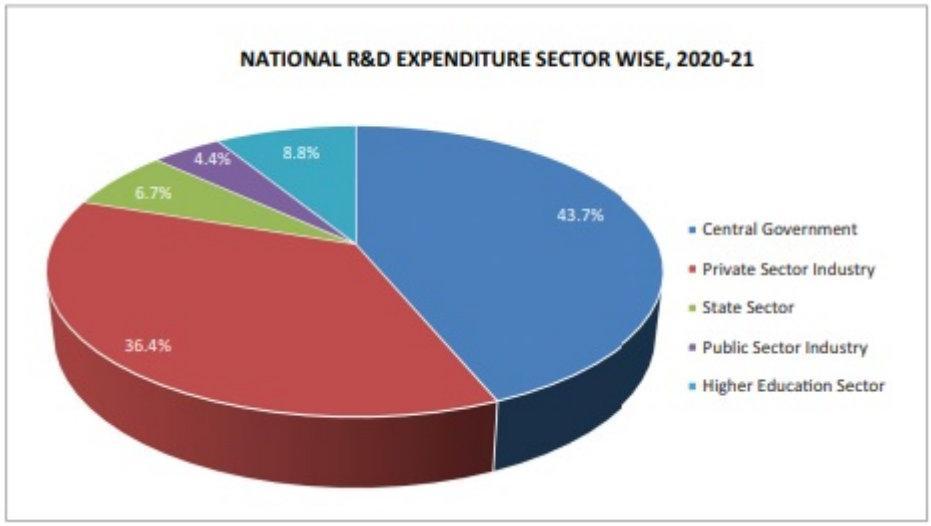
Status of India's R&D

Why in news?

Sustainable funding for science and research is crucial for India's journey towards becoming a science power by 2047.

Status of India's R&D

• The UNESCO defines R&D as - 'R&D is any creative systematic activity undertaken in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications'.
• National Science Day- The theme for 2024 is "Science for Sustainable Development", the country aims to become a developed nation by 2047 thriugh science and technology.
• In India, the government undertakes 60% of expenditure on Research and development (R&D), unlike other nations where private enterprise takes the lead.



• The ***India Innovation Index 2021*** has found that the overall spending on R&D by India has been relatively low across the country.
• India's R&D expense has dropped to the current 0.64% of GDP from 0.8% in 2008-2009 and 0.7% in 2017-2018, whereas the world average stands at around 1.8%.
• STIP, 2013- Science, Technology, and Innovation Policy noted that increasing Gross Expenditure on R&D (GERD) to 2% GDP has been a national goal for some time.
• Most developed countries allocate between 2% and 4% of their GDP for R&D, US and UK have consistently exceeded 2% mark over the past decade
• In 2021, OECD member countries on average invested 2.7% of their GDP in R&D.

What are the issues with India's R&D?

- **Low R&D spending**- India's R&D spending is among the lowest globally, inadequate funding hinders the country's ambitious science and technology goals.
- **Low private participation**- The overreliance on public fund signals an immature financing system and a weak domestic market, it is due to low private sector

contribution due to concerns about regulation, intellectual property rights etc.,

- **Fund deficit**- Anusandhan National Research Foundation (ANRF)has faced delays in implementation as the strategies for raining private sector fund remain unclear.

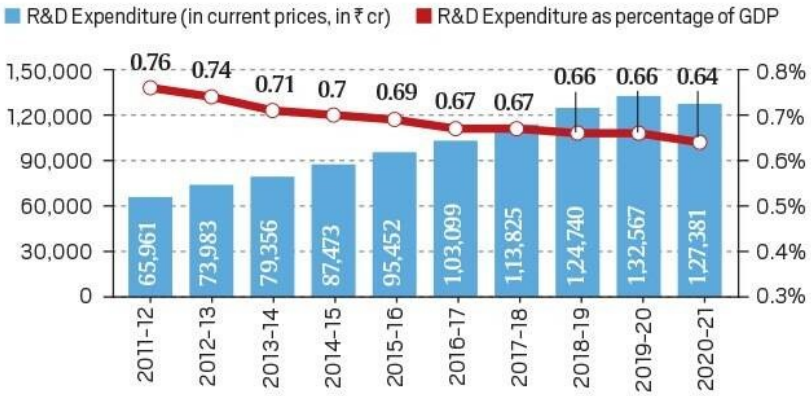
ANRF has been established under ANRF Act 2023 Act which aims to seed, grow and promote research and development (R&D) and foster a culture of research and innovation throughout India's universities, colleges, research institutions, and R&D laboratories.

