

Transfer of Technical Know-How Through Multinational Corporations in Pakistan**

by

G.M. RADHU*

The traditional theory of foreign investment says that foreign investors, which usually are the multinational corporations, bring to underdeveloped countries not only foreign equity and loan capital most often in foreign exchange but also advanced technology and managerial experience. Most underdeveloped countries lack qualified technical skills and managerial personnel; local entrepreneurs are usually not adequately trained to meet the problems involved in rapid technological change. Multinational corporations bring with them sophisticated technical know-how, modern management and marketing techniques and manufacturing experience. They also give training to local staff in both the technical and managerial fields.

Some patented processes and designs necessary to successful production are sometimes made available under licence without the accompanying foreign loan/equity capital; but management, marketing and organizational skills, and some technical know-how complementary to the licensed technology is usually not transferred by multinational firms without having equity participation [1]. Often the knowledge covered by licence alone is not sufficient; the complementary know-how and skills are required to apply the patented knowledge to actual production. Particularly in underdeveloped countries where local technical skills are scarce and technical personnel is limited, the complementary know-how and skill is very important.

In recent years however the problem of transfer of technology to underdeveloped countries has been subject to severe criticism, and serious doubts have been expressed about the advantages of transfer of technology through multinational corporations. The main criticism is concerned with technical knowledge as a source of monopolistic advantage. According to Hymer's way of thinking, [5] the terms of which proprietary technology is transferred to under-

*The author is a Research Economist at PIDE.

**The term multinational corporation is used here in a broad sense to refer to any firm which has subsidiaries in more than one foreign country.

developed countries are worked out by negotiation which depends upon the relative advantages held by each side in terms of attraction to the other party of what is offered. But the leverage usually lies with the multinational corporations which are in a position to offer the much needed technical and managerial know-how, capital and foreign exchange. To the extent these factors are not available elsewhere and their owners hold a monopolistic position, they are able to dictate the conditions of entry; in practice, however, they are not likely to collaborate with local interests, except on their own terms. Even if capital and foreign exchange were available from other sources, most of the technical knowledge developed by private companies is not easily obtainable from alternative sources. The international law for patents gives the inventor the exclusive right to use and license the patented knowledge. Due to their superior bargaining power if multinational corporations are able to control production from the transferred technology to obtain abnormally high rates of return and to dictate terms and conditions unfavourable to the interests of the local economies, then indeed the real costs of obtaining foreign private technical knowledge may well be very high.

The second criticism is concerned with the type of techniques transferred. It is often argued that the techniques which are transferred through multinational corporations are techniques inappropriate to underdeveloped countries; inappropriate in the sense that the techniques are usually capital-intensive when labour-surplus economies of under-developed countries require labour-intensive techniques.

This paper is an attempt to investigate the problems of transfer of technical and managerial know-how in the case of Pakistan. However, a thorough investigation of all the above mentioned issues is not possible because the kind of information and data necessary for such an investigation are not available. Perhaps due to this reason not much work has been done in this area. The scope of the present study is thus a limited one due to the unavailability of data.

Source and Coverage of Data

The present study is mainly based on a sample of 50 technical collaboration agreements made between multinational corporations and local enterprises. The source is the State Bank of Pakistan, Karachi. The sample was selected at random from a population of around 200 agreements; thus our sample covers roughly about one fourth of the population. The population refers to the total technical collaboration agreements made in the manufacturing sector of Pakistan and upto 1969. It does not include agreements made in other sectors of the economy. Also excluded are public technical collaboration agreements. In addition to the 50 agreements other relevant informations were also used to strengthen the analysis.

