



In Stanford ranking, hope for Indian science

Bottom line: Ranking provided by Stanford of could provide much-needed impetus in the backdrop of the National Research Foundation plan.

A comprehensive database

Stanford University, U.S. on the world ranking of scientists it paints a positive picture and shows there are definite signs of Indian scientists regaining lost ancient reputation of the nation. Scientists at Stanford University have created a database of 1,59,683 (top 2%) scientists of the world. From India, 1,594 Indians have made it to the list of top 2% scientists in the world.

Trends

1. An appraisal of the report, which includes disciplines of science, technology, medicine and allied areas, shows certain significant trends.
2. From the entire list of disciplines, one finds that more than four-fifths of the scientists are from government-supported institutions that include institutions of national importance, central universities, State universities, and government-funded research institutions.
3. Scientists from government-supported institutions have shown supremacy in the disciplines of science and technology, whereas scientists from private institutions find more place in the disciplines of medicine and allied areas.
4. An analysis of the report shows that there is an equitable distribution of scientists working in institutions in urban and rural areas.

National Research Foundation

Drawing inputs from the National Education Policy, the Government of India has proposed the setting up of a National Research Foundation, or NRF. India invests less than 1% of its GDP in research and innovation.

Relevance of the NRF

1. The proposal to set up an NRF can boost the overall research ecosystem in the country by focusing and extending support to take up research and development in thrust areas relevant to India's national priorities.
2. The NRF paves the way for a self-reliant India while advocating merit-based but equitable peer-reviewed research funding, an incentivisation of research, and to usher in a new culture of research and development in the country.



Problems of R&D Ecosystem in India:

1. Very low investment in R&D at less than 1% of GDP
2. Government expenditure, almost entirely the Central Government, is the driving force of R&D in India which is in contrast to the advanced countries where the private sector is the dominant and driving force of R&D spend.
3. Low participation of Private sector in research is one reason for stagnant manufacturing and industrial backwardness of our country.
4. Research focused to very few sectors
5. Youth not attracted towards research as career

Way Forward:

1. Double investment in R&D. This is below the expenditure of countries like the US (2.8), China (2.1), Israel (4.3) and Korea (4.2).
2. NRF can use Stanford research, support good institutions in remote areas, reform research ecosystems in medical sciences by government funded institutes.
3. There is a need for greater participation of State Governments and private sector in overall R&D spending in India especially in application oriented research and technology development.
4. Years of support and freedom in Institutes of Excellence have paid well, and must be continued with greater support.
5. Indian researchers are doing good in disruptive technologies like AI, so must receive adequate handholding for startups.

Mains:

1. Investments in R&D are key inputs in economic growth. The impact of this is proven on productivity, exports, employment and capital formation. Justify with proper reasoning and global examples.



Learn Through Graphics: Data verifying persistent Poverty of Innovation in India

Country	Patents granted per million population	Country	Rate of patents granted vis-à-vis applications (%) in '16
R. Korea	2,135	Israel	77
Japan	1,599	Japan	64
US	950	R. Korea	52
Israel	617	USA	50
China	296	China	30
India	6	India	18

Source: World Intellectual Property Organisation, World Bank, Economic Survey 2017-18, BS calculations; R. Korea: Republic of Korea

Constant vigilance

Bottom line: The arrest of five terror suspects in Delhi — two of whom were allegedly involved in the murder of Shaurya Chakra awardee Balwinder Singh in Punjab in October — has turned the spotlight on the embers of the long dead and buried Khalistan movement. Kashmir Valley is again on turmoil warranting security agencies to keep vigilance.

Highlights:

1. The Delhi police have claimed that Pakistan's Inter-Services Intelligence (ISI) is seeking yet again to link up terror outfits in Kashmir with pro-Khalistan activists.
2. The Khalistan movement has long become moribund with the neutralisation of the threat and the ending of the Punjab insurgency in the early 1990s. The movement has lost support from the Sikh community within India and the Sikh diaspora across the world.



3. The irrelevance of the Khalistan movement notwithstanding, agencies such as the ISI have not stopped trying to foment such violence, either directly by funding fringe sections or by linking them with terror groups in Kashmir. Security agencies must therefore remain vigilant.

Valley in turmoil Again

1. The lull in terror activities and the relative peace in the Valley from 2011 to 2015 are now a thing of the past and renewed violence besides disaffection have become a new normal, even if they have not reached the high levels of the 1990s and the early 2000s.
2. The persisting disaffection in the Valley can only be addressed by a new political process that seeks to review the unilateral changes made to the region's status and restores its full statehood.
3. While many of these incidents have occurred due to acts of terror emanating from within the Union Territory, infiltration of terrorists from Pakistan continues apace as well, which is also correlated with the increased ceasefire violations at both the Line of Control and the International Border.

