

***The Science Indigenous Technology and Advanced Research Accelerator***

SITARA, India’s first Science, Indigenous Technology & Advanced Research Accelerator, is dedicated to promoting India’s high-tech capabilities and has already achieved some success in this regard.

Sunday, January 24, 2021

Placed below are SITARA’s comments on the STIP draft.

There is much to welcome in the draft, which we have highlighted below.

India has achieved a major and historic success in producing a vaccine cure for the coronavirus, of which we are extremely proud. We firmly believe that if our recommendations are woven into the ST&I Policy, India can surmount any scientific and technological frontier.

Nonetheless, the real success of a Science and Technology Policy depends very much on how “connected” the supporting ecosystem is, in terms of responsive governance, productive, world-class R&D institutions in the public and private sectors, an R&D intensive economy, an Industrial Policy promoting domestic technological growth and domestic procurement (starting with high-tech product development), a sensible and efficient IPR and patent regime, and a first rate education system.

For example, DARPA’s success in the United States does not take place in a vacuum. DARPA is able to contract research to the country’s **top-class private sector, which is then assured of Government procurement. Procurement is the single most important incentive for a flourishing S&T ecosystem and it doesn’t find mention in the Policy, even though other arms of Government of India have mandated preferences for domestic procurement to encourage industrial development and manufacturing**. MOD has come out with a ban on import of 101 items and recently given a game-changing order for 83 Tejas aircraft, while NSCS/ DOT have effected other game-changing procurement reforms to encourage indigenous telecommunications production and innovation, and so on.

Further, technological advance in the U.S. is also fueled by institutions such as the FFRDCs (Federally Funded Research & Development Centres), InQTel funding, and schemes such as SBIR. DARPA also operates in a dynamic business environment which is largely free from bureaucratic interference. The United States also has a developmental Science State (Fred Block: “State of Innovation”) in which bureaucrats are trained to help the country’s scientific progress. Genuine Ease of Doing Business and elimination of manipulation is therefore extremely important to create a successful S&T ecosystem and R&D intensive economy. While the Policy refers to the need for a scientific temperament, a massive mindset change is required, along with a national training drive to effect a societal change, which must find mention in the Policy.

The Policy must therefore be more ambitious and bolder. The authors may also like to derive lessons from the S&T policies of countries like the US, Japan and China.

Our comments on individual elements in the draft policy:

1. **Science, Technology and Innovation are the key drivers for economic growth**

**SITARA Comments**: We supplement this with our belief, and that of reputed global strategic analysts,that technological power is the ultimate foundation/driver of economic and geopolitical power. **National** **S&T power is an integral part of National Security.** China's scientific and technological achievements and spending surpass us in many respects and pose an existential challenge to India. The geopolitical aspect is addressed in the middle of the document but stating it upfront will give greater focus and purpose to the Policy.

**Recommendation 1**: References to India’s strategic environment coupled with our *dangerous import dependencies* (which find mention later in the draft) - must be made upfront to give a sense of urgency and direction to the Policy. At the same time, S&T must also address / solve societal challenges and advance the standard of living of the nation. The Policy must therefore also address other national challenges such as climate change, food security, education and health, which too further National Security.

1. **Formation of a Strategic Technology Board as a link connecting different strategic departments.**

**Recommendation 2**: The Defence Ministry, ISRO, C-DAC/ CDOT/ ISRO / other Ministries dealing with high technology/ high-tech firms (both big and small), and top scientists/technologists in different spheres - must be consulted for the formulation of a **Priority Technology Development List**, which must be mentioned upfront to provide focus for ensuing efforts.

**Recommendation 3**: The **Priority Technology Development List** must identify “mega” projects with timelines – e.g. building India's futuristic ICT ecosystem and 4G/5G infrastructure by 2025/ frontline Defence Weaponry and Aircraft / Semiconductor Fabs (or fabless), components in electronics supply chains, priority pharmaceuticals, ecologically sustainable new agricultural technologies, renewable energy and other green technologies, etc.

1. **Digitisation/ Informatization and Intelligentisation of National Life and the importance of Data Security:**

The majority of technological breakthroughs are taking place in the digital space, whether it is advanced weaponry, nanotechnology, quantum technologies, AI, 4G/ 5G, defence technologies, as also in electric batteries=green tech/ space technologies etc. India must be largely independent and self-reliant in ICT Technologies because the entire national life, National Security and national development revolves around digitisation. China for example has focused its energies to leap ahead in 5G and Artificial Intelligence, where it aims to become the world’s No. 1 power, intelligentizing its industrial park and defence weaponry.

At the same time, the speed of “informatization” and “intelligentisation” of processes and products requires that national data protection policies be a part of STI policy. We are continuously losing our data to foreign entities who own the tech platforms and patented digital-intelligence based technologies. Apart from personal data, public data - whether of utilities usage, traffic, domestic and international trade and financial sector transactions, health, farming practices or the weather, rivers/oceans, environment or ecosystems – is also the raw material for analytics-based innovation, leading more innovation by those who extract and control it.

