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SCIENCE, TECHNOLOGY AND INNOVATION POLICY OF INDIA AND ITS PREACHING

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Increasingly, science and technology policy has become one of the core attributes that helps a state to sustain or establish its global influence as evidenced by the argument that the advanced digital technologies like 5G, AI are promising trillion-dollar addition to the existing economy.¹ If scholarly work has to be referred, one of the most respected futurists, Alvin Toffler, concluded that the states' power is determined by the technology and knowledge decades earlier.² Without much argument, it can be established that technology and knowledge have together become the fore front attribute to measure a country's power.

They not only determine the state's influence but also the geopolitical environment. Growing internet and digital communications wrongly tipped scholars and analysts to quickly conclude that they are the tools propagating universalism and global connectedness. Contradicting globalization and the much-celebrated interconnectedness of people, nation-states are opposing the global communications and free flow of information. The open proposal of Xi Jinping's cyber sovereignty and many states' embracing that idea along the Belt and Road initiative is an example of reversing geopolitics. In such a tumultuous geopolitical scenario, it is imperative to understand where India stands with its science and technology policy.

The Centre for Security Studies has already undertaken exploratory research on the Science & Technology policies of France and Germany earlier.³ France and Germany are moving ahead with their flagship policies National Science & Technology Policy 2020-2030 and High-Tech Strategy 2025 respectively. Germany appeared to take more practical approaches than France. This article will expand the science & technology policy analysis to India. It critically examines the Science, Technology, and Innovation Policy draft of 2020.

Some argue that India has taken good and significant steps to initiate data protection, and is moving towards data sovereignty.⁴ While it is true that India's data localization shows the government's intention to control the data, the draft data protection bill does little on the aspects data portability. AI policy of India appears to be a wishful ideal.⁵ There is significant development in terms of AI stack. It is a detailed structure of how data is stored in India and the usage of stored data for the

¹ Kastner, A. (2021). "7 views on how technology will shape geopolitics", *World Economic Forum*, April 7, 2021. Available at <https://www.weforum.org/agenda/2021/04/seven-business-leaders-on-how-technology-will-shape-geopolitics/>

² Toffler, A. (1991). *The Power Shift*. (United States: Batnam Books).

³ Polcumpally, A. T. (2020). "Science and Technology Policy of France", *Center for Security Studies*. Available at https://www.researchgate.net/publication/352349539_Science_and_Technology_Policy_of_France_and_Germany
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⁴ Pande, J. (2021). "Mapping India's Data Sovereignty and Security", *Center for Security Studies*. Available at <https://jgu.s3.ap-south-1.amazonaws.com/jsia/Jahnavi+Pande+-+Mapping+India's+Data+Security.pdf>

⁵ Polcumpally, A. T. (2020). "Artificial Intelligence and the National Policy of India", *Center for Security Studies*. Available at [https://jgu.s3.ap-south-1.amazonaws.com/JSIA/POLICY+BRIEF+-+Arun+-+Artificial+Intelligence+and+the+National+Policy+of+India+\(1\).pdf](https://jgu.s3.ap-south-1.amazonaws.com/JSIA/POLICY+BRIEF+-+Arun+-+Artificial+Intelligence+and+the+National+Policy+of+India+(1).pdf)

purpose of AI development.⁶ Though India appears to have made decent progress in establishing a policy for the advanced and strategic technologies, a comprehensive science policy is absent.

Analysis of the draft bill

The 2020 draft of India's science & technology policy aims to bring innovation in the emerging technologies across the sectors and throughout the society. The entire document is a wishful thinking and a policy document in general, is itself a wishful document. An excerpt below provides the aim of India's draft policy.

“The new Science, Technology, Innovation Policy aims to bring about profound changes through short-term, medium-term, and long-term mission mode projects by building a nurtured ecosystem that promotes research and innovation on the part of both individuals and organizations.”⁷

The Science, Technology and Innovation Policy will be guided by the following broad vision;⁸

- i. To achieve technological self-reliance and position India among the top three scientific superpowers in the decade to come.
- ii. To attract, nurture, strengthen and retain critical human capital through a ‘people centric’ science, technology and innovation (STI) ecosystem.
- iii. To double the number of Full-Time Equivalent (FTE) researchers, Gross Domestic Expenditure on R&D (GERD) and private sector contribution to the GERD every 5 years.
- iv. To build individual and institutional excellence in STI with the aspiration to achieve the highest level of global recognitions and awards in the coming decade.

