

Acknowledgement

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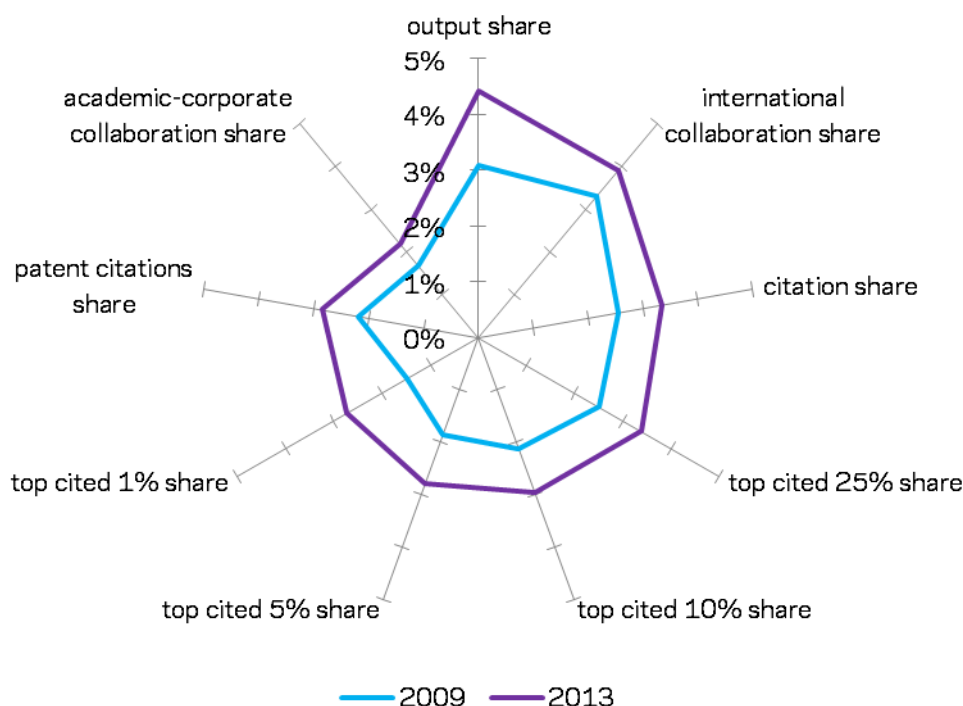
Executive Summary

India's research performance has improved from 2009 to 2013

In 2009, India produced more publications than Spain, Australia, Korea, Brazil, Sweden and Singapore. In 2013, India's output rose to also surpass that of Canada and Italy. Along multiple indicators of research, India has small but growing shares of the world's total, as shown in Figure A.

Figure A — Macro snapshot of India's research performance, 2009-2013.

Source: Scopus database.



- ▶ **INCREASING OUTPUT.** India's share of the world's S&T scholarly output has grown from 3.1% in 2009 to 4.4% in 2013. In absolute terms, this 1.3 percentage points increase corresponds to a high compound annual growth rate (CAGR, see Appendix J for term definition) of 13.9%, from 62,955 papers in 2009 to 106,065 papers in 2013. The world CAGR is 4.1% over that period. India's share of the world output of international collaboration publications has increased from 3.3% in 2009 to 3.9% in 2013.
- ▶ **GROWING IMPACT.** India's shares of the world's citations and of top cited papers (25%, 10%, 5%, and 1%) all have increased between 0.8 and 1.2 percentage points from 2009 to 2013, demonstrating that India has not

only grown in output but also in impact, especially in the highest excellence percentile.

- ▶ IMPROVING KNOWLEDGE TRANSFER. India's share of the world's patent citations has increased by 0.7 percentage points, from 2.2% in 2009 to 2.9% in 2013. Its share of the world's academic-corporate collaborated papers has grown by half a percentage point, from 1.7% to 2.2% in 2013. In absolute terms, this corresponds to 7.0% CAGR from 953 papers in 2009 to 1,250 papers in 2013.

Figure B shows that India's international collaboration network spans the whole globe, comprising several prolific partners (e.g., the USA, Germany) or impactful partnerships (e.g. with Mexico, Georgia, Sri Lanka, Armenia, Belarus).

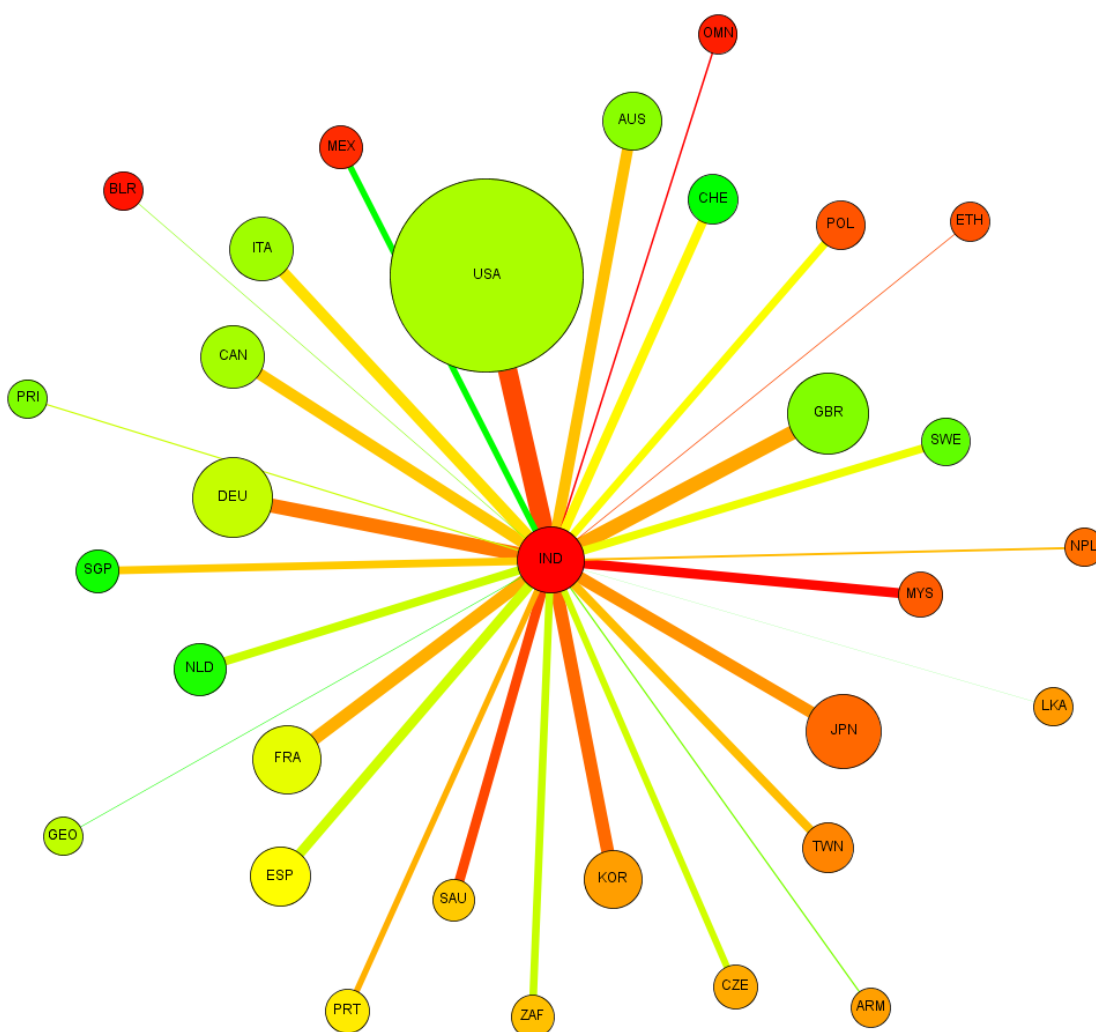


Figure B — India's international collaboration network 2010-2014. See Table H.2 in Appendix H for country abbreviations. The size of the nodes is proportional to the number of papers published by each country; the colour of the nodes reflects the FWCI of each country's papers; the size of the edges indicates Salton's Index; the colour of the edges represents the FWCI of India's papers collaborated with each country.

FWCI scales:
 0.75 nodes 1.82
 1.20 edges 5.35

Source: Scopus database.

Each node in Figure B is coloured based on the country's field-weighted citation impact (FWCI) wherein the count of their received citations per field and year have been normalised to the world average. An FWCI greater than 1.00 indicates the research is of higher quality than the world average. The edges or lines between the nodes indicate the quality of the research conducted by the two partners, and in all cases the quality is higher than the world average.

In 2013, 17,006 papers representing 16.0% of India's S&T scholarly output were the product of international collaboration and these papers were cited 39% more than the world average across collaboration types. However, the proportion of India's output resulting from international collaboration has decreased between 2009 and 2013 by 1.3 percentage points.

Although India is still a relatively small player on the global scientific stage, its wide-ranging international collaboration network and increasing shares of the world's main research performance indicators reflect its overall growth in output, impact, and knowledge transfer. Improving India's international and cross-sector collaborations could be key to further growing the impact and visibility of India's research on the global scientific scene.

India at a Glance

INDIA'S S&T SCHOLARLY OUTPUT IN 2013



106,065 papers

4.4% of the world's S&T scholarly output

INDIA'S S&T SCHOLARLY OUTPUT GROWTH FROM 2009 TO 2013



13.9% CAGR

high compound annual growth rate, compared to 4.1% for the world

INDIA'S RESEARCH FOCUS IN 2009-2013



Chemistry and Pharmacology

INDIA'S INTERNATIONAL COLLABORATION IN 2013



16.0%

of India's S&T scholarly output

3.9%

of global international collaboration output

INDIA'S MOST IMPACTFUL PROLIFIC INTERNATIONAL COLLABORATION PARTNERS IN 2009-2013



Brazil, Russia, China, Spain, Sweden, and the Netherlands

INDIA'S ACADEMIC-CORPORATE COLLABORATED OUTPUT IN 2013



1,250 papers

1.2% of India's S&T scholarly output

INDIA'S PATENT CITATIONS IN 2013



109 patent citations

2.9% of world patent citations

INDIA'S PATENT CITATIONS FOCUS IN 2009-2013



Materials Science, Chemistry, and Pharmacology, Toxicology & Pharmaceuticals

INDIA'S LOWEST AND HIGHEST FWCI 2009-2013

**0.75 (2011) & 0.77 (2009)**

Field-weighted citation impact has a -0.4% CAGR over 2009-2013

TOP INDIAN ACADEMIC INSTITUTIONS IN CHEMISTRY AND PHARMACOLOGY

**Indian Institute of Science Bangalore**

Chemistry

**Annamalai University**

Pharmacology

HIGHEST INSTITUTIONAL CITATIONS PER PAPER

**Tata institute of Fundamental Research**

12.7 CPP

TOP 3 INSTITUTIONS OF INDIA'S TOP 30 S&T ACADEMIC INSTITUTIONS



1. Indian Institute of Science Bangalore
2. Indian Institute of Technology, Kharagpur
3. Indian Institute of Technology, Delhi

BOTTOM 3 INSTITUTIONS OF INDIA'S TOP 30 S&T ACADEMIC INSTITUTIONS



28. University of Mysore
29. Jawaharlal Nehru University
30. University of Pune

Introduction

“The Department of Science & Technology plays a pivotal role in promotion of science and technology in India. The Department has wide ranging activities ranging from promoting high end basic research and development of cutting edge technologies on one hand, to service the technological requirements of the common man through development of appropriate skills and technologies on the other.”

Source: DST website , <http://www.dst.gov.in/about-us/mission-objectives>

1 About this study

The Department of Science & Technology (DST) was established in May 1971, with the objective of promoting new areas of Science and Technology (S&T) and to play the role of a nodal department for organising, coordinating and promoting S&T activities in India. The Department has major responsibilities for specific projects and programmes. Among its major responsibilities are:

- Formulation of policies relating to Science and Technology.
- Matters relating to the Scientific Advisory Committee of the Cabinet (SAC-C).
- Promotion of new areas of Science and Technology with special emphasis on emerging areas:
 - Research and Development through its research institutions or laboratories for development of indigenous technologies concerning bio-fuel production, processing, standardisation and applications, in co-ordination with the concerned Ministry or Department.
 - Research and Development activities to promote utilisation of by-products to develop value-added chemicals.

In light of these aims, it is crucial for DST to maintain a deep understanding of India's research performance, through time and in comparison with other nations, overall and for subject areas relevant to S&T. This report, commissioned to Elsevier by DST, aims to provide DST with such necessary insights.

In order to do so, this study presents data on three main bibliometric indicator types:

- Measures of publication output, growth, and impact
- Analysis of international, national, and institutional collaboration and the resulting publication output, growth and impact
- Evaluation of the transfer or knowledge between sectors

This study provides data on these indicators overall as well as for sixteen core S&T subject areas selected by DST (see Appendix I). The main study covers the years 2009-2013 (Appendices A to E include supplementary data for 2014). The study's analyses concern India as well as thirteen comparator countries (see Appendix H) and four benchmarks (world, BRICS, G8, SAARC), selected by DST. Moreover, a detailed overview of India's academic research landscape is presented, including data on its institutions, authors, and top publications.

The study is divided into six chapters. These chapters are concerned with the following themes:

- **Chapter 1** presents the 2009-2013 S&T scholarly output of India and its comparators, which includes their publication and received citation count, field-weighted citation impact, and number of excellent (i.e. highly cited) publications.
- **Chapter 2** presents the 2009-2013 S&T collaborative output of India and its comparators, which includes their distribution across collaboration types, and India's most prolific and most impactful collaborations.
- **Chapter 3** presents the 2009-2013 S&T knowledge transfer, which includes analyses of patent citation patterns and collaborations between academic and corporate research institutions.
- **Chapter 4** presents the 2002-2014 top 30 Indian S&T academic institutions, and analyses their publications, received citations, average number of citations per paper, and H-indices.
- **Chapter 5** presents the 2009-2013 active Indian researchers affiliated with the top 30 Indian S&T research institutions, including the top 10 most prolific researchers overall and per subject area.
- **Chapter 6** presents the 2009-2014 top 10 most cited S&T publications with an Indian affiliation, overall and per subject area.

The combination of the different analyses and assessments in these chapters should give a comprehensive view of the state of India's S&T research. Elsevier hopes that this will contribute to DST's knowledge of India's S&T research performance, and inform its evidence-based strategic decisions.

2 Methodology and data sources

2.1 Rationale and measures

Our methodology is based on the theoretical principles and best practices developed in the field of quantitative science and technology studies, particularly in science and technology indicators research. The *Handbook of Quantitative Science and Technology Research: The Use of Publication and Patent Statistics in Studies of S&T Systems* (Moed, Glänzel and Schmoch, 2004)¹ gives a good overview of this field. It is based

¹ Moed H., Glänzel W., & Schmoch U. (2004). *Handbook of Quantitative Science and Technology Research*, Kluwer: Dordrecht.

on the pioneering work of Derek de Solla Price (1978),² Eugene Garfield (1979)³ and Francis Narin (1976)⁴ in the USA, of Christopher Freeman, Ben Martin and John Irvine in the UK (1981, 1987)⁵, and of researchers in several European institutions including the Centre for Science and Technology Studies at Leiden University, the Netherlands, and the Library of the Academy of Sciences in Budapest, Hungary.

The analyses of bibliometric data in this report are based upon recognised advanced indicators (e.g., the concept of relative citation impact rates). Our base assumption is that such indicators are useful and valid, though imperfect and partial measures, in the sense that their numerical values are determined by research performance and related concepts, but also by other, influencing factors that may cause systematic biases. In the past decade, the field of indicators research has developed best practices which state how indicator results should be interpreted and which influencing factors should be taken into account. Our methodology builds on these practices.

The essential measures used in this report are the following:

- **Active researchers** are defined as all authors currently affiliated with an institution located in that country.
- **Article types.** For all bibliometric analysis, only the following document types are considered: article (ar); review (re); conference proceeding (cp).
- **Counting.** All analyses make use of integer counting rather than fractional counting of publications and citations. For example, a paper two authors from an Indian institution and one from a United Kingdom address would be counted as one article for each country (i.e. 1 for India and 1 for the United Kingdom). (The total counts for each country are the count of unique publications.) This method was favoured over fractional counting, in which the above paper would count as 0.67 for India and 0.33 for the United Kingdom, to maintain consistency with other reports (both public and private) we have conducted on the topic.
- **Collaboration.** Collaboration is defined as the set of publications with at least two co-authors (opposed to single-authored publications). There are three main collaboration types: international collaboration, national collaboration, and institutional collaboration.
 - International collaboration occurs if an article has at least two different countries listed in the authorship byline. If an article has only one author affiliated with institutions in two different countries, though, this article is not counted as an internationally collaborated article but as a single-authored article.
 - National collaboration occurs if an article has at least two different institutions listed in the authorship byline, all of which are from the same

² de Solla Price, D.J. (1977-1978). Foreword. *Essays of an Information Scientist*, Vol. 3, pp. v-ix.

³ Garfield, E. (1979). Is citation analysis a legitimate evaluation tool? *Scientometrics*, 1 (4), pp. 359-375.

⁴ Pinski, G., & Narin, F. (1976). Citation influence for journal aggregates of scientific publications: Theory with application to literature of physics. *Information Processing & Management* 12 (5), pp. 297-312.

⁵ Irvine, J., Martin, B. R., Abraham, J. & Peacock, T. (1987). Assessing basic research: Reappraisal and update of an evaluation of four radio astronomy observatories. *Research Policy*, 16(2-4), pp. 213-227.

country. In this report institutional collaborations are not counted as national collaborations.

- Institutional collaboration occurs if an article has at least two authors listed in the authorship byline, all of which are affiliated with the same institution. In this report institutional collaborations are not counted as national collaborations.
- **Cross-sector collaboration** is defined as the set of publications whose authors have affiliations in different sectors (e.g., academic, corporate, government, medical). The cross-sector collaboration analysed in this report is the academic-corporate collaboration type.

2.2 Data source: Scopus

Scopus is Elsevier's abstract and citation database of peer-reviewed literature, covering 60 million documents published in over 22,000 journals, book series and conference proceedings by some 5,000 publishers. Reference lists are captured for 37+ million records published from 1996 onwards, and the additional 22.3 million pre-1996 records reach as far back as the publication year 1823.

Scopus coverage is multi-lingual and global: approximately 15% of titles in Scopus are published in languages other than English (or published in both English and another language). In addition, more than half of Scopus content originates from outside North America, representing many countries in Europe, Latin America, Africa and the Asia Pacific region. The database contains titles from more than 120 different countries and over 50 languages in all geographic regions. Scopus covers approximately 11,800 active titles from Europe (18,000 total), 6,400 from North-America (10,500 total), 2,500 from Asia-Pacific (3,600 total), 700 from Central and South America (900 total), and 800 titles from the Middle East and Africa (1050 total). The number of Indian journals indexed by Scopus varies from 329 in 2009, 406 in 2011 and 355 in 2014. Over this period the amount of Indian journals in Scopus has grown, on average, with a 5.2% CAGR. The share of Indian journals in Scopus varies from 1.66% in 2009 and 2014 to 1.86% in 2011. The complete Scopus journal database (which also includes journals that have been covered outside of the period 2009-2014) contains 540 Indian journals (see Section G-2 of Appendix G).

Scopus coverage is also inclusive across all major research fields, with 6,900 titles in the Physical Sciences, 6,400 in the Health Sciences, 4,150 in the Life Sciences, and 6,800 in the Social Sciences (the latter including some 4,000 Arts & Humanities related titles). Titles which are covered are predominantly serial publications (journals, trade journals, book series and conference material), but considerable numbers of conference papers are also covered from stand-alone proceedings volumes (a major dissemination mechanism, particularly in the computer sciences). Acknowledging that a great deal of important literature in all fields (but especially in the Social Sciences and Arts & Humanities) is published in books, Scopus has begun to increase book coverage in 2013 (89,000 books in June 2015).

For this report, a static version of the Scopus database covering the period 1996-2014 inclusive was aggregated by country, region, and subject. Subjects were defined by ASJC subject areas (see Appendix I for more details).

2.3 Data source: LexisNexis

LexisNexis is a leader in comprehensive and authoritative legal, news and business information and tailored applications. LexisNexis® is a member of Reed Elsevier Group plc. Patents are obtained via a partnership with LexisNexis and include those from the United States Patent and Trademark Office (USPTO), the European Patent Office (EPO), the Japanese Patent Office (JPO), the Patent Cooperation Treaty (PCT) of the World Intellectual Property Organization (WIPO) and the UK Intellectual Property Office (UKIPO).

3 Limitations of this study

When considering the bibliometric analyses in this report, the limitations of this approach should be borne in mind. In the field of bibliometric indicators research, various caveats for the use of publication and citation data to assess research performance are known. Among others, these include the accumulation of citations over time, the skewed distribution of citations across articles (caused by citation bias, for instance), and differences in publication and citation practices between fields of research or different language communities. And even though best practices and advanced indicators have been developed to correct or mitigate these factors, other influencing factors may still have biasing effects.

Besides these general considerations to bear in mind when interpreting bibliometric data, there are several provisos that apply specifically to the analyses in this report:

- **Publication exclusion.** This report considers those specific document types that are considered scholarly (*viz.*, articles, reviews, and conference proceedings). Therefore, publication and citation data for other document types (e.g., book reviews, editorials, short surveys, obituaries, monographs) indexed by Scopus are neglected. These document types have been excluded in order to focus on publications that, typically, represent genuine scientific contributions.
- **Journal exclusion.** Since Scopus covers more than 22,000 journals, its journal coverage is extensive. However, no journal database can be fully exhaustive. And while the amount of Indian scientific journals in Scopus has grown with a 5.2% CAGR over the period 2009-2014 (reaching 355 titles in 2014), its coverage of Indian titles cannot be said to be fully complete.
- **Subject area exclusion.** This study focuses on bibliometric data overall and from journals that belong to at least one of the sixteen core S&T subject areas selected by DST (see Appendix I). The subject areas that are not specifically analysed in this study are: Arts & Humanities, Business, Management & Accounting, Decision Sciences, Economics, Econometrics & Finance, Neuroscience, Nursing, Psychology, Social Sciences, Dentistry, Health Professions,

and General (which contains multidisciplinary journals, like *Nature* and *Science*).

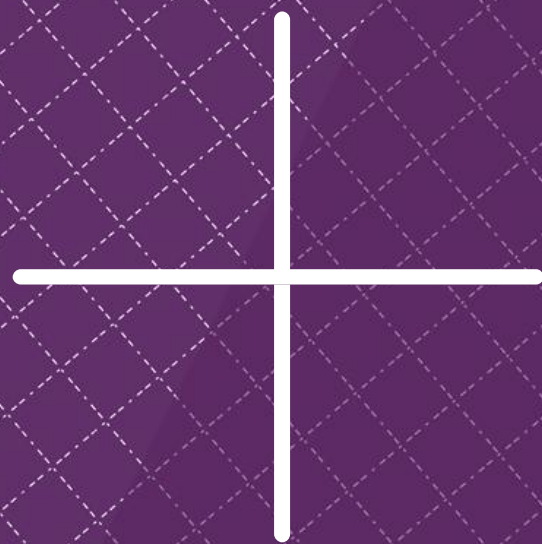
- **Institution exclusion.** In chapter 4 of this report India's top 30 academic institutions are listed. Here, we looked exclusively at institutes that are part of the academic sector. Research institutions from the corporate, government or medical sector are not taken into consideration in this chapter. The top 30 academic institutions are ranked based on their publication output in the period 2002-2014.

In chapter 4 and 5 we present India's top academic institutions overall and its top researchers overall as well as per subject area. For both the institutions and researchers their ranking is based on their publication output in the period 2002-2014 rather than 2009-2013 or 2009-2014. The reasons for this are twofold:

1. *Data Robustness.* We get a more robust picture of the research performance of academic institutions and researchers by ranking them based on their work over a longer period of time.
2. *Reader Convenience.* Picking one ranking provides a constant ordering of the institutions and researchers when we provide data for them on different indicators. As a consequence, for instance, it is easy to compare institutions, as they always have the same row in each table. Moreover, a ranking by 2002-2014 publication output makes the tables for 2009-2013 (in the report body) and 2009-2014 (in the appendices) comparable as well.

For inclusion in one of top 10 researcher lists in Chapter 5 (or Appendix E), the following three conditions need to be satisfied:

1. *Having an Indian affiliation.* Since this study counts all authors affiliated with a research institution located in India as Indian researchers, no distinction is made between researchers with an Indian nationality and researchers with a different nationality. As a consequence, the many researchers with an Indian nationality that are affiliated with non-Indian institutions are not included, while researchers without an Indian nationality that are affiliated with an Indian institution are included.
2. *Being among the 1,000 most prolific researchers overall in 2002-2014.* The top 10 authors per subject area are generated from the list of 1,000 most prolific Indian authors for the period 2002-2014. Therefore, it is impossible for an author to be included in the subject area top 10 if she is not among the most prolific authors for this period. The number of publications sufficient for inclusion is 117 or higher.
3. *Being among the 10 most prolific researchers in the relevant subject area in 2002-2014.* The top 10 authors per subject area are based on their publication output for that subject area in the period 2002-2014. So, even if authors have been very productive in their subject area for the period 2009-2013 (or 2009-2014 in Appendix E), they are not included if they are not in the top 10 in the period 2002-2014.



Chapter 1

Output, Growth, Impact, and Excellence

Between 2009 and 2013, India's S&T scholarly output has increased at a high 13.9% annual growth rate, reaching 4.4% of the world's 2013 output. India's output attracted 3.4% of the world's citations in 2013, but remains cited 25% less than world average. Compared to the subject distribution of the world, India is particularly prolific and cited in Chemistry and Pharmacology, and most impactful in Engineering.

1.1 Key Findings

INDIA'S S&T SCHOLARLY OUTPUT

106,065

4.4% of the world's S&T scholarly output in 2013

INDIA'S S&T SCHOLARLY OUTPUT GROWTH

13.9%

2009-2013 compound annual growth rate (CAGR), compared to 4.1% for the world

INDIA'S CITATION SHARE

3.4%

of world citations in 2013

INDIA'S CITATION IMPACT

0.75

25% less than world average in 2013

INDIA'S RESEARCH FOCUS

Chemistry and Pharmacology

Higher relative emphasis compared to the world in 2009-2013

INDIA'S MOST IMPACTFUL FIELD

Engineering

Cited 6% less than world average in 2009-2013

INDIA'S SECOND MOST IMPACTFUL FIELD

Materials Science

Cited 11% less than world average in 2009-2013

INDIA'S LEAST IMPACTFUL FIELD

Veterinary Sciences

Cited 61% less than world average in 2009-2013

1.2 Output

S&T scholarly output has grown globally in recent years at a rate of 4.1% CAGR (see Appendix J for terms and acronyms definitions). Figure 1.1 and Table 1.1 show that this growth rate was stronger from 2009 to 2011, and levelled off between 2011 and 2013. Comparatively, G8's growth rate was lower at 2.6%, while BRICS's and SAARC's were much higher at 9.5% and 13.9% respectively, resulting in BRICS overtaking the USA in 2010. To some extent, BRICS's and especially SAARC's fast growth can be attributed to India which grew its S&T scholarly output by an average 13.9% annually over that period.

For figures and tables in this chapter, the country abbreviations and full names are as follows:

AUS Australia BRA Brazil BRICS BRICS countries (Brazil, Russia, India, China, South Africa) CAN Canada CHN China DEU Germany ESP Spain G8 G8 countries (France, Germany, Italy, United Kingdom, Japan, United States, Canada, Russia) GBR United Kingdom IND India ITA Italy JPN Japan KOR Korea SAARC SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka) SGP Singapore SWE Sweden USA United States of America WLD World

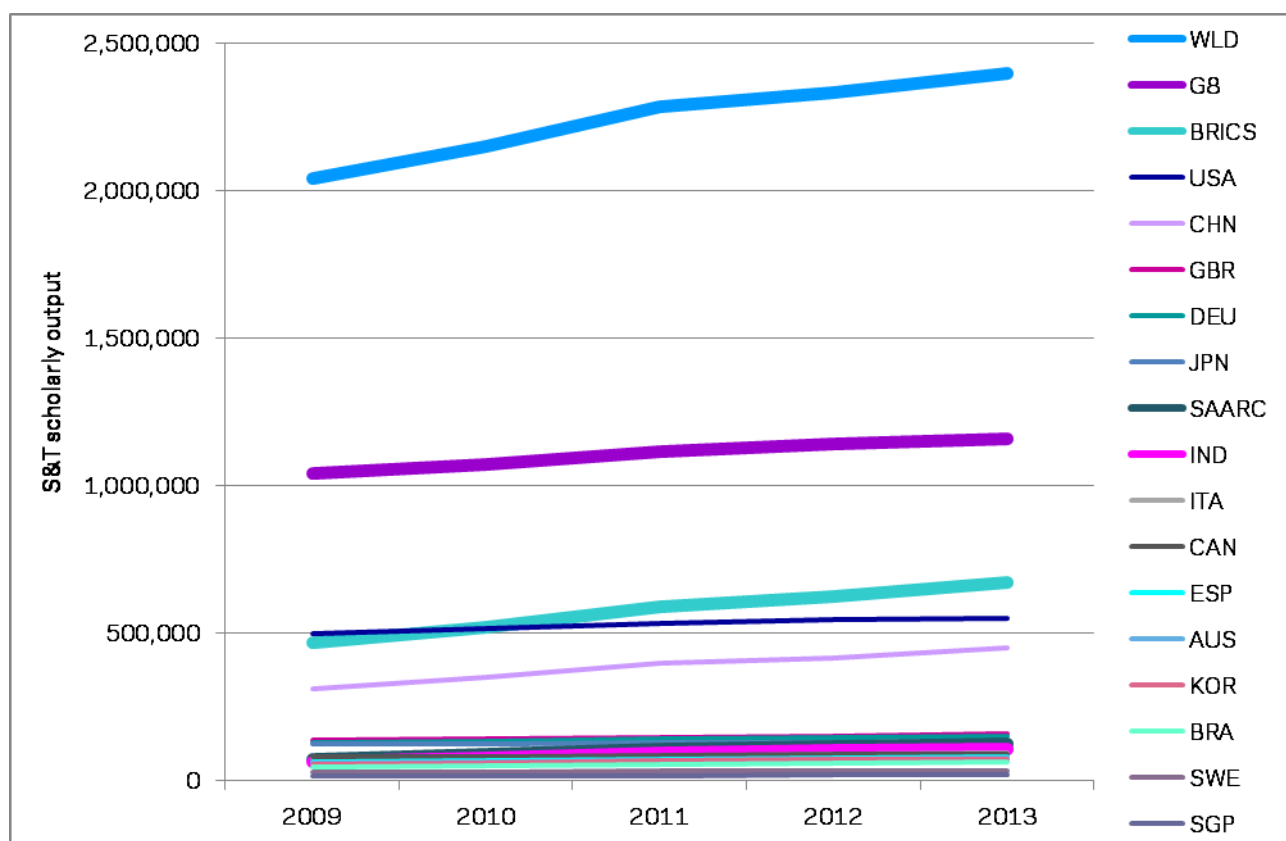


Figure 1.1 — S&T scholarly output of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.1 in Appendix A.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	2,044,054	2,149,802	2,284,516	2,333,624	2,397,424	2,339,825	4.1%
G8	1,043,051	1,071,911	1,114,100	1,140,530	1,156,850	1,104,049	2.6%
BRICS	465,445	517,130	590,381	621,403	669,325	698,680	9.5%
SAARC	72,296	85,588	103,590	113,721	121,663	127,461	13.9%
USA	495,093	512,456	533,022	544,245	549,176	522,421	2.6%
CHN	311,815	346,844	396,559	413,039	447,207	464,744	9.4%
GBR	135,015	138,225	144,531	149,995	155,630	148,689	3.6%
DEU	129,014	133,409	139,737	145,787	147,261	142,639	3.4%
JPN	122,243	123,444	126,218	126,112	125,093	114,525	0.6%
IND	62,955	74,535	90,793	99,524	106,065	112,009	13.9%
ITA	75,022	76,420	79,918	85,761	90,267	88,585	4.7%
CAN	77,417	79,712	82,180	85,644	86,714	84,287	2.9%
ESP	62,507	66,050	71,462	75,672	76,986	75,061	5.3%
AUS	55,258	59,790	64,629	68,370	74,489	74,608	7.8%
KOR	52,823	58,686	64,191	68,341	71,067	71,652	7.7%
BRA	44,889	48,444	52,017	57,245	59,536	59,370	7.3%
SWE	26,305	27,731	29,429	31,447	32,824	32,872	5.7%
SGP	12,860	14,308	15,076	16,387	17,091	16,899	7.4%

Table 1.1 — Annual publication output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Figure 1.2 and Table 1.2 present S&T scholarly output as share of the world. As per the growth rates mentioned above, SAARC and BRICS grow not only in absolute but also relative terms, while G8 shows an absolute increase but relative decrease.

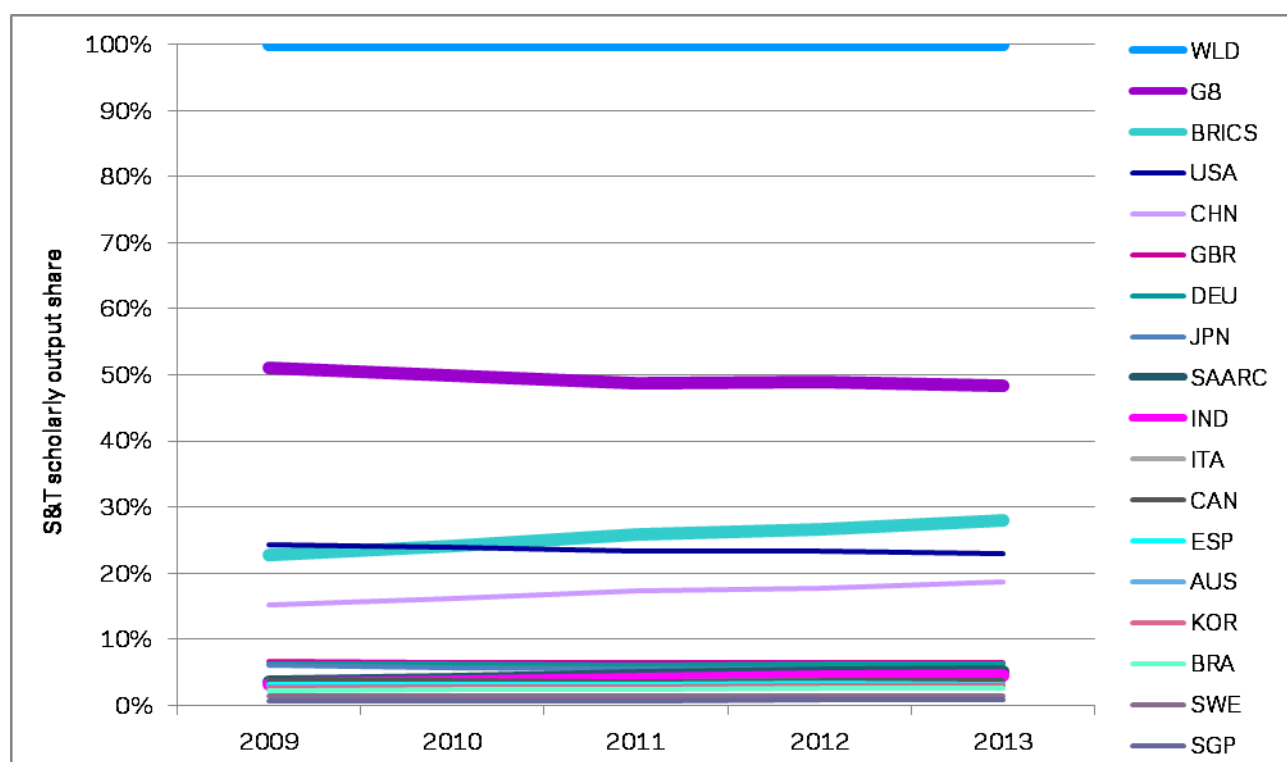


Figure 1.2 — S&T scholarly output share of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 1.2 or Table A.18 in Appendix A.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%
G8	51.0%	49.9%	48.8%	48.9%	48.3%	47.2%	-1.4%
BRICS	22.8%	24.1%	25.8%	26.6%	27.9%	29.9%	5.2%
SAARC	3.5%	4.0%	4.5%	4.9%	5.1%	5.4%	9.4%
USA	24.2%	23.8%	23.3%	23.3%	22.9%	22.3%	-1.4%
CHN	15.3%	16.1%	17.4%	17.7%	18.7%	19.9%	5.2%
GBR	6.6%	6.4%	6.3%	6.4%	6.5%	6.4%	-0.4%
DEU	6.3%	6.2%	6.1%	6.2%	6.1%	6.1%	-0.7%
JPN	6.0%	5.7%	5.5%	5.4%	5.2%	4.9%	-3.4%
IND	3.1%	3.5%	4.0%	4.3%	4.4%	4.8%	9.5%
ITA	3.7%	3.6%	3.5%	3.7%	3.8%	3.8%	0.6%
CAN	3.8%	3.7%	3.6%	3.7%	3.6%	3.6%	-1.1%
ESP	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	1.2%
AUS	2.7%	2.8%	2.8%	2.9%	3.1%	3.2%	3.5%
KOR	2.6%	2.7%	2.8%	2.9%	3.0%	3.1%	3.5%
BRA	2.2%	2.3%	2.3%	2.5%	2.5%	2.5%	3.1%
SWE	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.6%
SGP	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	3.2%

Table 1.2 — Publication output as share of world's publication output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Zooming in on the charts permits a more detailed view of the output of SAARC, India, and most countries (see Figures 1.3 and 1.4). For instance, the influence of India on SAARC is clearly visible in their parallel trend lines; it is also evident that India accounts for the vast majority of SAARC's output. While all comparators show absolute increases over the last five years, this is not true in relative terms: some countries' world output shares are stable (the UK, Germany, Italy, Canada, Singapore, Sweden) while others are declining (Japan). Although there was a clear difference of 2.5 percentage points between Japan's output share (6.0%) and SAARC's (3.5%) in 2009, by 2013 these have converged: SAARC publishes 5.1% of the world S&T scholarly output (4.4% for India) and Japan is now only 0.1 percentage points ahead. If current trends continue, SAARC will very shortly publish more S&T scholarly papers than Japan, having already overtaken Italy and Canada in 2011.

As illustrated in Figure 1.5, while there are some similarities between comparators in terms of their output's subject breakdowns, there are also differences. For instance, looking at the sixteen selected subject areas, it is evident that Medicine, Engineering, Physics & Astronomy, Computer Science, and Biochemistry Genetics & Molecular Biology, tend to be relatively prolific areas. However, relative to the world, BRICS (driven by China) tend to show relatively less emphasis on Medicine and more on Engineering, while Brazil shows a larger proportion of its publications in Agricultural & Biological Science. As for India, it presents less focus on the Health Sciences and publishes larger proportions of its output in Chemistry and Pharmacology. The total output counts for each country and region are shown in Table 1.1 and more detail on output and growth is available in selected tables in Appendix A.

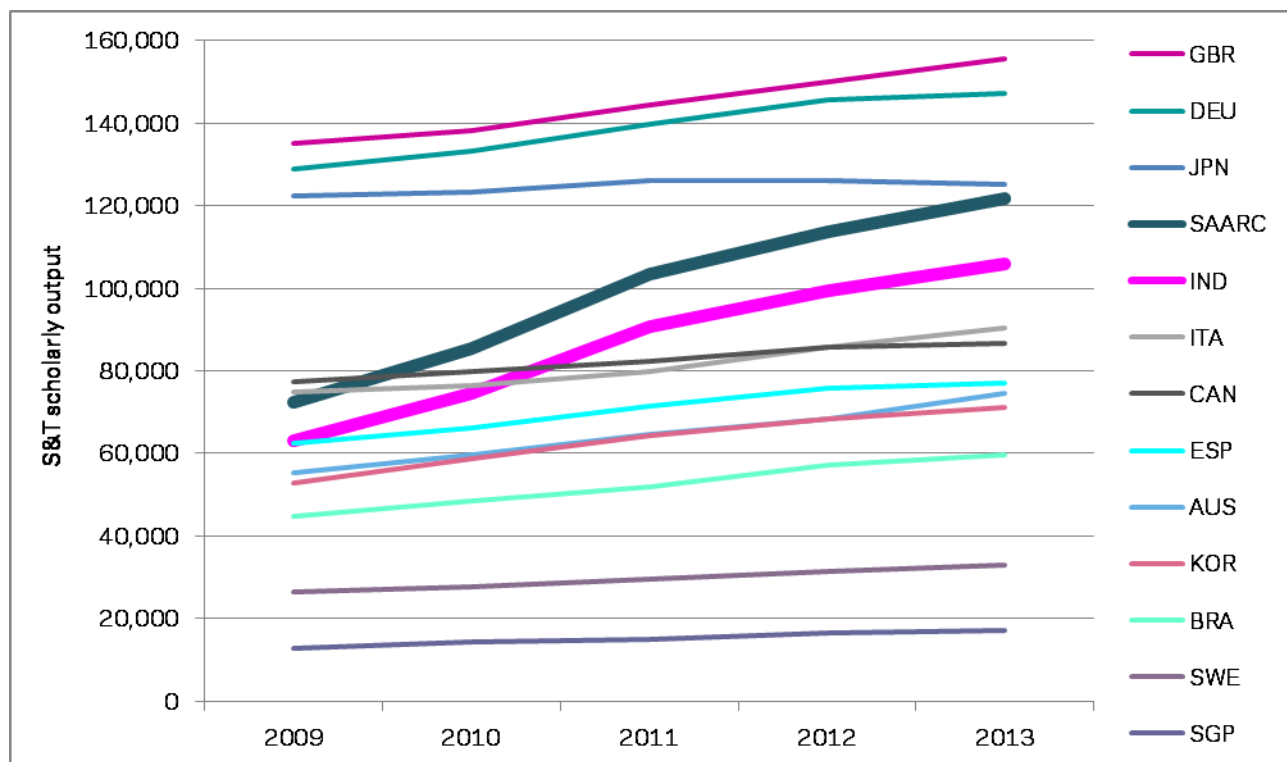


Figure 1.3 — S&T scholarly output of SAARC and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.1 in Appendix A. Source: Scopus database.

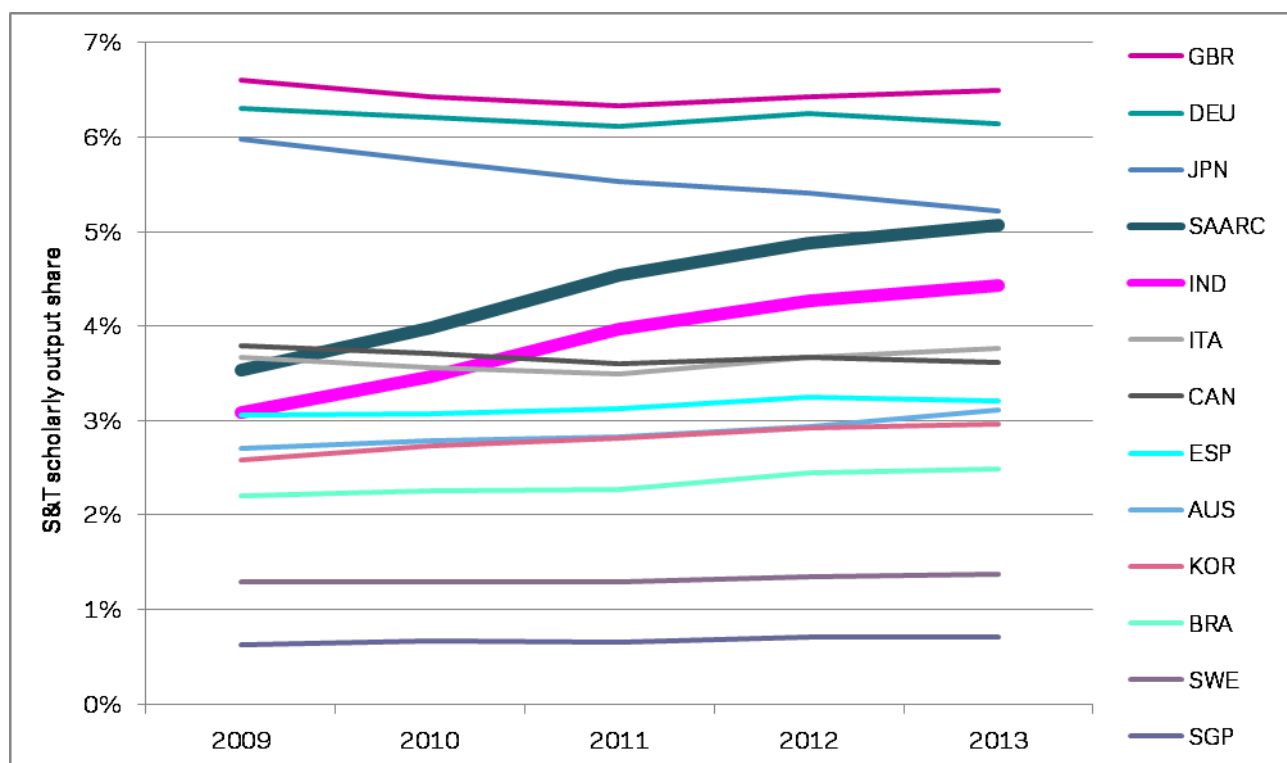


Figure 1.4 — S&T scholarly output share of SAARC and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.18 in Appendix A. Source: Scopus database.

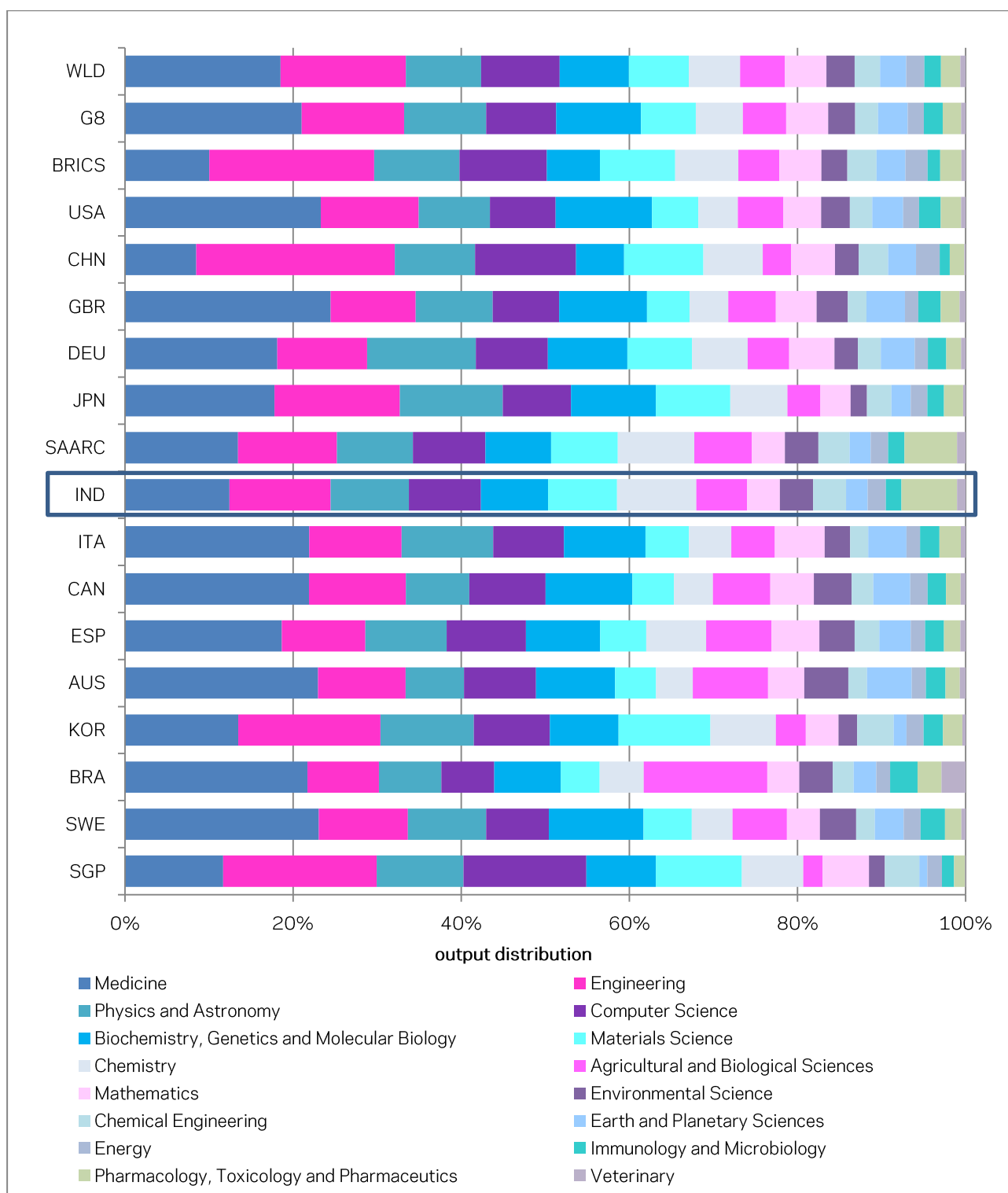


Figure 1.5 — Subject area breakdown of S&T scholarly output of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.19 in Appendix A.

Source: Scopus database.

1.3 Citations

S&T scholarly citations can be used as a proxy for academic impact and are to some extent tied to output volume; hence citation shares (see Figures 1.6 and 1.7, and Table 1.3) tend to look similar to output shares: again G8, the USA, and Japan decline in world shares, while most other comparators grow. BRICS, China, SAARC, India, South Korea, and Singapore show particularly high increases in citation shares (over 5% 2009-2013 CAGR). In 2013, India receives 3.4% of the world's S&T scholarly citations, one percentage point less than it holds in terms of S&T scholarly output.

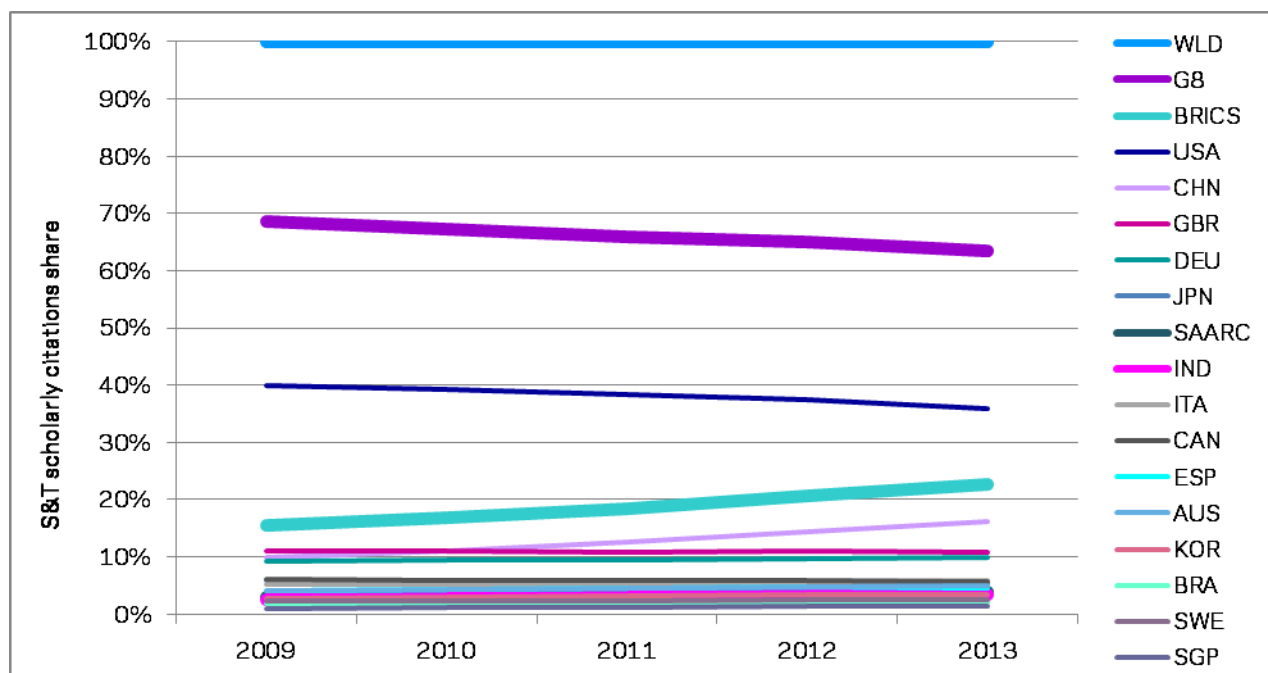


Figure 1.6 — S&T scholarly citation share of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.37 in Appendix A.

Source: Scopus database.

Across comparators, citation distribution by subject area tends to broadly mirror output distribution by subject area (see Figure 1.8). However, one trend that can be generally observed across comparators is that relative to output distribution, citation distribution appears to be skewed towards the physical sciences and away from the life and medical sciences. Accordingly, India's citation distribution by subject area seems roughly similar to its output distribution by subject area. However, it has relatively larger proportions of citations in the physical sciences. Against the citation distribution of comparators in Figure 1.8, India tends to show even larger proportions of citations in Chemistry than it does in output. More detail on citations is available in selected tables in Appendix A.

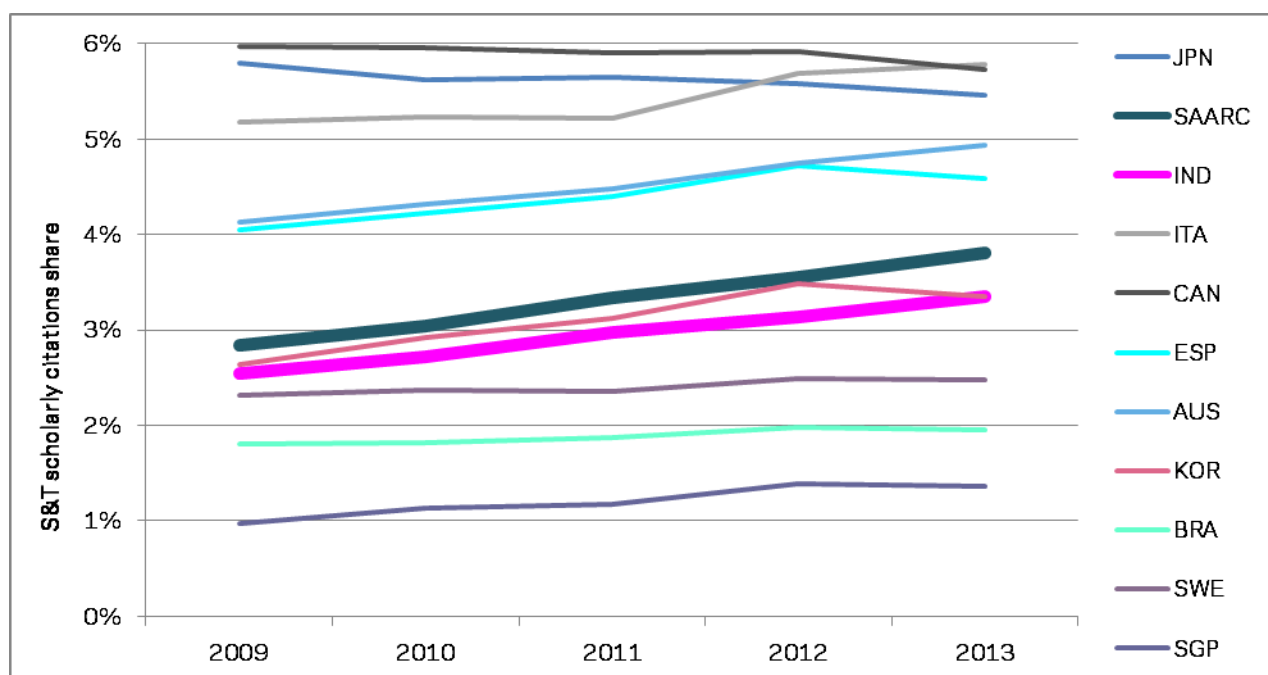


Figure 1.7 — S&T scholarly citation share of SAARC and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 1.3 or Table A.37 in Appendix A.
Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%
G8	68.5%	67.4%	66.0%	65.0%	63.4%	61.8%	-1.9%
BRICS	15.4%	16.8%	18.5%	20.6%	22.7%	25.1%	10.2%
SAARC	2.8%	3.0%	3.3%	3.5%	3.8%	4.2%	7.5%
USA	40.0%	39.3%	38.3%	37.5%	36.0%	35.0%	-2.6%
CHN	9.8%	11.1%	12.5%	14.4%	16.1%	18.0%	13.1%
GBR	11.1%	11.0%	10.7%	11.0%	10.8%	10.8%	-0.6%
DEU	9.3%	9.5%	9.5%	9.8%	9.8%	9.7%	1.4%
JPN	5.8%	5.6%	5.6%	5.6%	5.5%	5.3%	-1.5%
IND	2.5%	2.7%	3.0%	3.1%	3.4%	3.7%	7.1%
ITA	5.2%	5.2%	5.2%	5.7%	5.8%	5.9%	2.8%
CAN	6.0%	6.0%	5.9%	5.9%	5.7%	5.7%	-1.0%
ESP	4.0%	4.2%	4.4%	4.7%	4.6%	4.7%	3.2%
AUS	4.1%	4.3%	4.5%	4.7%	4.9%	5.2%	4.6%
KOR	2.6%	2.9%	3.1%	3.5%	3.4%	3.5%	6.2%
BRA	1.8%	1.8%	1.9%	2.0%	2.0%	1.9%	2.0%
SWE	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	1.6%
SGP	1.0%	1.1%	1.2%	1.4%	1.4%	1.4%	8.8%

Table 1.3 — Annual citation count as share of world's annual citation count for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

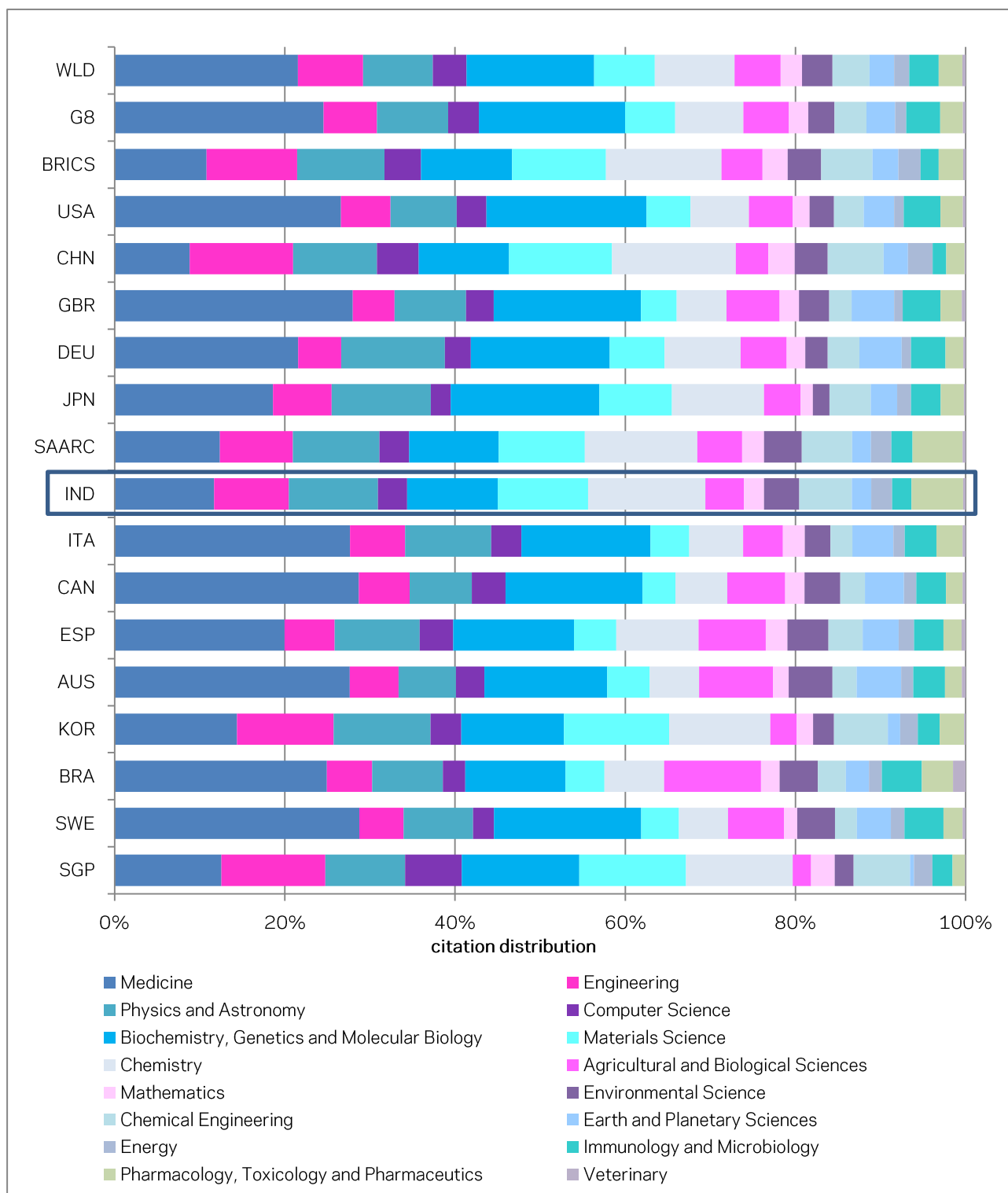


Figure 1.8 — Subject area breakdown of S&T scholarly citations of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.38 in Appendix A. Source: Scopus database.

1.4 Field-weighted Citation Impact

Field-weighted citation impact (FWCI) is a sophisticated indicator that accounts for differences in output age, publication type, and subject area; it is therefore well-suited to comparatively analyse the S&T scholarly impact of different entities. Figure 1.9 and Table 1.4 show that among comparator countries, the two least prolific (Singapore and Sweden) have the highest FWCI between 2009 and 2013. G8's FWCI has very slightly decreased over time, but remains comfortably above world average: G8's papers tend to be cited about 26% more than the world average. Anglophone countries have high FWCI relative to comparators too, and Singapore and Italy show particularly high growth between 2009 and 2013.



Figure 1.9 — Field-weighted citation impact of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 1.4 or Table A.39 in Appendix A.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.27	1.27	1.27	1.27	1.26	1.26	1.27	1.27	-0.2%
BRICS	0.71	0.73	0.75	0.78	0.79	0.80	0.75	0.76	2.7%
SAARC	0.76	0.75	0.74	0.75	0.75	0.76	0.75	0.75	-0.1%
USA	1.50	1.49	1.48	1.46	1.45	1.44	1.47	1.47	-0.8%
CHN	0.71	0.74	0.77	0.80	0.82	0.83	0.77	0.78	3.8%
GBR	1.52	1.53	1.55	1.55	1.56	1.57	1.54	1.55	0.6%
DEU	1.36	1.38	1.39	1.41	1.42	1.43	1.39	1.40	1.1%
JPN	0.94	0.95	0.95	0.97	0.98	0.99	0.95	0.96	1.0%
IND	0.77	0.75	0.75	0.75	0.75	0.76	0.75	0.76	-0.4%
ITA	1.36	1.40	1.44	1.49	1.51	1.54	1.44	1.46	2.7%
CAN	1.48	1.48	1.49	1.48	1.47	1.46	1.48	1.48	-0.1%
ESP	1.22	1.24	1.27	1.29	1.30	1.31	1.26	1.27	1.7%
AUS	1.46	1.49	1.51	1.54	1.55	1.56	1.51	1.52	1.5%
KOR	1.03	1.07	1.09	1.09	1.07	1.05	1.08	1.07	0.9%
BRA	0.81	0.81	0.80	0.79	0.78	0.76	0.80	0.79	-1.0%
SWE	1.57	1.59	1.62	1.63	1.63	1.63	1.61	1.61	1.0%
SGP	1.62	1.71	1.77	1.81	1.79	1.78	1.76	1.76	2.6%

Table 1.4 — Field-weighted citation impact (FWCI) per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

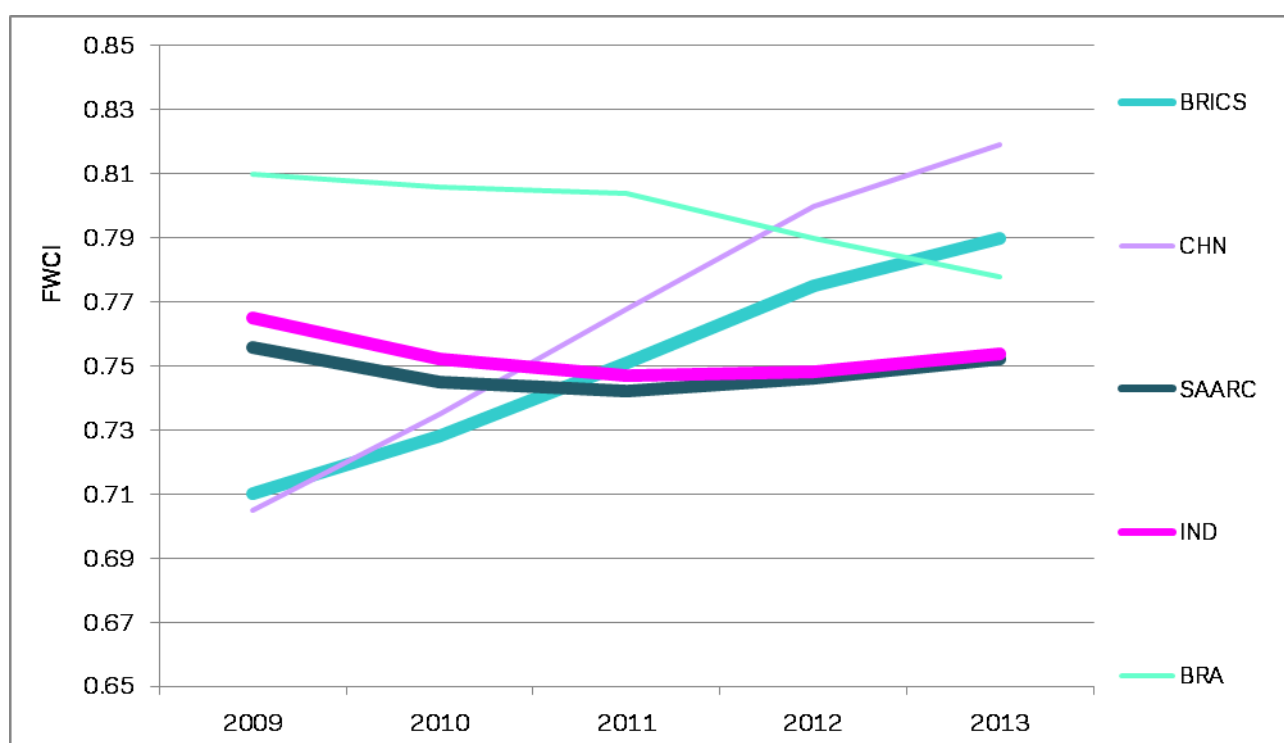


Figure 1.10 — Field-weighted citation impact of the BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table A.39 in Appendix A. Source: Scopus database.

Zooming in on the least impactful comparators (see Figure 1.10) shows that while BRICS's FWCI was lower than Brazil's, SAARC's and India's in 2009, annual growth led it to surpass

them so that BRICS's papers are getting closer to the world average citation impact in 2013. This high growth level is driven in part by China, whose growth pattern in FWCI is roughly opposite to that of Brazil. In 2009, China's FWCI was similar to BRICS's and Brazil's was higher; in 2013, China's FWCI was higher than BRICS's and Brazil's was lower. India's FWCI is similar to SAARC's; both have seen mild fluctuations equating to overall stability in the past five years, so that India's and SAARC's papers are cited 25% less than the world average in 2013.

A subject breakdown of FWCI (see Figures 1.11 to 1.16) reveals comparable patterns to the overall analysis: among the selected benchmarks, in all examined fields G8 leads, followed by the world, while SAARC and India appear very alike. However, the comparative picture between India and SAARC versus BRICS diverges from the overall one in some fields: India's and SAARC's FWCI are higher than BRICS's in several physical sciences fields (Physics & Astronomy, Computer Science, Energy, Engineering, Materials Science, and Mathematics). Engineering is India's most impactful area; in this field its FWCI is very close to the world average (6% lower). The FWCI of Anglophone and European countries are higher than the world's in all fields. Compared to selected American countries, India's FWCI is higher than or on a par with Brazil's in Chemical Engineering, Chemistry, Computer Science, Engineering, and Materials Science. Compared to selected Asian countries, India's FWCI is higher than or on a par with China's in Physics & Astronomy, Energy, Engineering, Materials Science, Mathematics, and Medicine. More detail on FWCI is available in selected tables in Appendix A.

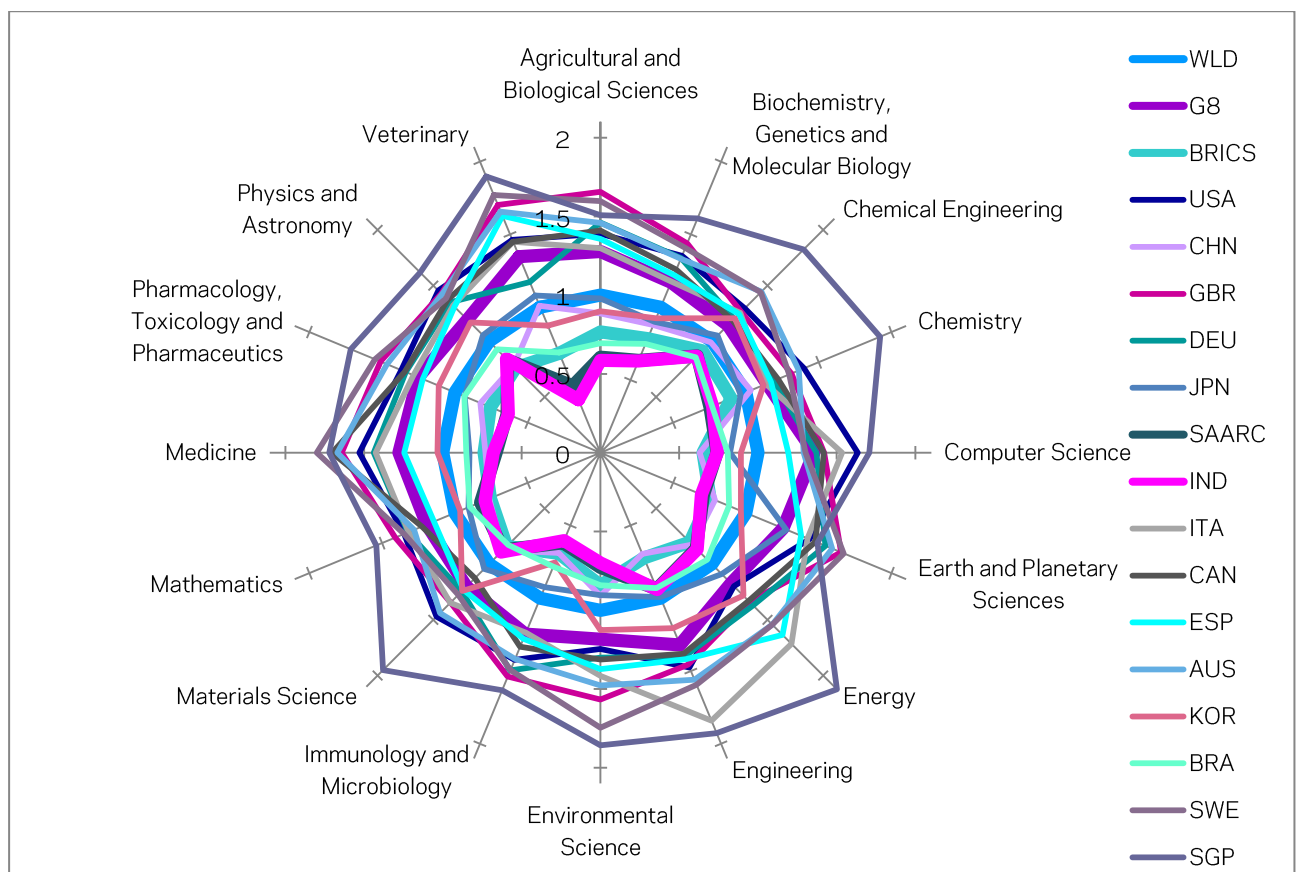


Figure 1.11 — Field-weighted citation impact subject area breakdown of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A.

Source: Scopus database.

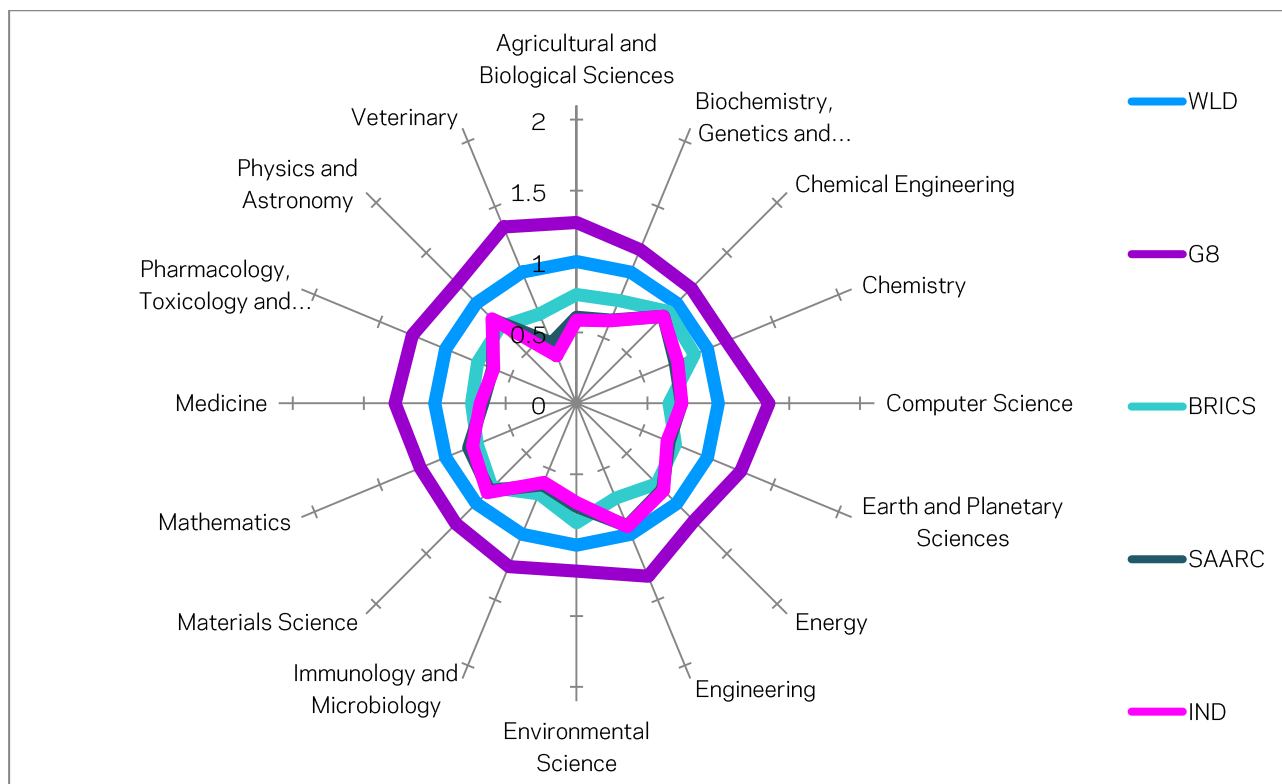


Figure 1.12 — Field-weighted citation impact subject area breakdown of the world, G8, BRICS, SAARC, and India 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A. Source: Scopus database.

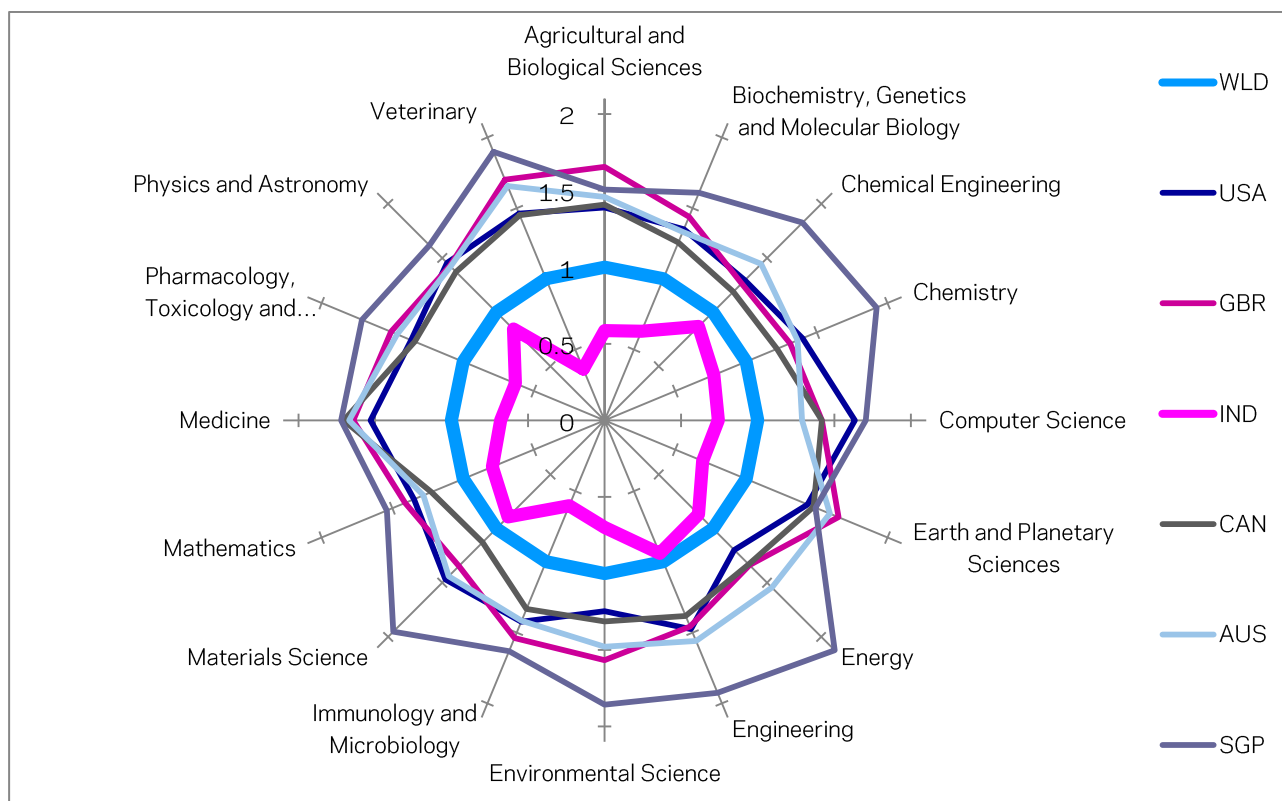


Figure 1.13 — Field-weighted citation impact subject area breakdown of the world, India, and selected Anglophone comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A. Source: Scopus database.

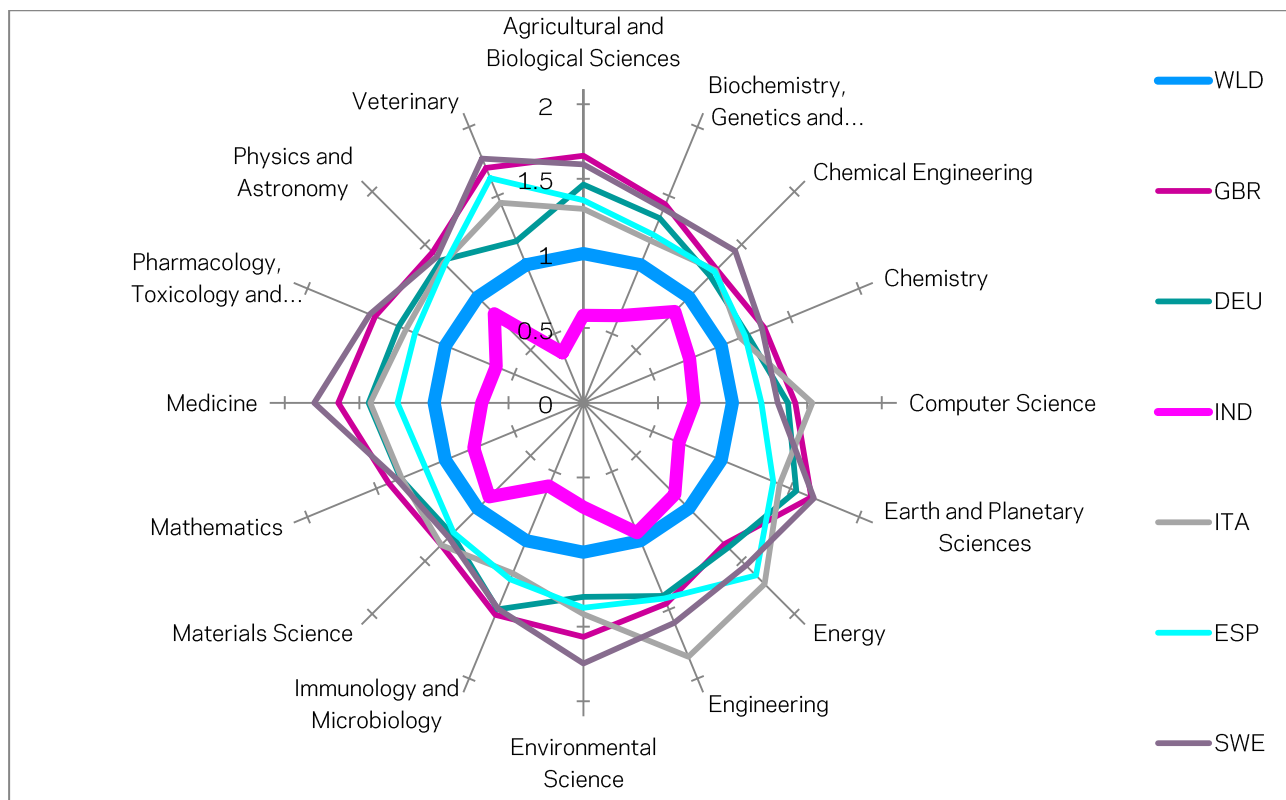


Figure 1.14 — Field-weighted citation impact subject area breakdown of the world, India, and selected European comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A. Source: Scopus database.

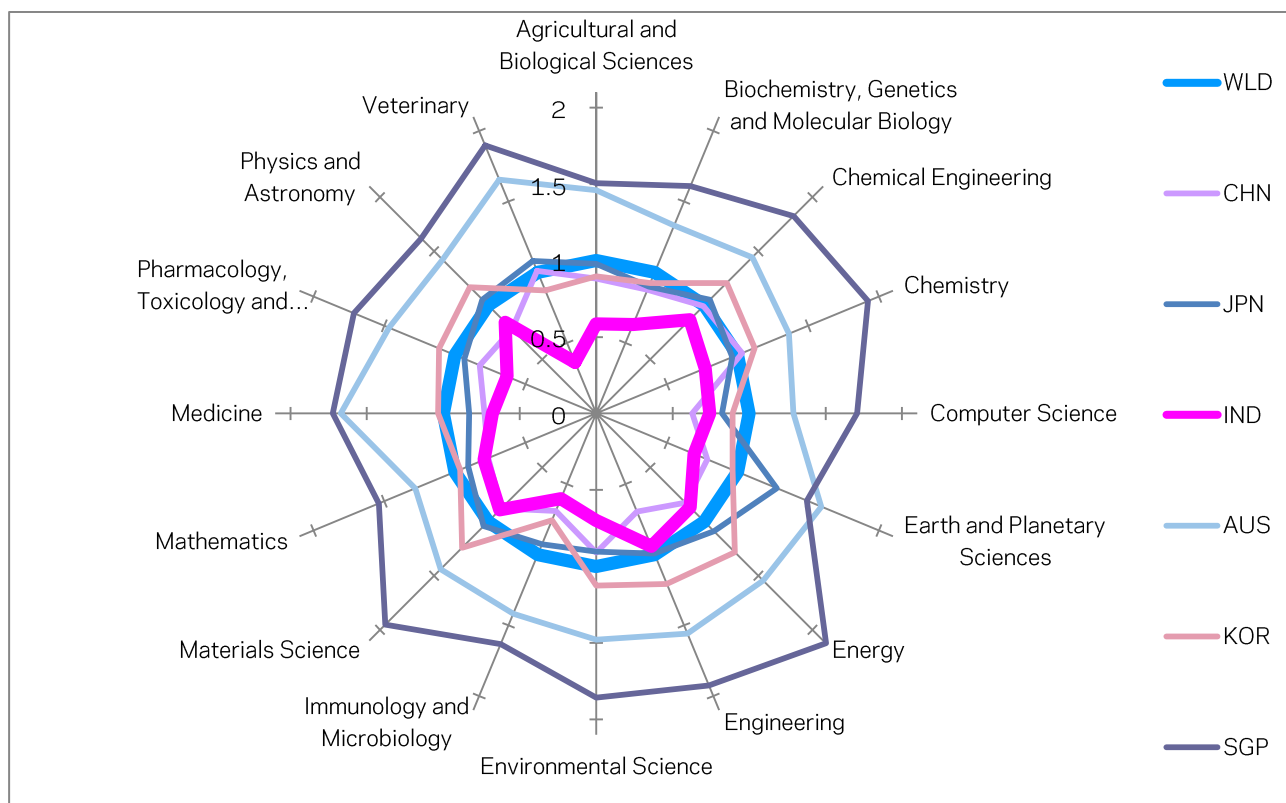


Figure 1.15 — Field-weighted citation impact subject area breakdown of the world, India, and selected Asian comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A. Source: Scopus database.

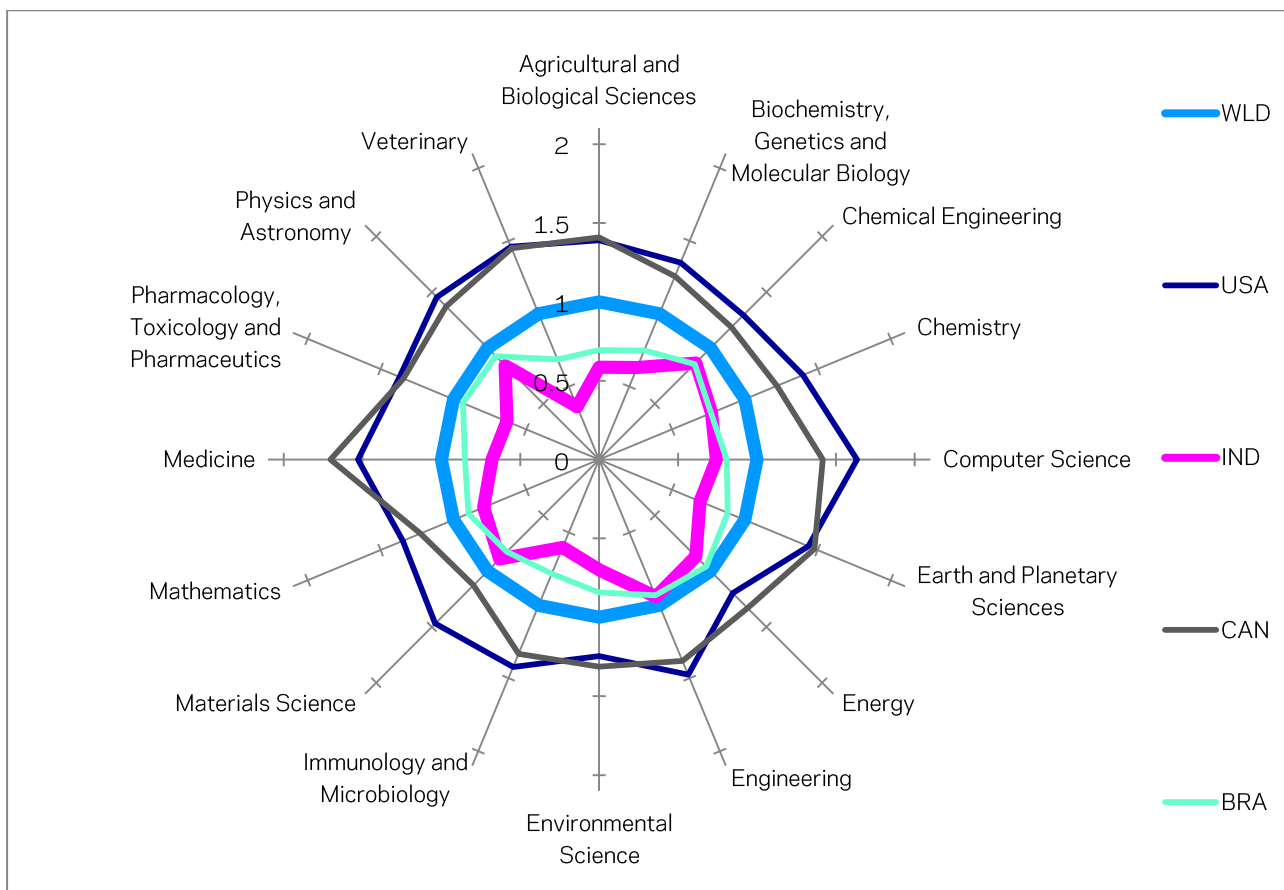


Figure 1.16 — Field-weighted citation impact subject area breakdown of the world, India, and selected American comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.40-55 in Appendix A. Source: Scopus database.

1.5 Excellence

Looking at shares of the world’s top-cited output (see Figures 1.17 and 1.18, and Tables 1.5 and 1.6) gives an idea of how each comparator fares in terms of the excellence of its research at various levels (top 25%, 10%, 5%, and 1%). Across all percentiles values, the shares of G8 and the USA decrease and the shares of BRICS, SAARC, India, and most other comparator countries increase. Japan, Canada, the UK, and Germany tend to see overall stability or mild decline across all examined output percentiles shares. From this analysis it looks like relative excellence in research is stagnating or declining among well-established research nations, with concomitant rises among less established research countries.

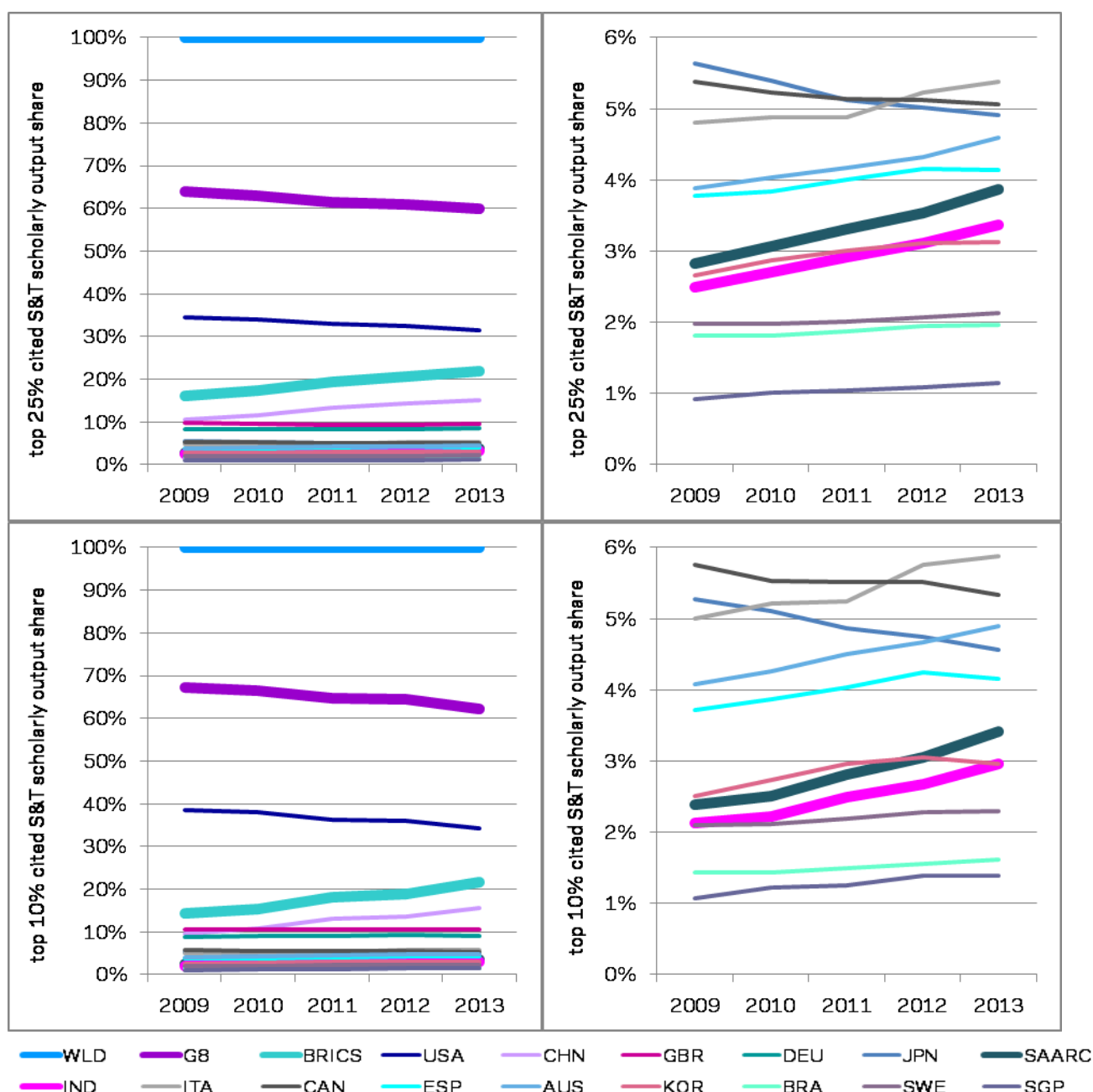


Figure 1.17 — Share of world top-cited S&T scholarly output (25%, and 10%) for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013 (zoom on the right). See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 1.7 or Table A.73 in Appendix A. Source: Scopus database.

For instance, in 2013 India holds over 3% of the world's top 25% cited papers, 3% of the world's top 10% cited papers, and nearly 3% of the world's top 5% cited and top 1% cited papers. Although this is lower than India's 4.4% share of the world's total output, which suggests that India publishes proportionally fewer highly cited papers, India sees strong growth at all examined percentile levels and in particular in the highest ones. For instance, while India's overall output growth is at 13.9% 2009-2013 CAGR, its output in top cited percentiles increases by 12.4% for the top 25% cited papers, 12.7% for the top 10% cited papers, 15.4% for the top 5% cited papers, and 20.8% for the top 1% cited papers. So India's growth rate in output may be slightly inferior in the medium excellence range to its overall output growth rate, but it is clearly superior at the high excellence range. This suggests that India is not only growing in scientific excellence, but that this growth is even more aggressive at the very top end of the excellence scale.