If the country does not have a strong data protection framework for all personal and non-personal data, then foreign entities digitally extracting our data will have de facto ownership and control which enables them to build and sell IP-protected intelligentised technologies derived from "our" data back to us. *This will drastically and dangerously squeeze the space for indigenous S&T development.*

**Recommendation 4:** While stating thatIndia must have mastery (manufacturing, design and control) over its digital domains - both hardware and software, a national data regulatory framework for both personal and non-personal data must be mentioned as a part of the Policy.

1. **Ambition to make India among the top 3 scientific super-powers.**

**Comments:** India’s R&D intensity has been falling in the last few years. The US S&E Indicators report mentions that statistics from India have been wholly lacking since 2015-16. The relevant statistics should be made available to the Indian public and to international bodies. We need a baseline so as to make international comparisons, measure our progress especially vis-à-vis China, and set/ achieve concrete benchmarks/ results.

**Recommendation 5**: India must establish a baseline and publish its R&D statistics for all publicly funded and privately funded R&D, as the US and several other countries do.

1. **The alignment with Prime Minister’s Atmanirbhar Bharat campaign and emphasis on indigenous technologies and grassroots innovation.**

**SITARA Comments:** this has been SITARA’s motto so we especially welcome it**.**

1. **Provisions for funding, especially for the private sector.**

* **Doubling the share of the central government’s R&D support and gross domestic expenditure on R&D**
* **Modification/waiver of General Financial Rules, for large scale mission mode programs and projects of national importance.**
* **The Industry-Govt collaborative ADMIRE funding concept.**
* **Creation of a Strategic Technology Development Fund to incentivize the private sector**
* **And other funding proposals**

**Comments:** We welcome all of the above.Wehope ADMIRE is immediately implemented in key technologies with Govt assistance, as proposed. The biggest problem in our country has been the difficulty of directly funding R&D expenditure in the private sector which is in a position to deliver. It is a travesty, that contracts and funding are *unquestioningly* given to FOEMs, while funding for swadeshi companies comes under concentrated scrutiny and is followed up by inquiries and even jail time. This completely discourages even honest bureaucrats from helping indigenous companies to grow.

**Recommendation 6:** Robust mechanisms for channeling government funding to the private sector must be created under the new policy.

**Recommendation 7:** A mechanism/ change in GFRs for ensuring that Vigilance and CBI enquiries are not launched against people pursuing the Prime Minister's Atmanirbharta campaign must be instituted (if not already done).

**Recommendation 8:** In the amended GFRs, we must provide for a No Cost Full Commitment model in our procurement rules

**Recommendation 9: A reference to a potent Industrial Policy to make India an Advanced Technology Power must be included.**

1. **Need for Procurement reforms – not mentioned in the Policy**

**Comments**: It has been SITARA’s fundamental contention from the beginning that a flawed procurement system favouring foreign companies has been the strongest disincentive to both domestic manufacturing and R&D investment. The DARPA /procurement linkage has been highlighted above. **As a current example**, Indian companies have developed world class, 5G technologies. But they lack funds to develop them. On the other hand, Systems Integrators are reluctant to help SMEs roll out their technology unless they win a tender first. *But they cannot win the tender unless they have demonstrated capability*. *It is a chicken and egg situation*. ***We have world class abilities but not the will, ecosystem or funding to activate them.*** ***Hence we will forever remain prey to predatory foreign companies and their enablers in our country***. For example, some Ministries are giving massive contracts to Big Tech, despite Big Tech’s destructive influence on the innovation ecosystem (they have absorbed 100s of small high-tech companies to eliminate competition and evaded billions of dollars in taxes, India reportedly being one of the highest tax avoidance jurisdictions in the developing world for Big Tech).

***As recommended, an S&T Policy without an R&D intensive Industrial Policy will not achieve the desired results.***

*We also have some doubts about the higher educational institutions’ contribution to augmenting India’s ST &I capacity, elaborated below:*

For example an IIT has been given Rs 250 cr for 5G. But it is our contention that unless Indian companies build the 4G infrastructure, they will not have the resources to build the 5G ecosystem. **It is essential Indian companies build our telecommunications infrastructure for National Security and National Development purposes, and there have been too many forces working against this for a long time**. Bear in mind that Huawei alone got over US$ 90 bn in funding support from the Chinese Govt, and Samsung has invested over US$100 bn in R&D. Our companies have got NOTHING. **We cannot become World No. 3 without proactive funding support to those that can deliver.** Instead we are wasting it by giving it to unaccountable, unaudited educational institutions.

**Recommendation 10:** Publicly funded R&D Institutes must help Indian high-tech companies roll out their technology first, instead of supporting start-ups of doubtful viability and future, otherwise this opportunity will be lost.

