Ltd.	6.4			D C M Shriram Ltd.	0.5			
	Tata Advanced Systems Ltd.	8.6							
	Brahmos Aerospace Pvt. Ltd.	3.4							
	Mazagon Dock Shipbuilders Ltd.	2							

Reliance Industries Ltd., Mahindra & Mahindra Ltd., and Hindustan Aeronautics Ltd., feature among the top 10 R&D spenders in India. These firms have R&D intensities that are close to or in some cases even well above the global average R&D intensities for their respective sectors.

Some of the other top Indian firms such as Lupin Ltd., Dr. Reddy's Laboratories Ltd., Maruti Suzuki India Ltd., and Tata Steel Ltd., have R&D intensities below the global average R&D intensity for their respective sectors.

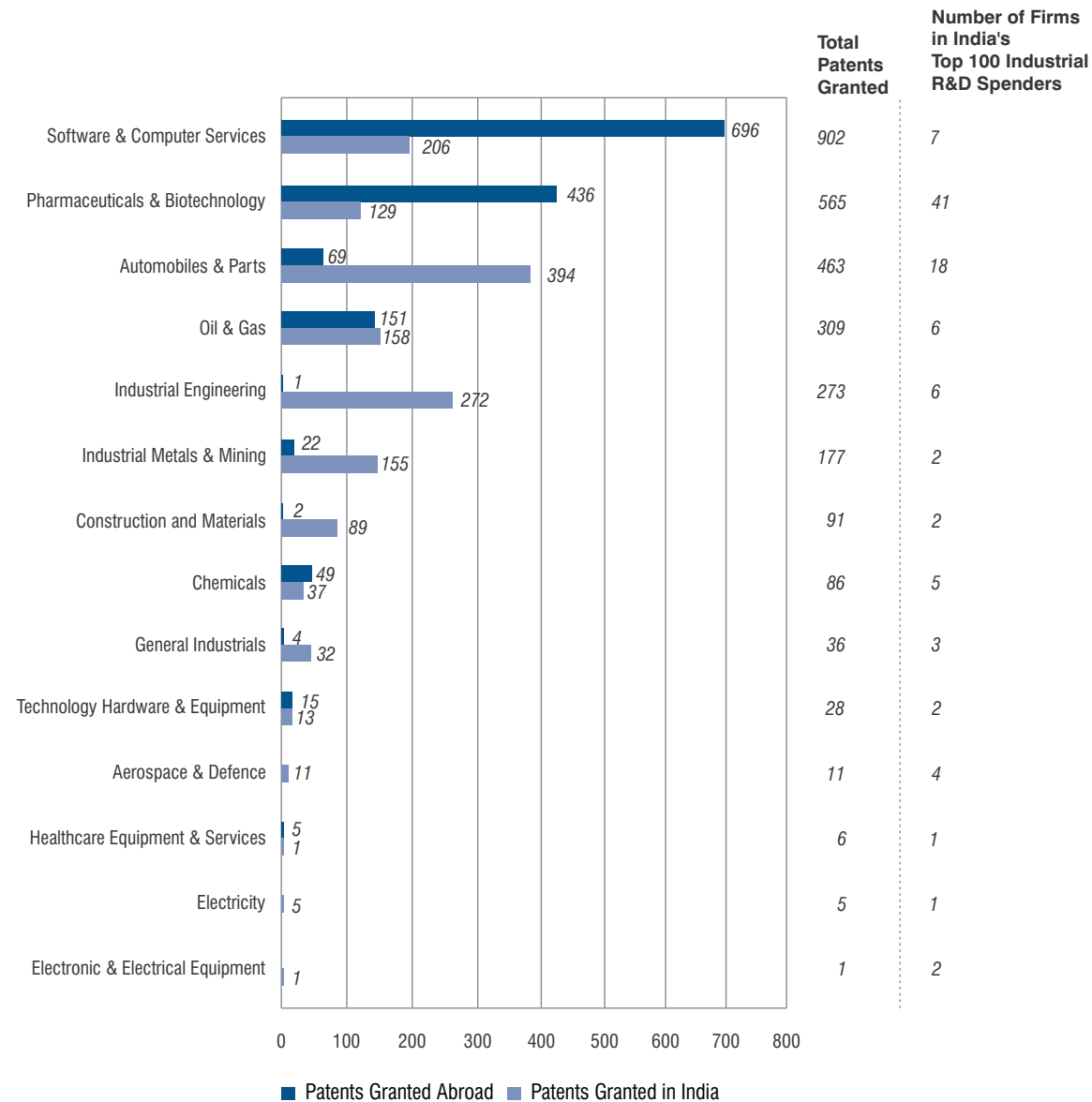
Top Indian software services firms such as TCS and Infosys have R&D intensities significantly lower than the global average R&D intensity for the software & computer services sector. This is because the global software & computer services sector tends to be dominated by software product firms such as Alphabet, Microsoft and Meta that have higher R&D intensities.

State-wise Distribution of Industrial R&D Centres



The directories of in-house R&D units released by the Department of Scientific and Industrial Research (DSIR) published the locations of one or more registered in-house R&D units of 2,466 firms. There were 366 firms that had multiple R&D units across different states in India. The state-wise locations of 3,143 R&D units were identified. Maharashtra had 789 R&D units, the highest number amongst all states, and accounted for 25 percent of the total DSIR recognised R&D Units. Some of the other top locations for the DSIR recognised R&D units were Karnataka, Telangana, Gujarat and Tamil Nadu.

