

UNIT 68 – UPSC - Indigenization of technology and developing new technology

The phrase Indigenisation denotes to substituting an imported item with one that is manufactured within the country. This does not indicate that the item manufactured within the country is a replica of the imported item. It could be functionally the same, but could have more modern, energy efficient, compact and reliable parts and sub-assemblies, that could themselves be either imported or indigenous. For example, in India, very few electronic components are manufactured and therefore, all the ICs and other electronic components are imported from foreign country.



In simple form, Indigenization is a term that is used in several ways depending on the perspective. It is the fact of making something more native; transformation of some service, idea to suit a local principles, especially through the use of more indigenous people in administration, employment. The Indigenization is mainly used by anthropologists to define what happens when locals take something from the outside and make it their own.

Importance of Indigenization of technology:

To increase its technological capability in the area of homeland security, the government is considering to establishing a centre for focused research on the latest electronic equipment, which can be indigenously manufactured.

The centre, funded by the government, is planned to be set up in partnership with the Indian Institute of Technology (IIT)-Bombay and the industry. The move is also driven by the security concerns regarding imported equipment for internal defence needs.

There is a need for development of products, especially for internal security issues.

Presently, several equipment that cater to the needs of various security agencies are either not available simply in the country, or very costly to deploy.

The force on the ground in Naxal-hit areas do not have communication tools. The only tool available is the satellite phone, which is very costly and cannot be used at a large scale. So, this

centre can be commissioned by the government or the industry to build equipment catering to their exact need, at reasonable price.

The specific areas where the research could be performed include image processing, video analytics, communication systems, and sensors for explosive detection, robotics, and autonomous vehicle such as unmanned aerial vehicles.

The centre, which will help the government to tackle internal security issues better, is a good idea and experts feel that research to be done on equipment which could be “productionised” and at a cost which is cheaper than what is already available.

The person added for instance, various combat agencies had their own security equipment but could not talk to each other in an emergency situation, as their communication systems were not on the same frequency.

Indigenization of technology in Indian context:

After independence in 1947, India had introduced policies and programmes for the development of indigenous capacities in Science and Technology as an integral part to develop as a modern nation state. A five-year planning approach was implemented for economic and industrial growth. The Indian experience of strengthening the Science and Technology capacities in the context of industrialisation as it has evolved over the various plan periods from 1947 to 2001 has been scrutinized. Consolidation of Science and Technology capacities is regarded as a process establishing innovation networks interconnecting science, innovation and industrial activities. Therefore, policies and programmes of nation for both Science and for Industry and the interrelationship between the two have been scanned.

Nevertheless, an indigenously manufactured electronic equipment using imported components, would still be desirable not only from the perspective of price, but also the availability of low cost repair and maintenance over many years of operation. In the viewpoint of defence and military applications, the value of indigenisation gets multiplied manifold in terms of the strategic reliability of ready and direct access to a local manufacturer and his support base. Furthermore, an indigenous manufacturer also has the ability to increase his product periodically using upgraded technology that could even be developed in-house.

It is well documented in studies that indigenisation of technology goes beyond just manufacturing the item based on drawings and materials supplied by a foreign manufacturer (OEM). Here, the local manufacturer is anticipated to understand the technology underlying the product or part, so as to be able to change, modify, improve or re-design the item as and when he likes. Most of the 'technology transfer' that happens in the Indian defence and aerospace sector, only relates to the manufacture of the item within the country and therefore concerns only the technology involved in manufacturing. The foreign manufacturers hardly provide any insight into the technology for design or modifications of the part.

It is presented that the Indian policies and programmes have developed through five phases of development. To strengthen Science and Technology capacities, the phases have been categorised as;

Phase	I:	Infrastructure	building
Phase	II:	Reorientation	
Phase	III:	Promotion of indigenous technologies	
Phase	IV:	Moving towards economic liberalisation	
Phase V: Science and Technology in liberalised economy			

Policies and programmes evolved in each of the phases have been scrutinised with illustrative examples. The growth of Science and Technology capacities for indigenisation of technology have been evaluated to demonstrate the steady emergence of innovation networks. India's developments in the last decade are visualized as the success of service sector and increasing outsourcing industries.

