



Current Research Trends in India in Achieving SDG 9

Mr. Saragadam Siva Kumar¹, Dr. G. V. K. Kasturi²

¹Part Time Research Scholar, GITAM Institute of Management

GITAM University, Visakhapatnam, India

²Associate Professor, Gitam School of Business

Gitam University, Visakhapatnam, India

Corresponding Author: Mr. Saragadam Siva Kumar

Email: 121963604503@Gitam.In

Abstract:

The concept 'Research' is logical and systematic approach to find new knowledge or solution to the new problem. Without research the world will not move forward with innovative concepts for the development of the world. To cope up with SDG goals, Indian Government initiated lot of reforms. The recent initiative is 'One Nation One Subscription' to enrich the students with various aspects of knowledge in all facets which will benefit and incline towards core research in addition to multidisciplinary research. This scheme is in line with the Viksit Bharat 2047, NEP 2020 & Anusandhan National Research Foundation Act 2023. Access to the research journals will have more knowledge. By reading a new concept will impact the student's body and mind and create interest in research which the student may think innovatively have inclination towards patents and startups. Further to study on the SDG 9 effectiveness especially on Research & Development expenditure as a proportion of Gross Domestic Product (GDP), Researchers (in full time equivalent) per million population, Total number of patents issued (granted) and Articles published in academic journals (per thousand population). The quality research will have short term as well as long term benefit to the nation especially medicine and technology-oriented concepts which will also have impact on economic growth and will achieve Sustainable Development Goals.

Keywords: Research, Journals, One Nation One Subscription, startups, SDG's

Introduction:

'Research' is logical and systematic approach to find new knowledge or solution to the new problem. Without research the world will not move forward with innovative concepts for the development of the world. Education means to bring up or to train which is to impart knowledge, skills and traits. There will be formal education and also informal education. In India during the early days, informal education used to have at Gurukulas whereas existing formal education have primary education, secondary education, higher education. The subject Education is the Concurrent list and both the Union and State Governments have a role to play both by the Centre and State Governments. The National Education Policy 2020 (Ministry of Human Resource Development, Government of India) initiated four year Graduate course and also can enrol to pursue research study directly without undergoing Post Graduate course. The higher education plays a vital role in the course curriculum of research. Basic infrastructure especially digital library consisting of various journals, books etc., required to think about new concepts and ideas. Creativity will be initiated by reading various concepts, ideas, current trends, existing information etc., which will be way forward for research and startups. The research concentrates to answer the

probable problem (Phillips, 1971) (Tandon, 1979). The following is the sequence of solving the problem and identifying new concept:

1. To formulate the research question or problem area
2. To review Literature on the specific issue
3. To develop Hypothesis
4. To define Research Design
5. To determine the sample size
6. To collect the data
7. To initiate the process
8. To Analyse the data
9. To test the hypothesis
10. To interpret the data
11. To start preparing the report
12. To conclude with the solution for the problem

Objectives of the study

1. To study the existing scenario of Indian higher education institutions
2. To study the scheme of One Nation One Subscription
3. To study about Anusandhan National Research Foundation (ANRF) Act
4. To study the modalities of entry to research and facilities thereon
5. To study the nature of research journals

6. To study on the SDG 9 especially on Research & Development expenditure as a proportion of Gross Domestic Product (GDP), Researchers (in full time equivalent) per million population, Total number of patents issued (granted) and Articles published in academic journals (per thousand population)
7. To discuss and suggest the measures for further improvement of the research in attaining Sustainable Development Goals

Research Methodology:

The data is collection of information obtained from the primary and secondary sources. The Primary data is the firsthand information obtained in the form of interview, questionnaire etc., for the specific purpose whereas the Secondary data is obtained from the published data which will be used for the study. The subject study data is obtained from the websites, newspaper, books etc.

