

Indian Science Reports: A Portal for Comprehensive Mapping of S&T Data and Analytics for India at an Overall and Institutional Level

Vivek Kumar Singh¹, Anurag Kanaujia^{1,*}, Prashasti Singh², Abhirup Nandy¹

¹Department of Computer Science, Banaras Hindu University, Varanasi, Uttar Pradesh, INDIA.

²School of Computer Science, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, INDIA.

ABSTRACT

This article is a commentary on features and usefulness of a newly developed STI data portal, Indian Science Reports (ISR) (available at www.indianscience.net). The ISR portal is an attempt towards a systematic portal on STI data and analytics for India, both at an overall as well as at the institutional level. It can be used by a very wide audience for a variety of purposes ranging from research performance assessment to evidence-based policy formulation.

Keywords: Indian science, Research competitiveness, Research evaluation, Scientometrics.

Correspondence:

Anurag Kanaujia

Department of Computer Science,
Banaras Hindu University, Varanasi,
Uttar Pradesh, INDIA.

Email: anuragkanaujia01@gmail.com
ORCID: 0000-0002-5813-7427

Received: 12-05-2023;

Revised: 27-06-2023;

Accepted: 28-07-2023.

INTRODUCTION

Science and Scientific research activities have grown at a very rapid pace in the recent years. India's contribution to scientific knowledge produced worldwide has increased significantly and India is now among the top research output producing countries.

^[1] Recognising the importance of scientific research activities for a country there is now an increased focus in India towards creating infrastructure and systems for doing science. Some examples of such initiatives include creation of Sophisticated Analytical and Technical Help Institutes (SATHI)^[2] centers, National Mission on Supercomputing,^[3] National Mission on Interdisciplinary Cyber Physical Systems,^[4] National Mission on Quantum Technologies and Applications^[5] etc. The draft Science Technology Innovation Policy (STIP)^[6] 2020 draft also appropriately highlights the need for expanding S&T infrastructure as well as providing ease of doing science. It also points towards the need for resources focused on providing Science Technology Innovation (STI) data and platforms that provide analytical insights into Indian scientific research. In this context, the Science Technology and Innovation (ISTI) portal^[7] of the Department of Science and Technology (DST); Scientific Research Infrastructure for Maintenance and Networks (SRIMAN) Portal,^[8] and National

Institutional Ranking Framework (NIRF)^[9] can be seen as some examples of such resources. However, on a closer look, one can observe that these portals are focused mainly on the input side of the Indian scientific ecosystem (such as funding, manpower, institutions, enabling infrastructure etc.) and do not provide data and analytics on the output side (such as research output, impact, visibility etc.)

The policy level inputs for S&T activities in India are at present limited by availability and accessibility of STI data and analytics, particularly on the output side. There are only some ad hoc reports published on such analytics at irregular intervals, such as the most recent report on Research and Development Statistics,^[10] based on the studies commissioned by Department of Science and Technology to Clarivate Analytics (owner of Web of Science database) and Elsevier (owner of Scopus database). The 2020 report on Science and Engineering Indicators by National Science Foundation (NSF)^[11] is another report where some limited data and analytics for India are available. There is, however, a need for a dedicated portal for STI data and analytics for India. The recently released Indian Science Reports Portal^[12,13] aims to address this information gap by providing details of research output for India at various levels of granularities by using data analytics and scientometric tools and presenting them in an organised, simple and easily accessible format. It is designed as a single integrated resource for analytical STI indicators on the research competencies of India vis-a-vis selected countries and of 1000 individual institutions from India. This research note draws attention to the analytical aspects related to the Indian R&D Statistics. This can provide a critical input for evidence-based



DOI: 10.5530/jscires.12.2.046

Copyright Information :

Copyright Author (s) 2023 Distributed under
Creative Commons CC-BY 4.0

Publishing Partner : EManuscript Tech. [www.emanuscript.in]

