

177/16

TECHNOLOGY TRANSFERS IN INDIA

C.B. GUPTA*

Imports of foreign technology and knowhow has been used as tool of rapid industrialisation in India. In recent years, there has been a spurt in technical collaborations from abroad. The Government should consider certain safeguards while permitting such collaborations. An analysis of technology transfer agreements since independence reveals that in many cases the imported technology has not been properly assimilated. Moreover, import of technology has taken place in many low priority areas at exorbitant price. Careful and continuous vigilance is required to ensure that technology transfers take place in accordance with prescribed policy norms. An open door policy is not conducive to national interests. The author is of the view that the efforts should be made to reduce dependence on foreign technology and knowhow.

The operation of Transnational Enterprises (TNEs) in developing countries has been advocated mainly on three grounds; viz (i) they supplement domestic investment; (ii) they provide the source of foreign exchange; and (iii) they bring the much needed technology and knowhow for rapid industrialisation. In this paper, an analysis has been made of the role played by TNEs in the sphere of technology in India.

TNEs are generally repositories of advanced technology and they are supposed to introduce sophisticated technology and knowhow in host countries. It has widely been argued that the main contribution of TNEs lies not in the supply of capital or foreign exchange, but in the transfer of advanced technology, superior managerial expertise and entrepreneurial skills.¹ Dissemination of valuable knowledge and entrepreneurship, product technology, marketing skills and managerial expertise is considered to be the main virtue of TNEs.² Foreign capital is allowed to enter the Indian economy on the assumption that the foreign companies will bring in sophisticated and modern technology.

I. Diffusion

The extent of the spread of foreign technology in Indian industries through the TNEs can be assessed only in terms of factual information of a representative nature. A rough index of diffusion is the number of Indians trained abroad by the TNEs. In recent years the number of foreign technicians employed in TNEs in India has gone down considerably and an increasing number of Indians have been trained abroad. But this alone should not be taken as a sign of increasing flow of foreign technology. Foreign firms possess a

* Dr. C.B. Gupta is Reader, Department of Commerce, Shri Ram College of Commerce, University of Delhi.

monopoly of technology in particular fields, and are reluctant to impart much of their know-how and skill to local personnel.³

The superior technical knowledge of TNEs often does not get permeated into Indian industries as it is heavily guarded as business secret by them through various restrictive practices including the heavy wall of patent rights. Technology transfer to developing countries takes place under imperfect conditions wherein the suppliers of technology dictate terms and conditions. They impose several types of restrictions e.g. territorial restrictions, restriction of commercial utilisation, prohibiting competitive technology, tying with purchases in the TNEs, etc.

Often important processes and formulae are not disclosed and explained to Indian partners and Indian technicians are not associated in designing project works. Thus, the expected diffusion of technology does not seem to have taken place. It has been seen that an overwhelming number of TNEs soon after gaining entry in the country, approach the Government to seek permission for signing a multiple of technical collaboration agreements.

Various types of restrictive clauses in collaboration agreements have increased over the years. The restrictions are not only found in a large proportion of the total number of agreements but are also pervasive in nature. They prohibit the Indian partner from sublicensing imported know-how and skills, from using certain processes, from manufacturing products outside the prescribed range etc. An industrywise classification of restrictive clauses shows that restrictions are more common in high-priority industries like electricals, chemicals, pharmaceuticals, shipping etc.⁴ Though such restrictions are now less common due to the government's policy, informally they may exist even now in a large number of cases. Foreign technology might have stimulated indigenous technology in certain industries but in view of the widespread restrictive clauses, there is little scope for the diffusion of imported technology into Indian industries. Several studies have substantiated this contention.⁵

II. Quality of Technology

Besides the degree of diffusion of foreign technology, the nature and quality of technology are also important. Sufficient data on the quality of technology imported is not available. However, analysis of the type of assets transferred, or the type of agreements, made, the sectoral distribution of technical collaborations and the size distribution of firms entering into such collaborations can shed some light on the type of technology brought in by the TNEs.

Analysis of the type of assets transferred shows that the number of cases involving transfer of know-how were about one-third of the total number. In the majority of cases, transfer of production knowhow took place through licensing agreements, involving supply of plant and machinery, use of patents and trade marks, etc. Training of Indian personnel abroad and

deputation of foreign technicians to India were relatively insignificant.⁶ Evidently, licensing agreements make for an extensive transfer of knowledge and a closer association between foreign and Indian enterprises, but do not necessarily involve transfer of superior technology.⁷ It is believed that strict controls over royalty have affected the quality of technology imported in India.