Scenario of Indian Higher Education Institutions:

The University Grants Commission is a statutory organisation under the Ministry of Education established by an act of parliament in the year 1956 for promotion and coordination of university education and to maintain the standards of teaching, examination and research in universities. UGC foresees the objectives through various autonomous bodies established for specific purpose. There will be professional councils which are responsible for recognition of courses and promotion of professional institutes. The following are the professional councils:

1. All India Council for Technical Education (AICTE)
2. Indian Council of Agricultural Research (ICAR)
3. Veterinary Council of India
4. National Council for Teacher Education (NCTE)
5. Dental Council of India
6. Pharmacy Council of India
7. Indian Nursing Council
8. Central Council for Research in Homeopathy
9. Rehabilitation Council of India
10. National Medical Commission (NMC)
11. Central Council for Indian Medicine
12. Bar Council of India
13. National Commission for Indian System of Medicine
14. Council of Architecture
15. Mahatma Gandhi National Council of Rural Education
16. National Council of Vocational Education and Training

Higher Education Institutions:

The Higher Education Institutes are established by an Act of Parliament, State Government etc., there are about 57 Central Universities, 138 Deemed to be Universities, 501 Private Universities, 494 State Universities (University Grants Commission, 2024). There are various colleges and autonomous colleges. The Institutions of National Importance which are about 165 which includes various National Institute of Technology, Indian Institute of Technology, Indian Institute of Management's etc., There are Institute of Eminence recognised by the Government of India in Government and Private sector. Some of them are Indian Institute of Science, Bangalore, University of Hyderabad, University of Delhi, Banaras Hindu University, Birla Institute of Technology and Science Pilani, Manipal Academy of Higher Education, O.P. Jindal Global University, Shiv Nadar Institute of Eminence Deemed to be university etc.

One Nation One Subscription:

One Nation One Subscription is introduced with an objective of providing access to scholarly research articles and journal publication to government higher educational institutes and research and development laboratories (Office of the Principal Scientific Advisor to the Government of India, 2024). The scheme is simple, user friendly and in digital mode. The scheme will be operated through national subscription coordinated by Information and Library Network (INFLIBNET), an autonomous inter university centre of the University Grants Commission. This scheme is in line with the Viksitbharat 2047, NEP 2020 & Anusandhan National Research Foundation (ANRF). The Anusandhan National Research Foundation will periodically review the usage of the scheme and publication of Indian authors. The outlay is about Rs.6,000 crores for this scheme for three calendar years 2025, 2026 & 2027. Some of the publishers on One Nation One Subscription are Elsevier Science direct, IEEE, Indianjournals.com, Wiley, Sage Publishing etc.

Anusandhan National Research Foundation (ANRF)

The Anusandhan National Research Foundation (ANRF) is established through an Act of Indian Parliament, ANRF Act 2023 (India Code - Digital Repository of Laws, 2024). The main objectives of this apex body on research are to initiate strategies for research, innovation and entrepreneurship in the fields of natural sciences including engineering, technology, mathematics, environment, earth sciences, health, agriculture and Scientific and technological interfaces of humanities and social sciences. The foundation will promote research and development and will foster culture of research and innovation throughout Indian

Universities, Colleges, Research Institutions and Research and Development laboratories. The following are the broad objectives of the foundation:

1. To prepare roadmap for short term, medium term and long term research and development
2. To fund peer reviewed grant proposals to the eligible persons
3. To facilitate research at academic and research institutions where research capacity is at nascent stage through programs such as creation of centre's of excellence, fellowships, research projects etc.,
4. To assist in setting up research infrastructure and an environment conducive for scientific pursuit
5. To increase India's role in key areas of national and global importance
6. To support the translation of research undertaken into capital intensive technology
7. To coordinate with all institutions, governments etc., on expenditure and research output
8. To participate in international collaborative projects and exchange of research and scientific information
9. To collaborate with the scientists from within and outside India
10. To encourage Public sector enterprises and private sector to invest in the foundation activities

The Anusandhan National Research Foundation (ANRF) is introduced various schemes as follows:

1. **Inclusivity Research Grant** – The Scheme provides funding support upto Rs.60 lakhs plus overheads for a period of three years for researchers belonging to Scheduled Castes & Scheduled Tribes to undertake research in the field of Science and Engineering. The scheme also supports expenses related to open access publications and patent filing charges.
2. **International Travel Scheme** – The Scheme provides financial assistance to Indian researchers upto Rs.50, 000/- for presenting research paper in an International Conference / Seminar / Workshop held abroad. The scheme also supports young scientists. The maximum duration is limited to 21 days.
3. **Mission for Advancement in High impact areas (MAHA) EV Mission** – The EV Mission will establish multiple e-nodes towards three technology verticals viz., Tropical EV battery and battery cells, Power Electronics, Machines & Drives (PEMD) and EV Charging infrastructure.