Indians were identified for being the global winners of IT-enabled services. It includes the airlines, healthcare, mobile phone, IT services etc. India is among world largest importers. It represents that India lacks in meeting demand of defence forces. Our indigenous efforts have shown results but there is a lot of cost escalation and breach of time-limit one after another. This is apparent from the facts:

- 1) Tejas aircraft had taken more than two decades in crore rupees. Even after the completion, armed forces were not ready to induct these aircrafts but as a result of negotiation between forces, DRDO and government the aircraft is given 1st level clearance now. DRDO is not able to develop its indigenous Kaveri engine due to limited access to advanced defence technology by countries such as USA, JAPAN.
- 2) Arjun Tank project was sanctioned in late 1970s but was rolled out for trial in just few years back. Even after all these years it is said to be too weighty to use in actual war operations. Now DRDO is working on using composites to decrease the weight.
- 3) First indigenous nuclear submarine was developed in collaboration with BARC by DRDO. But it has inadequate fuel inventor. As a result, it cannot go for long deployment and further enhancements are required.
- 4) India has BrahMos missile in collaboration with Russia. It is one of the best in its class and air, land and water variants are under development.
- 5) AGNI V has given India the status of ICBM holder country in 2013 though the project on integrated guided missile development was started in 1983. This along with Dhanush, Nirbhaya, Prithvi, and Akash missiles has improved our deterrence.
- 6) India's first indigenous Aircraft carrier INS Vikrant is under sea trials.

One of the major efforts towards indigenization has been the F-INSAS project which is intended to equip the Infantry with state-of-the-art equipment. F-INSAS means Futuristic Infantry Soldier as a System. The objective of this is converting an infantryman into a fully-networked all-terrain, all-weather, and weapons platform with enhanced lethality, survivability, sustainability, mobility and situational awareness for the digitised battlefield of the future. Most of the equipment are being developed by DRDO.

According to the news report, The Defence Procurement Procedure-2013 (DPP) announced by the government highlights two major points, strengthening the defence manufacturing base in the country and making the procurement process more competent. The policy indicated that “categorisation”, the process by which the Defence Ministry chooses between various options such as buying equipment and supplies from abroad, buying from within the country, making them in the country or importing technology to make them within the country, should clearly support indigenisation. The option of importing defence equipment should be exercised only after exhausting the option of sourcing it from within. These laudable objectives are probably driven by the bad experience with traders and corruption in procurement of defence equipment from

overseas suppliers. However, it would be immature to believe that this is a workable proposition given the state of indigenous defence equipment manufacturing base. Two of DRDO's highest profile projects, the Main Battle Tank and the Light Combat Aircraft, have showed that indigenisation is not simple, especially given the reluctance of existing suppliers to share main technologies. Indeed, accessing technology will be the major challenge for the development of indigenous defence manufacturing.

It is a great shudder in India, that still large amount of nuts, bolts, screws for aerospace and defence sector are imported from overseas today. India's defence procurement cost is increasing every year. India cannot afford to remain reliant on foreign nations to augment its aerospace ability. India must have to manufacture necessary defence products at its home to beat the competition. It should be independent and indigenous in its approach. The aerospace community within the country has the potential, it only needs to be cultivated and supported to break the restraints of imports.

Recently, Indian government has proposed new program, Make in India, to promote manufacturing sector which provides greater employment opportunities by implementing a responsive policy environment. Reports signify that Indian Prime Minister, Mr. Narendra Modi, pledged to strengthen the country's military which took a swipe at the defence department's research and development agency. India, the largest importer of weapons in the world, has been struggling to build an indigenous defence industry. To boost the effort, Mr. Modi's cabinet recently tried to open the defence manufacturing industry in India to more foreign investment, approving increasing to 49% the amount of foreign direct investment allowed in military equipment manufacturers.