Industrial and Country-Wise Classification

The following table shows the distribution of the 50 agreements by countries and industries. As Table I indicates, the United Kingdom leads in the number of agreements. Of the total agreements in the sample 34 percent are with the U.K. firms. Agreements with U.S. firms account for 20 percent of the sample. The other important countries in this respect are West Germany,

TABLE I

Agreements Classified by Industries and Countries

Industry/ Country	Food Pro- ducts	Toba- cco	Textile	Chemi- cals and Pharma- ceuticals	Oil Refinery	Cement and Clay Products	Iron and Steel	Fabri- cated Metal Pro- ducts	Machi- nery non- electrical	Electri- cal goods	Vehi- cles	Total
1. United Kingdom	1	1	1	7	1	1	—	—	1	3	1	17
2. United States	1	1	3	5	—	—	—	—	—	—	—	10
3. West Germany	—	—	1	3	—	—	1	—	—	1	—	6
4. Japan	—	—	—	1	—	—	1	—	1	3	—	6
5. Switzerland	—	—	2	2	—	1	—	—	—	1	—	6
6. Netherlands	—	—	—	—	—	—	—	1	—	2	—	3
7. France	—	—	—	—	1	—	—	—	—	—	—	1
8. Belgium	—	—	—	—	—	1	—	—	—	—	—	1
Total:	2	2	7	18	2	3	2	1	2	10	1	50

Source: State Bank of Pakistan, Karachi.

Japan and Switzerland. The industrial classification shows that of the total agreements listed in Table I, 36 percent are in the chemical and pharmaceutical industries. Electrical goods and textiles are the next important industries in terms of the agreements.

The predominance of the agreements with U.K. firms is explained by the historical ties and the long-standing business connections that have existed between the two countries. The superiority of the U.S. firms in the chemical and pharmaceutical industry accounts for the concentration of their agreements in this industry. In the early 1950's U.S. produced one-half of the world output of chemicals and her exports of chemicals increased five-fold between 1957 and 1959 [6]. Japan has collaboration agreements in those fields where she is regarded as technically more efficient than other countries, such as electrical goods, iron and steel etc.

Table II shows that the collaboration agreements are concentrated in complex technology industries. The measure of technological intensity is however a bit crude as there is no direct index of it. Generally research intensity or skill intensity is used as a proxy for technological intensity, on the assumption that complex technology industries require more research expenditure or more skill per unit of output. Our classification of industries into complex, medium and simple technology has been done on the basis of research intensity of different industries in the U.S.¹

The concentration of technical collaboration agreements in complex technology industries is noted above. The main motive of local firms for seeking foreign technical collaboration is to obtain technical know-how and skill which are scarce at home. And foreign technical assistance is needed most where the technology is complex. In the chemical and pharmaceutical industry for instance, not only the process of manufacturing is complex but it demands sophisticated methods of quality control.

Another fact which is revealed by our sample study is that 74 percent of our sample agreements were entered into in the 1960's; only around 26 percent of the agreements were made before that. The considerable increase in the number of agreements in the sixties as against the earlier period is probably due to the development of more complex technology industries during the second and third five year plans. As Papanek pointed out, "For the period after 1960, less than ten years after the rapid development of simple industry began in Pakistan, over one-third of the investment which industrialists were prepared to undertake in the next few years was in the more sophisticated industries". [8]. In fact in our sample all the agreements in machinery, electrical goods, iron and steel industries and most of the agreements in the chemical and pharmaceutical industries were entered into during the sixties. Thus, the considerable increase in the number of technical collaboration agreements in the sixties seems to reflect the shift in the industrial structure from the development of relatively simple-technology consumer goods industries in

¹Research intensity is defined as research and development expenditure as a percent of net output. The U.S. figures are given in B.R. Williams' book (14). Since relative complexity of various industries remain the same in different countries, so U.S. figures and ranking of industries may be used for ranking of industries in Pakistan.

the fifties to the development of more complex intermediate and capital goods industries in the sixties.

TABLE II

Distribution of Agreements by Technological Intensity

Industries	Number	Per cent
Complex Technology		
Machinery	2	4
Chemicals and pharmaceuticals	18	36
Electrical goods and equipment	10	20
Oil refinery	2	4
Total	32	64
Medium Technology		
Iron and steel	2	4
Metal products	1	2
Cement	3	6
Vehicles (assembly)	1	2
Total	7	14
Simple Technology		
Food	2	4
Tobacco	2	4
Textile	7	14
Total	11	22

Source: Table 1.

Provisions

The various technical informations, technical services and rights made available by the multinational corporations in Pakistan fall into three categories:

1. The right to use patents and trade marks owned by the multinational corporations.
2. Training of local staff both in Pakistan and abroad.
3. Provision of technical informations (unpatented) and technical services.