⁶ Polcumpally, A. T. (2021). “Analysis of the India Artificial Intelligence Stack”, *Center for Security Studies*. Available at https://www.cssjsia.com/files/ugd/348fae_4bca5eb92a8640269e7a8af541940543.pdf

⁷ Department of Science & Technology. (2020, December). *Science, Technology, Innovation Policy (STIP)*. Retrieved from Office of the Principle Scientific Advisor. Available at https://www.psa.gov.in/psa-prod/psa_custom_files/STIP_Doc_1.4_Dec2020.pdf

⁸ Department of Science & Technology. (2020, December). *Science, Technology, Innovation Policy (STIP)*. Retrieved from Office of the Principle Scientific Advisor. Available at https://www.psa.gov.in/psa-prod/psa_custom_files/STIP_Doc_1.4_Dec2020.pdf

How does the policy aim to build a science, technology and innovation ecosystem for an *Atmanirbhar Bharat*?

The draft policy provided many good wordings which essentially covers everything moral and ideal for good research. Some of the phrases are – “get financial resources”, “encourage R&D such that it caters to the country’s socio-economic needs and also enter into global competition”, “implement National Education Policy (2020)”, “develop scientific literature in all the languages”, “open access to public funded research”, “promote science diplomacy”. Such style of writing for a policy document is a stretch. A state’s policy should be a framework under which further rules and regulations will be drafted. If the policy says the rule document should achieve everything under the sun, then it needs to be revisited.

Evolution of the policy

A policy document does not necessarily contain the history of science and technology policy. However, the department of Science & Technology may have thought that the provision of historical tracing of S&T policy would provide the readers a good grip on the state’s perspective of S&T policy. In the historical tracing, it is identified that four national S&T policies were adopted before this draft policy.

They are as listed:

1. Scientific Policy Resolution, 1958 (SPR1958),
2. Technology Policy Statement (TPS) 1983,
3. STP2003,
4. STIP2013

Throughout the section, the document argues that India has steadily increased the per capita expenditure on Research and Development.⁹ However, the world bank data contradicts this.

⁹ Department of Science & Technology. (2020, December). *Science, Technology, Innovation Policy (STIP)*. Retrieved from Office of the Principle Scientific Advisor. Available at https://www.psa.gov.in/psa-prod/psa_custom_files/STIP_Doc_1.4_Dec2020.pdf

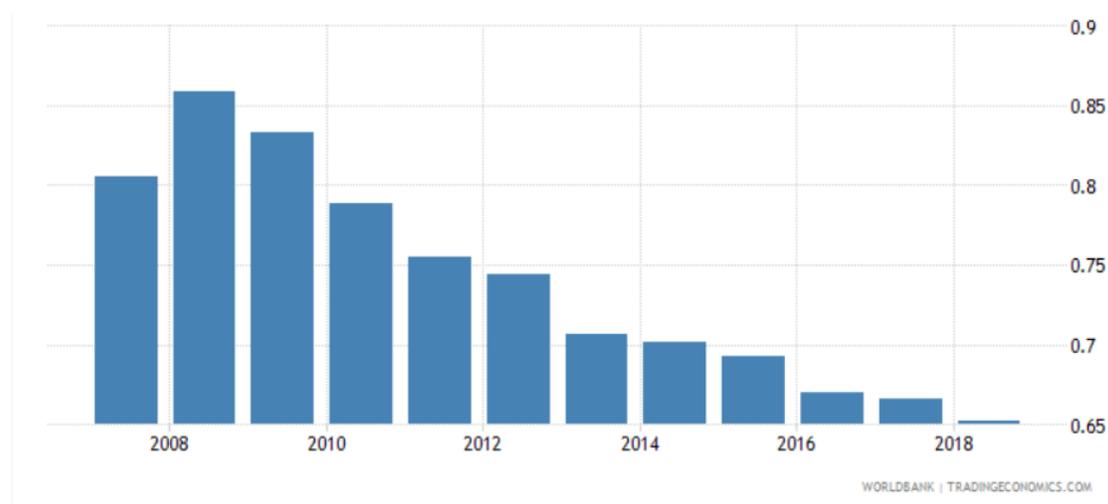


Figure 1: Decreasing % GDP of Science & Technology expenditure¹⁰

New initiatives promulgated by STI policy

National STI observatory will be set up to look after the project assessment, fund allocation and data repository in India. A separate Indian Science and Technology Archive of Research will be set up that would be responsible to operate publicly accessible data repository. This is similar to what National STI observatory would do. Maybe it is a part within STI observatory. If the idea ‘One nation, one subscription’ materializes, it would help all the individuals within the country to freely access the scientific journals. However, this seems to be very ambitious. Institutions, according to their budget, would acquire the journal access. If all such journals are to be bought by central government, it will definitely increase the burden on the exchequer.