The dangers of misplaced optimism

Recent GDP figures signals that the substantial relaxation of lockdown restrictions during that quarter has not ensured automatic recovery. The government's economic recovery hype is off track and this is not a time for fiscal conservatism.

V shaped recovery: Optimism and Ignorance

The government, however, sticks with its recovery hype. The Finance Ministry's Monthly Economic Report speaks of a V-shaped recovery reflective of "the resilience and robustness of the Indian economy". The danger is that such optimism would provide the justification to avoid adoption of the measures crucially needed to pull the economy out of recession.

Shun fiscal conservatism

Lockdowns adversely affect production, employment, income and demand. The tasks of providing safety nets, reviving employment and spurring demand become crucial. Since the market cannot deliver on those fronts, state action facilitated by



substantially enhanced expenditure is crucial. And since government revenues shrink during a recession, that expenditure has to be funded by borrowing. This is no time for fiscal conservatism, as governments across the world have come to accept.

Demand constrained economy in need of stimulus

The private final consumption expenditure at constant prices, which accounts for 56% of GDP, is still very low and in negative territory. Signals from the demand side have not been adequate to spur an investment revival. Fixed capital formation is still falling year-on-year. These are all signs of an economy that is severely demand constrained, requiring a significant step up in government expenditure.

Impact on States

Goods and Services Tax (GST) revenues having fallen from their lower-than-expected levels during the COVID-19 months, the States have been cash-strapped. Yet the centre has been absconding its legal liability under GST regime to compensate states. Needless to say, as a consequence, State spending has also been curtailed.

Misplaced frugality will prolong recession

1. Government Final Consumption Expenditure declined by 4% in the first half of 2020-21, when it should have been rising.
2. This trend suggests that allocations for welfare expenditures — ranging from subsidised food to minimal guaranteed employment — needed to support those whose livelihoods have been devastated by the pandemic, would be reduced over time.
3. As collateral damage, this frugality in a time of crisis is likely to prolong the recession, which could intensify as stocks are replenished and demand from those whom the government no longer supports, despite loss of earning and heightened indebtedness, shrinks.

Way Forward:

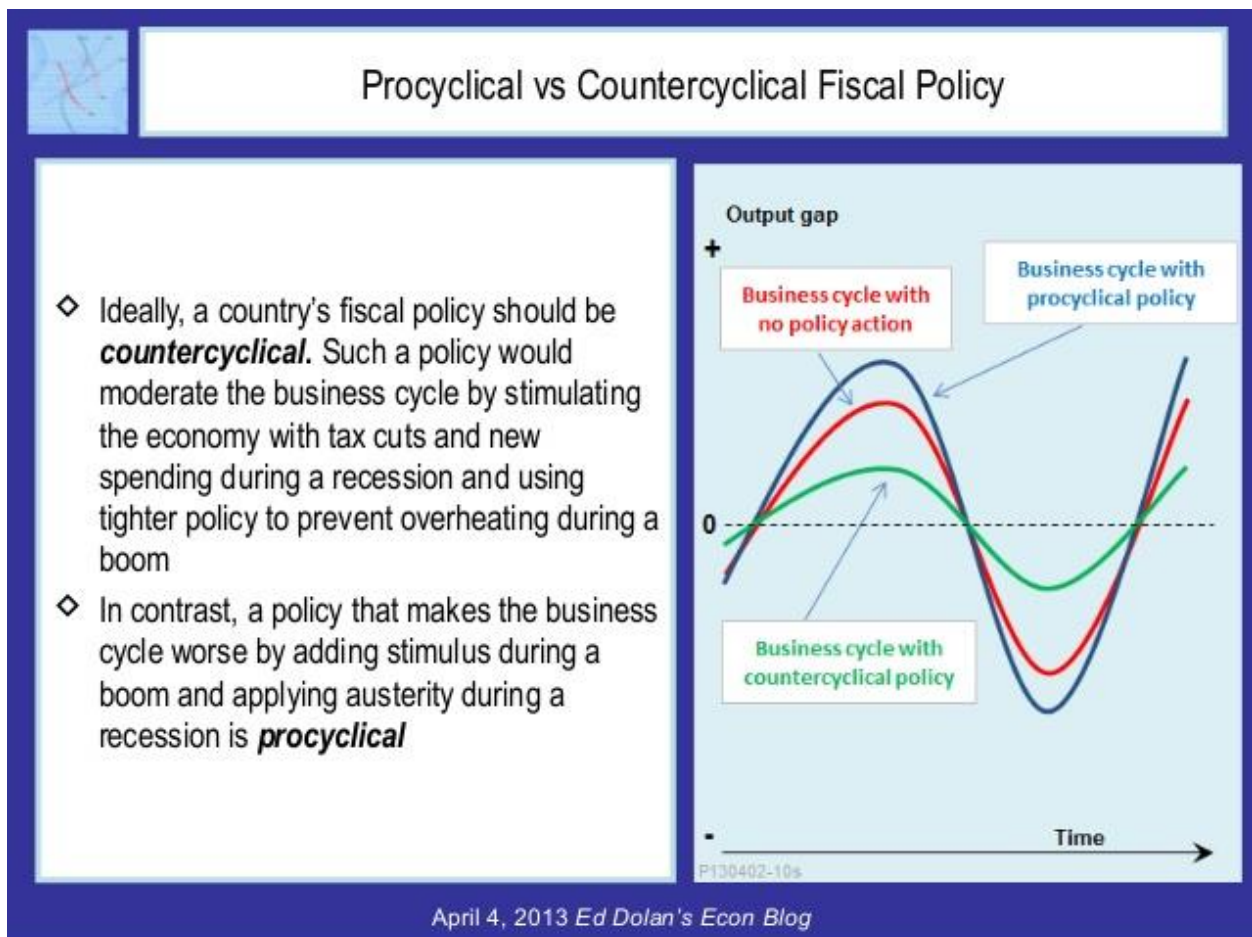
1. Government should follow counter cyclical policies to come out of the recession that was in making well before Pandemic.
2. Government Final Consumption Expenditure should increase creating jobs and demand thus spurring a positive investment-growth-demand cycle.