- **Underutilization of budget**-Ministries, such as the Department of Biotechnology and Department of Science and Technology, consistently under-utilize their allocated budgets.
- **Patent ownership**- Majority of the patents filed by India are owned by MNCs with less than 10% owned by Indian companies, it indicates a potential gap in indigenous innovation and technology development.

Key indicators: How India compares with others

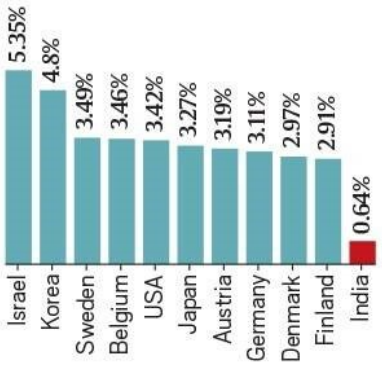
India compares unfavourably with the world's best on R&D expenditure as percentage of GDP — and the number has trended downward over the past decade. India has far fewer researchers per million population compared with China, Brazil, or the US

EXPENDITURE ON R&D (ALL PUBLIC PLUS PRIVATE)



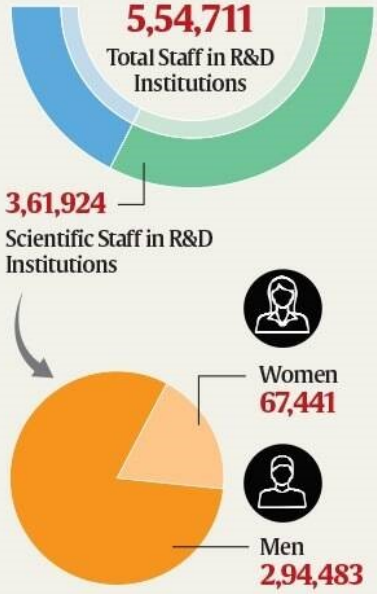
Source: Department of Science and Technology (DST)

TOP TEN COUNTRIES WITH MAXIMUM EXPENDITURE ON R&D AS % OF GDP



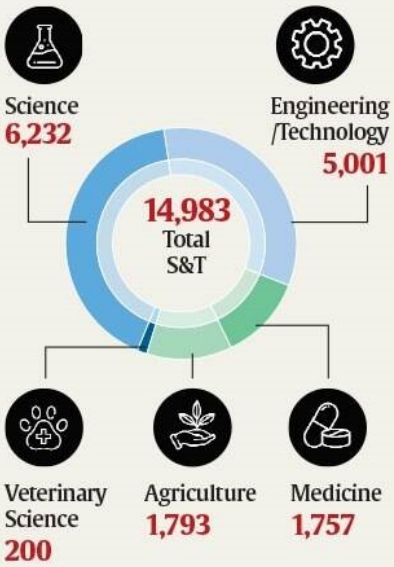
Source: UNESCO Science Report 2021

WOMEN IN SCIENCE (2021)