Each e-node will consist of three to four academic institutes / R&D labs / startups with the participation of domain industry. The Lead Principal Investigator (LPI) of the lead institution will form an e-node whereas Principal Investigator (PI) can participate in multiple e-node. E-nodes will function in two tracks in which funds will be allocated for three years for Track 1 and for Track 2, funds will allocate for another two years for higher Technology Readiness Level (TRL). Fundamental research is an integral part of both the Tracks I & II.

4. **Partnerships for Accelerated Innovation & Research (PAIR)** – The Scheme will establish vibrant pair networks each consists hub and several spoke institutions with Pull and Push approach and to focus on innovative research which may ensure regional diversity which atleast one spoke institution must be outside the state of the hub institution.

- a. The Hub institutions are institutions within 25 overall NIRF Rankings and Institutions of National importance within 26 to 50 NIRF overall ranking in the preceding two years.
- b. The Spoke institutions are categorised into three viz.,

- **Category – I** – Central Universities and State Public Universities within 200 NIRF overall ranking, 200 NIRF University ranking, 100 NIRF State Public University ranking
- **Category – II** – NIT's & IIIT's
- **Category – III** – Any Central or State Public University that is not in the above list

5. **Prime Minister Early Career Research Grant** – The scheme will assist researcher in research career in a new institution with research grant of Rs.60 lakhs plus overhead for a period of three years. The assistance will be for international travel, manpower, open access publication and patent filing charges. The maximum 700 grants will be awarded per annum for all research areas.
6. **Financial Assistance to Professional Bodies and Seminar/Symposia etc.,** - The Scheme support the young scientists and researchers to attend events in the research areas of engineering, technology, basic sciences, agriculture and medicines. Research proposals pertaining to social sciences & Management are exceptionally will be accepted.

Doctoral Research:

The Government of India through Council for Scientific & Industrial Research (CSIR) is providing various schemes for the promotion and development of research activities in India is as

follows (Ministry of Science & Technology, Government of India, 2024):

1. Doctoral & Post Doctoral Fellowships:

- a. **Junior Research Fellowships:** The test will be conducted by UGC / CSIR initiated in the year 1983 & GATE initiated in the year 2002 which are vital in Nature. The stipend / grant is Rs.31, 000/- per month with annual contingency grant of Rs.20, 000/-. The scheme is for a period of 5 years; however, after two years the subject scheme is upgraded to Senior Research Fellowship which is initiated in the year 1950 in which the stipend / grant will be increased to Rs.35,000/- per month along with annual contingency grant of Rs.20,000/-
 - b. **Dr. Shyam Prasad Mukherjee Fellowship (SPMF):** This scheme is initiated in the year 2001 in which the stipend / grant amount of Rs.36,000/- per month will be paid for about two years and will be upgraded to Rs.42,000/- per month with annual contingency grant of Rs.70,000/- for another three years.
 - c. **Research Associateship:** This scheme initiated in the year 1950 in which research associates will be recruited for about three years with varying monthly stipend / grant amounting to Rs.47,000/- / Rs.49,000/- / Rs.54,000/- with annual contingency grant of Rs.20,000/-.
 - d. **Senior Research Associateship:** This scheme initiated in the year 1950 in which the Senior Research Associates will be recruited for about three years with monthly stipend / grant varying between Rs.21,000/- to Rs.25,810/- plus allowance.
 - e. **CSIR Nehru Science Post Doctoral Fellowship:** This scheme initiated in the year 2009 in which the Scholar who are submitted the thesis or submitting the thesis are eligible for about two years with monthly stipend of Rs.65,000/- with annual contingency grant of Rs.3 lakhs.
- 2. Extramural Research Schemes:**
- a. **Emeritus Scientist:** Monthly Honorarium of Rs.20, 000/- along with contingency grant for about five years.
 - b. **Grant of Journals:** A varying amount between Rs.10, 000/- to Rs.1,00,000/- will be granted for the journals brought out in Indian languages.
 - c. **Funding of Research Schemes:** The scheme will be for about three years for employed faculty / scientists and the grant is normally up to Rs.15 lakhs
 - d. **Funding of Sponsored Research Schemes:** The scheme will be for about three years for employed faculty / scientists and the grant varies up to Rs.15 lakhs