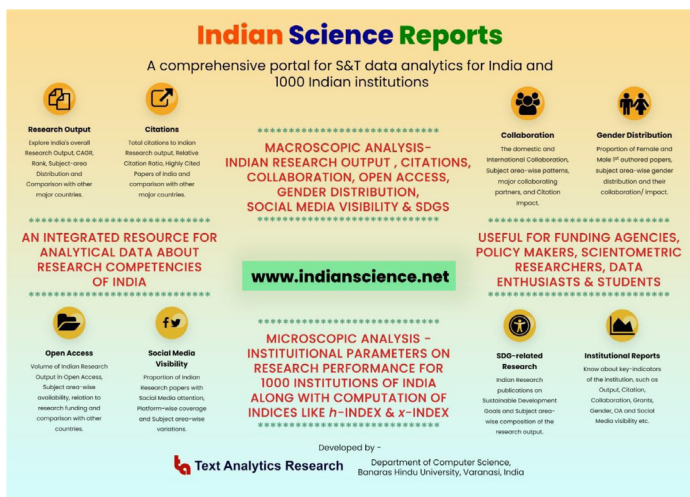


Figure 1: Salient features of Indian Science Reports Portal.

policy. The earlier study had provided a description of the essential features and some use cases of this portal.^[13]

Key features of the portal

The portal presents STI data and analytics at both, macroscopic and microscopic levels. Figure 1 presents a diagrammatic representation of salient features of the portal. At a broader level, it provides information about publications and citations (to measure research output and impact), collaborative research activity (at author and country level), gender distribution among authors of research, sources of funding, publications in open access journals, social media visibility of research publications and research on Sustainable Development Goals (SDGs) in India etc. The data and analytics for India are compared with other major knowledge producing countries of the world. Research output data for various subjects for a large period is analysed for the purpose. Different computational and programming techniques are used to produce analytical results. At the fine-grained level, the portal provides institutional reports comprising of research output, citations, h-index, x-index, open access levels, gender distribution, SDG related research etc. for 1000 Indian institutions. These 1000 Indian institutions comprise the major research output producing organizations. An example of institutional reports can be seen in Figure 2. A summary of indicators covered in the portal, at both macroscopic as well as microscopic levels, is shown in Table 1. The primary data for analytics is obtained from Dimensions database owing to its wider coverage.^[14] The portal is positioned to present as an integrated resource for analytics about research competencies of India in overall terms and of 1000 Indian institutions, at a finer level. The institutional profiles can be viewed by institution names or through a search interface provided. The specific focus of the portal on analytics of S&T data (more on the output side of the S&T ecosystem) is the differentiating characteristics of this portal and makes this portal unique and valuable.