The last category covers a wide range of items like the supply of blueprints, designs, patterns, secret processes, plant layout, installation of equipment, specification of materials, supervisory and managerial services, sales promotion, marketing and advertising information, new product information, etc.

Patents and Trade Marks

Licensing of patents and trademarks is generally part of the technical collaboration agreements. Granting of patents gives the inventor the exclusive right in its invention and those who wish to use the patented knowledge must secure a licence from the patentee. Table III shows the number of patent applications filed during the period 1955-1969 in Pakistan. As the table indicates around 95 percent of the patents are owned by foreigners.

Except for three cases, all the agreements studied include the provision of the use of patents and trade marks, 25 percent of the patent rights given are exclusive, the rest are non-exclusive. Given product differentiation, those exclusive rights are likely to give the licence-holder a certain degree of monopoly power because the licence-holder is the only firm which can produce the particular patented product in the country. Generally the knowledge covered by patent alone is not sufficient, the complementary know-how and skill are required to apply the patented knowledge to actual production, particularly in under-developed countries. This view is supported by our sample study. As the following table (Table IV) indicates the overwhelming number of agreements studied—that is around 90 per cent of them—have provision of complementary technical know-how in addition to patents and trade marks. Only 4 percent of the cases provide patent and trademark alone. In the developed countries, on the other hand, often the knowledge covered by patent alone is sufficient. According to one study done in the United States [2], out of 1,205 agreements made mostly between the U.S. firms and European firms 49 percent involved the extension of patent rights only i.e., without complementary know-how. The reason is that in the developed countries, highly qualified technical personnel are locally available and the standard of technical knowledge is high. Thus, it seems that in Pakistan the situation where the local firm is able to work the process covered by the patent without additional technical assistance from the foreign patentee is exceptional.

Foreign Technicians

From the study of agreements it appears that foreign technicians perform a variety of services. They render such services as feasibility study, plan lay out, installation of equipments, etc. They assist in production and marketing work, help in material selection and quality control, perform supervisory and managerial services, and train local staff. No figure is available on the total number of foreign technicians working in the manufacturing sector of Pakistan. The 1959-60 Census of Manufacturing Industries gives a figure of 661 foreign professionals and executives working in Pakistan at that time. According to Papanek, "Something over 10 percent of all firms obtained their technical knowledge from foreign technicians.....if one excludes small firms and traditional industries, 60 per cent of all investment was made in firms that used foreign technicians" [8]. Two case studies of joint ventures in Pakistan by Mukhtar [7] indicated that the technical side of these companies was completely handled and controlled by foreign technicians. Siemens (Pakistan) Ltd., during the initial periods, employed 30 German technicians [11].

TABLE III
Patents Applied for by Pakistanis and Foreigners, 1955-1969

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	Total
1. Foreign	880	872	981	1023	1103	1082	1063	1138	1170	1200	1231	1323	1209	1196	1130	16601
2. Pakistan	28	32	43	27	48	61	54	57	56	74	57	108	68	84	88	885
3. Total	908	904	1024	1050	1151	1143	1117	1195	1226	1274	1288	1431	1277	1280	1218	17486
2 as % of 3	3	3	4	2	4	5	4	4	4	5	4	7	5	6	7	5

Source: Patent Office, Karachi.

TABLE IV

Distribution of Agreements by Type of Assets Transferred

	Number	Per cent
Patents and trademarks	2	4
Know-how*	3	6
Patents and trademarks plus know-how	45	90

Source: Table 1

*Know-how here means complementary know-how.

Training of Local Staff

A majority of the agreements studied have provisions for giving training to local staff both locally and in the factories and plants of the parent companies located abroad. However, the number of persons to be given training and the duration of the training are generally not specified in the agreements. Training is given both in technical and managerial fields. The case study of Lever Brothers by Mukhtar [7] found that most of the senior Pakistani executives of Lever Brothers were trained both locally and abroad and out of the 14 assistant managers almost half were given training in the U.K. A survey of 56 companies carried out by the Overseas Investors' Chamber of Commerce and Industry reveals that over a period of 5 years, these companies sent 408 Pakistanis abroad for training. Similarly, Siemens (Pakistan) Ltd. alone sent 76 Pakistani members of their staff to Germany for training [11]. Thus it appears that a considerable number of Pakistani personnel has been given training by foreign companies in technical and managerial fields.