In Information technology sector, India got success in developing indigenous domestic computer industry capable of producing hardware for its huge market base and software for export. Such remarkable successes have been attained at considerable cost to other sectors of the economy, to subsectors of the IT industry, and to the long-term viability of the domestic IT industry. The costs of such policies include the following:

1. Other industries cannot obtain low-cost computing, since prices remain about two and a half times higher than world prices. This limits application of IT to improve efficiency of those industries.
2. Policies to defend domestic hardware producers have hurt the software industry by limiting its access to needed hardware and to software development tools. Higher prices due to import protection have also limited the diffusion of computer hardware, limiting local demand for software.
3. Policies to avert monopolization of the market have created a fragmented computer industry with over 200 producers of PCs, none of which achieve economies of scale necessary to match international prices.
4. Hardware production comprises of mainly assembly of imported components, with little or no value added in India.

India's policies have been mainly responsible for these successes and failures. Untying those policies and understanding how they came to be is critical to developing lessons for future policy in India and in other countries. Policies of the Indian government to promote the development of a domestic computer industry have been justified as India has a large pool of human resources which can be mobilized to realize that goal. A good telecommunications network is another

important element of the IT infrastructure. Without passable telecommunications, computer centres remain isolated units, and organizations that wish to connect units in different locations must invest in expensive dedicated communication links.

India has promoted IT Use: Numerous projects have been started to promote IT use in the private and public sectors and to mobilize a favourable bias towards IT use. For example:

- Demonstration projects have been initiated in areas such as CAD/CAM and computer networking.
- Government has promoted the use of IT applications in priority sectors such as cement, steel, coal, petroleum, power, telecommunications and transport.
- Government has reinforced the creation of administrative databases in areas such as agriculture, irrigation, education, health, and public grievances.
- Pilot projects for new technologies or applications have been initiated in one organization in a given sector and after its successful implementation this technology is to be transferred to other organizations.

It is observed that great efforts were also made to increase public awareness of IT. Computers have been introduced in locations visible to the public. These include the computerized Railway Reservation System, airline reservation systems, electricity billing, and retirement benefit accounting.

Regardless of these considerable efforts to promote IT use, there has been visible lack of incentives, such as tax breaks or accelerated depreciation rules, to encourage private sector use. Most importantly, the high barriers to imports have acted as strong disincentives to the use of IT.

In developing new technologies, India also lead in research and development and technology transfer. India's industrialization has depended on imported technology, much of which was acquired through technology licensing and technical collaboration agreements. Research and development by Indian companies has been basically oriented towards acclimatizing imported technologies to domestic requirements, and in some cases has helped Indian companies to develop their own technology. Interestingly, joint ventures spend more on R & D than Indian-owned enterprises, and among Indian enterprises, those who license technology do more R & D than those who do not. This advocates that technology transfer inspires instead of replaces, domestic R & D, a finding which denies prevailing development theories. India's R & D expenditures are well in advance as compared to other developing countries in the world.

It is generally considered that India is growing at speedy rate and has good reputation among Asian countries. Currently, India has far easier access to COTS and MOTS systems, but dependency on foreign suppliers has produced helplessness like the high cost of maintenance and inventories, and the danger of deficit of spares later in the life cycle due to the closure of overseas production lines. Additionally, it is difficult to optimise a platform's design with a high percentage of COTS and MOTS sub-systems and systems, because "systems engineering" demands that sub-systems and systems be specifically engineered and optimised for the platform. Only then can the effectiveness of the platform be more than the sum of its parts. Indigenization of military hardware is a mindful effort on the part of the defence establishment to develop products which suit Indian needs, circumstances and demands. It is a well-established that no nation can become hopeful to attain a great power status without being practically self-reliant in defence production.