

SOME ASPECTS OF TRANSFER OF FOREIGN TECHNOLOGY IN PAKISTAN

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1. ABSTRACT

Technology-Transfer is a complicated process and it involves many dimensions. The technology-developing organizations (from developed countries), keeping the economic interests on the top, often exploit the technology-receiving countries of third world. In addition to high costs, the technologies transferred by them are obsolete or going to be obsolete in the near future, in general. In some cases the technology transferred is not environment-friendly. These malpractices are facilitated by a weak institutional setup (required for assessment and forecasting of imported technologies) at the government level, in the buying countries. This study presents some analysis of the problems faced by developing countries like Pakistan while buying technology from the organizations of developed countries. It also suggests some policy measures to be taken by the technology-buyers and governments, before any agreement leading towards technology-transfer.

2. INTRODUCTION

According to the report of world economics, Pakistan ranks at number 83 in terms of Technology Index, while the ratings of China's and India's stand at number 49 and 50 respectively (14). Apparently this seems to be due to a weaker R&D base in our country. This is one of the main reasons for the country's dependence upon imported technologies.

At present no systematic information is available regarding the Pakistani expenditure on the imports of technology. Previously, a study was done in Pakistan in the eighties (10) according to which for a period between 1980-85 over Rs. 1500 million were spent annually as direct cost for patents, licenses and imported technical services, apart from direct cost on the import of machinery and other similar hardware. The recent data shows that during the financial year 2004-05, 21% of the total imports are contributed by machinery, excluding the transport equipment (2).

The process of technology-transfer is a crucial issue, as it involves many factors. The recipients of technology in most cases are developing and least-developed nations. The technology-vendor companies of developed nations, mostly look after their own commercial interests on long-term basis,

while the recipient nations due to lack of institutional arrangements, often import the technologies at a very high-cost, with other expenditures on repair and maintenance paid to the vendors on continuous basis. Further, the export of obsolete machinery/technology from the developing nations is frequently reported. This import of obsolete technology, most of the time, results in environmental and social problems.

After the acquisition of information about "Appropriate Technology", the assessment of technology is the most important factor for the importing enterprises, as the economic future of the firms, depends upon the successful exploitation of the technology. "Technology-Assessment" means a system of technology-information including procedures for studying or evaluating the interrelations between the various dimensions of the various technologies involved (5).

The objectives of our study are to deliberate upon the various issues of technology-transfer in the context of developing countries like Pakistan. One aspect of the study deals with the methods of technology-transfer, the choice and acquisition of technology and its sources, while the other aspect of the study includes the problems and impediments relevant to acquisition of technologies from abroad. Policy-issues are also mentioned, in order to resolve the problems. Furthermore, the implication of TRIPS' agreement of technology-transfer, is also mentioned. In the end, the study mentions the present status of institutional support and suggests some policy measures for a reasonable institutional setup, to facilitate technology-transfer (from developed nation) in Pakistan.

3. METHODS FOR THE TRANSFER OF TECHNOLOGY

3.1 Commercial Methods: The licensing of industrial property-rights and the supply of know-how, and joint ventures with the firms of developed nations, are the main methods employed for the commercial transfer of technology to developing countries including Pakistan (1).

The supply of know-how, may be the subject of an agreement to communicate technical information and skills concerning the use and

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application of industrial techniques (some times referred to as “ technical know-how “ or technical information and skills) and may be described in documentation or demonstration and orally, or through demonstration and training by engineers, technicians, specialists or other experts.

Know-how may also be supplied through consultants or other professional experts, who provide services and assistance covering the basic engineering of an industrial plant or its machinery and equipment, and the installation operation and maintenance of an industrial plant and the training of its personnel.

The commercial transfer of technology may also, in fact, take place with the sale and import of machinery and equipment and other capital goods, parts or other intermediate goods, parts or other components, that embody technology, and related literature.