Costs and Payments

To examine the costs of obtaining foreign technical know-how, it is not the amount of royalties and technical fees alone that is relevant, but the total cost both private and social, which is related in some way to the amount of technical information and services made available. In other words, costs may appear not only in the form of royalties and fees but also in the form of excessive prices charged for material and equipments supplied by the foreign collaborator, in the form of high salaries of foreign technicians and high profits on the equities invested by foreigners, in the form of unduly restrictive features of agreements and in the form of inappropriate techniques of production.

Royalties and Technical Fees

Royalty is paid for the use of patent and trademark, and technical fee is paid for the general technical services and information provided. But this distinction appears, to a certain extent arbitrary because many agreements have technical fee charges only, though they have provision, for both patents and other technical services.

Our study shows that there is no uniformity in the terms of royalty and technical fee payments of different companies. In six cases annual lumpsum payments are made, in four cases specific charges are made, but in the majority

are not confined to any particular industry; rather they are scattered in various industries. The purpose of such restrictions seems to be to safeguard the export markets of the parent companies. The parent companies do not like to have competition from their own subsidiaries or joint ventures in third markets. The restrictions are obviously very unfavourable both to the local firm and the host economy in general. Because the local firms' scale of operation and output is limited by the size of the local market, it has to forego the economies of scale, if there be any, and also the benefits of exports. It is against the interest of the local economy, too, as the purpose of industrialization is not only import-substitution for the domestic market but also the expansion of exports of manufactured goods.

Forty-four percent of the agreements studied have tie-in clauses which means that all equipment and materials (imports) have to be purchased from the foreign collaborators, or through them. In some cases they act as buying agents for the local firms and all the imports are purchased through them. The tie-in clauses may have serious implications. The foreign company being the sole supplier of equipment and material, because of the agreement, may charge monopoly prices or excessive prices for the goods supplied. Examples of such practices have been cited by many authors. For instance Vaitos's study in Columbia [12] has shown empirically that a very large proportion of the return to the supply of technical know-how and capital may be got by overpricing intermediate inputs. Unfortunately no data is available for Pakistan to verify this proposition; however, according to one source [10] some U.S. pharmaceutical companies sold processed drug materials, to their affiliates in Pakistan, at prices more than 100 percent higher than those prevailing in the international market. The tie-in clauses and the resulting overpricing of intermediate inputs, not only increases the cost of production but is also likely to increase the import component of a given investment. That is because if the profit from overpricing is very attractive then the foreign collaborator will try to sell the maximum amount of materials and inputs which will have an adverse effect on the balance of payments.

Another restrictive clause is that on termination of an agreement (which may be terminated at any time by either party with due advance notice) the local company should discontinue immediately the manufacture and sale of the products. All the technical information and process details supplied by the foreign collaborator should be returned. In our sample, 46 percent of the agreements contain this clause with varying details. Some agreements even demand the return of the equipment. The implication of this condition seems to be that whatever technical experience is gained by the local firm during the period of agreement becomes useless to a certain extent upon the termination of the agreement. Thus it compels the local firm to renew the agreement when it terminates and also perpetuates technical dependence. (See Table VI).

Other Costs

So far as the costs of foreign technicians are concerned, all their living and travel expenses are borne by the local firm. In addition, they are paid monthly salaries or daily allowances. An agreement with a British firm fixes the salary of foreign technicians around Rs. 4,000 per month. The salaries of foreign technicians are tax free for three years.

TABLE VI

Types of Restrictive Clauses

	Number of Clauses/ Agreements	Per cent of total sample
1. Export Restrictive Clauses		
(a) Exports prohibited	16	32
(b) Permission of the foreign collaborator necessary for exports	4	8
(c) Exports permitted only to certain countries	2	4
2. Tie-in Clauses		
Restriction on sources of supply of materials and equipment	22	44
3. Restriction on Termination of Agreements	23	46
4. Payments of Minimum Royalty	4	8

Note: The total number of agreements is less than the total number of restrictive clauses. Since one agreement may have more than one restrictive clause.