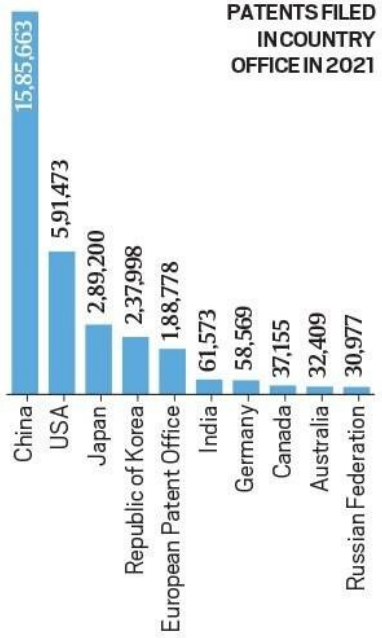
Source: DST

DOCTORATES AWARDED IN SCIENCE AND ENGINEERING IN 2020-21



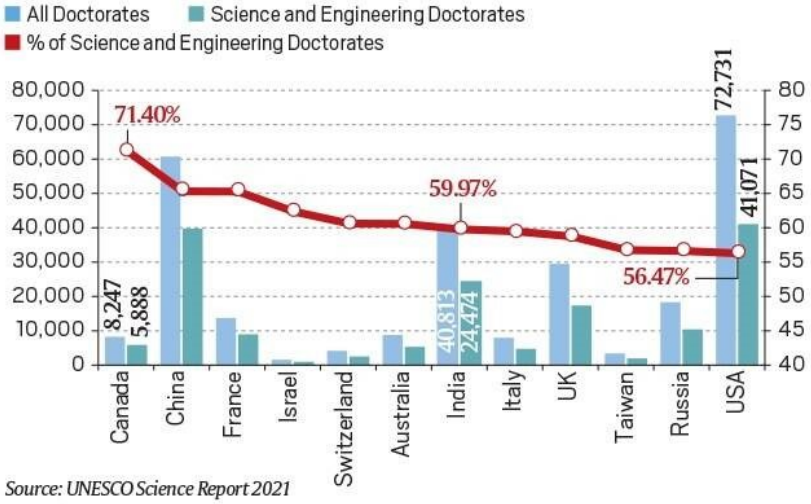
Source: DST

PATENTS FILED IN COUNTRY OFFICE IN 2021



Source: UNESCO Science Report 2021

DOCTORATES PRODUCED IN 2018



Source: UNESCO Science Report 2021

RESEARCHERS PER MILLION POPULATION

Israel	8,342
Singapore	7,287
Japan	5,455
USA	4,821
United Kingdom	4,684
Australia	4532
Canada	4516
Russian Federation	2,722
China	1585
Brazil	888
South Africa	484
Mexico	349
India	262

Source: UNESCO Science Report 2021

Graphic: Ritesh Kumar

- **Lack of collaboration**- There is a *weak linkage* between *academia and private industry* in India compared to Europe or America.
- **Diverse education standards**- The Indian education system is diverse in standards, *impacting the quality of research* produced by universities.
- **Skewed focus**- Indian research is primarily skewed towards basic research and lacks application-oriented R&D.
- **Weak enforcement of IPR**- Inadequate enforcement of Intellectual Property Rights in some areas despite improvements in IPR regime.
- **Non-Competitive global R&D-** Despite a growing talent pool, Indian R&D remains globally non-competitive.

What can be done?

- **Increase funding**- India should aim for at least 3% of GDP annually until 2047 for meaningful impact on development.
- **Political will**- It is important to prioritize and increase R&D expenditure.
- **Diversify funding sources-** Encourage *private sector participation* through incentives like *tax rebates* and foreign direct investments.
- **Simplify regulatory mechanisms**- To build investor confidence streamline approval process as this would make India an attractive *FDI destination* in R&D.
- **Capacity building-** There is a need to enhance bureaucratic capacity for evaluating science projects.
- **Regular inspection-** There is a need to regularly monitor and evaluate the project utilization to prevent it from under-utilization.
- **Provide incentives-** The government can explore mechanisms to attract private investments by providing *tax incentives*.
- **Prioritize R&D-** The Ministry of Finance should recognize R&D as core element of India's growth journey.
- **Public sensitisation**- The government should increase awareness among the public about the importance of *sustainable funding* for science.

Reference

The Hindu- Sustainable funding essential for India