The Industrial pattern of technical collaboration agreements can also throw some light on the magnitude, character and trend of technology transfer to India..

It appears that high priority industries such as electricals, machine tools, chemicals etc. account for more than half of the total number of agreements.⁸ However, the number of agreements may not be a satisfactory indicator of the relative importance of each group in the total technology transfers owing to differences in the size of different industry groups.⁹

III. Adaptation And Assimilation

Imported technology can be of little benefit unless it is adapted to suit Indian conditions and improvements are made therein to avoid dependence on foreign technology in future.¹⁰ Research and development (R&D) may be some indication of the degree of adaptation and assimilation of foreign technology. RBI's surveys reveal that though the R & D departments were established in most of the enterprises after the collaboration, only one-third of the enterprises having foreign collaborations had R&D departments.¹¹ Moreover, the R & D efforts were directed mainly towards product development and adoption or cost reduction and import substitution rather than towards product or process innovation or import substitution in production process. Further, in majority of the technical collaborations there existed restrictive clauses prohibiting the Indian partner from making any modifications and/or improvements in imported technology without the consent/prior permission of the foreign collaborator. In most of the collaboration agreements there was no stipulation requiring the host company to develop its own R&D facilities so as to eliminate dependence on the foreign collaborator beyond the duration of the collaboration.

Available data on R&D shows that TNEs spend an insignificant proportion of their sales on R & D in India. In spite of their very large size and huge resources, TNEs in India spend on an average one per cent of their sales which compares unfavourably with international levels of 5 to 10 per cent.¹² It has been found that there is a calculated reluctance on their part to undertake or assist R&D efforts within the plants in India.¹³

Thus, R & D are invariably conducted abroad and the technology is not supplied in its entirety. Moreover, the TNEs retain continuous control over the know-how through their production and staffing policies, so that the Indian enterprises have to depend on TNEs for all improvements in future. This continued technological dependence results in excess capital imports and a

heavy burden on the country's balance of payments.

It has also been found that TNEs make little effort to restructure technology to suit Indian conditions. Once the technology is supplied little attempt is made to adopt and improve upon it and the collaboration agreement is just renewed from period to period in the hope of getting more modern technology. Further, TNEs do not warrant licensed products and do not undertake responsibility for the future of a licensed process.

It appears from the foregoing analysis that TNEs are of little help in the development of indigenous technology. Foreign technology should be used to develop indigenous knowhow and should not be a permanent measure. Therefore, India must develop her own R&D facilities.¹⁴

Another qualitative measure of R & D efforts is the number of personnel employed in R&D departments of companies with foreign collaboration. The number of professional and qualified research personnel constituted a negligible proportion of the total number of employees and less than half of the total R&D personnel.¹⁵

It is possible that TNEs may have made the Indian industry more R&D conscious, but they have made the Indian licensee more dependent on the licensor's R&D instead of helping in the development of indigenous R&D. Export restrictions in collaboration agreements not only result in loss of foreign exchange but also raise the cost of technology transfer by restricting the size of the firm.¹⁶ Thus, the argument that TNEs graft much needed technical knowhow and skills into Indian industries is not borne out by empirical evidence.

Though large scale transfer of technology has enabled the programme of industrialisation to succeed, it has meant for India great financial costs, disturbances of local R&D, increased technological dependence and adverse impact on development goals.¹⁷

IV. Cost of Technology

Another important aspect of technology transfer by the TNEs is the cost of technology transferred to India. Technology transfer involves two types of costs — direct and indirect. Direct costs consist of remittances by way of royalties, technical fees, payments to foreign technicians, etc. Indirect costs arise in the form of over-invoicing of transfer of knowhow, etc. against equity, inhibition of the development of indigenous technology, transfer of inappropriate technology, etc. It is not possible to measure quantitatively the indirect costs of technology transfer. There is, however, evidence to believe that indirect costs have been high in India. Both the surveys conducted by the RBI and interviews taken by Mr. Balasubramanian reveal that transfer of human skills and tangible assets tended to be greater when TNEs had a high interest in equity capital. This implies that TNEs are willing to transfer a wide range of technology only when they are assured of effective control of the enterprise. These studies also point out that in most of the cases Indian

enterprises are required to import machinery and materials from the TNEs or from the sources specified by them. There is a wide scope for over-invoicing which increases the cost of technology. In the absence of relevant information, it is not possible to find out the extent of over-invoicing, but there is evidence to indicate that the problem is real and further research needs to be done in this area.¹⁷

