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INDIGENOUS DEVELOPMENT AND TECHNOLOGY ACQUISITION:THE INDIAN VIEWPOINT

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Abstract: India has chosen a two-pronged strategy to achieve techno-economic development: one focuses on establishing a climate for domestic technology development, and the other addresses the transfer and adaptation of technology from advanced nations. The author discusses India's support policy and various strategies for the development of the nation's technology base. The study also lists a number of foreign collaborations involving technology transfer that were entered into for improvement with the goal of achieving technical competence in various industries. A significant shift is also observed in the commercialization of domestic R&D efforts as well as in the purchase of technology in light of GATT and new economic liberalization initiatives. In order to obtain the tried-and-true technology with a demanding market and avoid paying royalties, which is necessary to contribute to the Government's recently established technology development fund, the Indian industry now prefers to import technological products rather than simply the technology.

IndexTerms - Development, Technology, India, Market.

I. Introduction

India has established a sizable institutional infrastructure base in education, science, technology, and industry as part of its efforts to develop its scientific and technological skills. Additionally, it devotes 0.84% of its GNP to research and development (R&D) activities, of which the industrial portion was only about 20% in 1992–1993 and the remaining portion was funded by the government, which serves as the primary funder of S&T in the nation.
Indian business is currently developing quickly. Wealthy nations are openly importing modern technology. Through ISO 9000 certification, new quality standards are being adopted and put into practice. In the past, the bulk of industries was protected by the government and only focused on production management. There wasn't much of a push for innovation. Recent events have resulted in a significant shift in the situation because industrial organizations that previously only managed production are now heavily investing in innovation and have established internal R&D departments in their facilities. There are approximately 1200 internal R&D units in the nation that have been approved and acknowledged by the Indian government. Even the national laboratories have been instructed to fund their R&D by creating and selling the necessary technologies to the Indian industry domestically. In 1993, India authorized a total of 1476 foreign technical collaborations (Table 1); Table 2 provides information on domestic R&D output by industry. Table 3 details the types of automobile products for which new connections with different foreign industrial companies were established in 1994.

II. Foreign Investments

According to the Industrial Policy Resolution published by the Government of India in July 1991, the country would welcome foreign investment and technological partnerships in order to obtain higher technology (to boost exports and broaden the production base) while continuing to pursue its policy of developing indigenous technology for self-reliance.
In terms of technology and investment, the connection between domestic and foreign industries also needs to be much more dynamic than in the past.

Table 1. Collaboration on technical issues with developed nations

Sector	Country					Total (numbers)
	USA	Germany	UK	Japan	Others*	
Chemical	52.00	24.00	26.00	09.00	101.00	212.00
Electrical & electronics	60.00	19.00	19.00	24.00	100.00	222.00
Consultancy and other services	72.00	11.00	19.00	04.00	90.00	196.00
Mechanical engineering	21.00	24.00	23.00	13.00	43.00	124.00
Industry Machinery	24.00	22.00	15.00	03.00	37.00	101.00
Others**	89.00	77.00	73.00	42.00	340.00	621.00
TOTAL	318.00	177.00	175.00	95.00	711.00	1476.00

**Other sectors include Metallurgy (70). Transport (81), Textile (44), Machine tools (11), Alternative energy source (10), and Miscellaneous (405).
*Other countries include Switzerland (63), Italy (58), and the Netherlands (55). France (49). Sweden (10), etc.

Table 2. Sector-specific R&D production, 1991-1992

R & D output	Institutional Sector		Industrial sector		Total
	Central Sector	State Sector	Public Sector	Private Sector	
Patents sealed	153.00	2.00	30.00	248.00	433.00
Products developed	611.00	102.00	704.00	4190.00	5607.00
Processes developed	400.00	51.00	177.00	1779.00	2407.00
Import substitutes developed	332.00	27.00	935.00	2489.00	3783.00
Design prototypes developed	438.00	1554.00	396.00	2482.00	4870.00
Consultancy services rendered	7882.00	3150.00	195.00	1167.00	12394.00

The total amount of foreign investment that was approved during 1993 was Rs. 8665 crores, a 128% increase over the corresponding numbers for 1992. About 13.6% of this money, or Rs. 1205 crores, came from non-resident Indians (NRIs). Approximately 44.5% of NRI investments are non-repatriable, and the remaining 55.5% are repatriable; in 1992, these numbers were 41% and 59%, respectively. As lump-sum technology payments, a total of Rs. 3690 crores (gross of taxes) were authorized in 1993, compared to Rs. 2281 crores and Rs. 980 crores in 1992 and 1991, respectively.