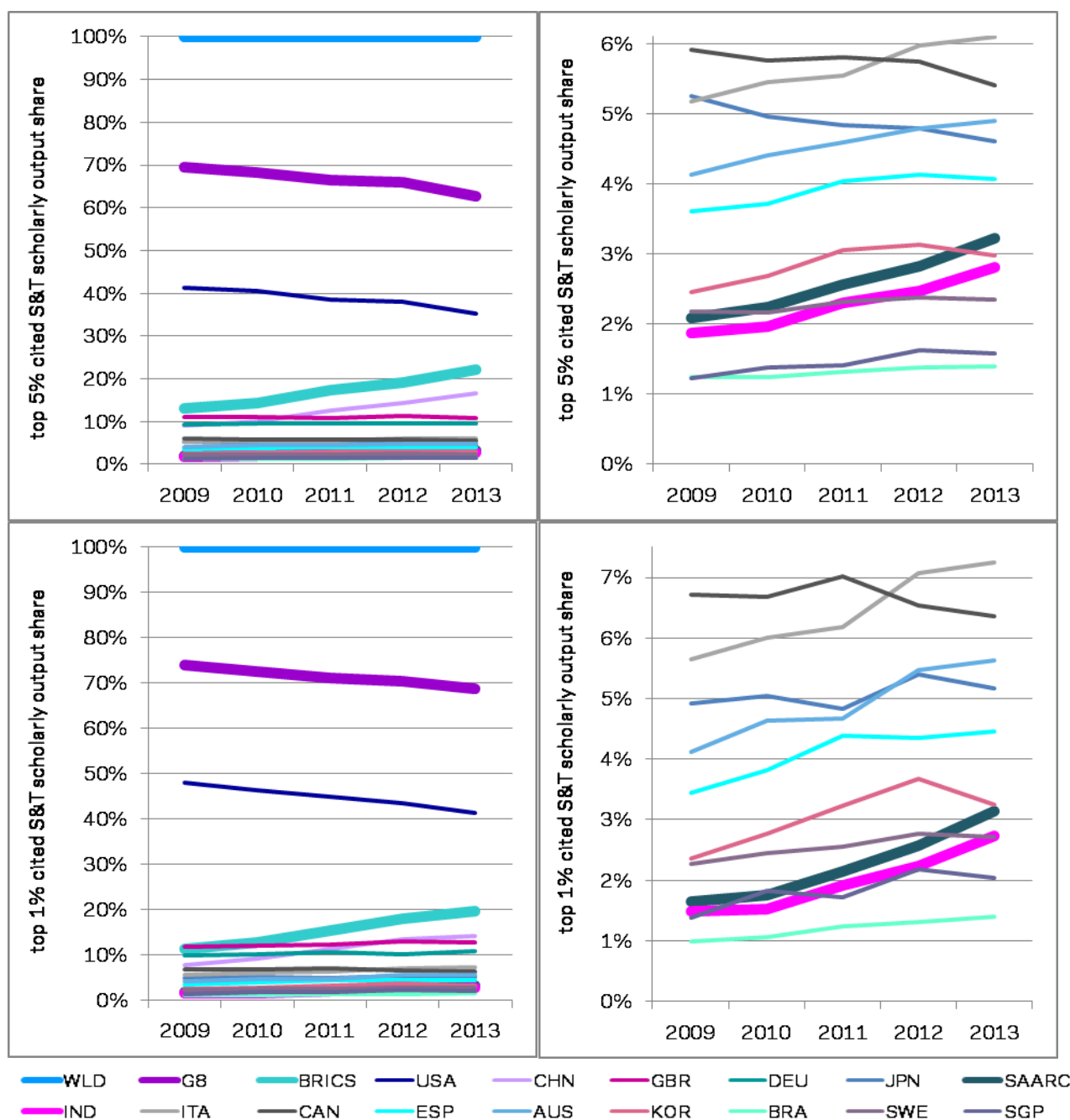


Figure 1.18 — Share of world top-cited S&T scholarly output (5%, and 1%) for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013 (zoom on the right). See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 1.7 or Table A.73 in Appendix A.

Source: Scopus database.

Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	135,899	680,357	1,734,088	4,054,557
G8	96,426	451,568	1,034,719	2,343,775
BRICS	23,091	123,112	391,621	929,688
SAARC	3,367	19,078	62,586	153,084
USA	62,074	263,707	558,119	1,218,585
CHN	16,999	89,182	282,498	659,308
GBR	18,446	77,904	160,794	346,249
DEU	14,119	64,478	145,599	320,956
JPN	6,183	31,646	86,316	213,285
IND	2,895	16,722	55,402	135,101
ITA	8,526	38,993	87,104	192,221
CAN	9,283	39,622	85,473	190,624
ESP	5,937	27,944	63,699	148,655
AUS	7,538	33,143	70,912	157,432
KOR	4,127	19,642	48,302	117,335
BRA	1,688	9,548	27,961	75,071
SWE	3,788	16,081	34,294	75,319
SGP	2,497	9,784	20,530	41,479

Table 1.5 — Publications in top citation percentiles for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	71.0%	66.4%	59.7%	57.8%
BRICS	17.0%	18.1%	22.6%	22.9%
SAARC	2.5%	2.8%	3.6%	3.8%
USA	45.7%	38.8%	32.2%	30.1%
CHN	12.5%	13.1%	16.3%	16.3%
GBR	13.6%	11.5%	9.3%	8.5%
DEU	10.4%	9.5%	8.4%	7.9%
JPN	4.5%	4.7%	5.0%	5.3%
IND	2.1%	2.5%	3.2%	3.3%
ITA	6.3%	5.7%	5.0%	4.7%
CAN	6.8%	5.8%	4.9%	4.7%
ESP	4.4%	4.1%	3.7%	3.7%
AUS	5.5%	4.9%	4.1%	3.9%
KOR	3.0%	2.9%	2.8%	2.9%
BRA	1.2%	1.4%	1.6%	1.9%
SWE	2.8%	2.4%	2.0%	1.9%
SGP	1.8%	1.4%	1.2%	1.0%

Table 1.6 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

The top-cited output distributions tend to be similar to the overall distributions of S&T scholarly output, as seen in figures 1.19 to 1.22. More detail on excellence is available in selected tables in Appendix A.

Relative to its overall output, India publishes particularly large proportions of its excellent papers in Engineering and Computer Science; this is true at all four examined top percentiles, but even more so for the highest excellence levels. On the other hand, India publishes larger proportions of excellent papers in Agricultural & Biological Sciences, Biochemistry, Genetics & Molecular Biology, Chemistry, and Pharmacology, Toxicology & Pharmaceutics in the mid-excellence range, and fewer papers of top excellence in these areas.

In all other selected subject areas, India's distribution of top-cited output by field appears similar between the various levels (top 25%, top 10%, top 5%, top 1%) of excellence.

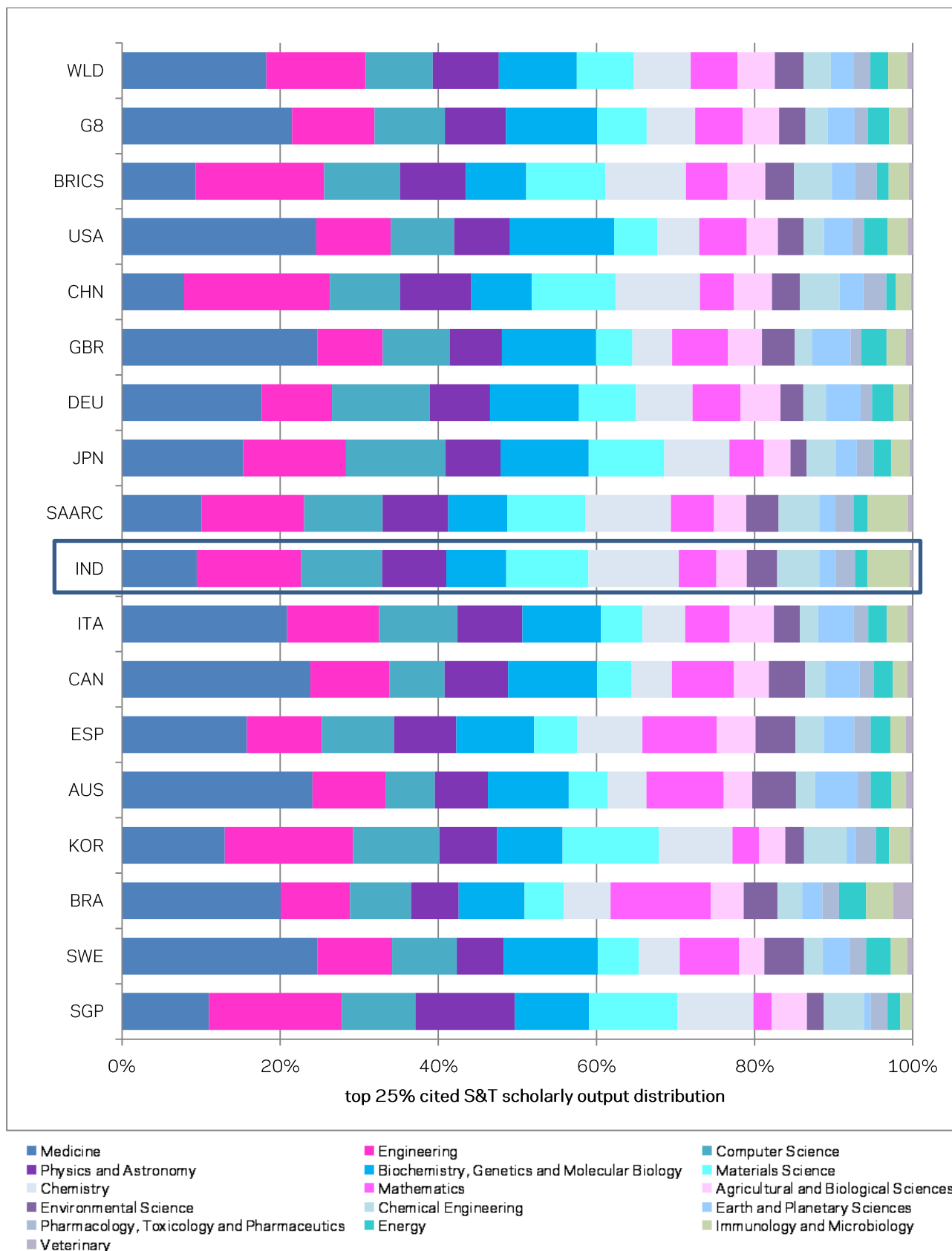


Figure 1.19 — Subject area breakdown of world top 25% cited S&T scholarly output (for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.74-89 in Appendix A. Source: Scopus database.

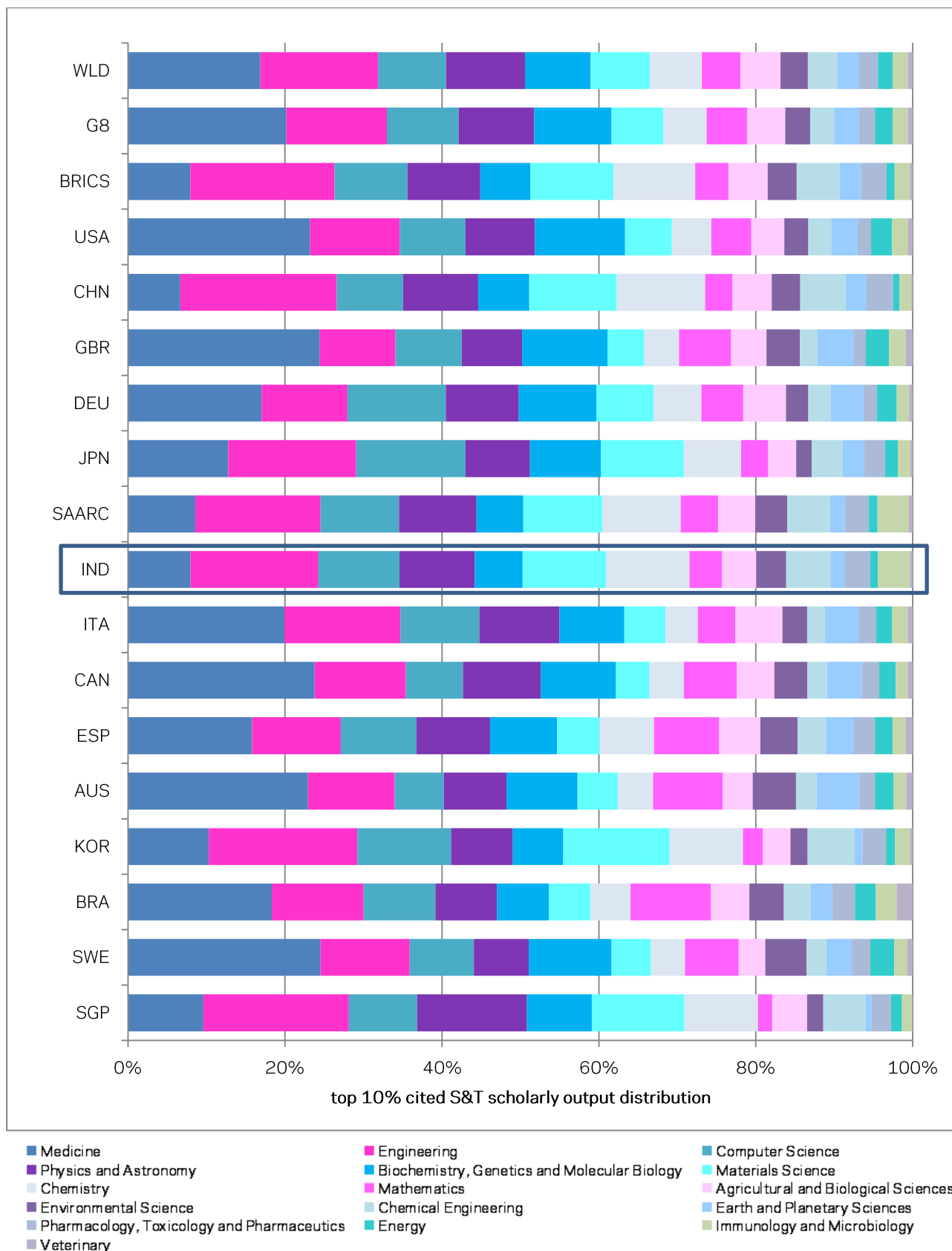


Figure 1.20 — Subject area breakdown of world top 10% cited S&T scholarly output (for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.74-89 in Appendix A. Source: Scopus database.

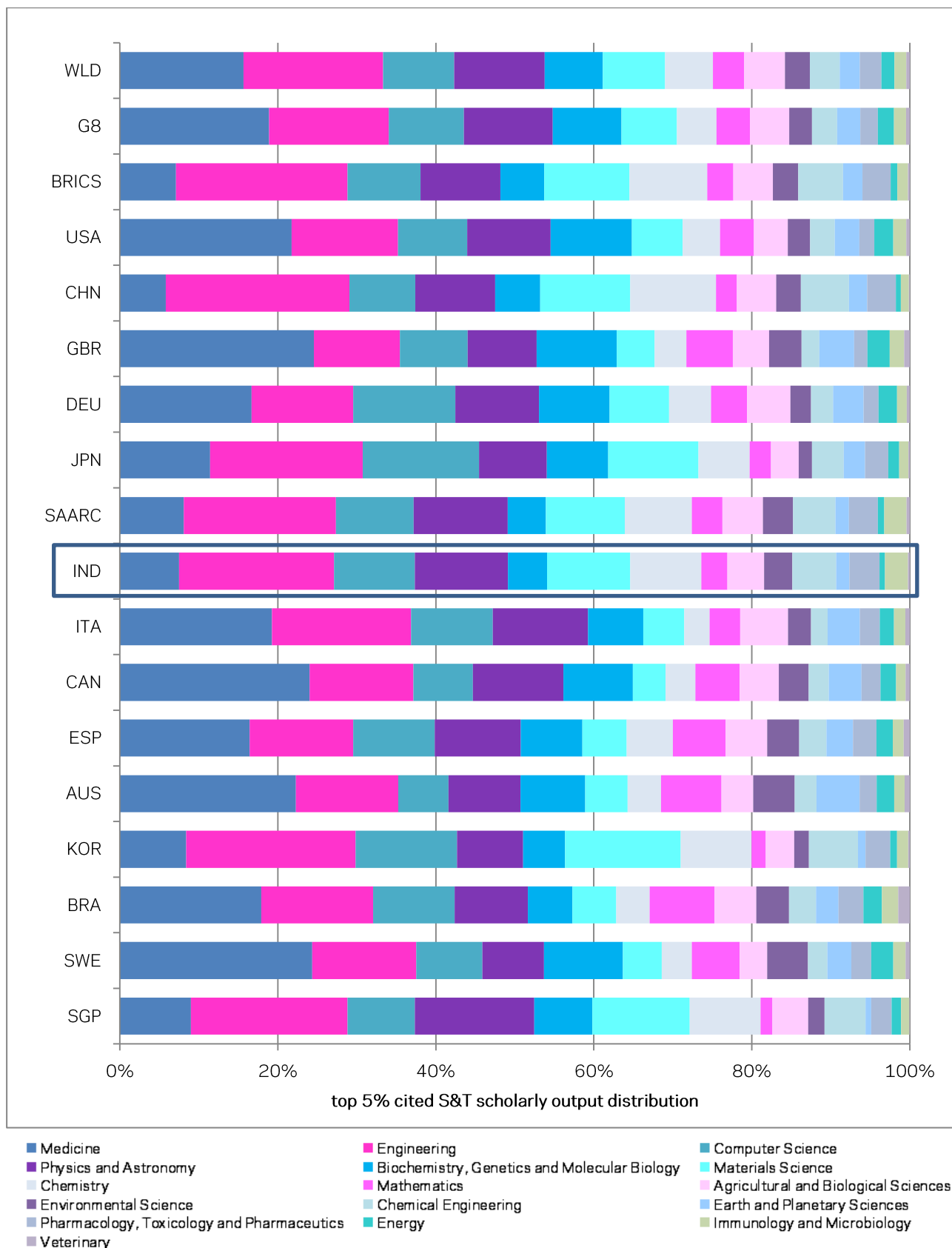


Figure 1.21 — Subject area breakdown of world top 5% cited S&T scholarly output (for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.74-89 in Appendix A. Source: Scopus database.

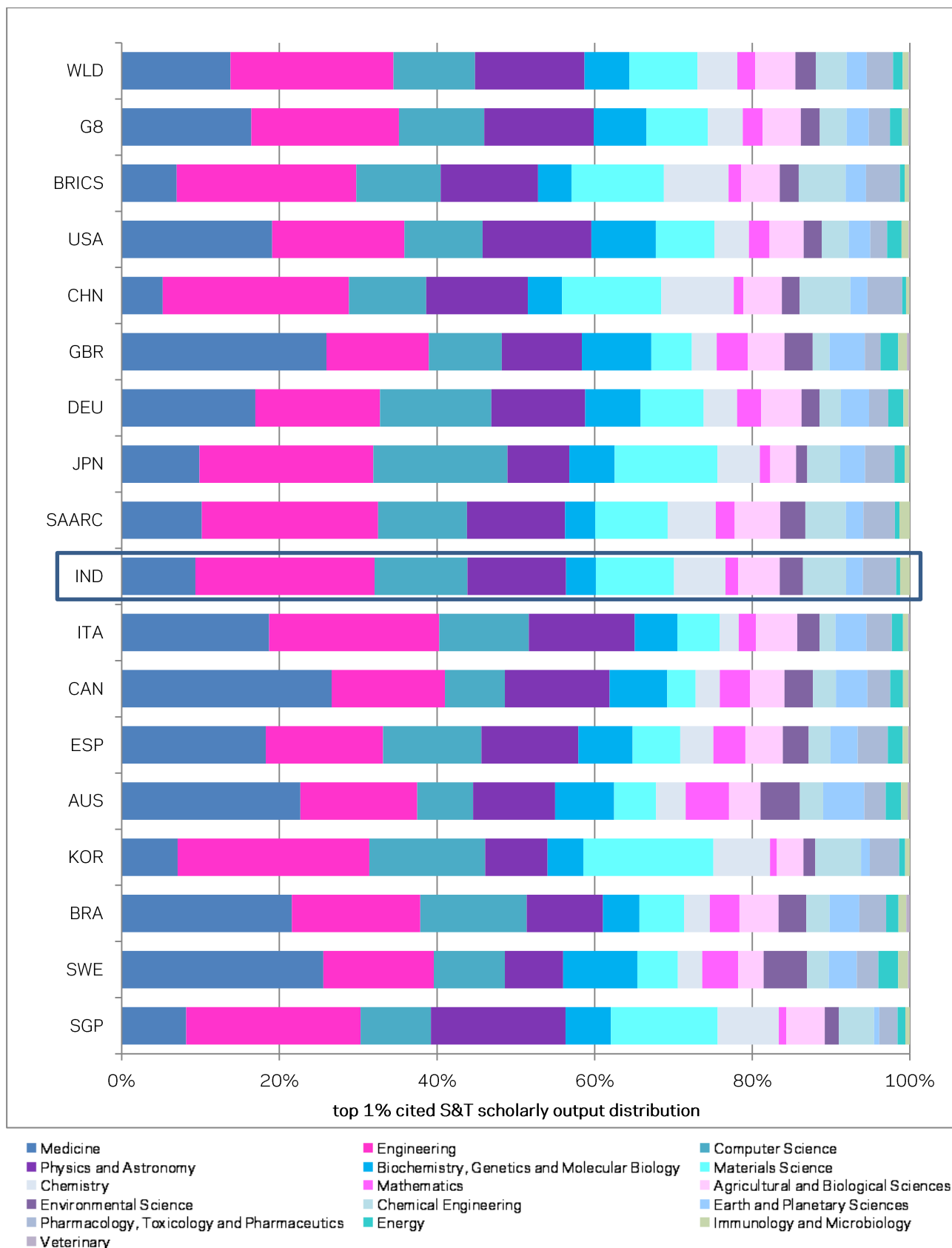


Figure 1.22 — Subject area breakdown of world top 1% cited S&T scholarly output (for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Tables A.74-89 in Appendix A. Source: Scopus database.



Chapter 2

Collaboration

In 2013, 16.0% of India's S&T scholarly output is the result of international collaboration, 32.1% the result of national collaboration, 46.2% the result of institutional collaboration, and 5.7% are single-authored papers. India's most impactful international collaborations are with Brazil, Russia, the Netherlands, Spain, China, and Sweden, but these are not necessarily the most prolific ones.

2.1 Key Findings

INDIA'S INTERNATIONAL COLLABORATION

16.0%

of India's output in 2013

INDIA'S NATIONAL COLLABORATION

32.1%

of India's output in 2013

INDIA'S INSTITUTIONAL COLLABORATION

46.2%

of India's output in 2013

INDIA'S SINGLE AUTHORED PAPERS

5.7%

of India's output in 2013

MOST IMPACTFUL INTERNATIONAL COLLABORATORS IN 2009-2013

Brazil, Russia, the Netherlands, Spain, China, Sweden

LEAST IMPACTFUL INTERNATIONAL COLLABORATOR IN 2009-2013

Malaysia

2.2 Collaboration Types

Research collaborations increasingly extend beyond the walls of an institution or the boundaries of a country, and can be evaluated through the proxy of co-authorship on S&T scholarly papers. As Figures 2.1 to 2.3 show, the various comparators in this study have different proportions of each collaboration type.

For figures and tables in this chapter, the country abbreviations and full names are as follows:

AUS Australia BRA Brazil BRICS BRICS countries (Brazil, Russia, India, China, South Africa) CAN Canada CHN China DEU Germany ESP Spain G8 G8 countries (France, Germany, Italy, United Kingdom, Japan, United States, Canada, Russia) GBR United Kingdom IND India ITA Italy JPN Japan KOR Korea SAARC SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka) SGP Singapore SWE Sweden USA United States of America WLD World



Figure 2.1— Proportion of collaboration of various types for India, SAARC, BRICS, and G8, with size of the circles representing FWCI, 2009–2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.



Figure 2.2 — Proportion of collaboration of various types for selected comparator countries, with size of the circles representing FWCI, 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

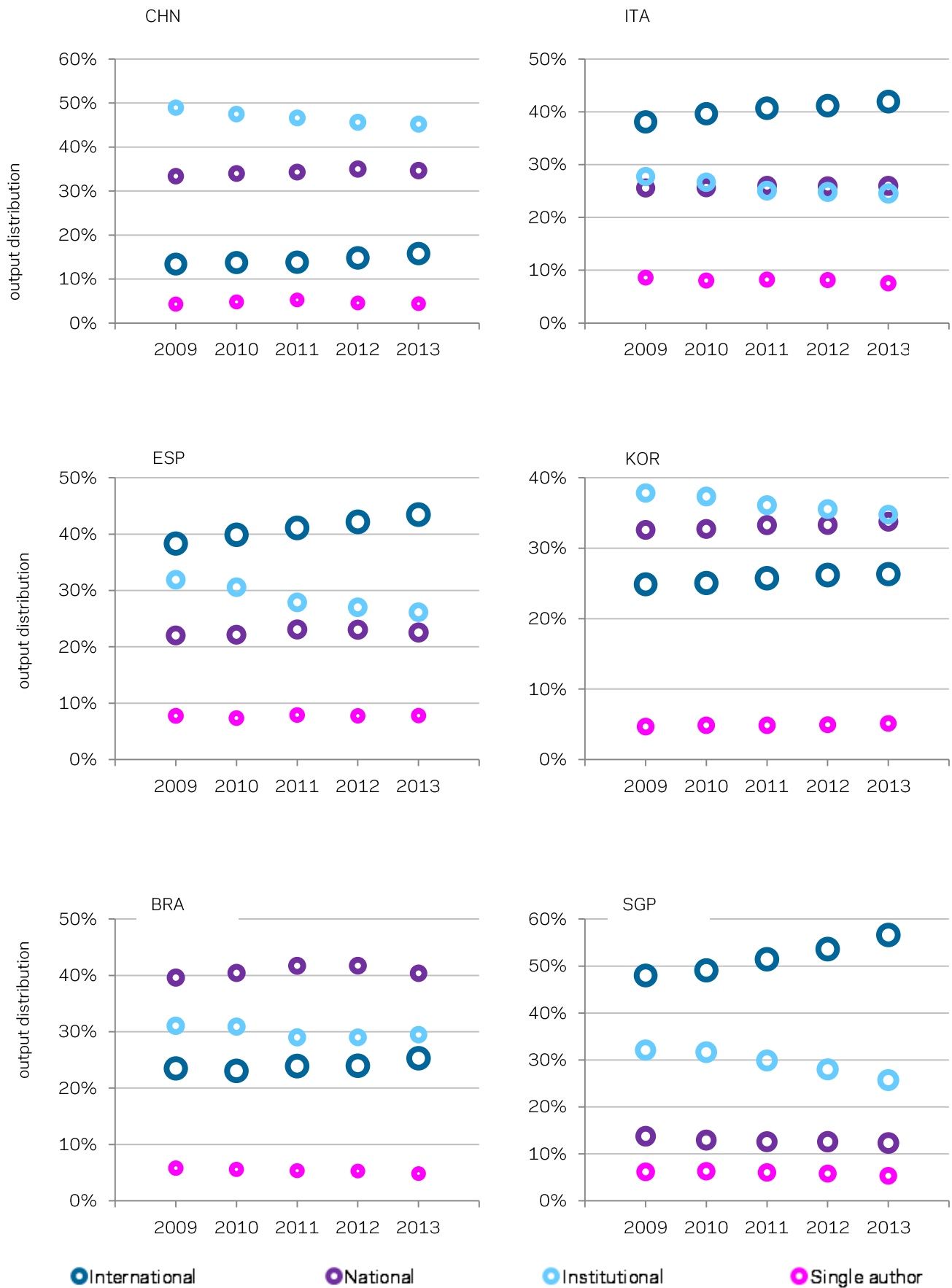


Figure 2.3 — Proportion of collaboration of various types for selected comparator countries, with size of the circles representing FWCI, 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

India's, SAARC's, and BRICS's distributions are similar, with nearly half of their output the result of institutional collaboration, about a third the result of national collaboration, about a fifth the result of national collaboration, and less than 10% written by single authors (see Section 2.1 of the Introduction for a definition of each mutually exclusive collaboration type).

Most comparators and especially established research nations, tend to present a different distribution, with a rising majority of internationally-collaborated output, followed by stable or declining proportions of institutionally, nationally, and single-authored papers. Notable exceptions include G8, for which 'international collaborations' refers to collaborations with non-G8 countries, and national collaborations may be national or international collaborations within one or several G8 countries. The USA shows similar proportions of international, national, and institutional collaborations – due to its scale, international collaboration may be partly replaced by inter-state collaboration. More analyses on collaboration are available in Appendix B.

2.3 Collaboration Network

Salton's Index is a measure of research intensity between two countries (see Appendix J for full definition of terms). India's top 30 collaboration partners as measured by this indicator span four continents. Surprisingly India's most impactful collaborations are not necessarily those with the most impactful countries, but rather those with emergent countries across the globe. For instance, India's collaborations with Mexico, Georgia, and Sri Lanka are cited over five times the world average, while those with Armenia and Belarus are cited over four times the world average.

country	Salton's Index	papers with India	FWCI of papers with India	total papers	total papers FWCI
USA	0.0227	25,791	1.80	2,661,320	1.46
SAU	0.0190	3,149	1.78	57,090	1.18
KOR	0.0154	6,185	2.06	333,937	1.08
GBR	0.0142	8,483	2.56	737,070	1.55
DEU	0.0139	8,126	2.20	708,833	1.41
MYS	0.0138	3,126	1.26	106,677	0.94
NPL	0.0131	576	2.72	3,996	0.99
FRA	0.0114	5,653	2.63	509,096	1.34
AUS	0.0105	4,286	2.77	341,886	1.53
ZAF	0.0105	1,928	3.73	70,219	1.16
OMN	0.0103	518	1.20	5,211	0.82
SGP	0.0102	2,002	2.85	79,761	1.79
CAN	0.0101	4,537	2.83	418,537	1.48
ARM	0.0100	482	4.36	4,776	1.09
CHE	0.0095	2,789	3.23	179,946	1.82
ITA	0.0094	4,235	3.03	420,951	1.49
PRI	0.0094	473	3.71	5,294	1.55
JPN	0.0091	4,987	2.40	615,392	0.97
GEO	0.0091	403	5.16	4,027	1.42
TWN	0.0079	2,463	2.75	202,050	1.03
ETH	0.0079	423	1.80	5,998	0.92
SWE	0.0078	2,139	3.41	154,303	1.62
CZE	0.0075	1,553	3.65	87,747	1.11
ESP	0.0075	3,158	3.67	365,231	1.29
LKA	0.0072	352	5.13	4,968	1.07
MEX	0.0069	1,393	5.35	83,879	0.84
POL	0.0069	1,959	3.30	167,140	0.93
NLD	0.0069	2,329	3.70	238,940	1.76
PRT	0.0065	1,354	2.64	89,546	1.25
BLR	0.0065	405	4.26	8,054	0.79

Table 2.1 — India's top 30 international collaborators by Salton's Index 2010-2014. See Table H.2 in Appendix H for country abbreviations.

Source: Scopus database.

For the collaboration partners found in this chapter, the country abbreviations and full names are as follows: **ARM** Armenia **AUS** Australia **AUT** Austria **BEL** Belgium **BGD** Bangladesh **BLR** Belarus **BRA** Brazil **CAN** Canada **CHE** Switzerland **CHL** Chile **CHN** China **CZE** Czech Republic **DEU** Germany **DNK** Denmark **ESP**

Spain *ETH* Ethiopia *FIN* Finland *FRA* France *GBR* United Kingdom *GEO* Georgia *GRC* Greece *IDN* Indonesia *IRN* Iran *ITA* Italy *JPN* Japan *KEN* Kenya *KOR* South Korea *LBY* Libya *LKA* Sri Lanka *MEX* Mexico *MYS* Malaysia *NGA* Nigeria *NLD* Netherlands *NOR* Norway *NPL* Nepal *OMN* Oman *PHL* Philippines *POL* Poland *PRI* Puerto Rico *PRT* Portugal *RUS* Russia *SAU* Saudi Arabia *SGP* Singapore *SRB* Serbia *SWE* Sweden *TUR* Turkey *TWN* Taiwan *USA* United States of America *ZAF* South Africa

Collaborations with Sri Lanka appear to be mostly in the field of Medicine, while those with Latin American or Eastern European countries seem to be proportionally skewed towards Physics & Astronomy and include a large percentage of impactful hypercollaborated papers (see Appendix J for definition of the term) which drive the overall impact of the international collaborations up. India’s prolific collaborations with established scientific nations tend to have lower, but still higher than average impact. For example, some collaborations with Europe (the Netherlands, Spain, the Czech Republic, Sweden, Poland, Switzerland, and Italy) are cited more than three times the world average (see Table 2.1 and Figure 2.4).

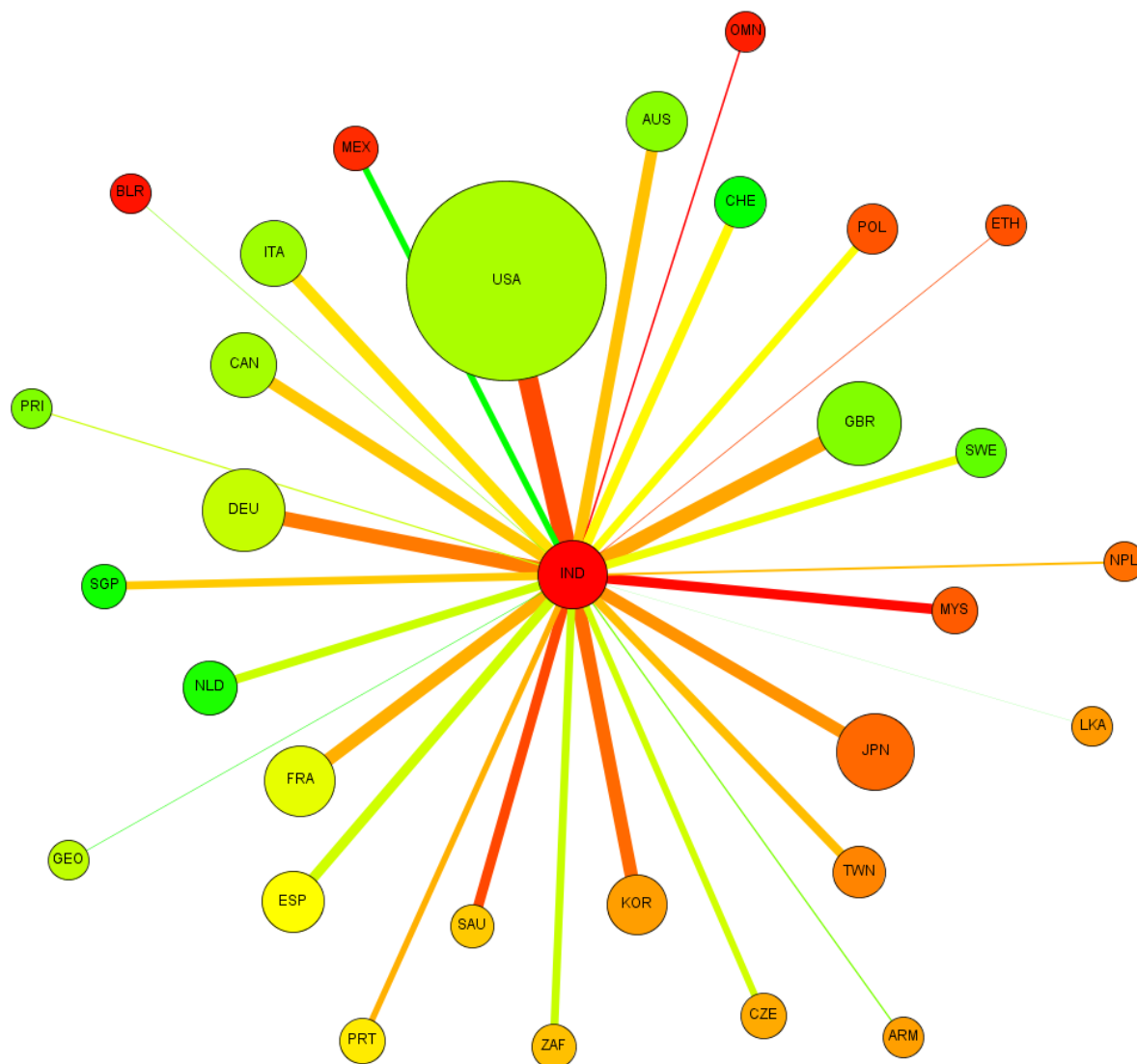


Figure 2.4 — India’s international collaboration network 2010-2014. See Table H.2 in Appendix H for country abbreviations. For data reference, see Table 2.1. The size of the nodes is proportional to the number of papers published by each country; the colour of the nodes reflects the FWCI of each country’s papers; the size of the edges indicates Salton’s Index; the colour of the edges represents the FWCI of India’s papers collaborated with each country.

FWCI scales:
 0.75 nodes 1.82
 1.20 edges 5.35

Source: Scopus database.

Papers collaborated with the selected Anglophone countries are also highly cited at 3.7 times the world average for those with South Africa, 2.8 for those with Australia, and 2.7 for those with Canada. As for India's most prolific collaboration with the USA, these 25,791 papers are cited nearly 80% more than the world average. Papers collaborated with Asian countries can also have high citation impact, at more than twice the world average for collaborations with Singapore, Taiwan, Nepal, Japan, and Korea. International collaboration is advantageous to the citation impact of India's research: collaborations with India's top 30 partners by Salton Index tend to yield papers that are more impactful than India's average citation rate, regardless of the partner country's FWCI or output. India's most impactful collaborations are however not its most prolific ones; should India wish to increase the impact of its internationally collaborated research further, it could be argued that it may wish to be more selective in its most prolific collaborations, prioritising projects with the highest citation impact potential (see Table 2.1 and Figure 2.4)

2.4 Collaboration Partners

Nevertheless, India's most prolific international collaborations still tend to be advantageous to both partner countries in terms of citation impact, as shown in Figure 2.5. India's most impactful prolific collaborations are with Brazil; on average these yield papers cited about three times more than both India's and Brazil's average for internationally co-authored papers. Collaborations with Russia are also highly impactful for both collaborators, since they tend to be cited at least two and a half times the rate of both India's and Russia's internationally co-authored papers. Collaborations with China, Spain, Sweden, and the Netherlands all tend to be cited at least two times more than India's internationally co-authored papers.

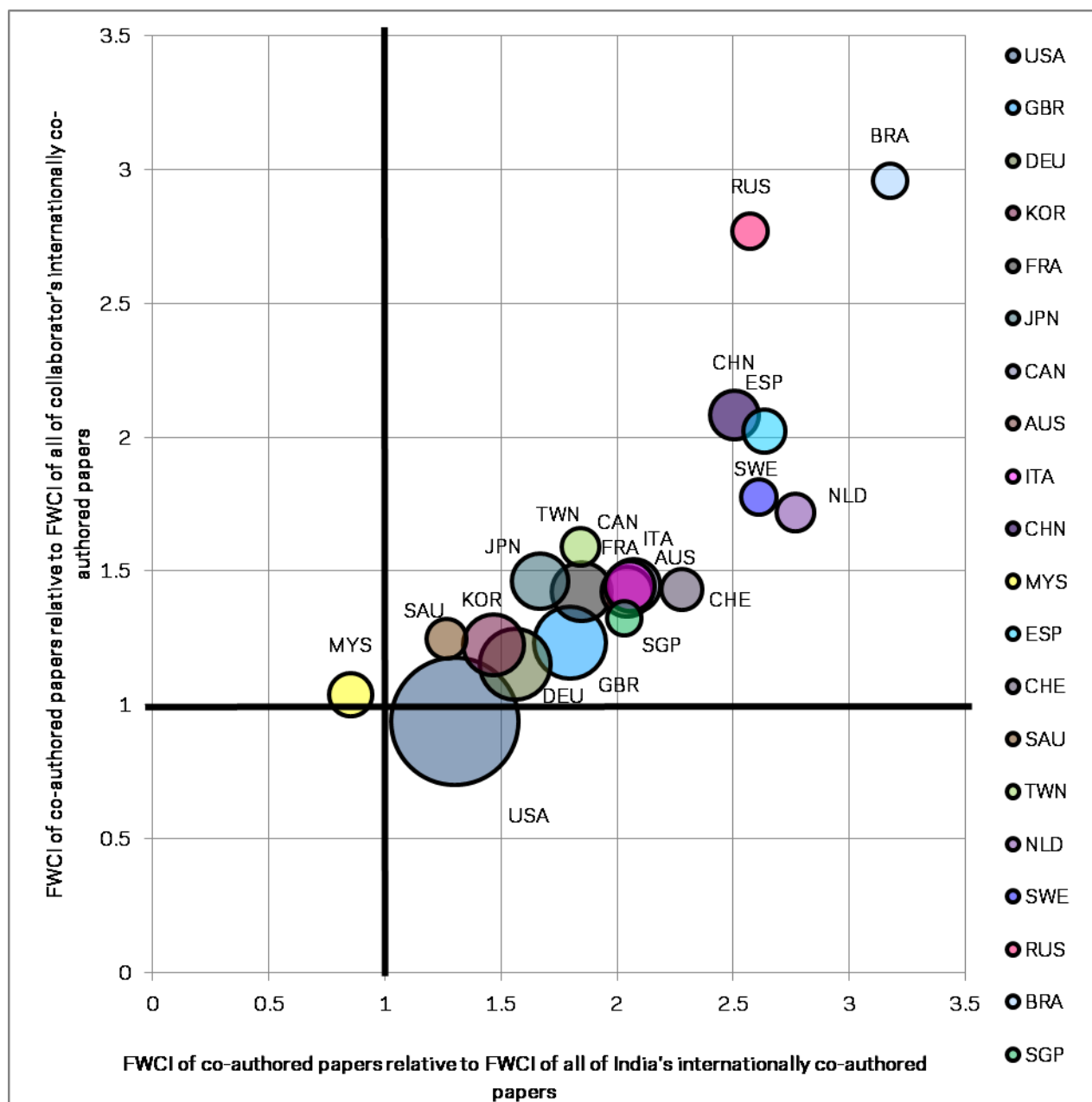
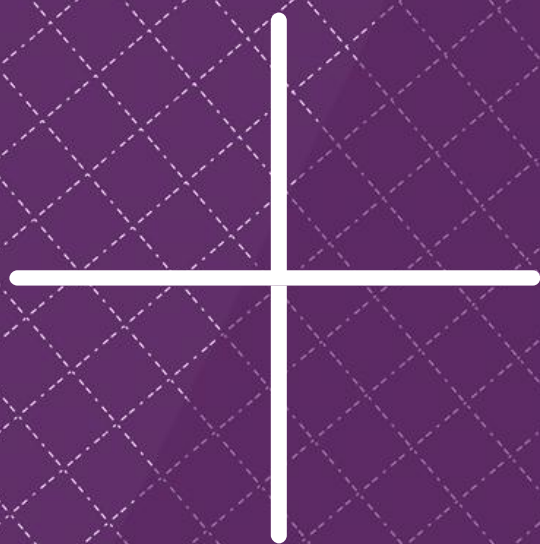


Figure 2.5 — India's collaboration matrix 2009-2013. Node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

On the other end of the spectrum, collaborations with Malaysia tend to be of little citation impact benefit to India, since on average they are of lower impact than that of India's internationally co-authored papers. Collaborations with the USA are the most numerous; while they are not advantageous to the USA in terms of citation impact, they are valuable to India since their impact is higher than that of India's internationally co-authored papers. Collaboration matrices by subject area can be found in Appendix B.



Chapter 3

Knowledge Transfer

India's share of world patent citations is 2.9%, and has grown by 0.7 percentage points between 2009 and 2013. Academic-corporate collaborations account for 1.2% of India's 2013 S&T scholarly output. In knowledge transfer India shows a higher emphasis than the world in Computer Science, Materials Science, Chemistry, and Pharmacology, Toxicology & Pharmaceuticals, in line with its output distribution.

3.1 Key Findings

INDIA'S PATENT CITATION SHARE

2.9%

of world patent citations in 2013

INDIA'S PATENT CITATION SHARE GROWTH

0.7

percentage points between 2009 and 2013

INDIA'S ACADEMIC-CORPORATE
COLLABORATION

1.2%

of India's 2013 S&T scholarly output

INDIA'S ACADEMIC-CORPORATE
COLLABORATION GROWTH

7.0%

CAGR between 2009 and 2013

INDIA'S KNOWLEDGE TRANSFER SUBJECT FOCUS

Computer Science, Materials Science, Chemistry, Pharmacology, Toxicology & Pharmaceuticals

Higher relative emphasis compared to the world

3.2 Patent Citations

The referencing of S&T scholarly literature in patents is an indication of the transfer of knowledge between the academic and corporate sectors and can be measured via patent citation shares. As shown in Figure 3.1 and Table 3.1, the patent citation share of G8 countries has decreased in recent years, by nearly two percentage points from 71.3% in 2009 to 69.5% in 2013.

For figures and tables in this chapter, the country abbreviations and full names are as follows:

AUS Australia BRA Brazil BRICS BRICS countries (Brazil, Russia, India, China, South Africa) CAN Canada CHN China DEU Germany ESP Spain G8 G8 countries (France, Germany, Italy, United Kingdom, Japan, United States, Canada, Russia) GBR United Kingdom IND India ITA Italy JPN Japan KOR Korea SAARC SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka) SGP Singapore SWE Sweden USA United States of America WLD World

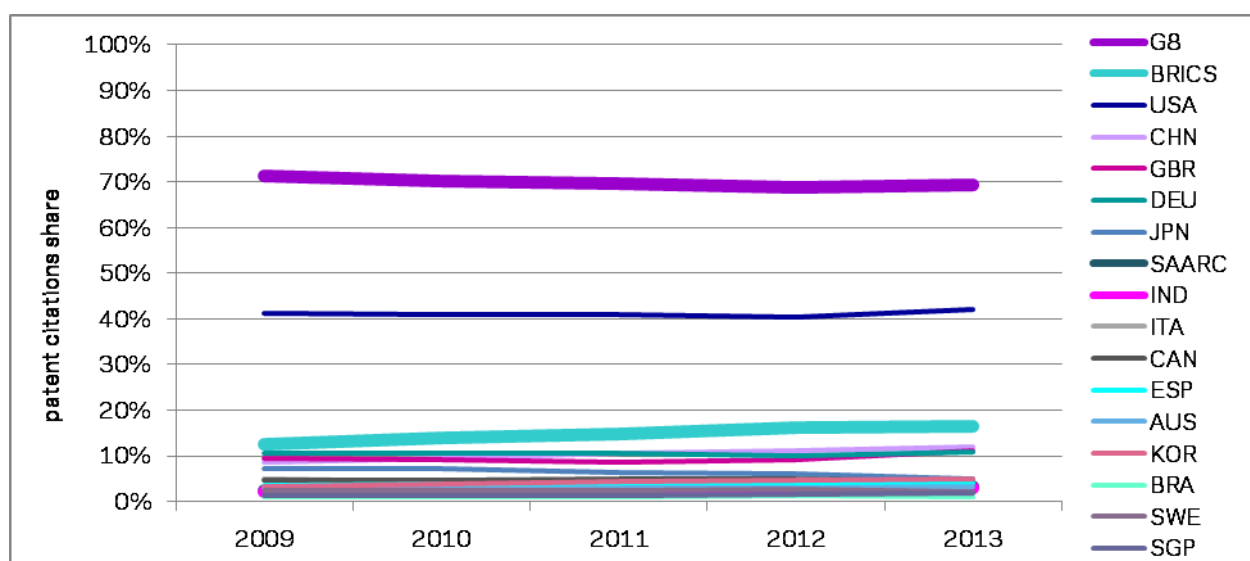


Figure 3.1 — World patent citation shares of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 3.1 or Table C.18 in Appendix C.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	71.3%	70.3%	69.6%	68.9%	69.5%	66.2%
BRICS	12.7%	13.9%	14.9%	16.1%	16.6%	16.3%
SAARC	2.3%	2.6%	2.8%	3.0%	3.2%	4.4%
USA	41.3%	40.9%	40.9%	40.5%	42.1%	40.7%
CHN	8.5%	9.6%	10.5%	11.0%	12.0%	10.2%
GBR	9.3%	9.3%	8.7%	9.2%	11.0%	10.5%
DEU	10.6%	10.6%	10.7%	10.1%	10.9%	8.7%
JPN	7.3%	7.1%	6.3%	6.0%	4.9%	4.4%
IND	2.2%	2.4%	2.4%	2.9%	2.9%	4.3%
ITA	4.9%	4.5%	4.6%	4.5%	4.4%	5.8%
CAN	4.7%	4.8%	4.9%	5.0%	4.5%	5.4%
ESP	3.5%	3.7%	3.9%	3.9%	4.0%	4.4%
AUS	2.9%	2.8%	3.0%	3.0%	3.3%	4.4%
KOR	3.3%	3.9%	4.5%	4.6%	4.9%	2.8%
BRA	1.1%	1.0%	1.0%	1.2%	1.0%	0.7%
SWE	2.4%	2.5%	2.5%	2.6%	2.2%	3.1%
SGP	1.3%	1.2%	1.3%	1.6%	2.0%	3.0%

Table 3.1 — Annual amount of patent citations as share of world's amount of patent citations for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014
WLD	34,269	27,548	19,758	10,567	3,813	607
G8	24,430	19,360	13,744	7,279	2,649	402
BRICS	4,340	3,830	2,935	1,702	633	99
SAARC	791	715	550	322	122	27
USA	14,137	11,268	8,085	4,281	1,607	247
CHN	2,905	2,634	2,067	1,166	457	62
GBR	3,197	2,558	1,724	974	420	64
DEU	3,618	2,911	2,113	1,065	415	53
JPN	2,512	1,964	1,248	632	186	27
IND	749	671	480	303	109	26
ITA	1,667	1,234	901	476	166	35
CAN	1,600	1,321	968	527	171	33
ESP	1,195	1,031	768	414	153	27
AUS	990	762	584	314	127	27
KOR	1,141	1,065	890	481	187	17
BRA	367	280	199	130	40	4
SWE	819	697	494	280	85	19
SGP	440	341	251	174	76	18

Table 3.2 — Annual amount of patent citations for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Zooming in allows a more detailed view of the comparators with fewer patent citations (see Figures 3.2 to 3.4). Between 2009 and 2013, the patent citation share of BRICS has increased by nearly four percentage points from 12.7% in 2009 to 16.6% in 2013; most of this growth can be traced to China.

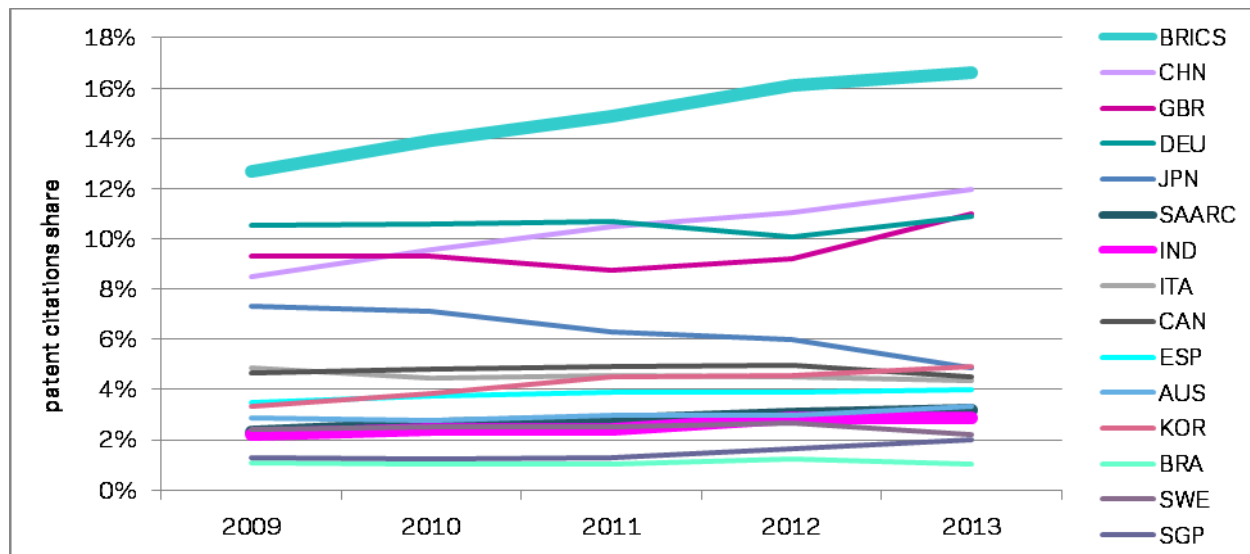


Figure 3.2 — World patent citation shares of BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table C.18 in Appendix C. Source: Scopus database.

Despite fluctuations in the 2009-2013 period, the UK and Germany also see growth, albeit more pronounced for Germany, leading it to catch up to the UK in terms of patent citations in 2013. SAARC and India grew more modestly but steadily over that period, by nearly a percentage point to 3.2% and by over half a percentage point to 2.9%, respectively.

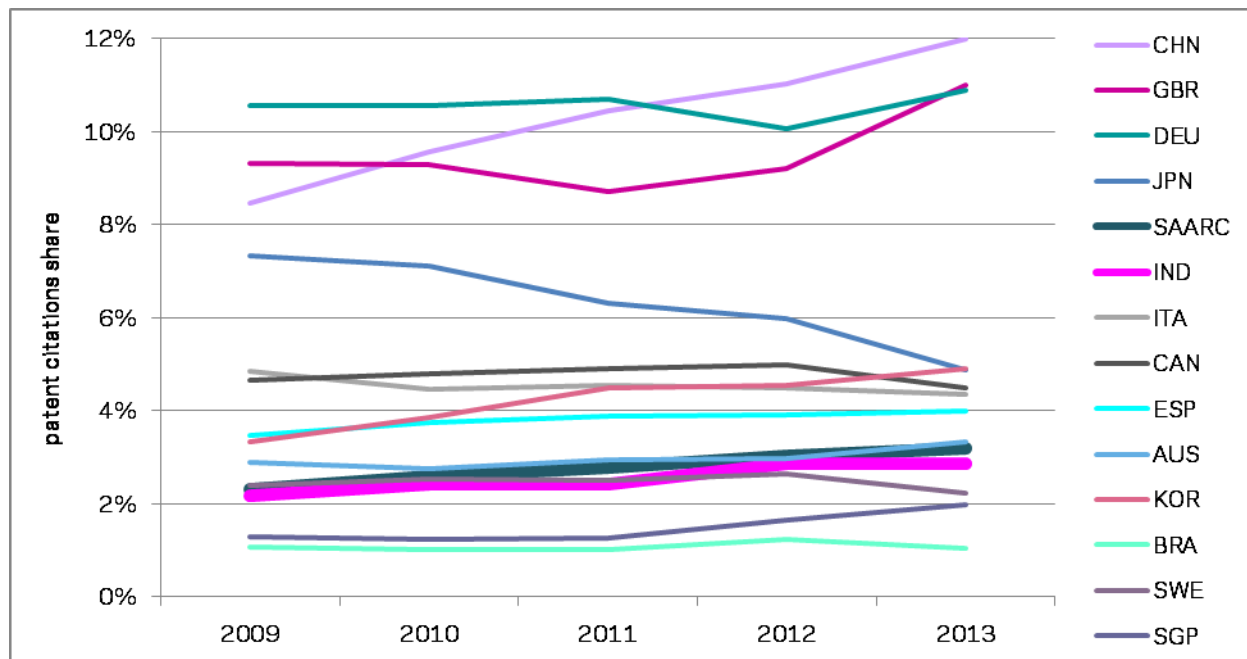


Figure 3.3 — World patent citation shares of BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table C.18 in Appendix C. Source: Scopus database.

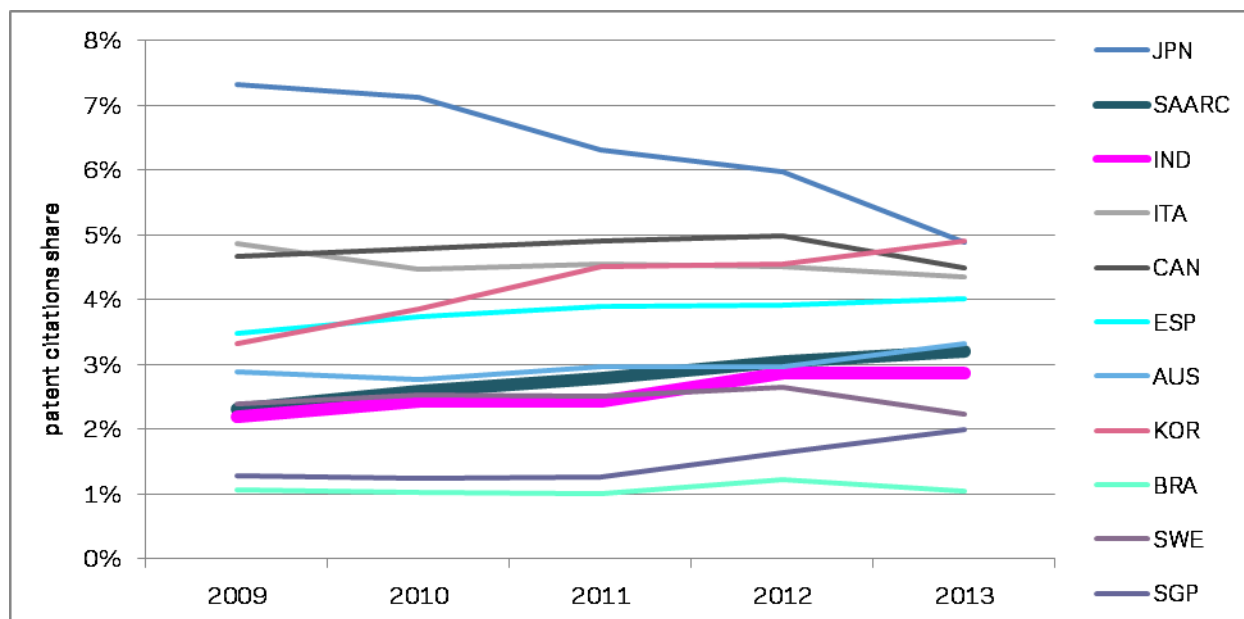


Figure 3.4 — World patent citation shares of BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table C.18 in Appendix C.

Source: Scopus database.

On the other hand Japan sees a marked decrease of over two percentage points in patent citation shares, from 7.3% in 2009 to 4.9% in 2013. Other country trends of interest include a sharp rise in patent citation share for Korea (from 3.3% in 2009 to 4.9% in 2013) and Singapore as well in the more recent years (+0.7 percentage points between 2011 and 2013, from a low base 1.3% to 2.0%). Most other comparator countries present either stability or minor growth.

Patents are records of intellectual property and technological innovation; therefore, they tend to be more concentrated in fields whose research has more applied aspects. This influences patent citation distribution, as does S&T scholarly output distribution. Hence, globally there is a greater concentration of patent citations in Biochemistry, Genetics & Molecular Biology and Medicine (see Figure 3.5). India's patent citation distribution, however, differs from that of the world with less emphasis on these two fields, and more in Materials Science, Chemistry, and Pharmacology, Toxicology & Pharmaceuticals. These variations to the global distribution of patent citations are in line with India's S&T scholarly output distribution.

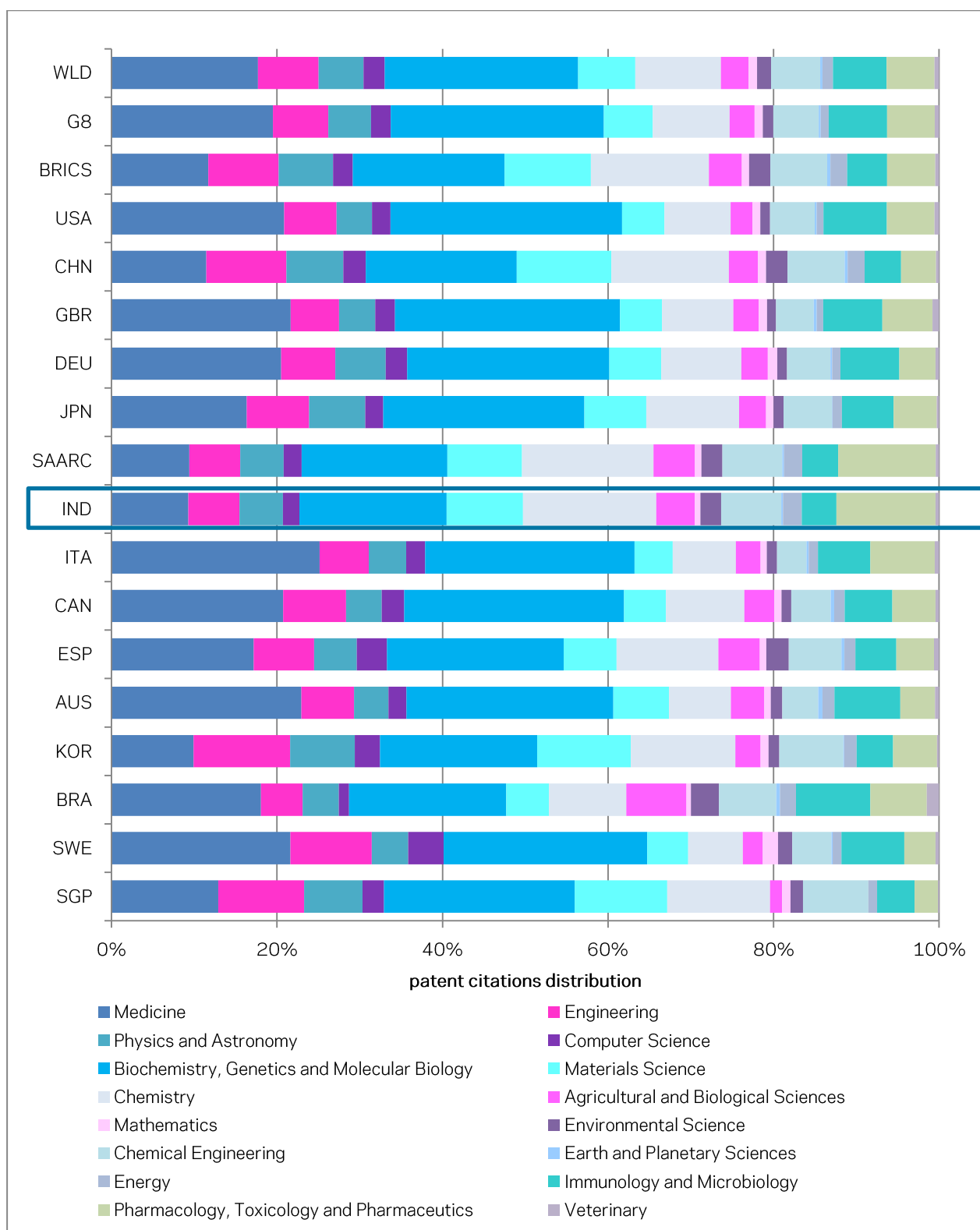


Figure 3.5 — Subject area breakdown of patent citations of the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table C.19 in Appendix C.

Source: Scopus database.

3.3 Academic-corporate Collaboration

Collaboration between the academic and corporate sectors is another indicator of knowledge transfer and can be measured via the proxy of papers co-authored across sectors. Despite slight fluctuations, academic-corporate collaborated papers appear stable in numbers for the world and G8 (see Figure 3.6 and Table 3.3).

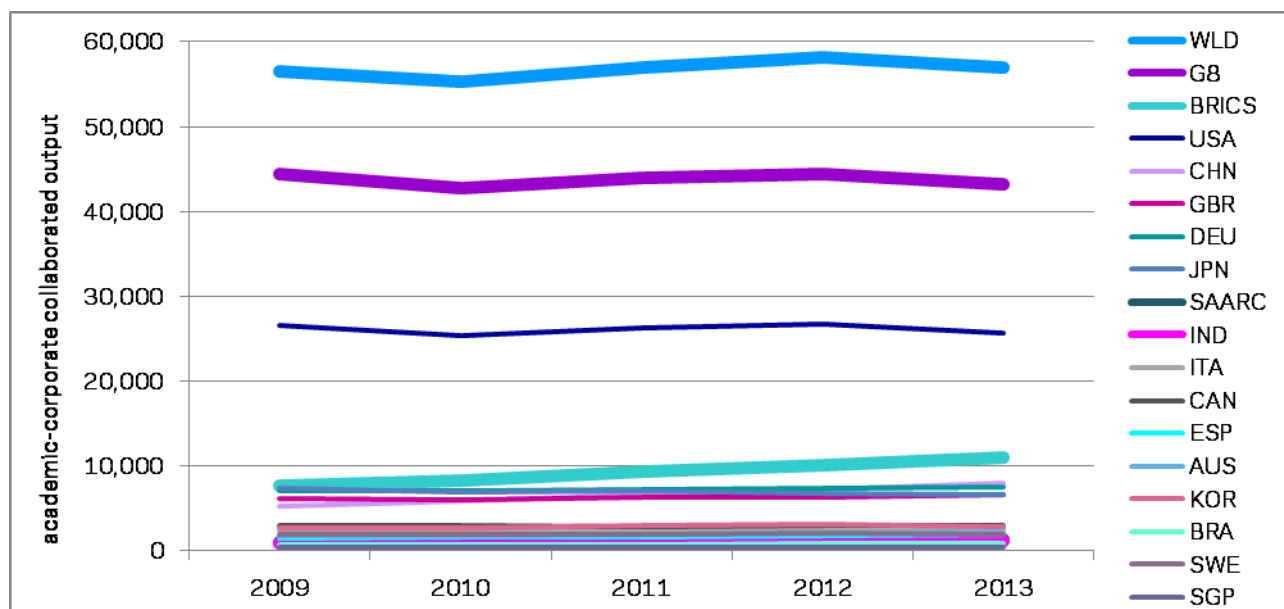


Figure 3.6 — Academic-corporate collaborations for World, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 3.2 or Table C.20 in Appendix C.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	56,579	55,235	57,003	58,122	56,989	52,621	0.2%
G8	44,436	42,743	44,011	44,351	43,239	39,009	-0.7%
BRICS	7,747	8,271	9,299	10,194	10,970	11,386	9.1%
SAARC	1,022	1,073	1,326	1,390	1,383	1,145	7.9%
USA	26,611	25,372	26,309	26,707	25,705	23,260	-0.9%
CHN	5,333	5,861	6,570	7,270	8,058	8,794	10.9%
GBR	6,259	6,077	6,324	6,394	6,634	6,135	1.5%
DEU	7,069	7,043	7,206	7,428	7,624	6,834	1.9%
JPN	7,392	6,974	7,144	6,787	6,703	6,019	-2.4%
IND	953	1,002	1,221	1,282	1,250	1,034	7.0%
ITA	2,417	2,420	2,421	2,622	2,675	2,482	2.6%
CAN	3,088	2,945	2,898	3,046	2,998	2,762	-0.7%
ESP	1,513	1,630	1,685	1,851	1,897	1,741	5.8%
AUS	1,840	1,810	1,890	2,039	2,212	1,996	4.7%
KOR	2,789	2,727	3,029	3,093	2,934	2,665	1.3%
BRA	718	758	801	937	903	859	5.9%
SWE	1,896	1,897	1,999	2,156	2,029	2,010	1.7%
SGP	484	447	491	513	506	526	1.1%

Table 3.3 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Zooming in (see Figure 3.7) reveals the full extent of BRICS’s strong increase in academic-corporate collaborated papers, driven mostly by China: BRICS’s growth rate in academic-corporate collaboration is 9.1% CAGR for 2009-2013 (10.9% for China), approaching its overall S&T scholarly output rate.

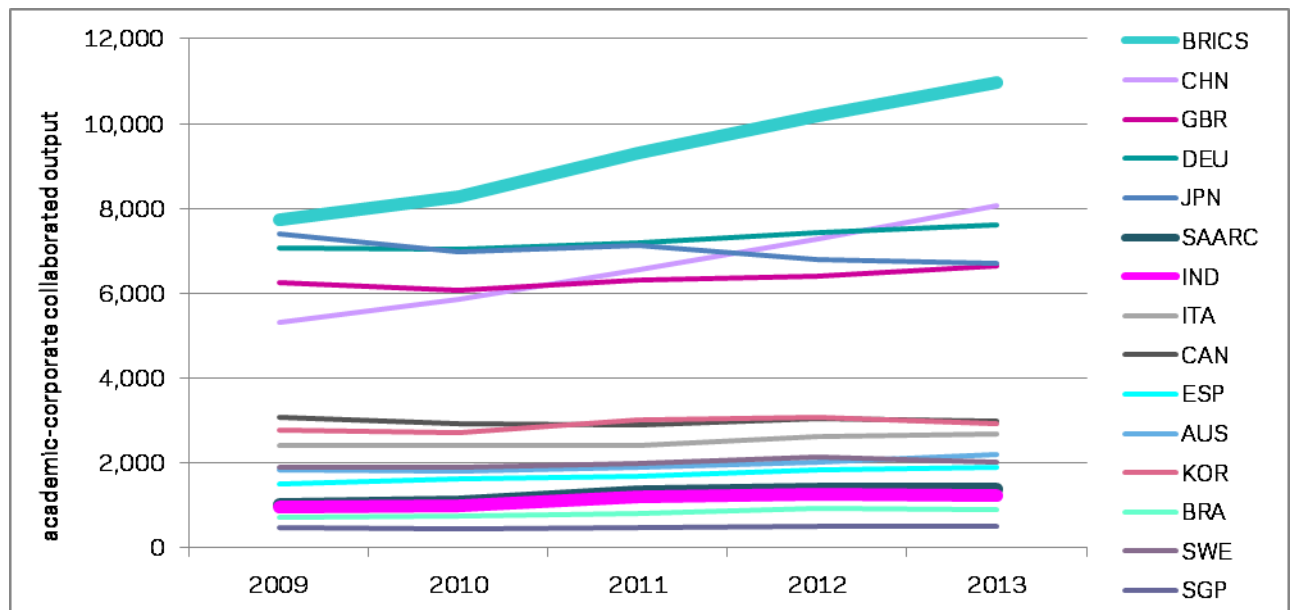


Figure 3.7 — Academic-corporate collaborations for BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 3.2 or Table C.20 in Appendix C. Source: Scopus database.

SAARC and India show more moderate growth, but present notable increases from 2010 to 2012 with lower growth between 2009 and 2010 and no growth between 2012 and 2013 (see Figure 3.8).

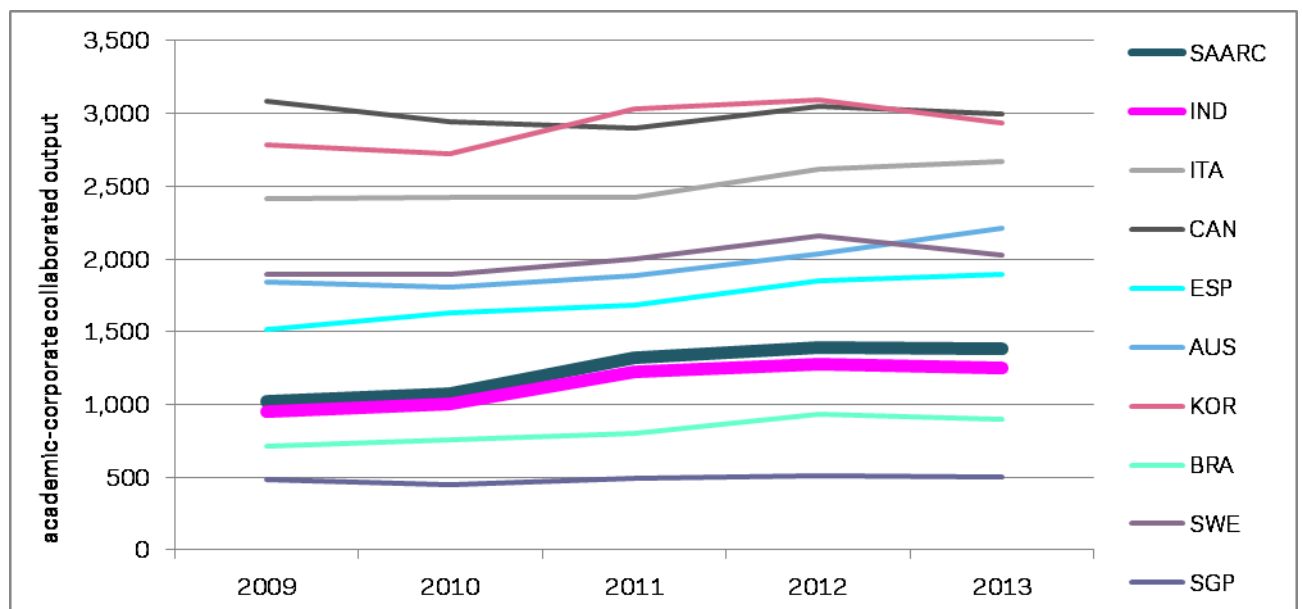


Figure 3.8 — Academic-corporate collaborations for BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 3.2 or Table C.20 in Appendix C. Source: Scopus database.

Although the absolute numbers of academic-corporate papers for most comparators have been stable or growing, when expressed as a proportion of each comparator's total S&T scholarly output, most have in fact decreased in relative terms, with the exception of BRICS's, which has remained stable (see Figure 3.9 and Table 3.4). In 2009, 2.8% of the world's S&T scholarly output was the result of academic-corporate collaborations; in 2013 this has dropped by 0.4 percentage points to 2.4%. G8 sees a similar decrease of 0.6 percentage points to 3.7%, while SAARC and India see a smaller shrinkage (0.3 percentage points) on a lower base, to 1.1% and 1.2%, respectively, in 2013. Only China and Spain see (minor) relative increases in academic-corporate collaborated output as share of country's output.

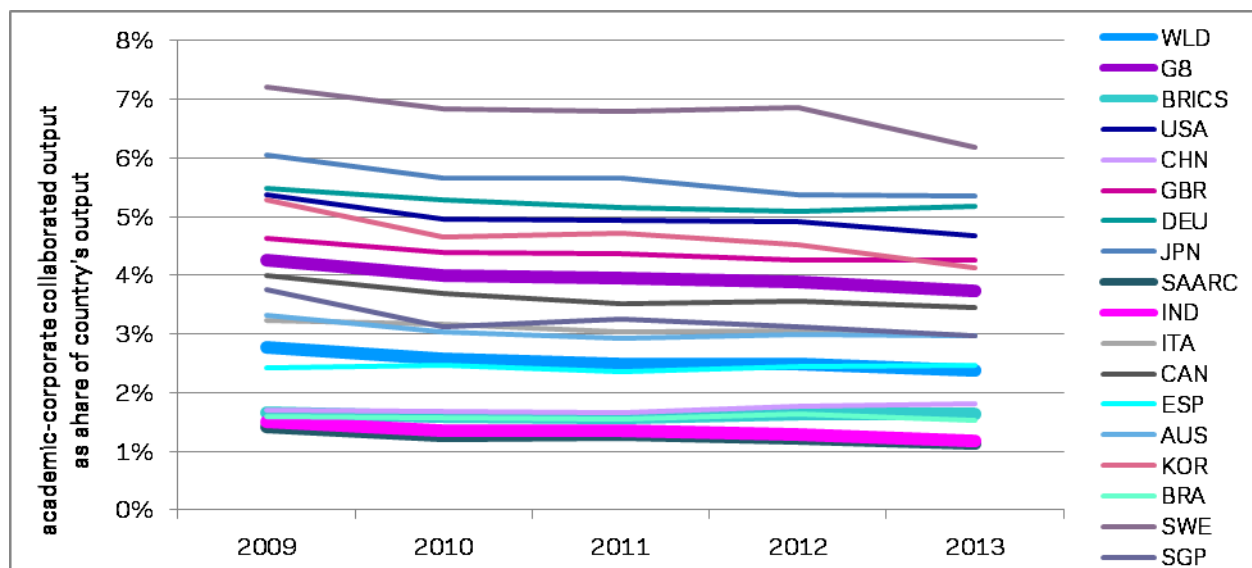


Figure 3.9 — Academic-corporate collaborations for the world, G8, BRICS, SAARC, and selected comparator countries as proportion of each comparator's S&T scholarly output 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table 3.4 or Table C.37 in Appendix C.

Source: Scopus database.

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	2.8%	2.6%	2.5%	2.5%	2.4%	2.2%	-3.7%
G8	4.3%	4.0%	4.0%	3.9%	3.7%	3.5%	-3.2%
BRICS	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	-0.4%
SAARC	1.4%	1.3%	1.3%	1.2%	1.1%	0.9%	-5.3%
USA	5.4%	5.0%	4.9%	4.9%	4.7%	4.5%	-3.4%
CHN	1.7%	1.7%	1.7%	1.8%	1.8%	1.9%	1.3%
GBR	4.6%	4.4%	4.4%	4.3%	4.3%	4.1%	-2.1%
DEU	5.5%	5.3%	5.2%	5.1%	5.2%	4.8%	-1.4%
JPN	6.0%	5.6%	5.7%	5.4%	5.4%	5.3%	-3.0%
IND	1.5%	1.3%	1.3%	1.3%	1.2%	0.9%	-6.1%
ITA	3.2%	3.2%	3.0%	3.1%	3.0%	2.8%	-2.1%
CAN	4.0%	3.7%	3.5%	3.6%	3.5%	3.3%	-3.5%
ESP	2.4%	2.5%	2.4%	2.4%	2.5%	2.3%	0.4%
AUS	3.3%	3.0%	2.9%	3.0%	3.0%	2.7%	-2.8%
KOR	5.3%	4.6%	4.7%	4.5%	4.1%	3.7%	-6.0%
BRA	1.6%	1.6%	1.5%	1.6%	1.5%	1.4%	-1.3%
SWE	7.2%	6.8%	6.8%	6.9%	6.2%	6.1%	-3.8%
SGP	3.8%	3.1%	3.3%	3.1%	3.0%	3.1%	-5.8%

Table 3.4 — Annual academic-corporate collaborated publications as share of country's total output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Academic-corporate collaborations by nature occur in fields of interest to corporations; as such, they tend to be more concentrated in fields whose research has more industrial or commercial applications. This influences the subject distribution of academic-corporate collaboration, as does S&T scholarly output distribution. Hence, globally there is a notably greater concentration of academic-corporate collaborated papers in Engineering, Computer Science, Materials Science, and Energy (see Figure 3.10). India's academic-corporate collaboration distribution however differs from that of the world with more emphasis in Computer Science, Chemistry, and Pharmacology, Toxicology & Pharmaceuticals. These variations to the global distribution of academic-corporate collaborations are in line with India's S&T scholarly output distribution.

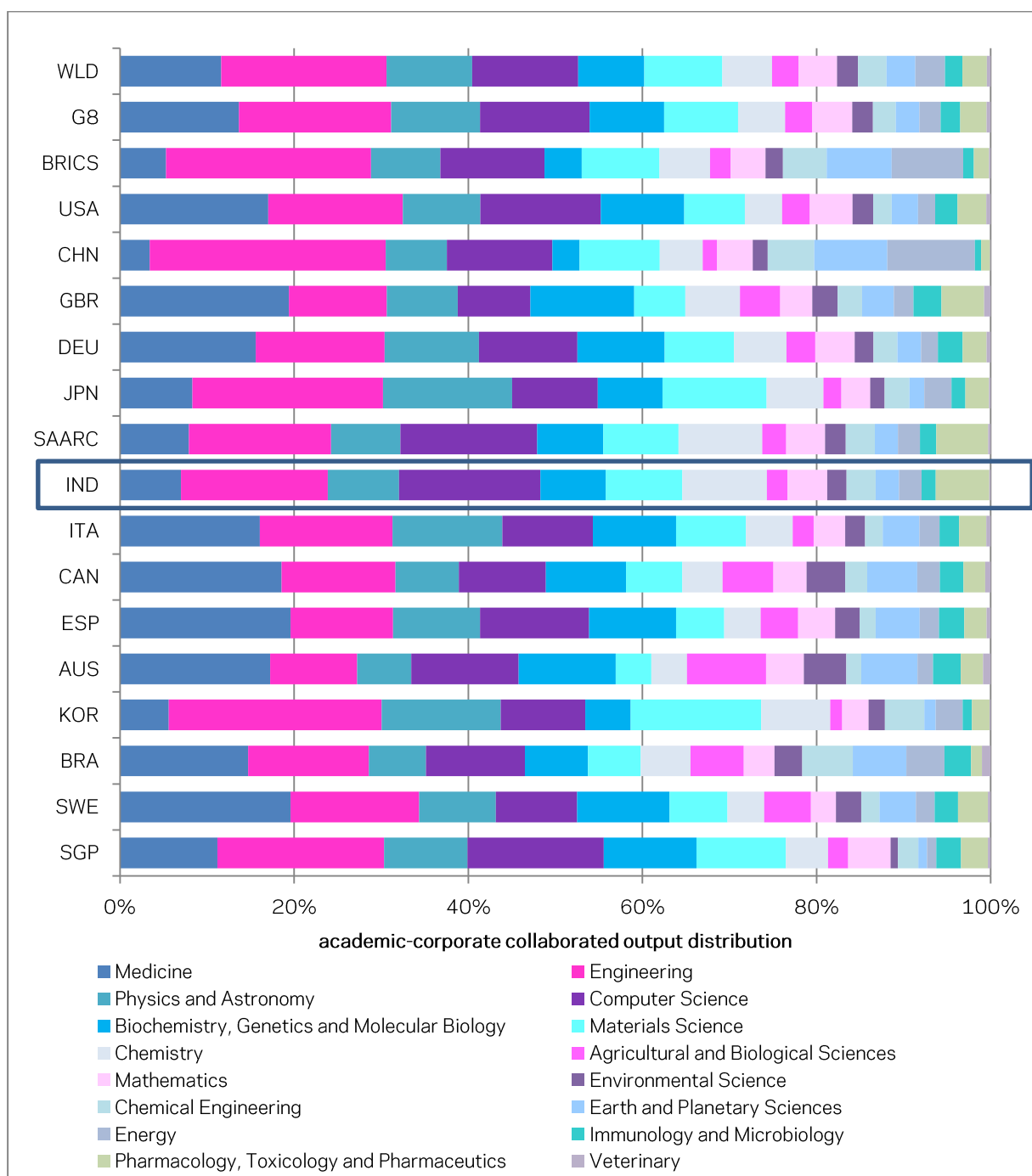
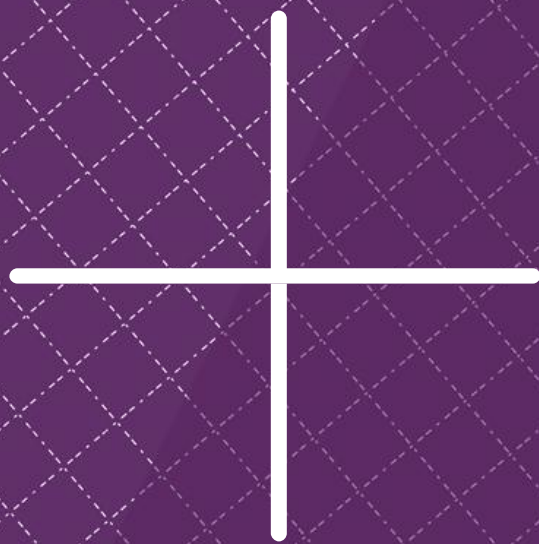


Figure 3.10 — Academic-corporate collaborations for the world, G8, BRICS, SAARC, and selected comparator countries 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. For data reference, see Table C.38 in Appendix C.

Source: Scopus database.



Chapter 4

Top 30 Indian Academic Institutions

India's most prolific academic institution was the Indian Institute of Science Bangalore, with 22,056 publications overall. Between 2002 and 2014 its output grew from 999 publications to 2,224 publications. The next two institutions are both Indian Institute of Technology locations, with Kharagpur leading Delhi in overall publication count.

4.1 Key Findings

TOP ACADEMIC INSTITUTION 2002-2014

22,056

Publications in total from Indian Institute of Science, Bangalore

AVERAGE INSTITUTION OUTPUT GROWTH

14.1%

CAGR increase in output between 2002 and 2014

SUBJECT AREA SPECIALISATIONS

13 out of 30

Institutions have a strong specialisation in Engineering

MOST COMMON SPECIALISED SUBJECT AREAS

Chemistry, Engineering, Physics & Astronomy

25 out of 30 Institutions are specialised in one of these

SUBJECT AREAS WITH ONLY ONE INSTITUTION SPECIALISING IN THE AREA

Biochemistry, Genetics & Molecular Biology, Computer Science

by Jawaharlal Nehru University and Indian Statistical Institute respectively

4.2 Publications

4.2.1 Overall

The Indian academic landscape is complex, evolving, and growing. India's top 100 academic institutions, selected by count of publications between 2002 and 2014, showed an average output growth rate, as measured by compound annual growth rate (CAGR), of 14.1% (median 11.5%). The focus in this section will be on the top 30 academic institutions in India over the period 2009-2013, highlighting the last five years of the measurement period. Table 4.1 shows the rank of institutions by 2002-2014 count of publications and their 2009-2013 publication totals. It should be emphasised that for this chapter of the report we only looked at academic institutions and not at institutes from the government or corporate sector.

Rank	Institution name	2002-2014	2009-2013
1	Indian Institute of Science Bangalore	22,056	10,086
2	Indian Institute of Technology, Kharagpur	15,797	7,710
3	Indian Institute of Technology, Delhi	14,956	6,984
4	University of Delhi	14,409	7,479
5	Anna University	12,756	7,109
6	Indian Institute of Technology, Madras	12,698	6,221
7	Indian Institute of Technology, Bombay	12,562	6,168
8	Jadavpur University	11,869	6,261
9	Banaras Hindu University	11,773	6,410
10	Indian Institute of Technology, Kanpur	11,233	5,111
11	Indian Institute of Technology Roorkee	9,070	4,886
12	Tata Institute of Fundamental Research	8,908	4,093
13	Aligarh Muslim University	7,740	4,343
14	Postgraduate Institute of Medical Education and Research	7,486	3,576
15	Manipal University	7,111	4,087
16	Panjab University	7,049	3,517
17	Annamalai University	6,997	3,879
18	University of Calcutta	6,931	3,708
19	Vellore Institute of Technology	6,173	3,869
20	Indian Institute of Technology, Guwahati	5,625	3,292
21	Indian Statistical Institute	5,316	2,563
22	University of Hyderabad	5,276	2,769
23	Indian Association for the Cultivation of Science	5,145	2,333
24	University of Madras	5,100	2,238
25	Birla Institute of Technology	4,938	2,794
26	University of Mumbai	4,659	2,181
27	Osmania University	4,457	2,352
28	University of Mysore	4,293	2,231
29	Jawaharlal Nehru University	4,265	2,104
30	University of Pune	4,045	2,149

Table 4.1 — Top 30 Indian academic institutions; rank and publication count in all subject areas, 2002-2014 & 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications. Appendix D-1 contains an overview of the India's top 100 academic institutions.

Source: Scopus database.

The top academic institution was the Indian Institute of Science Bangalore, with 22,056 publications between 2002 and 2014. The next two institutions are both Indian Institute of Technology locations, with Kharagpur leading Delhi in overall publication count. Of the top 30, seven are Indian Institute of Technology locations and five of them are in the top 10.

Within the 2009-2013 period most academic institutions produced their highest count of publications in 2013. Only eight of the institutions had their highest number of publication in 2012, or even 2011. Aligarh Muslim University's output dropped from a peak in 2011 of 1,324 to 891 in 2013.

Sixteen of the thirty institutions had CAGRs of less than 10%, twelve were between 10 and 20%, and only Anna University and Vellore Institute of Technology were higher, at 23.7% and 46.4% respectively.

4.2.2 Subject areas

Institutions worldwide often have strong foci on specific subjects, and the top 30 academic institutions in India are no different. Of these thirty, the subject area shares of output in each of the sixteen subject areas are shown in Figure 4.1. The institutions are sorted from top to bottom by their 2002-2014 publication count rank.

Twelve of the thirty academic institutions have their strongest focus in Engineering. The Indian Institute of Technology locations at Roorkee, Madras and Delhi all have Engineering shares higher than 40%, with Madras having the highest with 44.3%. Physics & Astronomy has seven institutions with the subject area as their primary focus. The Tata Institute of Fundamental Research has just shy of 60% of its publications in Physics & Astronomy. Only the specialised institution, the Postgraduate Institute of Medical Education and Research, has a higher subject focus - with just over 90% of its publications in Medicine. Of the sixteen subject areas, only six are focus areas of any of the institutions on the top 30 list. These include Medicine (3), Engineering (12), Physics & Astronomy (7), Computer Science (1), Biochemistry, Genetics & Molecular Biology (1), and Chemistry (6). Veterinary Sciences has the lowest share of publications for 29 of the thirty institutions.

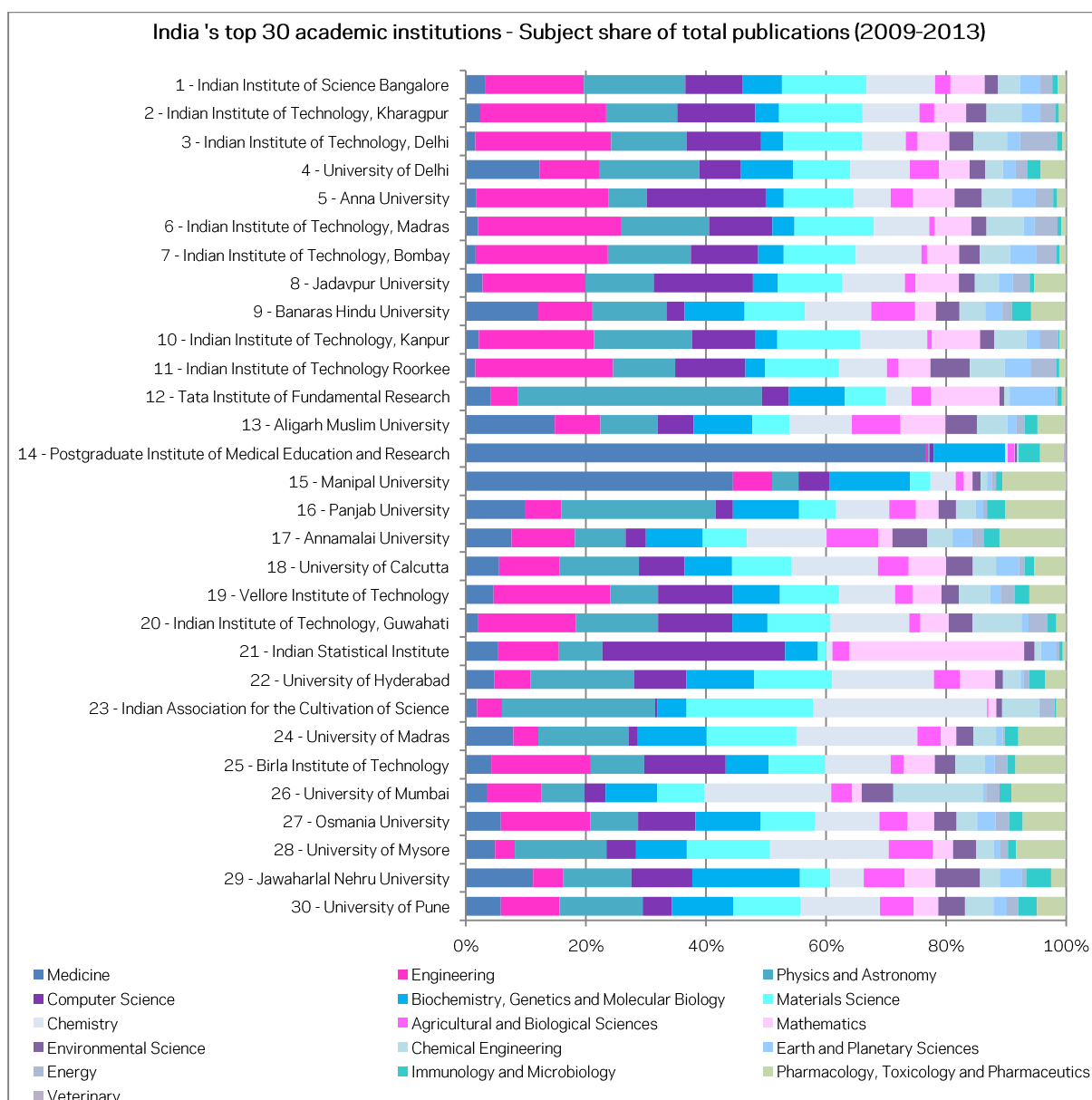


Figure 4.1 — Top 30 Indian academic institutions subject share of total output, 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

4.2.3 Subject area breakdown by academic institution

For each of the top 30 academic institutions the counts of publications overall and per subject area are shown in Tables 4.2a and 4.2b. The Indian Institute of Science Bangalore is the most prolific in the most subject areas, with the highest number of publications between 2009 and 2013 in six of the sixteen subject areas. These include Physics & Astronomy, Biochemistry, Genetics & Molecular Biology, Materials Science, Chemistry, Mathematics, and Earth & Planetary Sciences. The Indian Institute of Technology, Karagpur has the most publications in Engineering and Chemical Engineering; the Indian Institute of Technology, Delhi leads the count in the Energy subject area; Anna University leads in both Computer and Environmental Sciences; Banaras Hindu University leads in three subject areas - Agricultural & Biological Sciences, Immunology & Microbiology, and Veterinary Sciences. The Postgraduate Institute of Medical Education and Research and Annamalai University lead in Medicine, and Pharmacology, Toxicology & Pharmaceutics respectively.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	10,086	472	1,192	667	2,077	1,747	623	354	3,008
Indian Institute of Technology, Kharagpur	7,710	358	579	848	1,366	1,882	459	355	3,033
Indian Institute of Technology, Delhi	6,984	247	457	692	899	1,543	269	760	2,797
University of Delhi	7,479	541	994	332	1,123	776	243	211	1,131
Anna University	7,109	479	382	636	795	2,547	517	375	2,827
Indian Institute of Technology, Madras	6,221	105	428	709	1,067	1,210	205	449	2,757
Indian Institute of Technology, Bombay	6,168	99	452	541	1,167	1,198	473	356	2,354
Jadavpur University	6,261	181	437	424	1,115	1,755	249	298	1,819
Banaras Hindu University	6,410	794	1,090	471	1,199	324	307	175	982
Indian Institute of Technology, Kanpur	5,111	73	341	506	1,052	994	200	293	1,804
Indian Institute of Technology Roorkee	4,886	163	279	502	694	1,013	373	376	1,992
Tata Institute of Fundamental Research	4,093	191	561	52	255	269	450	25	273
Aligarh Muslim University	4,343	527	642	334	676	387	100	84	496
Postgraduate Institute of Medical Education and Research	3,576	46	504	6	15	29	3	2	19
Manipal University	4,087	75	736	60	231	288	42	41	359
Panjab University	3,517	228	569	171	458	147	65	31	305
Annamalai University	3,879	563	619	277	871	222	214	131	692
University of Calcutta	3,708	316	487	239	888	467	234	58	621
Vellore Institute of Technology	3,869	192	521	347	619	824	116	157	1,286
Indian Institute of Technology, Guwahati	3,292	112	353	495	795	753	70	189	990
Indian Statistical Institute	2,563	102	195	39	36	1,086	93	15	361
University of Hyderabad	2,769	211	552	144	829	423	27	46	296
Indian Association for the Cultivation of Science	2,333	12	219	280	1,325	19	4	115	190
University of Madras	2,238	173	508	166	893	68	50	14	185
Birla Institute of Technology	2,794	101	339	233	515	640	74	101	782
University of Mumbai	2,181	148	368	642	906	152	21	95	387
Osmania University	2,352	185	429	137	428	380	120	91	589
University of Mysore	2,231	295	341	118	794	198	43	50	133
Jawaharlal Nehru University	2,104	188	497	91	154	282	100	22	137
University of Pune	2,149	214	391	180	504	183	85	73	373

Table 4.2a — Subject area publication counts of top 30 Indian academic institutions, 2009-2013. The highest counts per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	10,086	406	175	2,575	1,041	580	243	3,091	13
Indian Institute of Technology, Kharagpur	7,710	487	92	2,015	771	350	172	1,713	3
Indian Institute of Technology, Delhi	6,984	502	111	1,627	651	199	82	1,558	2
University of Delhi	7,479	293	256	1,070	580	1,386	467	1,871	16
Anna University	7,109	584	87	1,496	884	217	188	825	4
Indian Institute of Technology, Madras	6,221	289	69	1,522	702	231	98	1,682	1
Indian Institute of Technology, Bombay	6,168	366	58	1,285	571	175	115	1,478	0
Jadavpur University	6,261	280	74	1,138	773	296	573	1,208	0
Banaras Hindu University	6,410	425	344	1,097	378	1,314	615	1,341	25
Indian Institute of Technology, Kanpur	5,111	221	23	1,294	754	202	102	1,530	3
Indian Institute of Technology Roorkee	4,886	571	40	1,073	464	136	100	897	0
Tata Institute of Fundamental Research	4,093	51	46	412	687	246	44	2,441	1
Aligarh Muslim University	4,343	339	143	406	495	970	295	625	19
Postgraduate Institute of Medical Education and Research	3,576	16	151	4	5	3,244	165	10	20
Manipal University	4,087	73	58	186	81	2,449	584	243	2
Panjab University	3,517	148	154	318	196	514	518	1,330	10
Annamalai University	3,879	377	167	480	157	498	720	553	9
University of Calcutta	3,708	273	101	609	383	342	324	813	3
Vellore Institute of Technology	3,869	193	159	653	319	308	408	529	0
Indian Institute of Technology, Guwahati	3,292	242	95	642	285	121	100	834	0
Indian Statistical Institute	2,563	62	21	50	1,038	192	20	259	1
University of Hyderabad	2,769	64	129	636	288	233	171	845	0
Indian Association for the Cultivation of Science	2,333	44	13	965	59	86	77	1,166	0
University of Madras	2,238	127	101	662	114	350	349	665	5
Birla Institute of Technology	2,794	163	63	444	244	200	398	418	2
University of Mumbai	2,181	225	83	333	68	149	392	308	0
Osmania University	2,352	147	89	358	177	232	283	316	5
University of Mysore	2,231	155	55	557	136	195	334	612	2
Jawaharlal Nehru University	2,104	207	115	141	142	311	63	316	7
University of Pune	2,149	171	118	428	156	222	184	529	3

Table 4.2b — Subject area publication counts of top 30 Indian academic institutions, 2009-2013, continued. The highest counts per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

4.3 Citations

S&T scholarly citations, as mentioned in Sections 1.3 to 1.5, can be considered a proxy for academic impact and are, to some extent, tied to output volume. In this section we examine the citation data for the top 30 academic institutions of India. Table 4.3 shows the count of citations and citations per paper (CPP) for each of the top 30 academic institutions in India. Three of the thirty academic institutions have more than ten citations per paper: the Tata Institute of Fundamental Research (12.7 CPP), Panjab University (11.6 CPP), and the Indian Association for the Cultivation of Science (11.1 CPP). The world average CPP is 4.9, and only six institutions have a lower CPP.