Background:

Fiscal conservatism is the economic philosophy of prudence in government spending and debt. Fiscal conservatives advocate the avoidance of deficit spending, the reduction of overall government spending and national debt whilst ensuring balanced budgets. In other words, fiscal conservatives are against the government expanding beyond its means through debt, but they will usually choose debt over tax increases.

Learn Through Graphics: Counter cyclical and Pro cyclical Fiscal Policies





The rise of the AI economy

CruX: Data and AI services are expected to help boost India's economic growth in a big way. Nasscom believes that data and AI will contribute \$450 billion-\$500 billion to India's GDP by 2025, which is around 10% of the government's aspiration of a \$5 trillion economy. The thrust will come from three key segments: consumer goods and retail, agriculture, and banking and insurance.

Transformative role of AI

1. The pandemic has revealed the potential of technologies such as artificial intelligence (AI) and machine learning (ML).
2. AI/ML models and algorithms have supplemented the work of healthcare professionals, medical researchers, public health authorities and local administrations in monitoring and predicting trends.
3. AI also accurately predicted protein structure of virus (SARS-COV-2) which greatly enhanced speed and accuracy of vaccine research.

Indian Aspiration: India's rising eminence in AI

1. We have made significant progress in AI capability-building in the past few years through government initiatives and private sector investments.
2. NITI Aayog's national strategy for AI envisages 'AI for all' for inclusive growth, and identifies focus areas for AI-led solutions for social impact.
3. The Telangana, Karnataka, Tamil Nadu and Maharashtra governments, among others, have announced policies and strategies for AI adoption.
4. Technology companies have established AI centres of excellence to create solutions for global clients.
5. India has a thriving AI start-up ecosystem with cutting-edge solutions being developed in areas such as cancer screening and smart farming.
6. Our talent pool in AI/ML is fast growing, with over 5,00,000 people working on these technologies at present. India is thus poised to become the AI powerhouse of the world. And with that, there is a potential of the rise of an AI economy in the country.



Social Impact of AI

1. The growing AI economy is estimated to create over 20 million technical roles alone.
2. We are now better prepared for an AI-led future in which we not just solve business problems but also find answers to complex social issues. For example, during the lockdown, the Telangana police used AI-enabled automated number plate recognition software to catch violations.

Top priorities for India

1. The stakes are high for India. We need to speed up our readiness to seize the opportunities that the future presents. Three areas need our attention.
2. The first is talent development. In 2019, we nearly doubled our AI workforce to 72,000 from 40,000 the year before. However, the demand continues to outpace the supply. That means our efforts to develop talent must pick up speed.
3. The second area is policies around data usage, governance and security. Without data, there cannot be AI. We need a robust legal framework that governs data and serves as the base for the ethical use of AI.
4. There is the problem of availability of clean datasets for training AI. Organisations need to invest in data management frameworks that will clean their data before they are analysed, thus vastly improving the outcomes of AI models.

Conclusion:

The future for AI looks promising but to convert the potential into reality, India will need better strategies around talent development, stronger policies for data usage and governance, and more investments in creating a technology infrastructure that can truly leverage AI.

Mains:

1. NITI Aayog's national strategy for AI envisages 'AI for all' for inclusive growth, and identifies focus areas for AI-led solutions for social impact. Enumerate possible social applications of AI. Discuss potential and challenges faced by India in becoming AI powerhouse.