There were 177 proposals with export duties in total that were approved in 1993, 142 of which had 100% export obligations. The 177 plans are broken down into the following sectors: 111 for miscellaneous, 13 for electrical and electronics, 10 for consulting and other services, 14 for chemicals, 7 for metallurgy, 8 for mechanical engineering, 9 for textiles, and 5 for transportation. The breakdown of the 100% export cases lists 94 cases under miscellaneous, 9 cases under electrical and electronics, 9 cases under consulting and other services, 11 cases under chemical, 6 cases under metallurgical, 5 cases under textiles, 6 cases under mechanical engineering, and 2 cases under transport.

III. Policy Directives

With a view to providing policy backing for the growth of indigenous technology in India, a Technology Policy Statement was enunciated in 1983, with the primary objective of developing indigenous technology and adapting imported technology, as appropriate to national priorities and resources, thus leading to a self-reliant economy in the country. In addition, the Government of India approved the R&D Cess Act in 1986, which established the levying and collection of a cess on all payments made for the import of technology with the aim of promoting the commercial application of indigenously developed technology, modifying imported technology for wider domestic applications, and dealing with matters related to or incidental to these.

Additionally, several promotional measures were introduced to strengthen the R&D culture in India in order to take into account the continuously rising investments made in the fields of education and scientific research in academic, industrial, and R&D institutions and laboratories, such as: acknowledging in-house R&D units, offering tax incentives, etc.; introducing a technology absorption and adaptation scheme; establishing national awards for excellence in R&D in industry.

Instead of pursuing industrial R&D as an academic endeavor, national laboratories of the Council of Scientific and Industrial Research (CSIR) have been instructed to earn their R&D expenditure through the commercialization of locally developed technologies and the promotion of applied R&D projects, resulting in the generation of patents. This has made joint ventures possible, which has allowed for development.

To speed up growth and promote the use of indigenous technology in production processes, a program called the Fund for Technology Development and Application has recently been introduced. The 5% cess on payments of royalty for imported technologies, which is presently collected under the Research and Development Cess Act, 1986, into a new Fund for Technology Development and Application, is being credited and placed with the Government of India Department of Science & Technology (DST), Government of India, New Delhi, which is already operating the Pass Book Scheme.

DST is developing the new scheme's features in order for it to go into effect at the beginning of 1996.

IV. Technological Self-Reliance

Under its “Programme Aimed at Technological Self-Reliance” (PATSER), the Department of Scientific & Industrial Research (DSIR), Government of India, is encouraging industry's efforts in the development and demonstration of indigenous technologies, development of capital goods, and absorption of imported technologies with a view to implementing these policies. The PATSER plan aims to accomplish the following:

1. Supporting the industry's adoption, development, and demonstration of technology;
2. fostering domestic capacity for the creation and commercialization of cutting-edge goods and methods with significant social effect;
3. Collaborating with national research organizations.

These RDDE initiatives ought to be focused on the development of capital goods that are in high demand as well as the improvement or full development of a product or a process. The projects should have a significant positive impact on the industry in terms of increasing its technological level, high turnover, energy and material savings/recovery, and foreign currency earnings or savings, among other things.

Therefore, it is possible to infer that the nation is committed to India's techno-economic development from the presence and nature of acts as well as the promotion and execution of measures for S&T development and protection.

V. R&D for Innovation

The Indian government is dedicated to developing India's technological ability and capabilities and utilizing them for the advancement of the country. In order to compete in the global market, national R&D organizations and industries are currently reviewing their strategies, policies, and programs, especially in light of the impending revision of intellectual property rights and GATT. The Indian system is working hard to rapidly adapt to the new global regime that will soon take effect in the delicate field of patents due to the GATT.

In science and technology, prioritization is preferred to broad classification as it is currently practiced. Since the Indian industry is more knowledgeable about the most recent developments in high-tech fields abroad, the government should support R&D projects in new fields in order to encourage industry investment in R&D, avoid importing technology repeatedly, and, if possible, gain an advantage over some of these. The R&D system in India may benefit greatly from this novel approach to managing R&D in particular fields, building a technology base, and reaching the pinnacles of excellence in some fields. India requires rapid technological innovation and adaptation given its current stage of development, as globalization has made it necessary to upgrade technologies even in the small-scale industrial sector.