3. Promoting Knowledge Sharing through Grants:

- a. **Travel Grant:** The scheme is initiated in the year 1981 which is applicable to research fellows / associates whose papers are accepted in international conferences.
- b. **Grant for holding Symposium/Seminar:** The scheme is initiated in the year 1962 who organises Symposium / Seminars and the grant varies between Rs.10, 000/- to Rs.1, 00, 000/-.

4. Promotion & Recognition of Excellence through awards:

- a. **Shanti Swarup Bhatnagar Prize:** The scheme is initiated in the year 1957 for the excellence in science and technology with Citation, plaque and Rs.5 lakhs along with book assistance amounting to Rs.10,000/- per annum and monthly Special Honorarium amounting to Rs.15,000/- till superannuation.
- b. **G. N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology:** The scheme initiated in the year 2004 and will award gold medal and citation for Indian citizens and Indian of Indian origin who excelled in research in Biological science and technology
- c. **Young Scientist Award:** The scheme initiated in the year 1987 for scientists working in CSIR whose age is below 35 years will be awarded Citation, plaque and Rs.50,000/- prize money. The research project can be done for about Rs.25 lakhs for five years. Monthly special incentive amounting to Rs.7, 500/- will be given up to 45 years of age.
- d. **Bhatnagar Fellowship:** The scheme is applicable for leading Indian scientists for about three years extendable by another two years. The annual grant will be about Rs.40 lakhs with annual Research project grant upto Rs.25 lakhs. For retired pensioners, apex scale of secretary after adjusting pension and for retired employees who are not eligible for pension the apex scale of secretary. The fellowship awardee who is employee will be given monthly fellowship amount of Rs.50, 000/- in addition to existing salary.

5. Internship:

- a. **CSIR Diamond Jubilee Research Interns Awards:** The scheme initiated in the year 2003 with monthly stipend amount of Rs.24, 000/- for about two years for First class graduates in Medicine, Pharmacy, Science, Engineering, Technology, Architecture with age limit of 25 years.

Journals:

Journals play a vital role for the academicians, researchers etc., which is collection of scholarly articles is base for the final output of most research. Journals are selective and specialised

in the coverage. Following are the various types of journals (Tandon, 1979):

1. **Academic / Scholarly Journals:** Academic/Scholarly Journals are the articles published for original research or experimental research to be available to the Scholarly world. Archives of Physical Medicine and Rehabilitation, JAMA: The Journal of the American Medical Association, Modern Fiction Studies etc., are the reputed Scholarly Journals. Scholarly Journals will cite the sources in the form of footnotes or bibliographies.
2. **Peer Reviewed Journals:** Scholarly / academic and Peer Reviewed Journals are used interchangeably. Peer Reviewed Journals are similar to scholarly / academic journals wherein the research articles are published in this Peer Reviewed Journals are reviewed first by the group of qualified peers available in the specific academic community which is well refined research article.
3. **Journal Indexing:** An index is a list of research topics / items organised by subject, discipline or type of publication. There are General Indexing covering various topics and disciplines whereas the Specialised Indexing covers specific topic or discipline which are nothing but Scholarly Journals. The H-index is a quantitative metric based on analysis of publication data using publications and citations. The h-core of a publication is a set of top cited h articles from the publication. The h-median of a publication is the median of the citation counts in its h-core. The h5-index, h5-core and h5-median of a publication are the articles that were published in the last five completed calendar years. Some of the reputed indexed journals are Web of Science, Directory of Open Access Journals (DOAJ), Academic Search (EBSCO), Medicus, JSTOR, SciELO, MedLine, PubMed, EMBASE, SCOPUS, SCIRUS, Caspur, Expanded Academic ASAP, Genamics Journal Seek, Hinari, Index Copernicus, Open J Gate, Primo Central,