Source: Table 1

Regarding the inappropriateness of techniques of production, there is evidence to suggest [12] that firms having foreign collaboration adopt relatively more capital-intensive techniques than the Pakistani firms in a given industry. This somewhat supports the proposition that the techniques transferred by the multinational corporations are inappropriate techniques to labour-surplus economies.

Conclusions

Companies established in Pakistan with foreign collaboration seem to have obtained most of their technical and managerial know-how from the multinational corporations. These include the provision of patented and unpatented technical information, process details, plant lay out, installation of equipment, specification of materials, supervisory and managerial services, marketing techniques etc. Also, Pakistani personnel have been given training both locally and abroad in technical and managerial fields. However, these

benefits to the country are not without costs some of which are reflected by the amount of royalty and technical fees, large profits and high salaries of foreign technicians. Other costs which are less obvious but equally (or more) important are the restrictive terms and conditions which may result in increased cost of production, hamper the development of exports, adversely affect the balance of payments, and may lead to the adoption of inappropriate techniques of production.

In short, our analysis suggests that there is a need to take a continuing hard look at the real net social benefits of obtaining know-how through multinational corporations. There are a number of important issues discussed in this study which need further detailed investigations. These are:

(1) Over-pricing of Capital and Intermediate Goods

There are reasons to believe that some multinational corporations charge excessive prices for the capital and intermediate goods supplied by them. The prices so charged need to be compared with international prices.

(2) Export Restrictions

Restrictions imposed by multinational corporations on the export of the finished articles sometimes necessitate the loss of the economies of the scale and of the potential foreign markets which could be developed. This needs careful examination.

(3) Net Foreign Exchange Benefits

The foreign exchange benefits need to be estimated carefully after fully taking into account the payment of royalties, technical fees, remittance of profits and dividends, salaries of foreign technicians, and loss of potential foreign markets due to export restrictions.

(4) Choice of Techniques

The techniques adopted by multinational corporations may not be the most appropriate ones, considering the resource endowment of the country. In such cases, the possibilities of alternative techniques need to be explored.

(5) Technical Training

The training in technical and managerial fields provided by multinational corporations to local personnel is one of the important advantages derived by the country. However, if this is the main reason for participation with a multinational corporation, the possibilities of alternative means for securing the necessary training for local personnel deserve examination.

Recommendations

However, some tentative suggestions or policy recommendations may be made on the basis of this study.

(1) In view of the high cost of importing foreign technology and know-how, the government may, (in certain cases) import the commodity or the pro-

duct of the technology instead of importing the technology itself. This is desirable in cases where the industries are highly inefficient and the net foreign exchange savings through import substitution are negligible. In such cases, the import of the commodity (instead of domestic production) would be consistent with efficient resource allocation and would not affect the balance of payments adversely.

(2) In case the domestic production of a commodity is deemed necessary due to some actual or expected social benefits, the government may take measures to improve the bargaining position of the local firm or enterprise vis-a-vis the multinational corporation. This may be done, for instance by providing information or facilities to get information, about alternative sources of supply of a given technology. Though, due to the patent system, the multinational corporations have monopolistic advantages, yet many commodities have substitutes. Even if the quality, brand or design of the commodities are different, they may serve the same function. Thus there may be alternative sources of technology if not for the same commodity then at least for similar commodities and substitutes.

(3) The government may improve the laws codes, and procedures for the registration and screening of foreign private investment and contractual agreements entered into by local firms with multinational corporations.

(4) Indigenous development of technologies is a possible alternative. One advantage of this is that such technologies are likely to be more consistent with local factor endowments. However, it may not be feasible until such time as the country and its educational and research facilities reach a fairly advanced stage of development.

(5) The government may actively participate and support international arrangements that are being made with the objectives of controlling the activities of multinational corporations. Such arrangements may be more effective than measures taken by an individual country to control the activities of multinational corporations.

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