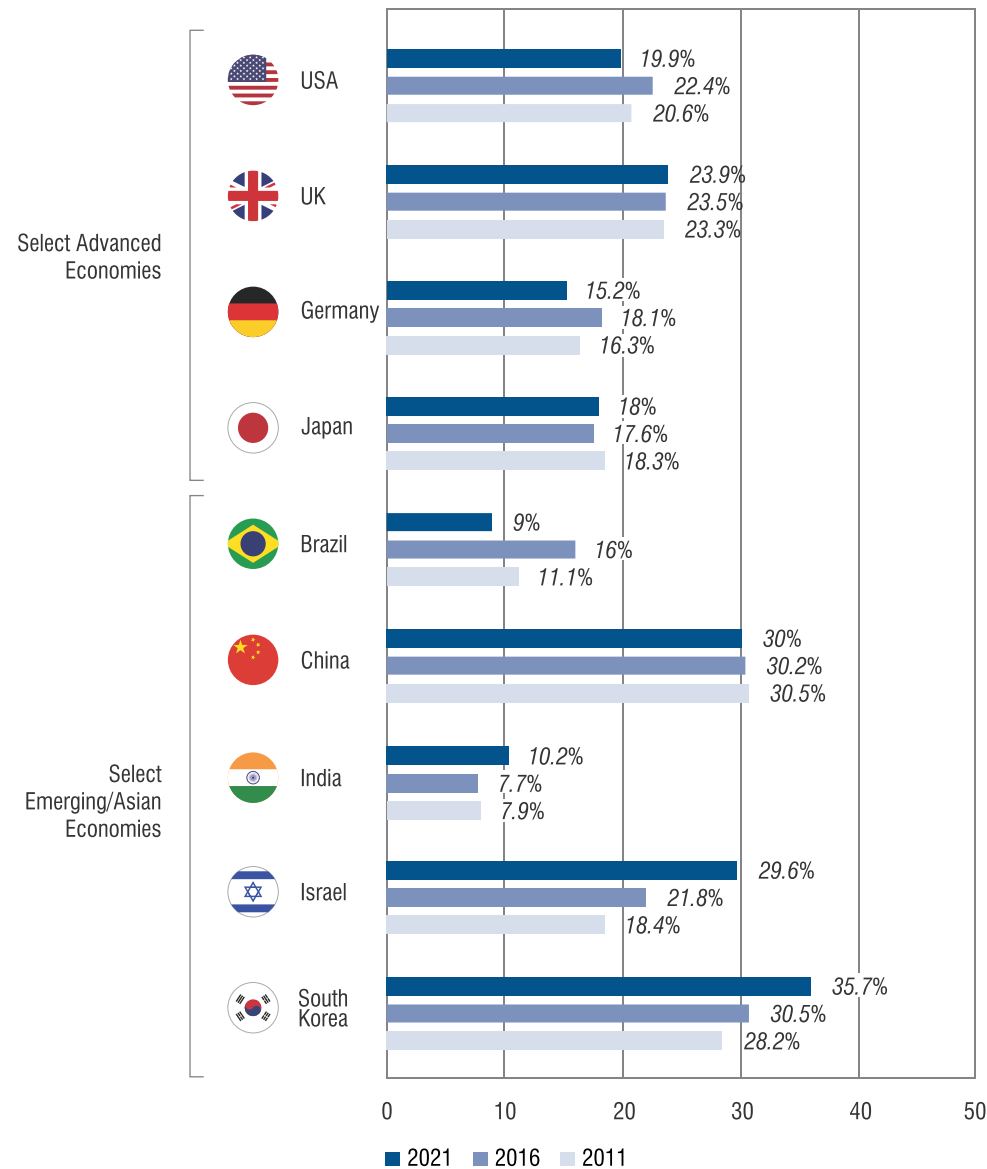
Sectoral Breakdown of Patents Granted to India's Top 100 Industrial R&D Spenders (2020-21)



There were a total of 2,952 patents granted to India's top R&D spenders in 2020-21. When firm level patent data was aggregated to obtain the number of patents by sector, the sectors that dominated were software & computer services and pharmaceutical & biotechnology. These sectors were followed by automobile & parts and oil & gas.

A higher share of patents was granted abroad for the software & computer services, pharmaceutical & biotechnology, and the oil & gas sectors, while the automobile & parts sector had a significantly higher share of patents granted by the Indian Patent Office.

High Technology Exports as Share of Manufactured Exports for Select Countries



India's share of high technology exports in manufactured exports was 10.2 percent in 2021 compared to 7.9 percent in 2011. In comparison to the other advanced and emerging economies, India continues to have the lowest share of high technology exports in manufactured exports. For the advanced economies, the share reported for the UK was above 20 percent in 2021 while for the USA it was close to 20 percent. With respect to the emerging economies like China, South Korea and Israel, the share of high technology exports in manufactured exports was close to or above 30 percent in 2021.

About CTIER

The Centre for Technology, Innovation and Economic Research (CTIER) was established in December 2015 to raise the level of debate and awareness amongst policy makers, industry and researchers in India about the essential role of technical capability in economic development, and how it is best fostered. We aim to inform policy making on the back of high quality empirical economic research, as well as impact higher education in India.

CTIER's work is contributing to systemic change in India's R&D and innovation ecosystem. We are a trusted source of data for all those shaping India's innovation and technological trajectory.

We have built strong linkages with industry and the academic community. Our unique analysis and insights are informing policies introduced to strengthen India's R&D and innovation ecosystem.

Our programmatic interventions are helping build capabilities needed to transform Indian industry into an innovation powerhouse. CTIER has also been at the forefront of shaping academic thought in economics of innovation.

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