Institution name	Citations	Citations per paper (CPP)
Indian Institute of Science Bangalore	81,466	8.1
Indian Institute of Technology, Kharagpur	52,836	6.9
Indian Institute of Technology, Delhi	44,837	6.4
University of Delhi	58,084	7.8
Anna University	24,883	3.5
Indian Institute of Technology, Madras	40,467	6.5
Indian Institute of Technology, Bombay	43,877	7.1
Jadavpur University	36,637	5.9
Banaras Hindu University	49,662	7.7
Indian Institute of Technology, Kanpur	34,183	6.7
Indian Institute of Technology Roorkee	34,777	7.1
Tata Institute of Fundamental Research	51,800	12.7
Aligarh Muslim University	27,242	6.3
Postgraduate Institute of Medical Education and Research	19,838	5.5
Manipal University	13,632	3.3
Panjab University	40,768	11.6
Annamalai University	21,876	5.6
University of Calcutta	21,597	5.8
Vellore Institute of Technology	15,136	3.9
Indian Institute of Technology, Guwahati	23,001	7.0
Indian Statistical Institute	10,598	4.1
University of Hyderabad	21,306	7.7
Indian Association for the Cultivation of Science	25,977	11.1
University of Madras	14,318	6.4
Birla Institute of Technology	14,859	5.3
University of Mumbai	15,408	7.1
Osmania University	8,926	3.8
University of Mysore	7,068	3.2
Jawaharlal Nehru University	13,845	6.6
University of Pune	13,544	6.3

Table 4.3 — Citations and citations per paper (CPP) overall of top 30 Indian academic institutions, 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications. Source: Scopus database.

The distribution of citations per subject area closely follows the count of publications per subject area, and is shown in Figure 4.2.

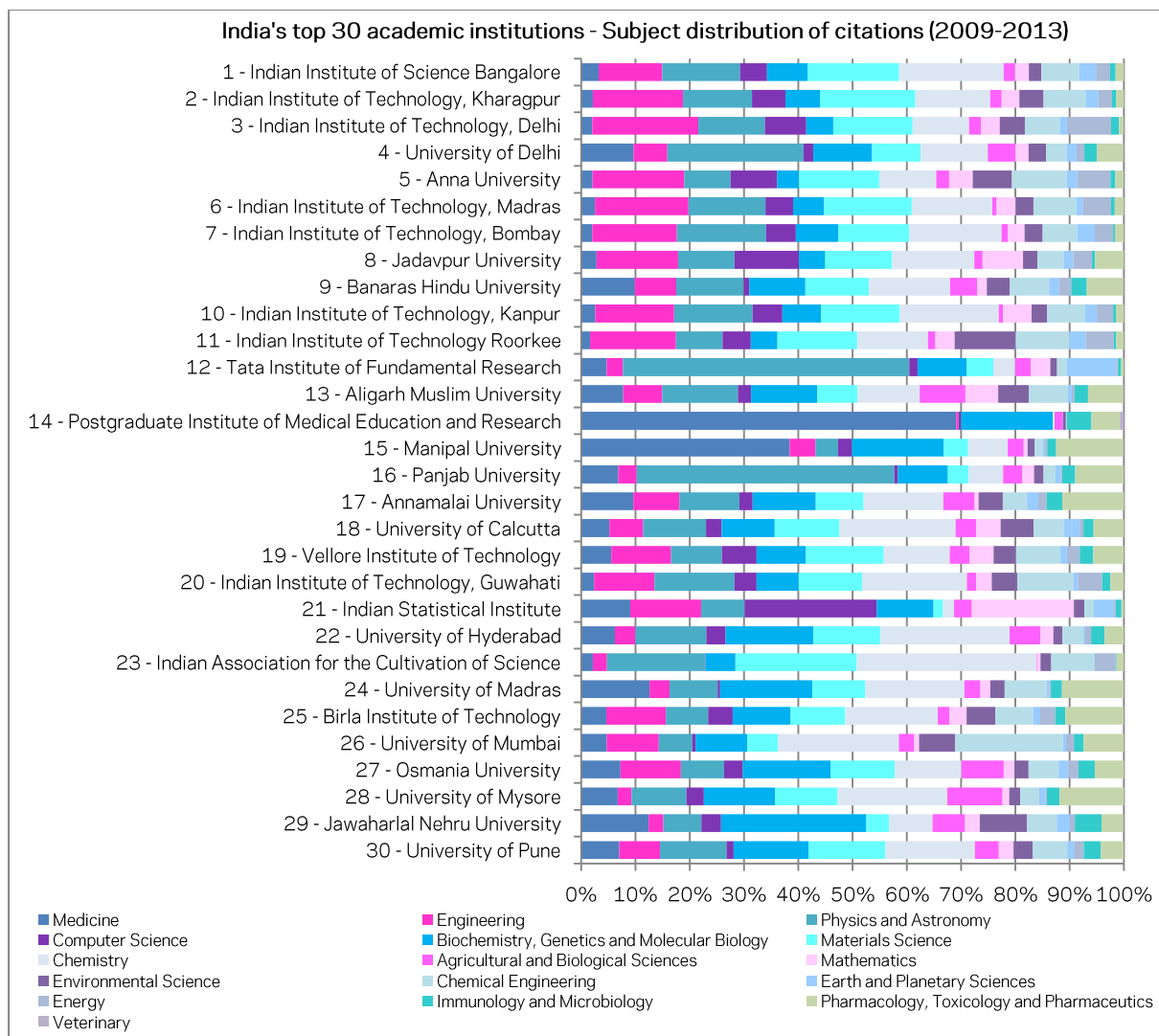


Figure 4.2 — Distribution of citations per subject area of top 30 Indian academic institutions, 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications. Source: Scopus database.

4.4 Citations per Paper

The citations per paper (CPP) distribution over subject areas and academic institutions provides insight into which institution achieves the most with their publications. Tables 4.4a and 4.4b provide the CPP per subject area per top institution. The Tata Institute of Fundamental Research has four of the subject area maximums for CPP, as well as the highest CPP of 12.7 when taking all publications into account.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	8.1	7.0	9.8	16.3	14.5	4.5	7.8	11.7	6.1
Indian Institute of Technology, Kharagpur	6.9	6.5	12.3	10.4	11.3	3.7	5.3	8.0	6.1
Indian Institute of Technology, Delhi	6.4	7.5	9.4	8.0	10.0	4.2	4.1	9.2	6.0
University of Delhi	7.8	8.5	9.9	10.5	10.0	2.1	6.8	6.0	4.9
Anna University	3.5	2.5	5.3	8.0	6.6	1.7	1.8	8.2	3.0
Indian Institute of Technology, Madras	6.5	6.7	11.2	9.4	11.7	3.5	4.8	9.6	5.2
Indian Institute of Technology, Bombay	7.1	9.2	13.4	9.1	11.3	3.5	5.3	7.5	5.1
Jadavpur University	5.9	6.0	7.9	8.0	9.6	4.8	5.0	8.0	5.8
Banaras Hindu University	7.7	6.0	9.0	14.6	11.8	2.9	5.7	12.0	7.4
Indian Institute of Technology, Kanpur	6.7	7.0	13.8	9.1	11.4	3.6	6.8	6.9	5.3
Indian Institute of Technology Roorkee	7.1	5.4	11.4	12.9	12.2	3.3	5.2	9.0	5.2
Tata Institute of Fundamental Research	12.7	10.7	11.6	25.3	11.2	4.0	14.4	9.2	7.7
Aligarh Muslim University	6.3	7.3	8.8	9.8	7.8	2.8	3.7	2.6	6.6
Postgraduate Institute of Medical Education and Research	5.5	8.4	8.5	3.8	5.1	4.1	4.0	1.5	4.6
Manipal University	3.3	8.2	4.7	5.4	6.5	1.8	1.6	2.1	2.7
Panjab University	11.6	8.5	8.8	7.0	7.5	2.7	8.2	4.2	6.1
Annamalai University	5.6	4.2	7.8	6.7	7.0	4.5	4.1	4.8	5.1
University of Calcutta	5.8	4.7	7.9	9.1	9.5	2.4	5.0	4.7	4.0
Vellore Institute of Technology	3.9	5.6	5.1	7.0	5.8	2.3	3.1	4.4	2.5
Indian Institute of Technology, Guwahati	7.0	7.0	10.1	9.7	11.3	2.5	5.4	11.1	5.2
Indian Statistical Institute	4.1	5.3	8.8	7.3	9.1	3.7	6.6	3.3	5.9
University of Hyderabad	7.7	10.6	11.5	10.6	11.2	3.3	4.6	9.1	5.0
Indian Association for the Cultivation of Science	11.1	6.4	13.2	15.0	13.1	3.8	3.3	17.6	7.1
University of Madras	6.4	4.9	9.5	13.3	5.8	1.8	2.9	5.9	5.6
Birla Institute of Technology	5.3	5.9	8.9	8.5	9.4	2.0	5.0	7.6	4.0
University of Mumbai	7.1	6.7	9.0	10.8	8.6	1.4	9.2	5.5	8.6
Osmania University	3.8	7.0	6.3	6.7	4.8	1.5	2.3	3.6	3.1
University of Mysore	3.2	4.6	5.2	4.0	3.4	2.2	3.6	0.7	2.6
Jawaharlal Nehru University	6.6	7.0	11.8	13.1	11.4	2.8	5.5	8.4	4.4
University of Pune	6.3	5.7	9.8	9.8	9.1	2.0	4.1	6.9	5.6

Table 4.4a — Subject area citations per paper (CPP) of top 30 Indian academic institutions, 2009-2013. The highest CPP per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceuticals	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	8.1	8.8	9.2	10.3	3.8	8.7	9.6	7.2	2.2
Indian Institute of Technology, Kharagpur	6.9	10.2	9.0	9.7	4.8	6.8	9.5	8.3	3.7
Indian Institute of Technology, Delhi	6.4	8.0	11.5	7.7	4.6	8.8	9.1	6.8	16.5
University of Delhi	7.8	10.0	8.2	7.6	3.8	6.3	9.5	12.2	6.6
Anna University	3.5	6.2	5.3	4.9	2.4	4.9	4.0	5.2	10.8
Indian Institute of Technology, Madras	6.5	9.5	8.7	8.9	4.2	9.2	14.4	7.1	5.0
Indian Institute of Technology, Bombay	7.1	7.1	4.2	7.9	4.2	8.9	11.1	8.7	0.0
Jadavpur University	5.9	6.7	5.4	7.6	6.8	6.7	6.5	6.0	0.0
Banaras Hindu University	7.7	9.5	8.0	10.1	4.3	7.1	10.4	8.8	5.5
Indian Institute of Technology, Kanpur	6.7	8.4	15.0	7.4	4.6	8.3	9.3	6.2	0.7
Indian Institute of Technology Roorkee	7.1	12.7	7.0	8.9	5.0	7.7	9.2	6.2	0.0
Tata Institute of Fundamental Research	12.7	17.1	8.6	8.5	3.8	13.7	8.5	15.4	0.0
Aligarh Muslim University	6.3	7.6	8.1	8.4	5.6	3.7	10.1	10.3	2.4
Postgraduate Institute of Medical Education and Research	5.5	9.1	7.6	0.0	0.8	5.4	8.0	2.2	9.7
Manipal University	3.3	3.7	5.9	5.0	1.8	3.2	4.4	3.5	10.5
Panjab University	11.6	6.5	8.4	6.6	5.9	7.2	9.4	19.4	2.7
Annamalai University	5.6	4.9	7.2	7.6	1.9	8.0	6.5	8.3	1.0
University of Calcutta	5.8	8.8	7.1	7.7	4.6	6.0	6.8	5.6	1.3
Vellore Institute of Technology	3.9	6.4	4.6	6.5	4.1	5.3	4.1	5.3	0.0
Indian Institute of Technology, Guwahati	7.0	9.0	7.3	8.5	4.7	9.1	11.6	8.2	0.0
Indian Statistical Institute	4.1	5.1	8.2	5.7	3.0	7.7	3.8	5.1	3.0
University of Hyderabad	7.7	10.0	7.7	7.6	3.3	10.4	8.1	6.1	0.0
Indian Association for the Cultivation of Science	11.1	23.4	5.7	12.2	5.3	13.2	9.4	8.1	0.0
University of Madras	6.4	6.1	5.7	4.2	4.4	10.3	9.3	3.8	4.0
Birla Institute of Technology	5.3	9.2	8.4	6.4	3.7	6.5	7.7	5.3	5.5
University of Mumbai	7.1	10.3	7.6	5.9	4.5	10.9	6.6	7.0	0.0
Osmania University	3.8	2.9	5.6	5.5	1.9	5.2	3.1	4.2	0.6
University of Mysore	3.2	1.8	5.6	2.8	1.2	4.6	4.8	2.2	0.5
Jawaharlal Nehru University	6.6	9.2	9.4	6.4	4.3	8.7	13.7	4.9	4.6
University of Pune	6.3	5.7	7.5	9.2	4.9	8.7	6.2	6.4	7.7

Table 4.4b — Subject area citations per paper (CPP) of top 30 Indian academic institutions, 2009-2013, continued. The highest CPP per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

The Indian Association for the Cultivation of Science has the maximum CPP per subject area for Energy, Environmental Science and Materials Science. The Indian Institute of Technology, Kanpur, has the maximums for Biochemistry, Genetics & Molecular Biology, and Immunology & Microbiology. The only other academic institution in the top 30 with maximums in more than one subject area was Jadavpur University, with Computer Science and Mathematics.

4.5 H-index

The Hirsch Index or H-index is calculated such that an entity has an H-index if at most h of its publications have at least h citations. In other words, an entity has an H-index of 27, say, if in its whole corpus of papers, 27 of these papers have at least 27 citations, and 28 of these papers have not received at least 28 citations.

Tables 4.5a and 4.5b show the H-indices per top academic institution overall and per subject area for their publications in 2009-2013. The Indian Institute of Science Bangalore has the highest H-index, 81, for this period. The University of Delhi and Tata Institute of Fundamental Research are the next highest, with an H-index of 75. Panjab University completes the top trio with an H-index of more than 70.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	81	21	40	42	63	34	30	29	44
Indian Institute of Technology, Kharagpur	63	22	35	38	42	31	19	26	46
Indian Institute of Technology, Delhi	61	21	31	31	37	35	15	40	45
University of Delhi	75	27	37	26	39	17	19	21	29
Anna University	41	15	20	31	29	20	12	28	30
Indian Institute of Technology, Madras	60	14	33	35	44	27	15	33	39
Indian Institute of Technology, Bombay	66	12	32	31	42	28	21	24	40
Jadavpur University	53	15	26	26	38	38	16	28	40
Banaras Hindu University	68	28	38	39	47	14	18	23	32
Indian Institute of Technology, Kanpur	51	10	29	28	42	22	18	22	34
Indian Institute of Technology Roorkee	62	15	25	36	39	23	21	32	35
Tata Institute of Fundamental Research	75	24	34	15	26	14	29	8	22
Aligarh Muslim University	52	26	31	25	27	15	10	7	25
Postgraduate Institute of Medical Education and Research	41	12	26	4	5	6	1	1	6
Manipal University	34	13	26	10	19	11	4	5	15
Panjab University	71	24	27	18	23	9	14	7	20
Annamalai University	44	18	30	21	32	16	14	13	28
University of Calcutta	42	17	26	20	35	16	14	9	21
Vellore Institute of Technology	39	17	21	22	25	21	9	13	23
Indian Institute of Technology, Guwahati	48	16	29	30	38	18	8	20	30
Indian Statistical Institute	32	12	18	10	11	24	13	5	21
University of Hyderabad	48	23	32	19	35	15	4	11	17
Indian Association for the Cultivation of Science	54	5	26	32	48	6	3	24	19
University of Madras	38	14	28	22	28	5	7	6	17
Birla Institute of Technology	43	12	27	20	31	17	9	14	24
University of Mumbai	45	15	27	33	33	8	5	12	26
Osmania University	33	18	23	16	19	10	9	10	18
University of Mysore	27	16	18	10	20	11	6	3	9
Jawaharlal Nehru University	41	17	31	19	22	13	14	7	13
University of Pune	41	17	29	21	32	10	9	13	24

Table 4.5a — Subject area and overall H-indices of top 30 Indian academic institutions, 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	81	27	20	58	25	29	21	46	4
Indian Institute of Technology, Kharagpur	63	33	14	47	24	23	20	41	2
Indian Institute of Technology, Delhi	61	28	18	38	23	20	14	36	1
University of Delhi	75	25	20	33	22	31	29	55	7
Anna University	41	27	11	30	20	17	14	25	4
Indian Institute of Technology, Madras	60	25	14	42	24	21	23	40	1
Indian Institute of Technology, Bombay	66	20	8	38	21	22	20	45	0
Jadavpur University	53	21	10	33	30	20	24	31	0
Banaras Hindu University	68	31	22	44	17	35	37	44	6
Indian Institute of Technology, Kanpur	51	21	10	36	22	20	16	33	1
Indian Institute of Technology Roorkee	62	34	10	38	19	14	16	27	0
Tata Institute of Fundamental Research	75	11	11	26	23	24	11	67	0
Aligarh Muslim University	52	25	17	25	24	24	27	36	4
Postgraduate Institute of Medical Education and Research	41	5	17	0	1	40	19	3	9
Manipal University	34	8	10	16	7	27	22	14	1
Panjab University	71	16	20	19	21	25	29	68	3
Annamalai University	44	20	17	27	8	29	30	29	2
University of Calcutta	42	23	14	27	20	20	21	26	1
Vellore Institute of Technology	39	18	13	25	18	19	21	22	0
Indian Institute of Technology, Guwahati	48	24	14	30	16	20	18	34	0
Indian Statistical Institute	32	10	8	11	21	18	5	17	1
University of Hyderabad	48	13	15	29	14	25	16	30	0
Indian Association for the Cultivation of Science	54	20	4	43	9	20	14	35	0
University of Madras	38	14	14	23	10	23	26	20	2
Birla Institute of Technology	43	20	10	23	13	17	27	22	1
University of Mumbai	45	26	13	18	10	24	26	22	0
Osmania University	33	10	12	19	8	15	13	15	1
University of Mysore	27	8	10	15	5	14	17	14	1
Jawaharlal Nehru University	41	22	18	18	13	24	16	18	3
University of Pune	41	18	16	29	14	21	15	27	2

Table 4.5b — Subject area and overall H-indices of top 30 Indian academic institutions, 2009-2013, continued. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

The Indian Institute of Science Bangalore has the highest H-indices in the most subject areas. These include Biochemistry, Genetics & Molecular Biology, Materials Science, Chemistry, Chemical Engineering, and Earth & Planetary Sciences. Banaras Hindu University has the highest H-indices in three subject areas including Agricultural & Biological Sciences, Immunology & Microbiology, and Pharmacology, Toxicology & Pharmaceutics. The top sixteen academic institutions have the highest H-indices for all sixteen subject areas.



Chapter 5

Indian Researchers

In 2009-2013 there were 366,445 active researchers associated with Indian institutions across all subject areas. Across all subject areas, the majority of Indian researchers produced more papers than the world average. In terms of performance of publications, however, there were more Indian researchers whose field-weighted citation impact was lower than the world average.

5.1 Key Findings

2009-2013 ACTIVE INDIAN AUTHORS

366,445

INDIAN RESEARCHERS IN CHEMICAL ENGINEERING
PUBLISHING MORE THAN THE WORLD AVERAGE

98.7%

SUBJECT AREA WITH THE LARGEST NUMBER OF ACTIVE RESEARCHERS FOR INDIA

Medicine & Engineering

SUBJECT AREA WITH HIGHEST SHARE OF INDIAN RESEARCHERS MORE PRODUCTIVE THAN WORLD AVERAGE

Chemical Engineering

SUBJECT AREA WITH THE LOWEST SHARE OF INDIAN RESEARCHERS MORE IMPACTFUL THAN WORLD AVERAGE

Veterinary Sciences

5.2 Active Researchers

In the period 2009-2013 there were 366,445 active researchers associated with Indian institutions across all subject areas. Active researchers are defined as those authors of at least one peer-reviewed research publication (i.e. research articles, reviews and conference papers in journals that are indexed by Scopus) in the period of interest, whose last known affiliation is located in India. As shown in Table 5.1, the distribution across subject areas is not uniform, but concentrated in specific subject areas. Medicine has the highest number of active researchers, followed by Engineering. Veterinary Sciences (9,846 researchers), Earth & Planetary Sciences (21,761), and Energy (21,764) have the lowest number of active researchers.

Subject area	Count of active researchers
Agricultural and Biological Sciences	59,988
Biochemistry, Genetics and Molecular Biology	87,285
Chemical Engineering	39,339
Chemistry	64,492
Computer Science	61,279
Earth and Planetary Sciences	21,761
Energy	21,764
Engineering	87,780
Environmental Science	41,232
Immunology and Microbiology	24,044
Materials Science	51,338
Mathematics	28,618
Medicine	118,305
Pharmacology, Toxicology and Pharmaceutics	69,369
Physics and Astronomy	49,758
Veterinary	9,846

Table 5.1 — *Count of active researchers affiliated with Indian institutions per subject area, 2009-2013.*
Source: Scopus database.

5.2.1 Publications per Active Researcher

Shown in Tables 5.2a and 5.2b are the ratios of publications divided by number of active researchers per each of the Top 30 research institutions of India. The Indian Association for the Cultivation of Science has the highest number of publications per active researcher, 5.4. It also has the highest values for Chemistry and Materials Science, with ratios of 3.6 and 3.3 respectively.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	3.7	1.4	1.6	1.6	2.8	2.4	2.8	1.6	2.8
Indian Institute of Technology, Kharagpur	3.8	1.8	1.6	1.6	2.4	2.6	1.9	1.5	2.7
Indian Institute of Technology, Delhi	4.3	1.9	1.8	1.6	2.2	2.8	1.9	2.3	3.1
University of Delhi	3.2	1.6	1.7	1.6	2.5	1.8	1.6	1.5	2.1
Anna University	2.2	1.0	1.1	1.3	1.7	1.6	1.1	1.4	1.8
Indian Institute of Technology, Madras	3.3	1.2	1.7	1.7	2.3	1.9	1.7	1.4	2.4
Indian Institute of Technology, Bombay	3.5	1.4	1.5	1.6	2.5	2.0	2.0	1.5	2.3
Jadavpur University	3.3	1.2	1.4	1.4	2.1	2.5	1.6	1.3	2.4
Banaras Hindu University	3.5	1.7	1.8	1.5	2.4	1.9	2.2	1.6	2.2
Indian Institute of Technology, Kanpur	3.5	1.9	1.7	1.6	2.4	2.0	1.9	2.4	2.5
Indian Institute of Technology Roorkee	4.4	1.5	1.8	1.8	2.7	2.8	2.2	2.1	2.8
Tata Institute of Fundamental Research	4.7	1.2	1.9	2.0	2.2	2.6	3.9	1.3	2.0
Aligarh Muslim University	2.4	1.5	1.3	1.6	2.0	1.9	1.3	1.3	1.8
Postgraduate Institute of Medical Education and Research	2.9	1.3	1.5	1.1	1.6	3.7	1.3	1.0	2.2
Manipal University	1.5	0.8	0.9	0.9	1.6	1.3	0.7	2.0	1.1
Panjab University	3.6	1.4	1.8	1.2	1.8	1.6	2.1	1.2	1.9
Annamalai University	2.1	1.0	1.1	1.1	1.9	1.9	1.0	1.1	1.8
University of Calcutta	3.2	1.2	1.5	1.5	2.6	2.6	1.7	1.1	2.2
Vellore Institute of Technology	1.8	1.0	1.2	1.2	2.1	1.5	1.0	1.0	1.2
Indian Institute of Technology, Guwahati	3.6	1.6	1.8	1.6	2.3	2.4	1.4	1.4	2.3
Indian Statistical Institute	5.0	1.3	2.3	1.3	2.0	4.9	1.7	1.1	2.8
University of Hyderabad	2.8	1.2	1.5	1.1	2.3	2.0	1.4	0.9	1.9
Indian Association for the Cultivation of Science	5.4	1.8	1.8	1.7	3.6	3.7	1.7	1.4	2.0
University of Madras	2.2	0.9	1.1	1.1	2.5	1.6	1.1	0.8	1.6
Birla Institute of Technology	2.8	1.5	1.8	1.4	2.4	1.6	1.3	1.5	1.7
University of Mumbai	2.3	1.0	1.2	1.6	1.8	1.4	1.9	1.1	1.5
Osmania University	1.9	1.0	1.1	1.1	1.5	1.8	1.2	1.5	1.7
University of Mysore	2.3	1.1	1.1	1.0	2.4	2.5	0.7	0.9	1.2
Jawaharlal Nehru University	3.1	1.4	2.0	1.3	2.1	2.5	2.1	1.3	2.2
University of Pune	2.2	1.2	1.4	1.0	1.8	1.3	1.3	0.9	1.4

Table 5.2a — Subject area and overall publication-count-to-active-researcher ratio of top 30 Indian academic institutions, 2009-2013. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

The highest ratio of all the subject areas, 6.5, is in Veterinary Sciences at Jadavpur University. Tata Institute of Fundamental Research has the next highest, in Physics & Astronomy, with 5.5 publications per active researcher in the period 2009-2013.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Technology, Kharagpur	3.8	1.6	1.1	2.9	1.8	1.7	1.3	2.6	2.2
Indian Institute of Technology, Delhi	4.3	1.6	1.4	2.7	2.0	1.7	1.6	3.1	2.9
University of Delhi	3.2	1.3	1.3	2.7	1.7	2.0	1.6	3.9	1.1
Anna University	2.2	1.3	0.8	1.8	1.3	1.0	1.3	2.0	0.8
Indian Institute of Technology, Madras	3.3	1.5	1.3	2.7	1.6	1.3	1.8	2.7	1.0
Indian Institute of Technology, Bombay	3.5	1.5	1.5	2.3	1.8	1.3	1.4	3.1	1.0
Jadavpur University	3.3	1.1	0.9	2.4	1.8	1.3	1.5	2.5	6.5
Banaras Hindu University	3.5	1.5	1.2	2.5	2.2	2.0	1.7	3.1	1.6
Indian Institute of Technology, Kanpur	3.5	1.6	1.9	2.5	1.9	1.7	1.4	2.8	1.0
Indian Institute of Technology Roorkee	4.4	1.9	1.0	2.7	2.1	2.1	1.5	2.9	2.4
Tata Institute of Fundamental Research	4.7	1.7	1.1	2.9	3.1	1.3	1.8	5.5	1.3
Aligarh Muslim University	2.4	1.5	0.9	1.8	2.3	1.3	1.2	2.1	0.9
Postgraduate Institute of Medical Education and Research	2.9	1.0	1.1	2.9	4.3	2.6	1.4	2.0	1.0
Manipal University	1.5	1.0	0.6	1.8	1.0	1.1	0.9	2.2	1.0
Panjab University	3.6	1.2	1.4	2.2	1.6	2.0	1.7	4.3	2.4
Annamalai University	2.1	1.0	0.9	2.1	1.3	1.0	1.2	2.0	1.2
University of Calcutta	3.2	1.3	1.0	2.2	2.2	1.3	1.3	2.6	0.8
Vellore Institute of Technology	1.8	0.9	0.8	2.0	1.4	1.1	1.0	2.2	1.8
Indian Institute of Technology, Guwahati	3.6	1.7	1.7	2.2	1.8	1.7	1.3	3.1	5.7
Indian Statistical Institute	5.0	1.3	0.9	2.6	3.9	2.1	1.5	4.0	1.0
University of Hyderabad	2.8	1.1	1.2	2.3	1.8	1.4	1.3	2.6	1.0
Indian Association for the Cultivation of Science	5.4	1.6	1.3	3.3	1.4	1.1	1.6	3.7	4.0
University of Madras	2.2	1.0	1.0	3.1	1.8	1.0	1.0	2.8	0.8
Birla Institute of Technology	2.8	1.5	1.5	2.2	1.5	1.6	2.0	2.3	3.7
University of Mumbai	2.3	1.2	1.1	1.7	1.2	1.0	1.5	1.8	1.0
Osmania University	1.9	0.9	0.7	1.8	1.5	1.0	1.1	1.9	0.6
University of Mysore	2.3	1.0	0.8	3.1	1.7	1.0	1.2	3.0	4.0
Jawaharlal Nehru University	3.1	1.7	1.4	2.9	1.8	1.8	1.4	3.5	1.3
University of Pune	2.2	1.0	1.0	2.1	1.4	1.3	1.5	2.1	0.7

Table 5.2b — Subject area and overall publication-count-to-active-researcher ratio of top 30 Indian academic institutions, 2009-2013, continued. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

5.3 Performance of Active Researchers

As seen in the previous tables, the ratio of publications to active researchers provides an indication of the productivity of researchers. Table 5.3 compares the proportions of India's active research base that are above or below the world average, overall and per subject area, in publications per active research and performance of publications using field-weighted citation impact (FWCI). It should be noted that output volumes and document types differ across subject areas. As such, comparisons between subject areas should be avoided, and only comparisons to world averages in the same subject areas should be considered.

Subject area	Publications per Active Indian Researcher			FWCI of Publications		
	World Average	Share of Indian Researchers Above World Average	Share of Indian Researchers Below World Average	World Average	Share of Indian Researchers Above World Average	Share of Indian Researchers Below World Average
General	4.64	43.6%	56.4%	1.00	18.0%	81.9%
Agricultural and Biological Sciences	2.57	83.7%	16.3%	1.00	15.6%	84.4%
Biochemistry, Genetics and Molecular Biology	3.08	71.1%	28.9%	1.00	15.2%	84.8%
Chemical Engineering	2.40	98.7%	1.3%	1.00	24.9%	75.1%
Chemistry	3.34	80.8%	19.2%	1.00	24.9%	75.1%
Computer Science	3.16	57.5%	42.5%	1.00	22.9%	77.1%
Earth and Planetary Sciences	3.15	74.8%	25.2%	1.00	16.2%	83.8%
Energy	2.26	91.7%	8.3%	1.00	24.5%	75.5%
Engineering	3.30	67.9%	32.1%	1.00	25.9%	74.1%
Environmental Science	2.20	92.5%	7.5%	1.00	20.0%	80.0%
Immunology and Microbiology	2.33	96.3%	3.7%	1.00	14.2%	85.8%
Materials Science	3.53	86.0%	14.0%	1.00	26.6%	73.4%
Mathematics	2.65	91.2%	8.8%	1.00	20.1%	79.9%
Medicine	3.65	57.5%	42.5%	1.00	14.8%	85.2%
Pharmacology, Toxicology and Pharmaceuticals	2.25	81.3%	18.7%	1.00	16.4%	83.6%
Physics and Astronomy	5.50	64.2%	35.8%	1.00	22.1%	77.9%
Veterinary	2.27	81.1%	18.9%	1.00	12.9%	87.1%

Table 5.3 — Subject area and overall publication-count-to-active-researcher proportions and publication performance proportions of Indian active researchers compared to world, 2009-2013. For 0.1% of the overall publications no subject area could be determined, so no FWCI could be calculated.

Source: Scopus database.

Across all selected subject areas, a majority of Indian researchers produced more papers than the world average. Especially salient are the subject areas Chemical Engineering and Immunology & Microbiology, in which more than 95% of all Indian researchers publish more than the world average in 2009-2013. The above-average percentage is lowest for the fields of Computer Science and Medicine (57.5% for both). Overall, only 43.6% of all Indian researchers publish above the world average, which goes to show how focused India's research base is on the core S&T subject areas.

In terms of performance of publications, the proportion of Indian researchers whose publications have an FWCI higher than the world's average is considerably smaller. Indian researchers in Materials Science and Engineering scored best, with more than a quarter of their researchers having FWCI higher than 1.0. This is closely followed by Chemistry (24.9%), Chemical Engineering (24.9%), and Energy (24.5%). The lowest performing subject area was Veterinary Sciences, with only 12.9% of all Indian researchers scoring above the world's FWCI. This low value may be associated with the low count of publications in this subject area.

5.3.1 Top 10 Researchers Overall and per Subject Area

The top 10 researchers per subject area are presented in the following section. The list of top 10 researchers is generated based on their cumulative 2002-2014 totals for each of the subject areas. The tables show the researchers' total publications and publications in the relevant field, citations in the subject area, citations per paper (CPP) in the subject area and H-index in the subject area. Also shown is the subject area share of the researchers' total publications. The values presented in the tables come from the researchers' respective 2009-2013 publication data. Data from 2009-2014 is presented in Appendix E.

Rank 02-14	Name	Affiliation; Institution	All publications 09-13	All publications 02-14	Citations	CPP 09-13	H-index 09-13
1	Banerjee S.	Tata Institute of Fundamental Research	625	1330	18,707	29.9	60
2	Kumar A.	Indian Institute of Technology	563	1258	6,708	11.9	36
3	Kumar R.	All India Institute of Medical Sciences	403	849	3,106	7.7	28
4	Mohanty G.	Tata Institute of Fundamental Research	391	801	12,090	30.9	51
5	Sarkar S.	Saha Institute of Nuclear Physics	439	800	23,987	54.6	61
6	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	293	788	2,927	10.0	24
7	Sharma V.	University of Delhi	310	706	11,238	36.3	48
8	Choudhary B.	University of Delhi	446	700	14,792	33.2	54
9	Bhatnagar V.	Panjab University	445	694	14,507	32.6	54
10	Beri S.	Panjab University	440	689	14,295	32.5	54

Table 5.4 — Top 10 researchers overall: publication and citation counts, citations per paper (CPP), and H-index for 2009-2013. Rank based on 2002-2014 publication count.

Source: Scopus database.

It should be noted that, because the following lists of top 10 authors per subject area are generated from the list of 1000 most prolific authors in the period 2002-2014, it is possible that some prolific authors are not included. Firstly, if an author published insufficiently to be included in the top 1000 for 2002-2014, then (s)he does not qualify for inclusion in a subject area top 10. Secondly, the ranking per subject area is based on the authors' publications in the subject area in 2002-2014. So, even if authors are very productive in their subject area for the period 2009-2013 (or 2009-2014 in Appendix E), they are not included if they are not in the top 10 in the period 2002-2014.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Agricultural and Biological Sciences					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Singh R.	Indian Institute of Science Education and Research Pune	182	183	37	20%	425	11.5	9
2	Bawa A.	Amity University, Uttar Pradesh; AMITY UNIVERSITY	77	145	65	84%	388	6.0	11
3	Upadhyaya H.	International Crops Research Institute for the Semi-Arid Tropics	94	139	80	85%	855	10.7	15
4	Kumar A.	Tezpur University	216	138	51	24%	123	2.4	6
5	Varshney R.	International Crops Research Institute for the Semi-Arid Tropics	111	137	89	80%	2,082	23.4	25
6	Singhal R.	Mumbai University Institute of Chemical Technology; University of Mumbai	108	127	43	40%	363	8.4	10
7	Kumar D.	Punjab Agricultural University India; Punjab Agricultural University	212	125	62	29%	178	2.9	7
8	Singh N.	Guru Nanak Dev University India; Guru Nanak Dev University	40	118	28	70%	274	9.8	10
9	Samiyappan R.	Tamilnadu Agricultural University; Tamil Nadu Agricultural University	56	114	51	91%	392	7.7	13
10	Singh A.	Institute of Himalayan Bioresource Technology India; CSIR - Biomedicine and Agriculture	110	110	51	46%	191	3.7	8

Table 5.5 — Top 10 authors in subject area Agricultural and Biological Sciences, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Biochemistry, Genetics and Molecular Biology					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	293	353	138	47%	1,696	12.3	22
2	Yathirajan H.	University of Mysore	298	235	3	1%	6	2.0	1
3	Kumar A.	Indian Institute of Technology	563	227	128	23%	1,459	11.4	21
4	Ravikumar K.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	57	222	18	32%	57	3.2	5
5	Narayana B.	Mangalore University India; Mangalore University	318	182	8	3%	10	1.3	2
6	Velmurugan D.	University of Madras	137	175	20	15%	112	5.6	6
7	Kamal A.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	110	172	64	58%	787	12.3	16
8	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	114	171	60	53%	696	11.6	14
9	Pandey A.	National Institute for Interdisciplinary Science and Technology; CSIR - Industry and Standards	110	160	67	61%	1,078	16.1	16
10	Raghunathan R.	University of Madras	140	157	28	20%	368	13.1	13

Table 5.6 — Top 10 authors in subject area Biochemistry, Genetics and Molecular Biology, 2009-2013.

Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Chemical Engineering					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Madras G.	Indian Institute of Science; Indian Institute of Science Bangalore	142	167	72	51%	1,007	14.0	16
2	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	293	161	99	34%	678	6.8	13
3	Yadav G.	Mumbai University Institute of Chemical Technology; University of Mumbai	73	158	58	79%	419	7.2	11
4	Joshi J.	Homi Bhabha National Institute, Mumbai	78	151	66	85%	574	8.7	14
5	Kabir-ud-Din K.	Aligarh Muslim University	129	141	71	55%	783	11.0	16
6	Parida K.	Siksha 'O' Anusandhan University	110	131	61	55%	917	15.0	18
7	Jasra R.	Reliance Industries Limited	80	130	51	64%	527	10.3	14
8	Kumar A.	Indian Institute of Technology	563	126	43	8%	492	11.4	11
9	De S.	Indian Institute of Technology, Kharagpur	79	122	59	75%	507	8.6	13
10	Lakshmi Kantham M.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	81	120	37	46%	431	11.6	11

Table 5.7 — Top 10 authors in subject area Chemical Engineering, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Chemistry					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	293	738	291	99%	2,913	10.0	24
2	Narayana B.	Mangalore University India; Mangalore University	318	402	311	98%	978	3.1	13
3	Gowda B.	Bangalore University	322	378	322	100%	632	2.0	8
4	Yathirajan H.	University of Mysore	298	368	296	99%	811	2.7	11
5	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	114	335	112	98%	1,146	10.2	16
6	Rao C.N.R.	Jawaharlal Nehru Centre for Advanced Scientific Research	168	305	109	65%	5,401	49.6	32
7	Kumar A.	Indian Institute of Technology	563	298	132	23%	1,716	13.0	23
8	Majumdar K.	University of Kalyani	139	275	138	99%	1,458	10.6	19
9	Mobin S.	Indian Institute of Technology Indore	134	249	132	99%	1,631	12.4	20
10	Dubey P.	Jawaharlal Nehru Technological University	145	242	135	93%	293	2.2	8

Table 5.8 — Top 10 authors in subject area Chemistry, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Computer Science					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Das S.	Indian Statistical Institute, Kolkata; Indian Statistical Institute	224	238	187	83%	2,857	15.3	22
2	Konar A.	Jadavpur University	146	231	133	91%	688	5.2	8
3	Debnath N.	Indian Institute of Technology, Guwahati	111	172	105	95%	105	1.0	5
4	Patnaik L.	Indian Institute of Science; Indian Institute of Science Bangalore	100	170	82	82%	49	0.6	3
5	Jawahar C.	CVIT	102	169	97	95%	240	2.5	8
6	Gupta P.	National Institute of Technical Teachers' Training and Research	125	165	115	92%	344	3.0	10
7	Nandi S.	Indian Institute of Technology, Guwahati	116	165	106	91%	149	1.4	6
8	Vaidehi V.	Anna University	101	158	97	96%	148	1.5	5
9	Chatterjee K.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	97	149	82	85%	536	6.5	14
10	Chaudhury S.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	89	148	86	97%	66	0.8	4

Table 5.9 — Top 10 authors in subject area Computer Science, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Earth and Planetary Sciences					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Sen M.	Indian School of Mines University	84	157	76	90%	396	5.2	12
2	Singh R.	Indian Institute of Science Education and Research Pune	182	131	31	17%	281	9.1	8
3	Moorthy K.	Indian Space Research Organization	76	126	71	93%	906	12.8	17
4	Mohanty U.	Indian Institute of Technology Bhubaneswar	54	114	51	94%	367	7.2	11
5	Sitharam T.	Indian Institute of Science; Indian Institute of Science Bangalore	77	102	66	86%	341	5.2	10
6	Majumdar P.	Saha Institute of Nuclear Physics	86	95	57	66%	1,484	26.0	21
7	Sagar R.	Indian Institute of Astrophysics	40	90	32	80%	226	7.1	8
8	Chakrabarti S.	Indian Centre for Space Physics	57	81	39	68%	256	6.6	9
9	Singh T.	Indian Institute of Technology, Bombay	81	78	51	63%	333	6.5	10
10	Mitra S.	Inter-University Centre for Astronomy and Astrophysics India	49	73	31	63%	1,037	33.5	17

Table 5.10 — Top 10 authors in subject area Earth and Planetary Sciences, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Energy					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	249	215	145	58%	235	1.6	8
2	Ghosh A.	Indian Institute of Technology, Kanpur	130	129	88	68%	834	9.5	13
3	Kothari D.	Wainganga College of Engineering and Management	102	103	52	51%	241	4.6	9
4	Singh S.	Indian Institute of Technology, Kanpur	76	98	60	79%	425	7.1	11
5	Tiwari G.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	73	98	42	58%	722	17.2	16
6	Nagarajan G.	Anna University	75	85	60	80%	768	12.8	16
7	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	240	84	65	27%	484	7.4	12
8	Kaushik S.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	60	77	38	63%	821	21.6	15
9	Chellapandi P.	Indira Gandhi Centre for Atomic Research	74	67	45	61%	140	3.1	6
10	Panigrahi B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	145	66	43	30%	251	5.8	8

Table 5.11 — Top 10 authors in subject area Energy, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Engineering					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	249	355	185	74%	859	4.6	19
2	Nair G.	Technocrat Society	65	228	65	100%	245	3.8	10
3	Kumar R.	Veer Bahadur Singh Purvanchal University	155	203	103	66%	203	2.0	7
4	Gupta M.	University of Delhi	92	188	85	92%	188	2.2	7
5	Tiwari M.	Indian Institute of Technology, Kharagpur	88	180	74	84%	646	8.7	14
6	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	82	171	77	94%	378	4.9	8
7	Pandian S.	Pandian Consultants	66	170	66	100%	267	4.0	11
8	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	240	169	106	44%	553	5.2	12
9	Hasan M.	Aligarh Muslim University	145	168	70	48%	205	2.9	8
10	Mohanam P.	Cochin University of Science and Technology	84	168	64	76%	372	5.8	12

Table 5.12 — Top 10 authors in subject area Engineering, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Environmental Science					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Nair G.	Technocrat Society	65	228	65	100%	245	3.8	10
2	Pandian S.	Pandian Consultants	66	170	66	100%	267	4.0	11
3	Sekar N.	Mumbai University Institute of Chemical Technology; University of Mumbai	66	118	31	47%	28	0.9	2
4	Venkata Mohan S.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	76	98	42	55%	816	19.4	18
5	Singh R.	Indian Institute of Science Education and Research Pune	182	73	31	17%	250	8.1	8
6	Kumar R.	All India Institute of Medical Sciences	403	71	27	7%	136	5.0	7
7	Madras G.	Indian Institute of Science; Indian Institute of Science Bangalore	142	66	22	15%	414	18.8	11
8	Chakrabarti T.	Visvesvaraya National Institute of Technology	57	66	33	58%	492	14.9	14
9	Govindwar S.	Shivaji University	91	63	52	57%	1,171	22.5	21
10	Kumar S.	Indian Institute of Petroleum; CSIR - Engineering	182	62	22	12%	156	7.1	7

Table 5.13 — Top 10 authors in subject area Environmental Sciences, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Immunology and Microbiology					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Sundar S.	Banaras Hindu University Institute of Medical Sciences; Banaras Hindu University	148	142	69	47%	959	13.9	18
2	Das P.	Indian Council of Medical Research	107	110	47	44%	369	7.9	12
3	Shouche Y.	National Centre for Cell Science India; National Centre for Cell Science	95	103	51	54%	423	8.3	11
4	Dash A.	National Institute of Malaria Research India	89	103	54	61%	689	12.8	14
5	Pandey A.	National Institute for Interdisciplinary Science and Technology; CSIR - Industry and Standards	110	92	42	38%	516	12.3	11
6	Shivaji S.	L.V. Prasad Eye Institute India	84	92	43	51%	454	10.6	14
7	Ramamurthy T.	National Institute of Cholera and Enteric Diseases India	76	91	39	51%	394	10.1	12
8	Kumar A.	Indian Institute of Technology	563	89	35	6%	335	9.6	11
9	Kaveri S.	Institute of Immunohaematology Mumbai; Indian Council of Medical Research	85	84	38	45%	921	24.2	14
10	Bhattacharya S.	National Academy of Sciences	38	84	10	26%	101	10.1	6

Table 5.14 — Top 10 authors in subject area Immunology and Microbiology, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Materials Science					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Gowda B.	Bangalore University	322	345	321	100%	630	2.0	8
2	Thomas S.	Mahatma Gandhi University	157	325	128	82%	1,112	8.7	16
3	Yathirajan H.	University of Mysore	298	318	272	91%	728	2.7	10
4	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	240	315	154	64%	1,163	7.6	17
5	Tyagi A.	Bhabha Atomic Research Centre	210	295	127	60%	1,387	10.9	22
6	Choudhary R.	SOA University	118	294	97	82%	692	7.1	13
7	Narayana B.	Mangalore University India; Mangalore University	318	286	254	80%	833	3.3	12
8	Avasthi D.	Inter University Accelerator Centre India	173	261	95	55%	490	5.2	11
9	Bhowmick A.	Indian Institute of Technology, Kharagpur	94	251	90	96%	1,134	12.6	16
10	Rao C.N.R.	Jawaharlal Nehru Centre for Advanced Scientific Research	168	246	93	55%	4,322	46.5	31

Table 5.15 — Top 10 authors in subject area Materials Science, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Mathematics					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Banerjee S.	Tata Institute of Fundamental Research	625	221	31	5%	764	24.6	21
2	Sharma V.	University of Delhi	310	187	29	9%	735	25.3	21
3	Behera P.	Utkal University	317	164	2	1%	3	1.5	1
4	Mohanty G.	Tata Institute of Fundamental Research	391	160	9	2%	189	21.0	6
5	Das S.	Indian Statistical Institute, Kolkata; Indian Statistical Institute	224	146	119	53%	2,070	17.4	17
6	Krishnamurthy M.	TIFR Centre for Interdisciplinary Sciences	22	140	1	5%	-	-	-
7	Bhuyan B.	Indian Institute of Technology, Guwahati	234	137	0	-	-	-	-
8	Biswas I.	Tata Institute of Fundamental Research	20	132	17	85%	24	1.4	2
9	Gupta V.	Netaji Subhas Institute of Technology	58	131	58	100%	359	6.2	10
10	Swain S.	National Institute of Science Education and Research	80	130	4	5%	52	13.0	4

Table 5.16 — Top 10 authors in subject area Mathematics, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Medicine					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Khandelwal N.	Postgraduate Institute of Medical Education and Research	191	302	176	92%	738	4.2	14
2	Kumar R.	University of	128	296	124	97%	695	5.6	14
3	Mahapatra A.	All India Institute of Medical Sciences	115	296	113	98%	535	4.7	12
4	Mohan V.	Madras Diabetes Research Foundation	172	282	154	90%	2,143	13.9	23
5	Kumar R.	All India Institute of Medical Sciences	403	278	127	32%	1,033	8.1	16
6	Gupta R.	Dr. Yashwant Singh Parmar University of Horticulture and Forestry	210	274	125	60%	1,108	8.9	18
7	Ghosh K.	King Edward Memorial Hospital India	137	245	124	91%	670	5.4	13
8	Bhansali A.	Postgraduate Institute of Medical Education and Research	141	244	135	96%	893	6.6	15
9	Sundar S.	Banaras Hindu University Institute of Medical Sciences; Banaras Hindu University	148	240	132	89%	2,163	16.4	24
10	Saxena R.	Guru Gobind Singh Indraprastha University	109	236	97	89%	428	4.4	11

Table 5.17 — Top 10 authors in subject area Medicine, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Pharmacology, Toxicology and Pharmaceutics					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	293	330	121	41%	1,415	11.7	20
2	Kamal A.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	110	200	73	66%	1,004	13.8	18
3	Sriram D.	Birla Institute of Technology and Science Pilani; Birla Institute of Technology	99	186	85	86%	1,249	14.7	20
4	Yogeeswari P.	Birla Institute of Technology and Science Pilani; Birla Institute of Technology	95	180	82	86%	1,224	14.9	20
5	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	114	162	55	48%	600	10.9	14
6	Kumar A.	Indian Institute of Technology	563	160	99	18%	1,193	12.1	20
7	Manavalan R.	Annamalai University	117	155	93	79%	297	3.2	7
8	Jain N.	ISF College of Pharmacy	66	150	51	77%	1,116	21.9	19
9	Khar R.	Jamia Hamdard Faculty of Pharmacy; Hamdard University	93	136	71	76%	1,135	16.0	18
10	Kadam V.	University of Mumbai	123	136	102	83%	588	5.8	11

Table 5.18 — Top 10 authors in subject area Pharmacology, Toxicology and Pharmaceutics, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Physics and Astronomy					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Banerjee S.	Tata Institute of Fundamental Research	625	1321	625	100%	18,707	29.9	60
2	Mohanty G.	Tata Institute of Fundamental Research	391	796	389	99%	12,090	31.1	51
3	Sarkar S.	Saha Institute of Nuclear Physics	439	782	436	99%	23,878	54.8	60
4	Choudhary B.	University of Delhi	446	696	444	100%	14,779	33.3	54
5	Beri S.	Panjab University	440	689	440	100%	14,295	32.5	54
6	Sharma V.	University of Delhi	310	686	302	97%	11,090	36.7	48
7	Behera P.	Utkal University	317	667	316	100%	10,196	32.3	46
8	Bhatnagar V.	Panjab University	445	666	429	96%	14,302	33.3	54
9	Ranjan K.	University of Delhi	404	612	403	100%	13,227	32.8	50
10	Yathirajan H.	University of Mysore	298	567	287	96%	749	2.6	10

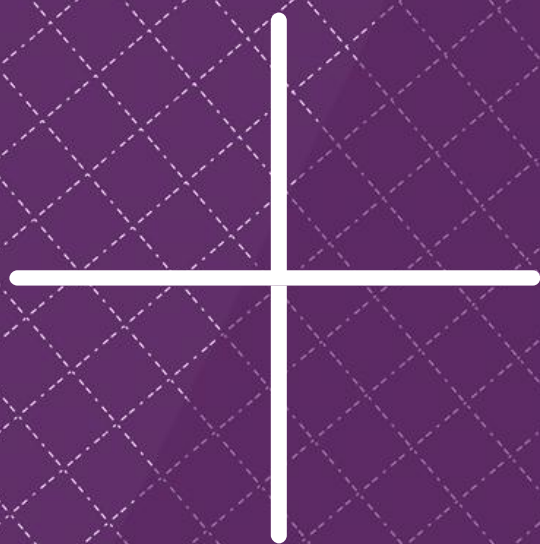
Table 5.19 — Top 10 authors in subject area Physics and Astronomy, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-13	Veterinary					
				Subject area publications 02-14	Subject area publications 09-13	Subject share of all publications	Citations	CPP	H-index
1	Balachandran C.	Tamil Nadu Veterinary and Animal Sciences University	48	108	37	77%	22	0.6	2
2	Kumar A.	Tezpur University	216	101	35	16%	70	2.0	5
3	Sarkar M.	Indian Veterinary Research Institute	65	84	37	57%	126	3.4	7
4	Singh C.	Central Soil and Water Conservation Research and Training Institute	93	75	23	25%	20	0.9	3
5	Gupta A.	National Dairy Research Institute India	168	71	36	21%	86	2.4	5
6	Dhama K.	Indian Veterinary Research Institute	41	70	19	46%	148	7.8	6
7	Kumar N.	Indian Veterinary Research Institute	159	65	22	14%	43	2.0	4
8	Singh V.	Pandit Bhagwat Dayal Sharma Post-graduate Institute of Medical Sciences	109	54	9	8%	29	3.2	3
9	Singh R.	National Bureau of Fish Genetic Resources, Lucknow	135	51	25	19%	133	5.3	6
10	Sharma D.	Fernandez Hospital	121	44	20	17%	13	0.7	2

Table 5.20 — Top 10 authors in subject area Veterinary, 2009-2013. Rank determined by count of publications in 2002-2014.

Source: Scopus database.



Chapter 6

Top 10 Publications with Indian Affiliation

India's top 10 cited 2009-2014 papers belong to the fields of Chemistry, Medicine, or Physics & Astronomy, and have collectively accrued more than 22,000 citations at the time of writing. These papers confirm the importance of large scale international partnerships to India's excellence, as all of them result from collaborations or hyper-collaborations. The top cited paper alone received over 4,000 citations.

6.1 Key Findings

NUMBER OF CITATIONS RECEIVED BY MOST CITED
2009-2014 PAPER WITH AN INDIAN AUTHOR

4,156

NUMBER OF CITATIONS RECEIVED BY SECOND MOST
CITED 2009-2014 PAPER WITH AN INDIAN AUTHOR

3,727

SUBJECT AREAS OF TOP 10 MOST CITED 2009-2014 PAPERS

**Chemistry, Medicine,
Physics & Astronomy**

6.2 Top 10 Publications with Indian Affiliation

Presented in this section are the top 10 publications over the period 2009-2014, ranked by citations received, for each subject area and overall, in which there is at least one author with an Indian affiliation.

Overall					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	4,156	2010	Review of particle physics	Journal of Physics G: Nuclear and Particle Physics	Gurtu A. (106) *(106) Tata Institute of Fundamental Research
2	3,727	2009	Dabigatran versus warfarin in patients with atrial fibrillation	New England Journal of Medicine	Xavier D. (49) *(49) St. John's National Academy Of Health Sciences India
3	2,245	2012	Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC	Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics	Ghodgaonkar M. (28); Bhardwaj A. (37); Raghavan R. (106); Choudhury R. (28); Kumar V. (28); Saini L. (114); Deshpande P. (106); Jain S. (115); Ahuja S. (37); Aziz T. (106); Bhatnagar V. (114); Topkar A. (28); Mohanty A. (28); Singh J. (114); Dütta S. (115); Nishu N. (114); Banerjee S. (106); Acharya B. (106); Banerjee S. (115); Beri S. (114); Choudhary B. (37); Dutta D. (28); Chendvankar S. (106); Kaur M. (114); Krishnaswamy M. (106); Kohli J. (114); Mondal N. (106); Narasimham V. (106); Mohanty G. (106); Naimuddin M. (37); Ranjan K. (37); Sarkar S. (115); Shivpuri R. (37); Kalmani S. (106); Lakkireddi V. (106); Bheesette S. (106); Panyam N. (106); Maity M. (106); Bhandari V. (114); Gupta P. (37); Verma P. (106); Gupta R. (114); Sharma V. (37); Wickramage N. (106); Pant L. (28); Kumar A. (37); Dhingra N. (114); Parida B. (106); Bhattacharya S. (115); Mehta M. (114); Gomber B. (115); Khurana R. (115); Mehta P. (28); Malhotra S. (37); Kataria S. (28); Ganguly S. (106); Shukla P. (28); Abdulsalam A. (28); Sharma A. (114); Guchoit M. (106); Sudhakar K. (106); Sharan M. (115); Dugad S. (106); Mazumdar K. (106); Chatterji S. (37); Gurtu A. (106); Patil M. (106); Ganguli S. (106); Kailas S. (28) *(28) Bhabha Atomic Research Centre, (37) University of Delhi (106) Tata Institute of Fundamental Research, (114) Panjab University, (115) Saha Institute of Nuclear Physics
4	2,008	2009	The seventh data release of the sloan digital sky survey	Astrophysical Journal, Supplement Series	Wadadekar Y. (42) *(42) National Centre for Radio Astrophysics India (part of Tata Institute of Fundamental Research)
5	1,978	2011	Prevention of HIV-1 infection with early antiretroviral therapy	New England Journal of Medicine	Kumarasamy N. (100); Mehendale S. (101); Godbole S. (101) *(100) Y R Gaitonade Center for AIDS Research and Education (101) National AIDS Research Institute India
6	1,930	2011	Apixaban versus warfarin in patients with atrial fibrillation	New England Journal of Medicine	Pais P. (95) *(95) St. John's Medical College
7	1,663	2009	Graphene: The new two-dimensional nanomaterial	Angewandte Chemie - International Edition	Govindaraj A. (62); Rao C.N.R. (62); Subrahmanyam K. (62); Sood A. (50) *(50) Indian Institute of Science Bangalore (62) Jawaharlal Nehru Centre for Advanced Scientific Research
8	1,567	2009	A surgical safety checklist to reduce morbidity and mortality in a global population	New England Journal of Medicine	Joseph S. (16) *(16) St. Stephen's Hospital, New Delhi
9	1,541	2012	Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010	Lancet, The	Schwebel D. (117); Mulholland K. (118); Aggarwal R. (119); Harrison J. (120); Vijayakumar L. (117) *(117) The Voluntary Health Services, Chennai (118) Betty Cowan Research and Innovation Center (119) Sanjay Gandhi Postgraduate Institute of Medical Sciences Lucknow, (120) All India Institute of Medical Sciences
10	1,359	2012	A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010	Lancet, The	Balakrishnan K. (121); Ghosh S. (121); Vijayakumar L. (117) *(117) The Voluntary Health Services, Chennai (121) Sri Ramachandra University

Table 6.1 — Top 10 publications overall with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Agricultural and Biological Sciences					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	328	2009	Perspectives for chitosan based antimicrobial films in food applications	Food Chemistry	Dutta P. (23); Tripathi S. (23); Mehrotra G. (23); Dutta J. (24) *(23) Motilal Nehru National Institute of Technology (24) Reliance Life Sciences
2	288	2009	Epigenetic regulation of stress responses in plants	Current Opinion in Plant Biology	Chinnusamy V. (27) *(27) Indian Agricultural Research Institute
3	280	2009	An overview of sustainability assessment methodologies	Ecological Indicators	Dikshit A. (3); Gupta S. (3) *(3) Indian Institute of Technology Bombay, Centre for Environmental Science and Engineering
4	261	2009	DPPH antioxidant assay revisited	Food Chemistry	Bhat T. (4); Sharma O. (4) *(4) Indian Veterinary Research Institute
5	244	2009	The relationship between metal toxicity and cellular redox imbalance	Trends in Plant Science	Sharma S. (14) *(14) Himachal Pradesh University
6	218	2010	ABA perception and signalling	Trends in Plant Science	Raghavendra A. (40); Gonugunta V. (40) *(40) University of Hyderabad
7	196	2009	Effects of brassinosteroids on the plant responses to environmental stresses	Plant Physiology and Biochemistry	Bajquz A. (9); Hayat S. (9) *(9) Aligarh Muslim University
8	190	2009	Biological control of postharvest diseases of fruits and vegetables by microbial antagonists: A review	Biological Control	Singh R. (41); Sharma R. (27); Singh D. (27) *(27) Indian Agricultural Research Institute (41) Central Institute of Post Harvest Engineering and Technology
9	166	2009	Arbuscular mycorrhizal fungi in alleviation of salt stress: A review	Annals of Botany	Giri B. (37); Kapoor R. (37); Evelin H. (37) *(37) University of Delhi
10	162	2011	What is new for an old molecule? systematic review and recommendations on the use of resveratrol	PLoS One	Nalini N. (98); Shukla Y. (25) *(25) Indian Institute of Toxicology Research (part of CSIR Industry and Standards) (98) Annamalai University

Table 6.2 — Top 10 publications in Agricultural and Biological Sciences with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	1,281	2009	Silver nanoparticles as a new generation of antimicrobials	Biotechnology Advances	Gade A. (8); Yadav A. (8); Rai M. (8) *(8) Sant Gadge Baba Amravati University
2	1,029	2009	Human Protein Reference Database - 2009 update	Nucleic Acids Research	Keshava Prasad T. (11); Mathivanan S. (12); Mohmood R. (13); Kumar S. (12); Kandasamy K. (12); Ranganathan P. (11); Goel R. (11); Raju R. (12); Marimuthu A. (11); Harrys Kishore C. (11); Balakrishnan L. (11); Keerthikumar S. (12); Kanth S. (11); Rani S. (11); Ray S. (11); Venugopal A. (12); Ramabadrans S. (11); Somanathan D. (11); Telikicherla D. (12); Shafreen B. (11); Sebastian A. (11); Ramachandra Y. (13); Banerjee S. (11); Ahmed M. (11); Krishna V. (13); Rahiman B. (13); Chaerkady R. (11); Mohan S. (11); Kashyap M. (12) *(11) Institute of Bioinformatics (12) Kuvempu University & Institute of Bioinformatics (13) Kuvempu University
3	995	2010	Association analyses of 249,796 individuals reveal 18 new loci associated with body mass index	Nature Genetics	Ebrahim S. (87) *(87) South Asia Network for Chronic Disease
4	973	2012	Guidelines for the use and interpretation of assays for monitoring autophagy	Autophagy	Srinivasula S. (110); Saran S. (111); Ganesh S. (1) *(1) Indian Institute of Technology, Kanpur (110) Indian Institute of Science Education and Research Thiruvananthapuram (111) Jawaharlal Nehru University
5	692	2010	Electrospinning: A fascinating fiber fabrication technique	Biotechnology Advances	Kundu S. (39); Bhardwaj N. (39) *(39) Indian Institute of Technology, Kharagpur
6	634	2010	Biodegradable polymeric nanoparticles based drug delivery systems	Colloids and Surfaces B: Biointerfaces	Yadav S. (52); Kumari A. (52) *(52) Institute of Himalayan Bioresource Technology India (part of CSIR Biomedicine and Agriculture)
7	424	2009	Computationally guided photothermal tumor therapy using long-circulating gold nanorod antennas	Cancer Research	Das S. (32); Bandaru N. (32) *(32) Indian Institute of Technology, Madras
8	318	2010	Meta-analysis identifies 13 new loci associated with waist-hip ratio and reveals sexual dimorphism in the genetic basis of fat distribution	Nature Genetics	Ebrahim S. (87) *(87) South Asia Network for Chronic Disease
9	316	2010	Novel chitin and chitosan nanofibers in biomedical applications	Biotechnology Advances	Prabakaran M. (53); Jayakumar R. (54); Nair S. (54) *(53) SRM University (54) Amrita Institute of Medical Sciences India (part of Amrita Vishwa Vidyapeetham)
10	307	2012	The IntAct molecular interaction database in 2012	Nucleic Acids Research	Mahadevan U. (108); Raghunath A. (108) *(108) Molecular Connections Private Limited

Table 6.3 — Top 10 publications in Biochemistry, Genetics and Molecular Biology with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Chemical Engineering					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	1,663	2009	Graphene: The new two-dimensional nanomaterial	Angewandte Chemie - International Edition	Govindaraj A. (62); Rao C.N.R. (62); Subrahmanyam K. (62); Sood A. (50) *(50) Indian Institute of Science Bangalore (62) Jawaharlal Nehru Centre for Advanced Scientific Research
2	634	2010	Biodegradable polymeric nanoparticles based drug delivery systems	Colloids and Surfaces B: Biointerfaces	Yadav S. (52); Kumari A. (52) *(52) Institute of Himalayan Bioresource Technology India (part of CSIR Biomedicine and Agriculture)
3	406	2010	An overview of the recent developments in polylactide (PLA) research	Bioresource Technology	John R. (79); Nair N. (79); Madhavan Nampoothiri K. (79) *(79) National Institute for Interdisciplinary Science and Technology (part of CSIR Industry and Standards)
4	383	2010	A review on the utilization of fly ash	Progress in Energy and Combustion Science	Ahmaruzzaman M. (63) *(63) National Institute of Technology Silchar
5	372	2012	Graphene quantum dots derived from carbon fibers	Nano Letters	Gupta B. (107) *(107) National Physical Laboratory India (part of CSIR Chemistry and Physics)
6	364	2010	MoS ₂ and WS ₂ analogues of graphene	Angewandte Chemie - International Edition	Pati S. (73); Datta R. (73); Gomathi A. (73); Late D. (73); Rao C.N.R. (73); Manna A. (73); Ramakrishna Matte H. (73) *(73) International Centre for Materials Science
7	335	2011	Ultrathin planar graphene supercapacitors	Nano Letters	Srivastava A. (72) *(72) Banaras Hindu University
8	271	2010	Biological synthesis of metal nanoparticles by microbes	Advances in Colloid and Interface Science	Sakthivel N. (65); Narayanan K. (65) *(65) Pondicherry University
9	270	2009	Next-generation sequencing technologies and their implications for crop genetics and breeding	Trends in Biotechnology	Varshney R. (48); Nayak S. (48) *(48) International Crops Research Institute for the Semi-Arid Tropics
10	270	2010	Biological synthesis of metallic nanoparticles	Nanomedicine: Nanotechnology, Biology, and Medicine	Parikh R. (47); Thakkar K. (47); Mhatre S. (47) *(47) National Centre for Cell Science India

Table 6.4 — Top 10 publications in Chemical Engineering with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Chemistry					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	1,663	2009	Graphene: The new two-dimensional nanomaterial	Angewandte Chemie - International Edition	Govindaraj A. (62); Rao C.N.R. (62); Subrahmanyam K. (62); Sood A. (50) *(50) Indian Institute of Science Bangalore (62) Jawaharlal Nehru Centre for Advanced Scientific Research Mukherjee P. (34)
2	734	2011	Supramolecular coordination: Self-assembly of finite two- and three-dimensional ensembles	Chemical Reviews	*(34) Indian Institute of Science Bangalore
3	634	2010	Biodegradable polymeric nanoparticles based drug delivery systems	Colloids and Surfaces B: Biointerfaces	Yadav S. (52); Kumari A. (52) *(52) Institute of Himalayan Bioresource Technology India (part of CSIR, Biomedicine and Agriculture)
4	604	2010	Atomic layers of hybridized boron nitride and graphene domains	Nature Materials	Srivastava A. (72); Jariwala D. (72) *(72) Banaras Hindu University
5	554	2009	Chitin and chitosan polymers: Chemistry, solubility and fiber formation	Progress in Polymer Science	Pillai C. (36); Sharma C. (36); Paul W. (36) *(36) Sree Chitra Tirunal Institute for Medical Sciences and Technology
6	540	2009	Progress in preparation, processing and applications of polyaniline	Progress in Polymer Science	Singha N. (39); Khastgir D. (39); Bhadra S. (39) *(39) Indian Institute of Technology, Kharagpur
7	534	2012	Core/shell nanoparticles: Classes, properties, synthesis mechanisms, characterization, and applications	Chemical Reviews	Paria S. (109); Ghosh Chaudhuri R. (109) *(109) National Institute of Technology Rourkela
8	407	2010	Recent contributions from the Baylis - Hillman reaction to organic chemistry	Chemical Reviews	Basavaiah D. (40); Reddy B. (40); Badsara S. (40) *(40) University of Hyderabad
9	394	2009	Mitsunobu and Related Reactions: Advances and Applications	Chemical Reviews	Balaraman E. (40); Kumar K. (40); Kumar N. (40); Kumara Swamy K. (40) *(40) University of Hyderabad
10	372	2012	Graphene quantum dots derived from carbon fibers	Nano Letters	Gupta B. (107) *(107) National Physical Laboratory India (part of CSIR, Chemistry and Physics)

Table 6.5 — Top 10 publications in Chemistry with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Computer Science					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	877	2011	Differential evolution: A survey of the state-of-the-art	IEEE Transactions on Evolutionary Computation	Das S. (31) *(31) Jadavpur University
2	766	2010	Recent advances and industrial applications of multilevel converters	IEEE Transactions on Industrial Electronics	Gopakumar K. (34) *(34) Indian Institute of Science Bangalore
3	525	2010	A survey on cascaded multi-level inverters	IEEE Transactions on Industrial Electronics	Gopakumar K. (34) *(34) Indian Institute of Science - Indian Institute of Science Bangalore
4	490	2009	Cuckoo search via Lévy flights	2009 World Congress on Nature and Biologically Inspired Computing, NABIC 2009 - Proceedings	Deb S. (64) *(64) C. V. Raman College of Engineering
5	423	2009	Differential evolution using a neighborhood-based mutation operator	IEEE Transactions on Evolutionary Computation	Konar A. (31); Das S. (31) *(31) Jadavpur University
6	423	2011	A survey on security issues in service delivery models of cloud computing	Journal of Network and Computer Applications	Subashini S. (88); Kavitha V. (88) *(88) Anna University
7	286	2012	Modeling and analysis of K-tier downlink heterogeneous cellular networks	IEEE Journal on Selected Areas in Communications	Ganti R. (32) *(32) Indian Institute of Technology, Madras
8	269	2009	Optimization of cooperative spectrum sensing with energy detection in cognitive radio networks	IEEE Transactions on Wireless Communications	Mallik R. (60) *(60) Indian Institute of Technology Delhi
9	236	2011	Teaching-learning-based optimization: A novel method for constrained mechanical design optimization problems	CAD Computer Aided Design	Rao R. (92); Vakharia D. (92); Savsani V. (92) *(92) Sardar Vallabhbhai National Institute of Technology Surat
10	217	2009	Neural networks and statistical techniques: A review of applications	Expert Systems with Applications	Kumar U. (2); Paliwal M. (2) *(2) Indian Institute of Technology, Bombay

Table 6.6 — Top 10 publications in Computer Science with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Earth and Planetary Sciences					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	2,008	2009	The seventh data release of the sloan digital sky survey	Astrophysical Journal, Supplement Series	Wadadekar Y. (42) *(42) National Centre for Radio Astrophysics India (part of Tata Institute of Fundamental Research)
2	521	2010	Tropical cyclones and climate change	Nature Geoscience	Srivastava A. (66) *(66) India Meteorological Department
3	406	2014	Planck 2013 results. XVI. Cosmological parameters	Astronomy and Astrophysics	Mitra S. (105) *(105) Inter-University Centre for Astronomy and Astrophysics India
4	339	2009	SEGUE: A spectroscopic survey of 240,000 stars with $g = 14-20$	Astronomical Journal	Wadadekar Y. (42) *(42) National Centre for Radio Astrophysics India (part of Tata Institute of Fundamental Research)
5	289	2010	The impact of global warming on the tropical Pacific Ocean and El Niño	Nature Geoscience	Lengaigne M. (78) *(78) National Institute of Oceanography
6	284	2011	The eighth data release of the sloan digital sky survey: First data from SDSS-III	Astrophysical Journal, Supplement Series	Sivarani T. (97) *(97) Indian Institute of Astrophysics
7	221	2011	SDSS-III: Massive spectroscopic surveys of the distant Universe, the MILKY WAY, and extra-solar planetary systems	Astronomical Journal	Sivarani T. (97) *(97) Indian Institute of Astrophysics
8	195	2011	Candels: The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey	Astrophysical Journal, Supplement Series	Ravindranath S. (105) *(105) Inter-University Centre for Astronomy and Astrophysics India
9	195	2011	Candels: The cosmic assembly near-infrared deep extragalactic legacy survey - The hubble space telescope observations, imaging data products, and mosaics	Astrophysical Journal, Supplement Series	Ravindranath S. (105) *(105) Inter-University Centre for Astronomy and Astrophysics India
10	192	2013	The Nuclear Spectroscopic Telescope Array (NuSTAR) high-energy X-ray mission	Astrophysical Journal	Bhalerao V. (105) *(105) Inter-University Centre for Astronomy and Astrophysics India

Table 6.7 — Top 10 publications in Earth and Planetary Sciences with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Energy					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	862	2009	Review on thermal energy storage with phase change materials and applications	Renewable and Sustainable Energy Reviews	Tyagi V. (10); Buddhi D. (10) *(10) Devi Ahilya University of Indore
2	496	2010	Production of first and second generation biofuels: A comprehensive review	Renewable and Sustainable Energy Reviews	Goud V. (59); Naik S. (60) *(59) Indian Institute of Technology, Guwahati (60) Indian Institute of Technology Delhi
3	383	2010	A review on the utilization of fly ash	Progress in Energy and Combustion Science	Ahmaruzzaman M. (63) *(63) National Institute of Technology Silchar
4	327	2009	Fluorescent carbon nanoparticles: Synthesis, characterization, and bioimaging application	Journal of Physical Chemistry C	Jana N. (51); Saha A. (51); Ray S. (51); Sarkar R. (51) *(51) Indian Association for the Cultivation of Science
5	305	2010	Biodiesel production through the use of different sources and characterization of oils and their esters as the substitute of diesel: A review	Renewable and Sustainable Energy Reviews	Singh D. (10); Singh S. (10) *(10) Devi Ahilya University of Indore
6	298	2012	High-efficiency dye-sensitized solar cell with a novel co-adsorbent	Energy and Environmental Science	Chiranjeevi B. (113); Malapaka C. (113) *(113) Indian Institute of Chemical Technology (part of CSIR, Chemistry and Physics)
7	293	2010	Hydrogen storage in Mg: A most promising material	International Journal of Hydrogen Energy	Jain I. (70); Lal C. (70); Jain A. (70) *(70) University of Rajasthan
8	230	2010	Enhancement of heat transfer using nanofluids-An overview	Renewable and Sustainable Energy Reviews	Raja B. (32); Mohan Lal D. (61); Godson L. (61) *(32) Indian Institute of Technology, Madras (61) College of Engineering
9	229	2010	Commercialization potential of microalgae for biofuels production	Renewable and Sustainable Energy Reviews	Singh J. (86) *(86) Indian Institute of Petroleum (part of CSIR, Engineering)
10	228	2009	Electrochemical reduction of oriented Graphene oxide films: An in situ Raman spectroelectrochemical study	Journal of Physical Chemistry C	Ramesha G. (34); Sampath N. (34) *(34) Indian Institute of Science Bangalore

Table 6.8 — Top 10 publications in Energy with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Engineering					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	766	2010	Recent advances and industrial applications of multilevel converters	IEEE Transactions on Industrial Electronics	Gopakumar K. (34)
2	604	2010	Atomic layers of hybridized boron nitride and graphene domains	Nature Materials	*(34) Indian Institute of Science Bangalore Srivastava A. (72); Jariwala D. (72)
3	573	2009	Synthesis, structure, and properties of boron- and nitrogen-doped graphene	Advanced Materials	*(72) Banaras Hindu University Waghmare U. (62); Krishnamurthy H. (34); Govindaraj A. (62); Saha S. (34); Panchakarla L. (62); Rao C.N.R. (62); Subrahmanyam K. (62)
4	525	2010	A survey on cascaded multi-level inverters	IEEE Transactions on Industrial Electronics	*(34) Indian Institute of Science Bangalore (62) Jawaharlal Nehru Centre for Advanced Scientific Research Gopakumar K. (34)
5	372	2012	Graphene quantum dots derived from carbon fibers	Nano Letters	*(34) Indian Institute of Science Bangalore Gupta B. (107)
6	364	2010	Properties and applications of colloidal nonspherical noble metal nanoparticles	Advanced Materials	*(107) National Physical Laboratory India (part of CSIR, Chemistry and Physics) Sau T. (71)
7	357	2010	Nonspherical noble metal nanoparticles: Colloid-chemical synthesis and morphology control	Advanced Materials	*(71) International Institute of Information Technology Hyderabad Sau T. (71)
8	335	2011	Ultrathin planar graphene supercapacitors	Nano Letters	*(71) International Institute of Information Technology Hyderabad Srivastava A. (72)
9	294	2010	Dendritic polyglycerols for biomedical applications	Advanced Materials	*(72) Banaras Hindu University Sharma S. (37)
10	286	2012	Modeling and analysis of K-tier downlink heterogeneous cellular networks	IEEE Journal on Selected Areas in Communications	*(37) University of Delhi Ganti R. (32)
					*(32) Indian Institute of Technology, Madras

Table 6.9 — Top 10 publications in Engineering with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Environmental Science					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	861	2009	Application of low-cost adsorbents for dye removal - A review	Journal of Environmental Management	Gupta V. (15) *(15) Indian Institute of Technology Roorkee
2	545	2009	Biodegradation aspects of Polycyclic Aromatic Hydrocarbons (PAHs): A review	Journal of Hazardous Materials	Kaushik C. (43); Haritash A. (43) *(43) Guru Jambheshwar University of Science and Technology
3	406	2010	An overview of the recent developments in polylactide (PLA) research	Bioresource Technology	John R. (79); Nair N. (79); Madhavan Nampoothiri K. (79) *(79) National Institute for Interdisciplinary Science and Technology (part of CSIR, Industry and Standards)
4	363	2009	Low-Cost adsorbents: Growing approach to wastewater treatment a review	Critical Reviews in Environmental Science and Technology	Gupta V. (15) *(15) Indian Institute of Technology Roorkee
5	298	2012	High-efficiency dye-sensitized solar cell with a novel co-adsorbent	Energy and Environmental Science	Chiranjeevi B. (113); Malapaka C. (113) *(113) Indian Institute of Chemical Technology (part of CSIR, Chemistry and Physics)
6	280	2009	An overview of sustainability assessment methodologies	Ecological Indicators	Dikshit A. (3); Gupta S. (3) *(3) Indian Institute of Technology Bombay, Centre for Environmental Science and Engineering
7	277	2009	Biosorption of hexavalent chromium by raw and acid-treated green alga <i>Oedogonium hatei</i> from aqueous solutions	Journal of Hazardous Materials	Rastogi A. (15); Gupta V. (15) *(15) Indian Institute of Technology Roorkee
8	238	2011	A comparative investigation on adsorption performances of mesoporous activated carbon prepared from waste rubber tire and activated carbon for a hazardous azo dye-Acid Blue 113	Journal of Hazardous Materials	Rastogi A. (93); Gupta B. (15); Gupta V. (15); Agarwal S. (94); Nayak A. (15) *(15) Indian Institute of Technology Roorkee (93) K.L.D.A.V. (P.G.) College (94) Jiwaji University
9	235	2009	Environmentally compatible next generation green energetic materials (GEMs)	Journal of Hazardous Materials	Muthurajan H. (7); Sivabalan R. (7); Gandhe B. (7); Talawar M. (7); Mukundan T. (7); Sikder A. (7); Rao A. (7) *(7) High Energy Materials Research Laboratory India
10	230	2011	Chromium removal by combining the magnetic properties of iron oxide with adsorption properties of carbon nanotubes	Water Research	Gupta V. (15); Agarwal S. (15) *(15) Indian Institute of Technology Roorkee

Table 6.10 — Top 10 publications in Environmental Science with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Immunology and Microbiology					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	459	2011	Pathogen recognition by the innate immune system	International Reviews of Immunology	Kumar H. (91) *(91) Indian Institute of Science Education and Research Bhopal
2	204	2012	Dasatinib or imatinib in newly diagnosed chronic-phase chronic myeloid leukemia: 2-Year follow-up from a randomized phase 3 trial (DASISION)	Blood	Agarwal M. (112) *(112) Bombay Hospital and Medical Research Centre
3	179	2011	Gain-of-function human STAT1 mutations impair IL-17 immunity and underlie chronic mucocutaneous candidiasis	Journal of Experimental Medicine	Casanova. J. (99) *(99) King Saud University
4	176	2009	Severe Plasmodium vivax malaria: A report on serial cases from Bikaner in north-western India	American Journal of Tropical Medicine and Hygiene	Kochar S. (17); Kochar D. (17); Kochar A. (17); Sirohi P. (17); Garg S. (18); Das A. (18); Gupta V. (17); Saxena V. (18); Khatri M. (17) *(17) Sardar Patel Medical College (18) Birla Institute of Technology and Science Pilani
5	161	2009	Mesenchymal stem cells: Immunobiology and role in immunomodulation and tissue regeneration	Cytotherapy	Kode J. (46); Hardikar A. (47); Joglekar M. (47); Mukherjee S. (46) *(46) Tata Memorial Hospital (47) National Centre for Cell Science India
6	155	2009	Microalga Scenedesmus obliquus as a potential source for biodiesel production	Applied Microbiology and Biotechnology	Mandal S. (39); Mallick N. (39) *(39) Indian Institute of Technology, Kharagpur
7	152	2012	Induction and molecular signature of pathogenic T H 17 cells	Nature Immunology	Awasthi A. (116) *(116) Translational Health Science and Technology Institute
8	149	2012	Draft genome sequence of pigeonpea (Cajanus cajan), an orphan legume crop of resource-poor farmers	Nature Biotechnology	Upadhyaya H. (48); Varshney R. (48); Shah T. (48); Saxena R. (48); Tuteja R. (48); Azam S. (48); Saxena K. (48) *(48) International Crops Research Institute for the Semi-Arid Tropics
9	145	2009	Global status of tospovirus epidemics in diverse cropping systems: Successes achieved and challenges ahead	Virus Research	Jain R. (27) *(27) Indian Agricultural Research Institute
10	144	2009	Biomimetic synthesis and characterisation of protein capped silver nanoparticles	Bioresource Technology	Sanghi R. (1); Verma P. (1) *(1) Indian Institute of Technology, Kanpur

Table 6.11 — Top 10 publications in Immunology and Microbiology with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Materials Science					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	937	2009	Ti based biomaterials, the ultimate choice for orthopaedic implants - A review	Progress in Materials Science	Asokamani R. (38); Gogia A. (123); Singh A. (124); Geetha M. (38) *(38) Vellore Institute of Technology (123) Project Office (Materials) (124) Defence Metallurgical Research Lab India
2	604	2010	Atomic layers of hybridized boron nitride and graphene domains	Nature Materials	Srivastava A. (72); Jariwala D. (72) *(72) Banaras Hindu University
3	573	2009	Synthesis, structure, and properties of boron- and nitrogen-doped graphene	Advanced Materials	Waghmare U. (62); Krishnamurthy H. (34); Govindaraj A. (62); Saha S. (34); Panchakarla L. (62); Rao C.N.R. (62); Subrahmanyam K. (62) *(34) Indian Institute of Science Bangalore (62) Jawaharlal Nehru Centre for Advanced Scientific Research
4	554	2009	Chitin and chitosan polymers: Chemistry, solubility and fiber formation	Progress in Polymer Science	Pillai C. (36); Sharma C. (36); Paul W. (36) *(36) Sree Chitra Tirunal Institute for Medical Sciences and Technology
5	540	2009	Progress in preparation, processing and applications of polyaniline	Progress in Polymer Science	Singha N. (39); Khastgir D. (39); Bhadra S. (39) *(39) Indian Institute of Technology, Kharagpur
6	372	2012	Graphene quantum dots derived from carbon fibers	Nano Letters	Gupta B. (107) *(107) National Physical Laboratory India (part of CSIR, Chemistry and Physics)
7	364	2010	Properties and applications of colloidal nonspherical noble metal nanoparticles	Advanced Materials	Sau T. (71) *(71) International Institute of Information Technology Hyderabad
8	357	2010	Nonspherical noble metal nanoparticles: Colloid-chemical synthesis and morphology control	Advanced Materials	Sau T. (71) *(71) International Institute of Information Technology Hyderabad
9	344	2009	Ab initio lattice dynamics simulations and inelastic neutron scattering spectra for studying phonons in BaFe ₂ As ₂ : Effect of structural phase transition, structural relaxation, and magnetic ordering	Physical Review B - Condensed Matter and Materials Physics	Mittal R. (28) *(28) Bhabha Atomic Research Centre
10	335	2011	Ultrathin planar graphene supercapacitors	Nano Letters	Srivastava A. (72) *(72) Banaras Hindu University

Table 6.12 — Top 10 publications in Materials Science with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Mathematics					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	877	2011	Differential evolution: A survey of the state-of-the-art	IEEE Transactions on Evolutionary Computation	Das S. (31) *(31) Jadavpur University
2	423	2009	Differential evolution using a neighborhood-based mutation operator	IEEE Transactions on Evolutionary Computation	Konar A. (31); Das S. (31) *(31) Jadavpur University
3	385	2010	Engineering optimisation by cuckoo search	International Journal of Mathematical Modelling and Numerical Optimisation	Deb S. (64) *(64) C. V. Raman College of Engineering
4	269	2009	Optimization of cooperative spectrum sensing with energy detection in cognitive radio networks	IEEE Transactions on Wireless Communications	Mallik R. (60) *(60) Indian Institute of Technology Delhi
5	158	2009	The influence of heat and mass transfer on MHD peristaltic flow through a porous space with compliant walls	Applied Mathematics and Computation	Srinivas S. (38); Kothandapani M. (38) *(38) Vellore Institute of Technology
6	154	2009	A new substitution-diffusion based image cipher using chaotic standard and logistic maps	Communications in Nonlinear Science and Numerical Simulation	Patidar V. (21); Pareek N. (22); Sud K. (21) *(21) Sir Padampat Singhanian University (22) Mohan Lal Sukhadia University
7	152	2012	Teaching-Learning-Based Optimization: An optimization method for continuous non-linear large scale problems	Information Sciences	Rao R. (92); Vakharia D. (92); Savsani V. (92) *(92) Sardar Vallabhbhai National Institute of Technology Surat
8	141	2009	Two-factor user authentication in wireless sensor networks	IEEE Transactions on Wireless Communications	Das M. (30) *(30) Dhirubhai Ambani Institute of Information and Communication Technology
9	129	2010	Response surface methodology	Wiley Interdisciplinary Reviews: Computational Statistics	Mukhopadhyay S. (2) *(2) Indian Institute of Technology, Bombay
10	128	2010	Heat transfer enhancement of copper-water nanofluids in a lid-driven enclosure	Communications in Nonlinear Science and Numerical Simulation	Kandaswamy P. (58); Muthamilselvan M. (58) *(58) Bharathiar University

Table 6.13 — Top 10 publications in Mathematics with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.
Source: Scopus database.

Medicine					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	3,727	2009	Dabigatran versus warfarin in patients with atrial fibrillation	New England Journal of Medicine	Xavier D. (49) *(49) St. John's National Academy Of Health Sciences India
2	1,978	2011	Prevention of HIV-1 infection with early antiretroviral therapy	New England Journal of Medicine	Kumarasamy N. (100); Mehendale S. (101); Godbole S. (101) *(100) Y R Gaitonade Center for AIDS Research and Education (101) National AIDS Research Institute India
3	1,930	2011	Apixaban versus warfarin in patients with atrial fibrillation	New England Journal of Medicine	Pais P. (95) *(95) St. John's Medical College
4	1,567	2009	A surgical safety checklist to reduce morbidity and mortality in a global population	New England Journal of Medicine	Joseph S. (16) *(16) St. Stephen's Hospital, New Delhi
5	1,541	2012	Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010	Lancet, The	Schwebel D. (117); Mulholland K. (118); Aggarwal R. (119); Harrison J. (120); Vijayakumar L. (117) *(117) The Voluntary Health Services, Chennai (118) Betty Cowan Research and Innovation Center (119) Sanjay Gandhi Postgraduate Institute of Medical Sciences Lucknow (120) All India Institute of Medical Sciences
6	1,359	2012	A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010	Lancet, The	Balakrishnan K. (121); Ghosh S. (121); Vijayakumar L. (117) *(121) Sri Ramachandra University (117) The Voluntary Health Services, Chennai
7	1,155	2012	Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010	Lancet, The	Hoffman H. (120); Ackerman I. (119); Popova S. (122); Brooks P. (119); Taylor H. (119); Marks R. (119); O'Donnell M. (118) *(120) All India Institute of Medical Sciences (119) Sanjay Gandhi Postgraduate Institute of Medical Sciences Lucknow (122) Vector Control Research Centre India (part of Indian Council of Medical Research) (118) Betty Cowan Research and Innovation Center
8	1,047	2010	Emergence of a new antibiotic resistance mechanism in India, Pakistan, and the UK: A molecular, biological, and epidemiological study	Lancet Infectious Diseases, The	Chaudhary U. (80); Sharma M. (80); Krishnan P. (81); Ray U. (82); Kumar A. (54); Upadhyay S. (83); Kumarasamy K. (81) *(54) Amrita Institute of Medical Sciences India (part of Amrita Vishwa Vidyapeetham) (80) Pandit B D Sharma PG Institute of Medical Sciences (81) University of Madras (82) Apollo Gleneagles Hospital (83) Banaras Hindu University Institute of Medical Sciences
9	960	2011	Apixaban in patients with atrial fibrillation	New England Journal of Medicine	Pais P. (95) *(95) St. John's Medical College
10	803	2010	Rapid molecular detection of tuberculosis and rifampin resistance	New England Journal of Medicine	Rodrigues C. (85); Shenai S. (85) *(85) P.D. Hinduja National Hospital and Medical Research Centre

Table 6.14 — Top 10 publications in Medicine with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	405	2009	Oxidative stress and neurodegenerative diseases: A review of upstream and downstream antioxidant therapeutic options	Current Neuropharmacology	Uttara B. (33); Mahajan R. (33) *(33) M.J. College
2	274	2009	Nanoparticle encapsulation improves oral bioavailability of curcumin by at least 9-fold when compared to curcumin administered with piperine as absorption enhancer	European Journal of Pharmaceutical Sciences	Shaikh J. (35); Beniwal V. (35); Singh D. (35) *(35) National Institute of Pharmaceutical Education and Research India
3	270	2010	Biological synthesis of metallic nanoparticles	Nanomedicine: Nanotechnology, Biology, and Medicine	Parikh R. (47); Thakkar K. (47); Mhatre S. (47) *(47) National Centre for Cell Science India
4	265	2012	Nanoparticles: A boon to drug delivery, therapeutics, diagnostics and imaging	Nanomedicine: Nanotechnology, Biology, and Medicine	Parveen S. (96); Misra R. (96); Sahoo S. (96) *(96) Institute of Life Sciences India
5	251	2010	Kinetic modeling on drug release from controlled drug delivery systems	Acta Poloniae Pharmaceutica	Nath L. (67); Dash S. (68); Murthy P. (69); Chowdhury P. (69) *(67) Dibrugarh University (68) Girijananda Chowdhury Institute of Pharmaceutical Science (69) Royal College of Pharmacy & Health Sciences
6	219	2011	PLGA nanoparticles containing various anticancer agents and tumour delivery by EPR effect	Advanced Drug Delivery Reviews	Sahoo S. (96); Acharya S. (96) *(96) Institute of Life Sciences India
7	215	2009	DNA damaging potential of zinc oxide nanoparticles in human epidermal cells	Toxicology Letters	Parmar D. (25); Dhawan A. (25); Das M. (25); Sharma V. (25); Saxena N. (25); Shukla R. (25) *(25) Indian Institute of Toxicology Research (part of CSIR, Industry and Standards)
8	211	2010	Advances in polymeric micelles for drug delivery and tumor targeting	Nanomedicine: Nanotechnology, Biology, and Medicine	Shidhaye S. (89); Kadam V. (90); Kedar U. (90); Phutane P. (90) *(89) Principal K.M. Kundhani College of Pharmacy (90) Bharati Vidyapeeth's College of Pharmacy, Navi Mumbai (part of Bharati Vidyapeeth University)
9	207	2009	Lipid-based systemic delivery of siRNA	Advanced Drug Delivery Reviews	Mozumdar S. (37) *(37) University of Delhi
10	200	2009	Glycogen synthase kinase 3: More than a namesake	British Journal of Pharmacology	Sodhi R. (44); Davis J. (44); Rayasam G. (44); Tulasi V. (44); Ray A. (44) *(44) Ranbaxy Research Laboratories

Table 6.15 — Top 10 publications in Pharmacology, Toxicology and Pharmaceutics with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Physics and Astronomy					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	4,156	2010	Review of particle physics	Journal of Physics G: Nuclear and Particle Physics	Gurtu A. (106) *(106) Tata Institute of Fundamental Research
2	2,245	2012	Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC	Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics	Ghodgaonkar M. (28); Bhardwaj A. (37); Raghavan R. (106); Choudhury R. (28); Kumar V. (28); Saini L. (114); Deshpande P. (106); Jain S. (115); Ahuja S. (37); Aziz T. (106); Bhatnagar V. (114); Topkar A. (28); Mohanty A. (28); Singh J. (114); Dütta S. (115); Nishu N. (114); Banerjee S. (106); Acharya B. (106); Banerjee S. (115); Beri S. (114); Choudhary B. (37); Dutta D. (28); Chendvankar S. (106); Kaur M. (114); Krishnaswamy M. (106); Kohli J. (114); Mondal N. (106); Narasimham V. (106); Mohanty G. (106); Naimuddin M. (37); Ranjan K. (37); Sarkar S. (115); Shivpuri R. (37); Kalmani S. (106); Lakkireddi V. (106); Bheesette S. (106); Panyam N. (106); Maity M. (106); Bhandari V. (114); Gupta P. (37); Verma P. (106); Gupta R. (114); Sharma V. (37); Wickramage N. (106); Pant L. (28); Kumar A. (37); Dhingra N. (114); Parida B. (106); Bhattacharya S. (115); Mehta M. (114); Gomber B. (115); Khurana R. (115); Mehta P. (28); Malhotra S. (37); Kataria S. (28); Ganguly S. (106); Shukla P. (28); Abdulsalam A. (28); Sharma A. (114); Guchait M. (106); Sudhakar K. (106); Sharan M. (115); Dugad S. (106); Mazumdar K. (106); Chatterji S. (37); Gurtu A. (106); Patil M. (106); Ganguli S. (106); Kailas S. (28) *(28) Bhabha Atomic Research Centre (37) University of Delhi (106) Tata Institute of Fundamental Research (114) Panjab University (115) Saha Institute of Nuclear Physics
3	2,008	2009	The seventh data release of the sloan digital sky survey	Astrophysical Journal, Supplement Series	Wadadekar Y. (42) *(42) National Centre for Radio Astrophysics India (part of Tata Institute of Fundamental Research)
4	634	2010	Biodegradable polymeric nanoparticles based drug delivery systems	Colloids and Surfaces B: Biointerfaces	Yadav S. (52); Kumari A. (52) *(52) Institute of Himalayan Bioresource Technology India (part of CSIR, Biomedicine and Agriculture)
5	604	2010	Atomic layers of hybridized boron nitride and graphene domains	Nature Materials	Srivastava A. (72); Jariwala D. (72) *(72) Banaras Hindu University
6	554	2009	Chitin and chitosan polymers: Chemistry, solubility and fiber formation	Progress in Polymer Science	Pillai C. (36); Sharma C. (36); Paul W. (36) *(36) Sree Chitra Tirunal Institute for Medical Sciences and Technology
7	540	2009	Progress in preparation, processing and applications of polyaniline	Progress in Polymer Science	Singha N. (39); Khastgir D. (39); Bhadra S. (39) *(39) Indian Institute of Technology, Kharagpur
8	514	2011	Colloquium: Nonequilibrium dynamics of closed interacting quantum systems	Reviews of Modern Physics	Sengupta K. (51) *(51) Indian Association for the Cultivation of Science
9	508	2014	Review of particle physics	Chinese Physics C	Gurtu A. (106) *(106) Tata Institute of Fundamental Research
10	406	2014	Planck 2013 results. XVI. Cosmological parameters	Astronomy and Astrophysics	Mitra S. (105) *(105) Inter-University Centre for Astronomy and Astrophysics India

Table 6.16 — Top 10 publications in Physics and Astronomy with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Veterinary Sciences					
Rank	Citations	Year	Title	Journal	Authors and affiliations
1	58	2009	Disease and economic burden of rotavirus diarrhoea in India	Vaccine	Gandhe S. (55); Chitambar S. (55); Ramani S. (56); Gladstone B. (56); Sarkar R. (56); Raghava M. (56); Sowmyanarayanan T. (56); Arora R. (57); Kang G. (56) *(55) National Institute of Virology India (part of Indian Council of Medical Research) (56) Christian Medical College, Vellore (57) Indian Council of Medical Research
2	55	2009	Assessment of immunogenic potential of Vero adapted formalin inactivated vaccine derived from novel ECSA genotype of Chikungunya virus	Vaccine	Parida M. (29); Dash P. (29); Khan M. (29); Santhosh S. (29); Rao P. (29); Tiwari M. (29) *(29) Defence Research & Development Establishment India
3	52	2009	Anthelmintic activity of extracts of <i>Artemisia absinthium</i> against ovine nematodes	Veterinary Parasitology	Chishti M. (19); Shawl A. (20); Tariq K. (19); Ahmad F. (19) *(19) University of Kashmir (20) Indian Institute of Integrative Medicine, Srinagar (part of CSIR, Biomedicine and Agriculture)
4	48	2010	Development of morulae from the oocytes of cultured sheep preantral follicles	Theriogenology	Shanmugasundaram N. (84); Arunakumari G. (84); Rao V. (84) *(84) College of Veterinary Science India
5	47	2009	Toll-like receptors TLR1, TLR2 and TLR4 gene mutations and natural resistance to <i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i> infection in cattle	Veterinary Immunology and Immunopathology	Chakurkar E. (26) *(26) Indian Council of Agricultural Research (ICAR) Complex
6	46	2009	Rotavirus diarrhea in bovines and other domestic animals	Veterinary Research Communications	Dhama K. (4); Malik S. (4); Chauhan R. (4); Mahendran M. (4) *(4) Indian Veterinary Research Institute
7	43	2009	Attitudes toward HPV vaccination among parents of adolescent girls in Mysore, India	Vaccine	Krupp K. (45); Madhivanan P. (45); Yashodha M. (45) *(45) Public Health Research Institute
8	43	2010	Molecular characterization and assessment of zoonotic transmission of <i>Cryptosporidium</i> from dairy cattle in West Bengal, India	Veterinary Parasitology	Pramanik A. (74); Debnath C. (74); Ganguly S. (75); Khan S. (76) *(74) West Bengal University of Animal and Fishery Sciences (75) National Institute of Cholera and Enteric Diseases India (76) National Institute of Cholera and Enteric Diseases India & West Bengal University of Animal and Fishery Sciences
9	41	2009	Isolation and pathotyping of H9N2 avian influenza viruses in Indian poultry	Veterinary Microbiology	Tosh C. (4); Behera P. (4); Pattnaik B. (5); Dubey S. (4); Ramaswamy V. (6); Rajukumar K. (4); Nagarajan S. (4); Purohit K. (4); Saxena G. (4) *(4) Indian Veterinary Research Institute (5) Project Directorate on Foot-and-Mouth Disease (6) Tamil Nadu Veterinary and Animal Sciences University
10	40	2011	Oxidative stress in lead and cadmium toxicity and its amelioration	Veterinary Medicine International	Patra R. (102); Swarup D. (103); Rautray A. (104) *(102) Indian Veterinary Research Institute & Orissa University of Agriculture and Technology (103) Indian Veterinary Research Institute & Central Institute for Research on Goats (104) Orissa University of Agriculture and Technology

Table 6.17 — Top 10 publications in Veterinary with at least one author affiliated with an Indian institution, 2009-2014. Number in brackets after author name indicates his or her affiliation, named in full after the *.