**Recommendation 11:** The funds given to Academia must have 100% pass-through to firms, as the former are in any case taxpayer funded. They should fund their research papers, seminars, travel requirements and private start ups through their own resources, while allotting funds given for a specific purpose to India’s firms.

**Recommendation 12:** Auditing requirements should be placed on Academia. We have found that a lot of funding is going to waste and not for increasing national S&T capabilities. Funding should have 100% pass through to fund R&D in firms.

**Recommendation 13:** Last but not least, DST/ PSA’s Office may instead like to revive the successful Carel model implemented earlier under PSA’s office for funding of platform technologies which everyone can license from a Govt lab / R&D development partner in the private sector/ academic institution for priority technologies. These could include 4G/ 5G/ ICT/ AI/ Quantum/ Nanotech/ 3D printing / Defence Industry technologies, renewable energies, public platforms/algorithms for new agricultural/health/educational technologies, advanced green materials, advanced process technologies, etc.

1. **Encouragement of quality foundational research in areas of disruptive potential.**

**SITARA comments/ recommendation 14**: Concrete emphasis on basic research is lacking in the Policy. Unless Indian scientists also conduct basic research, futuristic scientific and technological breakthroughs will not happen. The strengths of advanced Science Nations come from their simultaneous investment in basic research. This area could be further elaborated. The US experience with FFRDCs could be studied to strengthen our Govt and private sector labs and make them more productive.

1. **Retaining critical human capital**

**SITARA comments**: China has incentivized some of its best people to return from America (and poached engineers from TSMC to start its semiconductor industry). Semiconductors are at the heart of the US-China Technology War. Of interest is the data in a CSET report (Centre for Security and Emerging Technology attached) on the enormous contribution of Indian engineers to America’s semiconductors sector. It appears they dominate the foreign born category in practically all sectors pertaining to semiconductor manufacturing. Our experts too affirm that Indians have made an enormous contribution to advanced chip design but the IP is owned by FOEMs.

The other interesting point is that highly advanced semiconductor capabilities were catalyzed in Taiwan, Japan and South Korea – by returnee talent.

As matters stand now, an enormous reservoir of trained talent moves abroad every year due to lack of absorptive capabilities in a low R&D investing country. The loss to India from this continuing Brain and Start Up Drain is incalculable. There is no reason why India cannot catch up and overtake China if it can retain its talent.

**Recommendation 15:**

* It is imperative that STIP recognize this loss more concretely and contain concrete suggestions to create a dynamic ecosystem to retain Indian talent.
* References to retaining our human capital and high-tech start-ups must be strengthened and sufficiently attractive remuneration, incentives, **procurement** in terms of orders and recognition be provided.

**Recommendation 16:** It is requested to please not burden the private sector with more compliance requirements, like setting up STI offices in their premises. Instead of focusing on R&D, they will have to allot resources to bureaucracy, which we need less of.

**Recommendation 17:** Similarly creation of new institutions should be avoided unless they are modeled on best international practices, which need to be studied first. The focus should be on re-engineering/ overhauling/ reforming existing systems instead of creating additional layers which will not lead to any improved results, only increase bureaucracy with everyone working at cross purposes. **If new institutions are created, the non-functional older ones must be abolished.**

**Recommendation 18:** Skilling through Industry – vocational academia partnerships are essential for an R&D intensive economy. Germany and Switzerland are in the top Innovators league because of their robust, mainstreamed vocational education systems. The STIP should extend support to the NEP, mentioning that this is the surest way up the technology ladder, and promote/ fund initiatives in this area, but it can avoid going into detail into areas already covered by the NEP.

**Recommendation 19: Dependence on MNCs**

**We would like to introduce a sense of caution regarding the frequent references to dependence on foreign multinational companies (MNCs).** India's FDI policy does not impose any WTO-compatible performance requirements or technology transfer obligations on MNCs. **Several in-depth studies on technology payment outflows from foreign-invested companies in India have established the opposite i.e. (i) the absence of any significant technology transfer from foreign MNCs and (ii) perpetual technology dependence on foreign counterparts. We have already cited how Big Tech stifles technology development by any other entity.**

In fact no MNC has transferred technology in a meaningful way to host countries in any part of the world in the absence of performance requirements. While we must encourage hi-tech FDI in the country in such a way that it will lead to horizontal or vertical spill-overs, **references to foreign MNCs playing a crucial role in STI financing and technology transfer is naive and should be avoided. It may enable more highly damaging Big Tech-Govt contracts (on which we are panning to write to PM) which will enslave the country. It also reminds one of a colonial mindset.**

**Recommendation 20:** Our recommendations if followed, and perhaps a shorter document limited to the Executive Summary, with hard goals and concrete funding mechanisms and models, may be more impactful.

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