Institutional Profile: IISc

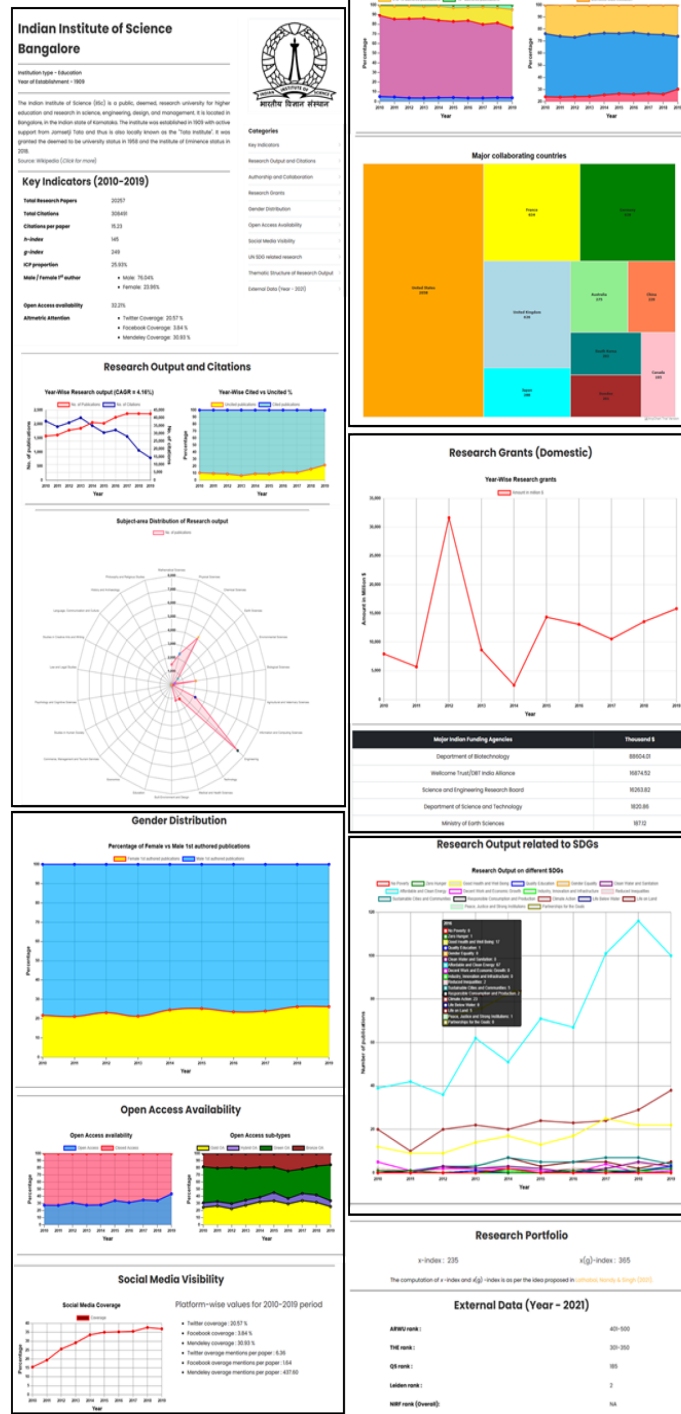


Figure 2: An example Institutional Profile on Indian Science Reports Portal.

Who can use the portal and how will it evolve?

The analytical results presented on the portal are of varied interest for the academic and research community in India, the scientometric researchers, the research institutions and researchers looking for potential collaborations, the funding agencies and policy makers, and to the data enthusiasts and

Table 1: List of Areas and Indicators covered in the Indian Science Reports Portal.

National Research Output	Institutional Reports (for Indian Organisations)
Research Output	Short Introduction.
Citations	Key Indicators.
Collaboration	Research Output and Citations.
Gender Distribution	Authorship and Collaboration.
Open Access	Research Grants.
Social Media Visibility	Gender Distribution.
Research Grants	Open Access Availability.
SDG Related Research	Social Media Visibility.
Major Institutions	UN SDG related research.
	Thematic Structure of Research Output.
	External Data (Year 2021)
	Ranking from 5 major ranking platforms.

students among others. The portal aligns with the emerging theme of listing of Key Performance Indicators (KPIs) on a dashboard by providing institutional profiles as summaries of all STI indicators on a single page (see Figure 2 as an example). The data and analytics presented in the portal can also be used to understand India's relative research competency in different subject areas, India's performance on different STI indicators along with a comparison with other major knowledge producing countries. The portal is first of its kind resource providing both macroscopic and microscopic data and analytics on S&T publishing activities in India.

Science Technology and Innovation (STI) Data plays crucial role for the policymakers across the world to make informed and actionable policy decisions. The requirement for measurement of research output is higher than ever before as the government, and funding organisations heavily depend upon these measurements when deciding upon award of research grants, performance-based funding, etc. National Institute for Transforming India (NITI) Aayog,¹ in its vision document on Data Governance Quality Index,^[15] has also called for improving availability of data on several granularities from different sectors. The decade of Innovation (2010-2020) has brought about significant changes in data collection, availability, and accessibility, in turn leading to a predominantly data driven governance across the globe. The Indian government also has taken large strides in this dimension and emphasised upon use of empirical evidence in decision making. In this context, the Indian Science Reports portal can be a very useful resource for the purposes of mapping, measurement and analysis of national and regional research competencies

1 NITI aayog is the policy think tank of the government of India which is tasked with promotion of economic development and collaborative federalism

and activity. It is proposed that the portal will provide annual or biennial updates to data and analytics presented. As such the portal is one of its kind and is an attempt to bridge the gap of availability of such a resource focused on Indian S&T research.

There is a large demand and imminent need of data on research, innovation, human and socio-economic resources in the developing countries. While developed countries have data observatories such as OECD.stat,^[16] which provide detailed data and analyses, the developing countries like India have to often rely on secondary sources or adhoc reports.^[17] The ISR portal, serves as an example of a potential data and analytics portal in this area which has the possibility of further. It includes most of the standard indicators for STI activities and also conforms with the requirement for accessibility of data across the different regional/international requirements.

