Technological Absorption in Defence Sector

Why in news?

The Indian Army observing 2024 as the 'Year of Technology Absorption', this underscores the Army's steadfast focus on embracing technology to transform itself.

What is Disruptive Technology (DT)?

- **Disruptive technology**- It is an innovation that significantly alters the way that consumers, industries, or businesses operate.
- **DT in Defence-** Disruptive technology in defense refers to innovations that significantly alter or replace existing technologies, processes, or capabilities within military operations.
- **Need-**These technologies can dramatically change the landscape of warfare by providing new methods and tools that offer substantial advantages over traditional systems.
- **Artificial Intelligence**- AI applications in defense range from autonomous weapon systems and drones to intelligence analysis, decision-making support, and predictive maintenance of equipment.
- **Autonomous weapon system**- It can operate independently or with minimal human intervention.
    - **Example-** Unmanned aerial vehicle (UAVs), ground robots and autonomous naval vessels.
- **Hypersonic weapons**- They travel at speeds greater than Mach 5 (five times the speed of sound), making them extremely difficult to detect and intercept.
- **Cyber warfare capabilities**- Advanced cyber tools and techniques such as hacking, cyber espionage etc., enable nations to conduct offensive and defensive operations in cyberspace.
- **Quantum technology**- It can revolutionize encryption and decryption, significantly enhancing secure communications and complex problem-solving capabilities.
- **Directed energy weapons**- These weapons use focused energy, such as lasers or microwaves, to disable or destroy targets. They offer precision targeting with minimal collateral damage and are effective against a wide range of threats, including drones and missiles.
- **Advanced materials-** Innovations in materials science, such as lightweight composites and nanomaterials, improve the durability, strength, and stealth capabilities of military platforms.
- **Biotechnology-** It includes advances in medical treatments, genetic engineering, and synthetic biology to enhance soldier performance, resilience, and recovery.
- **Internet of Military Things**- It involves the integration of various devices, sensors, and systems in the battlefield, creating a networked environment that enhances situational awareness, decision-making, and operational efficiency.

India is the world's largest defence equipment importer and is expected to spend around USD 220 Billion in the coming decade to modernize its armed forces.

What are the steps taken by India to promote technological absorption?

- **iDEX (innovation for Defence Excellence)** – It aims at creation of an ecosystem to *foster innovation and technology* development in Defence and Aerospace by engaging Industries including MSMEs, start-ups, individual innovators, R&D institutes & academia.
- **DISC (Defence India Start-up Challenge)** – It aimed at supporting Startups/MSMEs/Innovators to create prototypes and/or commercialize products/solutions in the area of National Defence and Security.
- **Defence Artificial Intelligence Council** - It is led by *Ministry of Defence* to provide overall guidance and support for projects involving cutting-edge technologies.
- **Defence AI Project Agency** - As per *Chandrasekaran committee* recommendation it was launched with an annual budget of 100 crores for AI programs to provide necessary guidance and structural support.
- **Project SAMBHAV**- It is an indigenous, secure, end-to-end mobile ecosystem operates on *5G technology* developed by the Indian Army.
- **Aero India 2023**- It is held at Bengaluru which emphasized on two major shifts within the Indian Armed Forces.
    - The move towards 'Atmanirbharta' or self-reliance
    - Critical and Emerging Technologies (CET)

Pillars of technology absorption identified by Indian Army
• Aligning and synergizing technology with existing systems for enhanced effectiveness. • Mapping Futuristic Technologies to stay ahead in technological readiness. • Strengthening the defense technology eco-system through collaboration with industry, academia, and government bodies. • Modernizing acquisition and procurement processes for rapid technology integration. • Training techno warriors and commanders to leverage new technologies efficiently.

What are the challenges in adopting DT in defence?

- **Lethality issues –** Incorporating new technologies into existing systems have made the modern battlefield more lethal.
- **Cybersecurity risks**- Maintaining the integrity and security of data is riskier, particularly when using AI and autonomous systems.
- **Fund deficit**- India has budgetary constraints that can limit the extent and pace of technology adoption.
- **Less industrial base**- Limited industrial base for advanced technology manufacturing can hinder the production and integration of disruptive technologies.
- **Regulatory constraints**- Lengthy and complex defense procurement procedures can slow down the acquisition and deployment of new technologies.
- **Lack of R&D -** Indian Defence Industry with strong R&D base and Defence R&D establishments are needed for the critical technology into products and systems needed by defence.

- **Low overall researcher density –** The researchers per million was negligible in India(156) compared to other countries such as Israel (8255), China (1133) Countries GDP contribution on R&D
- **License issues –** It is found that the technology concerned is subject to approval of the foreign government and hence obtaining latest technology becomes difficult.
- **Manpower shortage-** There is a shortage of skilled professionals with expertise in advanced technologies such as AI, robotics, and cyber warfare.
- **Regional security dynamics**- Navigating the complex security dynamics in the region, especially with neighbors like China and Pakistan.
- **Ethical issues-** The use of autonomous weapons raises ethical questions about accountability and decision-making in life-and-death situations.

What lies ahead?

- As technology continues to grow by leaps and bounds there is an incessant need for adopting it to innovate and develop new systems with greater potential in the future.
- Technology absorption will also necessarily include several macro level aspects such as organisational restructuring, the management of human resources and cultivating specialists at execution levels.

References

1. The Hindu | Marching ahead with technology absorption
2. ET Government | Making the armed forces future ready