Source: Scopus database.

Appendix A

Chapter 1 Supplements

A-1 Publication Output Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	2,044,054	2,149,802	2,284,516	2,333,624	2,397,424	2,339,825	4.1%
G8	1,043,051	1,071,911	1,114,100	1,140,530	1,156,850	1,104,049	2.6%
BRICS	465,445	517,130	590,381	621,403	669,325	698,680	9.5%
SAARC	72,296	85,588	103,590	113,721	121,663	127,461	13.9%
USA	495,093	512,456	533,022	544,245	549,176	522,421	2.6%
CHN	311,815	346,844	396,559	413,039	447,207	464,744	9.4%
GBR	135,015	138,225	144,531	149,995	155,630	148,689	3.6%
DEU	129,014	133,409	139,737	145,787	147,261	142,639	3.4%
JPN	122,243	123,444	126,218	126,112	125,093	114,525	0.6%
IND	62,955	74,535	90,793	99,524	106,065	112,009	13.9%
ITA	75,022	76,420	79,918	85,761	90,267	88,585	4.7%
CAN	77,417	79,712	82,180	85,644	86,714	84,287	2.9%
ESP	62,507	66,050	71,462	75,672	76,986	75,061	5.3%
AUS	55,258	59,790	64,629	68,370	74,489	74,608	7.8%
KOR	52,823	58,686	64,191	68,341	71,067	71,652	7.7%
BRA	44,889	48,444	52,017	57,245	59,536	59,370	7.3%
SWE	26,305	27,731	29,429	31,447	32,824	32,872	5.7%
SGP	12,860	14,308	15,076	16,387	17,091	16,899	7.4%

Table A.1 — Annual publication output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	143,458	153,534	171,044	181,836	193,998	186,757	7.8%
G8	70,075	72,990	78,980	87,000	91,666	86,128	6.9%
BRICS	34,011	38,238	44,640	47,404	54,968	56,357	12.8%
SAARC	8,141	9,580	11,404	11,757	11,924	11,747	10.0%
USA	33,718	35,869	38,351	42,965	44,815	41,587	7.4%
CHN	14,916	17,233	21,100	22,550	28,826	30,217	17.9%
GBR	9,237	9,488	10,508	11,581	12,614	11,891	8.1%
DEU	8,408	9,020	10,028	11,668	12,409	11,621	10.2%
JPN	6,969	7,167	7,755	8,036	8,733	8,031	5.8%
IND	6,553	7,571	8,847	9,381	9,276	9,264	9.1%
ITA	5,439	5,394	6,163	6,573	7,389	7,170	8.0%
CAN	6,810	7,082	7,514	8,537	8,794	8,558	6.6%
ESP	6,632	6,932	7,937	8,844	9,034	8,693	8.0%
AUS	6,246	6,706	7,444	8,149	9,146	8,899	10.0%
KOR	2,866	3,232	3,765	4,122	4,636	4,742	12.8%
BRA	8,711	9,424	10,221	11,250	12,017	12,077	8.4%
SWE	2,244	2,437	2,692	3,107	3,299	3,110	10.1%
SGP	374	458	563	656	732	725	18.3%

Table A.2 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Biochemistry, Genetics and Molecular Biology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	235,739	236,227	256,156	279,871	293,517	288,654	5.6%
G8	148,845	145,730	155,782	166,748	168,391	158,745	3.1%
BRICS	44,522	47,152	54,062	63,601	74,234	81,909	13.6%
SAARC	8,549	10,151	12,264	14,182	15,424	16,545	15.9%
USA	77,895	76,163	82,259	88,058	88,648	83,042	3.3%
CHN	27,659	28,428	32,576	39,574	48,305	54,274	15.0%
GBR	18,110	18,117	19,650	20,997	21,514	20,520	4.4%
DEU	17,955	17,998	19,522	21,515	21,707	20,975	4.9%
JPN	19,956	19,480	19,419	20,589	20,276	18,283	0.4%
IND	7,836	9,328	11,098	12,923	13,849	14,869	15.3%
ITA	10,459	10,353	11,313	12,363	13,346	12,665	6.3%
CAN	10,897	10,689	11,446	12,904	12,718	12,205	3.9%
ESP	7,807	8,019	8,875	10,072	9,915	9,766	6.2%
AUS	6,544	6,780	7,713	8,800	9,734	9,781	10.4%
KOR	6,848	7,674	8,523	9,468	10,033	10,303	10.0%
BRA	4,629	4,935	5,353	6,065	6,763	6,731	9.9%
SWE	4,300	4,396	4,702	5,179	5,414	5,188	5.9%
SGP	1,608	1,849	2,006	2,215	2,345	2,316	9.9%

Table A.3 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Chemical Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	87,873	89,693	96,892	96,835	105,852	108,890	4.8%
G8	42,013	41,093	43,962	42,231	43,929	40,984	1.1%
BRICS	25,482	27,808	30,808	32,941	39,492	45,829	11.6%
SAARC	4,462	4,913	6,044	6,123	7,252	9,218	12.9%
USA	18,013	18,551	20,295	19,096	19,152	16,934	1.5%
CHN	17,140	19,086	20,845	23,037	28,005	32,153	13.1%
GBR	4,137	3,885	4,409	4,154	4,280	4,217	0.9%
DEU	5,717	5,594	5,553	5,454	5,962	5,967	1.1%
JPN	6,041	5,267	5,626	5,657	5,948	5,519	-0.4%
IND	4,229	4,590	5,674	5,688	6,761	8,653	12.4%
ITA	2,540	2,318	2,385	2,495	3,018	2,918	4.4%
CAN	2,956	2,801	3,038	2,917	2,950	2,903	-0.1%
ESP	2,637	2,871	3,012	3,206	3,204	3,374	5.0%
AUS	1,572	1,924	1,751	1,841	2,191	2,443	8.7%
KOR	3,866	4,048	4,769	4,833	5,085	5,559	7.1%
BRA	1,585	1,540	1,623	1,769	2,149	2,290	7.9%
SWE	901	867	947	921	1,102	1,136	5.2%
SGP	905	895	966	1,064	1,161	1,241	6.4%

Table A.4 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Chemistry							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	175,063	182,013	196,864	198,197	207,999	211,596	4.4%
G8	84,008	85,405	90,420	87,119	90,296	88,296	1.8%
BRICS	57,494	60,909	68,219	72,501	79,251	87,484	8.4%
SAARC	11,873	12,818	14,453	15,257	16,229	17,603	8.1%
USA	31,550	32,857	35,206	33,867	35,002	34,309	2.6%
CHN	36,019	38,361	43,382	47,445	52,482	59,059	9.9%
GBR	8,181	8,484	9,116	8,706	8,856	8,975	2.0%
DEU	13,009	13,361	14,058	14,115	14,351	14,253	2.5%
JPN	13,779	13,091	13,683	13,275	13,585	13,009	-0.4%
IND	10,934	11,709	13,302	13,934	14,830	16,371	7.9%
ITA	5,796	5,602	6,078	6,048	6,585	6,377	3.2%
CAN	4,965	5,017	5,523	5,428	5,477	5,436	2.5%
ESP	6,631	6,838	7,400	7,592	7,669	7,571	3.7%
AUS	3,046	3,284	3,837	3,925	4,337	4,557	9.2%
KOR	6,571	7,513	8,609	8,769	8,982	9,194	8.1%
BRA	3,299	3,468	3,618	3,954	4,063	4,297	5.3%
SWE	1,923	1,955	2,087	2,152	2,237	2,416	3.9%
SGP	1,425	1,634	1,868	1,903	2,038	2,124	9.4%

Table A.5 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Computer Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	285,120	298,739	299,890	299,587	291,563	277,621	0.6%
G8	126,224	128,711	129,643	131,406	132,269	124,241	1.2%
BRICS	89,562	98,282	95,715	94,474	88,485	89,355	-0.3%
SAARC	9,174	10,957	14,715	15,749	16,376	20,853	15.6%
USA	55,567	55,953	56,508	56,796	56,395	52,323	0.4%
CHN	75,333	81,809	75,269	72,364	65,017	61,048	-3.6%
GBR	14,422	14,879	14,582	14,812	15,638	14,982	2.0%
DEU	16,510	17,773	17,743	18,619	18,416	17,467	2.8%
JPN	15,672	15,854	16,222	16,166	16,138	13,467	0.7%
IND	7,733	9,475	13,199	13,972	14,366	18,565	16.7%
ITA	9,439	9,502	10,043	10,189	11,209	10,949	4.4%
CAN	10,449	10,384	10,098	10,296	10,129	9,916	-0.8%
ESP	8,971	9,364	9,637	9,931	9,858	9,089	2.4%
AUS	6,947	6,889	7,009	7,373	7,823	7,162	3.0%
KOR	8,468	8,924	9,869	9,949	9,788	9,134	3.7%
BRA	3,742	4,035	4,067	4,959	5,281	5,159	9.0%
SWE	2,716	2,894	3,283	3,403	3,565	3,557	7.0%
SGP	3,207	3,420	3,497	3,728	3,866	3,742	4.8%

Table A.6 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	90,964	92,881	97,107	102,962	108,791	105,915	4.6%
G8	52,760	52,736	53,144	57,139	58,648	57,065	2.7%
BRICS	25,865	28,072	30,739	31,941	37,265	38,257	9.6%
SAARC	2,988	3,221	4,104	4,650	4,393	4,432	10.1%
USA	25,760	25,445	26,173	27,680	28,516	28,426	2.6%
CHN	16,895	18,515	20,354	20,791	25,698	26,521	11.1%
GBR	8,159	8,572	8,362	8,869	9,289	8,884	3.3%
DEU	7,488	8,223	8,094	9,207	9,161	8,910	5.2%
JPN	4,527	4,271	4,474	4,613	4,880	4,453	1.9%
IND	2,769	2,968	3,748	4,287	3,953	3,938	9.3%
ITA	5,083	5,166	5,036	6,045	5,882	5,368	3.7%
CAN	4,647	4,906	4,835	5,176	5,376	5,382	3.7%
ESP	3,125	3,698	3,698	4,135	4,262	4,303	8.1%
AUS	3,686	4,197	4,512	4,933	5,115	5,164	8.5%
KOR	1,406	1,471	1,446	1,678	1,817	1,922	6.6%
BRA	1,599	1,771	1,857	1,936	2,290	2,277	9.4%
SWE	1,281	1,509	1,368	1,554	1,621	1,620	6.1%
SGP	163	209	213	270	302	303	16.7%

Table A.7 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Earth and Planetary Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	64,017	63,376	68,206	69,689	78,044	80,821	5.1%
G8	29,230	26,833	29,934	28,713	33,315	32,462	3.3%
BRICS	20,581	22,090	23,014	24,823	27,794	30,876	7.8%
SAARC	2,704	2,682	3,436	3,597	3,699	4,655	8.1%
USA	13,011	12,569	13,656	13,329	15,098	14,906	3.8%
CHN	14,951	16,860	16,524	18,289	20,819	23,308	8.6%
GBR	2,972	2,690	2,862	2,850	3,628	3,581	5.1%
DEU	3,061	2,655	3,582	3,153	3,905	3,737	6.3%
JPN	4,348	3,780	3,928	3,328	4,140	3,626	-1.2%
IND	2,422	2,498	3,196	3,306	3,379	4,093	8.7%
ITA	1,780	1,605	2,059	2,015	2,343	2,593	7.1%
CAN	2,400	2,224	2,255	2,260	2,524	2,562	1.3%
ESP	1,502	1,385	1,905	1,761	2,180	2,215	9.8%
AUS	1,133	1,321	1,313	1,488	1,870	2,134	13.3%
KOR	2,022	1,887	2,012	2,234	2,561	2,789	6.1%
BRA	1,185	974	1,200	1,145	1,345	1,312	3.2%
SWE	694	760	835	839	1,145	1,139	13.3%
SGP	282	415	395	435	576	646	19.5%

Table A.8 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area *Energy*. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	420,346	442,419	484,453	495,326	515,085	513,765	5.2%
G8	187,921	188,567	189,645	189,781	191,662	183,924	0.5%
BRICS	132,685	150,193	187,855	197,419	213,055	224,069	12.6%
SAARC	13,599	14,828	18,325	21,196	23,357	28,336	14.5%
USA	83,459	84,813	83,897	82,966	84,458	77,419	0.3%
CHN	107,903	123,774	157,477	163,861	176,100	179,865	13.0%
GBR	18,899	18,859	19,074	19,059	19,503	19,640	0.8%
DEU	21,685	21,414	22,499	23,025	22,688	22,616	1.1%
JPN	30,393	30,142	29,379	28,820	28,484	24,971	-1.6%
IND	12,310	13,271	16,778	19,176	21,142	25,671	14.5%
ITA	12,359	12,530	12,825	13,535	14,313	15,454	3.7%
CAN	13,214	13,280	12,848	13,286	12,902	13,068	-0.6%
ESP	9,351	9,304	10,141	10,540	10,926	11,229	4.0%
AUS	7,369	8,443	8,793	9,386	9,826	10,399	7.5%
KOR	15,380	16,589	17,893	18,620	19,410	19,571	6.0%
BRA	5,167	5,817	5,569	6,365	6,952	7,192	7.7%
SWE	4,085	4,218	4,594	4,821	4,906	5,152	4.7%
SGP	4,332	4,518	4,295	4,332	4,665	4,760	1.9%

Table A.9 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area *Engineering*. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	93,704	97,866	110,358	110,969	117,846	118,162	5.9%
G8	45,901	47,693	50,818	51,516	53,333	52,639	3.8%
BRICS	22,126	23,400	29,724	29,191	33,748	36,114	11.1%
SAARC	5,176	5,680	6,147	6,541	7,368	7,732	9.2%
USA	22,911	23,651	25,087	25,174	26,383	25,412	3.6%
CHN	13,521	14,179	19,502	18,099	21,607	23,646	12.4%
GBR	6,286	6,727	7,033	7,290	7,604	7,717	4.9%
DEU	5,029	5,492	5,988	6,316	6,347	6,278	6.0%
JPN	3,735	3,728	4,177	3,747	4,051	4,024	2.1%
IND	4,588	5,041	5,433	5,724	6,363	6,549	8.5%
ITA	3,225	3,239	3,599	3,878	4,208	4,375	6.9%
CAN	4,546	4,907	5,188	5,378	5,485	5,561	4.8%
ESP	3,505	3,929	4,355	4,598	4,751	4,765	7.9%
AUS	3,760	3,979	4,322	4,746	5,249	5,482	8.7%
KOR	1,738	1,911	2,305	2,644	2,889	2,975	13.5%
BRA	2,136	2,358	2,736	3,230	3,491	3,413	13.1%
SWE	1,536	1,639	1,770	2,008	2,222	2,246	9.7%
SGP	339	378	479	511	582	653	14.5%

Table A.10 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Environmental Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Immunology and Microbiology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	56,363	59,100	64,269	64,159	67,318	66,307	4.5%
G8	33,407	33,919	35,666	36,177	36,805	35,626	2.5%
BRICS	10,787	11,907	13,954	14,208	16,449	17,190	11.1%
SAARC	2,494	2,864	3,265	3,122	3,350	3,598	7.7%
USA	17,267	17,501	18,916	19,253	19,391	18,524	2.9%
CHN	5,286	6,005	7,663	7,781	9,659	10,243	16.3%
GBR	4,780	4,913	5,106	5,025	5,107	5,163	1.7%
DEU	4,194	4,415	4,403	4,701	4,783	4,961	3.3%
JPN	3,994	3,883	3,892	3,913	3,972	3,447	-0.1%
IND	2,149	2,421	2,601	2,693	2,886	3,086	7.7%
ITA	2,382	2,517	2,799	2,844	3,078	3,196	6.6%
CAN	2,345	2,416	2,511	2,568	2,582	2,621	2.4%
ESP	2,013	2,107	2,300	2,426	2,440	2,439	4.9%
AUS	1,746	1,776	1,891	2,060	2,273	2,327	6.8%
KOR	2,035	2,274	2,413	2,562	2,708	2,837	7.4%
BRA	2,013	2,092	2,302	2,434	2,571	2,597	6.3%
SWE	1,150	1,228	1,242	1,254	1,273	1,279	2.6%
SGP	274	329	329	416	424	444	11.5%

Table A.11 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Materials Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	214,185	212,717	231,697	234,574	235,919	246,520	2.4%
G8	99,280	97,268	103,774	104,532	101,370	102,729	0.5%
BRICS	72,565	72,258	82,467	84,547	90,551	100,855	5.7%
SAARC	9,925	10,947	13,096	13,485	13,922	15,108	8.8%
USA	38,084	38,328	40,228	41,779	40,456	40,435	1.5%
CHN	53,158	51,895	59,380	60,187	65,931	72,932	5.5%
GBR	9,494	8,971	9,708	9,976	9,423	9,980	-0.2%
DEU	15,468	15,367	16,598	16,737	15,781	15,976	0.5%
JPN	18,418	17,530	18,226	16,930	16,361	15,902	-2.9%
IND	9,169	9,985	12,064	12,300	12,792	13,929	8.7%
ITA	5,853	5,748	6,241	6,447	6,657	6,990	3.3%
CAN	5,548	5,295	5,694	6,015	5,482	5,844	-0.3%
ESP	5,039	5,204	5,648	6,127	5,791	6,227	3.5%
AUS	3,486	3,933	3,918	4,500	4,714	5,267	7.8%
KOR	9,841	10,216	12,342	12,326	12,075	12,705	5.2%
BRA	2,972	3,209	2,907	3,793	3,313	4,144	2.8%
SWE	2,237	2,266	2,529	2,610	2,627	2,766	4.1%
SGP	2,152	2,430	2,462	2,734	2,651	2,706	5.4%

Table A.12 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Mathematics							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	145,982	149,691	156,131	162,298	164,249	158,152	3.0%
G8	75,261	76,425	78,575	78,245	79,103	75,175	1.3%
BRICS	40,367	42,397	42,023	48,833	51,076	52,559	6.1%
SAARC	4,273	5,234	6,566	7,378	7,276	7,449	14.2%
USA	31,480	32,447	32,685	32,629	32,268	30,001	0.6%
CHN	29,861	30,652	28,581	34,666	36,476	36,862	5.1%
GBR	8,793	8,883	9,183	9,019	9,561	9,164	2.1%
DEU	10,428	10,807	11,506	11,685	11,625	11,104	2.8%
JPN	7,368	6,901	7,117	7,022	6,951	6,672	-1.4%
IND	3,693	4,509	5,721	6,458	6,340	6,497	14.5%
ITA	6,666	6,649	7,060	7,260	7,779	7,554	3.9%
CAN	5,972	5,993	5,711	5,937	5,793	5,601	-0.8%
ESP	5,646	5,383	5,977	5,886	5,958	5,714	1.4%
AUS	3,654	3,204	3,766	3,729	3,793	3,800	0.9%
KOR	3,660	3,623	4,006	4,499	4,510	4,137	5.4%
BRA	2,293	2,436	2,699	2,838	3,094	3,248	7.8%
SWE	1,588	1,536	1,673	1,738	1,829	1,753	3.6%
SGP	1,177	1,375	1,301	1,336	1,477	1,352	5.8%

Table A.13 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Medicine							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	525,088	567,760	576,286	604,605	646,590	721,242	5.3%
G8	298,243	319,558	322,555	338,449	357,234	389,266	4.6%
BRICS	71,655	83,522	87,416	97,026	110,234	137,068	11.4%
SAARC	14,547	18,154	21,360	23,964	26,073	29,698	15.7%
USA	151,608	164,023	165,754	172,807	184,064	201,948	5.0%
CHN	42,896	49,363	49,630	54,253	64,567	84,450	10.8%
GBR	42,196	44,013	44,763	47,368	51,756	54,462	5.2%
DEU	34,207	37,109	36,746	39,199	41,331	46,837	4.8%
JPN	32,308	34,790	35,113	36,631	37,001	40,418	3.4%
IND	11,634	14,854	17,364	19,790	21,741	24,984	16.9%
ITA	23,679	24,833	25,164	27,869	29,464	32,162	5.6%
CAN	21,922	23,896	24,204	26,056	28,063	31,515	6.4%
ESP	16,931	18,699	18,601	19,579	20,718	23,847	5.2%
AUS	15,895	17,675	18,713	20,673	23,726	27,258	10.5%
KOR	10,526	12,955	13,829	15,493	17,305	20,647	13.2%
BRA	12,847	14,399	15,189	16,632	17,063	19,274	7.4%
SWE	8,713	9,467	9,531	10,166	11,222	12,660	6.5%
SGP	2,167	2,581	2,766	3,031	3,633	4,085	13.8%

Table A.14 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Pharmacology, Toxicology and Pharmaceuticals							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	63,275	68,852	75,671	77,392	79,368	78,530	5.8%
G8	32,335	33,495	34,397	35,155	34,999	33,504	2.0%
BRICS	16,750	19,761	24,327	25,395	27,074	28,630	12.8%
SAARC	6,037	8,441	11,238	11,300	11,504	10,879	17.5%
USA	16,195	16,874	17,737	18,360	18,225	17,552	3.0%
CHN	8,626	9,271	10,937	11,688	13,297	15,264	11.4%
GBR	3,845	4,228	4,287	4,401	4,466	4,178	3.8%
DEU	3,450	3,681	3,714	3,965	3,884	3,786	3.0%
JPN	4,765	4,724	4,532	4,236	4,125	3,798	-3.5%
IND	5,665	7,932	10,444	10,598	10,709	9,994	17.3%
ITA	2,914	2,895	3,083	3,100	3,217	3,095	2.5%
CAN	1,836	1,839	2,073	2,075	2,133	1,973	3.8%
ESP	1,754	2,015	1,916	2,079	2,124	1,963	4.9%
AUS	1,218	1,383	1,419	1,531	1,702	1,692	8.7%
KOR	2,075	2,341	2,465	2,493	2,532	2,369	5.1%
BRA	1,832	1,774	2,098	2,198	2,139	2,217	3.9%
SWE	730	802	854	881	895	847	5.2%
SGP	266	298	326	335	356	329	7.6%

Table A.15 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Pharmacology, Toxicology and Pharmaceuticals. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Physics and Astronomy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	266,136	275,774	290,508	288,769	290,839	282,815	2.2%
G8	148,424	151,790	155,813	154,043	149,586	143,113	0.2%
BRICS	81,089	83,546	93,365	94,818	103,273	106,164	6.2%
SAARC	10,748	12,621	14,899	15,177	16,589	16,605	11.5%
USA	59,078	61,300	62,043	63,104	59,607	57,120	0.2%
CHN	52,817	53,309	59,690	60,989	67,561	68,837	6.3%
GBR	16,737	16,967	17,462	17,515	17,539	17,507	1.2%
DEU	25,409	26,844	27,635	28,011	27,034	25,231	1.6%
JPN	24,592	25,039	25,168	23,380	22,921	20,928	-1.7%
IND	9,869	11,543	13,652	13,733	15,119	15,213	11.3%
ITA	12,465	12,795	12,929	13,600	13,318	13,306	1.7%
CAN	8,174	8,334	8,920	8,967	8,491	8,286	1.0%
ESP	8,826	9,631	10,079	10,665	9,868	9,537	2.8%
AUS	5,038	5,454	6,049	6,212	6,466	6,493	6.4%
KOR	10,569	11,297	12,101	12,199	11,713	11,486	2.6%
BRA	4,515	5,011	5,054	5,729	5,746	6,175	6.2%
SWE	3,518	3,944	4,072	4,215	4,060	4,155	3.6%
SGP	2,369	2,496	2,515	2,613	2,553	2,599	1.9%

Table A.16 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Veterinary							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	18,567	19,529	19,706	21,228	20,115	17,725	2.0%
G8	8,247	8,373	8,222	8,669	8,360	7,426	0.3%
BRICS	4,009	4,228	4,364	5,476	4,971	4,429	5.5%
SAARC	1,527	1,635	1,545	1,890	1,312	1,126	-3.7%
USA	3,836	3,899	3,958	4,063	3,987	3,445	1.0%
CHN	619	700	864	1,432	1,203	1,160	18.1%
GBR	1,343	1,320	1,341	1,462	1,329	1,175	-0.3%
DEU	1,165	1,104	1,062	1,160	1,048	1,049	-2.6%
JPN	701	620	577	636	595	510	-4.0%
IND	1,415	1,480	1,409	1,679	1,082	950	-6.5%
ITA	630	743	603	751	801	717	6.2%
CAN	637	684	663	726	682	660	1.7%
ESP	585	597	657	680	696	617	4.4%
AUS	502	554	619	598	618	623	5.3%
KOR	364	425	431	453	425	469	3.9%
BRA	1,769	1,868	1,880	2,123	2,424	2,126	8.2%
SWE	236	227	238	216	193	204	-4.9%
SGP	16	13	21	20	12	18	-6.9%

Table A.17 — Annual publication output for 2009-2014 and growth for 2009-2013 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

A-2 Publication Output Shares Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%
G8	51.0%	49.9%	48.8%	48.9%	48.3%	47.2%	-1.4%
BRICS	22.8%	24.1%	25.8%	26.6%	27.9%	29.9%	5.2%
SAARC	3.5%	4.0%	4.5%	4.9%	5.1%	5.4%	9.4%
USA	24.2%	23.8%	23.3%	23.3%	22.9%	22.3%	-1.4%
CHN	15.3%	16.1%	17.4%	17.7%	18.7%	19.9%	5.2%
GBR	6.6%	6.4%	6.3%	6.4%	6.5%	6.4%	-0.4%
DEU	6.3%	6.2%	6.1%	6.2%	6.1%	6.1%	-0.7%
JPN	6.0%	5.7%	5.5%	5.4%	5.2%	4.9%	-3.4%
IND	3.1%	3.5%	4.0%	4.3%	4.4%	4.8%	9.5%
ITA	3.7%	3.6%	3.5%	3.7%	3.8%	3.8%	0.6%
CAN	3.8%	3.7%	3.6%	3.7%	3.6%	3.6%	-1.1%
ESP	3.1%	3.1%	3.1%	3.2%	3.2%	3.2%	1.2%
AUS	2.7%	2.8%	2.8%	2.9%	3.1%	3.2%	3.5%
KOR	2.6%	2.7%	2.8%	2.9%	3.0%	3.1%	3.5%
BRA	2.2%	2.3%	2.3%	2.5%	2.5%	2.5%	3.1%
SWE	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.6%
SGP	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	3.2%

Table A.18 — Publication output as share of world's publication output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Medicine	Engineering	Physics and Astronomy	Computer Science	Biochemistry, Genetics and Molecular Biology	Materials Science	Chemistry	Agricultural and Biological Sciences
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	55.6%	39.4%	53.3%	44.1%	59.4%	44.3%	44.9%	47.2%
BRICS	16.1%	38.5%	33.2%	31.7%	23.0%	36.6%	36.3%	26.7%
SAARC	3.7%	4.2%	5.1%	5.0%	4.8%	5.6%	7.5%	6.3%
USA	28.6%	17.3%	21.4%	19.0%	31.2%	17.4%	17.3%	23.0%
CHN	9.5%	31.7%	21.4%	24.6%	14.5%	26.4%	23.6%	13.1%
GBR	7.8%	4.0%	6.1%	5.1%	7.5%	4.2%	4.5%	6.3%
DEU	6.5%	4.7%	9.5%	6.1%	7.5%	7.0%	7.1%	6.1%
JPN	5.9%	6.0%	8.4%	5.3%	7.4%	7.5%	6.9%	4.5%
IND	3.0%	3.8%	4.7%	4.4%	4.4%	5.1%	6.9%	4.9%
ITA	4.5%	2.8%	4.6%	3.5%	4.4%	2.8%	3.1%	3.7%
CAN	4.3%	2.7%	3.0%	3.5%	4.5%	2.5%	2.7%	4.6%
ESP	3.3%	2.1%	3.5%	3.2%	3.4%	2.5%	3.7%	4.7%
AUS	3.4%	1.9%	2.1%	2.5%	3.1%	1.9%	2.0%	4.5%
KOR	2.5%	3.7%	4.1%	3.2%	3.3%	5.1%	4.2%	2.3%
BRA	2.6%	1.3%	1.9%	1.6%	2.2%	1.5%	1.9%	6.2%
SWE	1.7%	1.0%	1.4%	1.1%	1.8%	1.1%	1.1%	1.6%
SGP	0.5%	0.9%	0.9%	1.2%	0.8%	1.1%	0.9%	0.3%

Table A.19a — Publication output per subject area as share of world's publication output per subject area for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Mathematics	Environmental Science	Chemical Engineering	Earth and Planetary Sciences	Energy	Immunology and Microbiology	Pharmacology, Toxicology and Pharmaceuticals	Veterinary
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	49.4%	46.5%	43.4%	55.4%	42.6%	56.1%	46.0%	42.2%
BRICS	29.6%	26.9%	34.5%	32.1%	35.2%	22.4%	32.0%	23.5%
SAARC	4.1%	6.0%	6.5%	4.0%	4.9%	5.0%	13.4%	7.7%
USA	20.4%	22.9%	19.1%	27.1%	19.5%	29.4%	23.7%	19.8%
CHN	21.0%	17.0%	23.9%	21.5%	26.1%	12.4%	15.6%	5.1%
GBR	5.8%	6.6%	4.3%	8.7%	4.4%	8.0%	5.7%	6.8%
DEU	7.2%	5.5%	5.8%	8.5%	4.7%	7.3%	5.1%	5.6%
JPN	4.5%	3.6%	5.8%	4.5%	5.5%	6.1%	5.9%	3.1%
IND	3.5%	5.2%	6.1%	3.6%	4.5%	4.2%	12.5%	6.9%
ITA	4.6%	3.5%	2.7%	5.4%	2.9%	4.5%	4.1%	3.6%
CAN	3.7%	4.8%	3.0%	5.1%	3.4%	4.0%	2.7%	3.5%
ESP	3.7%	4.0%	3.1%	3.9%	2.6%	3.6%	2.7%	3.3%
AUS	2.3%	4.2%	2.0%	4.6%	2.2%	3.2%	2.0%	3.0%
KOR	2.6%	2.2%	4.8%	1.6%	3.2%	3.9%	3.2%	2.2%
BRA	1.8%	2.7%	1.9%	2.0%	1.7%	3.7%	2.8%	10.4%
SWE	1.1%	1.8%	1.0%	1.5%	1.3%	2.0%	1.1%	1.1%
SGP	0.9%	0.5%	1.1%	0.2%	0.6%	0.6%	0.4%	0.1%

Table A.19b — Publication output per subject area as share of world's publication output per subject area for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

A-3 Citation Tables

Country	2009	2010	2011	2012	2013	2014
WLD	22,435,488	19,271,057	15,776,111	11,797,881	7,195,909	2,668,069
G8	15,369,235	12,981,348	10,411,376	7,666,952	4,562,639	1,648,611
BRICS	3,460,511	3,232,707	2,917,416	2,430,477	1,635,169	668,476
SAARC	638,335	586,750	525,987	418,355	273,775	112,843
USA	8,973,243	7,569,529	6,043,132	4,422,859	2,587,319	934,253
CHN	2,209,413	2,134,427	1,972,600	1,697,614	1,158,004	479,015
GBR	2,485,429	2,117,772	1,694,706	1,297,258	777,993	288,799
DEU	2,082,193	1,831,207	1,500,619	1,152,773	705,205	258,108
JPN	1,299,507	1,083,297	891,050	659,262	392,603	140,257
IND	571,385	523,440	469,325	370,198	241,102	99,743
ITA	1,161,880	1,008,650	822,672	671,880	416,088	156,724
CAN	1,339,920	1,147,809	931,811	697,861	412,392	151,292
ESP	907,503	814,031	694,164	556,856	330,019	126,524
AUS	926,048	831,882	706,973	559,638	355,452	137,651
KOR	591,138	563,858	491,932	410,555	241,072	92,050
BRA	404,445	349,958	294,193	233,769	140,400	51,226
SWE	520,269	455,542	371,345	293,349	177,740	66,778
SGP	218,114	218,925	185,507	163,553	98,203	37,107

Table A.20 — Annual citation count for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences						
Country	2009	2010	2011	2012	2013	2014
WLD	1,826,586	1,598,449	1,378,752	1,045,933	638,511	216,754
G8	1,177,729	1,022,378	871,174	659,111	393,690	130,792
BRICS	294,816	274,951	260,774	207,549	141,434	50,324
SAARC	58,411	58,163	50,870	36,372	23,384	8,146
USA	635,961	552,416	482,646	359,123	208,320	68,705
CHN	146,934	144,993	145,258	123,070	87,151	31,718
GBR	221,375	180,972	155,847	119,305	69,812	24,127
DEU	163,452	154,109	129,248	104,342	63,896	21,598
JPN	83,408	70,226	77,472	45,464	32,572	9,285
IND	44,952	44,787	39,160	28,547	18,238	6,128
ITA	77,372	69,940	63,543	47,585	32,797	11,474
CAN	133,913	106,675	89,920	69,801	41,037	13,971
ESP	119,899	97,193	87,543	68,022	40,468	14,280
AUS	116,003	100,162	93,106	69,655	45,724	16,728
KOR	31,105	31,050	27,161	23,059	14,285	4,918
BRA	69,345	57,147	50,380	38,628	24,436	8,481
SWE	48,931	42,677	37,258	30,852	18,859	6,109
SGP	7,388	8,067	9,386	6,279	3,605	1,274

Table A.21 — Annual citation count in the subject area *Agricultural and Biological Sciences* for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology						
Country	2009	2010	2011	2012	2013	2014
WLD	5,297,925	4,468,075	3,696,366	2,807,147	1,670,811	596,199
G8	4,013,711	3,304,915	2,723,156	2,015,969	1,159,622	403,093
BRICS	620,540	603,980	552,181	499,438	340,885	134,946
SAARC	116,202	105,342	95,452	83,511	51,568	19,935
USA	2,496,452	2,041,022	1,692,036	1,252,558	705,461	246,340
CHN	403,046	407,228	383,745	356,090	252,440	100,682
GBR	625,640	523,534	415,338	323,178	181,197	65,931
DEU	534,657	462,962	381,019	300,219	172,234	61,109
JPN	387,008	306,980	268,912	187,750	108,990	35,661
IND	106,543	97,365	87,210	75,013	46,071	17,906
ITA	277,015	231,080	187,599	153,173	94,594	32,944
CAN	305,806	264,031	211,198	171,034	92,990	34,090
ESP	207,298	180,484	151,696	131,415	70,837	26,197
AUS	198,154	167,085	145,412	121,846	74,909	28,247
KOR	125,517	118,636	109,798	90,633	53,038	19,439
BRA	67,360	60,251	50,622	44,056	26,505	9,631
SWE	134,473	117,982	93,965	76,745	46,109	16,011
SGP	54,204	55,749	47,776	41,208	22,858	8,227

Table A.22 — Annual citation count in the subject area *Biochemistry, Genetics and Molecular Biology* for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering						
Country	2009	2010	2011	2012	2013	2014
WLD	1,389,314	1,295,467	1,140,146	852,891	558,342	243,169
G8	819,827	737,067	620,215	444,464	271,374	111,277
BRICS	329,545	334,071	331,141	275,873	203,811	97,230
SAARC	61,153	60,296	54,573	45,367	32,829	16,207
USA	426,849	392,618	323,768	232,778	138,571	56,260
CHN	238,074	247,426	255,080	215,045	160,217	76,209
GBR	85,024	76,401	72,330	47,539	30,512	12,725
DEU	114,054	112,391	89,702	65,252	42,671	17,685
JPN	101,592	86,915	75,386	52,833	32,161	12,928
IND	58,244	56,263	51,368	42,736	30,620	15,016
ITA	46,805	38,595	32,555	25,690	17,132	6,798
CAN	52,144	47,658	41,638	29,649	16,821	7,109
ESP	54,365	53,403	46,335	35,232	21,308	9,706
AUS	35,736	33,677	30,179	23,248	15,567	7,365
KOR	59,150	66,159	57,969	47,766	30,056	12,132
BRA	19,329	17,970	14,099	10,804	7,261	3,132
SWE	18,871	17,483	16,271	10,397	7,328	2,923
SGP	22,600	29,092	21,705	20,007	13,202	5,625

Table A.23 — Annual citation count in the subject area Chemical Engineering for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry						
Country	2009	2010	2011	2012	2013	2014
WLD	3,068,850	2,755,096	2,398,804	1,830,955	1,180,864	496,655
G8	1,767,859	1,556,848	1,298,817	956,724	595,354	238,012
BRICS	790,869	762,429	723,901	615,968	427,520	198,918
SAARC	147,043	132,687	118,251	99,417	69,610	32,742
USA	848,972	769,236	615,453	462,229	284,325	112,711
CHN	562,964	560,374	547,601	474,189	329,192	154,705
GBR	192,451	176,762	153,987	110,808	68,224	29,042
DEU	281,864	248,522	216,739	160,185	102,040	40,941
JPN	234,083	187,160	162,827	119,020	74,981	28,938
IND	138,726	124,656	110,973	93,502	65,189	30,612
ITA	111,426	96,493	81,673	61,686	41,611	16,058
CAN	116,243	93,831	86,848	61,223	37,430	15,561
ESP	140,264	120,497	113,386	80,656	50,630	21,402
AUS	73,418	69,276	63,336	46,918	31,591	14,357
KOR	118,040	118,889	107,925	89,970	55,283	21,933
BRA	43,387	37,373	29,326	22,243	15,631	6,242
SWE	44,799	39,759	31,932	23,967	15,540	6,603
SGP	44,659	48,756	45,457	37,829	24,804	10,430

Table A.24 — Annual citation count in the subject area Chemistry for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science						
Country	2009	2010	2011	2012	2013	2014
WLD	1,413,117	1,206,269	1,012,280	714,848	402,140	123,869
G8	850,690	718,451	574,811	401,754	222,167	66,063
BRICS	272,752	256,427	234,050	181,098	107,986	36,908
SAARC	38,746	32,685	35,795	26,263	16,504	6,039
USA	474,940	397,989	314,181	211,292	112,447	32,889
CHN	215,146	205,924	184,891	144,192	84,138	28,669
GBR	126,578	93,033	79,285	57,303	32,747	10,120
DEU	99,777	87,163	75,497	53,550	28,462	9,490
JPN	52,828	42,905	34,397	25,009	13,509	3,882
IND	34,875	29,233	31,995	22,723	14,310	5,170
ITA	61,427	53,636	46,558	36,700	23,066	7,369
CAN	80,873	68,344	51,510	37,272	19,549	6,170
ESP	61,334	50,392	44,734	31,064	18,906	6,499
AUS	45,283	38,198	35,628	27,240	16,982	5,522
KOR	41,541	37,045	31,871	24,779	13,209	4,574
BRA	14,853	13,425	11,770	9,462	5,810	1,699
SWE	18,432	15,241	13,480	11,450	7,338	2,183
SGP	28,532	27,110	24,158	16,882	10,038	2,906

Table A.25 — Annual citation count in the subject area Computer Science for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences						
Country	2009	2010	2011	2012	2013	2014
WLD	1,031,486	858,316	688,288	534,144	342,940	126,067
G8	788,998	650,216	506,603	396,094	255,473	93,285
BRICS	204,790	177,582	155,829	120,743	86,823	32,867
SAARC	25,995	22,769	20,180	15,693	11,117	4,923
USA	475,378	396,264	297,673	235,614	155,306	55,810
CHN	128,688	117,033	103,528	81,809	59,053	21,656
GBR	180,640	146,398	118,215	90,777	63,729	22,955
DEU	165,385	137,824	106,408	88,335	61,667	22,013
JPN	66,147	54,466	47,043	32,791	23,682	7,880
IND	24,078	20,670	18,476	14,173	9,842	4,355
ITA	87,801	77,651	58,154	46,618	29,918	12,293
CAN	88,060	74,430	60,935	44,261	30,868	11,021
ESP	58,481	59,403	43,065	36,380	23,680	10,187
AUS	70,034	59,473	51,911	44,281	30,449	11,110
KOR	16,730	14,475	13,201	9,009	6,027	2,253
BRA	17,041	12,985	11,994	8,728	6,549	2,344
SWE	33,001	30,053	19,443	15,697	9,978	3,937
SGP	1,492	1,741	1,406	1,808	1,104	440

Table A.26 — Annual citation count in the subject area Earth and Planetary Sciences for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy						
Country	2009	2010	2011	2012	2013	2014
WLD	533,617	495,590	480,986	352,304	263,734	117,768
G8	259,356	231,712	232,491	166,202	119,383	51,508
BRICS	150,593	147,170	139,778	109,447	92,435	46,127
SAARC	27,674	23,793	22,368	16,204	12,994	5,797
USA	122,142	109,086	113,543	82,803	57,041	24,506
CHN	110,224	112,533	107,574	86,070	73,917	38,088
GBR	30,411	29,661	24,956	19,951	16,170	6,740
DEU	30,496	25,869	32,469	21,810	16,177	7,251
JPN	34,664	26,844	26,393	15,870	13,253	5,424
IND	25,707	22,484	20,075	14,903	11,817	5,293
ITA	20,610	18,562	18,151	15,089	10,351	5,631
CAN	23,969	22,955	21,945	13,953	10,627	4,342
ESP	22,546	20,860	22,556	16,346	10,957	4,957
AUS	13,864	16,682	15,324	13,329	10,659	5,134
KOR	19,297	18,667	20,026	15,458	12,117	5,707
BRA	8,433	7,750	6,822	5,298	3,754	1,400
SWE	10,683	10,675	9,299	6,633	5,658	2,346
SGP	6,122	6,588	8,335	7,061	6,422	2,905

Table A.27 — Annual citation count in the subject area Energy for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering						
Country	2009	2010	2011	2012	2013	2014
WLD	2,574,613	2,313,177	1,925,979	1,445,696	924,324	355,570
G8	1,408,212	1,252,834	997,256	724,817	443,789	163,430
BRICS	645,222	623,761	560,405	456,165	317,591	133,670
SAARC	96,651	86,284	79,150	62,600	43,884	18,758
USA	741,699	674,193	522,366	373,392	225,181	80,737
CHN	498,870	497,736	447,653	369,339	256,310	108,242
GBR	171,242	149,948	120,298	89,978	57,767	22,311
DEU	156,478	150,050	123,828	88,024	53,764	21,420
JPN	150,882	130,017	102,199	72,409	41,995	15,894
IND	90,432	79,418	73,065	56,801	40,020	16,592
ITA	109,390	99,742	82,981	66,562	44,141	17,727
CAN	114,978	99,492	80,950	59,311	33,126	12,650
ESP	80,538	77,668	67,077	49,715	33,023	12,531
AUS	75,508	67,396	60,065	47,698	31,165	13,992
KOR	116,739	119,565	101,413	80,178	50,185	18,588
BRA	32,744	28,789	22,395	17,492	11,075	4,045
SWE	38,691	34,526	29,834	23,610	14,585	5,709
SGP	49,888	51,841	38,915	33,903	21,884	8,440

Table A.28 — Annual citation count in the subject area Engineering for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science						
Country	2009	2010	2011	2012	2013	2014
WLD	1,224,540	1,057,386	913,387	671,040	410,691	161,307
G8	679,498	587,314	505,236	369,910	221,420	86,483
BRICS	249,724	226,122	213,230	165,167	109,155	46,265
SAARC	56,855	44,290	39,919	29,605	19,313	7,732
USA	359,574	312,474	272,515	196,779	117,606	45,056
CHN	160,788	150,910	149,094	117,080	79,644	34,178
GBR	124,866	106,259	88,712	66,365	39,633	16,099
DEU	77,178	74,557	64,817	50,126	32,519	12,004
JPN	41,597	33,607	30,950	20,322	14,142	5,493
IND	47,354	37,739	34,042	25,459	16,022	6,317
ITA	51,276	45,682	37,878	31,182	20,871	8,307
CAN	77,178	66,381	61,046	41,931	25,810	9,565
ESP	69,518	64,102	53,960	41,390	24,104	9,377
AUS	67,429	60,109	55,290	42,082	28,098	11,168
KOR	23,724	26,084	23,497	16,799	11,364	4,773
BRA	26,643	24,774	18,957	15,273	8,891	3,670
SWE	31,819	30,790	23,915	19,696	13,551	4,861
SGP	7,103	7,651	8,859	7,141	4,853	2,174

Table A.29 — Annual citation count in the subject area Environmental Science for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology						
Country	2009	2010	2011	2012	2013	2014
WLD	1,245,208	1,054,446	858,125	607,639	366,357	131,854
G8	932,368	783,784	632,302	442,718	261,596	93,483
BRICS	139,080	124,285	110,184	87,187	58,421	23,144
SAARC	30,254	25,666	23,194	16,963	10,370	4,064
USA	580,768	475,661	391,808	273,573	160,470	57,014
CHN	66,136	63,465	60,137	48,853	35,241	14,264
GBR	158,491	140,344	110,253	74,527	44,735	17,759
DEU	131,102	122,298	94,383	67,993	41,117	15,306
JPN	77,383	65,822	50,199	35,821	21,297	6,841
IND	25,504	21,349	18,493	14,214	8,797	3,442
ITA	64,955	59,857	49,932	35,460	21,153	8,570
CAN	68,846	58,975	46,904	32,386	19,143	7,606
ESP	52,381	46,618	38,635	27,814	16,179	6,300
AUS	55,186	43,281	36,904	27,451	18,863	7,286
KOR	28,080	27,527	22,031	17,935	10,137	3,581
BRA	28,470	24,880	20,562	15,985	9,000	3,811
SWE	35,890	31,833	28,344	18,180	10,753	3,430
SGP	9,189	9,901	8,109	6,887	3,886	1,457

Table A.30 — Annual citation count in the subject area Immunology and Microbiology for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science						
Country	2009	2010	2011	2012	2013	2014
WLD	2,297,997	2,122,128	1,808,849	1,386,297	901,004	379,840
G8	1,284,520	1,170,028	940,497	693,911	435,303	174,981
BRICS	652,302	625,971	591,049	489,219	340,765	154,492
SAARC	114,439	103,707	93,465	71,107	52,570	22,990
USA	632,254	598,705	466,151	349,377	215,901	85,800
CHN	474,391	473,266	457,699	386,720	268,045	123,334
GBR	144,188	128,523	103,089	76,585	49,409	20,872
DEU	209,141	186,008	153,687	110,080	70,719	28,810
JPN	183,317	159,480	125,983	91,122	53,098	21,684
IND	108,854	98,085	87,810	66,505	48,979	20,995
ITA	79,303	69,449	58,350	45,314	32,609	12,943
CAN	71,908	62,238	54,967	39,355	23,311	10,409
ESP	65,395	65,440	56,948	44,200	28,588	11,792
AUS	61,304	61,314	51,942	42,021	27,721	12,681
KOR	127,160	123,676	111,869	89,364	57,328	23,535
BRA	30,248	24,070	18,601	14,515	9,124	3,609
SWE	31,836	32,264	25,224	18,887	12,383	5,109
SGP	43,665	51,014	42,675	40,013	24,353	9,973

Table A.31 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics						
Country	2009	2010	2011	2012	2013	2014
WLD	922,675	756,787	610,946	442,353	257,485	89,066
G8	551,155	449,543	349,103	245,249	138,611	47,035
BRICS	202,945	173,335	144,930	121,083	76,630	28,045
SAARC	28,210	27,081	24,932	18,373	11,606	4,324
USA	284,781	226,648	172,365	115,008	62,931	21,198
CHN	151,848	127,371	105,402	89,188	56,738	20,747
GBR	90,559	67,535	55,194	36,277	21,178	7,121
DEU	70,506	62,559	53,404	37,813	21,089	7,621
JPN	33,355	27,474	20,553	15,513	8,399	3,080
IND	23,101	22,220	20,958	15,167	9,600	3,454
ITA	47,628	39,789	31,201	25,315	15,804	5,665
CAN	48,260	40,015	28,046	20,829	11,064	3,995
ESP	43,575	33,617	26,467	18,442	10,948	4,152
AUS	26,159	22,681	18,059	14,601	8,214	3,180
KOR	22,956	19,253	17,156	13,784	7,332	2,771
BRA	13,861	11,656	8,848	7,326	4,513	1,680
SWE	13,785	9,907	7,866	6,400	4,517	1,367
SGP	13,755	11,664	9,823	5,537	3,599	1,159

Table A.32 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine						
Country	2009	2010	2011	2012	2013	2014
WLD	7,487,655	6,880,015	5,117,848	3,864,463	2,428,781	1,024,201
G8	5,590,768	5,041,773	3,732,512	2,795,755	1,719,297	708,779
BRICS	629,094	678,126	535,080	464,799	336,555	167,338
SAARC	131,384	137,474	115,948	91,306	56,005	29,442
USA	3,445,678	3,096,123	2,298,269	1,699,933	1,038,505	428,805
CHN	331,027	374,188	301,669	276,575	216,235	111,526
GBR	956,429	884,382	667,598	517,154	321,507	132,764
DEU	694,606	645,324	493,387	372,241	238,186	103,321
JPN	393,519	353,947	261,782	205,578	124,872	52,176
IND	111,792	117,323	99,183	77,103	46,940	25,339
ITA	487,251	438,208	345,407	277,581	173,339	72,704
CAN	539,658	485,262	375,990	285,896	176,985	72,250
ESP	273,672	270,504	217,272	174,398	108,579	48,029
AUS	358,302	349,773	280,924	219,526	143,812	60,973
KOR	149,698	150,416	122,467	105,127	65,691	29,477
BRA	141,119	137,066	108,747	85,392	53,563	22,139
SWE	223,433	193,054	163,866	121,002	78,386	32,668
SGP	47,058	53,379	42,823	35,395	22,839	10,306

Table A.33 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics						
Country	2009	2010	2011	2012	2013	2014
WLD	971,126	859,809	692,869	516,077	310,286	112,563
G8	617,325	524,421	416,904	307,733	182,130	65,312
BRICS	180,849	174,360	153,746	119,122	75,737	29,201
SAARC	66,325	66,150	56,516	40,403	23,656	8,641
USA	345,910	298,400	230,758	172,641	102,660	37,521
CHN	89,662	86,417	79,123	64,616	44,055	17,412
GBR	86,215	75,498	63,943	46,067	28,447	9,611
DEU	67,804	61,432	51,508	36,615	22,014	8,192
JPN	61,671	50,706	41,252	26,892	16,146	5,237
IND	62,207	61,576	52,119	37,168	21,834	7,798
ITA	54,994	48,085	40,337	29,628	18,765	7,176
CAN	37,297	30,883	27,820	19,796	11,928	4,248
ESP	31,394	27,850	24,373	17,149	11,291	3,976
AUS	25,891	24,450	20,415	15,840	10,871	4,090
KOR	33,846	30,875	23,747	18,596	11,085	3,600
BRA	21,864	19,058	16,676	12,628	7,094	2,816
SWE	18,158	14,557	13,817	8,803	5,513	2,038
SGP	6,251	5,819	5,478	3,580	2,851	727

Table A.34 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy						
Country	2009	2010	2011	2012	2013	2014
WLD	2,820,565	2,452,219	1,973,519	1,585,164	989,316	378,522
G8	1,896,325	1,622,468	1,275,290	1,020,528	626,463	234,389
BRICS	651,910	597,499	514,128	449,091	294,926	118,106
SAARC	110,235	104,675	90,648	76,670	54,163	24,583
USA	986,325	867,921	656,336	548,442	332,514	123,115
CHN	420,533	403,141	340,883	312,084	199,920	78,127
GBR	293,799	244,293	194,719	167,284	103,642	42,635
DEU	392,568	339,678	272,388	235,779	139,767	51,788
JPN	243,960	213,865	165,163	135,277	79,436	29,855
IND	103,920	97,422	83,725	70,440	49,468	22,259
ITA	173,830	156,262	119,658	112,378	67,033	26,674
CAN	136,158	116,871	95,620	79,537	46,712	19,072
ESP	135,487	129,766	103,691	99,041	54,779	22,013
AUS	84,238	79,622	62,474	66,991	36,328	14,830
KOR	118,768	120,665	94,365	85,747	49,001	18,031
BRA	43,355	37,579	36,424	36,891	21,003	7,864
SWE	55,063	61,828	41,644	41,576	21,798	8,975
SGP	40,111	37,781	29,577	27,479	15,873	6,125

Table A.35 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary						
Country	2009	2010	2011	2012	2013	2014
WLD	144,017	118,654	93,293	64,912	35,531	11,155
G8	84,930	68,817	53,011	37,613	20,723	6,438
BRICS	23,168	17,249	15,141	10,998	6,427	1,981
SAARC	4,473	3,660	3,209	2,553	1,382	475
USA	44,993	35,629	28,376	19,522	10,571	3,309
CHN	6,912	5,293	4,661	4,251	2,387	858
GBR	18,438	13,734	10,586	8,380	4,301	1,347
DEU	9,719	7,626	5,945	4,359	2,249	754
JPN	4,942	3,810	2,776	2,216	1,119	328
IND	3,491	2,797	2,465	1,627	979	326
ITA	6,588	6,426	4,532	3,268	1,978	673
CAN	6,812	5,968	4,645	3,625	1,972	589
ESP	7,079	5,990	5,284	4,023	2,007	578
AUS	5,906	6,022	4,636	3,403	2,106	717
KOR	2,066	2,310	1,760	1,238	579	187
BRA	10,473	7,768	6,744	4,031	2,419	636
SWE	3,018	2,554	2,025	1,208	737	244
SGP	333	234	235	182	41	28

Table A.36 — Annual citation count in the subject area Agricultural and Biological Sciences for 2009-2014.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

A-4 Citation Shares Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%
G8	68.5%	67.4%	66.0%	65.0%	63.4%	61.8%	-1.9%
BRICS	15.4%	16.8%	18.5%	20.6%	22.7%	25.1%	10.2%
SAARC	2.8%	3.0%	3.3%	3.5%	3.8%	4.2%	7.5%
USA	40.0%	39.3%	38.3%	37.5%	36.0%	35.0%	-2.6%
CHN	9.8%	11.1%	12.5%	14.4%	16.1%	18.0%	13.1%
GBR	11.1%	11.0%	10.7%	11.0%	10.8%	10.8%	-0.6%
DEU	9.3%	9.5%	9.5%	9.8%	9.8%	9.7%	1.4%
JPN	5.8%	5.6%	5.6%	5.6%	5.5%	5.3%	-1.5%
IND	2.5%	2.7%	3.0%	3.1%	3.4%	3.7%	7.1%
ITA	5.2%	5.2%	5.2%	5.7%	5.8%	5.9%	2.8%
CAN	6.0%	6.0%	5.9%	5.9%	5.7%	5.7%	-1.0%
ESP	4.0%	4.2%	4.4%	4.7%	4.6%	4.7%	3.2%
AUS	4.1%	4.3%	4.5%	4.7%	4.9%	5.2%	4.6%
KOR	2.6%	2.9%	3.1%	3.5%	3.4%	3.5%	6.2%
BRA	1.8%	1.8%	1.9%	2.0%	2.0%	1.9%	2.0%
SWE	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	1.6%
SGP	1.0%	1.1%	1.2%	1.4%	1.4%	1.4%	8.8%

Table A.37 — Annual citation count as share of world's annual citation count for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Medicine	Engineering	Physics and Astronomy	Computer Science	Biochemistry, Genetics and Molecular Biology	Materials Science	Chemistry	Agricultural and Biological Sciences
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	73.1%	52.3%	65.5%	58.2%	73.5%	52.8%	54.7%	63.5%
BRICS	10.5%	28.7%	25.7%	22.4%	14.8%	32.1%	30.0%	18.3%
SAARC	2.1%	4.1%	4.5%	3.2%	2.5%	5.2%	5.1%	3.5%
USA	44.8%	27.4%	34.5%	31.7%	45.5%	26.4%	26.4%	34.4%
CHN	6.0%	22.8%	17.2%	17.7%	10.3%	24.5%	22.4%	10.1%
GBR	13.0%	6.4%	10.3%	8.2%	11.5%	5.9%	6.2%	11.5%
DEU	9.5%	6.2%	14.0%	7.3%	10.3%	8.5%	9.0%	9.5%
JPN	5.2%	5.4%	8.5%	3.5%	7.0%	7.1%	6.9%	4.7%
IND	1.8%	3.7%	4.2%	2.8%	2.3%	4.8%	4.8%	2.7%
ITA	6.7%	4.4%	6.4%	4.7%	5.3%	3.3%	3.5%	4.5%
CAN	7.2%	4.2%	4.8%	5.4%	5.8%	2.9%	3.5%	6.8%
ESP	4.1%	3.4%	5.3%	4.4%	4.1%	3.1%	4.5%	6.4%
AUS	5.3%	3.1%	3.4%	3.5%	4.0%	2.9%	2.5%	6.6%
KOR	2.3%	5.1%	4.8%	3.1%	2.8%	6.0%	4.4%	2.0%
BRA	2.0%	1.2%	1.8%	1.2%	1.4%	1.1%	1.3%	3.7%
SWE	3.0%	1.5%	2.3%	1.4%	2.6%	1.4%	1.4%	2.8%
SGP	0.8%	2.1%	1.5%	2.2%	1.2%	2.4%	1.8%	0.5%

Table A.38a — Annual citation count per subject area as share of world's citation count per subject area for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Mathematics	Environmental Science	Chemical Engineering	Earth and Planetary Sciences	Energy	Immunology and Microbiology	Pharmacology, Toxicology and Pharmaceutics	Veterinary
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	57.8%	55.2%	54.8%	75.1%	47.3%	73.8%	61.0%	58.1%
BRICS	24.3%	22.7%	28.7%	21.7%	30.6%	12.7%	21.2%	16.0%
SAARC	3.7%	4.5%	4.9%	2.8%	4.8%	2.6%	7.6%	3.4%
USA	28.7%	29.4%	28.7%	45.1%	22.7%	45.5%	34.3%	30.5%
CHN	17.9%	15.6%	21.8%	14.3%	23.5%	6.8%	11.0%	5.2%
GBR	9.0%	10.0%	5.9%	17.4%	5.7%	12.8%	8.9%	12.1%
DEU	8.2%	7.0%	8.1%	16.2%	6.0%	11.1%	7.1%	6.6%
JPN	3.5%	3.3%	6.6%	6.5%	5.5%	6.0%	5.8%	3.2%
IND	3.1%	3.8%	4.6%	2.6%	4.5%	2.2%	7.0%	2.5%
ITA	5.4%	4.4%	3.1%	8.7%	3.9%	5.6%	5.7%	5.0%
CAN	4.9%	6.4%	3.6%	8.6%	4.4%	5.5%	3.8%	5.0%
ESP	4.5%	5.9%	4.0%	6.5%	4.4%	4.4%	3.4%	5.3%
AUS	3.0%	6.0%	2.7%	7.5%	3.3%	4.4%	2.9%	4.9%
KOR	2.7%	2.4%	5.0%	1.7%	4.1%	2.6%	3.5%	1.7%
BRA	1.6%	2.2%	1.3%	1.7%	1.5%	2.4%	2.3%	6.9%
SWE	1.4%	2.8%	1.3%	3.1%	2.0%	3.0%	1.8%	2.1%
SGP	1.5%	0.9%	2.0%	0.2%	1.7%	0.9%	0.7%	0.2%

Table A.38b — Annual citation count per subject area as share of world's citation count per subject area for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

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Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.27	1.27	1.27	1.27	1.26	1.26	1.27	1.27	-0.2%
BRICS	0.71	0.73	0.75	0.78	0.79	0.80	0.75	0.76	2.7%
SAARC	0.76	0.75	0.74	0.75	0.75	0.76	0.75	0.75	-0.1%
USA	1.50	1.49	1.48	1.46	1.45	1.44	1.47	1.47	-0.8%
CHN	0.71	0.74	0.77	0.80	0.82	0.83	0.77	0.78	3.8%
GBR	1.52	1.53	1.55	1.55	1.56	1.57	1.54	1.55	0.6%
DEU	1.36	1.38	1.39	1.41	1.42	1.43	1.39	1.40	1.1%
JPN	0.94	0.95	0.95	0.97	0.98	0.99	0.95	0.96	1.0%
IND	0.77	0.75	0.75	0.75	0.75	0.76	0.75	0.76	-0.4%
ITA	1.36	1.40	1.44	1.49	1.51	1.54	1.44	1.46	2.7%
CAN	1.48	1.48	1.49	1.48	1.47	1.46	1.48	1.48	-0.1%
ESP	1.22	1.24	1.27	1.29	1.30	1.31	1.26	1.27	1.7%
AUS	1.46	1.49	1.51	1.54	1.55	1.56	1.51	1.52	1.5%
KOR	1.03	1.07	1.09	1.09	1.07	1.05	1.08	1.07	0.9%
BRA	0.81	0.81	0.80	0.79	0.78	0.76	0.80	0.79	-1.0%
SWE	1.57	1.59	1.62	1.63	1.63	1.63	1.61	1.61	1.0%
SGP	1.62	1.71	1.77	1.81	1.79	1.78	1.76	1.76	2.6%

Table A.39 — Field-weighted citation impact (FWCI) per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.26	1.28	1.28	1.28	1.27	1.27	1.28	1.28	0.2%
BRICS	0.73	0.75	0.77	0.78	0.79	0.79	0.77	0.77	1.9%
SAARC	0.61	0.61	0.60	0.60	0.61	0.62	0.61	0.61	0.0%
USA	1.39	1.41	1.40	1.38	1.37	1.36	1.39	1.39	-0.4%
CHN	0.81	0.86	0.89	0.90	0.89	0.88	0.88	0.88	2.5%
GBR	1.68	1.68	1.66	1.64	1.63	1.64	1.65	1.65	-0.7%
DEU	1.43	1.45	1.46	1.48	1.49	1.51	1.46	1.48	1.0%
JPN	0.94	0.94	0.99	0.99	1.00	0.98	0.98	0.98	1.8%
IND	0.59	0.59	0.58	0.59	0.60	0.60	0.59	0.59	0.1%
ITA	1.23	1.27	1.30	1.35	1.38	1.41	1.30	1.33	3.0%
CAN	1.42	1.42	1.41	1.39	1.38	1.37	1.41	1.40	-0.8%
ESP	1.36	1.36	1.35	1.35	1.36	1.36	1.36	1.37	-0.1%
AUS	1.41	1.44	1.46	1.49	1.52	1.56	1.46	1.49	2.0%
KOR	0.84	0.87	0.90	0.91	0.88	0.84	0.90	0.89	1.1%
BRA	0.71	0.70	0.69	0.68	0.67	0.65	0.69	0.69	-1.6%
SWE	1.59	1.60	1.60	1.60	1.60	1.60	1.60	1.60	0.2%
SGP	1.52	1.58	1.59	1.50	1.42	1.36	1.51	1.48	-1.6%

Table A.40 — Rebased field-weighted citation impact (FWCI) in Agricultural and Biological Sciences per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.17	1.17	1.17	1.18	1.19	1.20	1.17	1.18	0.2%
BRICS	0.69	0.74	0.78	0.82	0.84	0.85	0.78	0.80	4.9%
SAARC	0.64	0.63	0.63	0.63	0.64	0.64	0.63	0.63	-0.2%
USA	1.37	1.36	1.35	1.35	1.36	1.37	1.35	1.36	-0.2%
CHN	0.73	0.81	0.88	0.92	0.93	0.92	0.88	0.89	6.1%
GBR	1.43	1.44	1.43	1.45	1.47	1.51	1.44	1.45	0.7%
DEU	1.31	1.32	1.34	1.35	1.38	1.40	1.34	1.35	1.2%
JPN	0.88	0.88	0.90	0.91	0.93	0.93	0.90	0.90	1.4%
IND	0.64	0.63	0.63	0.63	0.63	0.64	0.63	0.63	-0.3%
ITA	1.15	1.16	1.17	1.19	1.21	1.23	1.18	1.19	1.3%
CAN	1.26	1.26	1.26	1.27	1.29	1.31	1.26	1.27	0.5%
ESP	1.16	1.19	1.22	1.25	1.26	1.29	1.22	1.24	2.3%
AUS	1.30	1.31	1.33	1.35	1.37	1.39	1.33	1.35	1.3%
KOR	0.86	0.89	0.92	0.94	0.93	0.91	0.92	0.92	2.0%
BRA	0.72	0.74	0.75	0.76	0.77	0.78	0.75	0.75	1.7%
SWE	1.36	1.38	1.40	1.43	1.46	1.48	1.41	1.42	1.8%
SGP	1.50	1.58	1.62	1.65	1.65	1.65	1.61	1.61	2.4%

Table A.41 — Rebased field-weighted citation impact (FWCI) in Biochemistry, Genetics and Molecular Biology per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.17	1.16	1.14	1.13	1.13	1.14	1.15	1.15	-0.9%
BRICS	0.86	0.88	0.92	0.95	0.97	0.98	0.92	0.93	3.2%
SAARC	0.96	0.89	0.86	0.86	0.86	0.86	0.87	0.86	-2.6%
USA	1.30	1.30	1.28	1.28	1.30	1.34	1.29	1.31	-0.1%
CHN	0.88	0.93	1.00	1.04	1.06	1.06	0.99	1.01	4.8%
GBR	1.32	1.28	1.26	1.24	1.27	1.28	1.26	1.26	-0.9%
DEU	1.19	1.19	1.20	1.20	1.21	1.20	1.20	1.20	0.3%
JPN	1.07	1.07	1.06	1.05	1.02	1.02	1.05	1.05	-1.1%
IND	0.95	0.88	0.86	0.85	0.84	0.83	0.87	0.85	-2.9%
ITA	1.36	1.31	1.27	1.22	1.19	1.15	1.25	1.22	-3.4%
CAN	1.25	1.21	1.19	1.17	1.14	1.11	1.19	1.17	-2.2%
ESP	1.30	1.26	1.26	1.23	1.23	1.22	1.24	1.24	-1.4%
AUS	1.50	1.45	1.45	1.49	1.53	1.55	1.44	1.48	0.5%
KOR	1.16	1.24	1.22	1.20	1.11	1.04	1.21	1.16	-1.1%
BRA	0.99	0.91	0.87	0.80	0.77	0.74	0.86	0.82	-6.1%
SWE	1.39	1.43	1.44	1.42	1.39	1.35	1.44	1.40	-0.1%
SGP	1.78	1.84	1.83	1.88	1.86	1.84	1.83	1.82	1.1%

Table A.42 — Rebased field-weighted citation impact (FWCI) in Chemical Engineering per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.16	1.15	1.14	1.13	1.12	1.12	1.15	1.14	-0.7%
BRICS	0.83	0.86	0.90	0.93	0.96	0.98	0.90	0.92	3.6%
SAARC	0.74	0.73	0.74	0.77	0.79	0.82	0.75	0.77	1.8%
USA	1.40	1.41	1.39	1.37	1.36	1.35	1.40	1.39	-0.9%
CHN	0.95	0.99	1.03	1.08	1.09	1.10	1.03	1.05	3.5%
GBR	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	-0.1%
DEU	1.22	1.21	1.19	1.18	1.18	1.17	1.19	1.19	-0.9%
JPN	0.97	0.96	0.97	0.96	0.96	0.95	0.96	0.96	-0.3%
IND	0.75	0.75	0.76	0.79	0.82	0.84	0.77	0.79	2.0%
ITA	1.14	1.15	1.14	1.13	1.13	1.12	1.14	1.13	-0.2%
CAN	1.26	1.23	1.22	1.19	1.18	1.17	1.22	1.21	-1.6%
ESP	1.19	1.18	1.18	1.16	1.16	1.16	1.17	1.17	-0.7%
AUS	1.38	1.38	1.36	1.35	1.35	1.36	1.36	1.36	-0.4%
KOR	1.12	1.12	1.13	1.11	1.08	1.05	1.12	1.10	-0.7%
BRA	0.80	0.78	0.77	0.74	0.74	0.73	0.77	0.76	-1.8%
SWE	1.34	1.33	1.29	1.26	1.23	1.21	1.30	1.27	-2.2%
SGP	1.77	1.87	1.94	1.97	1.95	1.92	1.92	1.92	2.4%

Table A.43 — Rebased field-weighted citation impact (FWCI) in Chemistry per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.37	1.38	1.36	1.34	1.31	1.30	1.36	1.35	-1.1%
BRICS	0.60	0.62	0.65	0.69	0.72	0.74	0.65	0.67	4.6%
SAARC	0.74	0.73	0.74	0.74	0.75	0.77	0.74	0.75	0.4%
USA	1.68	1.68	1.64	1.59	1.54	1.51	1.63	1.61	-2.2%
CHN	0.58	0.60	0.63	0.67	0.71	0.73	0.63	0.65	5.2%
GBR	1.40	1.41	1.42	1.41	1.40	1.39	1.42	1.41	-0.1%
DEU	1.39	1.38	1.37	1.36	1.38	1.40	1.37	1.37	-0.1%
JPN	0.84	0.84	0.82	0.82	0.81	0.84	0.82	0.83	-0.8%
IND	0.76	0.74	0.74	0.74	0.76	0.78	0.74	0.76	0.0%
ITA	1.43	1.49	1.53	1.60	1.63	1.68	1.53	1.57	3.3%
CAN	1.41	1.43	1.43	1.42	1.40	1.38	1.42	1.41	-0.2%
ESP	1.14	1.17	1.20	1.22	1.25	1.31	1.19	1.22	2.5%
AUS	1.19	1.25	1.30	1.35	1.39	1.43	1.29	1.32	3.8%
KOR	0.87	0.90	0.89	0.90	0.90	0.92	0.89	0.90	0.8%
BRA	0.81	0.82	0.82	0.81	0.79	0.77	0.81	0.80	-0.7%
SWE	1.25	1.26	1.29	1.31	1.34	1.32	1.30	1.28	1.8%
SGP	1.53	1.65	1.72	1.73	1.69	1.65	1.71	1.69	2.5%

Table A.44 — Rebased field-weighted citation impact (FWCI) in Computer Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.24	1.24	1.25	1.26	1.27	1.27	1.25	1.26	0.7%
BRICS	0.72	0.74	0.75	0.75	0.76	0.75	0.75	0.75	1.1%
SAARC	0.71	0.70	0.69	0.71	0.74	0.79	0.71	0.74	1.0%
USA	1.43	1.42	1.43	1.43	1.44	1.43	1.44	1.43	0.2%
CHN	0.74	0.77	0.79	0.79	0.78	0.76	0.79	0.78	1.1%
GBR	1.62	1.61	1.64	1.67	1.71	1.73	1.65	1.67	1.4%
DEU	1.51	1.51	1.54	1.55	1.58	1.59	1.55	1.56	1.2%
JPN	1.16	1.22	1.28	1.33	1.30	1.28	1.28	1.28	2.9%
IND	0.70	0.69	0.68	0.69	0.73	0.78	0.69	0.73	1.2%
ITA	1.39	1.42	1.44	1.48	1.48	1.54	1.42	1.48	1.6%
CAN	1.45	1.45	1.48	1.49	1.51	1.50	1.48	1.48	1.1%
ESP	1.38	1.37	1.37	1.40	1.43	1.45	1.38	1.41	0.8%
AUS	1.55	1.54	1.57	1.61	1.65	1.67	1.59	1.61	1.5%
KOR	0.95	0.95	0.99	0.95	0.94	0.88	0.96	0.94	-0.1%
BRA	0.95	0.92	0.89	0.84	0.82	0.78	0.88	0.85	-3.7%
SWE	1.61	1.64	1.65	1.69	1.68	1.70	1.67	1.68	1.0%
SGP	1.68	1.61	1.49	1.54	1.53	1.64	1.49	1.53	-2.2%

Table A.45 — Rebased field-weighted citation impact (FWCI) in Earth and Planetary Sciences per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.18	1.19	1.18	1.16	1.14	1.13	1.17	1.16	-0.9%
BRICS	0.78	0.78	0.80	0.83	0.86	0.89	0.80	0.83	2.3%
SAARC	0.92	0.86	0.84	0.83	0.85	0.83	0.86	0.84	-2.0%
USA	1.21	1.21	1.19	1.18	1.15	1.14	1.20	1.18	-1.2%
CHN	0.79	0.80	0.82	0.87	0.91	0.96	0.83	0.87	3.8%
GBR	1.29	1.30	1.34	1.35	1.35	1.33	1.34	1.32	1.1%
DEU	1.32	1.37	1.42	1.41	1.41	1.41	1.37	1.38	1.7%
JPN	1.13	1.13	1.11	1.06	1.01	0.97	1.09	1.06	-2.7%
IND	0.93	0.87	0.84	0.84	0.86	0.85	0.87	0.85	-2.0%
ITA	1.81	1.76	1.69	1.74	1.71	1.77	1.72	1.78	-1.4%
CAN	1.30	1.31	1.34	1.31	1.28	1.20	1.33	1.28	-0.4%
ESP	1.61	1.67	1.69	1.66	1.59	1.54	1.63	1.63	-0.4%
AUS	1.44	1.55	1.54	1.63	1.63	1.68	1.54	1.59	3.1%
KOR	1.25	1.29	1.31	1.31	1.31	1.31	1.28	1.30	1.2%
BRA	1.01	0.98	0.96	0.92	0.89	0.84	0.96	0.92	-3.1%
SWE	1.59	1.59	1.54	1.52	1.46	1.45	1.54	1.51	-2.0%
SGP	1.92	1.95	2.09	2.21	2.31	2.26	2.12	2.12	4.7%

Table A.46 — Rebased field-weighted citation impact (FWCI) in Energy per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.32	1.32	1.32	1.33	1.33	1.33	1.32	1.32	0.1%
BRICS	0.69	0.71	0.72	0.74	0.74	0.75	0.72	0.73	1.9%
SAARC	0.93	0.92	0.93	0.92	0.92	0.91	0.94	0.92	-0.2%
USA	1.51	1.51	1.48	1.46	1.44	1.43	1.47	1.47	-1.2%
CHN	0.66	0.68	0.70	0.71	0.72	0.72	0.70	0.70	2.2%
GBR	1.43	1.44	1.46	1.48	1.48	1.48	1.46	1.46	0.9%
DEU	1.36	1.39	1.41	1.42	1.43	1.43	1.40	1.40	1.4%
JPN	0.99	0.99	1.00	1.02	1.04	1.09	0.99	1.02	1.2%
IND	0.94	0.93	0.93	0.92	0.91	0.90	0.94	0.92	-0.8%
ITA	1.70	1.77	1.85	1.91	1.93	1.93	1.84	1.86	3.3%
CAN	1.40	1.39	1.39	1.38	1.35	1.33	1.38	1.37	-0.8%
ESP	1.38	1.41	1.42	1.43	1.43	1.41	1.42	1.41	1.0%
AUS	1.47	1.53	1.56	1.63	1.65	1.71	1.56	1.60	3.0%
KOR	1.17	1.20	1.22	1.21	1.19	1.15	1.21	1.19	0.4%
BRA	0.96	0.95	0.94	0.92	0.88	0.85	0.93	0.91	-2.0%
SWE	1.54	1.57	1.60	1.60	1.58	1.54	1.59	1.57	0.7%
SGP	1.71	1.82	1.92	1.99	2.01	1.98	1.93	1.92	4.1%

Table A.47 — Rebased field-weighted citation impact (FWCI) in Engineering per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.16	1.16	1.18	1.20	1.22	1.22	1.18	1.19	1.3%
BRICS	0.82	0.83	0.85	0.85	0.85	0.86	0.84	0.85	1.1%
SAARC	0.74	0.73	0.73	0.72	0.71	0.70	0.73	0.72	-1.2%
USA	1.20	1.22	1.25	1.27	1.29	1.30	1.25	1.26	1.8%
CHN	0.85	0.89	0.91	0.94	0.93	0.94	0.91	0.92	2.4%
GBR	1.54	1.53	1.56	1.58	1.59	1.58	1.57	1.57	0.9%
DEU	1.25	1.26	1.30	1.35	1.40	1.42	1.30	1.32	2.8%
JPN	0.90	0.88	0.90	0.93	0.97	1.01	0.90	0.92	1.9%
IND	0.71	0.70	0.70	0.69	0.69	0.68	0.70	0.69	-0.6%
ITA	1.32	1.34	1.41	1.47	1.49	1.48	1.42	1.43	3.0%
CAN	1.32	1.29	1.32	1.30	1.31	1.29	1.31	1.30	-0.2%
ESP	1.39	1.38	1.37	1.37	1.36	1.34	1.37	1.37	-0.7%
AUS	1.38	1.43	1.48	1.50	1.51	1.50	1.48	1.48	2.3%
KOR	1.16	1.25	1.15	1.09	1.02	1.02	1.13	1.12	-3.3%
BRA	0.97	0.91	0.85	0.80	0.78	0.77	0.84	0.83	-5.2%
SWE	1.67	1.71	1.76	1.75	1.74	1.68	1.75	1.73	0.9%
SGP	1.69	1.83	1.87	1.93	1.90	1.90	1.86	1.88	2.9%

Table A.48 — Rebased field-weighted citation impact (FWCI) in Environmental Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.22	1.24	1.25	1.25	1.26	1.26	1.25	1.25	0.8%
BRICS	0.69	0.68	0.69	0.71	0.72	0.74	0.69	0.70	1.4%
SAARC	0.66	0.62	0.62	0.63	0.64	0.64	0.62	0.62	-0.6%
USA	1.41	1.42	1.42	1.42	1.43	1.43	1.42	1.43	0.3%
CHN	0.65	0.67	0.68	0.72	0.73	0.74	0.69	0.71	2.7%
GBR	1.45	1.51	1.55	1.56	1.58	1.59	1.54	1.56	2.1%
DEU	1.39	1.46	1.51	1.52	1.52	1.51	1.50	1.50	2.3%
JPN	0.90	0.91	0.93	0.94	0.96	0.97	0.92	0.93	1.6%
IND	0.64	0.61	0.60	0.61	0.61	0.61	0.60	0.60	-1.1%
ITA	1.20	1.23	1.25	1.25	1.25	1.26	1.24	1.24	1.0%
CAN	1.33	1.33	1.33	1.34	1.35	1.36	1.33	1.35	0.4%
ESP	1.24	1.27	1.29	1.30	1.31	1.32	1.28	1.29	1.3%
AUS	1.34	1.37	1.42	1.44	1.47	1.48	1.42	1.44	2.3%
KOR	0.71	0.73	0.76	0.77	0.75	0.72	0.76	0.74	1.2%
BRA	0.80	0.79	0.79	0.79	0.79	0.80	0.78	0.79	-0.5%
SWE	1.39	1.46	1.52	1.50	1.51	1.48	1.49	1.47	2.2%
SGP	1.51	1.62	1.70	1.63	1.59	1.52	1.63	1.60	1.3%

Table A.49 — Rebased field-weighted citation impact (FWCI) in Immunology and Microbiology per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.23	1.22	1.20	1.19	1.18	1.18	1.20	1.20	-1.0%
BRICS	0.80	0.82	0.84	0.87	0.88	0.89	0.84	0.85	2.3%
SAARC	0.93	0.88	0.86	0.85	0.86	0.88	0.87	0.88	-2.0%
USA	1.52	1.50	1.47	1.44	1.43	1.44	1.47	1.47	-1.5%
CHN	0.81	0.84	0.88	0.92	0.94	0.95	0.88	0.89	3.7%
GBR	1.37	1.36	1.34	1.34	1.34	1.35	1.35	1.36	-0.4%
DEU	1.29	1.26	1.25	1.23	1.25	1.27	1.25	1.25	-0.7%
JPN	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.05	0.0%
IND	0.96	0.90	0.88	0.86	0.88	0.89	0.89	0.89	-2.1%
ITA	1.30	1.31	1.35	1.36	1.39	1.39	1.35	1.36	1.7%
CAN	1.19	1.15	1.14	1.13	1.13	1.16	1.13	1.15	-1.4%
ESP	1.21	1.22	1.24	1.25	1.25	1.24	1.23	1.22	0.9%
AUS	1.47	1.46	1.45	1.44	1.44	1.45	1.44	1.44	-0.5%
KOR	1.18	1.23	1.24	1.23	1.20	1.15	1.24	1.22	0.3%
BRA	0.86	0.84	0.83	0.78	0.75	0.69	0.83	0.78	-3.7%
SWE	1.31	1.30	1.28	1.26	1.23	1.24	1.28	1.27	-1.6%
SGP	1.77	1.86	1.95	2.02	2.02	1.99	1.95	1.96	3.4%

Table A.50 — Rebased field-weighted citation impact (FWCI) in Materials Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.19	1.20	1.19	1.20	1.20	1.21	1.19	1.20	0.2%
BRICS	0.72	0.73	0.75	0.78	0.80	0.80	0.76	0.76	2.6%
SAARC	0.84	0.82	0.81	0.81	0.83	0.84	0.82	0.83	-0.4%
USA	1.38	1.38	1.35	1.33	1.31	1.32	1.35	1.35	-1.4%
CHN	0.73	0.73	0.76	0.79	0.81	0.80	0.76	0.77	2.5%
GBR	1.40	1.42	1.43	1.41	1.39	1.38	1.41	1.41	-0.2%
DEU	1.31	1.31	1.32	1.34	1.39	1.44	1.32	1.34	1.5%
JPN	0.89	0.91	0.90	0.95	0.98	1.04	0.91	0.94	2.3%
IND	0.80	0.78	0.79	0.79	0.79	0.78	0.79	0.80	-0.4%
ITA	1.22	1.27	1.31	1.37	1.43	1.49	1.32	1.34	4.0%
CAN	1.22	1.23	1.23	1.26	1.25	1.28	1.23	1.25	0.7%
ESP	1.12	1.14	1.14	1.17	1.20	1.26	1.14	1.17	1.8%
AUS	1.20	1.26	1.28	1.33	1.33	1.36	1.28	1.29	2.7%
KOR	0.90	0.96	0.97	0.99	1.00	1.03	0.96	0.98	2.6%
BRA	0.92	0.91	0.89	0.89	0.88	0.87	0.90	0.90	-1.3%
SWE	1.25	1.30	1.34	1.37	1.37	1.33	1.35	1.34	2.2%
SGP	1.50	1.51	1.55	1.49	1.49	1.44	1.54	1.52	-0.1%

Table A.51 — Rebased field-weighted citation impact (FWCI) in Mathematics per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.30	1.29	1.28	1.27	1.27	1.27	1.28	1.28	-0.5%
BRICS	0.65	0.69	0.74	0.78	0.81	0.83	0.74	0.77	5.5%
SAARC	0.68	0.68	0.67	0.67	0.66	0.68	0.66	0.68	-0.6%
USA	1.57	1.55	1.53	1.52	1.50	1.49	1.53	1.52	-1.2%
CHN	0.57	0.64	0.72	0.80	0.84	0.86	0.73	0.77	10.3%
GBR	1.61	1.64	1.66	1.67	1.68	1.69	1.64	1.65	1.1%
DEU	1.41	1.42	1.44	1.46	1.47	1.48	1.44	1.45	1.1%
JPN	0.82	0.82	0.82	0.84	0.86	0.88	0.83	0.84	1.3%
IND	0.70	0.70	0.69	0.68	0.68	0.70	0.68	0.69	-0.8%
ITA	1.37	1.40	1.43	1.46	1.48	1.50	1.43	1.44	2.0%
CAN	1.73	1.71	1.71	1.69	1.67	1.65	1.70	1.68	-0.8%
ESP	1.12	1.18	1.25	1.31	1.34	1.36	1.25	1.27	4.7%
AUS	1.64	1.67	1.69	1.68	1.65	1.63	1.67	1.66	0.3%
KOR	1.00	1.02	1.04	1.04	1.02	1.01	1.03	1.03	0.6%
BRA	0.83	0.84	0.86	0.86	0.86	0.86	0.85	0.85	0.9%
SWE	1.79	1.79	1.82	1.82	1.82	1.82	1.80	1.80	0.5%
SGP	1.60	1.70	1.74	1.78	1.71	1.69	1.72	1.72	1.8%

Table A.52 — Rebased field-weighted citation impact (FWCI) in Medicine per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceuticals									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.21	1.23	1.25	1.27	1.29	1.29	1.25	1.26	1.5%
BRICS	0.76	0.76	0.75	0.76	0.76	0.76	0.76	0.76	0.1%
SAARC	0.73	0.68	0.64	0.62	0.60	0.61	0.64	0.64	-4.5%
USA	1.35	1.36	1.37	1.38	1.39	1.40	1.37	1.38	0.7%
CHN	0.75	0.79	0.83	0.85	0.86	0.85	0.83	0.83	3.3%
GBR	1.41	1.46	1.52	1.54	1.58	1.59	1.51	1.52	2.9%
DEU	1.28	1.31	1.35	1.37	1.40	1.42	1.34	1.36	2.3%
JPN	0.88	0.90	0.94	0.96	0.97	0.96	0.93	0.94	2.5%
IND	0.72	0.67	0.63	0.61	0.59	0.59	0.63	0.63	-4.9%
ITA	1.20	1.24	1.29	1.34	1.39	1.43	1.28	1.32	3.9%
CAN	1.30	1.33	1.36	1.37	1.38	1.39	1.34	1.35	1.4%
ESP	1.13	1.16	1.23	1.26	1.32	1.34	1.22	1.25	4.0%
AUS	1.35	1.42	1.48	1.52	1.55	1.58	1.47	1.49	3.6%
KOR	1.10	1.11	1.10	1.12	1.10	1.08	1.11	1.11	0.0%
BRA	0.91	0.93	0.94	0.95	0.95	0.95	0.94	0.94	1.2%
SWE	1.54	1.54	1.57	1.54	1.55	1.55	1.55	1.56	0.2%
SGP	1.57	1.62	1.73	1.70	1.73	1.63	1.72	1.66	2.5%

Table A.53 — Rebased field-weighted citation impact (FWCI) in Pharmacology, Toxicology and Pharmaceuticals per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.20	1.20	1.19	1.19	1.20	1.21	1.19	1.20	0.1%
BRICS	0.72	0.74	0.76	0.78	0.79	0.79	0.76	0.76	2.4%
SAARC	0.83	0.83	0.82	0.85	0.87	0.91	0.83	0.86	1.2%
USA	1.46	1.46	1.45	1.45	1.46	1.47	1.46	1.46	0.0%
CHN	0.72	0.75	0.78	0.81	0.80	0.80	0.78	0.78	2.9%
GBR	1.41	1.42	1.43	1.45	1.45	1.46	1.43	1.44	0.8%
DEU	1.36	1.35	1.35	1.35	1.37	1.38	1.35	1.35	0.2%
JPN	1.04	1.04	1.05	1.09	1.12	1.17	1.05	1.09	1.8%
IND	0.84	0.84	0.83	0.85	0.89	0.93	0.84	0.87	1.2%
ITA	1.25	1.30	1.33	1.35	1.35	1.37	1.32	1.33	2.0%
CAN	1.37	1.36	1.37	1.37	1.38	1.41	1.37	1.39	0.3%
ESP	1.27	1.29	1.31	1.35	1.36	1.38	1.31	1.33	1.7%
AUS	1.39	1.41	1.40	1.44	1.44	1.47	1.42	1.42	0.9%
KOR	1.08	1.15	1.18	1.19	1.16	1.12	1.17	1.15	2.0%
BRA	0.88	0.90	0.94	0.94	0.93	0.88	0.93	0.90	1.4%
SWE	1.33	1.37	1.38	1.40	1.39	1.39	1.38	1.38	1.1%
SGP	1.42	1.52	1.61	1.66	1.68	1.66	1.62	1.61	4.3%

Table A.54 — Rebased field-weighted citation impact (FWCI) in Physics and Astronomy per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
WLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0%
G8	1.31	1.34	1.34	1.36	1.36	1.35	1.35	1.35	0.8%
BRICS	0.68	0.67	0.68	0.67	0.68	0.68	0.68	0.68	0.2%
SAARC	0.38	0.41	0.45	0.50	0.56	0.61	0.46	0.49	10.3%
USA	1.46	1.47	1.46	1.46	1.46	1.45	1.46	1.46	0.0%
CHN	1.13	1.05	1.01	0.97	0.97	0.98	1.01	1.02	-3.8%
GBR	1.66	1.70	1.69	1.71	1.74	1.78	1.70	1.72	1.2%
DEU	1.06	1.12	1.18	1.20	1.19	1.16	1.17	1.16	3.1%
JPN	0.96	1.04	1.08	1.11	1.08	1.03	1.08	1.07	2.9%
IND	0.32	0.33	0.36	0.39	0.44	0.48	0.36	0.39	8.0%
ITA	1.45	1.47	1.48	1.48	1.47	1.48	1.45	1.46	0.4%
CAN	1.48	1.46	1.45	1.46	1.45	1.40	1.45	1.44	-0.6%
ESP	1.62	1.65	1.64	1.64	1.58	1.54	1.63	1.61	-0.5%
AUS	1.56	1.62	1.64	1.69	1.81	1.92	1.66	1.67	3.7%
KOR	0.86	0.88	0.88	0.85	0.79	0.73	0.87	0.84	-2.1%
BRA	0.74	0.72	0.70	0.64	0.59	0.53	0.69	0.65	-5.6%
SWE	1.76	1.78	1.78	1.80	1.79	1.77	1.77	1.79	0.5%
SGP	1.99	2.00	1.90	1.90	1.70	1.65	1.90	1.90	-3.8%

Table A.55 — Rebased field-weighted citation impact (FWCI) in Veterinary per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

A-6 Highly Cited Publication Output Tables

Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	135,899	680,357	1,734,088	4,054,557
G8	96,426	451,568	1,034,719	2,343,775
BRICS	23,091	123,112	391,621	929,688
SAARC	3,367	19,078	62,586	153,084
USA	62,074	263,707	558,119	1,218,585
CHN	16,999	89,182	282,498	659,308
GBR	18,446	77,904	160,794	346,249
DEU	14,119	64,478	145,599	320,956
JPN	6,183	31,646	86,316	213,285
IND	2,895	16,722	55,402	135,101
ITA	8,526	38,993	87,104	192,221
CAN	9,283	39,622	85,473	190,624
ESP	5,937	27,944	63,699	148,655
AUS	7,538	33,143	70,912	157,432
KOR	4,127	19,642	48,302	117,335
BRA	1,688	9,548	27,961	75,071
SWE	3,788	16,081	34,294	75,319
SGP	2,497	9,784	20,530	41,479

Table A.56 — Publications in top citation percentiles for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	6,319	46,642	109,982	294,628
G8	4,835	31,647	70,961	177,832
BRICS	969	8,317	20,306	58,627
SAARC	177	1,426	3,520	10,367
USA	3,080	17,824	38,171	91,860
CHN	590	5,123	12,302	33,731
GBR	1,175	6,609	13,377	29,747
DEU	904	5,334	11,207	26,316
JPN	242	1,757	4,423	12,408
IND	117	1,078	2,730	8,015
ITA	393	2,559	5,913	14,513
CAN	563	3,433	7,669	18,736
ESP	465	3,251	7,586	19,333
AUS	670	3,846	8,259	19,027
KOR	101	831	1,987	5,764
BRA	164	1,399	3,557	11,649
SWE	283	1,583	3,205	7,429
SGP	54	284	611	1,363

Table A.57 — Publications in top citation percentiles for the period 2009-2014 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	14,986	83,139	180,626	487,940
G8	12,174	63,099	132,375	340,419
BRICS	2,324	13,778	31,035	88,063
SAARC	270	1,785	4,541	14,555
USA	9,017	41,831	83,280	201,050
CHN	1,832	10,604	23,140	62,707
GBR	2,455	11,070	21,736	50,389
DEU	2,015	10,047	20,329	48,995
JPN	873	4,809	10,980	31,485
IND	243	1,621	4,113	13,164
ITA	913	4,557	9,826	25,492
CAN	1,123	5,235	10,575	26,889
ESP	758	3,706	7,832	20,303
AUS	880	4,036	8,281	19,991
KOR	458	2,238	4,957	14,500
BRA	149	925	2,308	7,683
SWE	578	2,485	4,854	11,693
SGP	321	1,382	2,584	5,594

Table A.58 — Publications in top citation percentiles for the period 2009-2014 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Chemical Engineering				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	8,240	39,933	81,360	192,092
G8	4,923	21,020	41,680	95,170
BRICS	2,586	12,962	25,287	58,501
SAARC	299	1,880	4,093	10,675
USA	3,171	11,770	21,923	46,260
CHN	2,200	10,468	19,613	43,182
GBR	502	2,314	4,582	10,213
DEU	608	2,936	5,875	13,576
JPN	487	2,229	4,848	11,763
IND	271	1,731	3,791	9,921
ITA	216	1,177	2,564	6,515
CAN	301	1,359	2,735	6,621
ESP	267	1,500	3,166	7,674
AUS	290	1,254	2,442	5,150
KOR	456	2,177	4,223	9,736
BRA	53	457	1,172	3,435
SWE	119	559	1,141	2,582
SGP	251	980	1,721	3,282

Table A.59 — Publications in top citation percentiles for the period 2009-2014 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Chemistry				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	12,401	67,799	142,828	363,823
G8	7,293	35,710	73,753	184,940
BRICS	4,218	23,666	48,409	118,227
SAARC	425	3,208	7,623	21,720
USA	4,493	18,950	36,601	83,694
CHN	3,667	19,479	37,937	87,037
GBR	847	4,359	8,832	21,344
DEU	1,091	5,885	12,197	31,023
JPN	748	3,963	8,676	23,629
IND	394	3,025	7,211	20,493
ITA	303	2,005	4,808	13,753
CAN	406	2,223	4,725	12,286
ESP	406	2,681	6,184	16,976
AUS	413	2,000	4,002	9,588
KOR	660	3,372	6,804	16,426
BRA	77	618	1,758	5,578
SWE	180	934	1,980	5,191
SGP	448	1,689	2,966	5,899

Table A.60 — Publications in top citation percentiles for the period 2009-2014 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	19,208	96,227	337,947	723,971
G8	12,918	60,510	183,067	371,378
BRICS	3,802	18,525	82,484	183,330
SAARC	607	3,307	19,824	39,700
USA	7,930	32,372	84,638	164,495
CHN	2,998	13,844	55,171	128,003
GBR	1,673	7,471	21,636	43,515
DEU	1,589	8,542	27,005	54,695
JPN	538	3,729	16,962	39,327
IND	542	2,936	17,535	34,883
ITA	1,177	5,884	16,572	32,287
CAN	1,141	5,181	14,790	29,637
ESP	827	3,916	11,666	25,251
AUS	767	3,436	9,709	20,554
KOR	491	2,577	9,083	21,172
BRA	154	1,067	5,499	12,185
SWE	262	1,476	4,837	9,883
SGP	551	2,258	5,874	11,232

Table A.61 — Publications in top citation percentiles for the period 2009-2014 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	5,029	26,767	70,218	173,812
G8	4,028	20,269	49,965	117,851
BRICS	1,055	5,585	15,396	40,634
SAARC	113	604	1,683	4,576
USA	2,603	12,190	29,051	64,860
CHN	731	3,974	10,679	28,362
GBR	1,079	4,789	9,710	21,881
DEU	901	4,209	8,943	20,467
JPN	378	1,589	3,580	8,714
IND	102	521	1,468	4,067
ITA	503	2,463	5,189	12,535
CAN	538	2,378	5,395	11,815
ESP	314	1,540	3,452	8,639
AUS	525	2,462	5,092	11,333
KOR	77	344	947	2,514
BRA	72	391	1,093	2,901
SWE	193	767	1,602	3,634
SGP	28	136	288	600

Table A.62 — Publications in top citation percentiles for the period 2009-2014 in the subject area Earth and Planetary Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Energy				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	5,672	27,626	72,209	150,035
G8	2,990	13,982	35,771	73,277
BRICS	1,576	7,974	19,489	41,725
SAARC	200	1,120	3,400	7,021
USA	1,528	6,677	17,475	35,139
CHN	1,281	6,255	14,412	30,491
GBR	368	1,651	3,950	8,125
DEU	407	1,850	4,413	8,761
JPN	304	1,483	3,879	8,477
IND	182	1,046	2,973	6,318
ITA	321	1,468	3,178	6,149
CAN	261	1,230	2,954	6,053
ESP	254	1,234	2,681	5,247
AUS	248	987	2,353	4,431
KOR	238	1,165	2,781	5,743
BRA	53	402	1,144	2,807
SWE	113	569	1,326	2,692
SGP	139	488	918	1,640

Table A.63 — Publications in top citation percentiles for the period 2009-2014 in the subject area Energy. See Table H.1 in Appendix H for benchmark and country abbreviations.
Source: Scopus database.