Open access for the public funded research, equal access to all learning spaces like conference rooms etc, digitization of Indian journals are the other aspects focused on. Though they appear easy to write, their implementation and maintenance is challenging.

¹⁰ Trading economics. (n.d.). *India - Research And Development Expenditure (% Of GDP)*. Retrieved from Trading economics. Available at <https://tradingeconomics.com/india/research-and-development-expenditure-percent-of-gdp-wb-data.html>

Capacity development

A good detail of ideal developments on education have been documented in this section of the draft policy. Usage of the Sanskrit word might give a touch of traditional legacy left behind by the great philosophers of Indian sub-continent as shown by the excerpt below:

“A new culture of Atmanirbharta (self-reliance) that includes Atmavishwas (self-confidence), Atmasamman (self-respect) and Atmachintan (self-assessment) must be inculcated among students at all educational levels.”¹¹

One does not need a policy document to understand this. All the four factors are historically followed in imparting education, irrespective of the region. If the above attributes are not being developed in the current educational system, then it is deeply flawed. However, any good educationalist would agree that education is always anchored to these four attributes. Well, writing them in Hindi in the national document shows the spirit to bring back India’s ancient glory.

An interesting proposal arises in the document which calls for clusters that comprise of schools or any educational institutions with universities, industries to dynamically revamp the curriculum and share resources and capacities. In the higher educational institutions, entrepreneurship cells will be established to foster innovative thinking.

Development of educational infrastructure

Higher Education Research Centres (HERCs) will be established in reputed Universities

There is no scale to measure what exactly is meant by reputation. Perhaps the government would consider the top NIRF ranking universities to establish the research centres.

Collaborative Research Centres (CRCs)

The collaboration is between the industries, academia, and research institutions.

¹¹ Department of Science & Technology. (2020, December). *Science, Technology, Innovation Policy (STIP)*. Retrieved from Office of the Principle Scientific Advisor. Available at https://www.psa.gov.in/psa-prod/psa_custom_files/STIP_Doc_1.4_Dec2020.pdf

Transforming existing R&D institutions to research universities

This is an interesting idea. However, a research university needs a higher budget. It would be helpful if the government stands up to its commitment and secures a decent budget for research universities. As there is no mechanism to ensure proper funding, the draft says that it would develop one.

Financing STI

Identifying the increasing need for R&D, the draft proposes that every state and central department should have an STI unit with a minimum budget earmarked.¹² Financial incentives and support should be provided to encourage private investments in the R&D.

A corpus fund will be established for investing in various long and medium-term projects, commercial ventures, start-ups, technology diffusion and licensing, etc., to address identified priority areas in the STI ecosystem. An STI development bank will be established to fund the long-term R&D.

Research

The document emphasised that the research should be encouraged in mission mode and priority should be given to strategic sectors as well as socially engaged research. There is a detailed explanation of what kind of research should be undertaken. However, there is no framework for a new institution that would ensure the strengthening of the research.

While the chapter on innovation and entrepreneurship is no different, it correctly identifies the areas where the state should focus. Early industry experience during school and undergraduate studies, theme-based incubators, creating innovation eco system in rural areas, drafting scales to assess the innovation, and so on. Even here, there is a lack of practical working structure.

¹² Department of Science & Technology. (2020, December). *Science, Technology, Innovation Policy (STIP)*. Retrieved from Office of the Principle Scientific Advisor. Available at https://www.psa.gov.in/psa-prod/psa_custom_files/STIP_Doc_1.4_Dec2020.pdf

Conclusion

The entire document is drafted in a similar fashion. The information provided by the department of science and technology is already well known to the policy-making experts. Repetition of the same is nothing but a wastage of the public resources and time. Rather than writing a document which more or less says ‘best policy should be made’, basic principles under which each ministry would carry out the mission and aims of the policy should have been focused upon. Science policy should provide an institutional framework that would operate under strict goals for a stipulated period.

In the next version of the draft bill, it is hoped that all the recent policy documents on Blockchain, AI, 5G technology, data usage in the medical sciences, etc., are represented. One of the best technology initiatives is the building up of AI Stack. Hopefully, the stack concept will be mentioned and encourages the Indian state to pursue data integration.

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