There have been several cases of import of unsuitable technology at a high cost in India. For instance, foreign technology has been used inefficiently in the paper industry. In the motor vehicles industry, imported techniques have imposed a pattern of fashion-induced changes utterly alien to Indian conditions, TNEs tend to over-import technology due to the ignorance of Indian conditions and due to their reluctance to import a complete technology. Import of sophisticated, high cost technology requiring complex servicing and high wage operation are as such wasteful in India. "By importing a technology lock, stock and barrel as many foreign investors tend to do, the country might easily saddle itself with apparatus that requires too sophisticated a network of servicing and ancillary industries or that cannot be justified in terms of ruling wage or employment levels."¹⁸

What is more important is that exceptionally high royalties and technical fees have frequently been permitted by the Government of India.¹⁹ The terms approved vary significantly from one enterprise to another.²⁰

V. Unwarranted Transfers

There has been a tendency in India to clamour for foreign technology and investment without taking into account their full implications.²¹ Such craze for imported knowhow has resulted in the import of technology in low-priority consumer products, well established industries and in other unnecessary and undesirable spheres.²²

It has been found that majority of the TNEs in the drugs and pharmaceutical industry in India process mainly imported bulk pharmaceutical into compounded pre-parations, tablets, ointments, injectibles, etc.²³ The type of processing work done by them does not involve in majority of cases, special types of experience and technical skills which the indigenous industry do not possess.²⁴ Permission and renewal of collaborations with TNEs in such cases is unjustified as it entails an avoidable use of scarce foreign exchange for a low-priority purpose.

VI. Repetitive Transfers

Apart from transfer of technology in unnecessary spheres, technology of the same type has been imported in India again and again. According to one estimate, a total of 33 agreements were approved in coatings: 22 each in cables, radios and transistors and 18 in ball bearings.²⁵ Dutt Committee found that repetitive collaborations were unduly involved in 102 out of 303

products²⁶ in which repetitive collaborations were permitted, assuming five collaborations or more for the same product category as the criterion of undue repetition in collaborations. In case of 50 products, multiple collaborations²⁷ appear to have been granted in the same year. To give a few instances, 26 collaborations were permitted in house service meters, 15 in transistors, 56 in textiles, 23 for cranes and 18 for electricmeters.

Repetitive imports of technology not only increase burden on the country's balance of payments but also make the absorption and adaptation of technology difficult. Permission for competing units where one or two will do and imports in non-essential industries result in excessive imports of technology thereby raising the cost of technology. For each agreement and for each and every bit of technology the TNEs in India make separate payments in foreign exchange. Two other factors which have caused excessive imports of technology in India are the non-permeation of imported skills in the economy and the xenophillia of Indian market. Imported know-how fails to permeate largely due to the TNEs' efforts to divorce importing of technology from imparting of technology.²⁸ Xenophillia refers to the Indian buyers preference for foreign brand names. Indian firms have in several cases sought association with TNEs not to have a better access to know-how but simply to acquire a foreign brand name.²⁹ This had led to excessive imports, unnecessary changes in product or process specification and unwarranted collaborations.³⁰ Government's efforts to check the use of foreign brands do not effect the old agreements and informal clauses to that effect. Kidron³¹ has suggested several measures to eliminate the abuse of foreign brand names. According to him³² the Government of India has to a great extent been responsible for the over import of technology. It has shown preference to concerns with foreign collaborations in the matter of licensing. Moreover, its "plants are normally very capital intensive throughout and impose a comparable structure on private units in shared industries. Its preparedness to pay high fees seems unlimited and it is notorious for inviting foreign experts when equally or more suitable local ones are available."³³

From the foregoing analysis, the following conclusions may be derived:

- I. Transfer of technology has been effective to a very limited extent. The imported technology has not been properly assimilated and adapted to suit Indian industry and it has not helped to any significant extent the development of indigenous technology, resulting in continued dependence on foreign technical know-how.
- II. Technology transferred by the TNEs has in some cases not been really of a good quality and a fairly high cost had to be incurred for the acquisition of technology through the TNEs.
- III. Technology has been imported in unnecessary and undesirable spheres of industry. Repetitive imports of similar knowhow have resulted in over-importing of technology at high prices. Imports of inappropriate technology have taken place. Mark-up of capital im-

ports and manipulation of profits occurred in quite a large number of cases due to restrictive clauses in the collaboration agreements.