Pro Quest etc., The indexed journals are based on publication standards are as follows:

- a. **International Standard Serial Number (ISSN)** is an 8 digit code used to identify newspapers, annual publications, journals, magazines, collections, websites, databases, blogs etc., the 8 digit is having two groups separated by hyphen. The 8th digit is modulus 11 algorithm on the basis of 7 preceding digits and the 8th digit will be X if the result is equal to 10.
- b. **Digital Object Identifiers (DOI's)** – DOI is a digital identifier of any object viz., Physical, digital or abstract. Example for DOI is <https://doi.org/10.1000/182>
- c. **Publishing Schedule** – The publisher to be reputed and have established publishing schedule
- d. **Copyright Policy** – Same article publishing in various journals is not ethical. Hence, the Copyright policy is to be ensured by the publisher

Sustainable Development Goals:

Sustainable Development Goals are 17 in number and SDG 9 pertains to Industry, Innovation & Infrastructure. Further SDG Goal 9.5 targets to enhance scientific research especially in developing countries. For evaluating the target, four parameters are the base which are Research & Development expenditure as a proportion of Gross Domestic Product (GDP), Researchers (in full time equivalent) per million inhabitants, Total number of patents issued and Articles published in academic journals (per thousand population) (The United Nations, 2024). The Research & Development expenditure is slightly decreasing in the year 2022-23 comparing with the year 2015-16 which is about 3% of the GDP. The Researchers in full time per million population is slightly increasing year on year but good potential is there comparing with the population. There is good sign for the patents issued which has tremendous growth over the years. The articles published in academic journals is continuously improving over year on year, but when comparing with population there should be an improvement and the Government is initiated one nation one subscription and also Anusandhan National Research Foundation Act 2023 which will improve in future research activities.

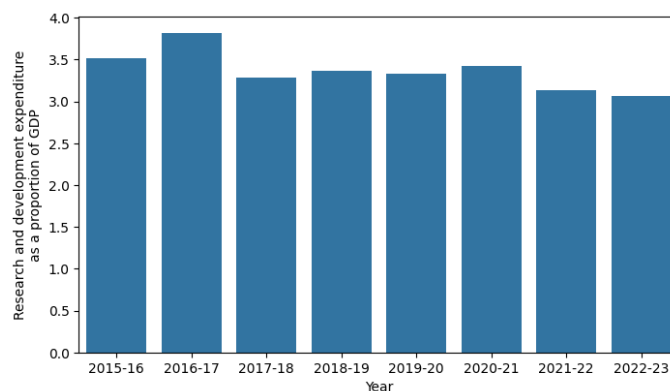


Figure 1 Research and Development expenditure as a proportion of GDP

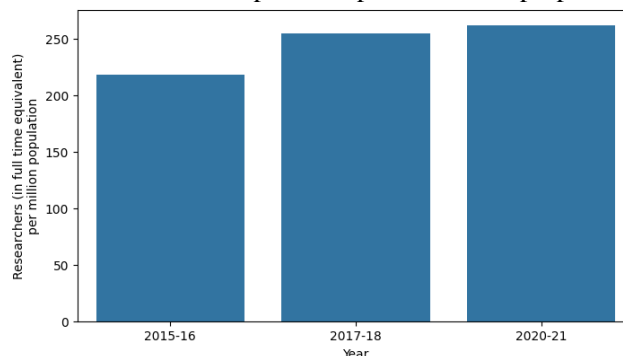


Figure 2 Researchers (in full time equivalent) per million population

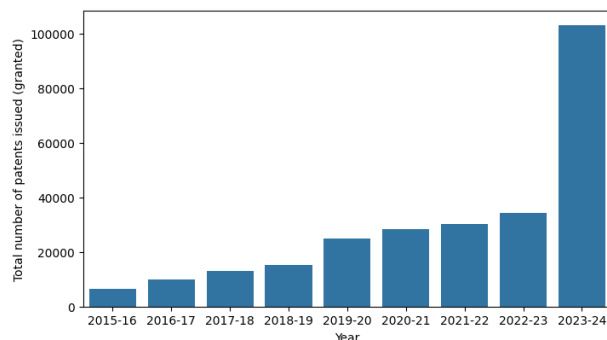


Figure 3 Total number of patents issued (granted)

