Updated Time Series on S&E Doctoral Degrees Attained in India (as of 2014)

Statistics on science and technology personnel are often used as indicators to measure a country's technical capability and its progress as a knowledge based economy. The number of doctoral degrees attained in science & engineering (S&E) is one of many such indicators. When we compare India's share of S&E doctoral degrees as a percent of total PhDs granted, with that of select global economies, we find that India compares well with Switzerland, performs better than Germany, Japan and Korea and lags behind the United States, China and Taiwan.

Table 1: S&E Doctoral Data for India[1]

Year	Total PhD Degrees	All S&E	S&E as a % of Total PhDs	Physical/ biological sciences	Agricultural sciences	Engineering
1998	11,066	5,609	51	3,894	971	744
1999	10,951	5,418	49	3,836	886	696
2000	11,296	5,541	49	3,885	933	723
2001	11,544	5,504	48	3,727	999	778
2002	11,974	5,637	47	3,955	948	734
2003	13,733	6,471	47	4,497	1,195	779
2004	17,853	7,636	43	5,612	1,142	882
2005	17,898	7,537	42	5,549	1,020	968
2006	18,730*	7,982	43	5,625	1,299	1,058
2007	12,733	5,767	45	4,098	825	844
2008	13,237	6,728	51	4,514	787	1,427
2009	13,768	6,721	49	4,786	690	1,245
2010	14,477	6,882	48	4,619	814	1,449
2011	16,093	7,701	48	5,271	748	1,682
2012	19,861	9,373	47	6,334	866	2,173
2013	20,275	9,702	48	6,641	942	2,119
2014	22,849*	10,663	47	7,018	1,112	2,533

*Provisional Figures

Note: India data include Computer Science and Computer Applications under Physical/Biological Sciences

Sources: India-Department of Science and Technology (various years), Ministry of Human Resource Development, University Grants Commission (UGC) Annual Reports (various years)

---

[1] For details on the classification and the treatment of India's data refer to 'Guidelines' below.

The recently launched Global Innovation Index (GII) report for 2016 introduced a new category - the number of S&E graduates as a percent of total graduates in a country. India's strong performance in this category according to the GII report (India ranked 8th in the world in this category), prompted us to delve deeper into the newly introduced category, and search for the number of doctoral degrees attained in S&E in India. The GII is an annual ranking of countries by their capacity for, and success in innovation[2].

In this brief, using publicly available data from various University Grants Commission (UGC) reports, we have constructed a time series of the number of doctoral degrees in S&E that have been attained in India between 1998 and 2014 (see Table 1). Currently, online databases like the UNESCO Institute of Statistics and reports such as the National Science Foundation's (NSF) Science & Engineering Indicators (2014 & 2016) provide fragmented data on the number of S&E doctoral degrees attained in India, with the latest reported number being from 2011.

We then go on to compare India's share of S&E doctoral degrees as a percent of total PhDs granted, with select advanced economies that featured among the top 10 ranked countries according to the GII (see Table 2), as well as with select Asian economies like China, Japan, Korea and Taiwan – all large spenders on research & development and ranked within the top 25 countries according to the GII (see Table 3).

While the data for India has been updated until 2014[3], the data in Tables 2 and 3 for other countries is only available until 2012 as per the latest NSF Science & Engineering Indicators 2016.

Table 1 above shows a marked increase over the years in the number of S&E doctoral graduates to around 10,600 degrees granted in the year 2014 from 5,600 granted in 1998. While doctoral degrees granted in agricultural sciences have remained fairly stable over the years, the increase in the total number of doctoral degrees has been led by a three-fold increase in engineering degrees and a doubling in the number of degrees in physical/biological sciences.

Table 2 below compares India's share of S&E doctoral degrees as a percent of total PhDs granted, with select advanced economies that featured among the top 10 ranked countries according to the GII. As is evident from the table below, India compares well with Switzerland, performs better than Germany, and lags behind the United States in this category.

---

[2] The GII is published by Cornell University, INSEAD, and the World Intellectual Property Organization annually since 2007.

[3] Users of our constructed time series may wish to note the difference in the data reported for the number of doctoral degrees attained in India in 2011- between the UGC Annual Report 2011 and that which has been reported in the NSF's Science & Engineering Indicators 2016 (21,544 doctoral degrees reported for India).

Table 2: Comparison of India with Select GII Top Ten Nations

Year	Switzerland All S&E	Switzerland S&E as a % of Total PhDs	Sweden All S&E	Sweden S&E as a % of Total PhDs	United Kingdom All S&E	United Kingdom S&E as a % of Total PhDs	United States All S&E	United States S&E as a % of Total PhDs	Germany All S&E	Germany S&E as a % of Total PhDs	India All S&E	India S&E as a % of Total PhDs
2000	1,186	43	1,659	54	6,892	60	25,423	57	10,655	41	5,541	49
2001	1,202	44	1,752	52	7,988	56	25,453	56	10,123	41	5,504	48
2002	1,239	44	1,914	54	7,847	55	24,254	55	9,353	39	5,637	47
2003	1,144	42	1,973	55	8,111	54	25,425	55	9,125	40	6,471	47
2004	1,208	41	2,165	56	8,488	56	26,573	55	9,013	39	7,636	43
2005	1,479	45	1,353	49	8,726	55	28,561	54	10,251	39	7,537	42
2006	1,631	48	2,146	57	9,055	55	30,452	54	9,684	39	7,982	43
2007	1,633	48	2,085	53	9,557	54	32,588	54	9,904	41	5,767	45
2008	1,539	45	1,991	55	8,802	53	33,359	54	10,602	41	6,728	51
2009	1,660	46	1,842	52	9,510	54	33,284	54	10,504	41	6,721	49
2010	1,678	44	1,783	53	10,296	55	32,649	57	11,358	44	6,882	48
2011	1,727	50	1,686	50	10,811	54	34,205	57	12,031	45	7,701	48
2012	1,787	49	1,716	51	10,993	54	35,360	57	12,380	46	9,373	47