Engineering				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	33,023	156,409	510,603	1,061,934
G8	19,982	86,498	235,502	472,142
BRICS	7,976	40,238	174,418	373,089
SAARC	1,071	5,665	21,691	43,833
USA	11,346	43,400	109,749	216,604
CHN	6,395	31,786	140,673	304,923
GBR	2,402	10,027	25,190	49,543
DEU	2,509	11,093	30,267	58,903
JPN	1,757	9,120	28,478	61,191
IND	949	5,164	19,532	39,399
ITA	2,082	9,244	22,014	40,861
CAN	1,355	6,291	16,615	33,737
ESP	1,060	5,012	13,023	26,598
AUS	1,249	5,157	12,940	25,394
KOR	1,617	7,036	18,631	39,521
BRA	264	1,686	6,571	14,449
SWE	559	2,594	6,875	13,477
SGP	901	3,223	7,166	13,306

Table A.64 — Publications in top citation percentiles for the period 2009-2014 in the subject area Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	5,821	34,866	80,735	196,819
G8	3,841	20,864	45,993	107,962
BRICS	1,151	7,519	18,346	45,066
SAARC	181	1,258	3,273	8,864
USA	2,325	11,366	23,971	54,688
CHN	847	5,497	13,083	30,459
GBR	921	4,513	8,772	18,598
DEU	582	2,953	6,220	13,758
JPN	195	1,050	2,730	6,725
IND	149	1,020	2,736	7,502
ITA	399	1,898	3,972	9,129
CAN	449	2,228	4,822	11,558
ESP	326	1,941	4,355	10,785
AUS	516	2,528	5,174	11,333
KOR	137	779	1,794	4,664
BRA	100	631	1,522	4,453
SWE	285	1,287	2,528	5,289
SGP	103	399	723	1,420

Table A.65 — Publications in top citation percentiles for the period 2009-2014 in the subject area Environmental Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	3,138	18,358	39,772	111,292
G8	2,748	14,774	30,403	78,320
BRICS	325	2,013	4,973	17,068
SAARC	42	283	803	3,285
USA	1,994	9,647	18,947	45,643
CHN	190	1,147	2,879	9,613
GBR	625	3,039	5,804	13,443
DEU	536	2,608	5,030	11,898
JPN	172	876	1,978	6,117
IND	31	222	643	2,708
ITA	219	1,169	2,333	6,071
CAN	244	1,163	2,284	5,718
ESP	196	987	2,042	5,186
AUS	207	1,057	2,114	5,090
KOR	64	367	876	2,957
BRA	62	374	898	3,150
SWE	150	674	1,320	3,049
SGP	45	229	453	950

Table A.66 — Publications in top citation percentiles for the period 2009-2014 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Materials Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	16,687	79,114	199,298	444,182
G8	10,078	43,900	107,945	231,149
BRICS	4,998	24,260	60,258	137,072
SAARC	506	3,363	8,735	21,682
USA	6,259	23,103	51,672	104,555
CHN	4,279	19,390	45,039	101,382
GBR	1,096	4,735	11,141	23,428
DEU	1,539	7,208	17,317	37,399
JPN	1,217	5,863	15,480	34,791
IND	469	3,153	8,172	20,207
ITA	590	2,956	7,356	15,956
CAN	432	2,227	5,922	13,227
ESP	486	2,311	5,857	13,200
AUS	541	2,391	5,573	11,552
KOR	1,190	5,147	10,708	23,685
BRA	100	720	2,740	6,094
SWE	240	1,108	2,702	6,121
SGP	665	2,206	3,987	7,480

Table A.67 — Publications in top citation percentiles for the period 2009-2014 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Mathematics				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	9,007	48,968	142,013	322,541
G8	5,516	29,645	82,929	181,998
BRICS	2,166	11,131	33,115	76,279
SAARC	348	1,712	4,244	10,383
USA	3,067	14,311	36,700	78,275
CHN	1,681	8,204	24,368	55,484
GBR	880	4,317	11,060	23,732
DEU	828	4,922	13,949	30,068
JPN	303	1,874	6,375	14,606
IND	267	1,382	3,508	8,802
ITA	548	3,226	8,780	18,498
CAN	468	2,510	6,402	13,725
ESP	401	2,168	5,744	13,325
AUS	338	1,646	4,157	9,218
KOR	298	1,330	3,263	7,633
BRA	108	757	2,366	5,581
SWE	140	724	1,981	4,380
SGP	178	712	1,721	3,614

Table A.68 — Publications in top citation percentiles for the period 2009-2014 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Medicine				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	35,150	177,588	376,183	945,326
G8	29,114	137,579	279,374	663,115
BRICS	3,515	18,273	41,465	114,478
SAARC	656	3,076	7,119	21,135
USA	20,517	88,948	173,674	391,479
CHN	2,137	11,586	25,949	69,731
GBR	6,911	26,860	49,928	108,295
DEU	4,551	18,914	36,191	80,891
JPN	1,468	7,418	16,657	46,693
IND	538	2,553	6,009	17,891
ITA	3,026	12,523	24,209	55,925
CAN	3,733	14,152	26,592	59,723
ESP	1,930	7,784	15,016	34,942
AUS	2,557	10,910	21,102	48,282
KOR	739	3,679	8,382	23,775
BRA	640	2,847	6,463	19,093
SWE	1,571	6,168	11,494	25,268
SGP	458	1,738	3,254	6,997

Table A.69 — Publications in top citation percentiles for the period 2009-2014 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	2,252	17,797	41,844	120,815
G8	1,642	11,624	26,043	70,317
BRICS	366	3,574	9,170	28,909
SAARC	115	1,119	2,940	9,754
USA	1,049	7,035	15,249	39,362
CHN	223	2,082	5,201	15,676
GBR	359	2,040	4,259	10,249
DEU	223	1,487	3,362	8,495
JPN	103	765	1,891	6,449
IND	101	1,017	2,693	8,948
ITA	150	1,020	2,396	6,702
CAN	98	728	1,691	4,437
ESP	85	699	1,507	4,128
AUS	100	688	1,445	3,633
KOR	67	599	1,409	4,359
BRA	31	368	953	3,214
SWE	71	383	787	2,037
SGP	25	177	375	850

Table A.70 — Publications in top citation percentiles for the period 2009-2014 in the subject area Pharmacology, Toxicology and Pharmaceutics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	18,239	86,871	226,527	521,250
G8	13,480	59,389	146,078	322,629
BRICS	3,833	19,487	54,064	132,066
SAARC	584	3,307	9,011	23,336
USA	8,180	31,421	70,006	146,847
CHN	2,834	13,394	34,441	83,623
GBR	2,037	8,602	19,366	41,979
DEU	2,780	12,455	28,812	63,007
JPN	1,663	7,849	20,230	45,728
IND	527	3,031	8,343	21,641
ITA	1,307	5,809	14,239	30,625
CAN	917	3,989	9,088	19,967
ESP	967	4,269	9,718	21,736
AUS	683	2,741	6,562	14,300
KOR	1,024	4,329	9,715	21,776
BRA	283	1,376	4,135	9,589
SWE	434	1,868	4,345	9,486
SGP	421	1,496	3,025	6,195

Table A.71 — Publications in top citation percentiles for the period 2009-2014 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Veterinary			
	Top 1%	Top 5%	Top 10%	Top 25%
WLD	603	5,275	12,470	33,016
G8	437	3,466	7,677	18,676
BRICS	54	627	1,732	5,248
SAARC	8	139	384	1,216
USA	243	1,804	4,004	9,418
CHN	16	225	605	1,769
GBR	121	813	1,663	3,739
DEU	52	416	880	2,099
JPN	11	122	352	1,161
IND	2	78	228	802
ITA	48	357	728	1,798
CAN	40	315	675	1,618
ESP	34	361	783	1,741
AUS	41	308	695	1,631
KOR	4	96	241	618
BRA	22	248	745	2,254
SWE	15	139	292	667
SGP	0	14	29	49

Table A.72 — Publications in top citation percentiles for the period 2009-2014 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

A-7 Highly Cited Publication Output Shares Tables

Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	71.0%	66.4%	59.7%	57.8%
BRICS	17.0%	18.1%	22.6%	22.9%
SAARC	2.5%	2.8%	3.6%	3.8%
USA	45.7%	38.8%	32.2%	30.1%
CHN	12.5%	13.1%	16.3%	16.3%
GBR	13.6%	11.5%	9.3%	8.5%
DEU	10.4%	9.5%	8.4%	7.9%
JPN	4.5%	4.7%	5.0%	5.3%
IND	2.1%	2.5%	3.2%	3.3%
ITA	6.3%	5.7%	5.0%	4.7%
CAN	6.8%	5.8%	4.9%	4.7%
ESP	4.4%	4.1%	3.7%	3.7%
AUS	5.5%	4.9%	4.1%	3.9%
KOR	3.0%	2.9%	2.8%	2.9%
BRA	1.2%	1.4%	1.6%	1.9%
SWE	2.8%	2.4%	2.0%	1.9%
SGP	1.8%	1.4%	1.2%	1.0%

Table A.73 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	76.5%	67.9%	64.5%	60.4%
BRICS	15.3%	17.8%	18.5%	19.9%
SAARC	2.8%	3.1%	3.2%	3.5%
USA	48.7%	38.2%	34.7%	31.2%
CHN	9.3%	11.0%	11.2%	11.4%
GBR	18.6%	14.2%	12.2%	10.1%
DEU	14.3%	11.4%	10.2%	8.9%
JPN	3.8%	3.8%	4.0%	4.2%
IND	1.9%	2.3%	2.5%	2.7%
ITA	6.2%	5.5%	5.4%	4.9%
CAN	8.9%	7.4%	7.0%	6.4%
ESP	7.4%	7.0%	6.9%	6.6%
AUS	10.6%	8.2%	7.5%	6.5%
KOR	1.6%	1.8%	1.8%	2.0%
BRA	2.6%	3.0%	3.2%	4.0%
SWE	4.5%	3.4%	2.9%	2.5%
SGP	0.9%	0.6%	0.6%	0.5%

Table A.74 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	81.2%	75.9%	73.3%	69.8%
BRICS	15.5%	16.6%	17.2%	18.0%
SAARC	1.8%	2.1%	2.5%	3.0%
USA	60.2%	50.3%	46.1%	41.2%
CHN	12.2%	12.8%	12.8%	12.9%
GBR	16.4%	13.3%	12.0%	10.3%
DEU	13.4%	12.1%	11.3%	10.0%
JPN	5.8%	5.8%	6.1%	6.5%
IND	1.6%	1.9%	2.3%	2.7%
ITA	6.1%	5.5%	5.4%	5.2%
CAN	7.5%	6.3%	5.9%	5.5%
ESP	5.1%	4.5%	4.3%	4.2%
AUS	5.9%	4.9%	4.6%	4.1%
KOR	3.1%	2.7%	2.7%	3.0%
BRA	1.0%	1.1%	1.3%	1.6%
SWE	3.9%	3.0%	2.7%	2.4%
SGP	2.1%	1.7%	1.4%	1.1%

Table A.75 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	59.7%	52.6%	51.2%	49.5%
BRICS	31.4%	32.5%	31.1%	30.5%
SAARC	3.6%	4.7%	5.0%	5.6%
USA	38.5%	29.5%	26.9%	24.1%
CHN	26.7%	26.2%	24.1%	22.5%
GBR	6.1%	5.8%	5.6%	5.3%
DEU	7.4%	7.4%	7.2%	7.1%
JPN	5.9%	5.6%	6.0%	6.1%
IND	3.3%	4.3%	4.7%	5.2%
ITA	2.6%	2.9%	3.2%	3.4%
CAN	3.7%	3.4%	3.4%	3.4%
ESP	3.2%	3.8%	3.9%	4.0%
AUS	3.5%	3.1%	3.0%	2.7%
KOR	5.5%	5.5%	5.2%	5.1%
BRA	0.6%	1.1%	1.4%	1.8%
SWE	1.4%	1.4%	1.4%	1.3%
SGP	3.0%	2.5%	2.1%	1.7%

Table A.76 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	58.8%	52.7%	51.6%	50.8%
BRICS	34.0%	34.9%	33.9%	32.5%
SAARC	3.4%	4.7%	5.3%	6.0%
USA	36.2%	28.0%	25.6%	23.0%
CHN	29.6%	28.7%	26.6%	23.9%
GBR	6.8%	6.4%	6.2%	5.9%
DEU	8.8%	8.7%	8.5%	8.5%
JPN	6.0%	5.8%	6.1%	6.5%
IND	3.2%	4.5%	5.0%	5.6%
ITA	2.4%	3.0%	3.4%	3.8%
CAN	3.3%	3.3%	3.3%	3.4%
ESP	3.3%	4.0%	4.3%	4.7%
AUS	3.3%	2.9%	2.8%	2.6%
KOR	5.3%	5.0%	4.8%	4.5%
BRA	0.6%	0.9%	1.2%	1.5%
SWE	1.5%	1.4%	1.4%	1.4%
SGP	3.6%	2.5%	2.1%	1.6%

Table A.77 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	67.3%	62.9%	54.2%	51.3%
BRICS	19.8%	19.3%	24.4%	25.3%
SAARC	3.2%	3.4%	5.9%	5.5%
USA	41.3%	33.6%	25.0%	22.7%
CHN	15.6%	14.4%	16.3%	17.7%
GBR	8.7%	7.8%	6.4%	6.0%
DEU	8.3%	8.9%	8.0%	7.6%
JPN	2.8%	3.9%	5.0%	5.4%
IND	2.8%	3.1%	5.2%	4.8%
ITA	6.1%	6.1%	4.9%	4.5%
CAN	5.9%	5.4%	4.4%	4.1%
ESP	4.3%	4.1%	3.5%	3.5%
AUS	4.0%	3.6%	2.9%	2.8%
KOR	2.6%	2.7%	2.7%	2.9%
BRA	0.8%	1.1%	1.6%	1.7%
SWE	1.4%	1.5%	1.4%	1.4%
SGP	2.9%	2.3%	1.7%	1.6%

Table A.78 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	80.1%	75.7%	71.2%	67.8%
BRICS	21.0%	20.9%	21.9%	23.4%
SAARC	2.2%	2.3%	2.4%	2.6%
USA	51.8%	45.5%	41.4%	37.3%
CHN	14.5%	14.8%	15.2%	16.3%
GBR	21.5%	17.9%	13.8%	12.6%
DEU	17.9%	15.7%	12.7%	11.8%
JPN	7.5%	5.9%	5.1%	5.0%
IND	2.0%	1.9%	2.1%	2.3%
ITA	10.0%	9.2%	7.4%	7.2%
CAN	10.7%	8.9%	7.7%	6.8%
ESP	6.2%	5.8%	4.9%	5.0%
AUS	10.4%	9.2%	7.3%	6.5%
KOR	1.5%	1.3%	1.3%	1.4%
BRA	1.4%	1.5%	1.6%	1.7%
SWE	3.8%	2.9%	2.3%	2.1%
SGP	0.6%	0.5%	0.4%	0.3%

Table A.79 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Earth and Planetary Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	52.7%	50.6%	49.5%	48.8%
BRICS	27.8%	28.9%	27.0%	27.8%
SAARC	3.5%	4.1%	4.7%	4.7%
USA	26.9%	24.2%	24.2%	23.4%
CHN	22.6%	22.6%	20.0%	20.3%
GBR	6.5%	6.0%	5.5%	5.4%
DEU	7.2%	6.7%	6.1%	5.8%
JPN	5.4%	5.4%	5.4%	5.7%
IND	3.2%	3.8%	4.1%	4.2%
ITA	5.7%	5.3%	4.4%	4.1%
CAN	4.6%	4.5%	4.1%	4.0%
ESP	4.5%	4.5%	3.7%	3.5%
AUS	4.4%	3.6%	3.3%	3.0%
KOR	4.2%	4.2%	3.9%	3.8%
BRA	0.9%	1.5%	1.6%	1.9%
SWE	2.0%	2.1%	1.8%	1.8%
SGP	2.5%	1.8%	1.3%	1.1%

Table A.80 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Energy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	60.5%	55.3%	46.1%	44.5%
BRICS	24.2%	25.7%	34.2%	35.1%
SAARC	3.2%	3.6%	4.2%	4.1%
USA	34.4%	27.7%	21.5%	20.4%
CHN	19.4%	20.3%	27.6%	28.7%
GBR	7.3%	6.4%	4.9%	4.7%
DEU	7.6%	7.1%	5.9%	5.5%
JPN	5.3%	5.8%	5.6%	5.8%
IND	2.9%	3.3%	3.8%	3.7%
ITA	6.3%	5.9%	4.3%	3.8%
CAN	4.1%	4.0%	3.3%	3.2%
ESP	3.2%	3.2%	2.6%	2.5%
AUS	3.8%	3.3%	2.5%	2.4%
KOR	4.9%	4.5%	3.6%	3.7%
BRA	0.8%	1.1%	1.3%	1.4%
SWE	1.7%	1.7%	1.3%	1.3%
SGP	2.7%	2.1%	1.4%	1.3%

Table A.81 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	66.0%	59.8%	57.0%	54.9%
BRICS	19.8%	21.6%	22.7%	22.9%
SAARC	3.1%	3.6%	4.1%	4.5%
USA	39.9%	32.6%	29.7%	27.8%
CHN	14.6%	15.8%	16.2%	15.5%
GBR	15.8%	12.9%	10.9%	9.4%
DEU	10.0%	8.5%	7.7%	7.0%
JPN	3.3%	3.0%	3.4%	3.4%
IND	2.6%	2.9%	3.4%	3.8%
ITA	6.9%	5.4%	4.9%	4.6%
CAN	7.7%	6.4%	6.0%	5.9%
ESP	5.6%	5.6%	5.4%	5.5%
AUS	8.9%	7.3%	6.4%	5.8%
KOR	2.4%	2.2%	2.2%	2.4%
BRA	1.7%	1.8%	1.9%	2.3%
SWE	4.9%	3.7%	3.1%	2.7%
SGP	1.8%	1.1%	0.9%	0.7%

Table A.82 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Environmental Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	87.6%	80.5%	76.4%	70.4%
BRICS	10.4%	11.0%	12.5%	15.3%
SAARC	1.3%	1.5%	2.0%	3.0%
USA	63.5%	52.5%	47.6%	41.0%
CHN	6.1%	6.2%	7.2%	8.6%
GBR	19.9%	16.6%	14.6%	12.1%
DEU	17.1%	14.2%	12.6%	10.7%
JPN	5.5%	4.8%	5.0%	5.5%
IND	1.0%	1.2%	1.6%	2.4%
ITA	7.0%	6.4%	5.9%	5.5%
CAN	7.8%	6.3%	5.7%	5.1%
ESP	6.2%	5.4%	5.1%	4.7%
AUS	6.6%	5.8%	5.3%	4.6%
KOR	2.0%	2.0%	2.2%	2.7%
BRA	2.0%	2.0%	2.3%	2.8%
SWE	4.8%	3.7%	3.3%	2.7%
SGP	1.4%	1.2%	1.1%	0.9%

Table A.83 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	60.4%	55.5%	54.2%	52.0%
BRICS	30.0%	30.7%	30.2%	30.9%
SAARC	3.0%	4.3%	4.4%	4.9%
USA	37.5%	29.2%	25.9%	23.5%
CHN	25.6%	24.5%	22.6%	22.8%
GBR	6.6%	6.0%	5.6%	5.3%
DEU	9.2%	9.1%	8.7%	8.4%
JPN	7.3%	7.4%	7.8%	7.8%
IND	2.8%	4.0%	4.1%	4.5%
ITA	3.5%	3.7%	3.7%	3.6%
CAN	2.6%	2.8%	3.0%	3.0%
ESP	2.9%	2.9%	2.9%	3.0%
AUS	3.2%	3.0%	2.8%	2.6%
KOR	7.1%	6.5%	5.4%	5.3%
BRA	0.6%	0.9%	1.4%	1.4%
SWE	1.4%	1.4%	1.4%	1.4%
SGP	4.0%	2.8%	2.0%	1.7%

Table A.84 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	61.2%	60.5%	58.4%	56.4%
BRICS	24.0%	22.7%	23.3%	23.6%
SAARC	3.9%	3.5%	3.0%	3.2%
USA	34.1%	29.2%	25.8%	24.3%
CHN	18.7%	16.8%	17.2%	17.2%
GBR	9.8%	8.8%	7.8%	7.4%
DEU	9.2%	10.1%	9.8%	9.3%
JPN	3.4%	3.8%	4.5%	4.5%
IND	3.0%	2.8%	2.5%	2.7%
ITA	6.1%	6.6%	6.2%	5.7%
CAN	5.2%	5.1%	4.5%	4.3%
ESP	4.5%	4.4%	4.0%	4.1%
AUS	3.8%	3.4%	2.9%	2.9%
KOR	3.3%	2.7%	2.3%	2.4%
BRA	1.2%	1.5%	1.7%	1.7%
SWE	1.6%	1.5%	1.4%	1.4%
SGP	2.0%	1.5%	1.2%	1.1%

Table A.85 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	82.8%	77.5%	74.3%	70.1%
BRICS	10.0%	10.3%	11.0%	12.1%
SAARC	1.9%	1.7%	1.9%	2.2%
USA	58.4%	50.1%	46.2%	41.4%
CHN	6.1%	6.5%	6.9%	7.4%
GBR	19.7%	15.1%	13.3%	11.5%
DEU	12.9%	10.7%	9.6%	8.6%
JPN	4.2%	4.2%	4.4%	4.9%
IND	1.5%	1.4%	1.6%	1.9%
ITA	8.6%	7.1%	6.4%	5.9%
CAN	10.6%	8.0%	7.1%	6.3%
ESP	5.5%	4.4%	4.0%	3.7%
AUS	7.3%	6.1%	5.6%	5.1%
KOR	2.1%	2.1%	2.2%	2.5%
BRA	1.8%	1.6%	1.7%	2.0%
SWE	4.5%	3.5%	3.1%	2.7%
SGP	1.3%	1.0%	0.9%	0.7%

Table A.86 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	72.9%	65.3%	62.2%	58.2%
BRICS	16.3%	20.1%	21.9%	23.9%
SAARC	5.1%	6.3%	7.0%	8.1%
USA	46.6%	39.5%	36.4%	32.6%
CHN	9.9%	11.7%	12.4%	13.0%
GBR	15.9%	11.5%	10.2%	8.5%
DEU	9.9%	8.4%	8.0%	7.0%
JPN	4.6%	4.3%	4.5%	5.3%
IND	4.5%	5.7%	6.4%	7.4%
ITA	6.7%	5.7%	5.7%	5.5%
CAN	4.4%	4.1%	4.0%	3.7%
ESP	3.8%	3.9%	3.6%	3.4%
AUS	4.4%	3.9%	3.5%	3.0%
KOR	3.0%	3.4%	3.4%	3.6%
BRA	1.4%	2.1%	2.3%	2.7%
SWE	3.2%	2.2%	1.9%	1.7%
SGP	1.1%	1.0%	0.9%	0.7%

Table A.87 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Pharmacology, Toxicology and Pharmaceutics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	73.9%	68.4%	64.5%	61.9%
BRICS	21.0%	22.4%	23.9%	25.3%
SAARC	3.2%	3.8%	4.0%	4.5%
USA	44.8%	36.2%	30.9%	28.2%
CHN	15.5%	15.4%	15.2%	16.0%
GBR	11.2%	9.9%	8.5%	8.1%
DEU	15.2%	14.3%	12.7%	12.1%
JPN	9.1%	9.0%	8.9%	8.8%
IND	2.9%	3.5%	3.7%	4.2%
ITA	7.2%	6.7%	6.3%	5.9%
CAN	5.0%	4.6%	4.0%	3.8%
ESP	5.3%	4.9%	4.3%	4.2%
AUS	3.7%	3.2%	2.9%	2.7%
KOR	5.6%	5.0%	4.3%	4.2%
BRA	1.6%	1.6%	1.8%	1.8%
SWE	2.4%	2.2%	1.9%	1.8%
SGP	2.3%	1.7%	1.3%	1.2%

Table A.88 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary				
Country	Top 1%	Top 5%	Top 10%	Top 25%
WLD	100.0%	100.0%	100.0%	100.0%
G8	72.5%	65.7%	61.6%	56.6%
BRICS	9.0%	11.9%	13.9%	15.9%
SAARC	1.3%	2.6%	3.1%	3.7%
USA	40.3%	34.2%	32.1%	28.5%
CHN	2.7%	4.3%	4.9%	5.4%
GBR	20.1%	15.4%	13.3%	11.3%
DEU	8.6%	7.9%	7.1%	6.4%
JPN	1.8%	2.3%	2.8%	3.5%
IND	0.3%	1.5%	1.8%	2.4%
ITA	8.0%	6.8%	5.8%	5.4%
CAN	6.6%	6.0%	5.4%	4.9%
ESP	5.6%	6.8%	6.3%	5.3%
AUS	6.8%	5.8%	5.6%	4.9%
KOR	0.7%	1.8%	1.9%	1.9%
BRA	3.6%	4.7%	6.0%	6.8%
SWE	2.5%	2.6%	2.3%	2.0%
SGP	0.0%	0.3%	0.2%	0.1%

Table A.89 — Publications in top citation percentiles as share of world's publications in top citation percentiles for the period 2009-2014 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Appendix B

Chapter 2 Supplements

B-1 Collaboration Type Charts

The charts in this section display a country’s publication output per collaboration type (international, national, institutional, single-authored) for each selected subject area during the period 2009-2013. These charts, just like the tables in sections B-2 to B-4, do not include the world as a benchmark, since the international and national collaboration types are not defined for the world.

IND

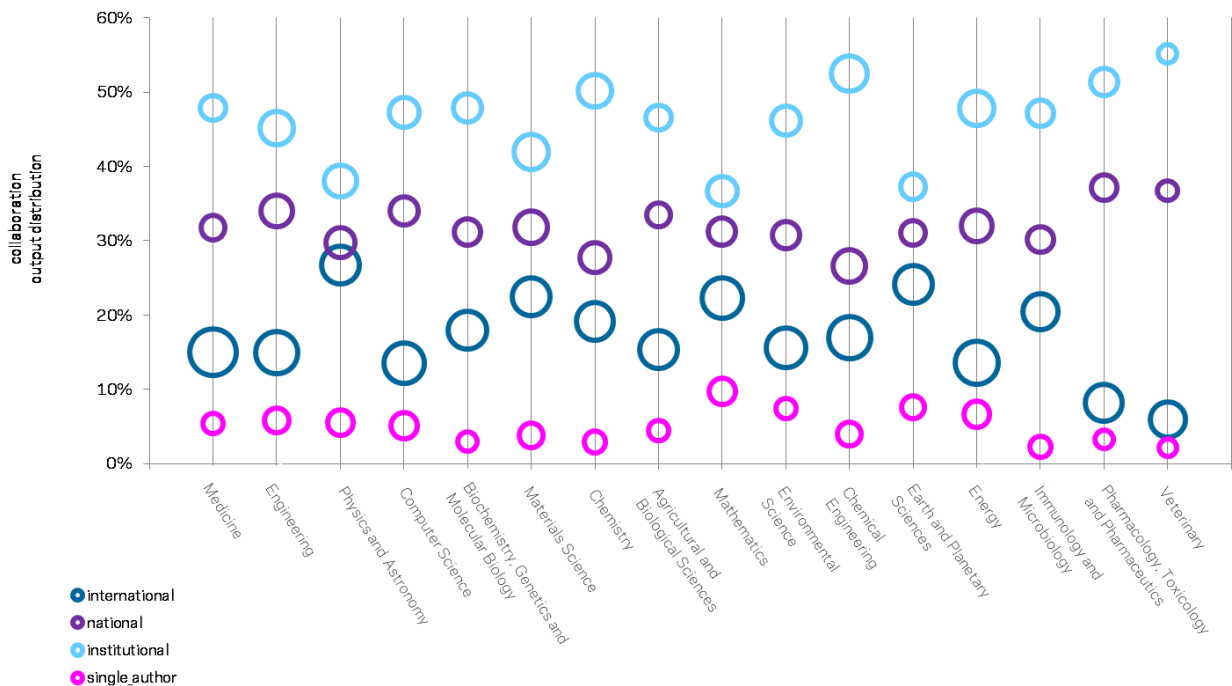


Figure B.1 — Collaboration output distribution per subject area for India in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

G8

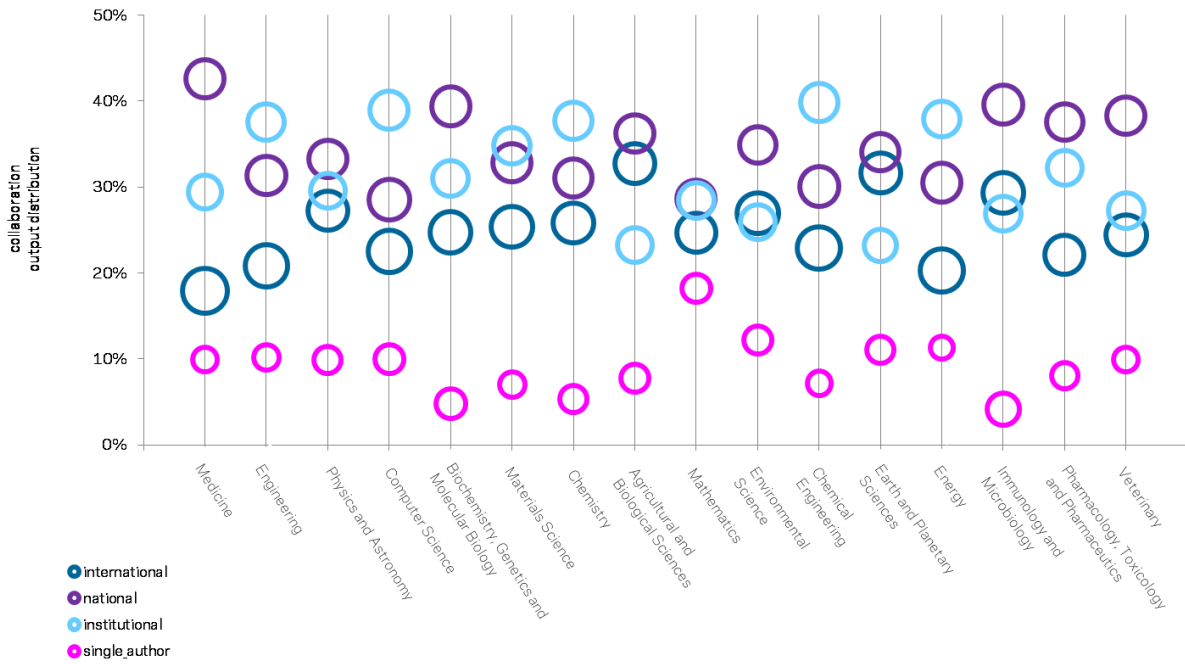


Figure B.2 — Collaboration output distribution per subject area for the G8 in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

BRICS

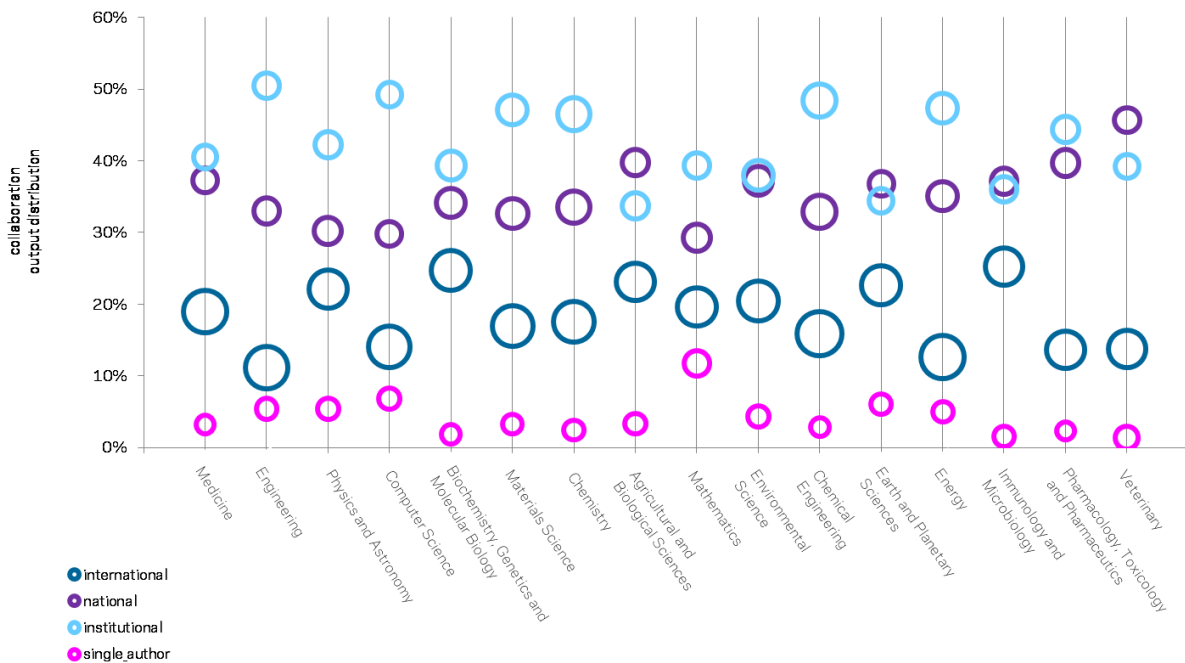


Figure B.3 — Collaboration output distribution per subject area for the BRICS countries in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

SAARC

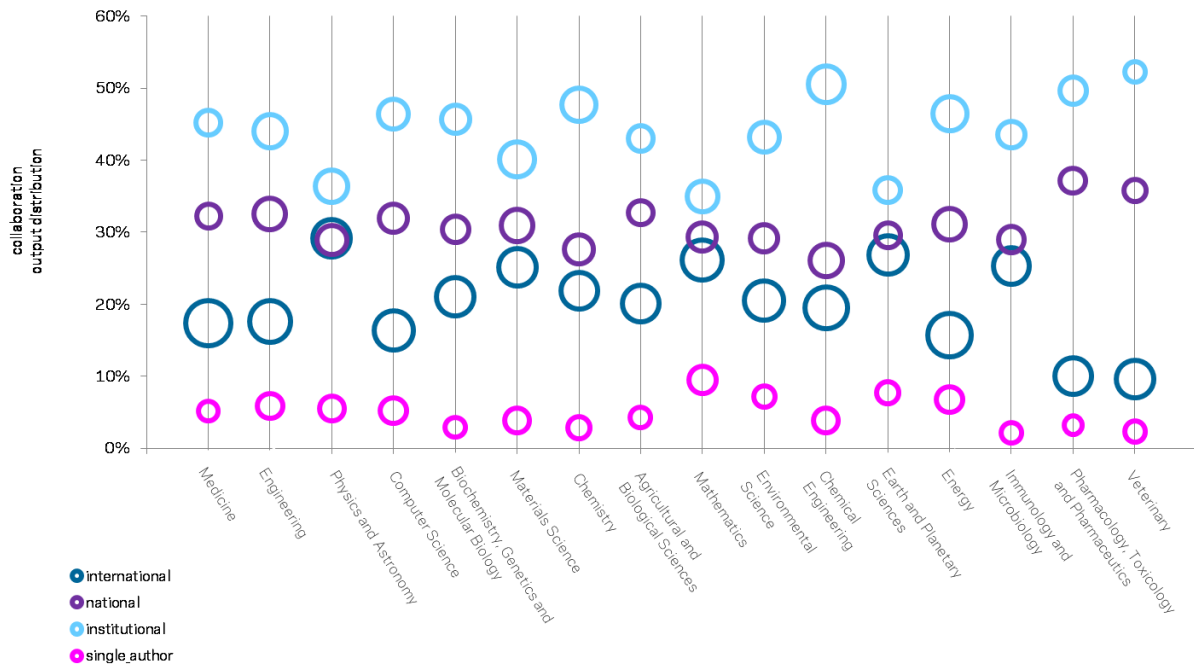


Figure B.4 — Collaboration output distribution per subject area for the SAARC countries in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

USA

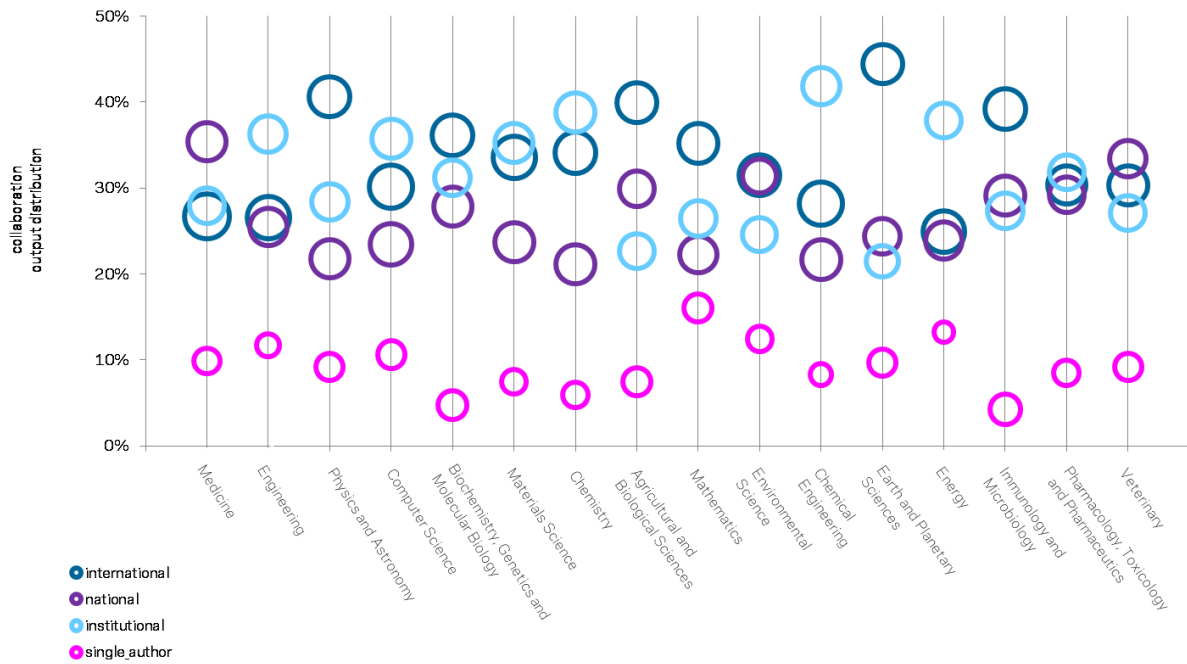


Figure B.5 — Collaboration output distribution per subject area for the United States in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

CHN

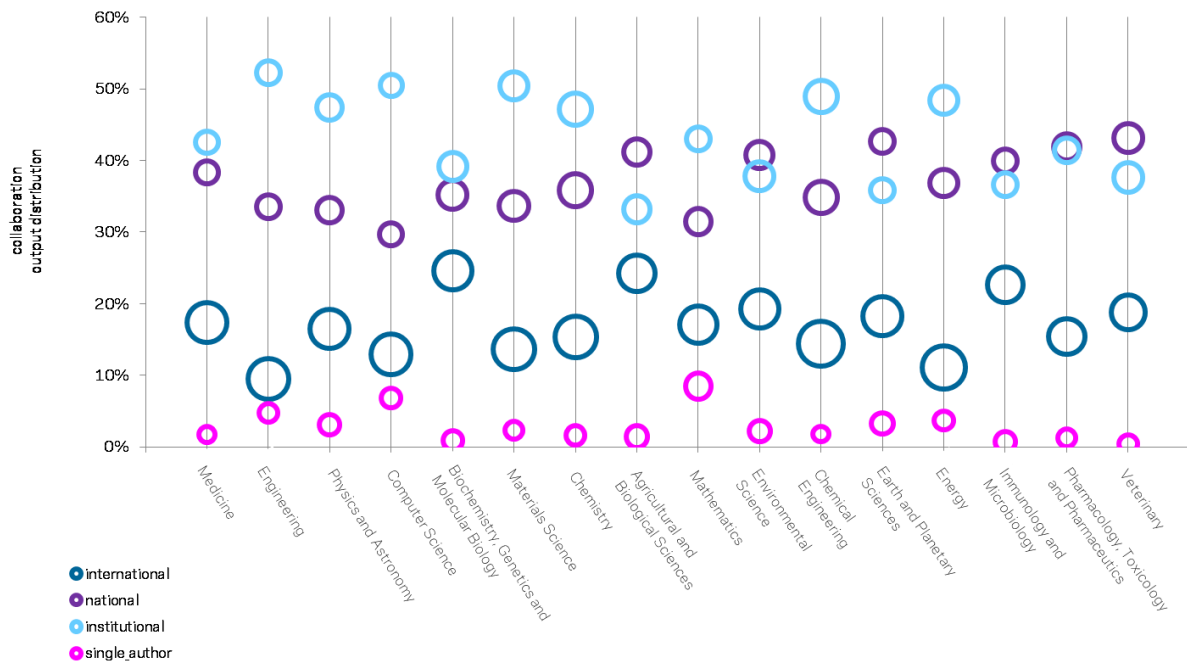


Figure B.6 — Collaboration output distribution per subject area for China in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

GBR

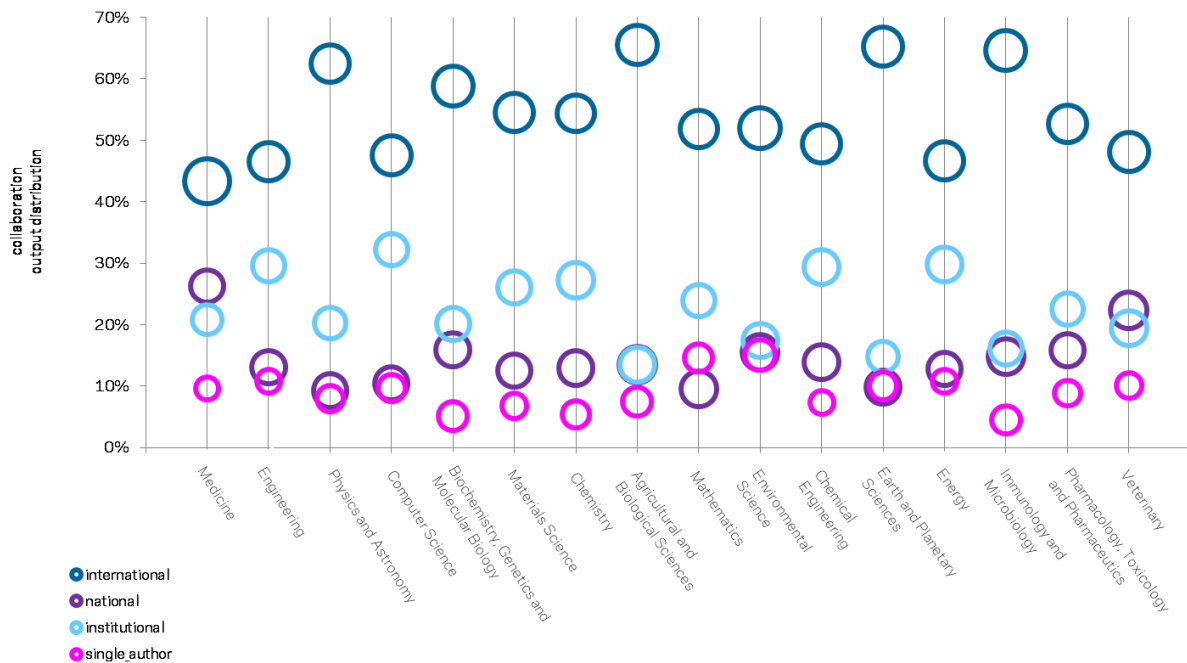


Figure B.7 — Collaboration output distribution per subject area for the United Kingdom in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

DEU

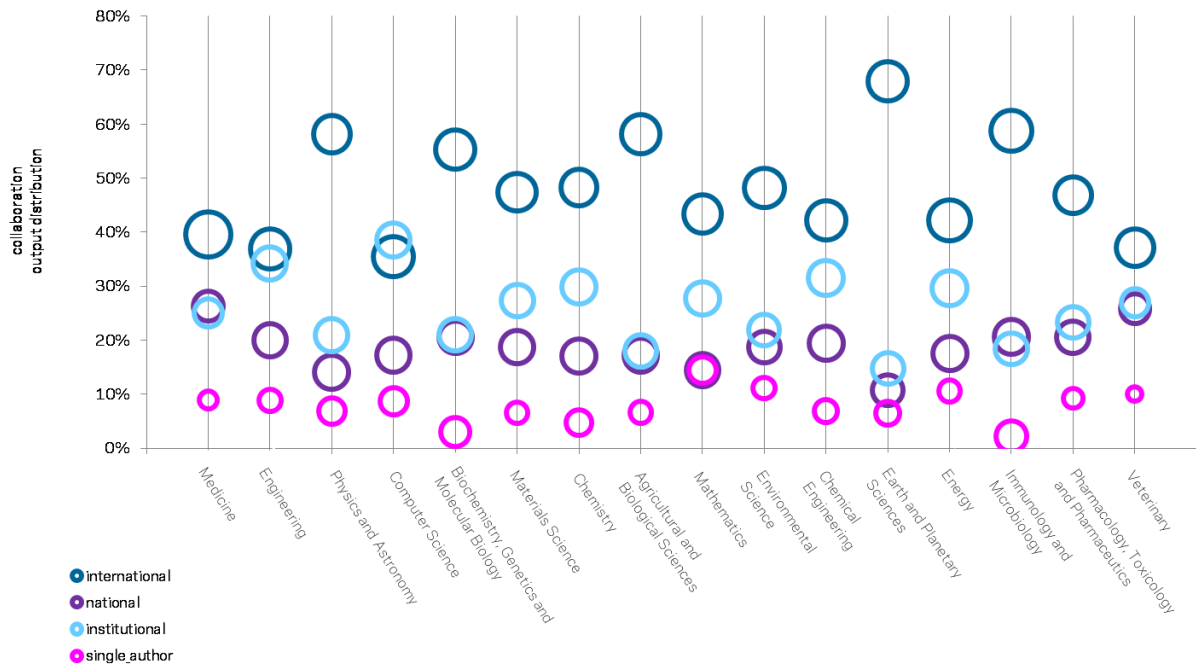


Figure B.8 — Collaboration output distribution per subject area for Germany in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

JPN

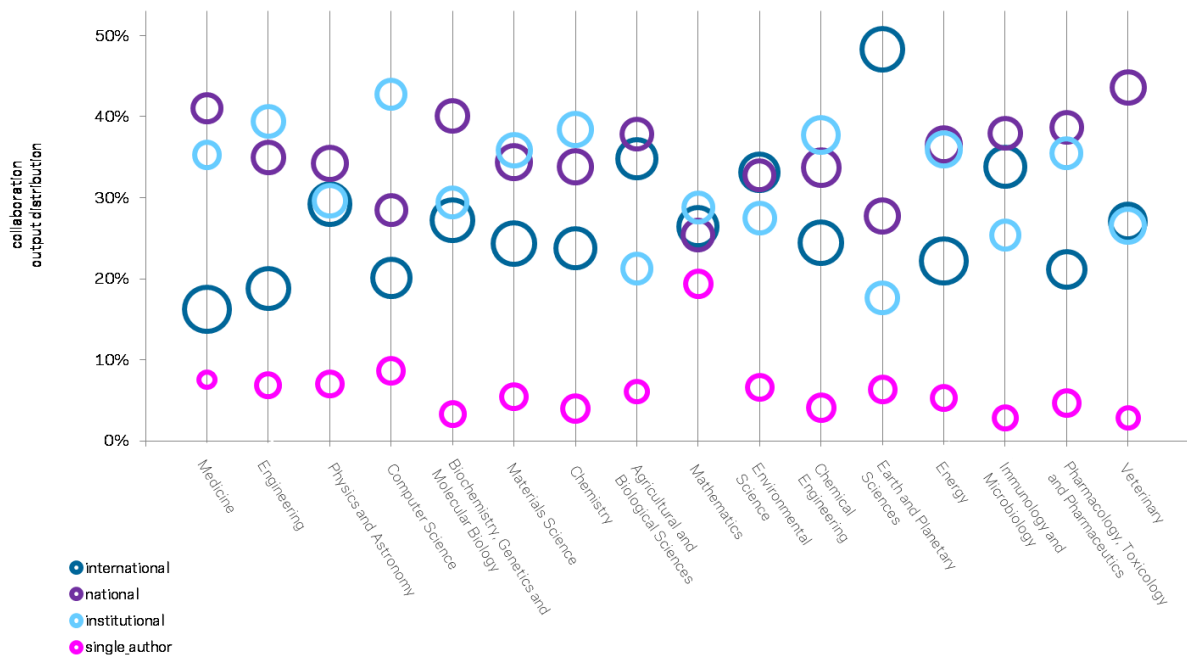


Figure B.9 — Collaboration output distribution per subject area for Japan in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

ITA

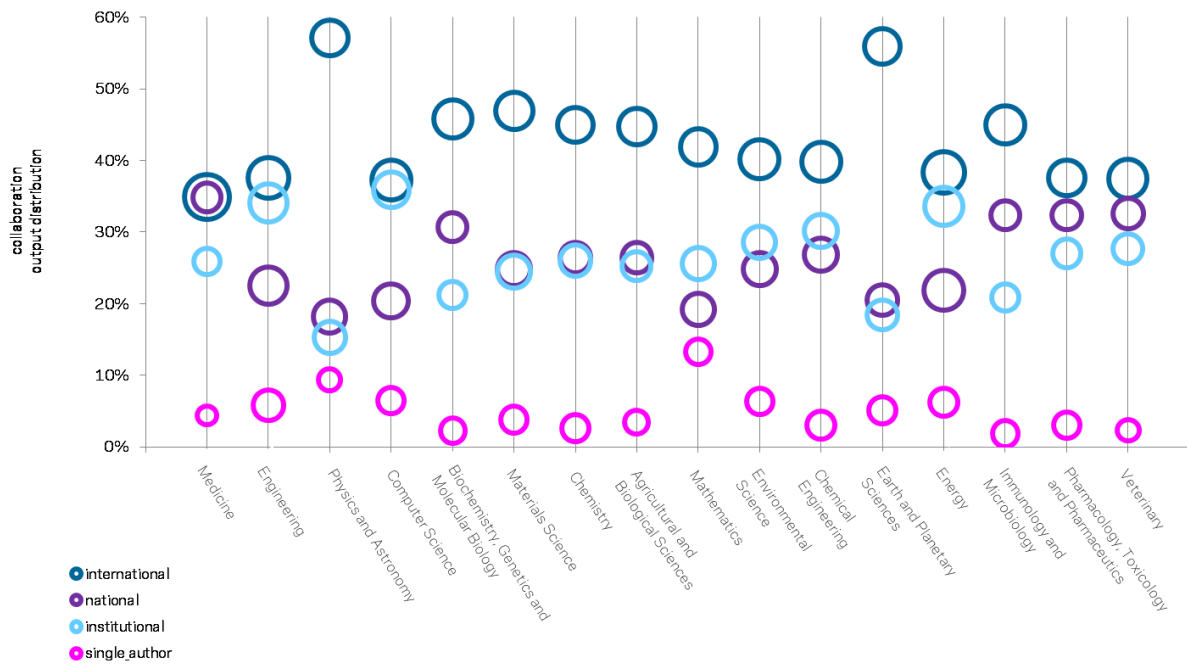


Figure B.10 — Collaboration output distribution per subject area for Italy in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

CAN

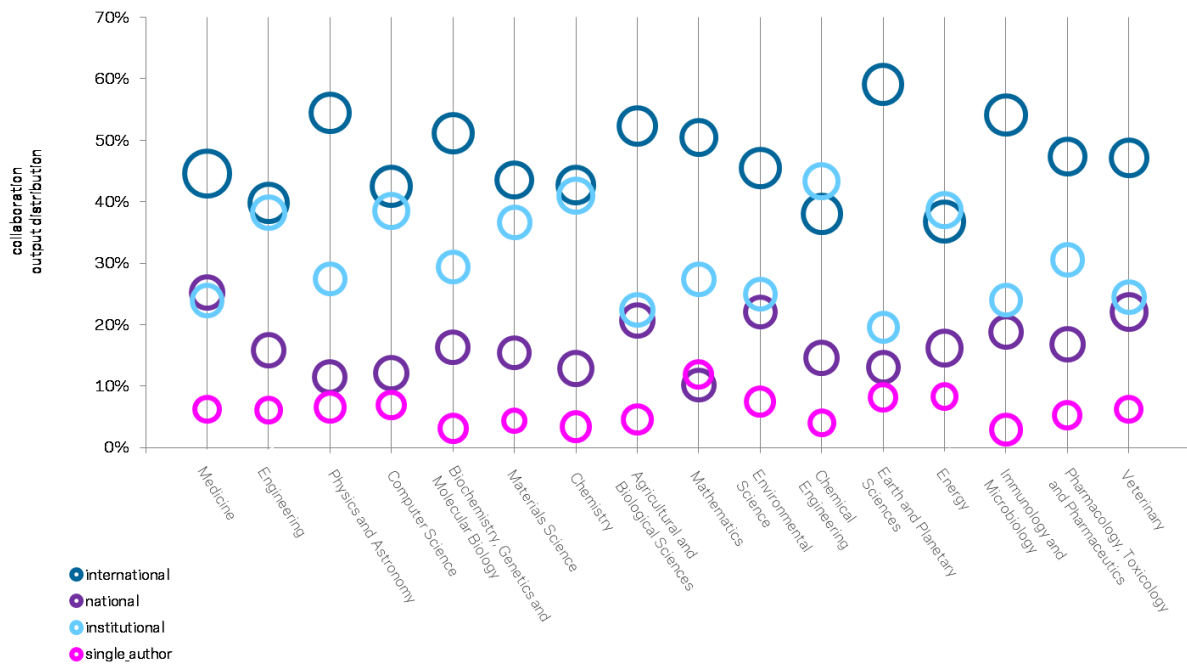


Figure B.11 — Collaboration output distribution per subject area for Canada in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

ESP

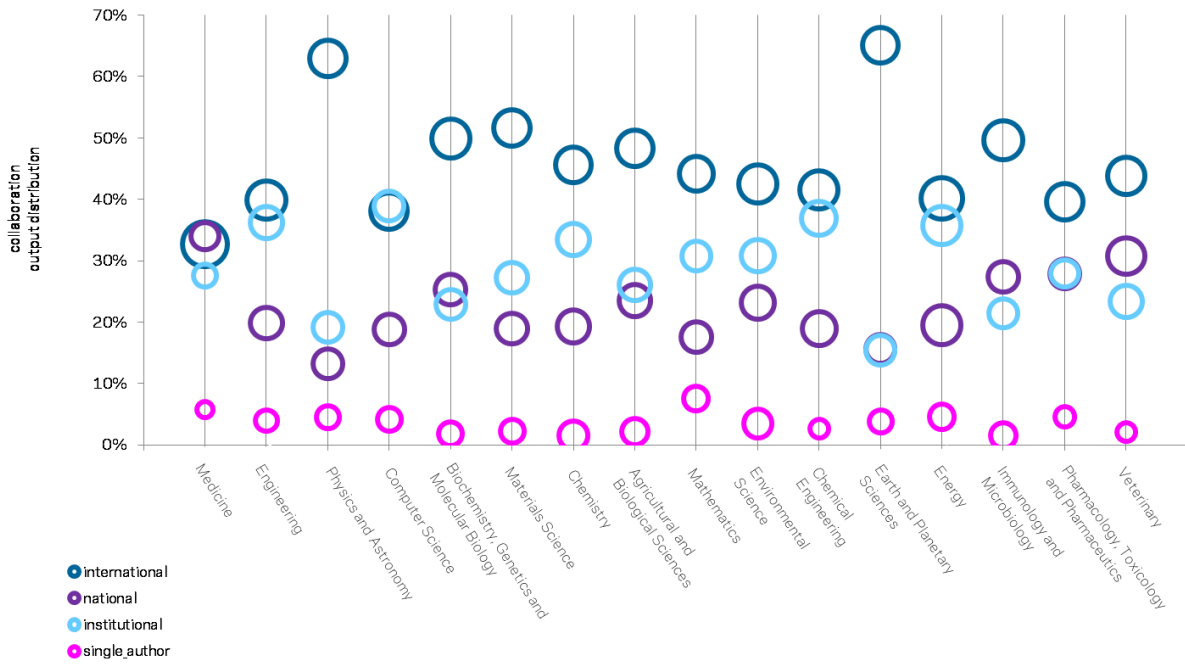


Figure B.12 — Collaboration output distribution per subject area for Spain in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

AUS

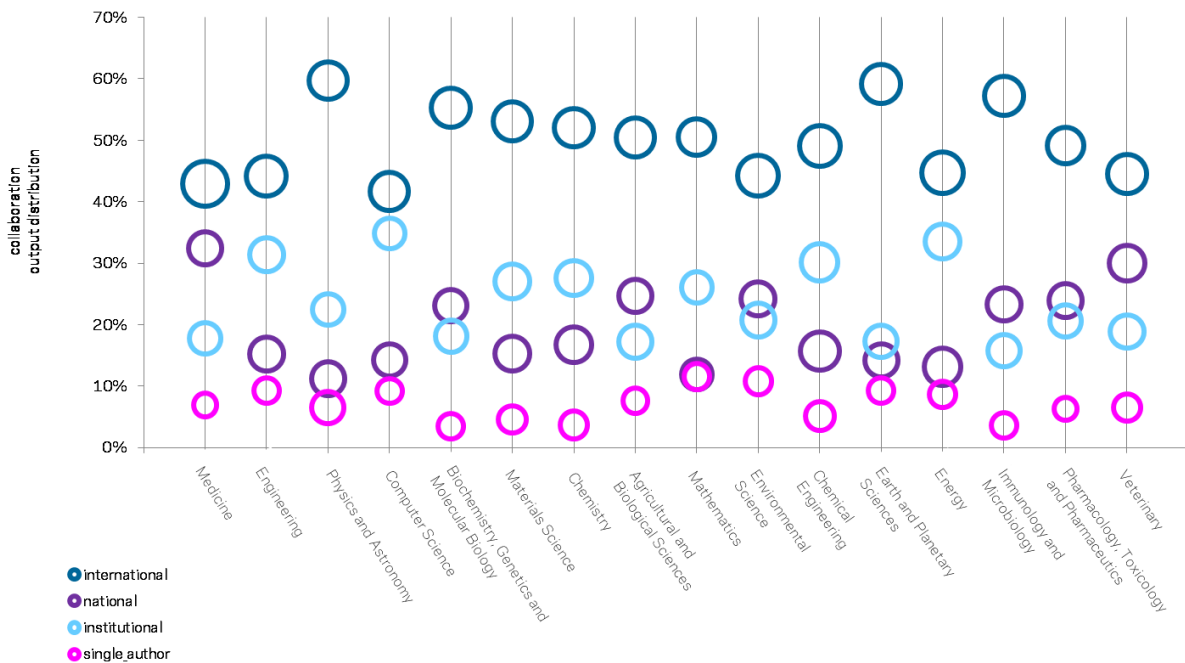


Figure B.13 — Collaboration output distribution per subject area for Australia in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

KOR

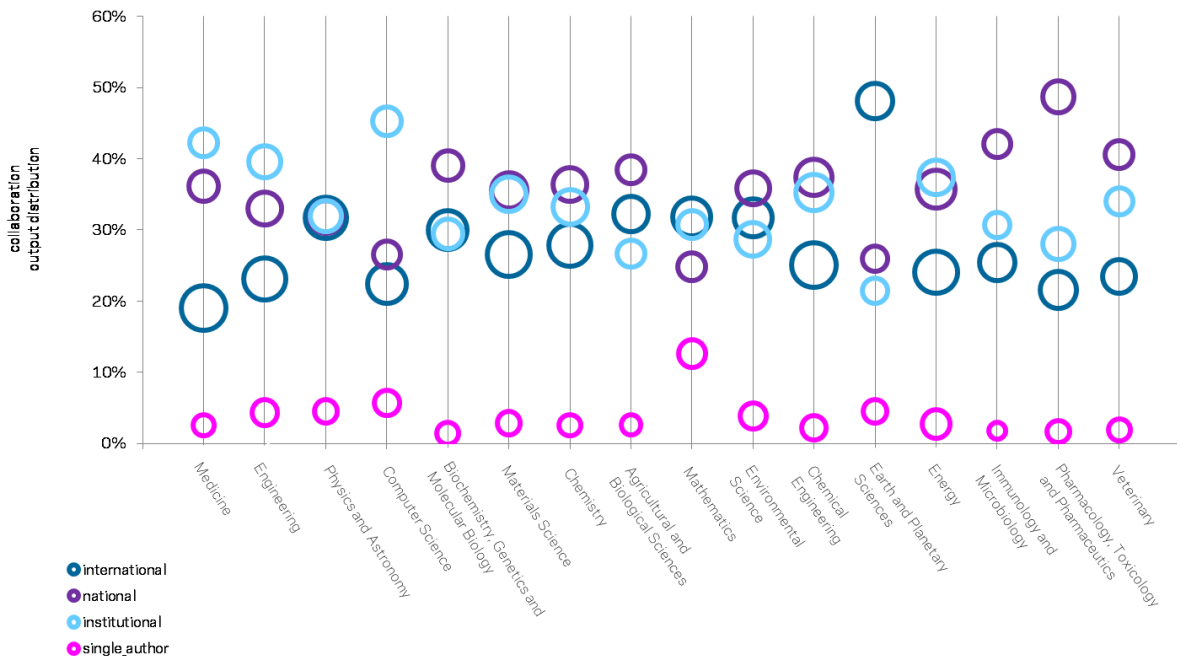


Figure B.14 — Collaboration output distribution per subject area for South Korea in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

BRA

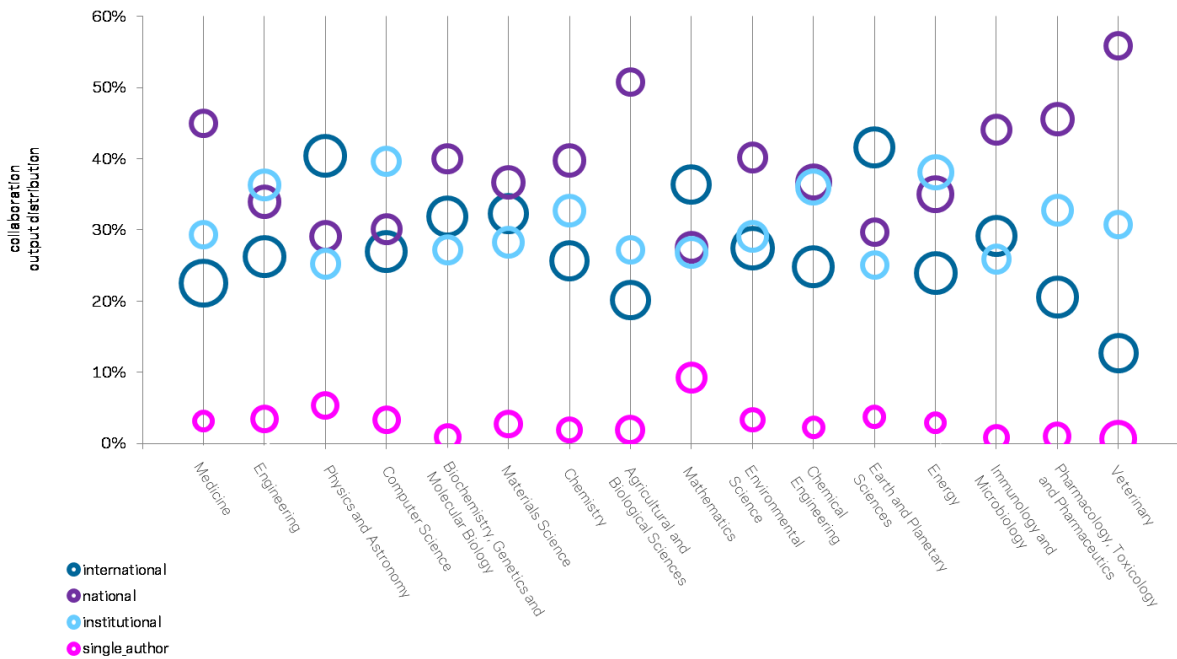


Figure B.15 — Collaboration output distribution per subject area for Brazil in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

SWE

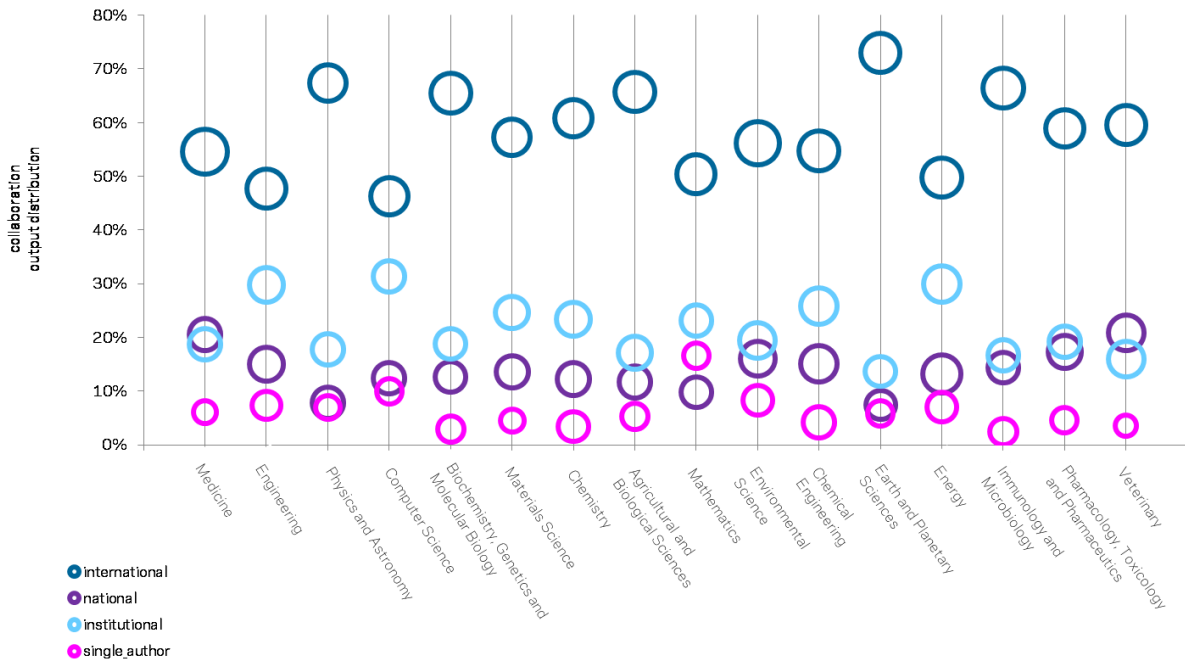


Figure B.16 — Collaboration output distribution per subject area for Sweden in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

SGP

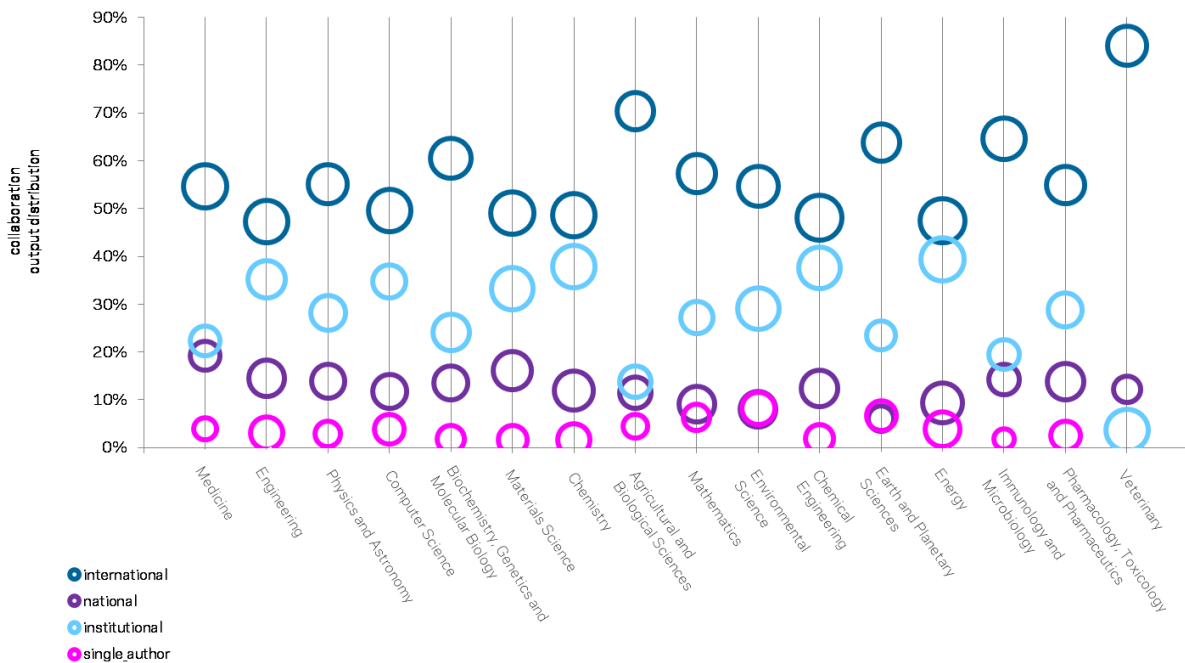


Figure B.17 — Collaboration output distribution per subject area Singapore in the period 2009-2013. Size of the nodes represents FWCI of each collaboration type. Source: Scopus database.

B-2 International Collaboration Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
G8	201,433	215,988	235,407	253,907	271,413	269,873	7.7%
BRICS	76,432	84,074	95,353	104,680	118,160	124,123	11.5%
SAARC	14,064	16,450	19,148	21,316	23,326	24,235	13.5%
USA	134,697	142,781	153,077	164,310	173,473	170,884	6.5%
CHN	41,687	47,577	54,697	61,023	70,589	74,978	14.1%
GBR	58,705	61,469	65,644	70,401	75,681	75,070	6.6%
DEU	55,560	58,504	62,215	66,423	68,860	66,507	5.5%
JPN	26,702	27,278	28,808	29,910	30,541	28,729	3.4%
IND	10,913	12,557	14,505	15,778	17,006	17,428	11.7%
ITA	28,395	30,128	32,329	35,209	37,858	37,727	7.5%
CAN	32,891	34,376	36,071	38,979	40,439	40,093	5.3%
ESP	23,746	26,155	29,187	31,813	33,465	33,515	9.0%
AUS	22,767	25,182	28,031	30,774	34,510	35,314	11.0%
KOR	13,087	14,649	16,453	17,863	18,704	18,378	9.3%
BRA	10,344	10,962	12,242	13,648	15,054	16,220	9.8%
SWE	13,696	14,686	15,933	17,505	18,539	18,537	7.9%
SGP	6,154	7,009	7,741	8,777	9,676	9,826	12.0%

Table B.1 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013.

See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences							2009-2013 CAGR
Country	2009	2010	2011	2012	2013	2014	
G8	20,757	22,454	25,940	29,537	32,314	30,912	11.7%
BRICS	7,309	8,284	10,059	11,422	13,454	13,337	16.5%
SAARC	1,425	1,891	2,194	2,335	2,700	2,657	17.3%
USA	12,253	13,444	15,411	17,691	19,273	18,256	12.0%
CHN	3,313	3,968	4,982	5,960	7,103	7,138	21.0%
GBR	5,682	6,011	6,769	7,659	8,593	7,979	10.9%
DEU	4,723	5,202	5,787	6,844	7,368	6,998	11.8%
JPN	2,210	2,389	2,703	2,982	3,155	2,789	9.3%
IND	885	1,136	1,330	1,435	1,590	1,460	15.8%
ITA	2,151	2,238	2,812	3,070	3,551	3,464	13.4%
CAN	3,282	3,583	3,958	4,610	4,820	4,524	10.1%
ESP	2,857	3,222	3,843	4,421	4,646	4,595	12.9%
AUS	2,863	3,201	3,733	4,330	4,883	4,814	14.3%
KOR	887	1,067	1,207	1,338	1,489	1,431	13.8%
BRA	1,634	1,682	1,967	2,273	2,719	2,862	13.6%
SWE	1,383	1,578	1,767	2,085	2,241	2,078	12.8%
SGP	254	315	387	468	534	537	20.4%

Table B.2 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	31,900	33,825	38,484	43,555	46,311	44,698	9.8%
BRICS	10,240	11,422	13,514	16,203	18,585	18,755	16.1%
SAARC	1,792	2,071	2,490	2,984	3,400	3,581	17.4%
USA	25,320	26,554	29,683	33,130	34,561	32,785	8.1%
CHN	5,968	6,960	8,325	10,204	11,998	12,036	19.1%
GBR	9,828	10,339	11,338	12,699	13,383	12,718	8.0%
DEU	9,561	9,852	10,833	12,041	12,262	11,752	6.4%
JPN	5,087	5,070	5,336	5,796	5,770	5,123	3.2%
IND	1,447	1,625	1,945	2,332	2,525	2,578	14.9%
ITA	4,599	4,599	5,238	5,768	6,194	5,872	7.7%
CAN	5,210	5,363	5,905	6,768	6,743	6,460	6.7%
ESP	3,604	3,885	4,508	5,110	5,143	5,147	9.3%
AUS	3,420	3,627	4,341	4,995	5,482	5,497	12.5%
KOR	1,948	2,201	2,691	2,858	3,032	2,979	11.7%
BRA	1,362	1,479	1,688	2,020	2,249	2,340	13.4%
SWE	2,696	2,798	3,098	3,522	3,600	3,479	7.5%
SGP	877	1,068	1,213	1,391	1,510	1,523	14.5%

Table B.3 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	8,314	8,847	9,887	10,311	11,310	11,878	8.0%
BRICS	3,690	4,261	4,953	5,314	6,598	7,643	15.6%
SAARC	761	964	1,156	1,201	1,524	1,815	19.0%
USA	4,646	4,998	5,407	5,660	6,022	6,281	6.7%
CHN	2,188	2,562	3,030	3,444	4,309	4,945	18.5%
GBR	1,867	1,843	2,051	2,132	2,281	2,258	5.1%
DEU	2,206	2,284	2,370	2,407	2,617	2,605	4.4%
JPN	1,260	1,227	1,407	1,522	1,538	1,546	5.1%
IND	642	805	955	931	1,221	1,484	17.4%
ITA	930	914	975	1,036	1,215	1,239	6.9%
CAN	1,110	987	1,180	1,137	1,147	1,265	0.8%
ESP	1,030	1,126	1,266	1,336	1,423	1,530	8.4%
AUS	694	793	885	953	1,206	1,382	14.8%
KOR	856	971	1,167	1,286	1,384	1,474	12.8%
BRA	369	402	411	434	528	617	9.4%
SWE	458	494	502	528	609	646	7.4%
SGP	373	414	443	554	611	691	13.1%

Table B.4 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	19,706	20,751	23,058	23,752	25,444	26,054	6.6%
BRICS	9,470	10,639	12,023	12,841	14,420	16,132	11.1%
SAARC	2,346	2,788	3,210	3,469	3,582	3,830	11.2%
USA	9,904	10,506	11,783	12,225	13,020	13,537	7.1%
CHN	5,071	5,822	6,692	7,311	8,508	9,717	13.8%
GBR	4,135	4,302	4,850	4,855	5,194	5,189	5.9%
DEU	6,147	6,237	6,666	6,949	7,171	6,922	3.9%
JPN	3,004	2,893	3,325	3,349	3,444	3,376	3.5%
IND	1,908	2,233	2,634	2,744	2,857	3,151	10.6%
ITA	2,471	2,480	2,708	2,820	3,046	3,054	5.4%
CAN	2,100	2,056	2,354	2,373	2,398	2,563	3.4%
ESP	2,812	3,022	3,441	3,546	3,661	3,745	6.8%
AUS	1,492	1,603	1,955	2,083	2,445	2,590	13.1%
KOR	1,724	2,003	2,387	2,526	2,635	2,607	11.2%
BRA	799	890	897	1,011	1,114	1,329	8.7%
SWE	1,105	1,171	1,283	1,356	1,379	1,496	5.7%
SGP	638	742	873	953	1,106	1,182	14.7%

Table B.5 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	25,097	27,099	28,577	31,235	33,249	32,974	7.3%
BRICS	10,834	11,704	12,794	14,159	16,056	16,497	10.3%
SAARC	1,702	1,890	2,227	2,476	2,645	2,705	11.7%
USA	15,142	15,971	16,725	17,939	18,822	18,481	5.6%
CHN	7,904	8,573	9,239	10,324	11,728	12,131	10.4%
GBR	6,172	6,551	6,784	7,303	8,057	7,903	6.9%
DEU	5,555	6,006	6,224	6,787	6,969	6,669	5.8%
JPN	3,034	3,086	3,092	3,412	3,396	3,121	2.9%
IND	1,256	1,397	1,644	1,775	1,868	1,852	10.4%
ITA	3,174	3,482	3,674	4,098	4,302	4,352	7.9%
CAN	4,135	4,215	4,220	4,443	4,765	4,730	3.6%
ESP	3,028	3,399	3,615	3,998	4,079	4,040	7.7%
AUS	2,492	2,785	2,928	3,182	3,592	3,628	9.6%
KOR	1,793	2,013	2,087	2,281	2,327	2,069	6.7%
BRA	971	1,007	1,114	1,303	1,512	1,558	11.7%
SWE	1,221	1,273	1,494	1,578	1,762	1,770	9.6%
SGP	1,467	1,561	1,724	1,895	2,130	2,141	9.8%

Table B.6 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	15,057	16,201	16,752	18,537	20,080	19,982	7.5%
BRICS	5,689	6,143	6,846	7,299	8,853	9,354	11.7%
SAARC	832	843	1,047	1,153	1,305	1,331	11.9%
USA	10,756	11,198	11,501	12,389	13,336	13,175	5.5%
CHN	2,762	3,303	3,613	3,984	5,014	5,532	16.1%
GBR	5,058	5,504	5,409	5,824	6,315	6,113	5.7%
DEU	4,882	5,494	5,558	6,293	6,397	6,251	7.0%
JPN	2,078	2,039	2,108	2,266	2,462	2,352	4.3%
IND	699	723	847	932	1,057	1,064	10.9%
ITA	2,660	2,971	2,887	3,375	3,293	3,234	5.5%
CAN	2,624	2,879	2,858	3,105	3,242	3,281	5.4%
ESP	1,923	2,425	2,409	2,723	2,810	2,874	9.9%
AUS	2,101	2,398	2,591	2,936	3,231	3,189	11.4%
KOR	618	733	680	855	857	901	8.5%
BRA	676	690	801	769	965	977	9.3%
SWE	925	1,086	1,011	1,142	1,183	1,251	6.3%
SGP	84	128	128	188	209	219	25.6%

Table B.7 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Earth and Planetary Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	5,130	5,159	5,789	6,103	7,574	8,248	10.2%
BRICS	2,365	2,584	2,901	3,056	3,974	4,798	13.9%
SAARC	403	402	539	507	668	802	13.5%
USA	3,048	3,006	3,196	3,318	4,184	4,472	8.2%
CHN	1,408	1,709	1,839	1,993	2,704	3,397	17.7%
GBR	1,311	1,223	1,323	1,239	1,747	1,833	7.4%
DEU	1,264	1,075	1,507	1,342	1,685	1,668	7.5%
JPN	814	809	868	764	1,044	1,008	6.4%
IND	323	339	430	389	518	573	12.5%
ITA	604	570	815	764	995	1,021	13.3%
CAN	838	805	817	814	988	1,058	4.2%
ESP	539	514	753	704	981	1,008	16.2%
AUS	495	558	569	639	906	1,007	16.3%
KOR	444	451	525	551	600	732	7.8%
BRA	233	243	277	303	335	419	9.5%
SWE	305	401	420	423	575	597	17.2%
SGP	126	191	175	202	302	309	24.4%

Table B.8 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Energy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	34,500	36,763	38,911	41,305	44,835	45,601	6.8%
BRICS	15,817	17,389	19,419	21,198	24,340	26,477	11.4%
SAARC	2,472	2,786	3,187	3,550	4,028	4,375	13.0%
USA	20,256	21,347	21,572	22,970	24,826	24,597	5.2%
CHN	10,682	12,154	13,711	15,129	17,380	19,203	12.9%
GBR	7,893	8,139	8,622	8,973	9,776	10,170	5.5%
DEU	7,676	7,851	8,109	8,427	8,881	8,827	3.7%
JPN	5,319	5,411	5,501	5,621	5,604	5,545	1.3%
IND	2,015	2,185	2,476	2,641	3,005	3,102	10.5%
ITA	4,336	4,591	4,879	5,158	5,597	6,012	6.6%
CAN	4,916	5,199	5,008	5,376	5,536	5,733	3.0%
ESP	3,526	3,601	4,018	4,236	4,605	4,906	6.9%
AUS	3,147	3,533	3,851	4,112	4,668	5,023	10.4%
KOR	3,415	3,748	4,111	4,394	4,533	4,404	7.3%
BRA	1,347	1,440	1,454	1,705	1,866	2,107	8.5%
SWE	1,885	1,991	2,133	2,317	2,455	2,608	6.8%
SGP	1,862	1,957	2,006	2,176	2,455	2,605	7.2%

Table B.9 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Environmental Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	10,974	11,893	13,436	14,596	15,969	16,487	9.8%
BRICS	4,337	4,748	5,809	6,166	7,156	7,854	13.3%
SAARC	956	1,060	1,248	1,435	1,639	1,749	14.4%
USA	6,296	6,921	7,985	8,342	9,167	9,352	9.8%
CHN	2,423	2,743	3,490	3,683	4,390	5,068	16.0%
GBR	3,029	3,235	3,553	3,881	4,208	4,449	8.6%
DEU	2,261	2,576	2,851	3,079	3,263	3,369	9.6%
JPN	1,179	1,151	1,302	1,293	1,471	1,433	5.7%
IND	633	718	858	954	1,060	1,024	13.8%
ITA	1,186	1,285	1,450	1,565	1,790	1,929	10.8%
CAN	1,916	2,134	2,331	2,508	2,689	2,631	8.8%
ESP	1,290	1,562	1,881	2,007	2,223	2,239	14.6%
AUS	1,504	1,615	1,908	2,180	2,523	2,685	13.8%
KOR	545	608	741	835	900	928	13.4%
BRA	628	655	750	810	931	995	10.3%
SWE	796	929	970	1,151	1,303	1,299	13.1%
SGP	178	180	233	309	351	390	18.5%

Table B.10 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Environmental Science. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Immunology and Microbiology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	9,027	9,528	10,513	10,822	11,547	11,352	6.3%
BRICS	2,631	2,988	3,501	3,674	4,174	4,345	12.2%
SAARC	584	701	787	814	928	953	12.3%
USA	6,402	6,744	7,371	7,606	8,017	7,894	5.8%
CHN	1,159	1,372	1,729	1,796	2,171	2,398	17.0%
GBR	2,998	3,102	3,329	3,266	3,348	3,375	2.8%
DEU	2,473	2,596	2,627	2,721	2,783	2,869	3.0%
JPN	1,274	1,278	1,319	1,378	1,392	1,254	2.2%
IND	401	492	516	562	632	633	12.0%
ITA	1,071	1,150	1,261	1,306	1,318	1,394	5.3%
CAN	1,227	1,313	1,352	1,377	1,457	1,372	4.4%
ESP	917	1,000	1,137	1,259	1,270	1,277	8.5%
AUS	969	1,023	1,078	1,194	1,311	1,311	7.8%
KOR	517	585	608	618	714	697	8.4%
BRA	533	586	690	738	765	814	9.5%
SWE	743	822	827	832	852	861	3.5%
SGP	168	210	220	266	280	300	13.6%

Table B.11 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	22,743	23,605	26,031	27,479	28,158	29,370	5.5%
BRICS	11,563	12,188	13,822	14,730	16,043	17,784	8.5%
SAARC	2,484	2,884	3,311	3,315	3,411	3,541	8.3%
USA	11,734	12,272	13,431	14,571	14,621	15,545	5.7%
CHN	6,319	6,802	7,971	8,658	9,817	11,071	11.6%
GBR	4,799	4,708	5,089	5,500	5,497	5,818	3.5%
DEU	7,071	7,213	7,622	7,900	7,927	7,714	2.9%
JPN	4,055	4,133	4,402	4,368	4,240	4,336	1.1%
IND	2,106	2,387	2,733	2,646	2,755	2,867	6.9%
ITA	2,619	2,658	2,879	3,129	3,201	3,458	5.1%
CAN	2,385	2,255	2,374	2,663	2,512	2,711	1.3%
ESP	2,501	2,605	2,879	3,182	3,154	3,315	6.0%
AUS	1,759	1,976	2,095	2,378	2,671	2,886	11.0%
KOR	2,445	2,680	3,229	3,336	3,374	3,455	8.4%
BRA	944	1,011	965	1,175	1,108	1,350	4.1%
SWE	1,229	1,268	1,441	1,523	1,562	1,663	6.2%
SGP	1,001	1,076	1,208	1,355	1,453	1,527	9.8%

Table B.12 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics							
Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
G8	16,695	17,765	19,073	20,362	21,571	20,905	6.6%
BRICS	7,499	7,930	8,516	9,554	10,604	10,984	9.0%
SAARC	1,163	1,403	1,646	1,839	1,961	1,913	14.0%
USA	10,402	10,839	11,220	12,055	12,295	11,853	4.3%
CHN	4,625	4,859	5,121	5,987	6,735	7,030	9.9%
GBR	4,210	4,452	4,664	4,768	5,249	5,143	5.7%
DEU	4,278	4,712	4,967	5,028	5,288	5,131	5.4%
JPN	1,722	1,815	1,848	2,031	1,913	1,898	2.7%
IND	885	1,062	1,219	1,328	1,463	1,400	13.4%
ITA	2,516	2,787	2,892	3,214	3,404	3,376	7.8%
CAN	2,863	2,912	2,851	3,083	3,125	3,101	2.2%
ESP	2,204	2,375	2,585	2,754	2,804	2,808	6.2%
AUS	1,632	1,626	1,801	1,987	2,098	2,126	6.5%
KOR	1,090	1,175	1,210	1,490	1,478	1,443	7.9%
BRA	827	910	939	1,035	1,134	1,196	8.2%
SWE	735	731	861	877	1,008	942	8.2%
SGP	652	754	700	817	894	888	8.2%

Table B.13 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Medicine							
Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
G8	46,719	54,195	56,592	63,080	72,055	84,546	11.4%
BRICS	11,998	15,044	16,329	18,896	22,767	29,079	17.4%
SAARC	2,519	3,148	3,532	4,083	4,704	6,152	16.9%
USA	36,944	42,317	43,228	47,561	53,482	61,758	9.7%
CHN	5,940	7,909	8,652	10,033	12,674	16,297	20.9%
GBR	16,390	18,488	19,098	21,079	23,968	26,985	10.0%
DEU	12,465	14,247	14,114	15,902	17,595	20,608	9.0%
JPN	4,989	5,606	5,328	5,848	6,557	7,487	7.1%
IND	1,791	2,289	2,495	2,890	3,317	4,298	16.7%
ITA	7,369	8,379	8,765	9,808	11,086	12,541	10.7%
CAN	9,278	10,390	10,648	11,757	13,094	15,001	9.0%
ESP	4,657	5,649	5,980	6,613	7,658	9,589	13.2%
AUS	6,422	7,517	7,910	8,893	10,624	12,574	13.4%
KOR	1,891	2,450	2,573	2,912	3,513	4,377	16.7%
BRA	2,622	2,962	3,300	3,711	4,268	5,324	13.0%
SWE	4,403	4,940	5,181	5,774	6,482	7,273	10.2%
SGP	1,048	1,383	1,484	1,698	2,106	2,357	19.1%

Table B.14 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	6,207	6,980	7,641	8,277	8,467	8,584	8.1%
BRICS	2,319	2,761	3,090	3,520	3,786	4,098	13.0%
SAARC	640	844	1,025	1,098	1,233	1,358	17.8%
USA	4,455	4,887	5,370	5,801	5,958	5,919	7.5%
CHN	1,276	1,493	1,603	1,856	2,077	2,214	13.0%
GBR	1,819	2,098	2,301	2,426	2,485	2,379	8.1%
DEU	1,531	1,659	1,798	1,877	1,893	1,826	5.4%
JPN	917	958	963	983	896	821	-0.6%
IND	509	655	789	848	924	981	16.1%
ITA	1,001	1,055	1,152	1,175	1,312	1,258	7.0%
CAN	833	841	996	1,008	1,038	1,019	5.7%
ESP	632	702	774	866	925	835	10.0%
AUS	550	627	684	796	908	856	13.4%
KOR	420	492	535	555	560	531	7.5%
BRA	321	367	415	488	459	550	9.4%
SWE	393	467	501	556	531	524	7.8%
SGP	133	159	168	194	214	190	12.6%

Table B.15 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Pharmacology, Toxicology and Pharmaceutics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	37,135	39,558	42,247	43,733	43,940	43,026	4.3%
BRICS	17,460	18,692	20,467	21,597	22,546	23,398	6.6%
SAARC	3,183	3,859	4,356	4,592	4,399	4,467	8.4%
USA	22,479	23,911	24,941	26,559	25,995	25,490	3.7%
CHN	7,760	8,689	9,696	10,669	11,562	12,258	10.5%
GBR	9,881	10,293	10,740	11,110	11,469	11,423	3.8%
DEU	14,419	15,442	15,987	16,375	16,146	15,002	2.9%
JPN	6,811	7,014	7,252	7,255	6,973	6,671	0.6%
IND	2,752	3,263	3,654	3,779	3,619	3,731	7.1%
ITA	6,777	7,282	7,336	7,906	7,834	7,776	3.7%
CAN	4,292	4,611	4,703	5,014	4,747	4,834	2.6%
ESP	5,286	5,940	6,388	6,793	6,481	6,291	5.2%
AUS	2,842	3,143	3,501	3,909	4,046	3,990	9.2%
KOR	3,127	3,380	3,875	3,985	3,980	3,862	6.2%
BRA	1,759	1,905	2,039	2,342	2,458	2,708	8.7%
SWE	2,295	2,591	2,719	2,916	2,819	2,852	5.3%
SGP	1,183	1,268	1,365	1,504	1,585	1,649	7.6%

Table B.16 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
G8	1,848	1,922	1,972	2,209	2,235	2,078	4.9%
BRICS	520	523	632	711	759	697	9.9%
SAARC	107	144	119	198	178	189	13.6%
USA	1,062	1,130	1,155	1,302	1,322	1,233	5.6%
CHN	128	144	173	229	231	226	15.9%
GBR	640	609	643	697	653	643	0.5%
DEU	398	402	378	461	403	412	0.3%
JPN	162	146	164	200	171	151	1.4%
IND	70	95	70	89	87	109	5.6%
ITA	232	259	232	282	310	305	7.5%
CAN	280	293	308	372	344	333	5.3%
ESP	227	250	282	325	319	303	8.9%
AUS	212	249	254	279	292	288	8.3%
KOR	86	100	88	97	120	95	8.7%
BRA	220	206	279	263	299	269	8.0%
SWE	122	136	131	143	128	137	1.2%
SGP	13	12	19	16	9	11	-8.8%

Table B.17 — Annual internationally collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

B-3 International Collaboration Shares Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
G8	19.3%	20.1%	21.1%	22.3%	23.5%	24.4%	5.0%
BRICS	16.4%	16.3%	16.2%	16.8%	17.7%	17.8%	1.8%
SAARC	19.5%	19.2%	18.5%	18.7%	19.2%	19.0%	-0.4%
USA	27.2%	27.9%	28.7%	30.2%	31.6%	32.7%	3.8%
CHN	13.4%	13.7%	13.8%	14.8%	15.8%	16.1%	4.2%
GBR	43.5%	44.5%	45.4%	46.9%	48.6%	50.5%	2.8%
DEU	43.1%	43.9%	44.5%	45.6%	46.8%	46.6%	2.1%
JPN	21.8%	22.1%	22.8%	23.7%	24.4%	25.1%	2.8%
IND	17.3%	16.8%	16.0%	15.9%	16.0%	15.6%	-1.9%
ITA	37.8%	39.4%	40.5%	41.1%	41.9%	42.6%	2.6%
CAN	42.5%	43.1%	43.9%	45.5%	46.6%	47.6%	2.4%
ESP	38.0%	39.6%	40.8%	42.0%	43.5%	44.7%	3.4%
AUS	41.2%	42.1%	43.4%	45.0%	46.3%	47.3%	3.0%
KOR	24.8%	25.0%	25.6%	26.1%	26.3%	25.6%	1.5%
BRA	23.0%	22.6%	23.5%	23.8%	25.3%	27.3%	2.3%
SWE	52.1%	53.0%	54.1%	55.7%	56.5%	56.4%	2.1%
SGP	47.9%	49.0%	51.3%	53.6%	56.6%	58.1%	4.3%