CONCLUDING REMARKS

The main objective of the portal is providing an overview of the scientometric indicators for research output from India as well as individual Indian Institutions. A total of 1000 major research output producing institutions are covered. Data and analytics on different aspects including gender distribution, open access, social media visibility and SDG related research, are presented. The developed portal is useful for policy makers, science administrators, scientometric researchers, data enthusiasts and students among others. It provides analytical information on STI data both at a broad national level as well as on the fine-grained level of individual institutions, universities, companies and hospitals. Hence it can be used by a very wide audience. As it follows a framework which includes conventional indicators for assessing STI performance within a field, as well as reflect the thematic strengths of an institution it can be used to select institutions in a performance-based funding scheme, so as to eventually develop these as centres of excellence. The framework can be used to determine the research competency of an institution, gender distribution in research publishing, proportion of research produced available in open access, focus on Sustainable Development Goals (SDGs), productivity in selected time-period, international connections, and impact and visibility of research.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Singh P, Singh VK, Arora P, Bhattacharya S. India's rank and global share in scientific research: How data drawn from different databases can produce varying outcomes?. *Journal of Scientific and Industrial Research*. 2020;80(4):336-46.
- Sophisticated Analytical and Technical Help Institutes (SATHI). Available from: <https://dst.gov.in/sophisticated-analytical-technical-help-institutes-sathi> Accessed on 12th Feb. 2023.
- National Supercomputing Mission India. Available from: <https://nsmindia.in/> Accessed on 12th Feb. 2023.

4. National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), India. Available from: <https://nmicps.in/> Accessed on 12th Feb. 2023.
5. National Mission on Quantum Technologies and Applications (NM-QTA), India. Available from: <https://www.psa.gov.in/technology-frontiers/quantum-technologies/346> Accessed on 12th Feb. 2023.
6. Science Technology and Innovation Policy Draft 2020. Available: https://dst.gov.in/sites/default/files/STIP_Doc_1.4_Dec2020.pdf on 12th Feb. 2023.
7. India Science Technology and Innovation (ISTI) portal Available from: <https://www.indiasciencetechnology.gov.in> Accessed on 12th Feb. 2023.
8. Scientific Research Infrastructure for Maintenance and Networks (SRIMAN) Portal
9. National Institutional Ranking Framework (NIRF), India. Available from: <https://www.nirfindia.org/> Accessed on 12th Feb. 2023.
10. Research and Development Statistics at a Glance, 2019-20, Report of Ministry of Science and Technology, Govt. of India. Available from: <https://dst.gov.in/document/reports/research-development-statistics-glance-2019-20>, (May 2020).
11. Science and Engineering Indicators 2020, Report by National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD). Available from <https://www.nsf.gov/statistics/2018/nsb20181/>, (April 2020).
12. Indian Science Reports Portal. Available from: www.indianscience.net Accessed on 12th Feb. 2023.
13. Singh VK, Nandy A, Singh P, *et al.* Indian Science Reports: a web-based scientometric portal for mapping Indian research competencies at overall and institutional levels. *Scientometrics*. 2022;127:4227-36. DOI: 10.1007/s11192-022-04395-6.
14. Singh VK, Singh P, Karmakar M, Leta J, Mayr P. The Journal Coverage of Web of Science, Scopus and Dimensions: A Comparative Analysis. *Scientometrics*, 2021;126(6):5113-42.
15. NITI Aayog, India. Data Governance Quality Index. Portal. Available from: <https://dmeo.gov.in/content/dgqi-overview> on 12th Feb. 2023.
16. OECD Stat. Available from: <https://stats.oecd.org/>.
17. UNCTAD secretariat, 2010, Science, technology and innovation indicators for policymaking in developing countries: an overview of experiences and lessons learned. *Trade and Development Board*, Geneva. Available from: https://unctad.org/system/files/official-document/ciimem1crp1_en.pdf on 17th July 2023.

Cite this article: Singh VK, Kanaujia A, Singh P, Nandy A. Indian Science Reports: A Portal for Comprehensive Mapping of S&T Data and Analytics for India at an Overall and Institutional Level. *J Scientometric Res.* 2023;12(2):501-4.