Sources: Organisation for Economic Co-operation and Development (OECD), OECD.StatExtracts; United States—National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR); India-Department of Science and Technology (various years), Ministry of Human Resource Development, University Grants Commission (UGC) Annual Reports (various years);

Notes: Physical/biological sciences include physical; biological; and earth, atmospheric, and ocean sciences. Data for doctoral degrees use International Standard Classification of Education (ISCED 97), level 6. S&E data do not include health fields. For all European countries, engineering corresponds to "engineering and engineering trades,". India data include Computer Science and Computer Applications under Physical/Biological Sciences

When one compares India's share of S&E doctoral degrees as a percent of total PhDs granted with select Asian economies – all large spenders on research & development and ranked within the top 25 countries according to the GII (Table 3), we find that India performs better than Japan and Korea, and lags behind China and Taiwan (countries that historically have had a very large share of S&E doctoral degrees as a percent of total PhDs granted).

Note

i. The S&E data reported in the NSF's S&E Indicators 2016 Report follow UNESCO's International Standard Classification of Education (ISCED), 1997.

ii. For the S&E Indicators 2018 Report, the NSF shall be adopting the ISCED, 2011.

iii. Going forward, India's education statistics are expected to be based on the Indian Standard Classification of Education (InSCED), 2014. InSCED, 2014 has been developed in accordance with UNESCO's International Standard Classification of Education (ISCED), 2011.

www.ctier.org
Centre for Technology Innovation and Economic Research
P B No.29, Mumbai Pune Road, Kasarwadi, Pune - 411034, Maharashtra, INDIA
CIN: U74999PN2015NPL157589

Table 3: Comparison with Select Asian Nations

Year	China[a] All S&E	S&E as a % of Total PhDs	Japan[b] All S&E	S&E as a % of Total PhDs	South Korea All S&E	S&E as a % of Total PhDs	Taiwan All S&E	S&E as a % of Total PhDs	India All S&E	S&E as a % of Total PhDs
1998	6,358	75	6,575	44	2,060	41	907	71	5,609	51
1999	6,778	67	7,082	46	2,304	41	901	69	5,418	49
2000	7,766	68	7,089	46	2,544	41	970	67	5,541	49
2001	8,153	65	7,401	46	2,517	41	970	66	5,504	48
2002	9,523	65	7,461	46	2,812	42	966	64	5,637	47
2003	12,238	65	7,581	46	2,700	38	1,167	66	6,471	47
2004	14,858	63	7,912	47	3,208	40	1,291	66	7,636	43
2005	17,595	64	7,658	45	3,348	40	1,385	64	7,537	42
2006	22,953	63	8,122	47	3,455	40	1,643	63	7,982	43
2007	26,582	64	8,017	46	3,342	37	1,905	67	5,767	45
2008	28,439	65	7,761	46	3,399	36	2,005	64	6,728	51
2009	31,423	65	7,396	47	3,489	35	2,295	64	6,721	49
2010	31,410	64	7,470	45	3,760	36	2,509	68	6,882	48
2011	32,208	64	7,100	45	4,723	41	2,472	64	7,701	48
2012	32,331	63	NA	NA	4,945	40	2,478	64	9,373	47

[a] China data include mathematics under physical and biological sciences and computer sciences under engineering.

[b] Japan data include thesis doctorates, called *ronbun hakase,* earned by employees in industry. In higher education data for Japan, mathematics are included in natural sciences, and computer sciences are included in engineering

^India data include Computer Science and Computer Applications under Physical/Biological Sciences

Sources: India-Department of Science and Technology (various years), Ministry of Human Resource Development, University Grants Commission (UGC) Annual Reports (various years); China—National Research Center for Science and Technology for Development and China Statistical Yearbook (Beijing) (various years); Japan—Japan Student Services Organization (various years); South Korea—Organisation for Economic Co-operation and Development (OECD) (various years), OECD.StatExtracts,; Taiwan—Ministry of Education, Educational Statistics of the Republic of China (Taiwan) (annual series).

Guidelines

i. We have adopted the NSF methodology for calculating and reporting the number of S&E doctoral degrees attained in India.
ii. The NSF reports data based on the following categories: Physical/Biological Sciences, Mathematics/Computer Sciences, Agricultural Sciences, Social/Behavioural Sciences and Engineering.
iii. The S&E doctoral data for India, as mentioned in various UGC annual reports, are based on the following categories: Science, Engineering & Technology, Agriculture, and Veterinary Science.
iv. The UGC reports tend to classify Computer Science & Computer Applications under 'Science'. We have combined the data from Agriculture and Veterinary Science in the UGC reports to derive the number of doctoral degrees under the category 'Agricultural Sciences'.
v. The UGC reports do not provide data separately on Mathematics/Computer Sciences and Social/Behavioural Sciences. We have assumed that doctoral degrees in Mathematics have been captured in the data reported under 'Science' in the UGC reports.
vi. The data under 'Science' in the various UGC reports have been classified under the category 'Physical/Biological Sciences' for our data series.

Janak Nabar
janak.nabar@ctier.org

Mehak Malhotra
mehak.malhotra@ctier.org