Making India A Tech-Leader

This editorial is based on **"Can India Become A Technology Leader?"** which was published in The Hindu on 20/12/2021. It talks about the challenges associated with India's technological growth and the corresponding measures that can be taken.

For Prelims: India's technology sector, STEM education.

For Mains: Roadblocks to India's technological development, how bilateral relations can be leveraged to facilitate India's tech revolution, the issue of brain drain affecting India's technological growth, steps that India can take to tackle slow development in technology.

Every time a technology giant chooses an India-born techie as its leader, there is a justifiable swelling of pride in the country, but also some disappointment.

Despite having so many celebrated technologists around the world, India is still not a major player in technology. This failure can be attributed to lower public spending, high imports and brain drain.

India's excellent bilateral relations with global tech leaders like the US and Japan can be leveraged for India's technology revolution. Besides, More public spending in R&D and in tertiary education is required to make India one of the leading countries in terms of technology.

Role of Government in Global Tech Leaders

- **US as Global Technology Leader:** Undoubtedly, the U.S. is a country of fabled opportunities but its credit cannot be given to the private sector only. An invisible hand of the government has also been there.
    - Public sector funding developed the algorithm that eventually led to Google's success.
        - It also helped discover the molecular antibodies that provided the foundation for biotechnology.
    - The **governmental agencies were proactive in identifying and supporting the more uncertain phases of the research,** which a risk-averse private sector would not have entered into.
- **The Case of China:** The role of the government has been even more prominent in shaping the economic growth of China. It has **succeeded by combining the strengths of the public sector, markets and globalisation.**
    - China's state-owned enterprises (SOEs) were seen as inefficient and bureaucratic, however, rather than privatising them or letting them weaken, China restructured its SOEs.
    - The state left the fields like light manufacturing and export-oriented sectors open for the private sector and **strengthened its presence in strategically important sectors** (petrochemicals, telecommunication, electronics etc).

India and The Tech World

- **India's Initial Efforts for Tech Revolution:** India's efforts for **planning and industrialisation in the early 1950s** was possibly the **most ambitious of such initiatives in the developing world.**
    - Public sector funding of the latest technologies of the time including space and atomic research and the establishment of institutions such as the IITs were among the hallmarks of that effort.
    - In terms of **growth in IT and pharmaceutical industries,** the development has been the fastest in Bengaluru and Hyderabad.
- **Achievements in STEM Education:** India possesses favourable supply and demand factors that can propel it into the frontlines of technology.
    - The number of persons enrolled for tertiary education in India (35.2 million in 2019) is **way ahead of the corresponding numbers in all other countries** except China.
    - As per **UNESCO**, **graduates from** STEM **programmes** (as a proportion of all graduates) was 32.2% for India in 2019, **one of the highest among all countries.**
- **Issues Associated with Tech Development of India:**
    - **Brain-Drain:** India's failures are linked to its inability to make use of the market-driven growth opportunities consequently leading the talented people out to countries like the U.S. for job opportunities.
        - As of 2019, there were **2.7 million Indian immigrants in the U.S** who are **among the most educated and professionally accomplished communities** in that country.
    - **Gradual Decline in R&D Spending:** In 1991, when India embraced markets and globalisation, it should have redoubled efforts to strengthen its technological capabilities.
        - However, the spending on research & development as a proportion of GDP declined in India **(0.85% in 1990-91 to 0.65% in 2018).**
        - In contrast, this proportion increased over the years in China and South Korea to reach 2.1% and 4.5%, respectively, by 2018.
    - **Lesser Public Spending for Tertiary Education:** An overwhelming proportion of tertiary students in India are **enrolled in private institutions.**
        - **According to the** Organisation for Economic Cooperation and Development (OECD)**, It was 60%** for those enrolled for a bachelor's degree in 2017, while the average for G20 countries was 33%.
    - **High Import of Electronic Items:** India is a large market for all kinds of new technologies. However, the domestic industry has not yet managed to derive the benefits.
        - The country is operating far below its potential in electronic manufacturing; **electronic goods and components are the second largest item in India's import bill** after oil.
        - As of 2020-21, India's **imports are almost five times its exports** in this technology sector.

Way Forward

- **Role of Government:** The government has a crucial role to play in positioning India as the Tech Garage of the World**.** It should **act as a catalyst, and bring together the synergies of the private sector** with the aim of innovating for India and the world.
    - The product development should ideally be undertaken through private entrepreneurship, with the **government acting as a facilitator.**
- **More Public Spending on Education:** The **'Make in India' initiative** will have to go beyond increasing the 'ease of business' for private industry. Indian industry needs to deepen and broaden its technological capabilities.
    - This will happen only if **universities and public institutions in the country are strengthened** and emboldened to enter areas of technology development for which the private sector may have neither the resources nor the patience.
- **Strengthening the Public Sector:** A strengthened public sector **will create more opportunities for private businesses** and widen the entrepreneurial base.
    - Small and medium entrepreneurs will flourish when there are mechanisms for the diffusion of publicly created technologies, along with greater availability of bank credit and other

forms of assistance.

- **Utilising the 'Techade' up to its Maximum Potential:** The "techade" is a portmanteau of technology and decade. Technology is going to be the key driver of the global economy in the next 20 years.
    - To take full advantage of the techade, India will need to play a constructive role in joining and shaping global standards that are currently in evolution – **around** privacy**,** data localisation**,** tax laws**, the definition of** monopolies**,** cyber security**, immigration and predictability of regulations.**
- **Role of the Indian Diaspora:** The **Indian diaspora** who has mostly settled in Silicon Valley has played a very significant role by acting as the bridge between the Indian skills, human resources and the American technology requirements.
    - Indian diaspora, IIT, BITS or NIT alumni in particular, can play a very crucial role in **acting as a mentor to the young talents** as they already have the experience and know what the advanced technologies and other developed countries want.
- **India-US Technology Partnership:** The US companies want access to India's data, talent, and consumers. **India should also make efforts for an Indo-US technology partnership decade.**
    - India and the US can collaborate in making the next generation of **quantum computers**, achieving breakthroughs in the use of **Artificial Intelligence (AI)**, making **genome sequencing** and analysis affordable etc.
    - A technology partnership can ignite rapid growth and set India up well for the future. Besides, India's good **bilateral relations with other technologically developed countries like Japan and Israel can also be leveraged.**

Conclusion

India has the potential to occupy the upper echelons of the global technology ladder. What is required is that the PSUs in India should be valued for their potential long-term contributions to economic growth, the technologies they can create, and the strategic and knowledge assets they can build.

Drishti Mains Question

What are the roadblocks to India technological progress and what steps can be taken to tackle the issues?