- IV. Foreign capital and sophisticated technical knowhow may be essential for certain industries but there is no need for a free flow of foreign enterprise in India. An "Open arms" policy is completely ruled out. Moreover, it is necessary to guard against the exploitation of the national economy by the TNEs. Careful and continuous vigilance is necessary to secure adherence to set policies and prescribed procedures. We can not afford to permit TNEs to secure concessions and exemptions for themselves through money power and political pressure at the cost of our economy.

NOTES AND REFERENCES

1. See for instances, Penrose, E. "Foreign Investment and the Growth of the Firm" in *The Economic Journal*, June, 1965, pp. 232-33; Cairncross, A.K. *Factors in Economic Development*, London, George Allen & Unwin, 1962, pp. 63 and 88; Meir, G. *International Economics of Development; Theory & Policy*, New Lewis, York, Harper, & Row, 1968, p. 141; Lewis, W.A. *The Theory of Economics Growth*, London, George Allen & Unwin 1965, p. 258 and Makesell, R.F. (ed); *U.S. Private Investment Abroad*, Eugene, 1962, p. 149.
2. Dunning, J.H. *Studies in International Investment*, London, George Allen & Unwin, 1970, pp. 4-5 and Kapoor, A. "Foreign Collaborations in India" in the *Oriental Economist*, July 1968, pp. 31-32.
3. Kidron, M. *Op. Cit.*, 1963, p. 17 3 13 and National Council of Applied Economic Research (NCAER): *Foreign Technology and Investment: their role in India's industrialisation*, New Delhi 1971, table 39
4. R.B.I.-op. cit. 1974, pp. 110-115, table 14.
5. See (a) Tariff Commission Reports on: The Aluminium Industry (1951, 1955 and 1960), Automobile Industry (1956), Piston Assembly Industry (1956), Bicycles Industries (1960), Power and Distribution transformers industry (1960) (b) Kirdon M-op. cit., pp. 288-93 (c) Sokhey, S.S. "The Drug Racket" in *Science & Culture*, January, 1962 and the EPW, September 28, 1967 p. 1624 and NCAER- op. cit. p. 47.
6. *The Economic Times* dated Nov. 30, 1964 October, 4, 1965; March 28, 1966; October 31, 1966; and November 30, 1969.
7. Balasubramanian, V.N. *International Transfer of Technology to India* New York, Praeger, 1973, p. 56.
8. All the approved agreements may not have materialised. The NCAER (op. cit. 1971, p. 168) study estimated that 25 per cent of the agreements failed to materialise while the RBI (op. cit. 1974, p.3) Survey found that 16 per cent of the approved agreements did not materialise.
9. Balasubramanian, V.N. *Op. cit.*, p. 44-45.
10. Kurién, K.M. op. cit., p. 345 observes that "the absorption of the benefits of foreign capital through greater assimilation of technical knowhow and expertise is as important as the absorption of income. In a country like India, this acquires greater significance because without better technology and managerial experience the abundant natural and human resources cannot be industrially harnessed to the advantage of the starving millions". He further observes that "no development is lasting or self-generating which is merely imposed from above or imported from abroad. The new education and technique will show results, only when they are completely assimilated and begin to develop on lines of a native tradition."
11. R.B.I.: op. cit. 1974, p. 133-34. The National Committee on Science and Technology in its Report of May 1973 reported that out of 197 subsidiaries of foreign companies operating in India only 80 had their own R&D departments.