Table B.18 — Annual internationally collaborated publications as share of country's total output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Country	Medicine	Engineering	Physics and Astronomy	Computer Science	Biochemistry, Genetics and Molecular Biology	Materials Science	Chemistry	Agricultural and Biological Sciences
G8	18.6%	21.4%	27.7%	23.1%	25.3%	25.8%	26.4%	33.3%
BRICS	19.4%	11.3%	22.1%	14.8%	24.3%	17.1%	17.7%	23.2%
SAARC	18.0%	17.0%	28.7%	15.5%	21.2%	24.8%	21.8%	20.5%
USA	27.4%	27.3%	41.2%	30.9%	36.7%	34.3%	35.0%	40.6%
CHN	17.8%	9.7%	16.7%	13.9%	24.0%	13.9%	15.6%	24.1%
GBR	44.3%	46.6%	62.6%	47.9%	59.1%	54.6%	54.5%	65.4%
DEU	40.3%	37.2%	58.3%	35.9%	55.4%	47.4%	48.2%	58.5%
JPN	16.6%	19.2%	29.6%	20.5%	27.3%	24.7%	24.1%	34.8%
IND	15.5%	14.2%	26.3%	12.7%	17.8%	22.1%	19.2%	15.4%
ITA	35.5%	37.7%	57.3%	37.6%	45.8%	47.3%	45.4%	45.3%
CAN	45.1%	40.4%	55.1%	43.3%	51.4%	44.0%	43.5%	52.4%
ESP	33.9%	40.5%	63.4%	39.0%	50.3%	51.8%	46.3%	49.1%
AUS	43.5%	44.9%	60.0%	43.1%	55.4%	53.3%	52.9%	51.1%
KOR	19.5%	22.9%	32.0%	22.4%	29.7%	26.6%	28.0%	31.8%
BRA	23.3%	26.8%	41.0%	27.4%	32.3%	32.2%	26.6%	20.6%
SWE	55.1%	48.2%	67.6%	46.9%	65.8%	57.8%	61.0%	65.9%
SGP	55.2%	48.6%	56.5%	50.9%	61.4%	50.3%	50.0%	71.1%

Table B.19a — Internationally collaborated publications per subject area as share of country's total output per subject area for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Mathematics	Environmental Science	Chemical Engineering	Earth and Planetary Sciences	Energy	Immunology and Microbiology	Pharmacology, Toxicology and Pharmaceuticals	Veterinary
G8	25.1%	27.6%	23.8%	32.2%	21.1%	29.7%	22.6%	24.9%
BRICS	19.9%	20.7%	16.0%	23.0%	13.2%	25.2%	13.8%	14.0%
SAARC	26.0%	20.9%	19.5%	27.4%	16.0%	25.5%	10.4%	10.3%
USA	35.9%	32.3%	29.5%	44.7%	25.7%	39.7%	30.9%	31.1%
CHN	17.4%	19.7%	14.6%	18.8%	11.8%	22.8%	15.2%	18.9%
GBR	52.2%	52.4%	49.6%	65.6%	46.7%	64.5%	53.2%	48.7%
DEU	43.8%	49.1%	42.3%	68.3%	42.5%	58.5%	47.1%	37.2%
JPN	26.7%	33.4%	25.0%	48.9%	22.9%	34.2%	21.2%	27.3%
IND	22.1%	15.6%	17.0%	24.6%	13.6%	20.4%	8.5%	6.5%
ITA	42.3%	40.9%	40.3%	56.5%	38.5%	44.6%	38.0%	38.2%
CAN	51.2%	45.7%	38.9%	59.3%	37.4%	53.8%	48.1%	47.6%
ESP	44.9%	43.2%	42.1%	65.3%	41.1%	50.0%	39.9%	44.5%
AUS	51.4%	45.1%	50.4%	59.6%	45.1%	57.0%	49.4%	44.8%
KOR	32.3%	31.5%	25.3%	47.7%	24.5%	25.2%	21.7%	22.8%
BRA	36.4%	27.5%	25.2%	41.6%	25.3%	29.5%	21.2%	12.6%
SWE	50.9%	56.5%	55.1%	73.7%	50.3%	66.5%	59.3%	60.7%
SGP	58.7%	55.8%	49.5%	65.5%	47.5%	65.2%	55.4%	80.0%

Table B.19b — Internationally collaborated publications per subject area as share of country's total output per subject area for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

B-4 International Collaboration FWCI Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.60	1.62	1.63	1.63	1.62	1.61	1.62	1.62	0.3%
BRICS	1.41	1.45	1.48	1.51	1.52	1.52	1.48	1.49	1.8%
SAARC	1.24	1.27	1.29	1.31	1.32	1.33	1.29	1.30	1.5%
USA	1.87	1.88	1.89	1.88	1.86	1.84	1.88	1.87	-0.1%
CHN	1.54	1.59	1.63	1.66	1.64	1.62	1.63	1.63	1.6%
GBR	1.95	1.97	1.98	1.98	1.98	1.97	1.97	1.97	0.3%
DEU	1.81	1.82	1.84	1.85	1.86	1.87	1.83	1.84	0.7%
JPN	1.49	1.51	1.55	1.58	1.59	1.60	1.54	1.56	1.7%
IND	1.30	1.33	1.36	1.38	1.39	1.42	1.35	1.37	1.8%
ITA	1.88	1.91	1.93	1.96	1.96	1.97	1.93	1.94	1.1%
CAN	1.92	1.93	1.95	1.94	1.93	1.90	1.94	1.93	0.1%
ESP	1.72	1.74	1.77	1.79	1.79	1.80	1.76	1.78	1.1%
AUS	1.88	1.92	1.95	1.98	1.97	1.96	1.94	1.95	1.2%
KOR	1.54	1.60	1.64	1.65	1.62	1.59	1.63	1.62	1.3%
BRA	1.41	1.45	1.46	1.46	1.44	1.41	1.45	1.43	0.4%
SWE	1.95	1.98	1.99	2.01	2.00	2.01	1.99	1.99	0.7%
SGP	1.92	2.04	2.09	2.11	2.06	2.02	2.07	2.06	1.8%

Table B.20 — Field-weighted citation impact (FWCI) of internationally collaborated publications per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.49	1.50	1.50	1.50	1.48	1.46	1.50	1.49	-0.2%
BRICS	1.28	1.30	1.32	1.32	1.32	1.31	1.31	1.31	0.8%
SAARC	1.09	1.12	1.12	1.13	1.13	1.14	1.12	1.13	1.1%
USA	1.70	1.70	1.71	1.67	1.63	1.59	1.68	1.66	-1.0%
CHN	1.39	1.43	1.43	1.43	1.40	1.37	1.42	1.42	0.1%
GBR	1.88	1.88	1.86	1.83	1.80	1.78	1.85	1.84	-1.1%
DEU	1.73	1.75	1.76	1.76	1.75	1.75	1.75	1.76	0.3%
JPN	1.34	1.33	1.43	1.38	1.38	1.31	1.37	1.36	0.8%
IND	1.13	1.18	1.21	1.22	1.22	1.20	1.20	1.20	1.9%
ITA	1.68	1.68	1.67	1.68	1.69	1.69	1.67	1.69	0.1%
CAN	1.75	1.71	1.70	1.66	1.65	1.63	1.70	1.68	-1.4%
ESP	1.63	1.62	1.62	1.61	1.59	1.58	1.62	1.61	-0.6%
AUS	1.75	1.76	1.78	1.79	1.81	1.82	1.78	1.80	0.7%
KOR	1.24	1.25	1.25	1.24	1.17	1.13	1.24	1.23	-1.5%
BRA	1.24	1.23	1.24	1.24	1.23	1.21	1.24	1.24	-0.3%
SWE	1.87	1.86	1.85	1.84	1.83	1.82	1.85	1.85	-0.5%
SGP	1.74	1.79	1.81	1.67	1.56	1.45	1.70	1.65	-2.7%

Table B.21 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Agricultural and Biological Sciences per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.56	1.59	1.60	1.62	1.60	1.60	1.60	1.60	0.7%
BRICS	1.32	1.39	1.43	1.45	1.46	1.46	1.42	1.43	2.6%
SAARC	1.07	1.15	1.19	1.20	1.20	1.20	1.18	1.19	2.8%
USA	1.79	1.81	1.82	1.82	1.80	1.80	1.81	1.81	0.2%
CHN	1.42	1.50	1.54	1.56	1.55	1.54	1.54	1.54	2.1%
GBR	1.92	1.95	1.93	1.94	1.93	1.96	1.93	1.94	0.1%
DEU	1.78	1.80	1.82	1.85	1.86	1.88	1.82	1.84	1.1%
JPN	1.51	1.53	1.60	1.61	1.62	1.60	1.58	1.58	1.6%
IND	1.12	1.19	1.23	1.25	1.28	1.31	1.22	1.24	3.3%
ITA	1.77	1.79	1.80	1.82	1.83	1.84	1.81	1.82	0.8%
CAN	1.77	1.79	1.78	1.81	1.81	1.85	1.78	1.81	0.7%
ESP	1.67	1.75	1.78	1.82	1.82	1.84	1.78	1.80	2.2%
AUS	1.75	1.79	1.82	1.86	1.87	1.89	1.83	1.85	1.7%
KOR	1.44	1.51	1.55	1.58	1.54	1.52	1.54	1.54	1.7%
BRA	1.25	1.29	1.32	1.34	1.37	1.39	1.32	1.32	2.4%
SWE	1.85	1.87	1.89	1.92	1.95	1.97	1.91	1.92	1.4%
SGP	1.91	2.03	2.08	2.10	2.07	2.05	2.06	2.05	2.1%

Table B.22 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Biochemistry, Genetics and Molecular Biology per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.71	1.77	1.78	1.77	1.73	1.70	1.76	1.75	0.2%
BRICS	1.80	1.85	1.87	1.88	1.87	1.87	1.86	1.86	1.0%
SAARC	1.48	1.47	1.47	1.51	1.52	1.55	1.48	1.50	0.8%
USA	1.92	2.01	2.04	2.04	1.99	1.96	2.02	2.01	1.0%
CHN	2.05	2.14	2.14	2.16	2.08	2.05	2.12	2.13	0.4%
GBR	1.81	1.81	1.81	1.77	1.79	1.76	1.79	1.78	-0.3%
DEU	1.72	1.74	1.75	1.73	1.72	1.71	1.74	1.74	0.1%
JPN	1.67	1.74	1.72	1.67	1.59	1.57	1.68	1.67	-1.2%
IND	1.49	1.49	1.52	1.54	1.53	1.53	1.51	1.51	0.7%
ITA	1.97	1.97	1.91	1.83	1.76	1.69	1.88	1.81	-2.8%
CAN	1.74	1.72	1.74	1.70	1.65	1.58	1.74	1.70	-1.2%
ESP	1.71	1.77	1.81	1.79	1.75	1.72	1.77	1.77	0.6%
AUS	1.92	1.94	1.99	2.05	2.05	2.04	1.97	2.01	1.6%
KOR	1.86	2.05	2.02	1.98	1.81	1.72	1.98	1.93	-0.7%
BRA	1.51	1.46	1.44	1.32	1.29	1.24	1.40	1.35	-3.9%
SWE	1.82	1.95	1.99	1.94	1.90	1.86	1.96	1.92	1.1%
SGP	2.42	2.59	2.53	2.54	2.45	2.38	2.53	2.47	0.3%

Table B.23 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Chemical Engineering per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.48	1.51	1.53	1.54	1.54	1.54	1.52	1.53	1.0%
BRICS	1.43	1.48	1.52	1.56	1.58	1.61	1.51	1.55	2.5%
SAARC	1.06	1.06	1.10	1.15	1.20	1.26	1.10	1.15	3.2%
USA	1.73	1.78	1.80	1.80	1.79	1.79	1.79	1.80	1.0%
CHN	1.75	1.81	1.85	1.88	1.86	1.87	1.83	1.86	1.6%
GBR	1.61	1.63	1.65	1.67	1.69	1.70	1.65	1.66	1.2%
DEU	1.53	1.53	1.53	1.52	1.53	1.53	1.53	1.53	-0.1%
JPN	1.42	1.46	1.52	1.54	1.55	1.53	1.51	1.51	2.3%
IND	1.13	1.13	1.17	1.21	1.29	1.35	1.17	1.21	3.3%
ITA	1.54	1.55	1.55	1.54	1.54	1.52	1.54	1.54	0.1%
CAN	1.53	1.51	1.56	1.55	1.58	1.58	1.55	1.56	0.8%
ESP	1.50	1.50	1.52	1.52	1.54	1.54	1.51	1.52	0.7%
AUS	1.75	1.77	1.77	1.78	1.77	1.78	1.76	1.77	0.4%
KOR	1.70	1.77	1.79	1.79	1.75	1.71	1.78	1.77	0.7%
BRA	1.24	1.20	1.21	1.17	1.19	1.17	1.21	1.19	-0.9%
SWE	1.72	1.71	1.64	1.61	1.59	1.59	1.66	1.65	-2.0%
SGP	2.09	2.25	2.38	2.43	2.41	2.39	2.34	2.37	3.7%

Table B.24 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Chemistry per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.64	1.68	1.69	1.67	1.65	1.64	1.67	1.67	0.2%
BRICS	1.48	1.55	1.62	1.65	1.66	1.67	1.60	1.62	3.0%
SAARC	1.22	1.24	1.28	1.32	1.33	1.35	1.29	1.30	2.1%
USA	2.01	2.03	2.02	1.98	1.93	1.90	2.00	1.98	-0.9%
CHN	1.56	1.65	1.73	1.76	1.75	1.74	1.71	1.72	2.9%
GBR	1.84	1.83	1.84	1.80	1.77	1.74	1.83	1.81	-1.0%
DEU	1.88	1.87	1.85	1.82	1.80	1.81	1.84	1.84	-1.0%
JPN	1.33	1.37	1.36	1.38	1.37	1.41	1.35	1.37	0.8%
IND	1.33	1.34	1.35	1.41	1.45	1.52	1.37	1.41	2.3%
ITA	1.86	1.89	1.90	1.92	1.95	1.99	1.90	1.91	1.2%
CAN	1.84	1.85	1.84	1.82	1.77	1.75	1.81	1.81	-0.9%
ESP	1.57	1.58	1.58	1.59	1.60	1.66	1.58	1.61	0.5%
AUS	1.64	1.68	1.73	1.77	1.78	1.80	1.73	1.75	2.1%
KOR	1.48	1.51	1.55	1.56	1.57	1.57	1.53	1.52	1.5%
BRA	1.34	1.42	1.41	1.38	1.32	1.26	1.40	1.35	-0.4%
SWE	1.62	1.63	1.67	1.69	1.73	1.70	1.68	1.66	1.6%
SGP	2.03	2.22	2.28	2.22	2.10	1.98	2.22	2.16	0.9%

Table B.25 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Computer Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.50	1.49	1.49	1.49	1.49	1.50	1.49	1.50	-0.1%
BRICS	1.40	1.41	1.42	1.42	1.44	1.43	1.43	1.43	0.7%
SAARC	1.20	1.20	1.20	1.22	1.26	1.34	1.20	1.26	1.1%
USA	1.72	1.70	1.69	1.68	1.68	1.67	1.70	1.69	-0.6%
CHN	1.54	1.55	1.59	1.59	1.59	1.55	1.60	1.58	0.7%
GBR	1.85	1.83	1.86	1.86	1.89	1.90	1.87	1.88	0.5%
DEU	1.75	1.72	1.73	1.73	1.76	1.77	1.74	1.75	0.1%
JPN	1.57	1.57	1.63	1.62	1.62	1.59	1.62	1.62	0.7%
IND	1.22	1.22	1.22	1.25	1.29	1.39	1.21	1.29	1.5%
ITA	1.65	1.63	1.63	1.64	1.64	1.70	1.61	1.66	-0.1%
CAN	1.77	1.75	1.79	1.77	1.78	1.75	1.78	1.77	0.2%
ESP	1.58	1.54	1.55	1.57	1.60	1.63	1.56	1.59	0.4%
AUS	1.85	1.79	1.81	1.82	1.87	1.86	1.84	1.84	0.3%
KOR	1.28	1.26	1.31	1.25	1.25	1.20	1.27	1.27	-0.6%
BRA	1.43	1.38	1.32	1.24	1.18	1.12	1.31	1.26	-4.6%
SWE	1.81	1.83	1.84	1.85	1.84	1.85	1.86	1.86	0.4%
SGP	2.05	1.89	1.67	1.62	1.59	1.62	1.69	1.63	-6.2%

Table B.26 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Earth and Planetary Sciences per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.67	1.75	1.80	1.81	1.78	1.76	1.76	1.76	1.7%
BRICS	1.66	1.73	1.78	1.83	1.85	1.87	1.75	1.79	2.7%
SAARC	1.37	1.41	1.48	1.54	1.58	1.56	1.50	1.50	3.7%
USA	1.66	1.76	1.85	1.90	1.89	1.88	1.82	1.83	3.2%
CHN	1.82	1.93	1.97	2.05	2.04	2.04	1.94	1.99	2.8%
GBR	1.67	1.75	1.83	1.83	1.83	1.80	1.77	1.78	2.3%
DEU	1.92	1.98	2.02	1.99	1.99	1.99	1.96	1.98	1.0%
JPN	1.86	1.92	1.98	1.96	1.97	1.95	1.93	1.94	1.3%
IND	1.42	1.43	1.51	1.59	1.64	1.63	1.54	1.55	3.6%
ITA	2.31	2.25	2.14	2.20	2.16	2.22	2.15	2.23	-1.6%
CAN	1.70	1.77	1.88	1.80	1.72	1.53	1.85	1.73	0.3%
ESP	1.94	2.07	2.17	2.15	2.08	1.99	2.08	2.08	1.8%
AUS	1.79	2.01	2.13	2.30	2.35	2.43	2.11	2.23	7.1%
KOR	1.69	1.78	1.86	1.84	1.85	1.80	1.82	1.77	2.4%
BRA	1.35	1.42	1.44	1.38	1.37	1.30	1.44	1.35	0.4%
SWE	1.90	1.92	1.89	1.88	1.83	1.82	1.88	1.87	-0.8%
SGP	2.06	2.13	2.45	2.68	2.82	2.69	2.49	2.50	8.2%

Table B.27 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Energy per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.64	1.69	1.71	1.72	1.70	1.68	1.69	1.69	0.8%
BRICS	1.49	1.57	1.65	1.70	1.71	1.72	1.63	1.65	3.5%
SAARC	1.33	1.37	1.42	1.46	1.48	1.48	1.42	1.43	2.7%
USA	1.90	1.96	1.98	1.97	1.93	1.89	1.95	1.94	0.4%
CHN	1.59	1.68	1.77	1.81	1.80	1.78	1.75	1.76	3.1%
GBR	1.75	1.78	1.81	1.83	1.81	1.80	1.79	1.80	0.9%
DEU	1.78	1.83	1.84	1.87	1.86	1.89	1.81	1.84	1.1%
JPN	1.53	1.55	1.60	1.63	1.65	1.66	1.57	1.59	1.8%
IND	1.40	1.44	1.49	1.54	1.59	1.61	1.50	1.51	3.1%
ITA	2.03	2.10	2.11	2.13	2.10	2.08	2.10	2.10	0.9%
CAN	1.70	1.71	1.71	1.71	1.67	1.65	1.69	1.69	-0.5%
ESP	1.72	1.77	1.78	1.78	1.78	1.77	1.77	1.77	0.8%
AUS	1.78	1.87	1.92	1.97	1.95	1.95	1.90	1.92	2.3%
KOR	1.67	1.77	1.82	1.84	1.77	1.68	1.80	1.76	1.4%
BRA	1.37	1.43	1.41	1.39	1.34	1.29	1.40	1.36	-0.6%
SWE	1.78	1.85	1.88	1.88	1.83	1.79	1.86	1.84	0.7%
SGP	2.01	2.16	2.24	2.28	2.26	2.22	2.24	2.22	3.0%

Table B.28 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Engineering per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.58	1.59	1.61	1.63	1.62	1.61	1.61	1.62	0.6%
BRICS	1.45	1.46	1.47	1.51	1.52	1.55	1.47	1.50	1.3%
SAARC	1.24	1.25	1.26	1.28	1.29	1.32	1.26	1.28	1.0%
USA	1.73	1.74	1.77	1.78	1.78	1.78	1.77	1.78	0.7%
CHN	1.50	1.54	1.58	1.62	1.60	1.60	1.58	1.59	1.7%
GBR	1.92	1.93	1.97	2.00	2.01	2.00	1.97	1.99	1.2%
DEU	1.74	1.75	1.81	1.87	1.91	1.92	1.82	1.85	2.4%
JPN	1.30	1.29	1.34	1.42	1.47	1.54	1.33	1.39	3.2%
IND	1.24	1.26	1.28	1.33	1.37	1.42	1.28	1.32	2.5%
ITA	1.81	1.82	1.88	1.95	1.97	1.96	1.90	1.91	2.1%
CAN	1.77	1.73	1.77	1.74	1.75	1.70	1.77	1.74	-0.3%
ESP	1.77	1.74	1.74	1.75	1.73	1.72	1.74	1.74	-0.5%
AUS	1.86	1.92	1.99	2.01	2.03	2.01	1.99	2.00	2.1%
KOR	1.41	1.51	1.48	1.44	1.38	1.36	1.46	1.43	-0.5%
BRA	1.63	1.60	1.51	1.53	1.51	1.55	1.51	1.53	-1.8%
SWE	2.12	2.19	2.26	2.25	2.20	2.12	2.23	2.21	0.8%
SGP	1.94	2.04	2.03	2.10	2.04	2.05	2.03	2.05	1.3%

Table B.29 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Environmental Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.56	1.58	1.57	1.56	1.54	1.52	1.57	1.57	-0.4%
BRICS	1.29	1.29	1.29	1.30	1.31	1.32	1.29	1.30	0.3%
SAARC	1.11	1.06	1.05	1.07	1.07	1.07	1.06	1.05	-0.8%
USA	1.79	1.80	1.79	1.77	1.75	1.75	1.79	1.79	-0.6%
CHN	1.29	1.33	1.34	1.35	1.33	1.32	1.34	1.34	0.7%
GBR	1.88	1.93	1.92	1.91	1.91	1.92	1.92	1.94	0.3%
DEU	1.86	1.94	1.97	1.95	1.93	1.89	1.95	1.94	0.9%
JPN	1.47	1.49	1.49	1.52	1.55	1.57	1.50	1.51	1.4%
IND	1.10	1.05	1.05	1.06	1.05	1.02	1.05	1.05	-1.2%
ITA	1.87	1.92	1.89	1.87	1.81	1.80	1.88	1.88	-0.9%
CAN	1.88	1.85	1.80	1.78	1.76	1.77	1.81	1.82	-1.6%
ESP	1.82	1.83	1.82	1.81	1.81	1.80	1.82	1.83	-0.1%
AUS	1.79	1.81	1.83	1.85	1.87	1.90	1.84	1.86	1.1%
KOR	1.31	1.34	1.34	1.31	1.24	1.19	1.32	1.29	-1.3%
BRA	1.35	1.33	1.31	1.35	1.34	1.41	1.31	1.36	-0.1%
SWE	1.85	1.92	1.97	1.91	1.90	1.83	1.94	1.89	0.6%
SGP	2.13	2.23	2.29	2.14	2.07	1.96	2.20	2.13	-0.7%

Table B.30 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Immunology and Microbiology per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.54	1.58	1.61	1.62	1.61	1.61	1.60	1.60	1.1%
BRICS	1.44	1.49	1.54	1.58	1.60	1.61	1.54	1.55	2.8%
SAARC	1.14	1.12	1.14	1.19	1.25	1.29	1.16	1.19	2.2%
USA	1.85	1.91	1.92	1.94	1.93	1.94	1.92	1.94	1.0%
CHN	1.68	1.77	1.83	1.88	1.85	1.83	1.82	1.83	2.4%
GBR	1.70	1.73	1.72	1.73	1.71	1.72	1.72	1.74	0.1%
DEU	1.66	1.67	1.66	1.65	1.66	1.70	1.65	1.67	0.0%
JPN	1.55	1.63	1.67	1.70	1.70	1.71	1.65	1.67	2.3%
IND	1.21	1.18	1.21	1.24	1.33	1.37	1.23	1.25	2.4%
ITA	1.64	1.70	1.74	1.77	1.80	1.82	1.74	1.77	2.4%
CAN	1.49	1.48	1.48	1.50	1.51	1.58	1.46	1.52	0.4%
ESP	1.48	1.57	1.64	1.67	1.69	1.68	1.61	1.62	3.3%
AUS	1.79	1.84	1.83	1.86	1.83	1.87	1.80	1.84	0.5%
KOR	1.76	1.86	1.90	1.89	1.83	1.76	1.90	1.87	1.0%
BRA	1.19	1.21	1.24	1.23	1.22	1.18	1.24	1.22	0.6%
SWE	1.60	1.63	1.59	1.58	1.54	1.56	1.59	1.60	-0.9%
SGP	1.99	2.19	2.30	2.42	2.40	2.39	2.31	2.33	4.8%

Table B.31 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Materials Science per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.45	1.47	1.48	1.49	1.50	1.52	1.47	1.48	0.9%
BRICS	1.30	1.35	1.38	1.43	1.44	1.47	1.38	1.40	2.5%
SAARC	1.26	1.30	1.34	1.36	1.36	1.36	1.32	1.33	2.0%
USA	1.67	1.70	1.68	1.67	1.64	1.66	1.66	1.68	-0.5%
CHN	1.43	1.47	1.49	1.52	1.52	1.53	1.48	1.50	1.6%
GBR	1.69	1.71	1.71	1.70	1.69	1.71	1.68	1.70	0.0%
DEU	1.64	1.66	1.65	1.67	1.71	1.78	1.65	1.68	1.1%
JPN	1.38	1.43	1.41	1.48	1.49	1.57	1.41	1.47	1.8%
IND	1.26	1.32	1.39	1.41	1.41	1.40	1.37	1.38	2.8%
ITA	1.59	1.61	1.62	1.69	1.78	1.91	1.63	1.69	2.9%
CAN	1.45	1.49	1.49	1.54	1.53	1.59	1.47	1.52	1.3%
ESP	1.43	1.44	1.41	1.45	1.49	1.60	1.42	1.47	1.2%
AUS	1.53	1.60	1.60	1.64	1.62	1.63	1.59	1.61	1.5%
KOR	1.40	1.46	1.47	1.47	1.47	1.49	1.44	1.44	1.3%
BRA	1.23	1.24	1.22	1.28	1.29	1.30	1.24	1.26	1.2%
SWE	1.65	1.69	1.73	1.78	1.81	1.79	1.77	1.77	2.4%
SGP	1.74	1.83	1.87	1.77	1.72	1.66	1.82	1.79	-0.3%

Table B.32 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Mathematics per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.94	1.93	1.91	1.88	1.84	1.81	1.90	1.88	-1.3%
BRICS	1.72	1.72	1.71	1.69	1.67	1.64	1.70	1.68	-0.7%
SAARC	1.62	1.69	1.70	1.66	1.60	1.57	1.66	1.63	-0.3%
USA	2.20	2.18	2.17	2.13	2.08	2.04	2.14	2.12	-1.4%
CHN	1.71	1.71	1.71	1.70	1.65	1.62	1.71	1.69	-0.8%
GBR	2.44	2.45	2.45	2.41	2.36	2.32	2.42	2.39	-0.8%
DEU	2.38	2.35	2.35	2.32	2.30	2.27	2.34	2.32	-0.8%
JPN	1.82	1.86	1.92	1.97	1.96	1.94	1.91	1.92	1.8%
IND	1.75	1.83	1.87	1.81	1.75	1.72	1.80	1.78	0.0%
ITA	2.52	2.49	2.49	2.46	2.43	2.40	2.47	2.45	-0.9%
CAN	2.53	2.50	2.50	2.45	2.40	2.34	2.48	2.44	-1.3%
ESP	2.38	2.40	2.43	2.43	2.37	2.32	2.40	2.37	-0.1%
AUS	2.37	2.41	2.44	2.41	2.33	2.25	2.40	2.35	-0.4%
KOR	1.95	2.00	2.01	2.01	1.94	1.92	1.99	1.98	-0.1%
BRA	1.87	1.90	1.92	1.87	1.84	1.79	1.89	1.84	-0.4%
SWE	2.47	2.43	2.44	2.42	2.40	2.38	2.42	2.42	-0.7%
SGP	2.22	2.34	2.36	2.40	2.28	2.23	2.33	2.31	0.6%

Table B.33 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Medicine per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.40	1.43	1.46	1.48	1.48	1.49	1.45	1.47	1.4%
BRICS	1.24	1.28	1.31	1.33	1.34	1.35	1.30	1.32	1.8%
SAARC	1.13	1.14	1.14	1.13	1.12	1.13	1.13	1.14	-0.2%
USA	1.52	1.54	1.56	1.58	1.58	1.59	1.56	1.57	1.1%
CHN	1.28	1.33	1.37	1.40	1.39	1.38	1.37	1.38	2.0%
GBR	1.62	1.66	1.71	1.72	1.75	1.75	1.70	1.72	1.9%
DEU	1.53	1.56	1.59	1.63	1.66	1.71	1.58	1.62	2.2%
JPN	1.19	1.22	1.27	1.30	1.32	1.32	1.26	1.28	2.6%
IND	1.14	1.15	1.16	1.15	1.14	1.14	1.15	1.16	0.0%
ITA	1.51	1.55	1.61	1.65	1.69	1.72	1.59	1.64	2.9%
CAN	1.46	1.50	1.52	1.55	1.54	1.55	1.51	1.53	1.3%
ESP	1.46	1.48	1.56	1.56	1.58	1.57	1.53	1.56	2.0%
AUS	1.54	1.59	1.66	1.71	1.75	1.78	1.65	1.70	3.2%
KOR	1.35	1.36	1.37	1.37	1.31	1.24	1.37	1.35	-0.7%
BRA	1.31	1.36	1.42	1.44	1.46	1.48	1.39	1.42	2.8%
SWE	1.72	1.71	1.74	1.69	1.70	1.71	1.71	1.73	-0.3%
SGP	1.58	1.65	1.77	1.77	1.80	1.70	1.79	1.72	3.4%

Table B.34 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Pharmacology, Toxicology and Pharmaceutics per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.45	1.47	1.48	1.49	1.50	1.51	1.48	1.49	0.8%
BRICS	1.25	1.30	1.34	1.38	1.40	1.41	1.34	1.35	2.8%
SAARC	1.10	1.11	1.14	1.22	1.28	1.37	1.15	1.22	3.9%
USA	1.74	1.76	1.77	1.79	1.80	1.82	1.77	1.78	0.8%
CHN	1.47	1.56	1.60	1.65	1.62	1.59	1.60	1.60	2.4%
GBR	1.71	1.72	1.72	1.74	1.74	1.77	1.72	1.75	0.4%
DEU	1.60	1.60	1.60	1.63	1.65	1.69	1.60	1.63	0.9%
JPN	1.53	1.54	1.56	1.60	1.63	1.66	1.56	1.59	1.5%
IND	1.15	1.16	1.19	1.26	1.35	1.44	1.20	1.26	4.0%
ITA	1.55	1.60	1.61	1.66	1.66	1.70	1.61	1.64	1.6%
CAN	1.72	1.73	1.76	1.77	1.78	1.81	1.75	1.78	0.9%
ESP	1.55	1.58	1.61	1.66	1.67	1.71	1.61	1.64	1.9%
AUS	1.62	1.71	1.70	1.77	1.75	1.80	1.70	1.72	2.0%
KOR	1.58	1.69	1.72	1.75	1.72	1.68	1.71	1.70	2.2%
BRA	1.26	1.35	1.44	1.47	1.46	1.41	1.42	1.40	3.9%
SWE	1.57	1.64	1.65	1.69	1.67	1.69	1.65	1.67	1.5%
SGP	1.66	1.82	1.92	1.99	1.98	1.97	1.92	1.92	4.5%

Table B.35 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Physics and Astronomy per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary									
Country	2009	2010	2011	2012	2013	2014	2009-2013	2009-2014	2009-2013 CAGR
G8	1.54	1.55	1.55	1.55	1.55	1.54	1.54	1.54	0.1%
BRICS	1.25	1.25	1.27	1.26	1.26	1.23	1.27	1.25	0.2%
SAARC	0.99	1.04	1.16	1.17	1.22	1.19	1.15	1.15	5.5%
USA	1.65	1.65	1.63	1.62	1.59	1.59	1.61	1.61	-0.9%
CHN	1.33	1.31	1.26	1.25	1.20	1.21	1.26	1.25	-2.5%
GBR	1.87	1.87	1.85	1.83	1.85	1.86	1.85	1.84	-0.2%
DEU	1.54	1.58	1.64	1.60	1.58	1.50	1.61	1.58	0.7%
JPN	1.06	1.16	1.20	1.19	1.12	1.03	1.16	1.12	1.4%
IND	0.88	0.92	1.02	1.02	1.07	1.03	1.01	0.97	4.9%
ITA	1.89	1.90	1.88	1.86	1.78	1.74	1.83	1.83	-1.5%
CAN	1.65	1.59	1.56	1.55	1.57	1.54	1.56	1.55	-1.2%
ESP	1.74	1.74	1.74	1.74	1.70	1.65	1.71	1.69	-0.6%
AUS	1.87	1.87	1.80	1.75	1.71	1.70	1.80	1.77	-2.2%
KOR	1.05	1.11	1.13	1.18	1.08	1.06	1.09	1.10	0.7%
BRA	1.27	1.22	1.23	1.20	1.20	1.14	1.23	1.20	-1.5%
SWE	1.90	1.90	1.86	1.87	1.81	1.76	1.85	1.86	-1.2%
SGP	2.06	2.03	1.91	2.02	1.89	2.01	1.92	2.03	-2.1%

Table B.36 — Field-weighted citation impact (FWCI) for the internationally collaborated publications in the subject area Veterinary per year 2009-2014, per periods 2009-2013 and 2009-2014, and growth 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

B-5 India's Collaboration Matrices by Subject Area

In the subject area Agricultural and Biological Sciences, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.18). The mutually most impactful collaborations are with Mexico. Collaborations with Iran, Taiwan, South Korea, and Saudi Arabia are of lower impact than the impact of both partners' internationally co-authored papers.

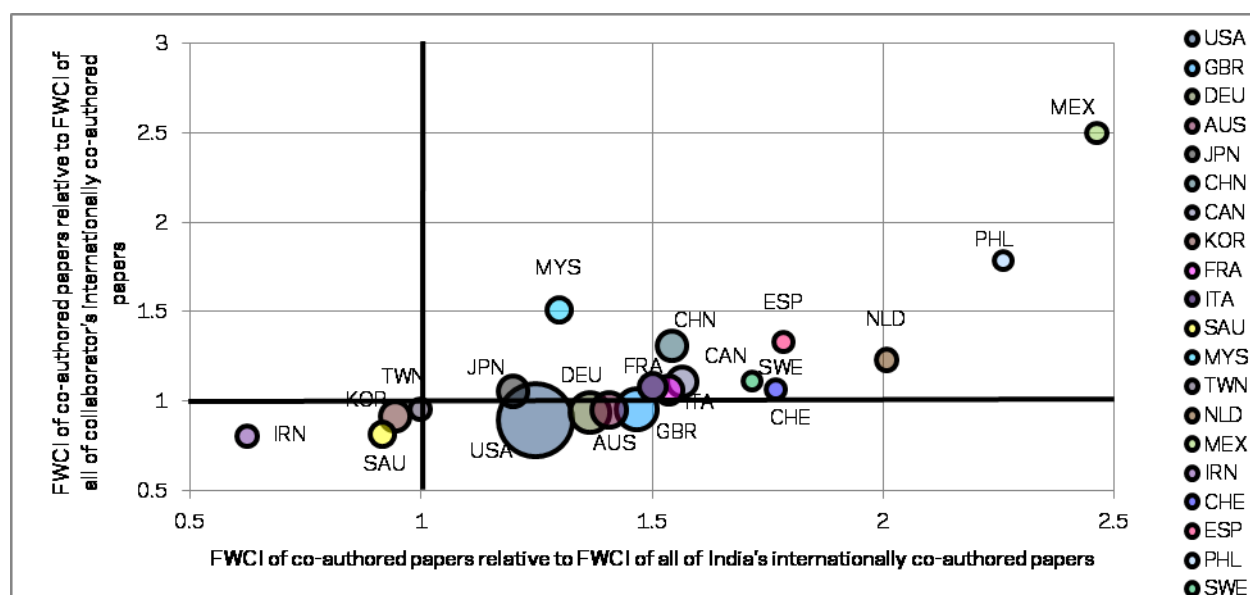


Figure B.18 — India's collaboration matrix in the subject area Agricultural and Biological Science 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 for abbreviations.

Source: Scopus database.

In the subject area Biochemistry, Genetics and Molecular Biology, India's international collaborations tend to be effective for both partner countries in terms of impact (see Figure B.19). The mutually most impactful collaborations are with the Netherlands and Spain. Collaborations with Malaysia and Saudi Arabia are of lower impact than the impact of both partners' internationally co-authored papers.

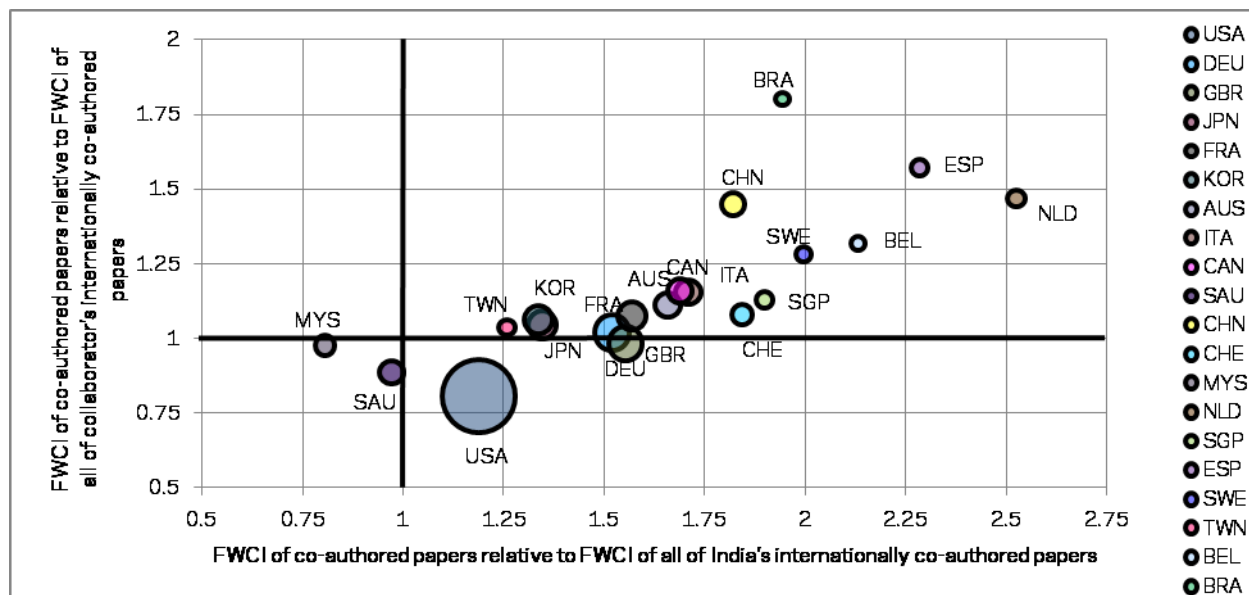


Figure B.19 — India's collaboration matrix in the subject area Biochemistry, Genetics and Molecular Biology 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Chemical Engineering, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.20). The mutually most impactful collaborations are with China. Collaborations with South Africa, Taiwan, Germany, and Switzerland are of lower impact than the impact of both partners' co-authored papers.

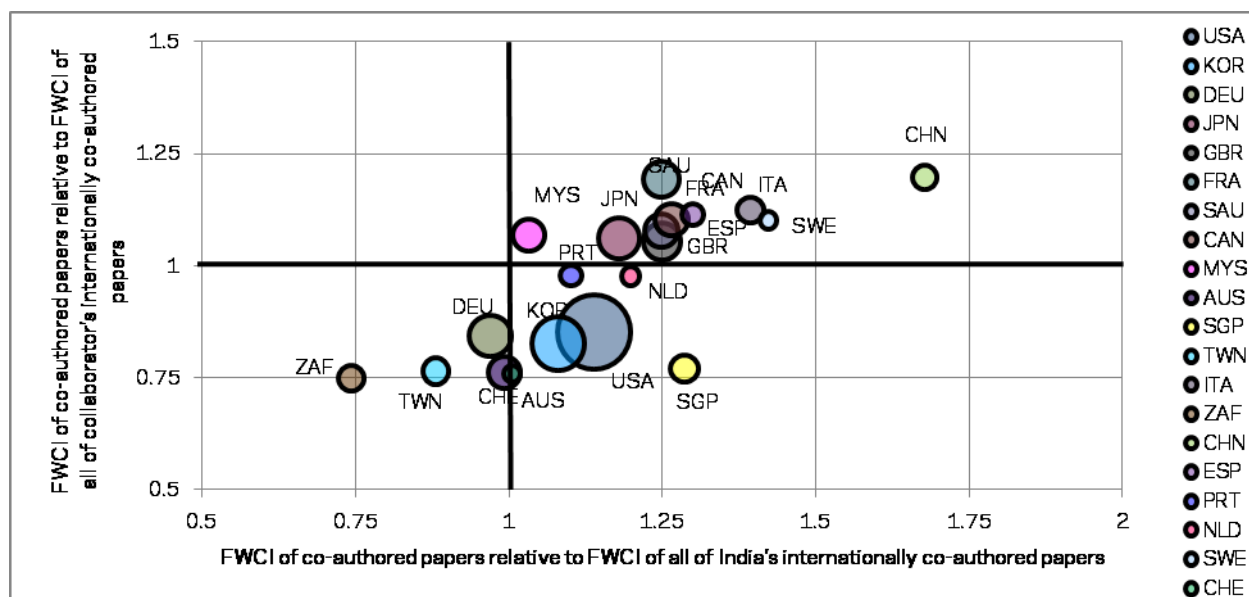


Figure B.20 — India's collaboration matrix in the subject area Chemical Engineering 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Chemistry, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.21). The mutually most impactful collaborations are with China. Collaborations with Malaysia, South Africa, Taiwan, and Germany are of lower impact than the impact of both partners' internationally co-authored papers.

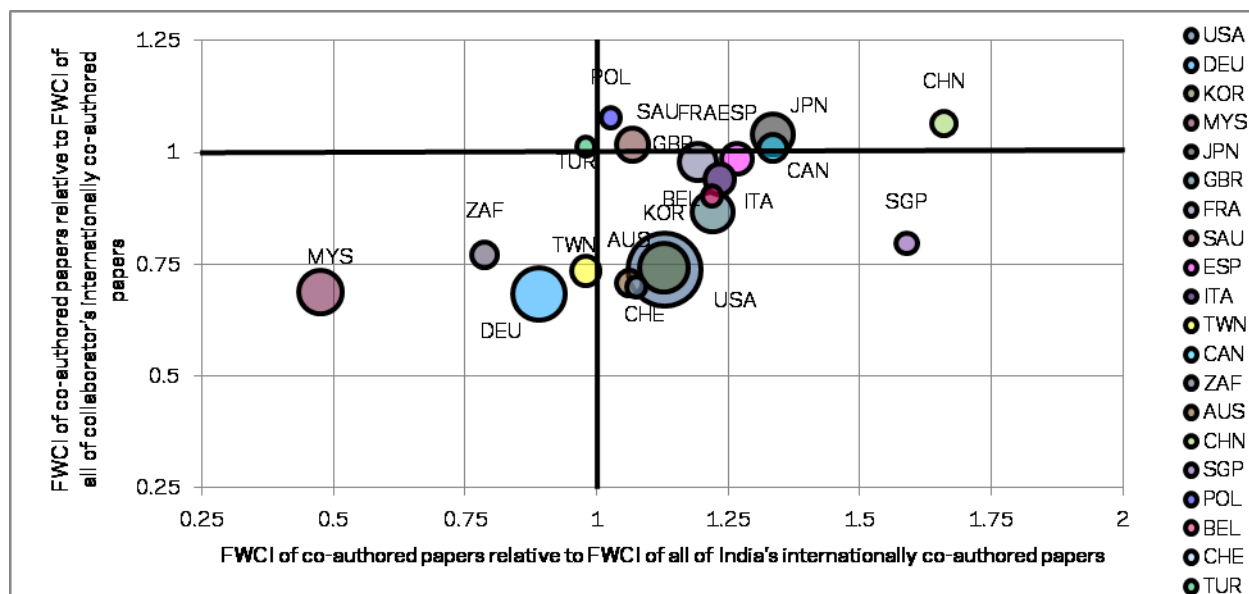


Figure B.21 — India's collaboration matrix in the subject area Chemistry 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Computer Science, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.22). The mutually most impactful collaborations are with Spain and Norway. Collaborations with Saudi Arabia are of lower impact than the impact of both partners' internationally co-authored papers.

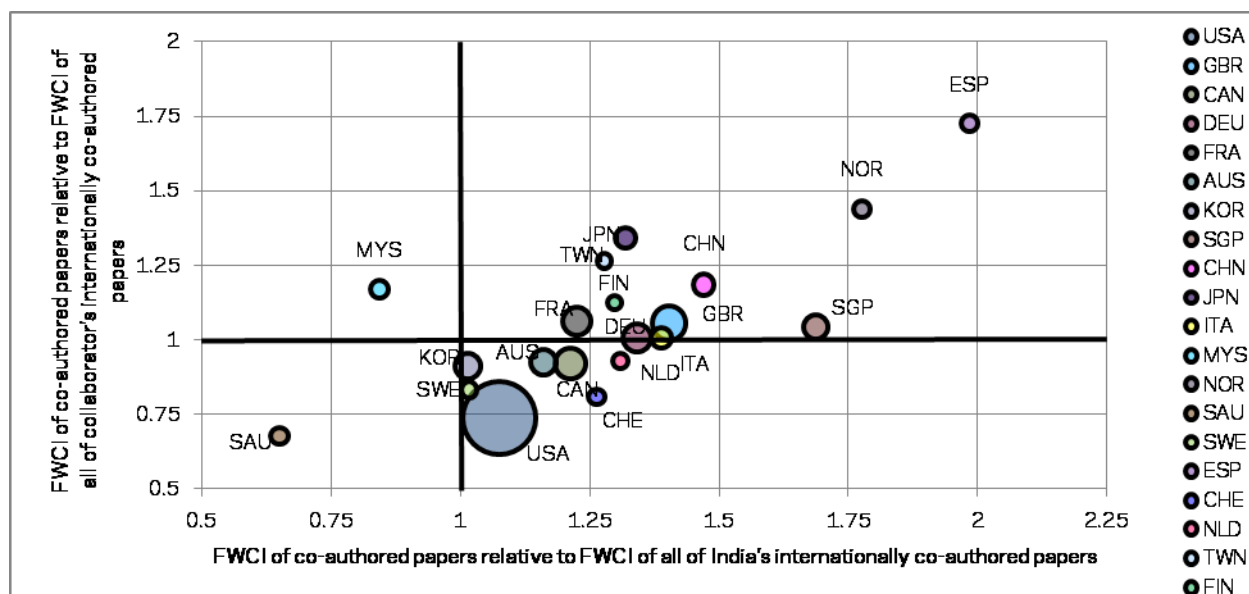


Figure B.22 — India's collaboration matrix in the subject area Computer Science 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Earth and Planetary Sciences, India's international collaborations tend to be effective for both partner countries in terms of impact (see Figure B.23). The mutually most impactful collaborations are with Chile. Collaborations with Taiwan are of lower impact than the impact of both partners' internationally co-authored papers.

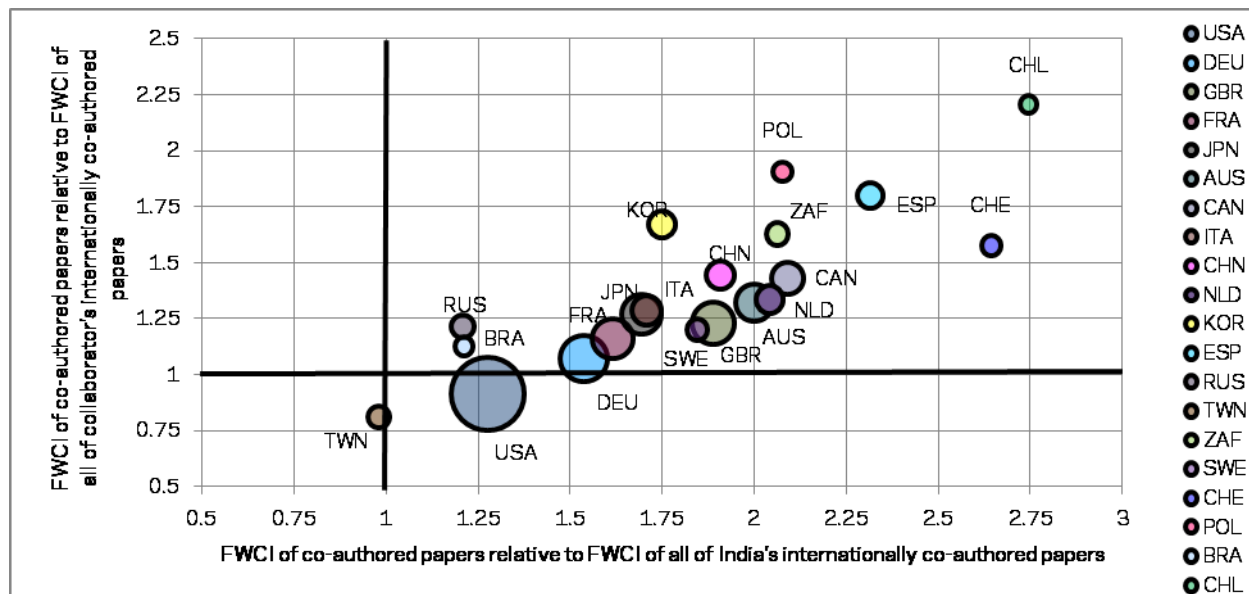


Figure B.23 — India's collaboration matrix in the subject area Earth and Planetary Sciences 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Energy, about half of India's international collaborations are effective for both partner countries in terms of impact (see Figure B.24). The mutually most impactful collaborations are with Russia and Spain. Collaborations with South Africa, Australia, Canada, Malaysia, the United Kingdom and the United States are of lower impact than the impact of both partners' internationally co-authored papers.

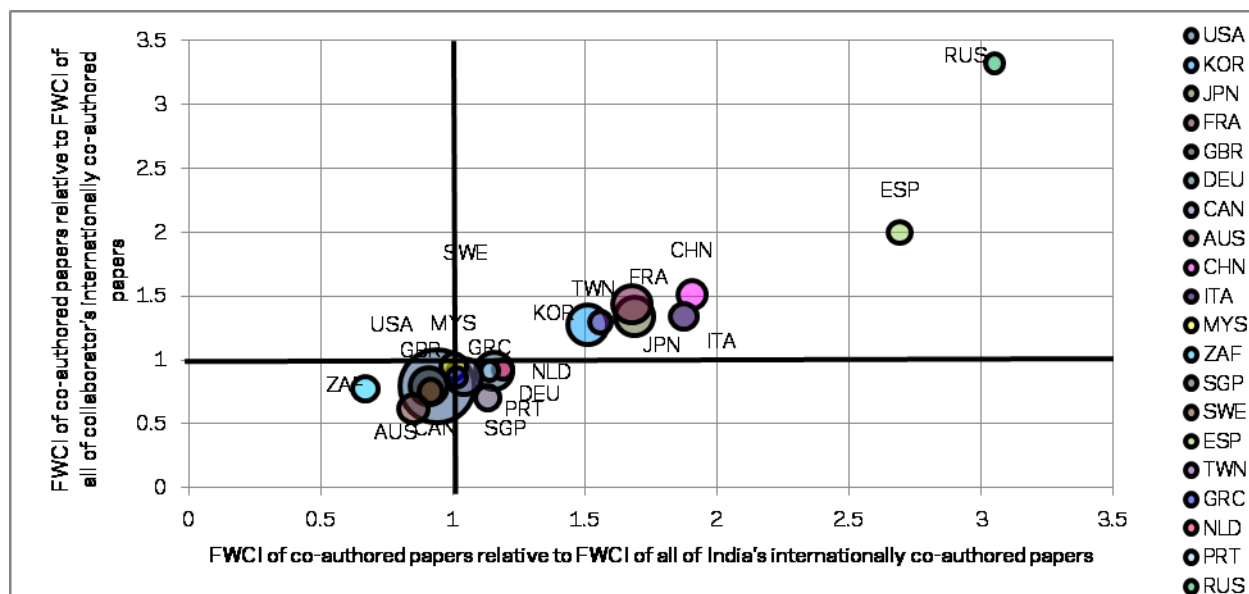


Figure B.24 — India's collaboration matrix in the subject area Energy 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Engineering, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.25). The mutually most impactful collaborations are with Spain and China. Collaborations with Malaysia, Saudi Arabia, and South Africa are of lower impact than the impact of both partners' internationally co-authored papers.

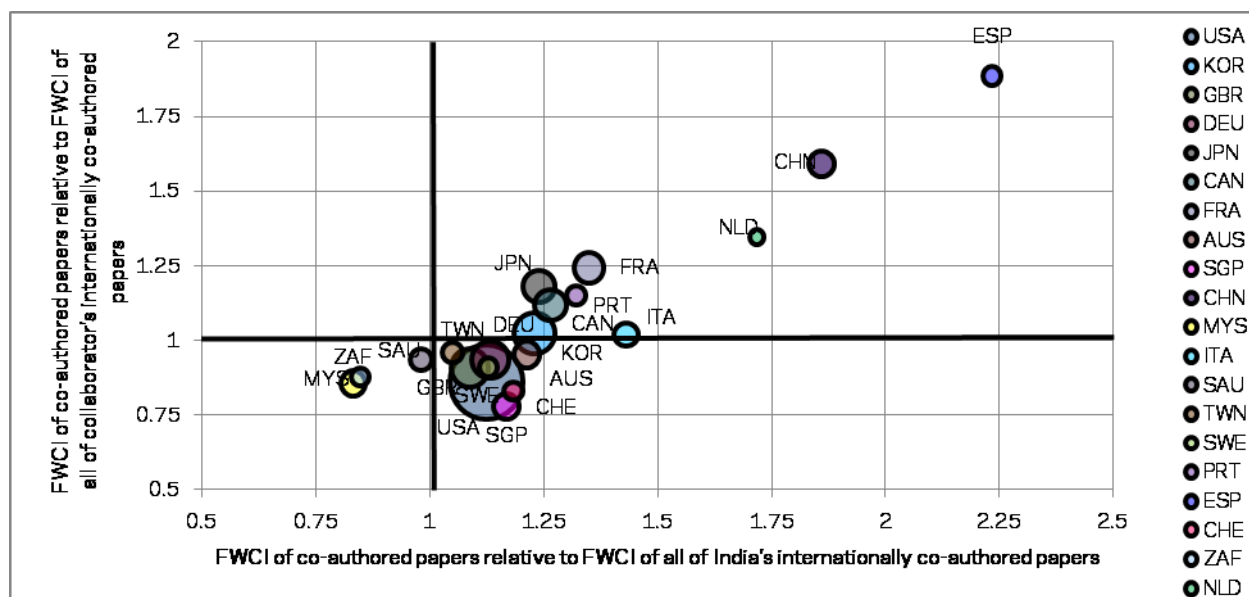


Figure B.25 — India's collaboration matrix in the subject area Engineering 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Environmental Science (see Figure B.26), India's international collaborations tend to be more effective for both partner countries in terms of impact. The mutually most impactful collaborations are with Italy. All of the prolific collaborations are effective for India, but not necessarily to the partner country, in terms of citation impact (e.g., this is not the case for South Korea, Germany, Sweden, the United Kingdom, and the United States).

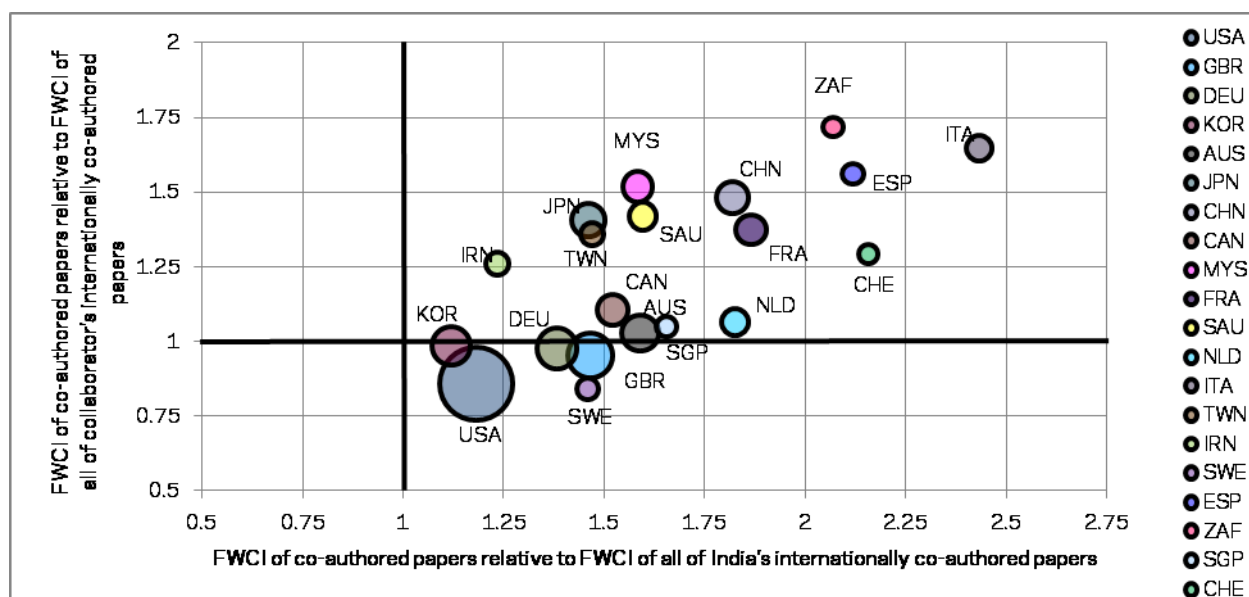


Figure B.26 — India's collaboration matrix in the subject area Environmental Science 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Immunology and Microbiology, India's international collaborations tend to be more effective for India than for its partner countries (see Figure B.27). The mutually most impactful collaborations are with Denmark and Brazil. Collaborations with Saudi Arabia and Taiwan are of lower impact compared to the impact of India's internationally co-authored papers.

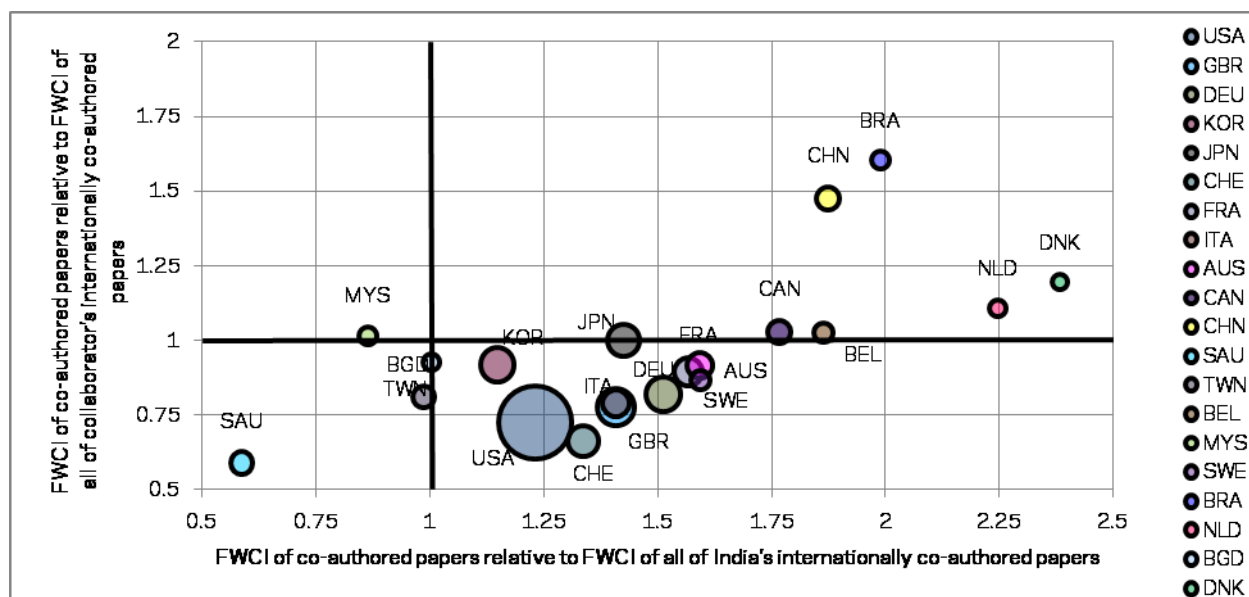


Figure B.27 — India's collaboration matrix in the subject area Immunology and Microbiology 2009-2013.

The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations.

Source: Scopus database.

In the subject area Materials Science, about three quarters of India's prolific international collaborations tend to be effective for India but not for its partner countries in terms of impact (see Figure B.28). The mutually most impactful collaborations are with China. Collaborations with Malaysia, Germany, South Africa, Poland, Sweden, and Taiwan are of lower impact than the impact of both partners' internationally co-authored papers.

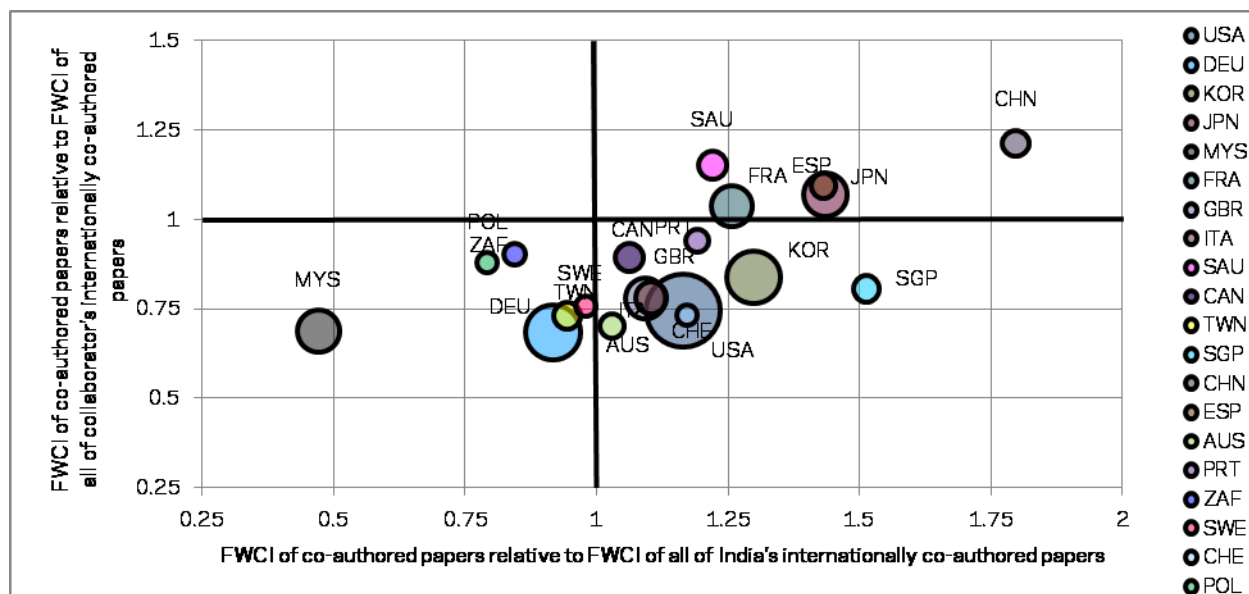


Figure B.28 — India's collaboration matrix in the subject area Materials Science 2009-2013. The node size

is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations.

Source: Scopus database.

In the subject area Mathematics, India's international collaborations tend to be effective for both partner countries in terms of impact (see Figure B.29). The mutually most impactful collaborations are with Finland and Switzerland. All of the prolific collaborations are effective for India, but not necessarily to the partner country, in terms of citation impact (e.g., this is not the case for Saudi Arabia, Canada, and the United States).

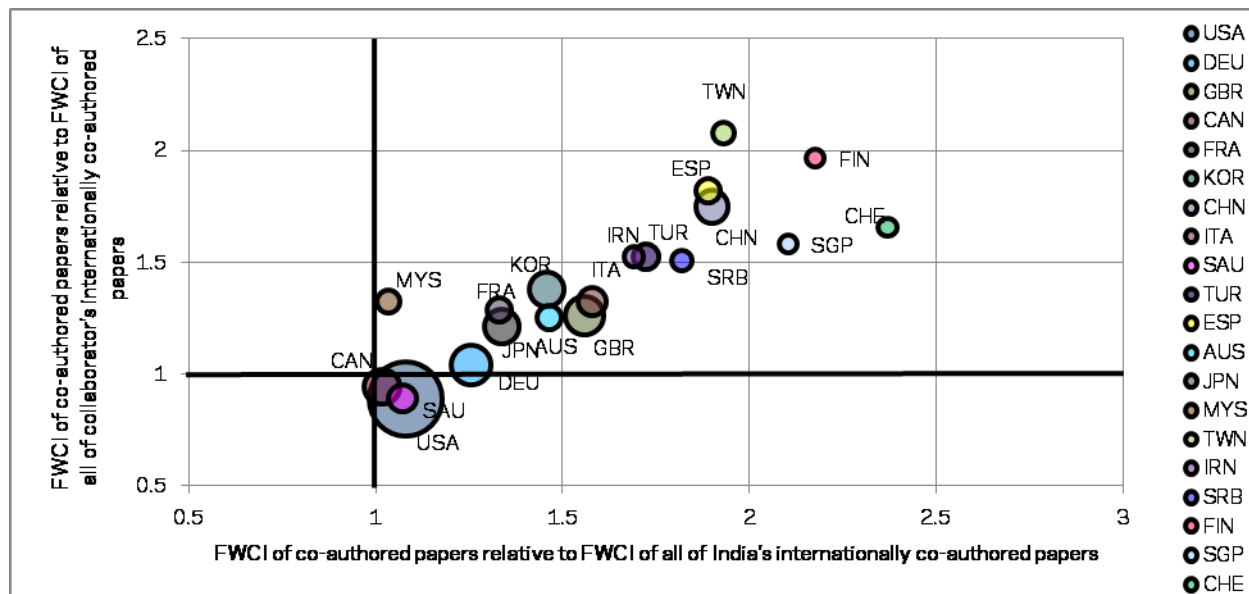


Figure B.29 — India's collaboration matrix in the subject area Mathematics 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Medicine, India's prolific international collaborations are all effective for both partner countries in terms of impact (see Figure B.30). The mutually most impactful collaborations are with South Africa, Spain, and Brazil.

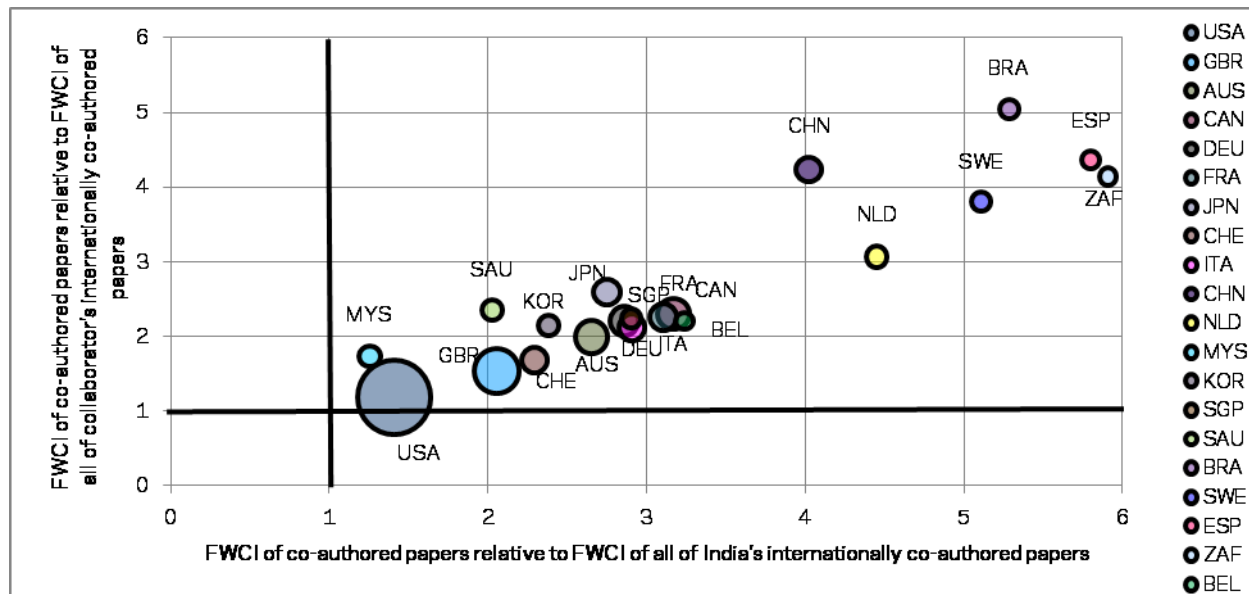


Figure B.30 — India's collaboration matrix in the subject area Medicine 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Pharmacology, Toxicology and Pharmaceutics, India's international collaborations tend to be more effective for India than for its partner countries in terms of impact (see Figure B.31). The mutually most impactful collaborations are with China. Collaborations with Libya, Nigeria, and Malaysia are of lower impact than the impact of both partners' internationally co-authored papers. All other prolific collaborations are beneficial to India.

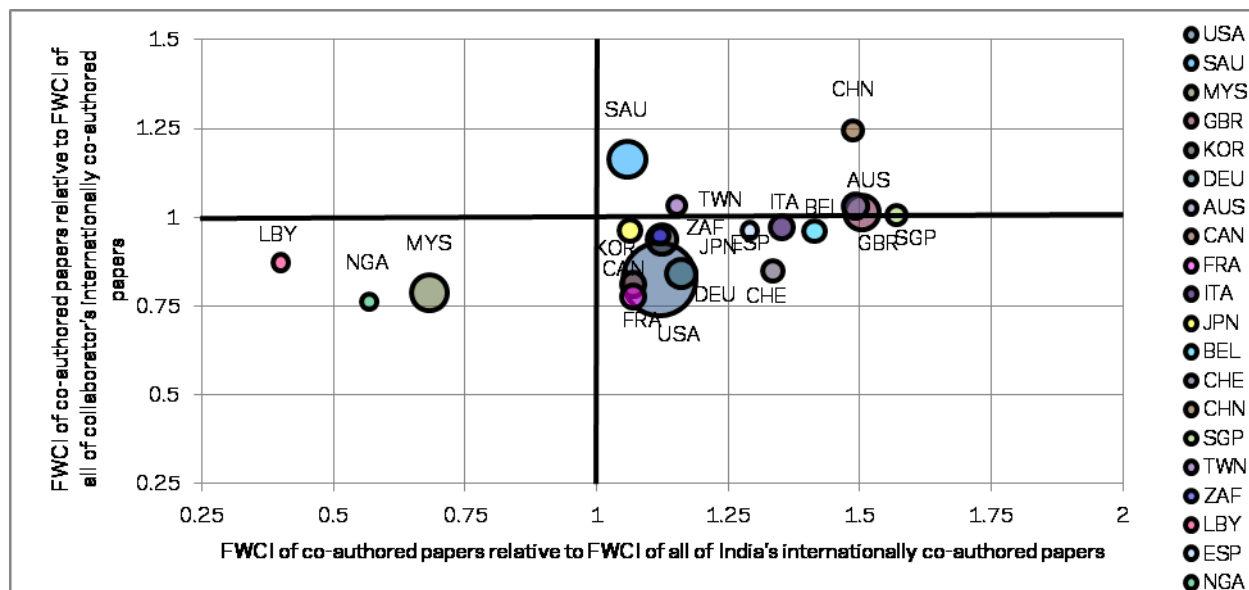


Figure B.31 — India's collaboration matrix in the subject area Pharmacology, Toxicology and Pharmaceutics 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Physics and Astronomy, India's international collaborations tend to be effective for both partner countries in terms of impact (see Figure B.32). The mutually most impactful collaborations are with Mexico. All prolific collaborations are beneficial to both partners' impact, except for those with Malaysia (lower for both) and the USA (neutral for the USA).

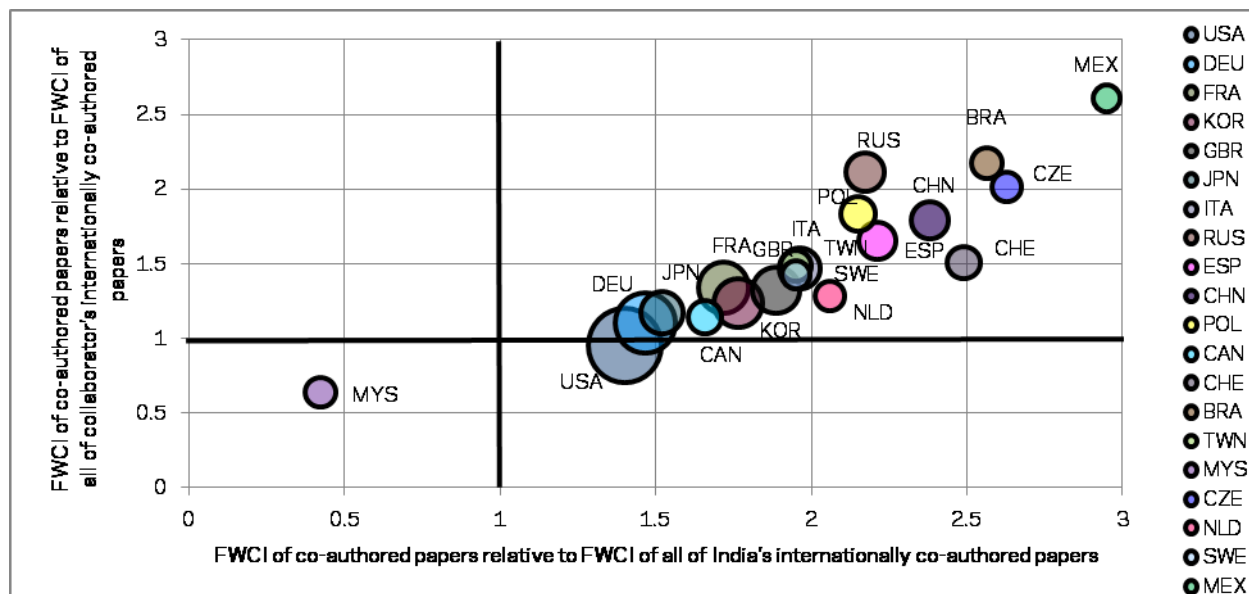


Figure B.32 — India's collaboration matrix in the subject area Physics and Astronomy 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

In the subject area Veterinary, India's international collaborations tend more effective for India than for its partner countries in terms of impact (see Figure B.33). The mutually most impactful collaborations are with Belgium. Collaborations with Bangladesh, Kenya, Sweden, Ethiopia, Canada, Indonesia, and Iran are of lower impact than the impact of both partners' internationally co-authored papers.

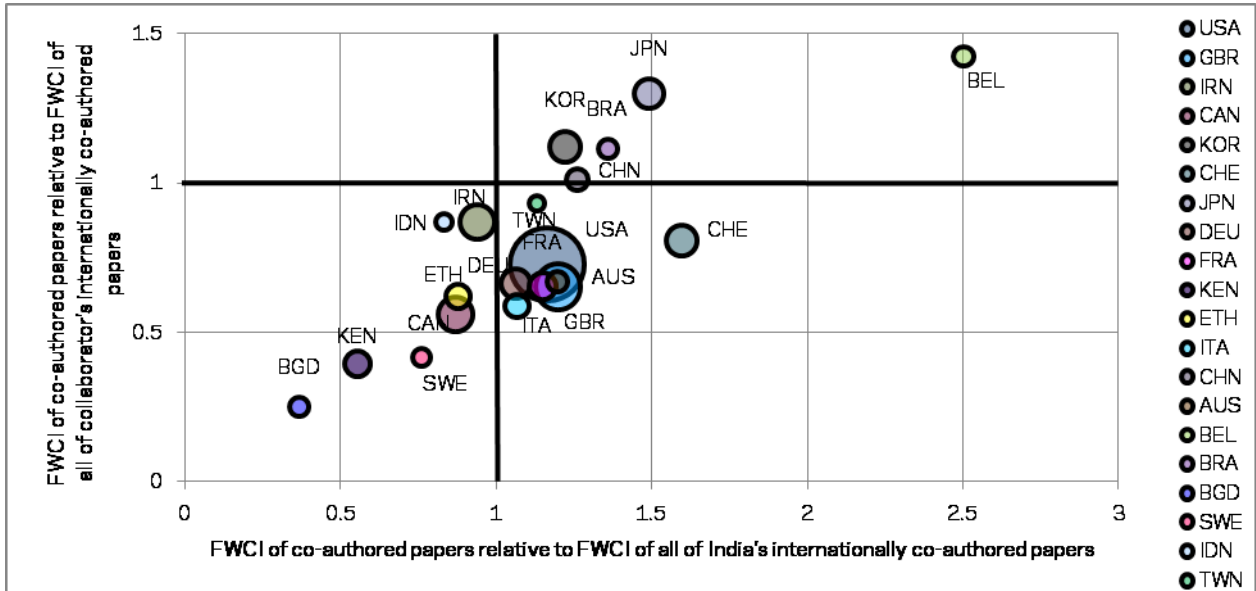


Figure B.33 — India's collaboration matrix in the subject area Veterinary 2009-2013. The node size is proportional to the number of co-authored papers. See Table H.2 in Appendix H for country abbreviations. Source: Scopus database.

Appendix C

Chapter 3 Supplements

C-1 Patent Citations Tables

Country	2009	2010	2011	2012	2013	2014
WLD	34,269	27,548	19,758	10,567	3,813	607
GB	24,430	19,360	13,744	7,279	2,649	402
BRICS	4,340	3,830	2,935	1,702	633	99
SAARC	791	715	550	322	122	27
USA	14,137	11,268	8,085	4,281	1,607	247
CHN	2,905	2,634	2,067	1,166	457	62
GBR	3,197	2,558	1,724	974	420	64
DEU	3,618	2,911	2,113	1,065	415	53
JPN	2,512	1,964	1,248	632	186	27
IND	749	671	480	303	109	26
ITA	1,667	1,234	901	476	166	35
CAN	1,600	1,321	968	527	171	33
ESP	1,195	1,031	768	414	153	27
AUS	990	762	584	314	127	27
KOR	1,141	1,065	890	481	187	17
BRA	367	280	199	130	40	4
SWE	819	697	494	280	85	19
SGP	440	341	251	174	76	18

Table C.1 — Annual amount of patent citations for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences						
Country	2009	2010	2011	2012	2013	2014
WLD	2,016	1,631	1,300	743	271	35
G8	1,263	1,006	812	446	167	19
BRICS	334	289	231	136	45	6
SAARC	66	75	57	27	15	1
USA	634	519	427	239	81	11
CHN	210	156	154	86	27	5
GBR	154	145	104	56	23	3
DEU	192	174	118	71	29	1
JPN	142	106	90	36	18	4
IND	58	68	41	26	13	1
ITA	73	49	63	31	13	0
CAN	120	80	51	33	10	0
ESP	113	86	59	47	15	5
AUS	49	54	53	26	12	0
KOR	71	60	59	26	19	2
BRA	42	41	27	17	4	0
SWE	26	27	28	13	6	0
SGP	14	6	8	5	4	0

Table C.2— Annual amount of patent citations for 2009-2014 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology						
Country	2009	2010	2011	2012	2013	2014
WLD	14,875	11,832	8,601	4,639	1,758	298
G8	11,526	8,920	6,452	3,512	1,302	212
BRICS	1,457	1,373	1,057	623	257	46
SAARC	269	270	158	102	46	13
USA	7,266	5,449	4,102	2,229	837	132
CHN	958	943	782	438	188	27
GBR	1,530	1,253	780	472	203	38
DEU	1,605	1,262	921	488	206	26
JPN	1,126	890	545	287	77	12
IND	253	253	145	98	41	13
ITA	754	528	402	191	73	16
CAN	751	638	440	242	77	10
ESP	469	382	306	152	62	10
AUS	418	336	259	125	64	13
KOR	400	397	365	202	96	8
BRA	124	94	63	46	16	2
SWE	362	315	202	111	35	12
SGP	209	158	113	77	27	15

Table C.3— Annual amount of patent citations for 2009-2014 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering						
Country	2009	2010	2011	2012	2013	2014
WLD	3,386	3,098	2,348	1,253	497	87
G8	2,210	1,928	1,492	788	327	48
BRICS	518	534	428	227	80	19
SAARC	90	94	95	45	23	8
USA	1,253	1,094	870	415	196	29
CHN	364	380	300	155	54	11
GBR	214	221	164	75	35	3
DEU	285	268	213	141	57	8
JPN	271	203	129	82	18	2
IND	88	87	85	43	19	8
ITA	111	71	46	34	12	2
CAN	99	111	99	58	19	4
ESP	104	138	78	65	23	4
AUS	73	52	51	19	14	3
KOR	135	176	152	85	47	2
BRA	40	46	22	13	4	0
SWE	57	63	52	21	4	2
SGP	47	57	49	34	13	5

Table C.4 — Annual amount of patent citations for 2009-2014 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Chemistry						
Country	2009	2010	2011	2012	2013	2014
WLD	6,022	5,320	4,065	2,237	816	129
G8	3,798	3,303	2,525	1,328	512	76
BRICS	1,132	1,041	824	539	170	28
SAARC	222	215	165	118	41	12
USA	1,872	1,603	1,273	642	265	39
CHN	788	723	591	358	117	16
GBR	414	416	283	159	69	10
DEU	586	518	392	205	78	13
JPN	488	397	266	155	46	3
IND	213	203	149	112	38	11
ITA	198	149	144	68	29	4
CAN	240	214	172	107	32	3
ESP	245	216	186	107	37	7
AUS	104	104	92	38	21	4
KOR	267	285	242	131	45	5
BRA	50	51	26	30	12	0
SWE	86	89	54	37	9	3
SGP	79	78	81	49	28	4

Table C.5 — Annual amount of patent citations for 2009-2014 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Computer Science						
Country	2009	2010	2011	2012	2013	2014
WLD	1,706	1,204	958	564	146	25
G8	1,088	786	635	331	95	17
BRICS	215	157	122	96	25	2
SAARC	34	21	30	17	2	0
USA	565	432	367	166	58	9
CHN	176	124	92	80	21	2
GBR	145	84	78	48	13	1
DEU	189	126	98	44	16	3
JPN	113	60	52	32	6	2
IND	32	19	22	13	2	0
ITA	59	44	36	31	7	2
CAN	79	74	38	24	5	2
ESP	79	76	37	36	5	2
AUS	43	29	16	11	5	1
KOR	84	65	54	27	3	1
BRA	5	6	3	7	1	0
SWE	68	42	18	45	5	1
SGP	17	19	20	7	3	1

Table C.6 — Annual amount of patent citations for 2009-2014 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences						
Country	2009	2010	2011	2012	2013	2014
WLD	170	143	110	53	10	1
G8	110	88	54	39	4	1
BRICS	31	30	29	7	5	0
SAARC	3	2	2	1	2	0
USA	56	45	34	25	2	1
CHN	23	18	20	2	3	0
GBR	18	21	11	4	0	0
DEU	12	16	8	4	0	0
JPN	5	2	2	0	0	0
IND	3	2	2	1	2	0
ITA	5	5	4	7	0	0
CAN	15	11	3	5	0	0
ESP	7	7	9	0	0	0
AUS	8	6	7	4	0	0
KOR	1	2	1	2	0	0
BRA	3	2	2	1	0	0
SWE	3	2	1	0	0	0
SGP	0	0	0	0	0	0

Table C.7 — Annual amount of patent citations for 2009-2014 in the subject area Earth and Planetary Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy						
Country	2009	2010	2011	2012	2013	2014
WLD	704	651	490	291	107	14
G8	378	327	280	155	60	7
BRICS	166	155	104	82	20	4
SAARC	40	31	17	15	3	2
USA	175	154	134	95	28	4
CHN	114	111	76	54	15	2
GBR	35	39	28	11	12	1
DEU	64	39	55	16	10	3
JPN	53	43	20	14	6	0
IND	39	29	14	15	3	2
ITA	24	22	21	11	6	0
CAN	30	36	24	10	2	0
ESP	20	32	18	10	6	1
AUS	17	22	15	11	4	0
KOR	32	42	19	16	9	1
BRA	5	11	8	9	2	0
SWE	16	18	7	3	0	0
SGP	6	5	11	3	2	1

Table C.8— Annual amount of patent citations for 2009-2014 in the subject area Energy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Engineering						
Country	2009	2010	2011	2012	2013	2014
WLD	4,554	3,806	2,761	1,426	519	87
G8	2,829	2,458	1,717	881	340	49
BRICS	722	632	476	284	94	14
SAARC	103	68	74	39	10	1
USA	1,525	1,327	942	498	201	29
CHN	562	510	378	226	78	12
GBR	299	274	193	99	47	6
DEU	360	351	292	136	62	8
JPN	361	278	161	96	12	2
IND	101	67	61	37	9	1
ITA	158	131	92	55	21	3
CAN	187	184	150	75	19	2
ESP	142	143	119	48	17	5
AUS	108	86	73	26	13	3
KOR	270	275	209	105	37	4
BRA	31	25	16	13	6	0
SWE	137	139	51	72	11	6
SGP	94	78	43	37	11	2

Table C.9— Annual amount of patent citations for 2009-2014 in the subject area Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Environmental Science						
Country	2009	2010	2011	2012	2013	2014
WLD	982	876	662	347	133	23
G8	480	476	367	187	68	12
BRICS	212	191	159	70	33	4
SAARC	36	35	27	13	10	2
USA	243	254	219	106	30	7
CHN	149	138	114	48	22	2
GBR	57	54	29	19	12	3
DEU	64	61	51	29	11	5
JPN	59	36	35	10	5	0
IND	34	33	24	13	8	2
ITA	28	38	16	11	4	0
CAN	30	27	24	10	3	0
ESP	45	68	25	23	12	3
AUS	19	22	19	3	4	0
KOR	22	27	29	13	9	1
BRA	19	17	16	6	3	0
SWE	27	18	18	9	0	0
SGP	4	4	11	12	7	0

Table C.10 — Annual amount of patent citations for 2009-2014 in the subject area Environmental Science. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Immunology and Microbiology						
Country	2009	2010	2011	2012	2013	2014
WLD	4,220	3,309	2,409	1,168	489	82
G8	3,158	2,482	1,798	876	368	57
BRICS	419	363	282	133	56	10
SAARC	66	57	41	31	13	3
USA	1,958	1,527	1,140	572	236	31
CHN	263	237	185	81	34	5
GBR	425	311	212	107	57	15
DEU	462	368	275	136	64	4
JPN	294	229	147	64	17	4
IND	63	49	35	29	11	3
ITA	195	120	108	44	21	7
CAN	147	157	111	38	13	7
ESP	97	94	73	41	13	2
AUS	142	107	74	46	14	4
KOR	88	101	76	44	29	1
BRA	58	42	39	16	7	1
SWE	115	98	74	21	8	3
SGP	40	37	19	14	5	5

Table C.11 — Annual amount of patent citations for 2009-2014 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Materials Science						
Country	2009	2010	2011	2012	2013	2014
WLD	4,087	3,596	2,660	1,403	528	93
G8	2,402	2,190	1,536	820	316	43
BRICS	878	793	599	339	107	14
SAARC	144	125	93	57	13	3
USA	1,135	1,118	783	426	181	25
CHN	657	610	457	258	86	11
GBR	250	240	165	95	40	8
DEU	392	359	223	129	49	6
JPN	349	270	176	79	27	2
IND	141	117	86	55	12	2
ITA	123	116	63	40	15	4
CAN	121	112	101	59	18	5
ESP	140	126	77	41	25	7
AUS	101	87	78	35	23	2
KOR	274	233	225	93	44	5
BRA	29	30	18	11	5	0
SWE	54	76	46	23	6	5
SGP	89	80	59	42	14	2

Table C.12 — Annual amount of patent citations for 2009-2014 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics						
Country	2009	2010	2011	2012	2013	2014
WLD	704	519	373	201	67	15
G8	469	334	242	138	38	8
BRICS	88	61	53	21	11	1
SAARC	7	9	16	4	1	0
USA	263	169	140	56	24	4
CHN	78	42	37	16	9	1
GBR	56	42	26	21	7	0
DEU	68	63	53	23	3	1
JPN	54	24	15	12	4	1
IND	7	8	13	2	1	0
ITA	16	17	9	13	2	1
CAN	21	24	12	9	5	0
ESP	18	16	11	6	1	1
AUS	22	12	1	2	1	0
KOR	26	19	18	10	1	0
BRA	2	4	1	2	1	0
SWE	36	26	5	7	3	0
SGP	9	7	3	5	2	1

Table C.13 — Annual amount of patent citations for 2009-2014 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine						
Country	2009	2010	2011	2012	2013	2014
WLD	11,229	9,936	6,088	3,101	1,206	268
G8	8,671	7,571	4,545	2,329	894	192
BRICS	936	1,000	619	340	147	37
SAARC	135	160	92	40	24	9
USA	5,308	4,667	2,831	1,430	581	121
CHN	602	698	427	242	108	21
GBR	1,205	1,051	608	360	145	34
DEU	1,350	1,176	718	367	149	23
JPN	745	648	356	158	61	14
IND	126	150	79	37	20	9
ITA	720	567	390	186	74	19
CAN	612	502	328	172	64	20
ESP	353	331	252	105	61	11
AUS	370	318	234	129	52	11
KOR	225	230	165	97	45	5
BRA	126	90	69	28	13	4
SWE	306	262	218	68	45	10
SGP	111	105	57	36	18	8

Table C.14 — Annual amount of patent citations for 2009-2014 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Pharmacology, Toxicology and Pharmaceutics						
Country	2009	2010	2011	2012	2013	2014
WLD	3,718	2,984	2,032	1,166	426	86
G8	2,644	2,016	1,358	778	286	60
BRICS	454	435	360	178	82	20
SAARC	173	172	135	57	28	5
USA	1,520	1,176	782	444	179	33
CHN	210	207	201	99	46	11
GBR	342	244	196	109	53	5
DEU	269	238	177	92	26	8
JPN	243	194	123	55	15	4
IND	166	161	124	54	27	5
ITA	218	177	126	60	19	7
CAN	137	130	97	43	15	5
ESP	98	91	59	32	11	3
AUS	55	61	45	32	9	6
KOR	117	110	104	61	15	1
BRA	38	44	16	20	5	0
SWE	55	31	42	25	4	1
SGP	20	23	15	9	5	0

Table C.15 — Annual amount of patent citations for 2009-2014 in the subject area Pharmacology, Toxicology and Pharmaceutics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Physics and Astronomy						
Country	2009	2010	2011	2012	2013	2014
WLD	3,400	2,887	1,948	1,085	360	55
G8	2,209	1,914	1,270	725	226	32
BRICS	591	497	351	205	70	5
SAARC	71	77	54	41	8	0
USA	1,005	967	583	356	123	15
CHN	443	353	254	143	52	4
GBR	233	185	146	92	27	5
DEU	400	343	220	111	47	8
JPN	311	237	161	83	22	2
IND	68	70	49	39	8	0
ITA	131	86	69	52	9	2
CAN	102	100	87	46	12	2
ESP	114	97	67	48	6	3
AUS	71	54	43	25	8	2
KOR	211	182	128	56	23	2
BRA	29	24	11	11	4	0
SWE	54	65	29	29	6	2
SGP	73	50	26	18	12	1

Table C.16 — Annual amount of patent citations for 2009-2014 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Veterinary						
Country	2009	2010	2011	2012	2013	2014
WLD	374	265	186	109	36	9
G8	263	163	126	68	25	5
BRICS	48	33	20	16	6	1
SAARC	6	5	6	1	1	0
USA	133	107	93	38	12	2
CHN	25	19	8	12	3	0
GBR	57	35	16	14	2	2
DEU	41	13	8	11	6	1
JPN	15	8	4	5	1	0
IND	6	5	6	1	1	0
ITA	18	9	9	2	2	0
CAN	10	10	9	4	2	1
ESP	15	11	7	7	0	0
AUS	9	9	4	1	0	0
KOR	6	5	5	3	0	0
BRA	9	8	5	3	2	1
SWE	3	10	4	0	1	0
SGP	0	0	1	2	0	0

Table C.17 — Annual amount of patent citations for 2009-2014 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

C-2 Patent Citations Shares Tables

Country	2009	2010	2011	2012	2013	2014
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	71.3%	70.3%	69.6%	68.9%	69.5%	66.2%
BRICS	12.7%	13.9%	14.9%	16.1%	16.6%	16.3%
SAARC	2.3%	2.6%	2.8%	3.0%	3.2%	4.4%
USA	41.3%	40.9%	40.9%	40.5%	42.1%	40.7%
CHN	8.5%	9.6%	10.5%	11.0%	12.0%	10.2%
GBR	9.3%	9.3%	8.7%	9.2%	11.0%	10.5%
DEU	10.6%	10.6%	10.7%	10.1%	10.9%	8.7%
JPN	7.3%	7.1%	6.3%	6.0%	4.9%	4.4%
IND	2.2%	2.4%	2.4%	2.9%	2.9%	4.3%
ITA	4.9%	4.5%	4.6%	4.5%	4.4%	5.8%
CAN	4.7%	4.8%	4.9%	5.0%	4.5%	5.4%
ESP	3.5%	3.7%	3.9%	3.9%	4.0%	4.4%
AUS	2.9%	2.8%	3.0%	3.0%	3.3%	4.4%
KOR	3.3%	3.9%	4.5%	4.6%	4.9%	2.8%
BRA	1.1%	1.0%	1.0%	1.2%	1.0%	0.7%
SWE	2.4%	2.5%	2.5%	2.6%	2.2%	3.1%
SGP	1.3%	1.2%	1.3%	1.6%	2.0%	3.0%

Table C.18 — Annual amount of patent citations as share of world's amount of patent citations for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Medicine	Engineering	Physics and Astronomy	Computer Science	Biochemistry, Genetics and Molecular Biology	Materials Science	Chemistry	Agricultural and Biological Sciences
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
G8	76.0%	62.9%	65.5%	64.1%	76.0%	59.1%	62.1%	61.9%
BRICS	9.7%	16.9%	17.7%	13.4%	11.5%	22.1%	20.1%	17.4%
SAARC	1.4%	2.2%	2.6%	2.3%	2.0%	3.5%	4.2%	4.0%
USA	46.9%	34.4%	31.3%	34.7%	47.7%	29.7%	30.6%	31.9%
CHN	6.6%	13.4%	12.8%	10.8%	7.9%	16.8%	13.9%	10.6%
GBR	10.7%	7.0%	7.1%	8.0%	10.2%	6.5%	7.3%	8.1%
DEU	11.9%	9.2%	11.6%	10.3%	10.7%	9.4%	9.6%	9.8%
JPN	6.2%	6.9%	8.4%	5.8%	7.0%	7.3%	7.3%	6.6%
IND	1.3%	2.1%	2.4%	1.9%	1.9%	3.3%	3.9%	3.5%
ITA	6.1%	3.5%	3.6%	3.9%	4.7%	2.9%	3.2%	3.8%
CAN	5.3%	4.7%	3.6%	4.8%	5.1%	3.4%	4.1%	4.9%
ESP	3.5%	3.6%	3.4%	5.1%	3.3%	3.4%	4.3%	5.4%
AUS	3.5%	2.3%	2.1%	2.3%	2.9%	2.6%	2.0%	3.2%
KOR	2.4%	6.8%	6.2%	5.1%	3.5%	7.1%	5.2%	4.0%
BRA	1.0%	0.7%	0.8%	0.5%	0.8%	0.8%	0.9%	2.2%
SWE	2.9%	3.2%	1.9%	3.9%	2.5%	1.7%	1.5%	1.7%
SGP	1.1%	2.0%	1.8%	1.5%	1.4%	2.3%	1.7%	0.6%