R&D is thus a crucial part of the innovation system for fostering technology development in the nation, regardless of whether it involves developing technology domestically or acquiring and modifying foreign know-how. The repetitive costs associated with importing the newest technology needed to produce high-quality goods for both domestic and foreign markets could be avoided through technological innovation. In any event, multinational corporations won't be able to save India from the difficulties of constant technology importation. Only domestic technology can.

India is using a two-pronged approach to R&D management for her socio-economic development, which is to "make some and buy some." This enables her to take advantage of her late starter status, the benefit of choosing a suitable area of specialization, and the potential to exploit the trade-in technologies in the global marketplace.

It is now necessary to make efforts to find ways to raise the level of S&T in India. This is advantageous because the nation already has a sizable S&T infrastructure, manpower, investments, and climate that encourage the creation, adoption, and adaptation of

technology. This has led to a close connection between the internationalization of industrial research and technology and the globalization of the economy.

VI. Lacunae

The apex science advisory bodies have been tasked with identifying and recommending measures that would increase the nation's technological self-reliance with particular reference to the Government's policy on foreign collaboration and technology import. This pattern of development for further utilization of India's S&T resources, particularly measures for striking a balance between domestic capabilities and foreign assistance.
However, self-reliance (or adopting an inward strategy) has weakened India's sectors' competitive spirit. Targeting beyond self-reliance is necessary for success in the global marketplace as a result of globalization.
Even industry-related study has evolved into academic endeavors. These goals have influenced how science and technology have developed in India.
In addition, there is a lack of knowledge about patents in the nation, which prevents India from integrating its research efforts with those of the rest of the globe.
Following liberalization in India, there will be greater demand for patent information in order to encourage the development of homegrown technology and prevent the repeated purchase of expensive technology.
Now, as a result of liberalization and the signing of the GATT, India has entered an age of extensive subcontracting due to the availability of inexpensive labor, raw materials, a sizable consumer market, etc., in addition to opening up Pandora's Box of high-quality consumer goods. However, there is concern that it might not have an impact on India's technological base because of the free flow of investments and technologies by foreign corporations. Fear is also being voiced regarding issues like the developed world imposing subpar technologies or dumping hazardous materials on the nation. The potency and applicability of India's policy statements on science, technology, industry, education, etc. would also be put to the test in this context.

VII. Conclusion

Technology plays a significant role in both research and production. The North's developed nations control the majority of the world's S&T resources, which gives them a significant R&D advantage in frontier regions.
The spread of new, cutting-edge technologies like telematics, microelectronics, biotechnology, and new materials in the West poses a further danger to widening the gap between developed and developing nations in terms of technology. The possibility for these technologies to advance is enormous.
They are becoming so crucial to the industrial sector that virtually all the major international corporations are moving their operations there through a variety of strategies, including diversification, acquisition, mergers, etc. The adoption of new technologies would significantly alter the global pattern of production and commerce. This includes intellectual property rights laws that seek to preserve the dominant power of technological advancements as well as laws that promote technological advancements by strengthening government-industry partnerships in emerging technologies.
As a consequence, it should be noted that a small number of industrialized nations account for a significant portion of the world's S&T resources, R&D activity, and innovations. These are necessary for capturing the benefits of technological advancement for the growth of developing nations. Building up native technological capacity is necessary for this.
Everyone is aware that any endeavor to develop indigenous technologies will face significant challenges unless a concerted effort is made to develop local technological capabilities for absorbing the imported technologies. India has adopted a two-pronged strategy to achieve techno-economic development, namely:

(i) Developing indigenous R&D to create an infrastructure for the transfer and application of technology toward industrial development; and
(ii) Acquiring and transferring technology from abroad and gradually assimilating, adapting, and disseminating it into the established system.

To allow India to compete and succeed in the international market, a techno-economic strategy is now required to implement specific corrective measures. Being the most important factor in economic development, technological capability is vital for prosperity as well as for raising the standard of living. In the absence of incorporating science and technology into the planning process, simple economic liberalization would not give India a competitive edge.

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