12. Subrahmanian, K.K. "Market structure and R&D Activity: A case study of the Chemical Industry" in the Economic and Political weekly, Bombay, August, 1971, pp.
13. Subramanian, K.K. "Problems of Technology Transfer from Advanced to Developing Countries" in International Seminar on Technology Transfer, Seminar papers, vol. I., New Delhi, Council of Scientific and Industrial Research, February, 1973, pp. 3.19-3.20
Also see Report of the (Mathi) Committee on Drugs and Pharmaceutical Industry in India, Government of India, 1974, ch. 5.
14. United Nations: Measures for the Development of Underdeveloped Countries, New York, 1958, para 83.
15. G. O. I. Report of the National Committee on Science and Technology, May 1973.
16. "Much of the dynamism of private industry can be traced directly to the increasing number of foreign collaboration agreements concluded since 1947," Kidron, M- "Indo Foreign Technical Collaborations, in Hazari, R.K. (ed) op. cit. p. 164.
17. Kidron, M. (Foreign Investments in India, London, Oxford, 1965, p. 292) observes that "unable to undertake full production, the Indian concern is often effectively prevented from adopting products and processes to local conditions and materials, or from encouraging local ancillary industries and so become even more dependent on imported supplies".
18. See the Hindustan Times, August 12, 1979, p. 9.
19. See for instance Lal, S. "International Pharmaceutical Industry and Less Developed Countries" in EPW Nov. 30, 1974, p. 1992, Latif S. "A New Approach" in Seminar, July 1974, p. 29. The Economic Times, May 7, 1977: Richman, B.M. and Copen, M.R. International Management and Economic Development, New Delhi Tata Mc Graw Hill, p. 603, and Subrahmanian K.K. and Pillai, P.M. "Implications of Technology Transfer in Export Led Growth Strategy, in EPW, Oct. 30, 1976. The last mentioned study revealed a marked difference in the prices paid by domestic firms and foreign firms for imports of similar raw materials during the same period of time.
20. Addison, J.C. A case Study in Industrial Development in the Growth of the Pulp and Paper Industry in India, Cambridge Mass 1965, R. Roned, pp. 264-65.
21. Tariff Commission's Report on the Automobile Industry, 1956, p. 47.
22. Kidron, M. op. cit. in R.K. Hazari (ed) p. 161.
23. Nigam, R.K. "Flow of Foreign Investments" in Company News & Notes, August, 1964, pp. 21-22 and Kidron, M. op. cit. 1965, pp. 265-71.
24. The Report of the Industrial Licensing Policy Inquiry (Dutt) Committee, 1969, Vol. III. pp. 64-68, revealed that TNEs have charged varying rates for identical or similar technology in case of 70 selected products. For instance, in the case of domestic refrigerators, the agreement with Hyderabad Allwyn made in 1957 and valid for ten years provided for a royalty of 15 per cent in addition to a lump sum payment covering the actual cost of drawings plus 5 per cent there on. As against this, the agreement with Godrej and Boyce made in the same year and valid for 5 years, provided for a royalty of 4 per cent plus lumpsum payment for the cost of drawings plus 3 per cent thereon. For further details refer to pp. 125-129, tables XII, XIII and Appendix XV-B of the report.
25. Report of the Industrial licensing policy Inquiry (Dutt) Committee, op. cit., table XIV, p. 131.
26. "Foreign and foreign associated persons were permitted to establish capacities in industries where and when they had no special contribution to make, to the disadvantage of the indigenous manufacturer and technical knowhow." *Ibid*, table XV, p. 132.
27. Subrahmanian, K.K. "A study of Foreign Private Investment in India since 1950", Bombay University, 1967, Ch. 4.
28. Report of the Pharmaceutical Enquiry (Bhatia) Committee, G.O.I. 1954, p. 63.
29. Report of the licensing Policy Inquiry Committee, op. cit. pp. 124-125.
30. It may be noted that the Committee on Foreign Collaborations (Mudaliar Committee) had in its Report (Para 13) taken the view that repetitive import of knowhow may be considered significant where the number of collaborations exceeds five or six.

31. Kidron, M., "Excess Imports of Capital and Technology in the Private Sector" in Hazari, R.K. (ed), op. cit., p. 264.
32. Kidron, M. op. cit., pp. 266-267.
33. Kidron, M. Op. cit., p. 3045-To give one instance of the Government's excessive reliance on foreign technical knowhow., the entire work relating to a project including the preparation of project reports, workings, drawings and designs in the case of National Coal Development Corporation was assigned to foreign collaborations even when the Corporation had the necessary technical know-how" (quoted in Kidron M. op. cit., p. 304.).