Table C.19a — Amount of patent citations per subject area as share of world's total amount of patent citations for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Mathematics	Environmental Science	Chemical Engineering	Earth and Planetary Sciences	Energy	Immunology and Microbiology	Pharmacology, Toxicology and Pharmaceutics	Veterinary
WLD	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
GB	65.4%	52.6%	63.7%	60.8%	53.5%	74.8%	68.6%	66.4%
BRICS	12.5%	22.1%	16.9%	20.9%	23.5%	10.8%	14.7%	12.7%
SAARC	2.0%	4.1%	3.3%	2.1%	4.8%	1.8%	5.5%	1.9%
USA	34.9%	28.4%	36.2%	33.5%	26.1%	46.8%	39.7%	39.3%
CHN	9.7%	15.6%	11.8%	13.6%	16.5%	6.9%	7.4%	6.8%
GBR	8.1%	5.8%	6.7%	11.1%	5.6%	9.7%	9.1%	12.9%
DEU	11.2%	7.3%	9.1%	8.2%	8.3%	11.2%	7.8%	8.2%
JPN	5.9%	4.8%	6.6%	1.8%	6.0%	6.5%	6.1%	3.4%
IND	1.6%	3.8%	3.1%	2.1%	4.5%	1.6%	5.2%	1.9%
ITA	3.1%	3.2%	2.6%	4.3%	3.7%	4.2%	5.8%	4.1%
CAN	3.8%	3.1%	3.7%	7.0%	4.5%	4.1%	4.1%	3.7%
ESP	2.8%	5.8%	3.9%	4.7%	3.9%	2.7%	2.8%	4.1%
AUS	2.0%	2.2%	2.0%	5.1%	3.1%	3.3%	2.0%	2.3%
KOR	3.9%	3.3%	5.6%	1.2%	5.3%	2.9%	3.9%	1.9%
BRA	0.5%	2.0%	1.2%	1.6%	1.6%	1.4%	1.2%	2.9%
SWE	4.1%	2.4%	1.9%	1.2%	1.9%	2.7%	1.5%	1.8%
SGP	1.4%	1.3%	1.9%	0.0%	1.2%	1.0%	0.7%	0.3%

Table C.19b — Amount of patent citations per subject area as share of world's total amount of patent citations for the period 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

C-3 Academic-Corporate Collaboration Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	56,579	55,235	57,003	58,122	56,989	52,621	0.2%
GB	44,436	42,743	44,011	44,351	43,239	39,009	-0.7%
BRICS	7,747	8,271	9,299	10,194	10,970	11,386	9.1%
SAARC	1,022	1,073	1,326	1,390	1,383	1,145	7.9%
USA	26,611	25,372	26,309	26,707	25,705	23,260	-0.9%
CHN	5,333	5,861	6,570	7,270	8,058	8,794	10.9%
GBR	6,259	6,077	6,324	6,394	6,634	6,135	1.5%
DEU	7,069	7,043	7,206	7,428	7,624	6,834	1.9%
JPN	7,392	6,974	7,144	6,787	6,703	6,019	-2.4%
IND	953	1,002	1,221	1,282	1,250	1,034	7.0%
ITA	2,417	2,420	2,421	2,622	2,675	2,482	2.6%
CAN	3,088	2,945	2,898	3,046	2,998	2,762	-0.7%
ESP	1,513	1,630	1,685	1,851	1,897	1,741	5.8%
AUS	1,840	1,810	1,890	2,039	2,212	1,996	4.7%
KOR	2,789	2,727	3,029	3,093	2,934	2,665	1.3%
BRA	718	758	801	937	903	859	5.9%
SWE	1,896	1,897	1,999	2,156	2,029	2,010	1.7%
SGP	484	447	491	513	506	526	1.1%

Table C.20 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Agricultural and Biological Sciences							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	143,458	153,534	171,044	181,836	193,998	186,757	0.0%
G8	70,075	72,990	78,980	87,000	91,666	86,128	0.2%
BRICS	34,011	38,238	44,640	47,404	54,968	56,357	1.9%
SAARC	8,141	9,580	11,404	11,757	11,924	11,747	0.0%
USA	33,718	35,869	38,351	42,965	44,815	41,587	-0.4%
CHN	14,916	17,233	21,100	22,550	28,826	30,217	2.5%
GBR	9,237	9,488	10,508	11,581	12,614	11,891	-0.7%
DEU	8,408	9,020	10,028	11,668	12,409	11,621	1.0%
JPN	6,969	7,167	7,755	8,036	8,733	8,031	1.8%
IND	6,553	7,571	8,847	9,381	9,276	9,264	0.1%
ITA	5,439	5,394	6,163	6,573	7,389	7,170	3.0%
CAN	6,810	7,082	7,514	8,537	8,794	8,558	-0.8%
ESP	6,632	6,932	7,937	8,844	9,034	8,693	-0.1%
AUS	6,246	6,706	7,444	8,149	9,146	8,899	2.0%
KOR	2,866	3,232	3,765	4,122	4,636	4,742	1.1%
BRA	8,711	9,424	10,221	11,250	12,017	12,077	-1.6%
SWE	2,244	2,437	2,692	3,107	3,299	3,110	0.2%
SGP	374	458	563	656	732	725	-1.6%

Table C.21 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Agricultural and Biological Sciences. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Biochemistry, Genetics and Molecular Biology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	235,739	236,227	256,156	279,871	293,517	288,654	0.0%
G8	148,845	145,730	155,782	166,748	168,391	158,745	0.2%
BRICS	44,522	47,152	54,062	63,601	74,234	81,909	4.9%
SAARC	8,549	10,151	12,264	14,182	15,424	16,545	-0.2%
USA	77,895	76,163	82,259	88,058	88,648	83,042	-0.2%
CHN	27,659	28,428	32,576	39,574	48,305	54,274	6.1%
GBR	18,110	18,117	19,650	20,997	21,514	20,520	0.7%
DEU	17,955	17,998	19,522	21,515	21,707	20,975	1.2%
JPN	19,956	19,480	19,419	20,589	20,276	18,283	1.4%
IND	7,836	9,328	11,098	12,923	13,849	14,869	-0.3%
ITA	10,459	10,353	11,313	12,363	13,346	12,665	1.3%
CAN	10,897	10,689	11,446	12,904	12,718	12,205	0.5%
ESP	7,807	8,019	8,875	10,072	9,915	9,766	2.3%
AUS	6,544	6,780	7,713	8,800	9,734	9,781	1.3%
KOR	6,848	7,674	8,523	9,468	10,033	10,303	2.0%
BRA	4,629	4,935	5,353	6,065	6,763	6,731	1.7%
SWE	4,300	4,396	4,702	5,179	5,414	5,188	1.8%
SGP	1,608	1,849	2,006	2,215	2,345	2,316	2.4%

Table C.22 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Biochemistry, Genetics and Molecular Biology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemical Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	87,873	89,693	96,892	96,835	105,852	108,890	0.0%
G8	42,013	41,093	43,962	42,231	43,929	40,984	-0.9%
BRICS	25,482	27,808	30,808	32,941	39,492	45,829	3.2%
SAARC	4,462	4,913	6,044	6,123	7,252	9,218	-2.6%
USA	18,013	18,551	20,295	19,096	19,152	16,934	-0.1%
CHN	17,140	19,086	20,845	23,037	28,005	32,153	4.8%
GBR	4,137	3,885	4,409	4,154	4,280	4,217	-0.9%
DEU	5,717	5,594	5,553	5,454	5,962	5,967	0.3%
JPN	6,041	5,267	5,626	5,657	5,948	5,519	-1.1%
IND	4,229	4,590	5,674	5,688	6,761	8,653	-2.9%
ITA	2,540	2,318	2,385	2,495	3,018	2,918	-3.4%
CAN	2,956	2,801	3,038	2,917	2,950	2,903	-2.2%
ESP	2,637	2,871	3,012	3,206	3,204	3,374	-1.4%
AUS	1,572	1,924	1,751	1,841	2,191	2,443	0.5%
KOR	3,866	4,048	4,769	4,833	5,085	5,559	-1.1%
BRA	1,585	1,540	1,623	1,769	2,149	2,290	-6.1%
SWE	901	867	947	921	1,102	1,136	-0.1%
SGP	905	895	966	1,064	1,161	1,241	1.1%

Table C.23 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Chemical Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Chemistry							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	175,063	182,013	196,864	198,197	207,999	211,596	0.0%
G8	84,008	85,405	90,420	87,119	90,296	88,296	-0.7%
BRICS	57,494	60,909	68,219	72,501	79,251	87,484	3.6%
SAARC	11,873	12,818	14,453	15,257	16,229	17,603	1.8%
USA	31,550	32,857	35,206	33,867	35,002	34,309	-0.9%
CHN	36,019	38,361	43,382	47,445	52,482	59,059	3.5%
GBR	8,181	8,484	9,116	8,706	8,856	8,975	-0.1%
DEU	13,009	13,361	14,058	14,115	14,351	14,253	-0.9%
JPN	13,779	13,091	13,683	13,275	13,585	13,009	-0.3%
IND	10,934	11,709	13,302	13,934	14,830	16,371	2.0%
ITA	5,796	5,602	6,078	6,048	6,585	6,377	-0.2%
CAN	4,965	5,017	5,523	5,428	5,477	5,436	-1.6%
ESP	6,631	6,838	7,400	7,592	7,669	7,571	-0.7%
AUS	3,046	3,284	3,837	3,925	4,337	4,557	-0.4%
KOR	6,571	7,513	8,609	8,769	8,982	9,194	-0.7%
BRA	3,299	3,468	3,618	3,954	4,063	4,297	-1.8%
SWE	1,923	1,955	2,087	2,152	2,237	2,416	-2.2%
SGP	1,425	1,634	1,868	1,903	2,038	2,124	2.4%

Table C.24 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Chemistry. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Computer Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	285,120	298,739	299,890	299,587	291,563	277,621	0.0%
G8	126,224	128,711	129,643	131,406	132,269	124,241	-1.1%
BRICS	89,562	98,282	95,715	94,474	88,485	89,355	4.6%
SAARC	9,174	10,957	14,715	15,749	16,376	20,853	0.4%
USA	55,567	55,953	56,508	56,796	56,395	52,323	-2.2%
CHN	75,333	81,809	75,269	72,364	65,017	61,048	5.2%
GBR	14,422	14,879	14,582	14,812	15,638	14,982	-0.1%
DEU	16,510	17,773	17,743	18,619	18,416	17,467	-0.1%
JPN	15,672	15,854	16,222	16,166	16,138	13,467	-0.8%
IND	7,733	9,475	13,199	13,972	14,366	18,565	0.0%
ITA	9,439	9,502	10,043	10,189	11,209	10,949	3.3%
CAN	10,449	10,384	10,098	10,296	10,129	9,916	-0.2%
ESP	8,971	9,364	9,637	9,931	9,858	9,089	2.5%
AUS	6,947	6,889	7,009	7,373	7,823	7,162	3.8%
KOR	8,468	8,924	9,869	9,949	9,788	9,134	0.8%
BRA	3,742	4,035	4,067	4,959	5,281	5,159	-0.7%
SWE	2,716	2,894	3,283	3,403	3,565	3,557	1.8%
SGP	3,207	3,420	3,497	3,728	3,866	3,742	2.5%

Table C.25 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Computer Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Earth and Planetary Sciences							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	90,964	92,881	97,107	102,962	108,791	105,915	0.0%
G8	52,760	52,736	53,144	57,139	58,648	57,065	0.7%
BRICS	25,865	28,072	30,739	31,941	37,265	38,257	1.1%
SAARC	2,988	3,221	4,104	4,650	4,393	4,432	1.0%
USA	25,760	25,445	26,173	27,680	28,516	28,426	0.2%
CHN	16,895	18,515	20,354	20,791	25,698	26,521	1.1%
GBR	8,159	8,572	8,362	8,869	9,289	8,884	1.4%
DEU	7,488	8,223	8,094	9,207	9,161	8,910	1.2%
JPN	4,527	4,271	4,474	4,613	4,880	4,453	2.9%
IND	2,769	2,968	3,748	4,287	3,953	3,938	1.2%
ITA	5,083	5,166	5,036	6,045	5,882	5,368	1.6%
CAN	4,647	4,906	4,835	5,176	5,376	5,382	1.1%
ESP	3,125	3,698	3,698	4,135	4,262	4,303	0.8%
AUS	3,686	4,197	4,512	4,933	5,115	5,164	1.5%
KOR	1,406	1,471	1,446	1,678	1,817	1,922	-0.1%
BRA	1,599	1,771	1,857	1,936	2,290	2,277	-3.7%
SWE	1,281	1,509	1,368	1,554	1,621	1,620	1.0%
SGP	163	209	213	270	302	303	-2.2%

Table C.26 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Earth and Planetary Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Energy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	64,017	63,376	68,206	69,689	78,044	80,821	0.0%
G8	29,230	26,833	29,934	28,713	33,315	32,462	-0.9%
BRICS	20,581	22,090	23,014	24,823	27,794	30,876	2.3%
SAARC	2,704	2,682	3,436	3,597	3,699	4,655	-2.0%
USA	13,011	12,569	13,656	13,329	15,098	14,906	-1.2%
CHN	14,951	16,860	16,524	18,289	20,819	23,308	3.8%
GBR	2,972	2,690	2,862	2,850	3,628	3,581	1.1%
DEU	3,061	2,655	3,582	3,153	3,905	3,737	1.7%
JPN	4,348	3,780	3,928	3,328	4,140	3,626	-2.7%
IND	2,422	2,498	3,196	3,306	3,379	4,093	-2.0%
ITA	1,780	1,605	2,059	2,015	2,343	2,593	-1.4%
CAN	2,400	2,224	2,255	2,260	2,524	2,562	-0.4%
ESP	1,502	1,385	1,905	1,761	2,180	2,215	-0.4%
AUS	1,133	1,321	1,313	1,488	1,870	2,134	3.1%
KOR	2,022	1,887	2,012	2,234	2,561	2,789	1.2%
BRA	1,185	974	1,200	1,145	1,345	1,312	-3.1%
SWE	694	760	835	839	1,145	1,139	-2.0%
SGP	282	415	395	435	576	646	4.7%

Table C.27 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Energy. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Engineering							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	420,346	442,419	484,453	495,326	515,085	513,765	0.0%
G8	187,921	188,567	189,645	189,781	191,662	183,924	0.1%
BRICS	132,685	150,193	187,855	197,419	213,055	224,069	1.9%
SAARC	13,599	14,828	18,325	21,196	23,357	28,336	-0.2%
USA	83,459	84,813	83,897	82,966	84,458	77,419	-1.2%
CHN	107,903	123,774	157,477	163,861	176,100	179,865	2.2%
GBR	18,899	18,859	19,074	19,059	19,503	19,640	0.9%
DEU	21,685	21,414	22,499	23,025	22,688	22,616	1.4%
JPN	30,393	30,142	29,379	28,820	28,484	24,971	1.2%
IND	12,310	13,271	16,778	19,176	21,142	25,671	-0.8%
ITA	12,359	12,530	12,825	13,535	14,313	15,454	3.3%
CAN	13,214	13,280	12,848	13,286	12,902	13,068	-0.8%
ESP	9,351	9,304	10,141	10,540	10,926	11,229	1.0%
AUS	7,369	8,443	8,793	9,386	9,826	10,399	3.0%
KOR	15,380	16,589	17,893	18,620	19,410	19,571	0.4%
BRA	5,167	5,817	5,569	6,365	6,952	7,192	-2.0%
SWE	4,085	4,218	4,594	4,821	4,906	5,152	0.7%
SGP	4,332	4,518	4,295	4,332	4,665	4,760	4.1%

Table C.28 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Engineering. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Environmental Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	93,704	97,866	110,358	110,969	117,846	118,162	0.0%
G8	45,901	47,693	50,818	51,516	53,333	52,639	1.3%
BRICS	22,126	23,400	29,724	29,191	33,748	36,114	1.1%
SAARC	5,176	5,680	6,147	6,541	7,368	7,732	-1.2%
USA	22,911	23,651	25,087	25,174	26,383	25,412	1.8%
CHN	13,521	14,179	19,502	18,099	21,607	23,646	2.4%
GBR	6,286	6,727	7,033	7,290	7,604	7,717	0.9%
DEU	5,029	5,492	5,988	6,316	6,347	6,278	2.8%
JPN	3,735	3,728	4,177	3,747	4,051	4,024	1.9%
IND	4,588	5,041	5,433	5,724	6,363	6,549	-0.6%
ITA	3,225	3,239	3,599	3,878	4,208	4,375	3.0%
CAN	4,546	4,907	5,188	5,378	5,485	5,561	-0.2%
ESP	3,505	3,929	4,355	4,598	4,751	4,765	-0.7%
AUS	3,760	3,979	4,322	4,746	5,249	5,482	2.3%
KOR	1,738	1,911	2,305	2,644	2,889	2,975	-3.3%
BRA	2,136	2,358	2,736	3,230	3,491	3,413	-5.2%
SWE	1,536	1,639	1,770	2,008	2,222	2,246	0.9%
SGP	339	378	479	511	582	653	2.9%

Table C.29 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Environmental Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Immunology and Microbiology							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	56,363	59,100	64,269	64,159	67,318	66,307	0.0%
G8	33,407	33,919	35,666	36,177	36,805	35,626	0.8%
BRICS	10,787	11,907	13,954	14,208	16,449	17,190	1.4%
SAARC	2,494	2,864	3,265	3,122	3,350	3,598	-0.6%
USA	17,267	17,501	18,916	19,253	19,391	18,524	0.3%
CHN	5,286	6,005	7,663	7,781	9,659	10,243	2.7%
GBR	4,780	4,913	5,106	5,025	5,107	5,163	2.1%
DEU	4,194	4,415	4,403	4,701	4,783	4,961	2.3%
JPN	3,994	3,883	3,892	3,913	3,972	3,447	1.6%
IND	2,149	2,421	2,601	2,693	2,886	3,086	-1.1%
ITA	2,382	2,517	2,799	2,844	3,078	3,196	1.0%
CAN	2,345	2,416	2,511	2,568	2,582	2,621	0.4%
ESP	2,013	2,107	2,300	2,426	2,440	2,439	1.3%
AUS	1,746	1,776	1,891	2,060	2,273	2,327	2.3%
KOR	2,035	2,274	2,413	2,562	2,708	2,837	1.2%
BRA	2,013	2,092	2,302	2,434	2,571	2,597	-0.5%
SWE	1,150	1,228	1,242	1,254	1,273	1,279	2.2%
SGP	274	329	329	416	424	444	1.3%

Table C.30 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Immunology and Microbiology. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Materials Science							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	214,185	212,717	231,697	234,574	235,919	246,520	0.0%
G8	99,280	97,268	103,774	104,532	101,370	102,729	-1.0%
BRICS	72,565	72,258	82,467	84,547	90,551	100,855	2.3%
SAARC	9,925	10,947	13,096	13,485	13,922	15,108	-2.0%
USA	38,084	38,328	40,228	41,779	40,456	40,435	-1.5%
CHN	53,158	51,895	59,380	60,187	65,931	72,932	3.7%
GBR	9,494	8,971	9,708	9,976	9,423	9,980	-0.4%
DEU	15,468	15,367	16,598	16,737	15,781	15,976	-0.7%
JPN	18,418	17,530	18,226	16,930	16,361	15,902	0.0%
IND	9,169	9,985	12,064	12,300	12,792	13,929	-2.1%
ITA	5,853	5,748	6,241	6,447	6,657	6,990	1.7%
CAN	5,548	5,295	5,694	6,015	5,482	5,844	-1.4%
ESP	5,039	5,204	5,648	6,127	5,791	6,227	0.9%
AUS	3,486	3,933	3,918	4,500	4,714	5,267	-0.5%
KOR	9,841	10,216	12,342	12,326	12,075	12,705	0.3%
BRA	2,972	3,209	2,907	3,793	3,313	4,144	-3.7%
SWE	2,237	2,266	2,529	2,610	2,627	2,766	-1.6%
SGP	2,152	2,430	2,462	2,734	2,651	2,706	3.4%

Table C.31 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Materials Science. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Mathematics							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	145,982	149,691	156,131	162,298	164,249	158,152	0.0%
G8	75,261	76,425	78,575	78,245	79,103	75,175	0.2%
BRICS	40,367	42,397	42,023	48,833	51,076	52,559	2.6%
SAARC	4,273	5,234	6,566	7,378	7,276	7,449	-0.4%
USA	31,480	32,447	32,685	32,629	32,268	30,001	-1.4%
CHN	29,861	30,652	28,581	34,666	36,476	36,862	2.5%
GBR	8,793	8,883	9,183	9,019	9,561	9,164	-0.2%
DEU	10,428	10,807	11,506	11,685	11,625	11,104	1.5%
JPN	7,368	6,901	7,117	7,022	6,951	6,672	2.3%
IND	3,693	4,509	5,721	6,458	6,340	6,497	-0.4%
ITA	6,666	6,649	7,060	7,260	7,779	7,554	4.0%
CAN	5,972	5,993	5,711	5,937	5,793	5,601	0.7%
ESP	5,646	5,383	5,977	5,886	5,958	5,714	1.8%
AUS	3,654	3,204	3,766	3,729	3,793	3,800	2.7%
KOR	3,660	3,623	4,006	4,499	4,510	4,137	2.6%
BRA	2,293	2,436	2,699	2,838	3,094	3,248	-1.3%
SWE	1,588	1,536	1,673	1,738	1,829	1,753	2.2%
SGP	1,177	1,375	1,301	1,336	1,477	1,352	-0.1%

Table C.32 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Mathematics. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Medicine							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	525,088	567,760	576,286	604,605	646,590	721,242	0.0%
G8	298,243	319,558	322,555	338,449	357,234	389,266	-0.5%
BRICS	71,655	83,522	87,416	97,026	110,234	137,068	5.5%
SAARC	14,547	18,154	21,360	23,964	26,073	29,698	-0.6%
USA	151,608	164,023	165,754	172,807	184,064	201,948	-1.2%
CHN	42,896	49,363	49,630	54,253	64,567	84,450	10.3%
GBR	42,196	44,013	44,763	47,368	51,756	54,462	1.1%
DEU	34,207	37,109	36,746	39,199	41,331	46,837	1.1%
JPN	32,308	34,790	35,113	36,631	37,001	40,418	1.3%
IND	11,634	14,854	17,364	19,790	21,741	24,984	-0.8%
ITA	23,679	24,833	25,164	27,869	29,464	32,162	2.0%
CAN	21,922	23,896	24,204	26,056	28,063	31,515	-0.8%
ESP	16,931	18,699	18,601	19,579	20,718	23,847	4.7%
AUS	15,895	17,675	18,713	20,673	23,726	27,258	0.3%
KOR	10,526	12,955	13,829	15,493	17,305	20,647	0.6%
BRA	12,847	14,399	15,189	16,632	17,063	19,274	0.9%
SWE	8,713	9,467	9,531	10,166	11,222	12,660	0.5%
SGP	2,167	2,581	2,766	3,031	3,633	4,085	1.8%

Table C.33 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Medicine. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Pharmacology, Toxicology and Pharmaceuticals							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	63,275	68,852	75,671	77,392	79,368	78,530	0.0%
G8	32,335	33,495	34,397	35,155	34,999	33,504	1.5%
BRICS	16,750	19,761	24,327	25,395	27,074	28,630	0.1%
SAARC	6,037	8,441	11,238	11,300	11,504	10,879	-4.5%
USA	16,195	16,874	17,737	18,360	18,225	17,552	0.7%
CHN	8,626	9,271	10,937	11,688	13,297	15,264	3.3%
GBR	3,845	4,228	4,287	4,401	4,466	4,178	2.9%
DEU	3,450	3,681	3,714	3,965	3,884	3,786	2.3%
JPN	4,765	4,724	4,532	4,236	4,125	3,798	2.5%
IND	5,665	7,932	10,444	10,598	10,709	9,994	-4.9%
ITA	2,914	2,895	3,083	3,100	3,217	3,095	3.9%
CAN	1,836	1,839	2,073	2,075	2,133	1,973	1.4%
ESP	1,754	2,015	1,916	2,079	2,124	1,963	4.0%
AUS	1,218	1,383	1,419	1,531	1,702	1,692	3.6%
KOR	2,075	2,341	2,465	2,493	2,532	2,369	0.0%
BRA	1,832	1,774	2,098	2,198	2,139	2,217	1.2%
SWE	730	802	854	881	895	847	0.2%
SGP	266	298	326	335	356	329	2.5%

Table C.34 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Pharmacology, Toxicology and Pharmaceuticals. See Table H.1 in Appendix H for benchmark and country abbreviations. Source: Scopus database.

Physics and Astronomy							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	266,136	275,774	290,508	288,769	290,839	282,815	0.0%
G8	148,424	151,790	155,813	154,043	149,586	143,113	0.1%
BRICS	81,089	83,546	93,365	94,818	103,273	106,164	2.4%
SAARC	10,748	12,621	14,899	15,177	16,589	16,605	1.2%
USA	59,078	61,300	62,043	63,104	59,607	57,120	0.0%
CHN	52,817	53,309	59,690	60,989	67,561	68,837	2.9%
GBR	16,737	16,967	17,462	17,515	17,539	17,507	0.8%
DEU	25,409	26,844	27,635	28,011	27,034	25,231	0.2%
JPN	24,592	25,039	25,168	23,380	22,921	20,928	1.8%
IND	9,869	11,543	13,652	13,733	15,119	15,213	1.2%
ITA	12,465	12,795	12,929	13,600	13,318	13,306	2.0%
CAN	8,174	8,334	8,920	8,967	8,491	8,286	0.3%
ESP	8,826	9,631	10,079	10,665	9,868	9,537	1.7%
AUS	5,038	5,454	6,049	6,212	6,466	6,493	0.9%
KOR	10,569	11,297	12,101	12,199	11,713	11,486	2.0%
BRA	4,515	5,011	5,054	5,729	5,746	6,175	1.4%
SWE	3,518	3,944	4,072	4,215	4,060	4,155	1.1%
SGP	2,369	2,496	2,515	2,613	2,553	2,599	4.3%

Table C.35 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Physics and Astronomy. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Veterinary							2009-2013
Country	2009	2010	2011	2012	2013	2014	CAGR
WLD	18,567	19,529	19,706	21,228	20,115	17,725	0.0%
G8	8,247	8,373	8,222	8,669	8,360	7,426	0.8%
BRICS	4,009	4,228	4,364	5,476	4,971	4,429	0.2%
SAARC	1,527	1,635	1,545	1,890	1,312	1,126	10.3%
USA	3,836	3,899	3,958	4,063	3,987	3,445	0.0%
CHN	619	700	864	1,432	1,203	1,160	-3.8%
GBR	1,343	1,320	1,341	1,462	1,329	1,175	1.2%
DEU	1,165	1,104	1,062	1,160	1,048	1,049	3.1%
JPN	701	620	577	636	595	510	2.9%
IND	1,415	1,480	1,409	1,679	1,082	950	8.0%
ITA	630	743	603	751	801	717	0.4%
CAN	637	684	663	726	682	660	-0.6%
ESP	585	597	657	680	696	617	-0.5%
AUS	502	554	619	598	618	623	3.7%
KOR	364	425	431	453	425	469	-2.1%
BRA	1,769	1,868	1,880	2,123	2,424	2,126	-5.6%
SWE	236	227	238	216	193	204	0.5%
SGP	16	13	21	20	12	18	-3.8%

Table C.36 — Annual academic-corporate collaborated publications for 2009-2014 and growth for 2009-2013 in the subject area Veterinary. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

C-4 Academic-Corporate Collaboration Shares Tables

Country	2009	2010	2011	2012	2013	2014	2009-2013 CAGR
WLD	2.8%	2.6%	2.5%	2.5%	2.4%	2.2%	-3.7%
G8	4.3%	4.0%	4.0%	3.9%	3.7%	3.5%	-3.2%
BRICS	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	-0.4%
SAARC	1.4%	1.3%	1.3%	1.2%	1.1%	0.9%	-5.3%
USA	5.4%	5.0%	4.9%	4.9%	4.7%	4.5%	-3.4%
CHN	1.7%	1.7%	1.7%	1.8%	1.8%	1.9%	1.3%
GBR	4.6%	4.4%	4.4%	4.3%	4.3%	4.1%	-2.1%
DEU	5.5%	5.3%	5.2%	5.1%	5.2%	4.8%	-1.4%
JPN	6.0%	5.6%	5.7%	5.4%	5.4%	5.3%	-3.0%
IND	1.5%	1.3%	1.3%	1.3%	1.2%	0.9%	-6.1%
ITA	3.2%	3.2%	3.0%	3.1%	3.0%	2.8%	-2.1%
CAN	4.0%	3.7%	3.5%	3.6%	3.5%	3.3%	-3.5%
ESP	2.4%	2.5%	2.4%	2.4%	2.5%	2.3%	0.4%
AUS	3.3%	3.0%	2.9%	3.0%	3.0%	2.7%	-2.8%
KOR	5.3%	4.6%	4.7%	4.5%	4.1%	3.7%	-6.0%
BRA	1.6%	1.6%	1.5%	1.6%	1.5%	1.4%	-1.3%
SWE	7.2%	6.8%	6.8%	6.9%	6.2%	6.1%	-3.8%
SGP	3.8%	3.1%	3.3%	3.1%	3.0%	3.1%	-5.8%

Table C.37 — Annual academic-corporate collaborated publications as share of country's total output for 2009-2014 and growth for 2009-2013. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Medicine	Engineering	Physics and Astronomy	Computer Science	Biochemistry, Genetics and Molecular Biology	Materials Science	Chemistry	Agricultural and Biological Sciences
WLD	20.3%	32.0%	16.3%	20.3%	12.7%	15.0%	9.6%	5.2%
G8	23.6%	28.8%	16.8%	20.8%	14.2%	14.1%	9.0%	5.3%
BRICS	9.3%	40.7%	13.3%	19.8%	7.1%	14.9%	9.7%	3.9%
SAARC	14.6%	27.5%	13.5%	26.1%	12.8%	14.4%	15.9%	4.8%
USA	28.3%	24.5%	14.1%	22.2%	15.3%	11.1%	6.9%	5.2%
CHN	6.1%	46.8%	11.9%	20.0%	5.3%	15.4%	8.4%	2.8%
GBR	32.5%	18.2%	13.2%	13.5%	19.2%	9.5%	10.0%	7.6%
DEU	27.2%	24.7%	17.8%	18.6%	16.7%	13.3%	10.0%	5.8%
JPN	15.8%	38.3%	26.0%	17.3%	13.1%	21.3%	11.7%	3.7%
IND	13.1%	28.5%	14.0%	27.0%	12.7%	14.7%	16.2%	4.2%
ITA	27.7%	24.9%	20.5%	17.0%	15.5%	13.2%	9.0%	4.2%
CAN	30.6%	20.6%	11.4%	15.5%	14.7%	10.2%	7.3%	9.5%
ESP	33.0%	18.7%	16.1%	20.1%	16.4%	9.3%	7.1%	7.3%
AUS	28.6%	15.8%	9.9%	19.3%	17.4%	6.8%	6.5%	14.3%
KOR	11.6%	45.7%	25.1%	18.1%	9.9%	28.1%	14.7%	2.6%
BRA	24.0%	22.6%	10.3%	18.1%	11.6%	9.8%	9.5%	9.9%
SWE	32.5%	24.2%	13.9%	15.5%	17.0%	10.7%	6.8%	8.9%
SGP	21.3%	32.0%	16.4%	26.8%	18.2%	17.2%	8.5%	4.2%

Table C.38a — Academic-corporate collaborated publications per subject area as share of country's total output for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Country	Mathematics	Environmental Science	Chemical Engineering	Earth and Planetary Sciences	Energy	Immunology and Microbiology	Pharmacology, Toxicology and Pharmaceutics	Veterinary
WLD	7.4%	4.1%	5.5%	5.7%	5.9%	3.3%	4.7%	0.7%
G8	7.6%	4.0%	4.4%	4.6%	4.1%	3.7%	5.0%	0.8%
BRICS	6.7%	3.4%	8.4%	12.7%	14.3%	2.0%	2.9%	0.3%
SAARC	7.2%	4.1%	5.7%	5.0%	4.4%	3.1%	10.1%	0.5%
USA	7.9%	3.8%	3.5%	5.0%	3.2%	4.0%	5.4%	0.8%
CHN	6.9%	3.0%	8.8%	14.2%	17.3%	1.2%	1.7%	0.1%
GBR	6.0%	4.8%	4.4%	5.9%	3.7%	5.2%	7.9%	1.2%
DEU	7.5%	3.6%	4.7%	4.7%	3.2%	4.8%	4.6%	0.8%
JPN	5.9%	3.0%	5.0%	3.0%	5.4%	2.8%	4.7%	0.3%
IND	7.5%	3.8%	5.8%	5.0%	4.6%	2.7%	10.5%	0.3%
ITA	6.1%	3.7%	3.4%	7.1%	3.9%	3.8%	5.1%	0.8%
CAN	5.9%	7.0%	3.9%	9.3%	4.1%	4.2%	4.1%	0.9%
ESP	6.7%	4.7%	3.0%	8.2%	3.6%	4.7%	4.1%	0.8%
AUS	6.8%	7.5%	2.8%	10.0%	2.9%	5.0%	3.9%	1.4%
KOR	5.6%	3.4%	8.5%	2.4%	6.0%	2.0%	3.7%	0.2%
BRA	5.9%	5.1%	9.4%	9.6%	7.3%	4.8%	2.0%	1.5%
SWE	4.7%	4.8%	3.4%	6.9%	3.5%	4.2%	5.5%	0.6%
SGP	8.3%	1.7%	4.2%	1.8%	2.0%	4.9%	5.5%	0.6%

Table C.38b — Academic-corporate collaborated publications per subject area as share of country's total output for 2009-2014. See Table H.1 in Appendix H for benchmark and country abbreviations.

Source: Scopus database.

Appendix D

Chapter 4 Supplements

D-1 Top 100 Institutions: Overview

Rank	Institution name	Publications 2002-2014	Publications 2009- 2014	Citations 2009-2014	Citations per paper 2009- 2014	H-index 2009- 2014
1	Indian Institute of Science Bangalore	22,056	12,310	84,716	6.88	81
2	Indian Institute of Technology, Kharagpur	15,797	9,378	54,862	5.85	63
3	Indian Institute of Technology, Delhi	14,956	8,572	46,543	5.43	61
4	University of Delhi	14,409	9,272	60,689	6.55	75
5	Anna University	12,756	9,198	26,040	2.83	41
6	Indian Institute of Technology, Madras	12,698	7,641	41,892	5.48	60
7	Indian Institute of Technology, Bombay	12,562	7,739	45,953	5.94	66
8	Jadavpur University	11,869	7,676	38,156	4.97	53
9	Banaras Hindu University	11,773	7,762	51,507	6.64	68
10	Indian Institute of Technology, Kanpur	11,233	6,211	35,599	5.73	51
11	Indian Institute of Technology Roorkee	9,070	6,031	36,364	6.03	62
12	Tata Institute of Fundamental Research	8,908	5,021	54,273	10.81	76
13	Aligarh Muslim University	7,740	5,132	28,239	5.50	52
14	Postgraduate Institute of Medical Education and Research	7,486	4,465	21,036	4.71	42
15	Manipal University	7,111	5,007	14,166	2.83	34
16	Panjab University	7,049	4,382	42,422	9.68	71
17	Annamalai University	6,997	4,738	22,637	4.78	44
18	University of Calcutta	6,931	4,645	22,764	4.90	42
19	Vellore Institute of Technology	6,173	5,656	16,188	2.86	39
20	Indian Institute of Technology, Guwahati	5,625	4,132	24,289	5.88	48
21	Indian Statistical Institute	5,316	3,091	11,031	3.57	32
22	University of Hyderabad	5,276	3,439	22,246	6.47	48

Rank	Institution name	Publications 2002-2014	Publications 2009- 2014	Citations 2009-2014	Citations per paper 2009- 2014	H-index 2009- 2014
23	Indian Association for the Cultivation of Science	5,145	2,825	27,369	9.69	54
24	University of Madras	5,100	2,742	14,821	5.41	38
25	Birla Institute of Technology	4,938	3,582	15,570	4.35	43
26	University of Mumbai	4,659	2,693	16,256	6.04	45
27	Osmania University	4,457	3,033	9,421	3.11	33
28	University of Mysore	4,293	2,623	7,399	2.82	27
29	Jawaharlal Nehru University	4,265	2,659	14,519	5.46	42
30	University of Pune	4,045	2,609	14,067	5.39	41
31	Christian Medical College	3,848	2,233	11,909	5.33	40
32	Andhra University	3,834	2,434	5,548	2.28	24
33	University of Rajasthan	3,793	2,160	13,522	6.26	46
34	Punjab Agricultural University	3,738	2,112	5,226	2.47	27
35	Saha Institute of Nuclear Physics	3,647	2,164	19,991	9.24	52
36	Jawaharlal Nehru Technological University	3,602	2,670	7,271	2.72	26
37	Pondicherry University	3,587	2,647	9,122	3.45	33
38	National Institute of Technology Tiruchirappalli	3,567	2,726	12,806	4.70	38
39	Sanjay Gandhi Postgraduate Institute of Medical Sciences	3,497	1,889	14,581	7.72	36
40	Indian Veterinary Research Institute	3,483	1,969	5,987	3.04	26
41	Sri Venkateswara University	3,430	2,293	10,474	4.57	37
42	Jawaharlal Nehru Centre for Advanced Scientific Research	3,327	1,841	22,989	12.49	57
43	Cochin University of Science and Technology	3,241	1,848	6,660	3.60	27
44	SASTRA	3,236	2,968	7,532	2.54	32
45	Guru Nanak Dev University	3,224	1,922	12,657	6.59	39
46	Bharathiar University	3,102	2,201	10,247	4.66	36
47	University of Lucknow	3,070	2,089	9,466	4.53	33
48	National Institute of Technology Rourkela	3,011	2,469	10,251	4.15	35
49	M.S. University of Baroda	2,985	1,844	8,669	4.70	32
50	Hamdard University	2,966	2,015	13,075	6.49	43
51	Bharathidasan University	2,898	1,934	10,857	5.61	37
52	University of Allahabad	2,898	1,943	10,916	5.62	37
53	Bengal Engineering and Science University	2,889	2,008	8,153	4.06	32
54	Amrita Vishwa Vidyapeetham	2,835	2,327	12,322	5.30	46
55	Madurai Kamaraj University	2,624	1,619	8,600	5.31	35

Rank	Institution name	Publications 2002-2014	Publications 2009- 2014	Citations 2009-2014	Citations per paper 2009- 2014	H-index 2009- 2014
56	PSG College of Technology India	2,613	1,786	4,358	2.44	22
57	Maulana Azad Medical College	2,529	1,386	4,694	3.39	24
58	Mangalore University	2,518	1,513	4,108	2.72	21
59	Shivaji University	2,444	1,675	13,929	8.32	44
60	University of Kalyani	2,377	1,533	7,396	4.83	30
61	SRM University	2,349	2,236	7,239	3.24	33
62	Bangalore University	2,244	1,404	6,582	4.69	30
63	CCS Haryana Agricultural University	2,243	1,056	1,492	1.41	14
64	Kurukshetra University	2,235	1,586	5,804	3.66	25
65	University of Burdwan	2,203	1,418	7,543	5.32	32
66	G.B. Pant University of Agriculture and Technology	2,181	1,206	2,720	2.26	18
67	Karnatak University	2,143	1,129	5,485	4.86	30
68	Punjabi University	2,135	1,481	6,493	4.38	30
69	Indian School of Mines University	2,068	1,586	4,983	3.14	23
70	University of Kerala	2,053	1,279	5,314	4.16	27
71	Sathyabama University	2,037	1,841	2,851	1.55	20
72	Visva-Bharati University	2,026	1,408	10,123	7.19	40
73	Dr. Harisingh Gour University, Sagar	2,009	1,251	8,152	6.52	35
74	Tamil Nadu Agricultural University	1,900	1,063	3,130	2.94	21
75	Tezpur University	1,801	1,454	7,830	5.39	32
76	Bose Institute	1,781	1,075	8,070	7.51	38
77	Jawaharlal Institute of Postgraduate Medical Education and Research	1,692	1,048	3,272	3.12	21
78	Sardar Patel University	1,629	998	4,408	4.42	24
79	Rashtrasant Tukadoji Maharaj Nagpur University	1,628	1,132	4,163	3.68	22
80	Alagappa University	1,626	1,097	5,292	4.82	26
81	Gauhati University	1,602	1,136	3,567	3.14	22
82	Kakatiya University	1,543	954	2,947	3.09	22
83	North-Eastern Hill University India	1,522	892	3,070	3.44	19
84	University of Jammu	1,517	960	7,659	7.98	39
85	Maharshi Dayanand University	1,480	986	4,411	4.47	29
86	AMITY UNIVERSITY	1,469	1,339	3,938	2.94	26
87	Kuvempu University	1,430	1,039	6,865	6.61	32
88	Mahatma Gandhi University	1,410	840	3,292	3.92	21
89	Thiagarajar College of Engineering	1,410	1,067	3,229	3.03	27
90	Bharati Vidyapeeth University	1,403	1,036	5,098	4.92	27
91	Acharya Nagarjuna University	1,401	1,032	2,538	2.46	17
92	Devi Ahilya University of Indore	1,397	875	4,524	5.17	25

Rank	Institution name	Publications 2002-2014	Publications 2009- 2014	Citations 2009-2014	Citations per paper 2009- 2014	H-index 2009- 2014
93	International Institute of Information Technology Hyderabad	1,392	962	3,049	3.17	23
94	Rashtreeya Vidyalaya College of Engineering	1,384	1,056	1,677	1.59	18
95	Gulbarga University	1,319	778	3,446	4.43	24
96	Guru Jambheshwar University of Science and Technology	1,265	840	5,216	6.21	30
97	Himachal Pradesh University	1,232	775	4,273	5.51	26
98	Sri Krishnadevaraya University India	1,198	825	3,756	4.55	23
99	Vidyasagar University	1,187	803	4,171	5.19	24
100	Gandhigram Rural University	1,144	829	6,485	7.82	37

Table D.1 - Top 100 Indian academic institutions; rank, publication count in all subject areas, 2002-2014 and 2009-2014, citations 2009-2014, citations per paper 2009-2014, H-index 2009-2014. Top 100 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

D-2 Top 30 Institutions: Subject Area Shares

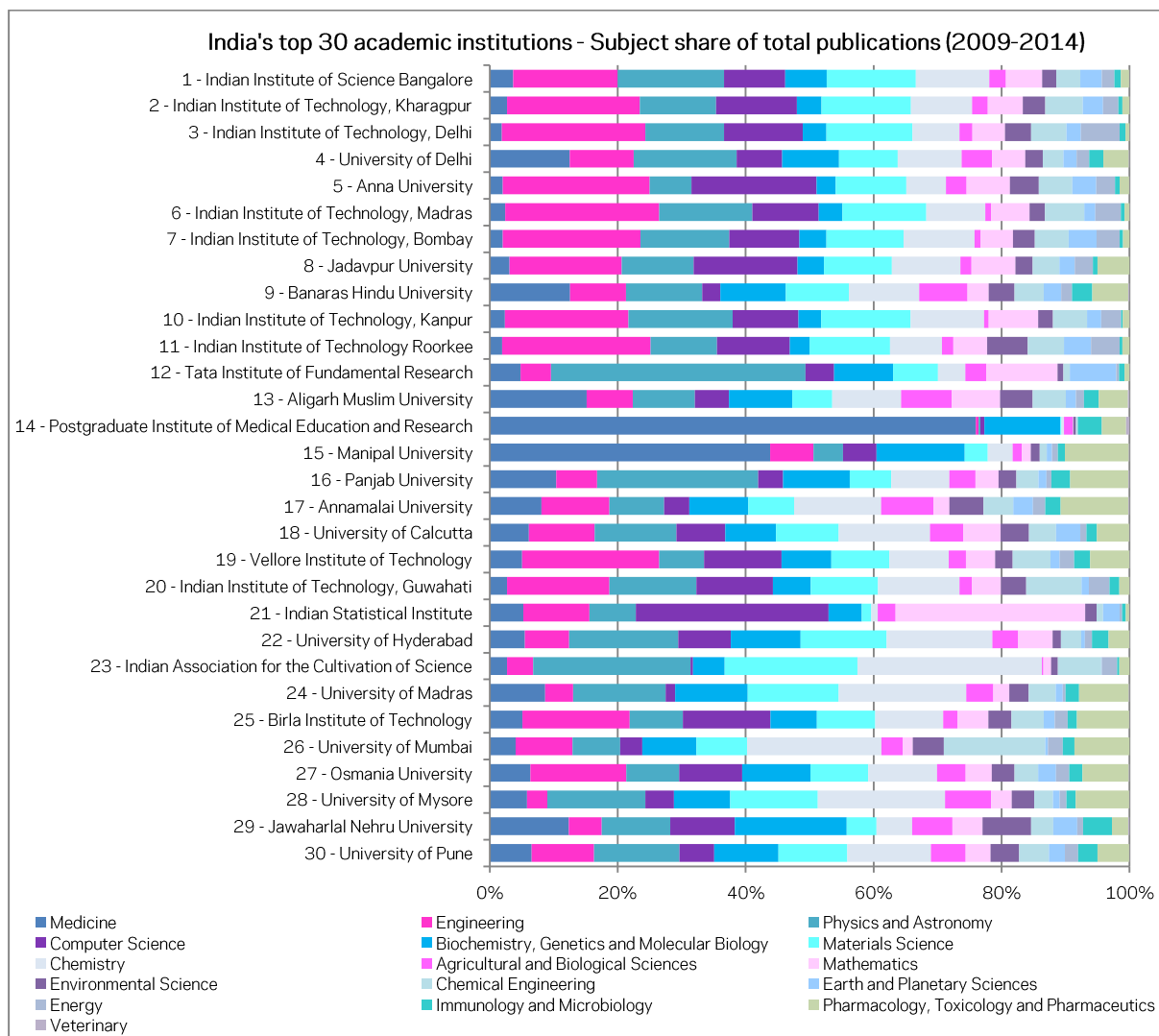


Figure D.1 - Top 30 Indian academic institutions subject share of total output, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications. Source: Scopus database.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	12,310	578	1,439	839	2,562	2,136	743	443	3,641
Indian Institute of Technology, Kharagpur	9,378	434	673	1,036	1,677	2,223	558	423	3,645
Indian Institute of Technology, Delhi	8,572	307	564	843	1,118	1,876	346	923	3,424
University of Delhi	9,272	677	1,269	458	1,429	1,015	296	280	1,424
Anna University	9,198	527	489	859	1,019	3,197	614	475	3,765
Indian Institute of Technology, Madras	7,641	126	522	870	1,307	1,476	247	564	3,412
Indian Institute of Technology, Bombay	7,739	128	566	713	1,496	1,479	591	481	2,897
Jadavpur University	7,676	228	538	551	1,402	2,128	313	372	2,290
Banaras Hindu University	7,762	1,002	1,359	602	1,462	378	369	222	1,167
Indian Institute of Technology, Kanpur	6,211	82	408	611	1,310	1,170	248	359	2,203
Indian Institute of Technology Roorkee	6,031	192	335	614	874	1,231	460	478	2,511
Tata Institute of Fundamental Research	5,021	242	685	73	319	336	541	32	356
Aligarh Muslim University	5,132	620	774	408	840	417	123	99	563
Postgraduate Institute of Medical Education and Research	4,465	71	635	10	22	34	4	3	25
Manipal University	5,007	98	943	75	267	360	54	64	465
Panjab University	4,382	266	680	227	595	255	82	50	416
Annamalai University	4,738	666	750	378	1,100	317	250	154	863
University of Calcutta	4,645	405	622	330	1,117	599	297	74	806
Vellore Institute of Technology	5,656	257	741	565	882	1,159	136	217	2,043
Indian Institute of Technology, Guwahati	4,132	149	453	665	981	926	92	245	1,235
Indian Statistical Institute	3,091	121	223	44	43	1,294	110	17	444
University of Hyderabad	3,439	248	669	193	1,012	502	37	66	423
Indian Association for the Cultivation of Science	2,825	15	273	376	1,598	21	5	134	228
University of Madras	2,742	226	610	227	1,073	79	59	23	237
Birla Institute of Technology	3,582	132	443	305	648	832	108	123	1,023
University of Mumbai	2,693	178	453	849	1,125	187	23	123	478
Osmania University	3,033	230	550	191	551	504	141	106	768
University of Mysore	2,623	346	419	140	952	215	49	51	150
Jawaharlal Nehru University	2,659	229	636	127	203	367	136	33	188
University of Pune	2,609	252	469	218	611	253	116	97	455

Table D.2a – Subject area publication counts of top 30 Indian academic institutions, 2009-2014. The highest counts per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	12,310	491	223	3,109	1,262	815	287	3,700	14
Indian Institute of Technology, Kharagpur	9,378	612	106	2,458	963	476	193	2,096	3
Indian Institute of Technology, Delhi	8,572	623	135	2,051	775	285	97	1,876	2
University of Delhi	9,272	393	320	1,312	737	1,785	564	2,296	17
Anna University	9,198	743	120	1,809	1,108	331	247	1,071	6
Indian Institute of Technology, Madras	7,641	342	82	1,861	852	341	111	2,062	1
Indian Institute of Technology, Bombay	7,739	460	74	1,625	681	275	135	1,868	0
Jadavpur University	7,676	350	91	1,393	897	405	657	1,472	0
Banaras Hindu University	7,762	540	420	1,312	442	1,666	745	1,580	29
Indian Institute of Technology, Kanpur	6,211	262	27	1,591	884	268	118	1,859	3
Indian Institute of Technology Roorkee	6,031	685	48	1,361	569	206	121	1,116	0
Tata Institute of Fundamental Research	5,021	68	64	524	831	358	58	2,960	1
Aligarh Muslim University	5,132	398	178	490	590	1,185	357	758	20
Postgraduate Institute of Medical Education and Research	4,465	23	200	9	5	4,068	203	15	29
Manipal University	5,007	97	76	247	94	2,998	683	313	7
Panjab University	4,382	181	189	423	235	679	597	1,642	10
Annamalai University	4,738	433	196	582	200	654	861	694	13
University of Calcutta	4,645	346	130	766	461	476	394	1,000	4
Vellore Institute of Technology	5,656	261	237	866	436	482	586	667	2
Indian Institute of Technology, Guwahati	4,132	305	120	814	351	208	121	1,046	2
Indian Statistical Institute	3,091	76	26	63	1,273	224	22	312	2
University of Hyderabad	3,439	81	159	825	329	337	201	1,046	1
Indian Association for the Cultivation of Science	2,825	58	17	1,151	66	148	89	1,364	0
University of Madras	2,742	163	113	765	135	464	420	778	5
Birla Institute of Technology	3,582	220	87	556	297	309	498	506	2
University of Mumbai	2,693	260	98	424	86	216	462	397	0
Osmania University	3,033	182	107	464	211	327	372	426	6
University of Mysore	2,623	169	70	656	153	279	400	734	2
Jawaharlal Nehru University	2,659	275	165	170	171	449	91	389	8
University of Pune	2,609	207	142	500	183	304	230	625	3

Table D.2b – Subject area publication counts of top 30 Indian academic institutions, 2009-2014, continued. The highest counts per subject area are highlighted. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

D-3 Top 30 Institutions: Citations & Distribution

Institution name	Citations	Citations per paper (CPP)
Indian Institute of Science Bangalore	84,716	6.9
Indian Institute of Technology, Kharagpur	54,862	5.9
Indian Institute of Technology, Delhi	46,543	5.4
University of Delhi	60,689	6.5
Anna University	26,040	2.8
Indian Institute of Technology, Madras	41,892	5.5
Indian Institute of Technology, Bombay	45,953	5.9
Jadavpur University	38,156	5.0
Banaras Hindu University	51,507	6.6
Indian Institute of Technology, Kanpur	35,599	5.7
Indian Institute of Technology Roorkee	36,364	6.0
Tata Institute of Fundamental Research	54,273	10.8
Aligarh Muslim University	28,239	5.5
Postgraduate Institute of Medical Education and Research	21,036	4.7
Manipal University	14,166	2.8
Panjab University	42,422	9.7
Annamalai University	22,637	4.8
University of Calcutta	22,764	4.9
Vellore Institute of Technology	16,188	2.9
Indian Institute of Technology, Guwahati	24,289	5.9
Indian Statistical Institute	11,031	3.6
University of Hyderabad	22,246	6.5
Indian Association for the Cultivation of Science	27,369	9.7
University of Madras	14,821	5.4
Birla Institute of Technology	15,570	4.3
University of Mumbai	16,256	6.0
Osmania University	9,421	3.1
University of Mysore	7,399	2.8
Jawaharlal Nehru University	14,519	5.5
University of Pune	14,067	5.4

Table D.3 - Citations and citations per paper (CPP) overall of top 30 Indian academic institutions, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications. Source: Scopus database.

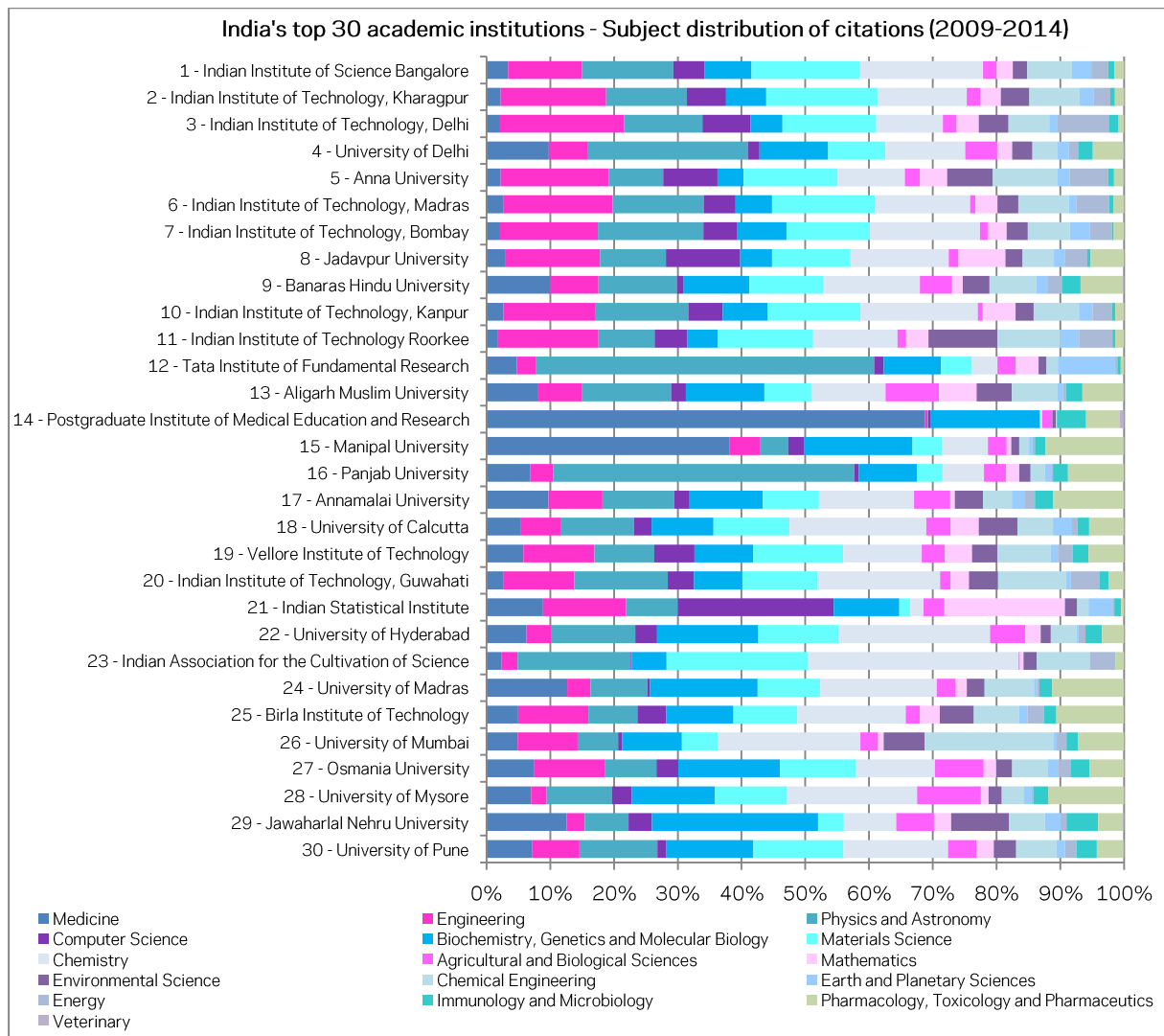


Figure D.2 - Distribution of citations per subject area of top 30 Indian academic institutions, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications. Source: Scopus database.

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	6.9	6.0	8.4	13.6	<u>12.3</u>	3.7	6.7	9.6	5.2
Indian Institute of Technology, Kharagpur	5.9	5.6	10.8	8.8	9.6	3.2	4.5	7.1	5.3
Indian Institute of Technology, Delhi	5.4	6.2	7.9	6.8	8.4	3.6	3.4	7.9	5.1
University of Delhi	6.5	7.0	8.1	8.2	8.3	1.7	5.7	4.9	4.1
Anna University	2.8	2.3	4.4	6.2	5.4	1.4	1.6	6.7	2.4
Indian Institute of Technology, Madras	5.5	5.8	9.5	7.9	9.9	3.0	4.2	7.9	4.4
Indian Institute of Technology, Bombay	5.9	7.4	11.1	7.5	9.4	2.9	4.4	5.7	4.3
Jadavpur University	5.0	4.9	6.8	6.5	8.0	<u>4.0</u>	4.2	6.8	4.8
Banaras Hindu University	6.6	5.0	7.5	12.0	10.2	2.5	5.0	9.7	6.4
Indian Institute of Technology, Kanpur	5.7	6.3	<u>11.9</u>	8.0	9.6	3.1	5.8	5.8	4.5
Indian Institute of Technology Roorkee	6.0	4.8	9.8	11.0	10.3	2.8	4.3	7.5	4.3
Tata Institute of Fundamental Research	<u>10.8</u>	8.8	9.8	<u>18.6</u>	9.4	3.3	<u>12.4</u>	7.3	6.2
Aligarh Muslim University	5.5	6.4	7.6	8.4	6.6	2.6	3.1	2.3	6.0
Postgraduate Institute of Medical Education and Research	4.7	5.9	7.2	3.0	3.8	3.6	3.3	1.0	3.9
Manipal University	2.8	6.5	3.9	4.4	5.8	1.5	1.9	1.5	2.2
Panjab University	9.7	7.5	7.6	5.7	6.2	1.6	6.7	3.2	4.9
Annamalai University	4.8	3.7	6.6	5.1	5.8	3.3	3.5	4.3	4.2
University of Calcutta	4.9	3.9	6.5	7.0	8.0	1.9	4.1	5.0	3.2
Vellore Institute of Technology	2.9	4.5	3.9	4.7	4.4	1.7	2.7	3.4	1.7
Indian Institute of Technology, Guwahati	5.9	5.5	8.3	7.9	9.6	2.2	4.4	9.0	4.4
Indian Statistical Institute	3.6	4.6	7.9	6.8	8.1	3.2	5.9	2.9	5.0
University of Hyderabad	6.5	<u>9.2</u>	9.8	8.6	9.7	2.8	3.4	7.0	3.8
Indian Association for the Cultivation of Science	9.7	5.5	11.2	12.3	11.4	3.4	2.6	<u>15.9</u>	6.2
University of Madras	5.4	3.9	8.2	10.1	5.1	1.6	2.5	4.9	4.6
Birla Institute of Technology	4.3	4.9	7.1	6.9	7.8	1.6	3.7	6.4	3.2
University of Mumbai	6.0	5.7	7.6	8.8	7.3	1.2	8.4	4.6	<u>7.2</u>
Osmania University	3.1	5.9	5.1	5.1	3.9	1.2	2.0	3.4	2.6
University of Mysore	2.8	4.1	4.4	3.5	3.0	2.0	3.6	0.7	2.3
Jawaharlal Nehru University	5.5	6.0	9.5	10.3	9.4	2.3	4.3	6.0	3.5
University of Pune	5.4	5.2	8.4	8.3	7.7	1.6	3.3	5.4	4.7

Table D.4a – Subject area citations per paper (CPP) of top 30 Indian academic institutions, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	6.9	7.5	7.5	8.9	3.3	6.7	8.3	6.3	2.1
Indian Institute of Technology, Kharagpur	5.9	8.5	7.9	8.3	3.9	5.4	8.8	7.0	3.7
Indian Institute of Technology, Delhi	5.4	6.7	9.5	6.4	4.0	6.6	7.9	5.8	16.5
University of Delhi	6.5	7.7	6.9	6.5	3.1	5.2	8.1	10.4	6.5
Anna University	2.8	5.1	4.0	4.3	2.0	3.6	3.2	4.2	7.5
Indian Institute of Technology, Madras	5.5	8.2	7.5	7.5	3.5	6.6	12.9	6.0	5.0
Indian Institute of Technology, Bombay	5.9	5.8	3.5	6.5	3.6	6.4	9.8	7.2	0.0
Jadavpur University	5.0	5.6	4.6	6.5	6.0	5.2	5.8	5.2	0.0
Banaras Hindu University	6.6	7.7	6.8	8.8	3.8	5.9	8.9	7.7	4.8
Indian Institute of Technology, Kanpur	5.7	7.3	13.0	6.3	4.0	6.9	8.3	5.4	0.7
Indian Institute of Technology Roorkee	6.0	10.8	6.1	7.5	4.2	5.7	7.9	5.4	0.0
Tata Institute of Fundamental Research	10.8	13.4	6.5	6.9	3.2	9.9	6.7	13.4	0.0
Aligarh Muslim University	5.5	6.6	7.0	7.2	4.8	3.2	8.7	8.8	2.3
Postgraduate Institute of Medical Education and Research	4.7	6.5	6.1	0.6	0.8	4.5	6.9	1.5	6.9
Manipal University	2.8	2.8	4.7	4.0	1.6	2.7	3.8	3.0	3.7
Panjab University	9.7	5.5	7.1	5.4	5.0	5.7	8.3	16.4	2.7
Annamalai University	4.8	4.4	6.3	6.5	1.6	6.4	5.6	7.0	0.8
University of Calcutta	4.9	7.2	5.8	6.5	4.0	4.6	5.8	4.8	1.3
Vellore Institute of Technology	2.9	4.9	3.3	5.2	3.1	3.8	3.0	4.5	0.0
Indian Institute of Technology, Guwahati	5.9	7.4	6.0	7.1	4.0	6.2	9.9	6.9	0.5
Indian Statistical Institute	3.6	4.3	6.8	4.7	2.5	6.8	3.7	4.4	1.5
University of Hyderabad	6.5	8.2	6.6	6.3	3.0	7.7	7.2	5.2	0.0
Indian Association for the Cultivation of Science	9.7	19.6	4.8	10.7	5.0	8.8	8.3	7.2	0.0
University of Madras	5.4	5.1	5.2	3.8	3.8	8.1	7.9	3.4	4.0
Birla Institute of Technology	4.3	7.2	6.5	5.4	3.2	4.8	6.4	4.5	5.5
University of Mumbai	6.0	9.1	6.7	4.9	3.7	8.3	5.8	5.9	0.0
Osmania University	3.1	2.4	4.9	4.5	1.6	4.0	2.5	3.3	0.5
University of Mysore	2.8	1.7	4.6	2.4	1.1	3.5	4.2	2.0	0.5
Jawaharlal Nehru University	5.5	7.7	7.0	5.6	3.6	6.5	10.1	4.1	4.0
University of Pune	5.4	4.9	6.5	8.1	4.2	6.7	5.3	5.6	7.7

Table D.4b - Subject area citations per paper (CPP) of top 30 Indian academic institutions, 2009-2014, continued. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

D-4 Top 30 Institutions: H-index

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	81	21	40	42	63	34	30	29	44
Indian Institute of Technology, Kharagpur	63	22	35	38	42	31	19	26	46
Indian Institute of Technology, Delhi	61	21	31	31	37	35	15	40	45
University of Delhi	75	27	37	26	39	17	19	21	29
Anna University	41	15	20	31	29	20	12	28	30
Indian Institute of Technology, Madras	60	14	33	35	44	27	15	33	39
Indian Institute of Technology, Bombay	66	12	32	31	42	28	21	24	40
Jadavpur University	53	15	26	26	38	38	16	28	40
Banaras Hindu University	68	28	38	39	47	14	18	23	32
Indian Institute of Technology, Kanpur	51	10	29	29	42	22	18	22	34
Indian Institute of Technology Roorkee	62	15	25	36	39	23	21	32	35
Tata Institute of Fundamental Research	76	24	34	15	26	14	29	8	22
Aligarh Muslim University	52	26	31	25	27	15	10	7	25
Postgraduate Institute of Medical Education and Research	42	12	26	4	5	6	1	1	6
Manipal University	34	13	26	10	19	11	7	5	15
Panjab University	71	24	27	18	23	9	14	7	20
Annamalai University	44	18	30	21	32	16	14	13	28
University of Calcutta	42	17	26	20	35	16	14	12	21
Vellore Institute of Technology	39	17	21	22	25	21	9	13	23
Indian Institute of Technology, Guwahati	48	16	29	30	38	18	9	20	30
Indian Statistical Institute	32	12	18	10	11	24	13	5	21
University of Hyderabad	48	23	32	19	35	15	4	12	17
Indian Association for the Cultivation of Science	54	5	26	32	48	6	3	24	19
University of Madras	38	14	28	22	28	5	7	7	17
Birla Institute of Technology	43	12	27	20	31	17	9	14	24
University of Mumbai	45	15	27	33	33	8	5	12	26
Osmania University	33	18	24	16	19	10	9	11	18
University of Mysore	27	16	18	10	20	11	7	3	9
Jawaharlal Nehru University	42	17	31	19	22	13	14	8	13
University of Pune	41	17	29	21	32	11	9	13	24

Table D.5a – Subject area and overall h-indices of top 30 Indian academic institutions, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	81	27	20	58	25	29	21	46	4
Indian Institute of Technology, Kharagpur	63	33	14	48	24	23	20	41	2
Indian Institute of Technology, Delhi	61	28	18	38	23	20	14	36	1
University of Delhi	75	25	20	33	22	31	29	55	7
Anna University	41	27	11	30	20	17	14	25	4
Indian Institute of Technology, Madras	60	25	14	42	24	21	23	40	1
Indian Institute of Technology, Bombay	66	20	8	38	21	22	20	45	0
Jadavpur University	53	21	10	33	30	20	24	31	0
Banaras Hindu University	68	31	22	44	17	35	37	44	6
Indian Institute of Technology, Kanpur	51	21	10	36	22	21	16	33	1
Indian Institute of Technology Roorkee	62	34	10	38	19	15	16	27	0
Tata Institute of Fundamental Research	76	11	11	26	23	24	11	68	0
Aligarh Muslim University	52	25	17	25	24	24	27	36	4
Postgraduate Institute of Medical Education and Research	42	5	18	2	1	41	19	3	9
Manipal University	34	8	10	16	7	27	22	14	2
Panjab University	71	16	20	19	21	25	29	68	3
Annamalai University	44	20	17	27	8	29	30	29	2
University of Calcutta	42	23	14	27	20	20	21	26	1
Vellore Institute of Technology	39	18	13	25	18	19	21	22	0
Indian Institute of Technology, Guwahati	48	24	14	30	16	20	18	34	1
Indian Statistical Institute	32	10	8	11	21	18	5	17	1
University of Hyderabad	48	13	15	29	14	25	16	30	0
Indian Association for the Cultivation of Science	54	21	4	43	10	20	14	35	0
University of Madras	38	15	14	23	10	23	26	20	2
Birla Institute of Technology	43	20	10	23	13	17	27	22	1
University of Mumbai	45	26	13	18	10	24	26	22	0
Osmania University	33	10	12	19	8	15	13	15	1
University of Mysore	27	8	10	15	5	14	17	14	1
Jawaharlal Nehru University	42	23	18	18	13	24	16	18	3
University of Pune	41	18	16	29	14	21	15	27	2

Table D.5b - Subject area and overall h-indices of top 30 Indian academic institutions, 2009-2014, continued. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Appendix E

Chapter 5 Supplements

E-1 Researchers: Active Researchers

Subject area	Count of active researchers
Agricultural and Biological Sciences	70,784
Biochemistry, Genetics and Molecular Biology	107,042
Chemical Engineering	49,909
Chemistry	76,634
Computer Science	78,881
Earth and Planetary Sciences	25,225
Energy	26,929
Engineering	111,300
Environmental Science	50,456
Immunology and Microbiology	28,972
Materials Science	61,103
Mathematics	34,474
Medicine	149,400
Pharmacology, Toxicology and Pharmaceutics	82,679
Physics and Astronomy	58,619
Veterinary	11,184

Table E.1 – Count of active researchers affiliated with Indian institutions per subject area, 2009-2014.
Source: Scopus database.

E-2 Researchers: Publications per Active Researcher

Institute name	All	Agricultural and Biological Sciences	Biochemistry, Genetics and Molecular Biology	Chemical Engineering	Chemistry	Computer Science	Earth and Planetary Sciences	Energy	Engineering
Indian Institute of Science Bangalore	3.8	1.4	1.7	1.7	2.8	2.4	2.7	1.6	2.8
Indian Institute of Technology, Kharagpur	3.9	1.8	1.6	1.7	2.4	2.6	1.9	1.5	2.7
Indian Institute of Technology, Delhi	4.5	<u>2.0</u>	1.8	1.6	2.3	2.9	2.0	<u>2.4</u>	<u>3.2</u>
University of Delhi	3.3	1.6	1.7	1.6	2.6	1.8	1.7	1.5	2.1
Anna University	2.3	1.0	1.1	1.3	1.7	1.6	1.1	1.3	1.8
Indian Institute of Technology, Madras	3.3	1.2	1.6	1.7	2.3	1.9	1.7	1.4	2.5
Indian Institute of Technology, Bombay	3.6	1.5	1.6	1.6	2.5	2.0	2.1	1.5	2.3
Jadavpur University	3.5	1.3	1.4	1.4	2.2	2.6	1.8	1.4	2.5
Banaras Hindu University	3.6	1.7	1.9	1.5	2.5	2.0	2.2	1.5	2.3
Indian Institute of Technology, Kanpur	3.6	2.0	1.7	1.6	2.4	2.0	2.0	2.2	2.5
Indian Institute of Technology Roorkee	4.5	1.6	1.8	1.8	2.7	2.8	2.2	2.2	2.9
Tata Institute of Fundamental Research	5.0	1.3	2.0	<u>2.0</u>	2.3	2.4	<u>4.3</u>	1.2	1.9
Aligarh Muslim University	2.5	1.5	1.4	1.7	2.1	1.9	1.4	1.3	1.8
Postgraduate Institute of Medical Education and Research	3.0	1.2	1.5	1.0	1.5	3.1	1.4	1.1	1.8
Manipal University	1.5	0.7	0.8	0.9	1.7	1.3	0.7	1.6	1.1
Panjab University	3.7	1.5	1.8	1.3	2.0	1.6	2.1	1.1	2.0
Annamalai University	2.3	1.0	1.1	1.1	1.9	1.8	1.1	1.1	1.8
University of Calcutta	3.4	1.2	1.5	1.4	2.7	2.6	1.8	1.2	2.2
Vellore Institute of Technology	1.8	1.0	1.2	1.1	1.8	1.4	1.1	0.9	1.2
Indian Institute of Technology, Guwahati	3.7	1.6	1.8	1.7	2.3	2.4	1.5	1.4	2.3
Indian Statistical Institute	5.4	1.3	<u>2.4</u>	1.5	2.1	<u>5.0</u>	1.9	1.2	2.9
University of Hyderabad	2.9	1.2	1.5	1.1	2.4	2.1	1.4	0.9	2.0
Indian Association for the Cultivation of Science	<u>5.7</u>	1.7	1.7	1.8	<u>3.9</u>	4.0	1.8	1.3	2.0
University of Madras	2.3	0.9	1.1	1.1	2.6	1.8	1.1	0.8	1.5
Birla Institute of Technology	2.9	1.6	1.8	1.5	2.3	1.7	1.4	1.6	1.8
University of Mumbai	2.3	1.0	1.2	1.6	1.8	1.4	2.0	1.1	1.5
Osmania University	2.0	1.0	1.1	1.1	1.5	1.8	1.1	1.4	1.8
University of Mysore	2.4	1.1	1.1	1.1	2.6	2.5	0.8	0.9	1.3
Jawaharlal Nehru University	3.2	1.5	2.0	1.4	2.2	2.5	2.2	1.1	2.2
University of Pune	2.3	1.3	1.4	1.1	1.9	1.3	1.4	1.0	1.4

Table E.2a – Subject area and overall publication-count-to-active-researcher ratio of top 30 Indian academic institutions, 2009-2014. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

Institute name	All	Environmental Science	Immunology and Microbiology	Materials Science	Mathematics	Medicine	Pharmacology, Toxicology and Pharmaceutics	Physics and Astronomy	Veterinary
Indian Institute of Science Bangalore	3.8	1.7	1.2	3.0	2.0	1.3	1.8	3.2	1.1
Indian Institute of Technology, Kharagpur	3.9	1.5	1.1	3.0	1.9	1.6	1.3	2.7	2.1
Indian Institute of Technology, Delhi	4.5	1.6	1.4	2.8	2.1	1.7	1.6	3.2	2.7
University of Delhi	3.3	1.3	1.4	2.7	1.7	2.0	1.6	4.0	1.2
Anna University	2.3	1.3	0.8	1.9	1.3	0.9	1.3	2.0	0.8
Indian Institute of Technology, Madras	3.3	1.5	1.3	2.6	1.6	1.3	1.7	2.6	1.0
Indian Institute of Technology, Bombay	3.6	1.6	1.4	2.3	1.7	1.3	1.4	3.0	1.0
Jadavpur University	3.5	1.2	1.0	2.5	1.8	1.3	1.6	2.6	5.6
Banaras Hindu University	3.6	1.5	1.3	2.7	2.1	2.0	1.7	3.2	1.6
Indian Institute of Technology, Kanpur	3.6	1.6	1.9	2.5	2.0	1.7	1.4	2.8	1.5
Indian Institute of Technology Roorkee	4.5	1.9	1.0	2.8	2.2	1.8	1.6	2.9	2.6
Tata Institute of Fundamental Research	5.0	1.5	1.1	2.8	3.0	1.4	1.8	5.9	1.5
Aligarh Muslim University	2.5	1.3	1.0	1.8	2.4	1.3	1.2	2.1	1.0
Postgraduate Institute of Medical Education and Research	3.0	1.1	1.1	2.5	4.1	2.7	1.3	2.1	1.0
Manipal University	1.5	0.8	0.5	1.8	1.0	1.2	0.9	2.2	0.8
Panjab University	3.7	1.2	1.5	2.3	1.7	2.0	1.8	4.8	2.6
Annamalai University	2.3	1.0	0.9	2.2	1.3	1.0	1.3	2.2	1.3
University of Calcutta	3.4	1.2	1.0	2.3	2.3	1.3	1.3	2.8	0.7
Vellore Institute of Technology	1.8	0.9	0.9	1.9	1.3	1.0	1.0	2.2	1.6
Indian Institute of Technology, Guwahati	3.7	1.7	1.7	2.2	1.8	1.4	1.4	3.0	4.8
Indian Statistical Institute	5.4	1.5	0.9	2.6	4.1	2.2	1.6	4.1	1.3
University of Hyderabad	2.9	1.2	1.2	2.4	1.7	1.3	1.3	2.6	0.3
Indian Association for the Cultivation of Science	5.7	1.4	1.2	3.4	1.6	1.1	1.5	3.9	4.0
University of Madras	2.3	1.0	1.0	3.0	1.9	0.9	1.0	2.9	0.9
Birla Institute of Technology	2.9	1.4	1.4	2.1	1.6	1.6	2.1	2.3	3.3
University of Mumbai	2.3	1.2	1.0	1.8	1.1	1.0	1.4	1.9	1.0
Osmania University	2.0	0.9	0.7	1.9	1.5	1.0	1.0	1.8	0.7
University of Mysore	2.4	1.0	0.8	3.5	1.7	1.0	1.2	3.2	4.0
Jawaharlal Nehru University	3.2	1.8	1.3	2.6	1.8	1.8	1.3	3.5	1.2
University of Pune	2.3	1.0	0.9	2.0	1.3	1.2	1.5	2.2	0.7

Table E.2b – Subject area and overall publication-count-to-active-researcher ratio of top 30 Indian academic institutions, 2009-2014, continued. Top 30 institutions is determined by 2002-2014 count of publications.

Source: Scopus database.

E-3 Researchers: Research Performance

Subject area	Publications per Active Indian Researcher			FWCI of Publications		
	World Average	Share of Indian Researchers Above World Average	Share of Indian Researchers Below World Average	World Average	Share of Indian Researchers Above World Average	Share of Indian Researchers Below World Average
General	4.81	43.7%	56.3%	1.00	18.1%	81.9%
Agricultural and Biological Sciences	2.66	84.3%	15.7%	1.00	16.8%	83.2%
Biochemistry, Genetics and Molecular Biology	3.19	71.3%	28.7%	1.00	15.5%	84.5%
Chemical Engineering	2.48	98.8%	1.2%	1.00	24.1%	75.9%
Chemistry	3.45	81.4%	18.6%	1.00	25.1%	74.9%
Computer Science	3.23	56.0%	44.0%	1.00	19.9%	80.1%
Earth and Planetary Sciences	3.28	75.4%	24.6%	1.00	17.3%	82.7%
Energy	2.32	91.8%	8.2%	1.00	24.3%	75.7%
Engineering	3.37	66.1%	33.9%	1.00	23.7%	76.3%
Environmental Science	2.29	93.1%	6.9%	1.00	19.1%	80.9%
Immunology and Microbiology	2.40	96.5%	3.5%	1.00	14.8%	85.2%
Materials Science	3.63	86.3%	13.7%	1.00	26.5%	73.5%
Mathematics	2.75	91.8%	8.2%	1.00	19.8%	80.2%
Medicine	3.76	58.9%	41.1%	1.00	16.2%	83.8%
Pharmacology, Toxicology and Pharmaceuticals	2.31	82.0%	18.0%	1.00	16.4%	83.6%
Physics and Astronomy	5.69	65.2%	34.8%	1.00	23.2%	76.8%
Veterinary	2.35	82.8%	17.2%	1.00	14.0%	86.0%

Table E.3 – Subject area and overall publication-count-to-active-researcher proportions and publication performance proportions of Indian active researchers compared to world, 2009-2014. For 0.1% of the overall publications no subject area could be determined, so no FWCI could be calculated.

Source: Scopus database.

E-4 Researchers: Top 10 Overall and per Subject Area

Rank 02-14	Name	Affiliation; Institution	Publications 02-14	Pblications 09-14	Citations	CPP	H-index
1	Banerjee S.	Tata Institute of Fundamental Research	1330	759	19,471	25.7	60
2	Kumar A.	Indian Institute of Technology	1258	650	6,870	10.6	36
3	Kumar R.	All India Institute of Medical Sciences	849	456	3,142	6.9	28
4	Mohanty G.	Tata Institute of Fundamental Research	801	475	12,645	26.6	52
5	Sarkar S.	Saha Institute of Nuclear Physics	800	532	25,171	47.3	61
6	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	788	311	2,938	9.4	24
7	Sharma V.	University of Delhi	706	365	12,213	33.5	49
8	Choudhary B.	University of Delhi	700	538	15,444	28.7	54
9	Bhatnagar V.	Panjab University	694	524	15,100	28.8	54
10	Beri S.	Panjab University	689	531	14,947	28.1	54

Table E.4- Top 10 researchers overall: publication and citation counts, citations per paper (CPP), and H-index for 2009-2014. Rank based on 2002-2014 publication count.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Agricultural and Biological Sciences					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Singh R.	Indian Institute of Science Education and Research Pune	214	183	47	22%	443	9.4	9
2	Bawa A.	Amity University, Uttar Pradesh; AMITY UNIVERSITY	79	145	67	85%	389	5.8	11
3	Upadhyaya H.	International Crops Research Institute for the Semi-Arid Tropics	115	139	98	85%	884	9.0	15
4	Kumar A.	Tezpur University	233	138	56	24%	127	2.3	6
5	Varshney R.	International Crops Research Institute for the Semi-Arid Tropics	144	137	113	78%	2,184	19.3	25
6	Singhal R.	Mumbai University Institute of Chemical Technology; University of Mumbai	120	127	47	39%	370	7.9	10
7	Kumar D.	Punjab Agricultural University India; Punjab Agricultural University	246	125	72	29%	181	2.5	7
8	Singh N.	Guru Nanak Dev University India; Guru Nanak Dev University	49	118	37	76%	303	8.2	10
9	Samiyappan R.	Tamilnadu Agricultural University; Tamil Nadu Agricultural University	59	114	54	92%	392	7.3	13
10	Singh A.	Institute of Himalayan Bioresource Technology India; CSIR - Biomedicine and Agriculture	135	110	71	53%	230	3.2	8

Table E.4a - Top 10 authors in subject area Agricultural and Biological Sciences, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Biochemistry, Genetics and Molecular Biology					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	311	353	150	48%	1,704	11.4	22
2	Yathirajan H.	University of Mysore	340	235	3	1%	6	2.0	1
3	Kumar A.	Indian Institute of Technology	650	227	146	22%	1,488	10.2	21
4	Ravikumar K.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	65	222	18	28%	57	3.2	5
5	Narayana B.	Mangalore University India; Mangalore University	344	182	8	2%	10	1.3	2
6	Velmurugan D.	University of Madras	163	175	27	17%	137	5.1	6
7	Kamal A.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	145	172	88	61%	830	9.4	16
8	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	144	171	80	56%	725	9.1	15
9	Pandey A.	National Institute for Interdisciplinary Science and Technology; CSIR - Industry and Standards	125	160	77	62%	1,090	14.2	16
10	Ragunathan R.	University of Madras	154	157	34	22%	374	11.0	13

Table E.4b - Top 10 authors in subject area Biochemistry, Genetics and Molecular Biology, 2009-2014.

Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Chemical Engineering					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Madras G.	Indian Institute of Science; Indian Institute of Science Bangalore	186	167	93	50%	1,079	11.6	16
2	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	311	161	104	33%	679	6.5	13
3	Yadav G.	Mumbai University Institute of Chemical Technology; University of Mumbai	97	158	79	81%	470	5.9	11
4	Joshi J.	Homi Bhabha National Institute, Mumbai	96	151	79	82%	592	7.5	14
5	Kabir-ud-Din K.	Aligarh Muslim University	157	141	86	55%	825	9.6	16
6	Parida K.	Siksha 'O' Anusandhan University	133	131	72	54%	986	13.7	18
7	Jasra R.	Reliance Industries Limited	83	130	53	64%	529	10.0	14
8	Kumar A.	Indian Institute of Technology	650	126	48	7%	496	10.3	11
9	De S.	Indian Institute of Technology, Kharagpur	92	122	66	72%	529	8.0	13
10	Lakshmi Kantham M.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	91	120	43	47%	440	10.2	11

Table E.4c - Top 10 authors in subject area Chemical Engineering, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Chemistry					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	311	738	309	99%	2,924	9.5	24
2	Narayana B.	Mangalore University India; Mangalore University	344	402	331	96%	984	3.0	13
3	Gowda B.	Bangalore University	322	378	322	100%	632	2.0	8
4	Yathirajan H.	University of Mysore	340	368	334	98%	846	2.5	11
5	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	144	335	142	99%	1,187	8.4	16
6	Rao C.N.R.	Jawaharlal Nehru Centre for Advanced Scientific Research	185	305	123	66%	5,486	44.6	32
7	Kumar A.	Indian Institute of Technology	650	298	146	22%	1,737	11.9	23
8	Majumdar K.	University of Kalyani	148	275	147	99%	1,469	10.0	19
9	Mobin S.	Indian Institute of Technology Indore	175	249	172	98%	1,779	10.3	20
10	Dubey P.	Jawaharlal Nehru Technological University	184	242	170	92%	313	1.8	8

Table E.4d - Top 10 authors in subject area Chemistry, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Computer Science					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Das S.	Indian Statistical Institute, Kolkata; Indian Statistical Institute	244	238	205	84%	2,901	14.2	22
2	Konar A.	Jadavpur University	195	231	174	89%	707	4.1	8
3	Debnath N.	Indian Institute of Technology, Guwahati	129	172	122	95%	109	0.9	5
4	Patnaik L.	Indian Institute of Science; Indian Institute of Science Bangalore	114	170	94	82%	49	0.5	3
5	Jawahar C.	CVIT	118	169	112	95%	241	2.2	8
6	Gupta P.	National Institute of Technical Teachers' Training and Research	147	165	136	93%	358	2.6	10
7	Nandi S.	Indian Institute of Technology, Guwahati	132	165	122	92%	151	1.2	6
8	Vaidehi V.	Anna University	115	158	110	96%	157	1.4	5
9	Chatterjee K.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	118	149	102	86%	552	5.4	14
10	Chaudhury S.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	103	148	100	97%	68	0.7	4

Table E.4f - Top 10 authors in subject area Computer Science, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Earth and Planetary Sciences					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Sen M.	Indian School of Mines University	97	157	87	90%	401	4.6	12
2	Singh R.	Indian Institute of Science Education and Research Pune	214	131	34	16%	294	8.6	9
3	Moorthy K.	Indian Space Research Organization	84	126	77	92%	909	11.8	17
4	Mohanty U.	Indian Institute of Technology Bhubaneswar	66	114	63	95%	372	5.9	11
5	Sitharam T.	Indian Institute of Science; Indian Institute of Science Bangalore	83	102	72	87%	344	4.8	10
6	Majumdar P.	Saha Institute of Nuclear Physics	96	95	64	67%	1,501	23.5	21
7	Sagar R.	Indian Institute of Astrophysics	46	90	36	78%	234	6.5	8
8	Chakrabarti S.	Indian Centre for Space Physics	76	81	45	59%	264	5.9	9
9	Singh T.	Indian Institute of Technology, Bombay	96	78	57	59%	335	5.9	10
10	Mitra S.	Inter-University Centre for Astronomy and Astrophysics India	98	73	68	69%	1,855	27.3	23

Table E.4g – Top 10 authors in subject area Earth and Planetary Sciences, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Energy					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	317	215	171	54%	240	1.4	8
2	Ghosh A.	Indian Institute of Technology, Kanpur	152	129	103	68%	834	8.1	13
3	Kothari D.	Wainganga College of Engineering and Management	116	103	58	50%	266	4.6	10
4	Singh S.	Indian Institute of Technology, Kanpur	94	98	68	72%	426	6.3	11
5	Tiwari G.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	83	98	50	60%	734	14.7	16
6	Nagarajan G.	Anna University	85	85	67	79%	779	11.6	16
7	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	245	84	68	28%	495	7.3	12
8	Kaushik S.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	75	77	48	64%	843	17.6	15
9	Chellapandi P.	Indira Gandhi Centre for Atomic Research	92	67	53	58%	142	2.7	6
10	Panigrahi B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	175	66	54	31%	264	4.9	9

Table E.4h – Top 10 authors in subject area Energy, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Engineering					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	317	355	248	78%	935	3.8	19
2	Nair G.	Technocrat Society	81	228	81	100%	308	3.8	10
3	Kumar R.	Veer Bahadur Singh Purvanchal University	188	203	125	66%	227	1.8	7
4	Gupta M.	University of Delhi	104	188	97	93%	195	2.0	7
5	Tiwari M.	Indian Institute of Technology, Kharagpur	99	180	84	85%	654	7.8	14
6	Singh B.	Indian Institute of Technology Delhi; Indian Institute of Technology, Delhi	98	171	88	90%	395	4.5	8
7	Pandian S.	Pandian Consultants	82	170	82	100%	330	4.0	11
8	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	245	169	109	44%	559	5.1	12
9	Hasan M.	Aligarh Muslim University	149	168	74	50%	205	2.8	8
10	Mohan P.	Cochin University of Science and Technology	108	168	78	72%	379	4.9	12

Table E.4i - Top 10 authors in subject area Engineering, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Environmental Science					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Nair G.	Technocrat Society	81	228	81	100%	308	3.8	10
2	Pandian S.	Pandian Consultants	82	170	82	100%	330	4.0	11
3	Sekar N.	Mumbai University Institute of Chemical Technology; University of Mumbai	86	118	34	40%	28	0.8	2
4	Venkata Mohan S.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	97	98	58	60%	870	15.0	18
5	Singh R.	Indian Institute of Science Education and Research Pune	214	73	34	16%	258	7.6	8
6	Kumar R.	All India Institute of Medical Sciences	456	71	30	7%	136	4.5	7
7	Madras G.	Indian Institute of Science; Indian Institute of Science Bangalore	186	66	25	13%	424	17.0	11
8	Chakrabarti T.	Visvesvaraya National Institute of Technology	62	66	35	56%	492	14.1	14
9	Govindwar S.	Shivaji University	102	63	58	57%	1,183	20.4	21
10	Kumar S.	Indian Institute of Petroleum; CSIR - Engineering	205	62	29	14%	159	5.5	7

Table E.4j - Top 10 authors in subject area Environmental Sciences, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Immunology and Microbiology					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Sundar S.	Banaras Hindu University Institute of Medical Sciences; Banaras Hindu University	187	142	78	42%	972	12.5	18
2	Das. P.	Indian Council of Medical Research	140	110	53	38%	373	7.0	12
3	Shouche Y.	National Centre for Cell Science India; National Centre for Cell Science	119	103	68	57%	447	6.6	11
4	Dash A.	National Institute of Malaria Research India	90	103	54	60%	689	12.8	14
5	Pandey A.	National Institute for Interdisciplinary Science and Technology; CSIR - Industry and Standards	125	92	46	37%	525	11.4	11
6	Shivaji S.	L.V. Prasad Eye Institute India	94	92	46	49%	459	10.0	14
7	Ramamurthy T.	National Institute of Cholera and Enteric Diseases India	95	91	48	51%	400	8.3	12
8	Kumar A.	Indian Institute of Technology	650	89	39	6%	340	8.7	11
9	Kaveri S.	Institute of Immunohaematology Mumbai; Indian Council of Medical Research	106	84	49	46%	951	19.4	14
10	Bhattacharya S.	National Academy of Sciences	43	84	12	28%	101	8.4	6

Table E.4k – Top 10 authors in subject area Immunology and Microbiology, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Materials Science					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Gowda B.	Bangalore University	322	345	321	100%	630	2.0	8
2	Thomas S.	Mahatma Gandhi University	193	325	148	77%	1,186	8.0	16
3	Yathirajan H.	University of Mysore	340	318	303	89%	742	2.4	10
4	Raj B.	Indian Institute of Science; Indian Institute of Science Bangalore	245	315	157	64%	1,174	7.5	17
5	Tyagi A.	Bhabha Atomic Research Centre	241	295	143	59%	1,419	9.9	22
6	Choudhary R.	SOA University	166	294	133	80%	745	5.6	13
7	Narayana B.	Mangalore University India; Mangalore University	344	286	269	78%	841	3.1	12
8	Avasthi D.	Inter University Accelerator Centre India	197	261	108	55%	498	4.6	11
9	Bhowmick A.	Indian Institute of Technology, Kharagpur	111	251	101	91%	1,147	11.4	16
10	Rao C.N.R.	Jawaharlal Nehru Centre for Advanced Scientific Research	185	246	100	54%	4,360	43.6	31

Table E.4l – Top 10 authors in subject area Materials Science, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Mathematics					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Banerjee S.	Tata Institute of Fundamental Research	759	221	31	4%	764	24.6	21
2	Sharma V.	University of Delhi	365	187	29	8%	735	25.3	21
3	Behera P.	Utkal University	324	164	2	1%	3	1.5	1
4	Mohanty G.	Tata Institute of Fundamental Research	475	160	10	2%	189	18.9	6
5	Das S.	Indian Statistical Institute, Kolkata; Indian Statistical Institute	244	146	131	54%	2,089	15.9	17
6	Krishnamurthy M.	TIFR Centre for Interdisciplinary Sciences	28	140	1	4%	0	0.0	-
7	Bhuyan B.	Indian Institute of Technology, Guwahati	266	137	-	-	-	-	-
8	Biswas I.	Tata Institute of Fundamental Research	31	132	27	87%	24	0.9	2
9	Gupta V.	Netaji Subhas Institute of Technology	73	131	73	100%	376	5.2	10
10	Swain S.	National Institute of Science Education and Research	154	130	5	3%	52	10.4	4

Table E.4m – Top 10 authors in subject area Mathematics, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Medicine					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Khandelwal N.	Postgraduate Institute of Medical Education and Research	225	302	209	93%	768	3.7	14
2	Kumar R.	University of	144	296	140	97%	702	5.0	14
3	Mahapatra A.	All India Institute of Medical Sciences	132	296	130	98%	545	4.2	12
4	Mohan V.	Madras Diabetes Research Foundation	204	282	184	90%	2,227	12.1	23
5	Kumar R.	All India Institute of Medical Sciences	456	278	152	33%	1,052	6.9	16
6	Gupta R.	Dr. Yashwant Singh Parmar University of Horticulture and Forestry	257	274	155	60%	1,161	7.5	19
7	Ghosh K.	King Edward Memorial Hospital India	155	245	141	91%	673	4.8	13
8	Bhansali A.	Postgraduate Institute of Medical Education and Research	167	244	161	96%	930	5.8	15
9	Sundar S.	Banaras Hindu University Institute of Medical Sciences; Banaras Hindu University	187	240	167	89%	2,247	13.5	24
10	Saxena R.	Guru Gobind Singh Indraprastha University	128	236	116	91%	433	3.7	11

Table E.4n – Top 10 authors in subject area Medicine, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Pharmacology, Toxicology and Pharmaceutics					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Yadav J.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	311	330	131	42%	1,418	10.8	20
2	Kamal A.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	145	200	96	66%	1,045	10.9	18
3	Sriram D.	Birla Institute of Technology and Science Pilani; Birla Institute of Technology	141	186	116	82%	1,300	11.2	20
4	Yogeeswari P.	Birla Institute of Technology and Science Pilani; Birla Institute of Technology	136	180	111	82%	1,272	11.5	20
5	Reddy B.	Indian Institute of Chemical Technology; CSIR - Chemistry and Physics	144	162	74	51%	612	8.3	14
6	Kumar A.	Indian Institute of Technology	650	160	109	17%	1,214	11.1	20
7	Manavalan R.	Annamalai University	122	155	97	80%	298	3.1	7
8	Jain N.	ISF College of Pharmacy	81	150	59	73%	1,145	19.4	19
9	Khar R.	Jamia Hamdard Faculty of Pharmacy; Hamdard University	97	136	73	75%	1,135	15.5	18
10	Kadam V.	University of Mumbai	126	136	105	83%	596	5.7	11

Table E.4o – Top 10 authors in subject area Pharmacology, Toxicology and Pharmaceutics, 2009-2014.

Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publications 09-14	Physics and Astronomy					
				Subject area publications 02-14	Subject area publications 09-14	Subject share of all publications	Citations	CPP	H-index
1	Banerjee S.	Tata Institute of Fundamental Research	759	1321	756	100%	19,471	25.8	60
2	Mohanty G.	Tata Institute of Fundamental Research	475	796	473	100%	12,645	26.7	52
3	Sarkar S.	Saha Institute of Nuclear Physics	532	782	525	99%	25,062	47.7	60
4	Choudhary B.	University of Delhi	538	696	536	100%	15,431	28.8	54
5	Beri S.	Panjab University	531	689	531	100%	14,947	28.1	54
6	Sharma V.	University of Delhi	365	686	356	98%	12,065	33.9	49
7	Behera P.	Utkal University	324	667	322	99%	10,208	31.7	46
8	Bhatnagar V.	Panjab University	524	666	508	97%	14,895	29.3	54
9	Ranjan K.	University of Delhi	474	612	473	100%	13,752	29.1	51
10	Yathirajan H.	University of Mysore	340	567	323	95%	782	2.4	10

Table E.4p – Top 10 authors in subject area Physics and Astronomy, 2009-2014. Rank determined by count of publications in 2002-2014.

Source: Scopus database.

Subject area rank 02-14	Name	Affiliation; Institution	All publica-tions 09-14	Veterinary					
				Subject area publi-cations 02-14	Subject area publi-cations 09-14	Subject share of all publications	Citations	CPP	H-index
1	Balachandran C.	Tamil Nadu Veterinary and Animal Sciences University	51	108	38	75%	22	0.6	2
2	Kumar A.	Tezpur University	233	101	41	18%	76	1.9	5
3	Sarkar M.	Indian Veterinary Research Institute	77	84	46	60%	133	2.9	7
4	Singh C.	Central Soil and Water Conserva-tion Research and Training Institute	97	75	23	24%	20	0.9	3
5	Gupta A.	National Dairy Research Institute India	200	71	50	25%	91	1.8	5
6	Dhama K.	Indian Veterinary Research Institute	120	70	60	50%	173	2.9	6
7	Kumar N.	Indian Veterinary Research Institute	200	65	29	15%	46	1.6	4
8	Singh V.	Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences	114	54	9	8%	29	3.2	3
9	Singh R.	National Bureau of Fish Genetic Resources, Lucknow	148	51	25	17%	133	5.3	6
10	Sharma D.	Fernandez Hospital	164	44	22	13%	13	0.6	2

Table E.4q – Top 10 authors in subject area Veterinary, 2009-2014. Rank determined by count of publica-tions in 2002-2014.

Source: Scopus database.

Appendix F

Publications by SNIP Decile

A sophisticated measure for a journal's quality is its SNIP score. Source Normalized Impact per Paper (SNIP) measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa. Journals are allocated a decile based on their 2014 SNIP value, and the number of publications in each decile is then counted. Presented here are the distribution deciles for Indian publications, world publications and India's share of world output in each decile, for 2014. India has 14,809 publications in journals in the top SNIP value decile. This accounts for 2.37% of the total of all publications in the same decile. India's share in the deciles increases and their maximum share is found in the 80-90 decile.

Decile	India Count	World Count	Indian Share
0-10	14,809	624,048	2.37%
10-20	14,914	463,914	3.21%
20-30	16,646	420,358	3.96%
30-40	15,366	416,037	3.69%
40-50	16,214	342,644	4.73%
50-60	18,918	366,669	5.16%
60-70	25,209	397,361	6.34%
70-80	25,320	407,436	6.21%
80-90	23,732	361,817	6.56%
90-100	21,143	350,380	6.03%

Table F.1 – Distribution and world share of Indian publications by SNIP deciles for all subject areas, 2014.
Source: Scopus database.

Figure F.1 presents the distribution of Indian publications by SNIP decile for 2014. Decile 1 is defined as the 10% journals with the highest SNIP scores, whereas Decile 10 corresponds to the 10% journals with the lowest SNIP scores. In 2014, Indian institutions published 14,809 papers in Decile 1 journals, and they published most in Decile 8 (25,320 publications). The magenta line represents the number of Indian publications per SNIP decile over the total number of publications per SNIP decile. The publication share of Indian institutions in Decile 1 was 2.37%, and their share was highest in Decile 9 (6.56%). Figures F.2 to F.17 are the same as Figure F.1, except that they are specified for the selected subject areas.

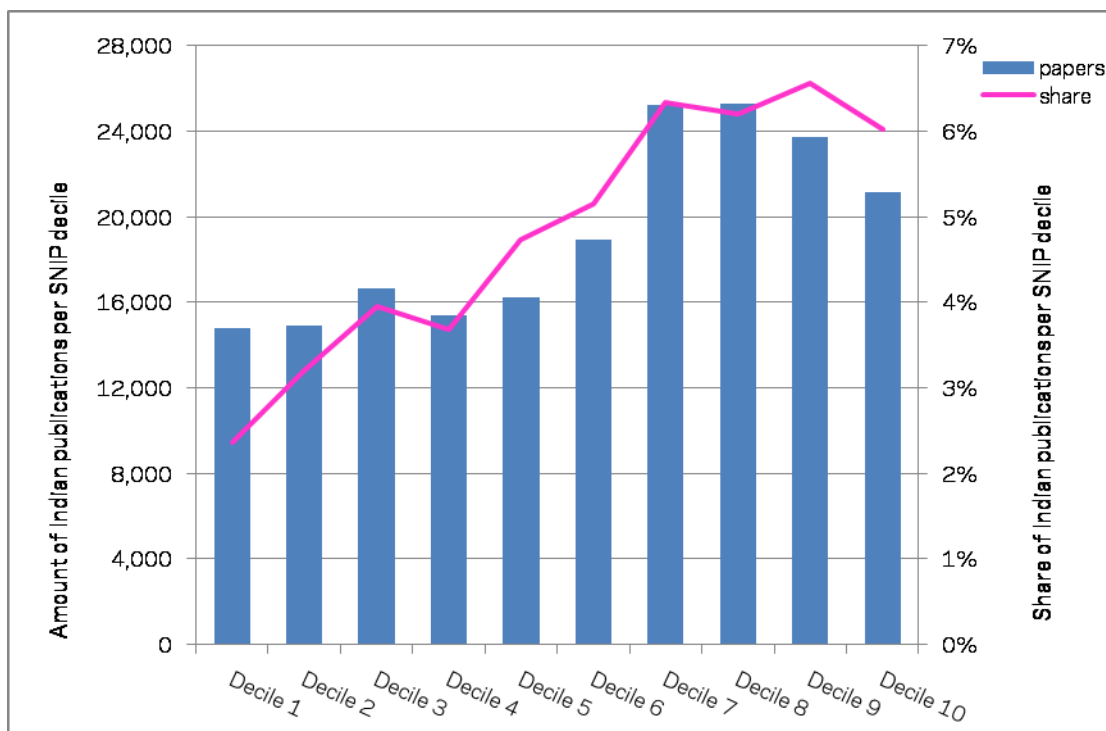


Figure F.1 — Number and share of 2014 Indian papers in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

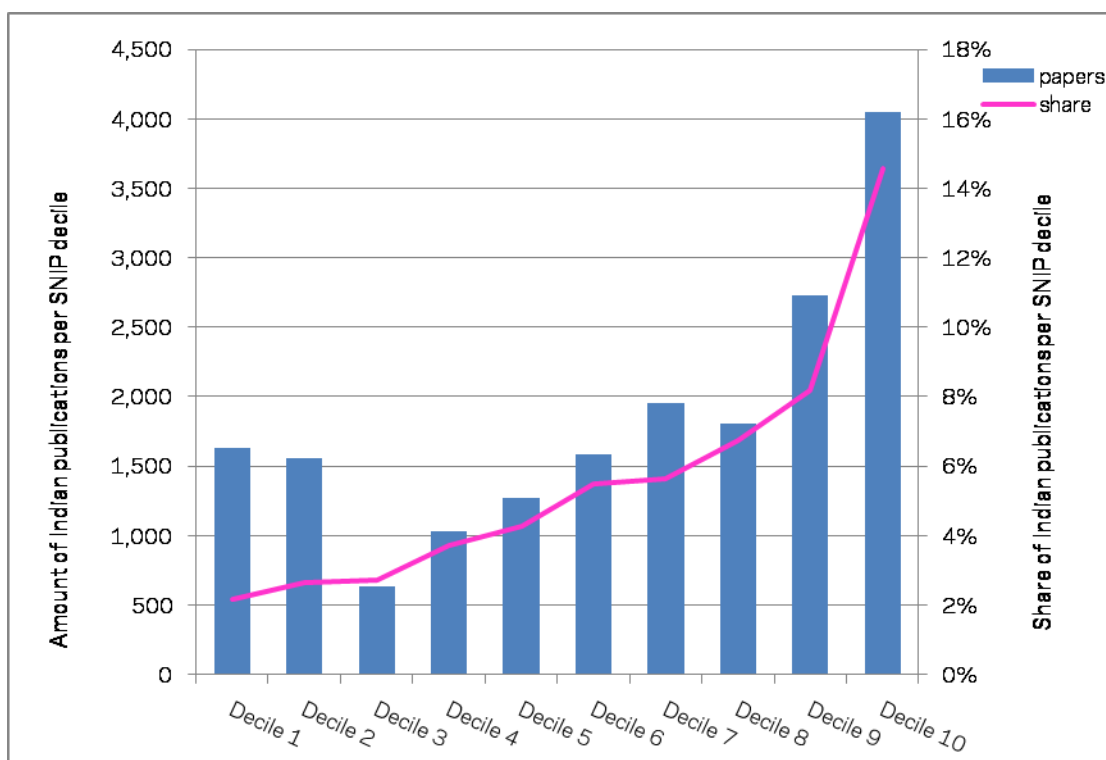


Figure F.2 — Number and share of 2014 Indian papers in the subject area Agricultural and Biological Sciences in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

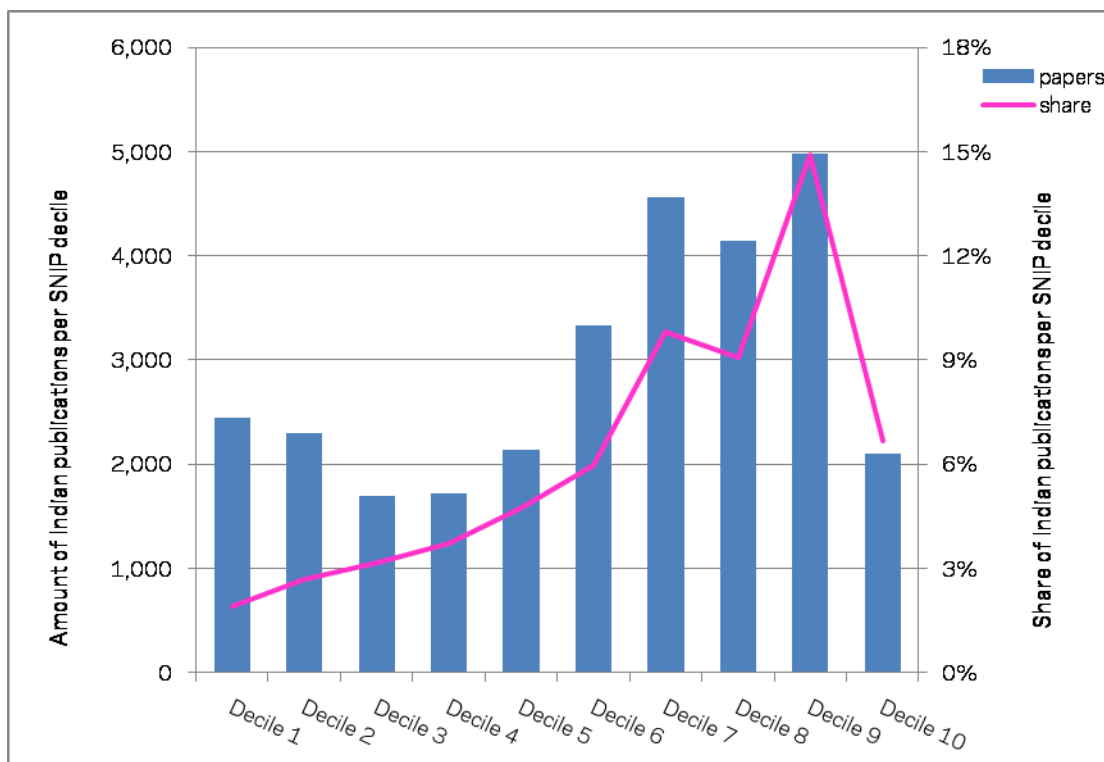


Figure F.3 — Number and share of 2014 Indian papers in the subject area Biochemistry, Genetics and Molecular Biology in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

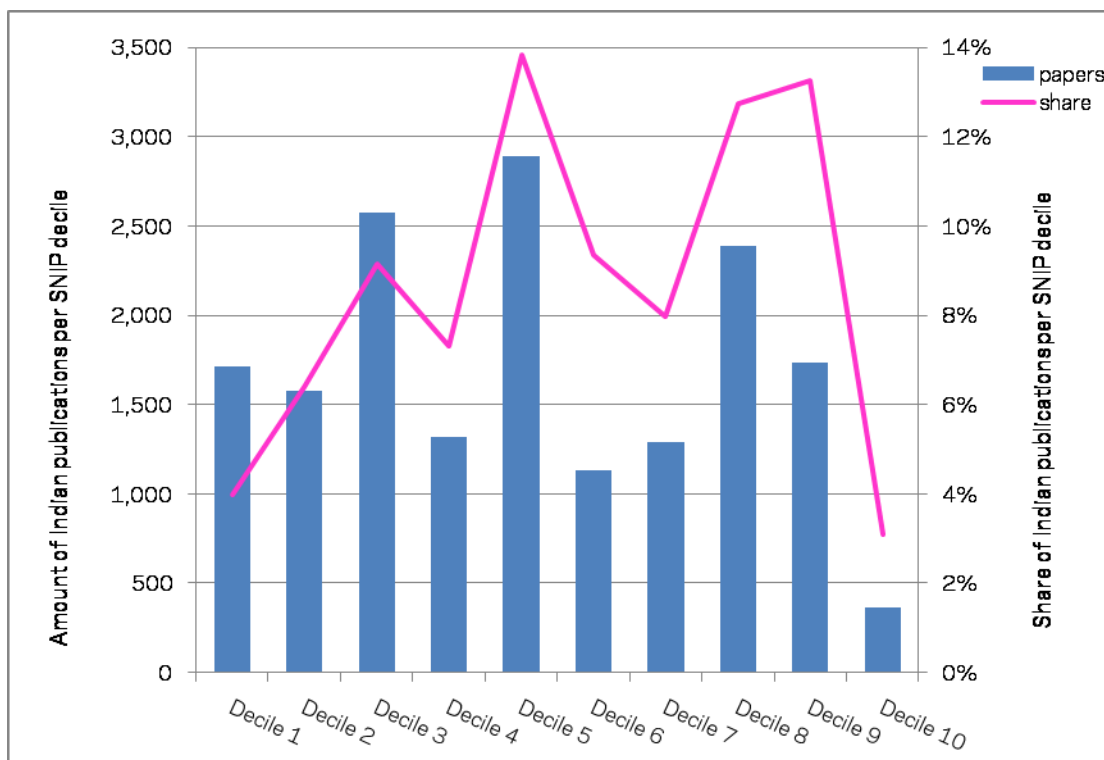


Figure F.4 — Number and share of 2014 Indian papers in the subject area Chemical Engineering in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

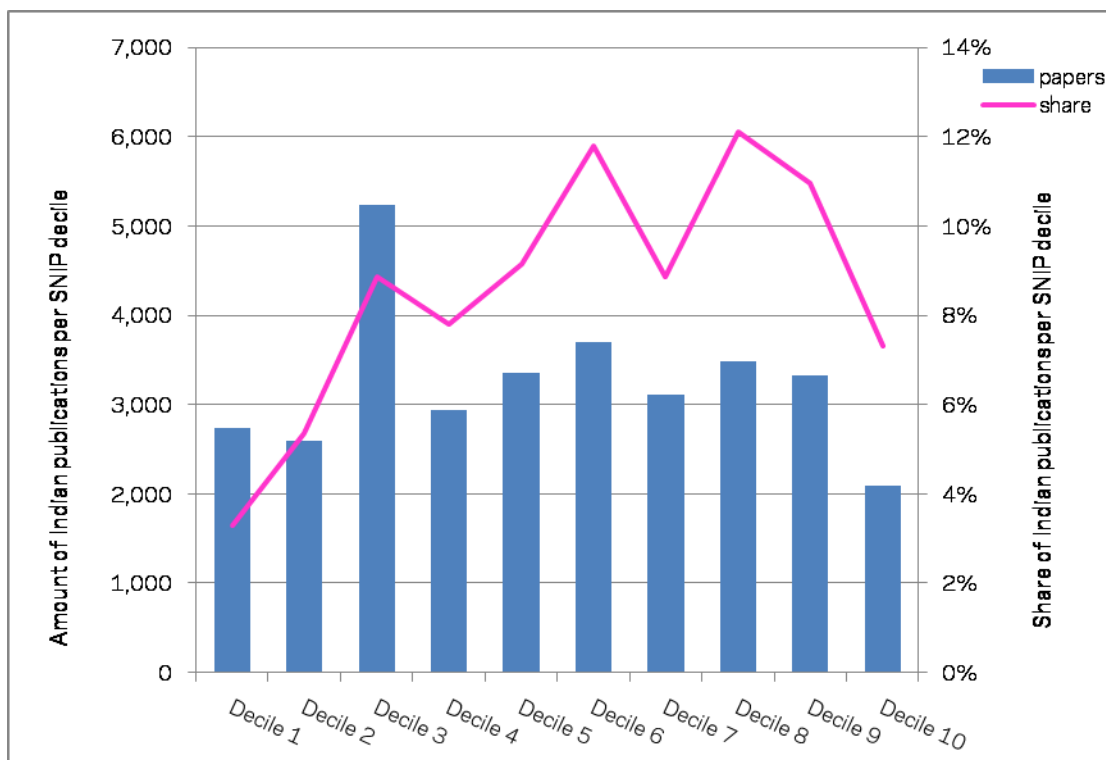


Figure F.5 — Number and share of 2014 Indian papers in the subject area Chemistry in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

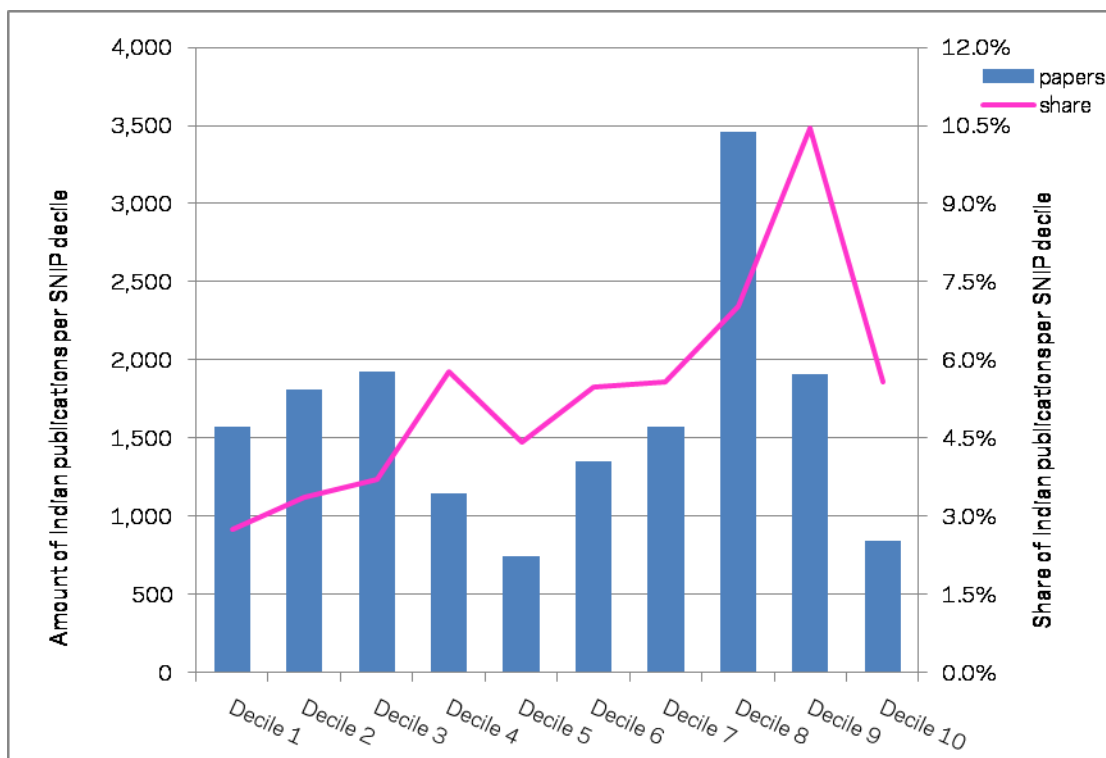


Figure F.6 — Number and share of 2014 Indian papers in the subject area Computer Science in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

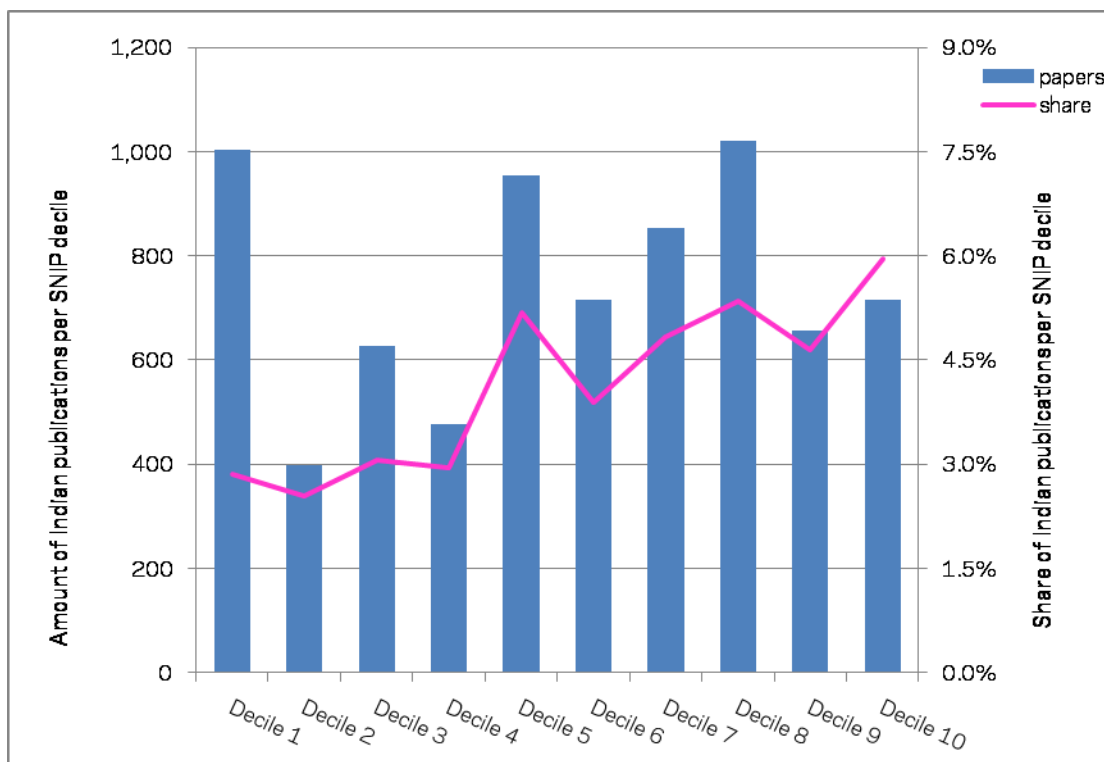


Figure F.7 — Number and share of 2014 Indian papers in the subject area Earth and Planetary Science in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

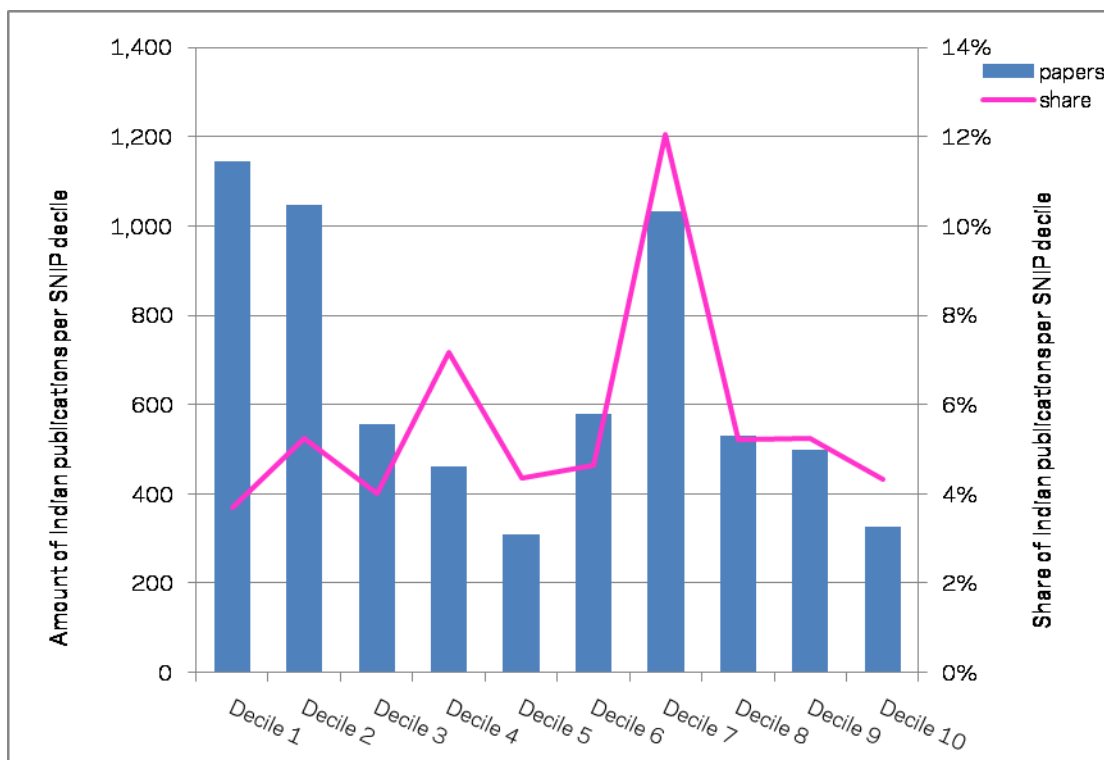


Figure F.8 — Number and share of 2014 Indian papers in the subject area Energy in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

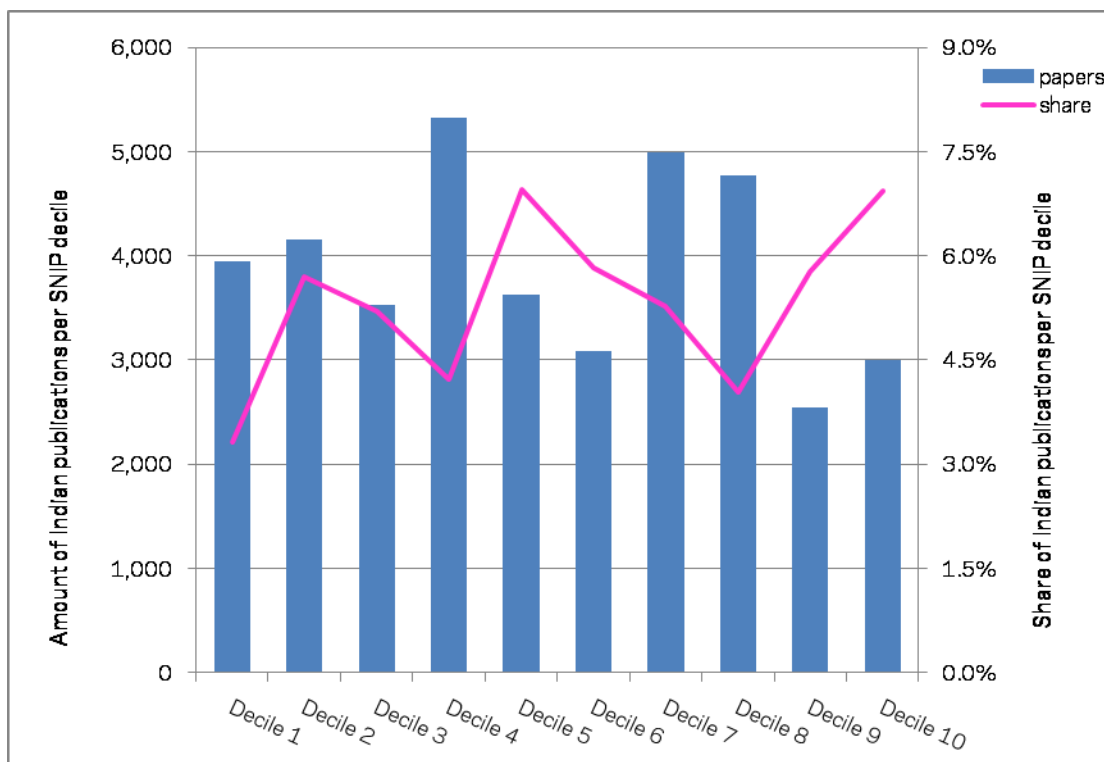


Figure F.9 — Number and share of 2014 Indian papers in the subject area Engineering in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

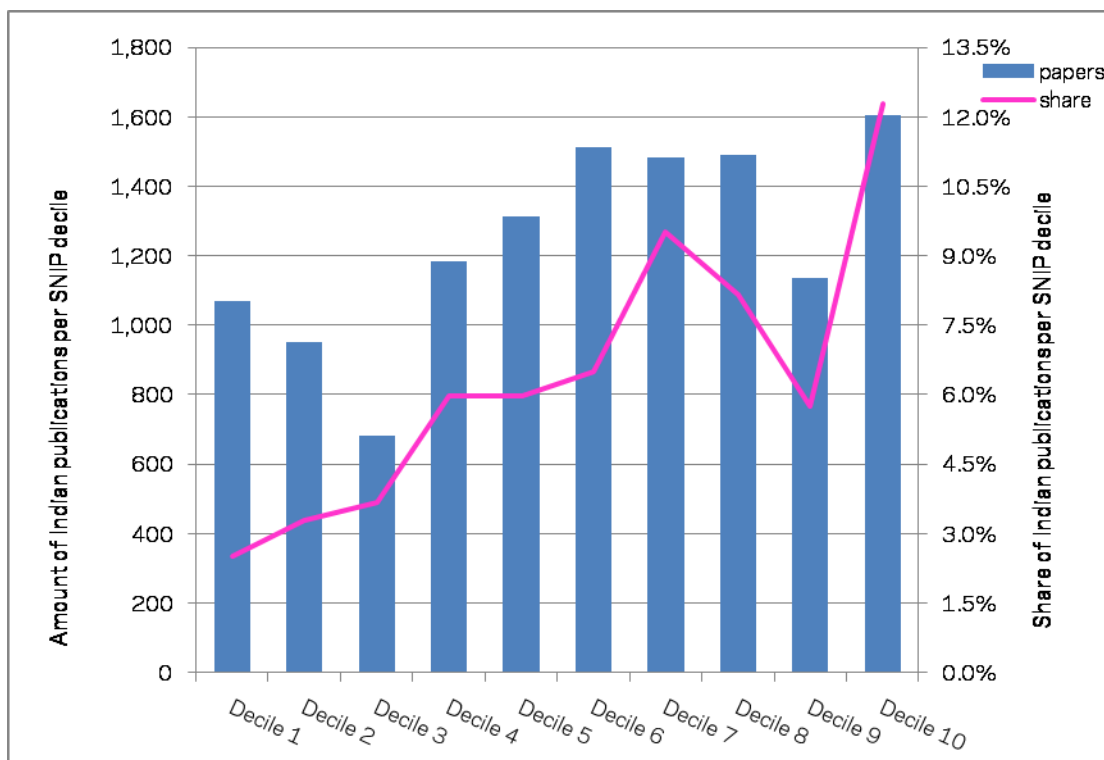


Figure F.10 — Number and share of 2014 Indian papers in the subject area Environmental Science in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

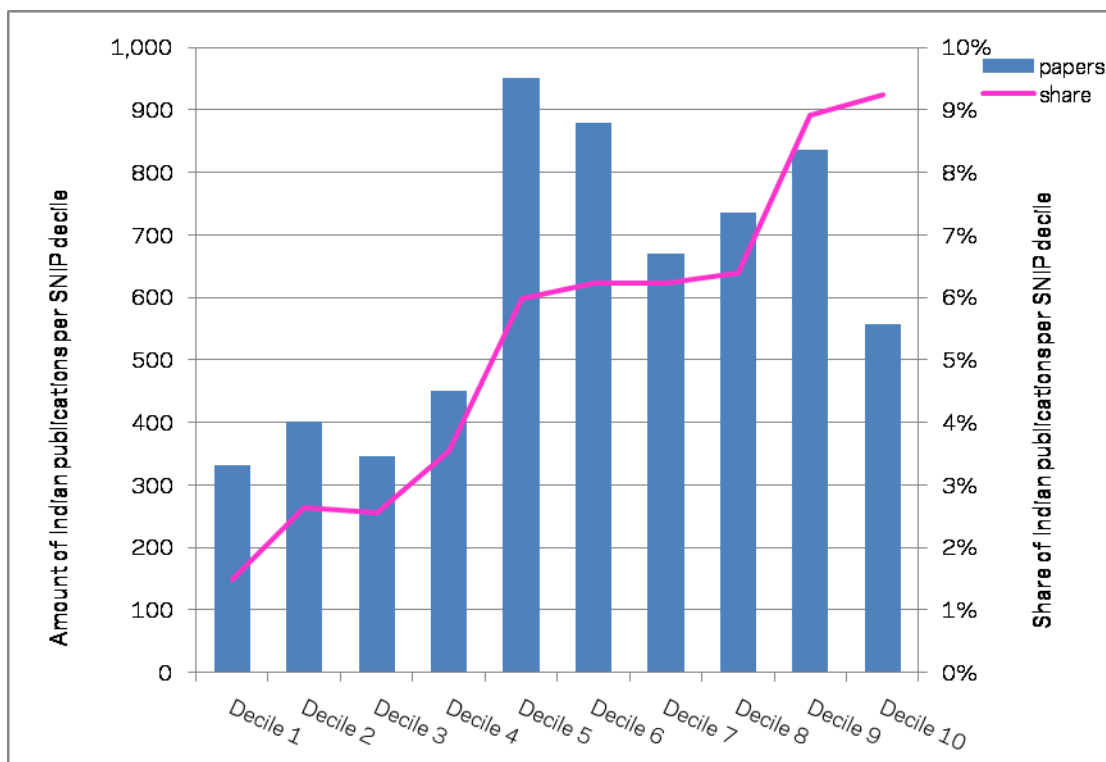


Figure F.11 — Number and share of 2014 Indian papers in the subject area Immunology and Microbiology in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

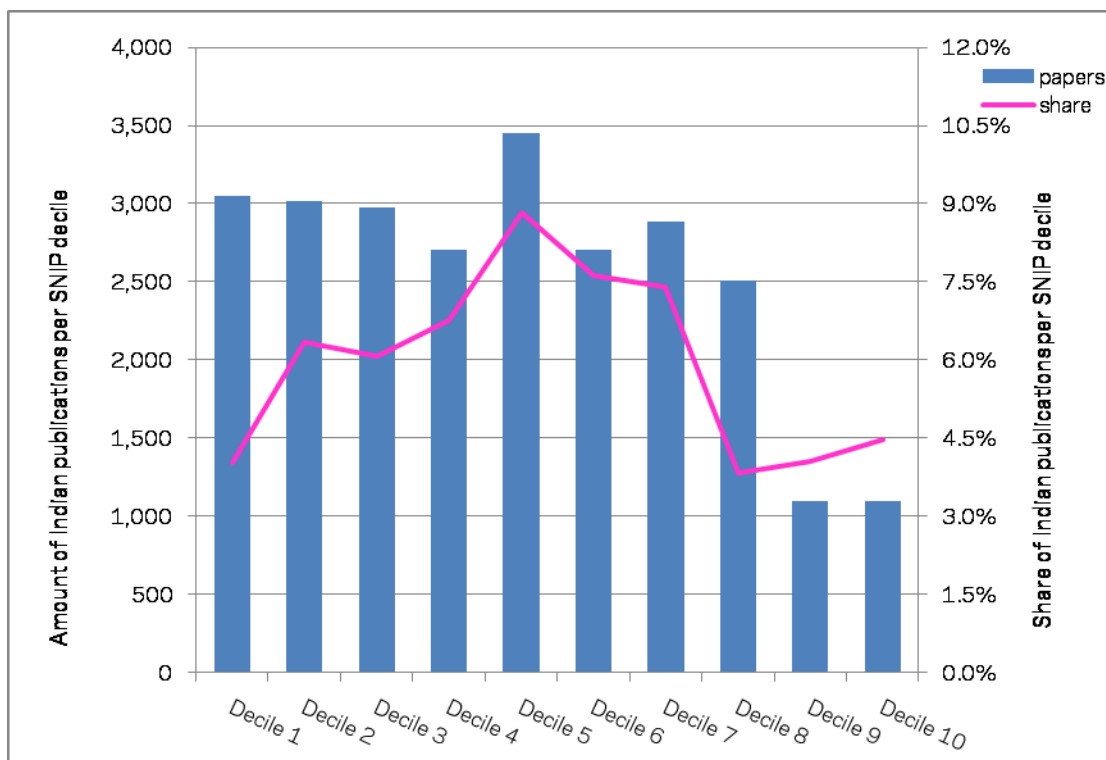


Figure F.12 — Number and share of 2014 Indian papers in the subject area Materials Science in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

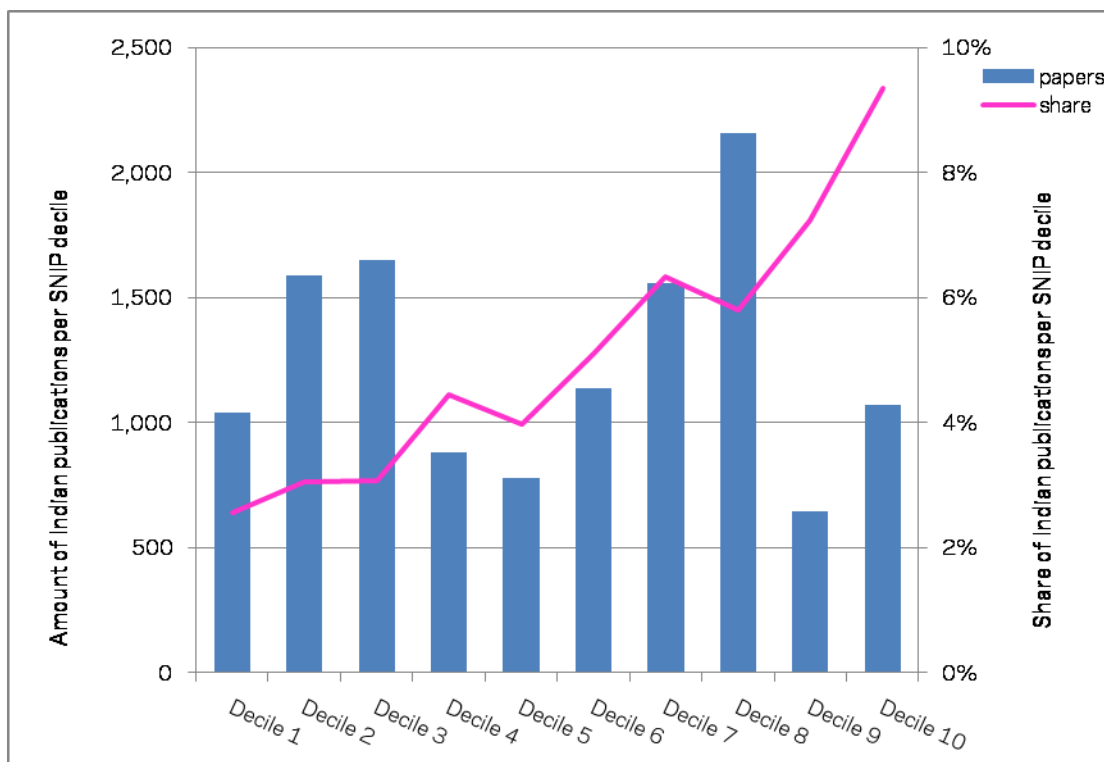


Figure F.13 — Number and share of 2014 Indian papers in the subject area Mathematics in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

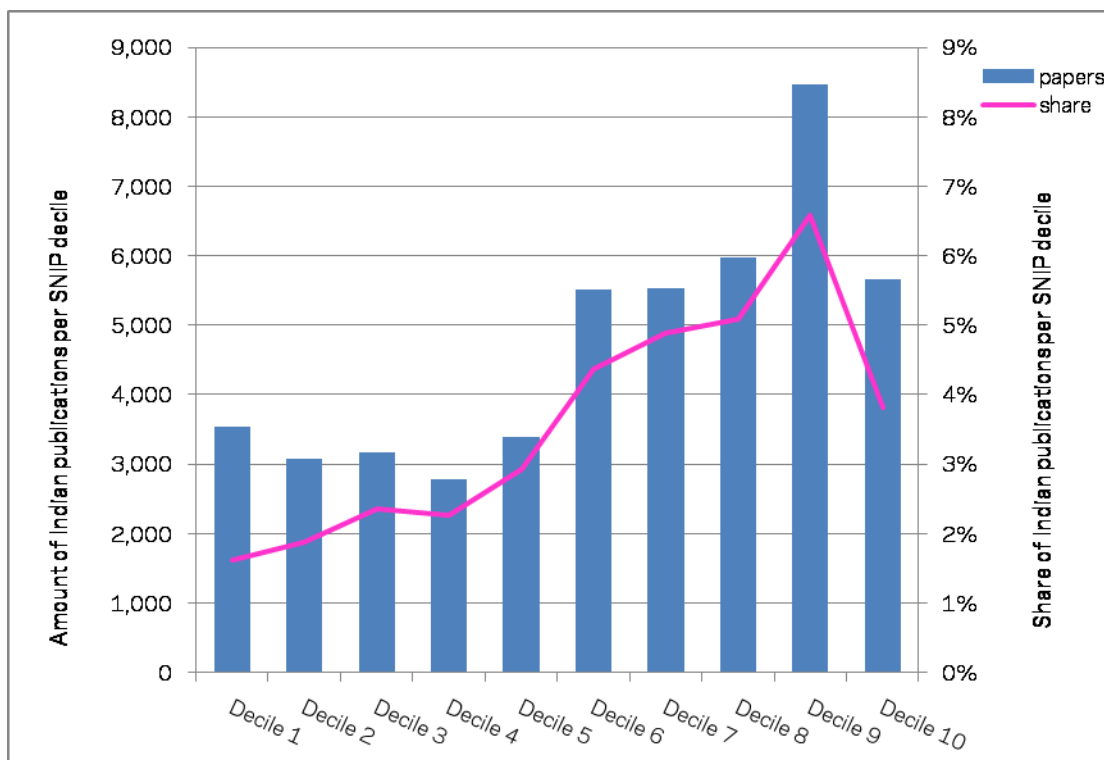


Figure F.14 — Number and share of 2014 Indian papers in the subject area Medicine in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

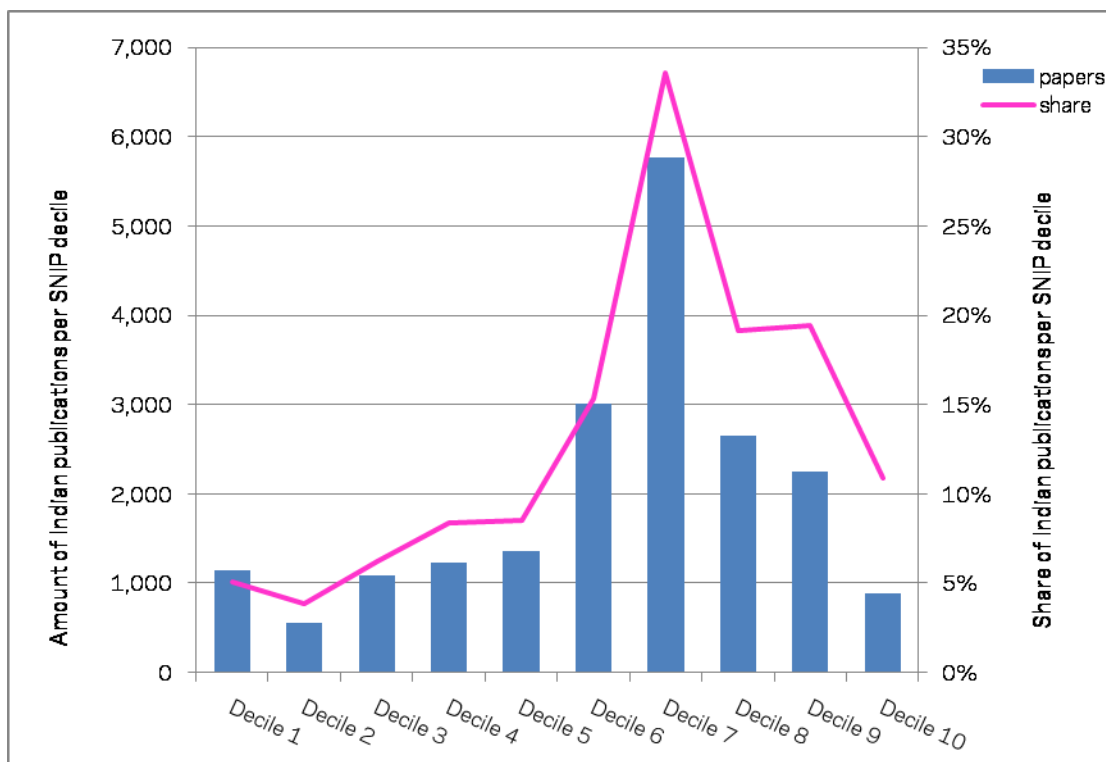


Figure F.15 — Number and share of 2014 Indian papers in the subject area Pharmacology, Toxicology and Pharmaceutics in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

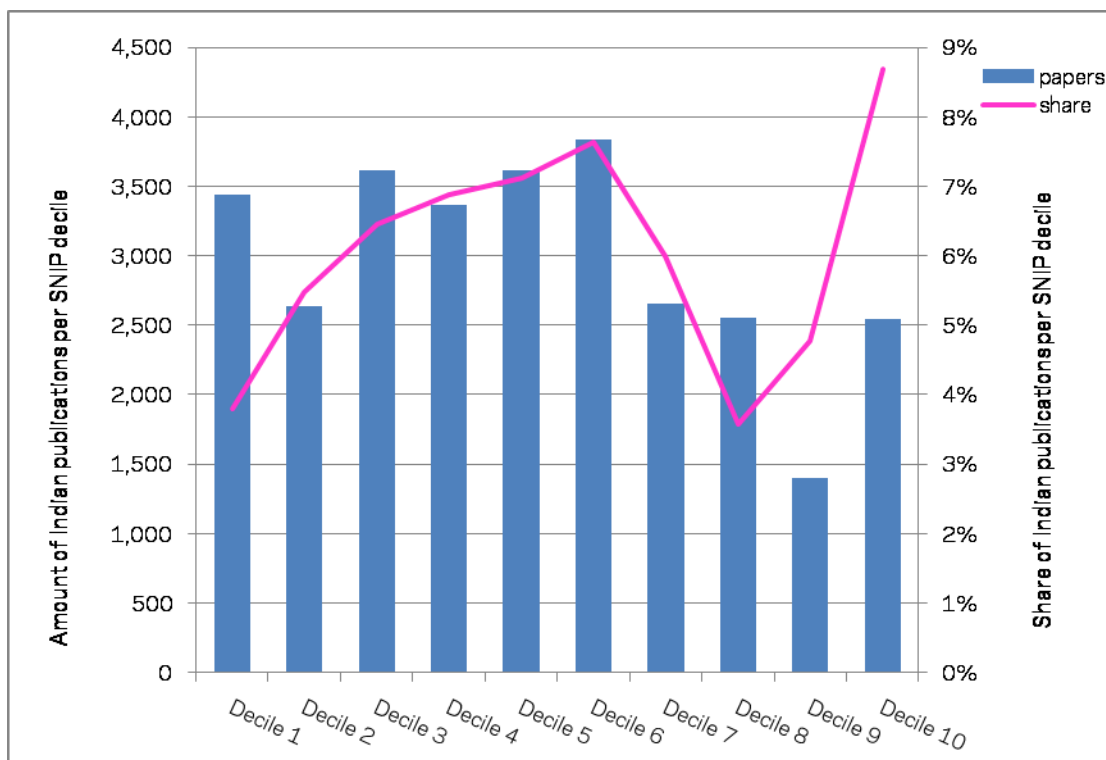


Figure F.16 — Number and share of 2014 Indian papers in the subject area Physics and Astronomy in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

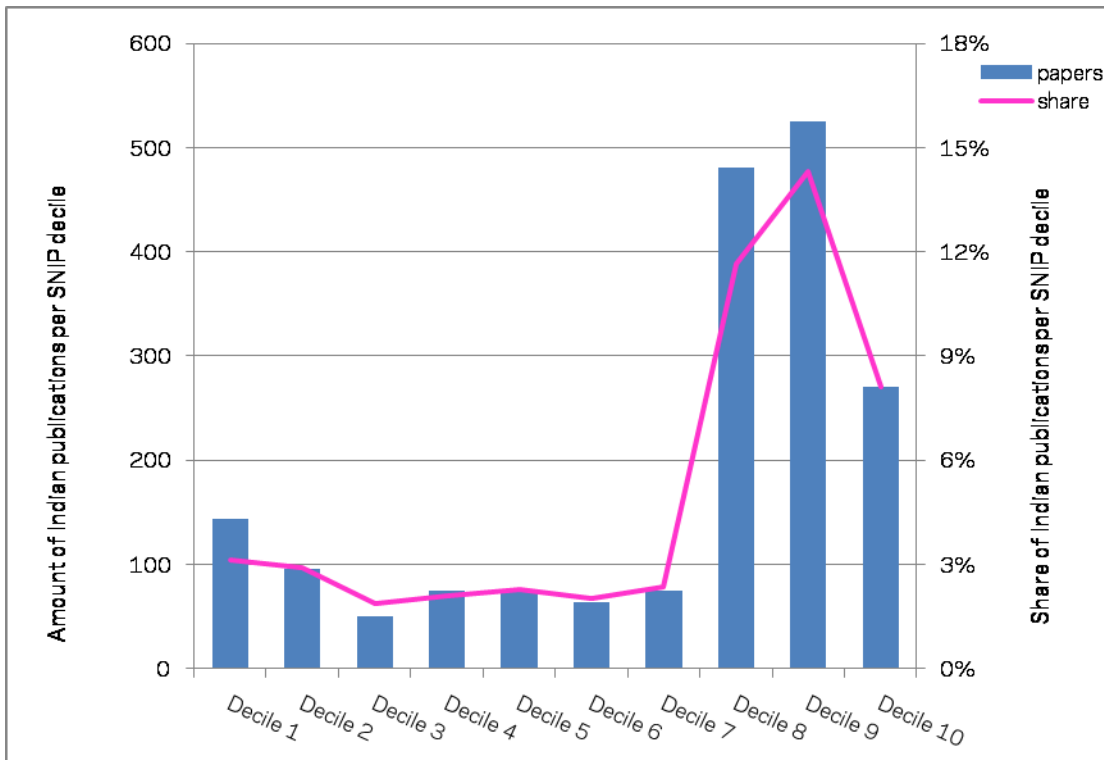


Figure F.17 — Number and share of 2014 Indian papers in the subject area Veterinary in each SNIP decile (1 being the highest, 10 being the lowest).

Source: Scopus database.

Appendix G

Indian Journals in Scopus

G-1 Coverage of Indian Journals in Scopus

Figure G.1 presents the number of Indian journals indexed by Elsevier's Scopus over 2009-2014 per year. This number varies from 329 in 2009 to 406 in 2011. Over this period the amount of Indian journals in Scopus has grown, on average, with 5.2% CAGR. The line in magenta represents the number of Indian journals in Scopus over the total number of journals in Scopus. The share of Indian journals in Scopus varies from 1.66% in 2009 and 2014 to 1.86% in 2011.

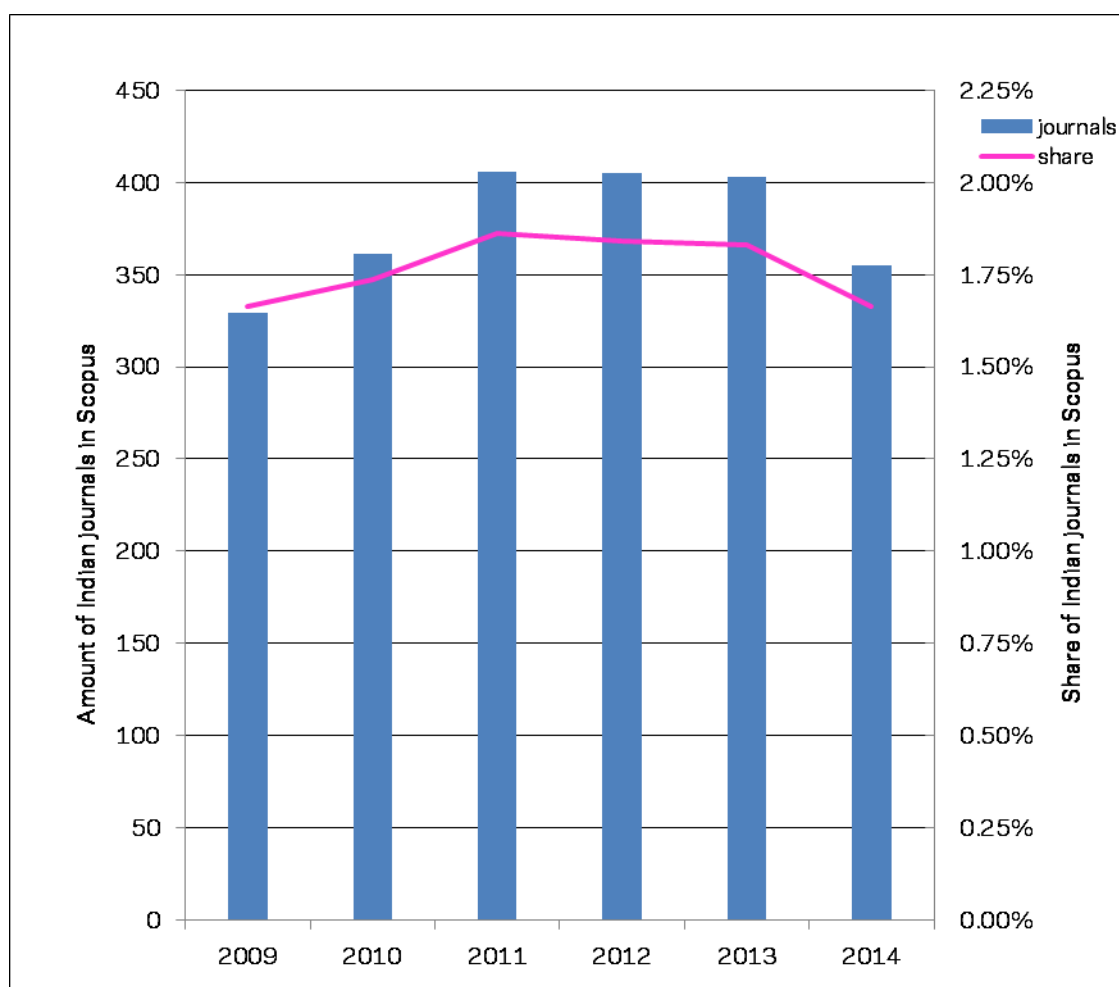


Figure G.1 — Annual amount and share of coverage of Indian journals in Scopus for 2009-2014.

Source: Scopus database.

G-2 Indian Journals in Scopus

Journal title	ISSN	e-ISSN	Coverage start
Journal of the Geological Society of India	00167622		1845
Journal of Genetics	00221333		1911
Proceedings of the Indian Academy of Sciences - Section A	03700089		1934
Indian Journal of Practical Pediatrics	09729607		1936
Indian Journal of Pediatrics	00195456	09737693	1939
Indian Journal of Social Work	00195634		1945
Indian Veterinary Journal	00196479		1945
Current Science	00113891		1945
Indian Journal of Surgery	00195650		1945
Indian Journal of Medical Research	09715916		1945
Annals of biochemistry and experimental medicine	03650642		1945
The Nursing journal of India	00296503		1946
Indian Journal of Ophthalmology	03014738	19983689	1946
Indian journal of venereal diseases and dermatology			1946
Indian Journal of Malariology	03678326		1947
The Journal of the All India Dental Association	03770516		1947
Indian Journal of Pharmacy	00195472		1948
Indian Journal of Otolaryngology	00195421		1950
Indian Journal of Medical Sciences	00195359	19983654	1957
Indian Journal of Physiology and Pharmacology	00195499		1959
Hindustan Antibiotics Bulletin	00181935		1960
Journal of the Anatomical Society of India	00032778		1960
Journal of scientific & industrial research. C. Biological sciences		03684229	1960
The Journal of the Association of Physicians of India	00045772		1961
Journal of Postgraduate Medicine	00223859	09722823	1961
Indian journal of public health	0019557X		1961
Indian Heart Journal	00194832		1961
Armed Forces medical journal, India	00042218		1961
Journal of the All-India Ophthalmological Society	00447307		1961
Indian journal of pathology & bacteriology		00195448	1961
The Indian journal of chest diseases	00195111		1961
The Indian journal of child health	04457684		1961
Indian Journal of Dermatology	00195154	19983611	1962
Artha vijnana : journal of the Gokhale Institute of Politics and Economics, Poona (India)	00043559		1962
The Sociological Bulletin	00380229		1963
Indian Pediatrics	00196061	09747559	1964
Indian journal of biochemistry	00195081		1964
Indian Journal of Cancer	0019509X	19984774	1965
Indian Journal of Experimental Biology	00195189	09751009	1965
Neurology India	00283886		1965
Journal of the Indian Dental Association	00194611		1966
Irrigation and Power Journal	03679993		1966
Journal of Mines, Metals and Fuels	00222755		1968
Indian Journal of Pure and Applied Physics	00195596	09751041	1969
Electro-Technology	00134643		1969
Indian Concrete Journal	00194565		1969
Transactions of the Indian Ceramic Society	0371750X		1969
Journal of Scientific and Industrial Research	00224456		1969

Journal title	ISSN	e-ISSN	Coverage start
Indian J Chem	00195103		1969
Indian Journal of Technology	00195669		1969
Journal of the Institution of Engineers (India): Electrical Engineering Division	00203386		1969
Journal of the Institution of Engineers (India): Mechanical Engineering Division	00203408		1969
J Inst Eng (India), Pub Health Eng Div	00203416		1970
Indian Journal of Psychiatry	00195545	19983794	1970
Journal of the Institution of Engineers (India): Civil Engineering Division	03731995		1970
Defence Science Journal	0011748X		1970
Indian Journal of Chemistry - Section B Organic and Medicinal Chemistry	03764699		1970
Journal of the Institution of Engineers (India): Chemical Engineering Division	00203351		1970
Indian J Technol	00915669		1970
China Report	00094455		1971
Indian Journal of Animal Sciences	03678318		1971
Man in India	00251569		1971
Bulletin of the Institute of Medicine (Hyderabad)	03049566		1971
Yojana	00440515		1972
Leprosy in India	00241024		1972
Indian Journal of Biochemistry and Biophysics	03011208		1972
Indian Journal of Pathology and Microbiology	03774929	09745130	1972
Indian Journal of Environmental Health	0367827X		1972
INDIAN J.DERM.VENEREOL.	00195162		1973
Journal of the Indian Society of Remote Sensing	0255660X	09743006	1973
Biomedicine	09702067		1973
Pramana - Journal of Physics	03044289	09737111	1973
Indian Journal of Tuberculosis	00195707		1973
Indian Journal of Microbiology	00468991		1973
Annals of Biology	09700153		1973
Journal of the Diabetic Association of India	03044513		1973
Journal of the Indian Chemical Society	00194522		1973
The Eastern Anthropologist	00128686		1973
Indian Journal of Medical Research	00195340		1973
Indian Journal of Ecology	03045250		1974
Indian Journal of Orthopaedics	00195413	19983727	1974
Indian Journal of Agricultural Sciences	00195022		1974
International Journal of Sociology of the Family	00207667		1974
Journal of Food Science and Technology	00221155		1974
Journal of Communicable Diseases	00195138		1974
International Journal of Ecology and Environmental Sciences	0377015X		1974
Bulletin of the Indian Institute of History of Medicine (Hyderabad)	03049558		1974
Indian Journal of Fisheries	05372003		1974
Journal of the Indian Institute of Science	00194964		1974
Journal of Population Research	03770478		1974
J Inst Electron Telecommun Eng	03772063		1974
Bulletin, Postgraduate Institute of Medical Education and Research, Chandigarh	03022404		1975
NIHAE bulletin	03786196		1975
Indian Journal of Marine Sciences	03795136		1976
Annals of Arid Zone	05701791		1976

Journal title	ISSN	e-ISSN	Coverage start
Tropical Ecology	05643295		1976
The Indian journal of chest diseases & allied sciences		03779343	1976
Indian Journal of Dermatology, Venereology and Leprology	03786323	09733922	1976
Urban and Rural Planning Thought	00420824		1976
Journal of the Institution of Engineers (India): Environmental Engineering Division	0251110X		1977
Indian Journal of Meteorology, Hydrology and Geophysics	03764796		1977
Indian Journal of Agricultural Economics	00195014		1978
Indian Journal of Pharmacology	02537613	19983751	1978
Administrative Change			1978
Economic and Political Weekly	00129976		1978
IIPS newsletter	00470716		1978
Indian Journal of Pharmaceutical Sciences	0250474X	19983743	1978
Health and Population: Perspectives and Issues	02536803		1978
Transactions of the SAEST (Society for Advancement of Electrochemical Science and Technology)	00360678		1978
Proceedings of the Indian Academy of Sciences: Chemical Sciences	02534134		1978
Proceedings of the Indian Academy of Sciences, Earth and Planetary Sciences	02534126		1978
Proceedings of the Indian Academy of Sciences: Mathematical Sciences	02534142	09737685	1978
Industrial research/development	01604074		1978
Bulletin of Materials Science	02504707		1979
Indian Journal of Earth Sciences	03795128		1979
Social Change	00490857		1979
Journal of Biosciences	02505991		1979
Mausam	02529416		1979
Journal of the Institution of Engineers (India), Part MM: Mining and Metallurgy Division	00203394		1979
SPA Journal of School of Planning and Architecture, New Delhi	09700706		1979
Indian Journal of Sexually Transmitted Diseases	02537184	19983816	1980
Journal of Astrophysics and Astronomy	02506335		1980
Transactions of the Institute of Indian Geographers	09709851		1980
IETE Journal of Research			1980
Journal of Chemical Sciences	09743626	09737103	1980
Electricity Conservation Quarterly	09702318		1981
Population Geography	02565331		1981
Indian Journal of Environmental Protection	02537141		1981
Indian Journal of Gastroenterology	02548860	09750711	1982
International Journal of Structures	02534754		1982
Indian Forester	00194816		1982
Journal of Rural Development	09703357		1982
Indian Journal of Thoracic and Cardiovascular Surgery	09709134		1982
Tropical gastroenterology : official journal of the Digestive Diseases Foundation	0250636X		1983
Journal of the Indian Society of Pedodontics and Preventive Dentistry	09704388		1983
Indian Journal of Textile Research	03778436		1984
Journal of the Institution of Engineers (India): Agricultural Engineering Division	02573431		1984
Journal of the Institution of Engineers (India): Architectural Engineering Division	0257344X		1984
IETE Technical Review (Institution of Electronics and Telecommunication Engineers, India)	02564602	09745971	1984

Journal title	ISSN	e-ISSN	Coverage start
Sadhana - Academy Proceedings in Engineering Sciences	02562499		1984
Indian Journal of Urology	09701591		1984
Indian Journal of Leprosy	02549395		1984
Indian Journal of Radiology and Imaging	09713026	19983808	1984
Journal of the Institution of Engineers. India. Mining Engineering Division	0257442X		1984
Journal of the Institution of Engineers (India): Aerospace Engineering Journal	02573423		1985
South Asia Research	02627280	17413141	1985
Journal of the Institution of Engineers (India), Part TX: Textile Engineering Division	02574438		1985
Journal of Indian Water Works Association	0970275X		1985
Manushi	02577305		1985
Studies in history of medicine and science	09705562		1985
Journal of the Institution of Engineers (India), Part MM: Metallurgy and Material Science Division	02574411		1985
Journal of the Institution of Engineers (India), Part PR: Production Engineering Division	02576708		1985
Journal of Cytology	09709371	09745165	1985
Journal of the Institution of Engineers (India), Part CP: Computer Engineering Division	09710469		1986
Journal of the Institution of Engineers (India), Part MR: Marine Engineering Division	09710450		1986
Indian Journal of Clinical Biochemistry	09701915		1986
Indian Journal of Medical Microbiology	02550857	19983646	1986
BTRA Scan	09728341		1987
Journal of Polymer Materials	09700838		1987
Pacific and Asian Journal of Energy	09703888		1987
Journal of the Diabetic Association of India	09704027		1987
Contributions to Indian Sociology	00699667		1987
Studies in History	02576430		1987
Plant Physiology and Biochemistry	02543591		1987
Memoires - Geological Society of India	04354001		1988
National Medical Journal of India	0970258X		1988
Journal of Structural Engineering (Madras)	09700137		1988
Journal of Environmental Biology	02548704		1988
Annals of Saudi Medicine	02564947		1988
Bulletin of Electrochemistry	02561654		1988
Population Review	0032471X		1988
Indian Journal of Dental Research	09709290	19983603	1989
Colourage	00101826		1989
Journal of Financial Management and Analysis	09704205		1989
Health for the millions	09708685		1989
Indian Drugs	0019462X		1989
Indian Journal of Medical Research - Section B Biomedical Research Other Than Infectious Diseases	09709568		1989
Indian Journal of Medical Research - Section A Infectious Diseases	0970955X		1989
Man-Made Textiles in India	03777537		1989
Textile Dyer and Printer	00404926		1989
Biomedical Research	0970938X		1990
Exploration and Research for Atomic Minerals	09709231		1990
ATIRA Communications on Textiles	09710833		1990
Journal International Medical Sciences Academy	0971071X		1990
Indian Minerals	00195936		1990

Journal title	ISSN	e-ISSN	Coverage start
Indian Journal of Maternal and Child Health	09708928		1990
Indian Journal of Fibre and Textile Research	09710426		1990
Journal of Human Ecology	09709274		1990
Indian Journal of Agricultural Research	03678245	0976058X	1990
Journal of the Bombay Natural History Society	00066982		1990
Journal (Academy of Hospital Administration (India))	09709542		1991
Asian Textile Journal	09713425		1992
Indian Journal of Sericulture	04457722		1992
Journal of Plant Biochemistry and Biotechnology	09717811		1992
Bulletin of Pure and Applied Sciences - Section F Geological Sciences	09704639		1992
Indian Journal of Agronomy	0537197X	09744460	1993
Indian Silk	00196355		1993
Indian Journal of Petroleum Geology	09712542		1993
Textile Magazine	00405078		1993
Textiles Trends	00405205		1993
Wool and Woollens of India	00437808		1993
Journal of Advanced Zoology	02537214		1993
Indian medical tribune	0971488X		1993
Indian Journal of Otolaryngology and Head and Neck Surgery	22313796	09737707	1993
Indian Journal of Applied Economics	09718281		1993
Journal of Spacecraft Technology	09711600		1994
South Asian Survey	09715231		1994
International Studies	00208817		1994
Indian Journal of Chemical Technology	0971457X		1994
Indian Journal of Engineering and Materials Sciences	09714588		1994
Psychology and Developing Societies	09713336		1994
Journal of Health Management	09720634		1994
National Family Health Survey bulletin	10838678		1995
Water and Energy International	0972057X		1995
Indian Journal of Gender Studies	09715215		1995
Electronics Information and Planning	03049876		1996
Journal of Optics (India)	09700374		1996
Metals Materials and Processes	0970423X		1996
Indian Journal of Labour Economics	00195308		1996
Journal of Surface Science and Technology	09701893		1996
Phytomorphology: An International Journal of Plant Morphology	00319449		1996
Allelopathy Journal	09714693		1996
Journal of Anaesthesiology Clinical Pharmacology	09709185		1996
Journal of Applied Animal Research	09712119		1996
Journal of Camel Practice and Research	09716777		1996
Asian Journal of Chemistry	09707077		1996
Indian Journal of Pure and Applied Mathematics	00195588		1996
Journal of Industrial Pollution Control	09702083		1996
Science, Technology and Society	09717218		1996
Indian Journal of Heterocyclic Chemistry	09711627		1996
Pestology	09703012		1996
Indian Journal of Chemistry - Section A Inorganic, Physical, Theoretical and Analytical Chemistry	03764710		1996
Indian Journal of Indigenous Medicines	09715452		1996
Issues in medical ethics.			1996
Indian Journal of Radio and Space Physics	03678393		1996

Journal title	ISSN	e-ISSN	Coverage start
Journal of Human Values	09716858		1996
Resonance	09718044		1996
Journal of Entrepreneurship	09713557		1996
Journal of Internal Medicine of India	09721096		1997
Ecology, Environment and Conservation	0971765X		1997
Ultrasound International	09716874		1997
IDMA Bulletin	09706054		1997
JK Practitioner	09718834		1997
Pollution Research	02578050		1997
Medico-Legal Update	0971720X		1997
Current Pediatric Research	09719032		1998
Asian Agri-History	09717730		1998
International Journal of Medical Toxicology and Legal Medicine	09720448		1999
Indian Journal of Otolaryngology	09717749	22499520	1999
Indian Journal of Occupational and Environmental Medicine	09732284	19983670	1999
Phytomedica	09723293		1999
Journal of the Textile Association	03684636		1999
Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology	09728074		2000
Indian Journal of Hematology and Blood Transfusion	09714502	09740449	2000
Physiology and Molecular Biology of Plants	09715894	09740430	2000
Bull RGKMC	09718001		2000
Perinatology	09722408		2001
JK Science	09721177		2001
Indian Pacing and Electrophysiology Journal	09726292		2001
Zoos' Print Journal	09716378		2001
Indian Journal of Plastic Surgery	09700358	1998376X	2001
Trends in Biomaterials and Artificial Organs	09711198		2001
International Journal of Diabetes in Developing Countries	09733930		2001
Global Business Review	09721509		2001
Plant Cell Biotechnology and Molecular Biology	09722025		2002
Asian Journal of Spectroscopy	09719237		2002
Journal of Carcinogenesis	09746773	14773163	2002
Noise and Health	14631741	19984030	2002
Journal of Natural Remedies	09725547	23203358	2002
Indian Journal of Biotechnology	09725849	09750967	2002
Online Journal of Health and Allied Sciences	09725997		2002
Indian Journal of Human Genetics	09716866		2002
Journal of Bamboo and Rattan	15691586	15691594	2002
Journal of Indian Association of Pediatric Surgeons	09719261	19983891	2002
TIDEE (Teri Information Digest on Energy and Environment)	09726721		2002
Journal of Dharma	02537222		2002
Journal of Interdisciplinary Mathematics	09720502		2002
Sugar Tech	09721525	09740740	2003
JMS - Journal of Medical Society	09724958		2003
Journal of Ecophysiology and Occupational Health	09724397		2003
Asian Biotechnology and Development Review	09727566		2003
Journal of Vector Borne Diseases	09729062		2003
Indian Journal of Agricultural Biochemistry	09706399		2003
International Journal of Applied Mathematics and Statistics	09731377		2003
Indian Journal of Medical Research, Supplement	03679012		2004

Journal title	ISSN	e-ISSN	Coverage start
Annals of Agri Bio Research	09719660		2004
Journal of Environmental Science and Engineering	0367827X		2004
CytoJournal	09745963	17426413	2004
Indian Journal of Critical Care Medicine	09725229	1998359X	2004
Indian journal of medical ethics	09748466		2004
Journal of Chemical and Pharmaceutical Research	09757384		2004
Indian Journal of Physics	02529262		2005
Journal, Indian Academy of Clinical Medicine	09723560		2005
Journal of Cancer Research and Therapeutics	09731482	09741127	2005
Journal of Indian Prosthodontist Society	09724052	19984057	2005
Journal of Minimal Access Surgery	09729941		2005
Indian Journal of Palliative Care	09731075	19983735	2005
Sankhya: The Indian Journal of Statistics	09727671		2005
Annals of African Medicine	15963519	09755764	2005
Toxicology International	09716580		2005
National Academy Science Letters	0250541X		2005
ISET Journal of Earthquake Technology	09720405		2005
Biosciences Biotechnology Research Asia	09731245		2005
International Journal of Performability Engineering	09731318		2005
Proceedings of the Indian National Science Academy	03700046		2005
Asia Pacific Disability Rehabilitation Journal			2006
Asian Dyer	09729488		2006
Journal of Pediatric Neurosciences	18171745		2006
Annals of Indian Academy of Neurology	09722327		2006
Annals of Thoracic Medicine	18171737	19983557	2006
Journal of Digital Information Management	09727272		2006
Journal of Medical Physics	09716203		2006
Journal of Indian Association for Child and Adolescent Mental Health	09731342		2006
Pharma Times	00316849		2006
Saudi Journal of Gastroenterology	13193767	19984049	2006
International Journal of Regulation and Governance	09724907		2006
Global Journal of Flexible Systems Management	09722696		2006
Current Topics in Pharmacology	09724559		2006
Current Trends in Immunology	09724567		2006
Rheedeia	09712313		2006
Indian Journal of Natural Products and Resources	09760504	09760512	2006
Proceedings of the Indian National Science Academy Part A - Physical Sciences	03698203	22501762	2006
Research Journal of Chemistry and Environment	09720626		2007
Journal of Essential Oil-Bearing Plants	0972060X		2007
Annals of Cardiac Anaesthesia	09719784	09745181	2007
Journal of Tropical Agriculture	0971636X		2007
Himalayan Geology	09718966		2007
Journal of Pure and Applied Microbiology	09737510		2007
Natural Product Radiance	0972592X		2007
Mens Sana Monographs	09731229	19984014	2007
South Asia Economic Journal	13915614		2007
Current Topics in Peptide and Protein Research	09724524		2007
Current Topics in Toxicology	09728228		2007
Journal of South Asian Development	09731741		2007
Journal of Veterinary Parasitology	09711031		2007

Journal title	ISSN	e-ISSN	Coverage start
International Journal of Oceans and Oceanography	09732667		2007
Advances and Applications in Fluid Mechanics	09734686		2007
Indian Journal of Science and Technology	09746846	09745645	2007
Advances in Vibration Engineering	09725768		2007
Indian Journal of Geo-Marine Sciences	09751033		2007
Anthropologist	09720073		2008
Research Journal of Biotechnology	09736263		2008
Animal Nutrition and Feed Technology	09722963	0974181X	2008
Far East Journal of Mathematical Sciences	09720871		2008
Pharmacognosy Magazine	09731296	09764062	2008
Indian Journal of Pharmaceutical Education and Research	00195464		2008
Rasayan Journal of Chemistry	09741496	09760083	2008
Vegetos	09704078		2008
Legume Research	02505371		2008
International Journal of Human Genetics	09723757		2008
Journal of Applied Horticulture	09721045		2008
Differential Equations and Dynamical Systems	09713514		2008
Indian Journal of Forensic Medicine and Toxicology	09739122	09739130	2008
Hepatitis B Annual	09729747	19983573	2008
Veterinary Practitioner	09724036		2008
International Journal of Economic Research	09729380		2008
Indian Journal of Traditional Knowledge	09725938	09751068	2008
Journal of Agrometeorology	09721665		2008
Indian Journal of Animal Research	03676722	09760555	2008
Bulletin of the Astronomical Society of India	03049523		2008
Research on Crops	09723226		2008
Journal of Algebra and Discrete Structures	09725946		2008
Veterinary World	09728988	22310916	2008
International Journal of Applied Business and Economic Research	09727302		2008
Proceedings of the National Academy of Sciences India Section B - Biological Sciences	03698211	22501746	2008
Indian Journal of Genetics and Plant Breeding	00195200	09756906	2008
Journal of Intellectual Property Rights	09717544	09751076	2008
International Journal of Applied Chemistry	09731792	09739734	2008
Journal of Computational Mathematics and Optimization	09729372		2008
Indian Journal of Community Medicine	09700218	19983581	2009
Journal of Clinical and Diagnostic Research	0973709X		2009
International Journal of Computer Science and Applications	09729038		2009
International Journal of Ecology and Development	09729984	09737308	2009
Journal of Emerging Market Finance	09726527		2009
International Journal of Tomography and Statistics	09729976	09737294	2009
Carbon - Science and Technology	09740546		2009
Asian Journal of Management Cases	09728201		2009
International Journal of Applied Environmental Sciences	09736077	09740260	2009
Studies on Ethno-Medicine	09735070		2009
Mapan - Journal of Metrology Society of India	09703950	09749853	2009
African Journal of Paediatric Surgery	01896725	09745998	2009
International Journal of Imaging	09740627		2009
International Journal of Artificial Intelligence	09740635		2009
Journal of Hindu Studies	17564255	17564263	2009
Journal of Parasitic Diseases	09717196		2009

Journal title	ISSN	e-ISSN	Coverage start
International Journal of Rural Management	09730052		2009
International Journal of Plastics Technology	0972656X	0975072X	2009
Lung India	09702113	0974598X	2009
International Journal of Green Pharmacy	09738258	19984103	2009
Asian Journal of Pharmaceutical and Clinical Research	09742441		2009
Asian Journal of Pharmaceutics	09738398	1998409X	2009
Indian Journal of Medical and Paediatric Oncology	09715851	09752129	2009
Biomedical and Pharmacology Journal	09746242		2009
Indian Journal of Nephrology	09714065	19983662	2009
Pharmacognosy Journal	09753575		2009
Journal of Gynecological Endoscopy and Surgery	09741216	09747818	2009
Annals of Pediatric Cardiology	09742069	09745149	2009
International Journal of PharmTech Research	09744304		2009
International Journal of ChemTech Research	09744290		2009
Pharmacognosy Reviews	09737847	09762787	2009
Journal of Human Reproductive Sciences	09741208		2009
Disaster Advances	0974262X		2009
Annals of Tropical Medicine and Public Health	17556783	09746005	2009
International Journal of Pharmacy and Pharmaceutical Sciences	09751491		2009
Range Management and Agroforestry	09712070		2009
OPSEARCH	00303887	09750320	2009
International Journal of Agricultural and Statistical Sciences	09731903	09763392	2009
Journal of Analysis and Applications	09725954		2009
Indian Journal of Horticulture	00195251		2009
Nature Environment and Pollution Technology	09726268		2009
IUP Journal of English Studies	09733728		2009
International Journal of Vehicle Structures and Systems	09753060	09753540	2009
Journal of South India Medicolegal Association	09746196		2009
Biology and Medicine	09748369		2009
International Journal of Engineering and Technology	09754024		2009
Trends in Carbohydrate Research	09750304		2009
International Journal of Trichology	09747753		2009
Hamadryad	0972205X		2009
Asian Journal of Transfusion Science	09736247	19983565	2009
Journal of the Ramanujan Mathematical Society	23203110		2009
Journal of Obstetrics and Gynecology of India	09719202	09756434	2010
Indian Journal of Nuclear Medicine	09723919	09740244	2010
Pharmacognosy Research	09748490		2010
International Journal of Drug Development and Research	09759344		2010
International Journal of Research in Pharmaceutical Sciences	09757538		2010
Journal of Young Pharmacists	09751483	09751505	2010
International Journal of Systems Assurance Engineering and Management	09756809	09764348	2010
Indian Journal of Virology	09702822	09740120	2010
Journal of Maxillofacial and Oral Surgery	09728279	0974942X	2010
Journal of the Indian Academy of Wood Science	0972172X	09768432	2010
Indian Journal of Anaesthesia	00195049	09762817	2010
Journal of Discrete Mathematical Sciences and Cryptography	09720529		2010
International Journal of Earth Sciences and Engineering	09745904		2010
Journal of Chemical and Pharmaceutical Sciences	09742115		2010
Indian Journal of Surgical Oncology	09757651	09766952	2010

Journal title	ISSN	e-ISSN	Coverage start
Journal of Pharmaceutical Negative Results	09769234	22297723	2010
International Journal of Pharmaceutical Sciences Review and Research	0976044X		2010
JP Journal of Algebra, Number Theory and Applications	09725555		2010
JP Journal of Heat and Mass Transfer	09735763		2010
Advanced Materials Letters	09763961	0976397X	2010
Journal of Natural Science, Biology and Medicine	09769668	22297707	2010
Current Neurobiology	09759042	09761705	2010
IIOAB Journal	09763104		2010
International Journal of Infertility and Fetal Medicine	22293817	22293833	2010
JP Journal of Geometry and Topology	0972415X		2010
Journal of Stem Cells and Regenerative Medicine	09737154		2010
Journal of Biopesticides	0974391X		2010
Dental Hypotheses	21558213		2010
Journal of Ayurveda and Integrative Medicine	09759476	09762809	2010
Journal of Pharmacology and Pharmacotherapeutics	0976500X	09765018	2010
Journal of Advanced Pharmaceutical Technology and Research	01105558	09762094	2010
Journal of Cardiovascular Disease Research	09753583	09762833	2010
Journal of Neurosciences in Rural Practice	09763147	09763155	2010
International Journal of Current Pharmaceutical Review and Research	0976822X		2010
International Journal of Pharmaceutical Sciences	09754725		2010
Global Journal of Pure and Applied Mathematics	09731768	09739750	2010
Journal of Global Pharma Technology	09758542		2010
Strategic Analysis	09700161		2010
Journal of Emergencies, Trauma and Shock	09742700	0974519X	2010
Open Access Journal of Medicinal and Aromatic Plants	09747877		2010
Indian Journal of Public Health Research and Development	09760245	09765506	2010
Systematic Reviews in Pharmacy	09758453		2010
Journal of Craniovertebral Junction and Spine	09748237	09769285	2010
Pravara Medical Review	09750533		2011
Annals of Neurosciences	09727531	09763260	2011
Conservation and Society	09724923		2011
Journal of Conservative Dentistry	09720707	09745203	2011
Plant Archives	09725210		2011
AKCE International Journal of Graphs and Combinatorics	09728600		2011
International Journal of Ayurveda Research	09747788	0974925X	2011
International Journal of Applied Pharmaceutics	09757058		2011
Donald School Journal of Ultrasound in Obstetrics and Gynecology	0973614X		2011
International Journal of Imaging and Robotics	2231525X		2011
International Journal of Chemical Sciences	0972768X		2011
International Journal of Pharmacognosy and Phytochemical Research	09754873		2011
Journal of Current Glaucoma Practice	09740333	09751947	2011
Clinical Rhinology	09744630	09756965	2011
Otorhinolaryngology Clinics	0975444X		2011
Journal of SAFOG	09748938	09751920	2011
World Journal of Laparoscopic Surgery	09745092		2011
World Journal of Endocrine Surgery	09755039	09757902	2011
BioTechnology: An Indian Journal	09747435		2011
Journal of Oral and Maxillofacial Pathology	0973029X	1998393X	2011
Indian Journal of Psychological Medicine	02537176	09751564	2011

Journal title	ISSN	e-ISSN	Coverage start
Journal of Punjab Academy of Forensic Medicine and Toxicology	09725687	0974083X	2011
Research Journal of Pharmacy and Technology	09743618	0974360X	2011
IUP Journal of Commonwealth Literature	09748822		2011
Annals of Library and Information Studies	09725423	09752404	2011
Journal of Indian Society of Periodontology	0972124X		2011
Journal of Indian Academy of Forensic Medicine	09710973		2011
Biopesticides International	0973483X		2011
International Journal of Pharmaceutical Quality Assurance	09759506		2011
International Journal of Applied Engineering Research	09734562		2011
Journal of the Palaeontological Society of India	05529360		2011
Journal of Applied Pharmaceutical Science	22313354		2011
Purusharta	0975024X		2011
Journal of Entomological Research	03789519	09744576	2011
Journal of Surgical Technique and Case Report	20068808	09762825	2011
International Journal of Pharmacy and Technology	0975766X		2011
Journal of Pharmacy and Bioallied Sciences	09764879	09757406	2011
Saudi Journal of Anaesthesia	1658354X	09753125	2011
Journal of Global Infectious Diseases	0974777X	09748245	2011
Urology Annals	09747796	09747834	2011
Surgical Neurology International	21527806		2011
Middle East African Journal of Ophthalmology	09749233	09751599	2011
North American Journal of Medical Sciences	22501541	19472714	2011
PVRI Review	09746013	09751602	2011
Indian Journal of Geosciences	22293574		2011
Journal of Clinical Imaging Science	21567514	21565597	2011
National Journal of Physiology, Pharmacy and Pharmacology	23204672; 22313206		2011
Indian Journal of Community Health	09717587	22489509	2012
Drug Invention Today	09757619		2012
Journal of Datta Meghe Institute of Medical Sciences University	09743901		2012
Clay Research	02557193	09744509	2012
Indian Journal of Mathematics	00195324		2012
International Journal of Control Theory and Applications	09745572		2012
Biomedical Journal	23194170	23202890	2012
South Asian Journal of Cancer	2278330X	22784306	2012
DESIDOC Journal of Library and Information Technology	09740643	09764658	2012
Nucleus (India)	0029568X	09767975	2012
Oman Journal of Ophthalmology	0974620X	09747842	2012
Gujarat Journal of Otorhinolaryngology and Head and Neck Surgery	09731024		2012
International Journal of Perioperative Ultrasound and Applied Technologies	22777466	22777474	2012
International Journal of Tomography and Simulation	23193336		2012
International Journal of Research in Ayurveda and Pharmacy	22774343	22293566	2012
Journal of Krishna Institute of Medical Sciences University	22314261		2012
Endoscopic Ultrasound	23039027	22267190	2012
Indian Journal of Marketing	09738703		2013
Indian Journal of Finance	09738711		2013
Far East Journal of Electronics and Communications	09737006		2013
Journal of the Indian Mathematical Society	00195839		2013
National Journal of Otorhinolaryngology and Head and Neck Surgery	23206578	23214740	2013

Journal title	ISSN	e-ISSN	Coverage start
Journal of Pharmacy Research	09746943		2013
VirusDisease	23473584	23473517	2014
World Journal of Dentistry	09766006	09766014	2014
Media Watch	22498818	09760911	2014
Journal of Vibrational Engineering and Technologies	23213558		2014
International Journal of Epilepsy	22136320		2014
Journal of Arthroscopy and Joint Surgery	22149635		2015
Contemporary Clinical Dentistry			2015

Table G.1 — Indian journals that are, or have been, covered in Scopus with their coverage start year.

Source: Scopus database.

Appendix H

Countries, Benchmarks, and Collaborators

H-1 Comparator Countries and Benchmarks

Code	Country
AUS	Australia
BRA	Brazil
BRICS	BRICS countries (Brazil, Russia, India, China, South Africa)
CAN	Canada
CHN	China
DEU	Germany
ESP	Spain
G8	G8 countries (France, Germany, Italy, United Kingdom, Japan, United States, Canada, Russia)
GBR	United Kingdom
IND	India
ITA	Italy
JPN	Japan
KOR	Korea
SAARC	SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka)
SGP	Singapore
SWE	Sweden
USA	United States of America
WLD	World

Table H.1 — List of countries and benchmarks used throughout this report.

H-2 Collaborating Countries from Chapter 2

Code	Country
ARM	Armenia
AUS	Australia
AUT	Austria
BEL	Belgium
BGD	Bangladesh
BLR	Belarus
BRA	Brazil
CAN	Canada
CHE	Switzerland
CHL	Chile

Code	Country
CHN	China
CZE	Czech Republic
DEU	Germany
DNK	Denmark
ESP	Spain
ETH	Ethiopia
FIN	Finland
FRA	France
GBR	United Kingdom
GEO	Georgia
GRC	Greece
IDN	Indonesia
IRN	Iran
ITA	Italy
JPN	Japan
KEN	Kenya
KOR	South Korea
LBY	Libya
LKA	Sri Lanka
MEX	Mexico
MYS	Malaysia
NGA	Nigeria
NLD	Netherlands
NOR	Norway
NPL	Nepal
OMN	Oman
PHL	Philippines
POL	Poland
PRI	Puerto Rico
PRT	Portugal
RUS	Russia
SAU	Saudi Arabia
SGP	Singapore
SRB	Serbia
SWE	Sweden
TUR	Turkey
TWN	Taiwan
USA	United States of America
ZAF	South Africa

Table H.2 — *List of countries used in the section on India's collaborating partners.*

Appendix I

Subject Classification

Journals in Scopus are classified under four broad subject clusters (life sciences, physical sciences, health sciences, and social sciences and humanities), which are further divided into 27 major subject areas, of which DST selected sixteen (highlighted in violet in the table below) as the focus of this analysis. Journals may belong to more than one subject area.

Scopus Subject Classification	Broad Cluster	ASJC Code
General (multidisciplinary journals like Nature and Science)	All	1000
Agricultural and Biological Sciences	Life Sciences	1100
Arts and Humanities	Social Sciences	1200
Biochemistry, Genetics and Molecular Biology	Life Sciences	1300
Business, Management and Accounting	Social Sciences	1400
Chemical Engineering	Physical Sciences	1500
Chemistry	Physical Sciences	1600
Computer Science	Physical Sciences	1700
Decision Sciences	Social Sciences	1800
Earth and Planetary Sciences	Physical Sciences	1900
Economics, Econometrics and Finance	Social Sciences	2000
Energy	Physical Sciences	2100
Engineering	Physical Sciences	2200
Environmental Science	Physical Sciences	2300
Immunology and Microbiology	Life Sciences	2400
Materials Science	Physical Sciences	2500
Mathematics	Physical Sciences	2600
Medicine	Health Sciences	2700
Neuroscience	Life Sciences	2800
Nursing	Health Sciences	2900
Pharmacology, Toxicology and Pharmaceutics	Life Sciences	3000
Physics and Astronomy	Physical Sciences	3100
Psychology	Social Sciences	3200
Social Sciences	Social Sciences	3300
Veterinary	Health Sciences	3400
Dentistry	Health Sciences	3500
Health Professions	Health Sciences	3600

Table I.1 — List of 27 subject areas in which journals of classified in Scopus. Rows highlighted in blue were selected for the current study.

Appendix J

Glossary of Terms

Article (unless otherwise indicated) denotes the main types of peer reviewed documents published in journals: articles, reviews, and conference papers. In this report the terms 'article', 'publication' and 'paper' are used synonymously.

Article output for a country is the count of articles with at least one author from that country (according to the affiliation listed in the authorship byline). All analyses make use of 'whole' rather than 'fractional' counting: an article representing international collaboration (with at least two different countries listed in the authorship byline) is counted once each for every country listed.

BRICS is a grouping acronym that collectively refers to Brazil, Russia, India, China, and South Africa.

CAGR (Compound Annual Growth Rate) is defined as the year-over-year constant growth rate over a specified period of time. Starting with the first value in any series and applying this rate for each of the time intervals yields the final value of the series:

$$CAGR(t_0, t_n) = \left(\frac{V(t_n)}{V(t_0)} \right)^{\frac{1}{t_n - t_0}} - 1$$

Here, $V(t_0)$ is the starting value, $V(t_n)$ is the finishing value, and $t_n - t_0$ is the number of the years.

Citation is a formal reference to earlier work made in an article or patent, frequently to other journal articles. A citation is used to credit the originator of an idea or finding and is usually used to indicate that the earlier work supports the claims of the work citing it. The number of citations received by an article from subsequently-published articles is a proxy of the quality or importance of the reported research.

CPP (Citations per Paper) is defined as the average number of citations a paper in a certain publication set has received within a certain period.

FWCI (Field-weighted Citation Impact) is an indicator of mean citation impact, that compares the actual number of citations received with the expected number of citations for articles of the same document type (article, review or conference proceeding paper), publication year and subject field. Where the article is classified in two or more subject areas, the harmonic mean of the actual and expected citation rates is used. The indicator is always defined with reference to a global baseline of 1.0 and intrinsically accounts for differences in citation accrual over time, in citation rates for different document types (reviews typically attract more citations than research articles, for example) as well as subject-specific differences in citation frequencies overall and over time and document types.

When field-weighted citation impact is considered as a snapshot, an un-weighted variable window is applied. The field-weighted citation impact value for '2010', for example, comprises articles published in 2010 and their field-weighted citation impact in the period 2010-14, while for '2014,' comprises articles published in 2014 and their field-weighted citation impact in 2014 alone. When field-weighted citation impact is used in trend analysis, a weighted moving window is applied. The field-weighted citation impact value for '2012', for example comprises the weighted average of the unweighted variable field-weighted citation impact values for 2010 and 2014 (weighted 13.3% each), 2011 and 2013 (weighted 20% each) and for 2012 (weighted 33.3%). The weighting applies in the same ratios for previous years also. However, for 2013 and 2014 it is at this moment in time not possible to extend the weighted average by 2 years on either side, so weightings are readjusted across the remaining available values.

G8 stands for Group of Eight and collectively refers to Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States of America.

Highly cited articles are those in the top-cited X% of all articles published in a given period. We report on highly cited articles in the top 1%, 5%, 10%, and 25%.

H-index (Hirsch Index) measures the cumulative citation impact of a researcher throughout their career. A researcher has an H-index of h if at most h of their publications have each received at least h citations.

Hypercollaborations are collaborations among hundreds or thousands of co-authors. No precise threshold exists for the number of co-authors required to constitute hypercollaborative co-authorships. As an indication of the frequency of such hypercollaborative articles, 74 articles published in 2012 had more than 3,000 authors. All of them reported results from the ATLAS experiment at CERN's Large Hadron Collider in Switzerland. Hypercollaborative co-authorships may be a consequence of the rise of so-called 'Big Science' – a term used to describe research that requires major capital investment and is often, but not always, international in nature. While such hypercollaborative articles may represent extreme outliers in co-authorship data, they are included in all the analyses since they remain proportionally few and because they are counted only as a single internationally co-authored article for each country represented in the article, and for each country pairing.

Publication output is the number of publications per country, which have at least one author affiliated to an institution in that country (according to the authorship byline). All analyses make use of 'whole' rather than 'fractional' counting: an article representing international collaboration (with at least two different countries listed in the authorship byline) is counted once each for every country listed.

Publication share is the global share of publications for a specific country expressed as a percentage of the total global output. Using a global share in addition to absolute numbers of publications provides insight by normalising for increases in world publication growth and expansion of the field in question or the whole Scopus database.

SAARC stands for the South Asian Association for Regional Cooperation; it collectively refers to Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

Salton's Index (also known as Salton's cosine or Salton's measure) for a country pair is calculated by dividing the number of co-authored articles by the geometric mean (square root of the product) of the total article outputs of the two partners⁶ – hence it is a size-independent indicator of collaboration strength. Salton's Index is the most useful indicator of collaboration strength when the results are to be used for visualisation.⁷ As a cosine measure, the values of Salton's Index vary between 0 (where there are no co-authored articles between a given country pairing) and 1 (where all articles from both countries represent co-authorship between them). In practice, the range typically seen at country level is in the range 0.000 to 0.100 for most country pairings of significant size.

SNIP (Source Normalized Impact per Paper) is defined as the ratio of a journal's citation count per paper and the citation potential in its subject area. It aims to allow direct comparison of sources in different subject areas. Citation potential is shown to vary not only between journal subject areas (e.g., journals in Mathematics, Engineering and Social Sciences tend to have lower values than titles in the Life Sciences cluster), but also between journals within the same subject area. For instance, basic journals tend to show higher citation potentials than applied or clinical journals, and journals covering emerging topics show higher citation potentials than periodicals in classical subjects or more general journals. SNIP corrects for such differences.

Sectors in this report are used to delimit the parts of the national research base. The main sectors are Corporate, Higher Education, Government, and Medical sectors.

Subject areas (or fields) are the categories for journals used in Scopus. Journals are classified under four broad subject clusters (Life Sciences, Physical Sciences, Health Sciences, Social Sciences & Humanities), which are further divided into a variety of major subject areas (see Appendix I). Journals may belong to more than one subject area.

⁶ Glänzel, W. (2001) National characteristics in international scientific co-authorship relations. *Scientometrics* 51 (1), pp. 69–115.

⁷ Leydesdorff, L. (2008) On the normalization and visualization of author co-citation data: Salton's Cosine versus the Jaccard Index.

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