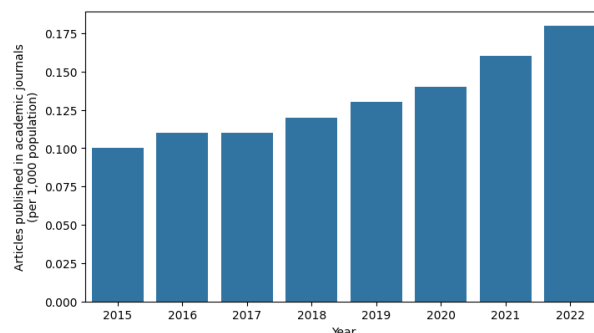


Figure 4 Articles published in academic journals (per 1,000 population)

Discussion & Conclusion:

Good research will lead to creation of ideas thereby innovative products and services. However, the GOI is increasing the outlay on education but the percentage on GDP is around 3% only. But interrelated outlay is on rural development and infrastructure will indirectly boost the education sector. Earlier only Post Graduates are eligible to

pursue research now Graduate degree with 4 years duration are eligible to pursue research directly without completing post graduation duly following the admission regulations. Further there is continuous trust on research in all sectors with the schemes of Junior Research Fellowships along with other schemes of Senior Research Fellowships with reasonable stipend. The Anusandhan National

Research Foundation Act 2023 is further encouraging various higher education institutes and state universities to thrust on research. The Research & Development expenditure is slightly decreasing in the year 2022-23 comparing with the year 2015-16 which is about 3% of the GDP. However though the spending is about 3% of the GDP but the Government is spending in other areas like rural development and also in infrastructure which will indirectly benefit for the research. The Researchers in full time per million population is slightly increasing year on year but good potential is there comparing with the population. Lot of fellowships are being granting including the social sciences like Indian Knowledge Systems. There is good sign for the patents issued which has tremendous growth over the years. There are specific tax incentives for the startups and less procedures for starting and windingup of the startups. The articles published in academic journals is continuously improving over year on year, but when comparing with population there is lot of potential and the latest initiatives like one nation one subscription and Anusandhan National Research Foundation Act 2023 will definitely improve in future research activities and create more innovative products and services which will increase startups and also economic growth of our country and thereby the attaining the SDG and also Viksit Bharat. The concept of One Nation One Subscription & ANRF Act is being introducing in India and this study will helps the researchers for further research.

References:

1. India Code - Digital Repository of Laws. (2024, December 26). India Code: Anusandhan National Research Foundation Act, 2023. Retrieved from https://www.indiacode.nic.in/handle/123456789/19767?view_type=search&col=123456789/1362
2. Ministry of Human Resource Development, Government of India. (n.d.). National Education Policy 2020. Retrieved from Ministry of Education, Government of India: https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English.pdf
3. Ministry of Science & Technology, Government of India. (2024, December 26). Retrieved from Council of Scientific & Industrial Research: <https://www.csir.res.in/>
4. Office of the Principal Scientific Advisor to the Government of India. (2024, December 26). Retrieved from One Nation One Subscription: <https://www.psa.gov.in/oneNationOneSubscription>
5. Phillips, B. S. (1971). Social Research, Strategy and Tactics. New York: The Macmillan Company.
6. Tandon, B. C. (1979). Research Methodology in Social Sciences. Allahabad: Chaitanya Publishing.
7. The United Nations. (2024, December 26). Sustainable Development Goals. Retrieved from The United Nations: <https://sdgs.un.org/goals>
8. University Grants Commission. (2024, December 26). Retrieved from University Grants Commission: <https://www.ugc.gov.in/>