The commercial transfer of technology may also occur in connection with the system of the franchising or the distributorships of consumer goods and services. The services may extend to the rental of consumer or power equipment or to hotel operation or dry-cleaning facilities. The outlet for the marketing of such goods and services, is usually based upon a trademark or services-mark, combined with technical information, or technical services and assistance.

3.2 Non-Commercial Methods: Another way in which technology is transferred to developing countries is through non-commercial channels, including initiatives taken by international organizations, by the governments of developed countries and by non-governmental organizations (NGOs).

This can involve many types of mechanisms. One process, for example, is the vertical transfer of technologies from international research centers (such as those belonging to the Consultative Group on International Agricultural Research, CGIAR) to research centers, farmers and firms in developing countries. Other channels include the development projects of multilateral organizations (11).

Another mechanism of technology-transfer to

developing countries, is the development and transfer by NGOs of appropriate technologies to address specific problems of given countries.

3.3 Informal Methods: These methods include the technology-transfer without formal agreements and payments. This consists of, ineralia, the transfer through reverse engineering, through movement of skilled personnel from one country or organization to another, through consulting technical reports and general, and through technical visits and participation seminars, conferences and trade fare.

4. THE CHOICE OF TECHNOLOGY TO BE TRANSFERRED

The issue of transfer of technology in the above context has been deliberated upon in the last two decades, in-depth at the appropriate international forums, and is a central issue in North-South for a new social and economic order. The Vienna programme of action on science and technology for development (1979) has explicitly agreed to strengthen the scientific capacity of developing countries, as well as their capacity to create, transfer and adapt technology for the solution of development problems.

In this regard, it is imperative that each developing country, including Pakistan, should formulate the policy on the acquisition and transfer of technology, as an integral part of its national policy for scientific and technological development. Such a policy should provide for a technological spectrum, ranging from the most simple to the assimilation and adaptation of imported technology.

An essential aspect of technological self-reliance in developing countries, is the development of capability to exercise suitable technological choice and to ensure that the acquisition-absorption and development of selected technology is consistent with and complementary to the growth of national scientific and technological capacity, in the relevant production and services sectors (3).

Issues of technological choice and the process of acquisition and development of technologies, have posed considerable difficulties for developing countries, partly because of inadequate knowledge and experience of alternative technologies, lack of appropriate attention of the various economic sectors, including rural and urban areas, and partly

because of the weaker bargaining position of those countries.

Technological choice refers not only to the use of a particular technological process, but also to the complex choices which may constitute an integrated project or programme in a particular sector. There are choices to be made, for example, between large-scale production between labor intensive and capital-intensive techniques, between importing technology from abroad and developing it from local sources, or between adapting the imported technology to suit specific social, economic, or climatic conditions, on the one hand, and developing or upgrading indigenous techniques and processes on the other hand. In order to independently formulate and answer such questions, and to exercise effective control over such choices, Pakistan must relate the technological choice to the social and economic conditions under which the technology will be applied, and also ensure that the technology chosen responds to the real needs and the resources of the people and their environment. Pakistan needs to select import of those technologies, which increase employment and are more appropriate to the economic and social environment of the country (13).

Apart from appropriate technological choice, institutions, enterprises and other users in developing countries, need to ensure that a chosen technology is acquired on suitable terms and conditions, enabling its rapid absorption, adaptation and development into the context of local conditions and resources. It is also necessary to strengthen the ability of developing countries, to generate technology from within the terms of adaptation and innovations. These aspects would necessitate consideration of policies, institutional measures and appropriate mechanisms which would, on the one hand, improve the conditions under which foreign technology is acquired and on the other, encourage the choice and application of indigenous technologies.

5. SOURCES OF TECHNOLOGY

The foremost task in the process of technology-transfer is the identification of technological needs, which is a complex process. This is reflected in the fact that only a few developing countries have been able to formulate comprehensive technology development plans and policies. The reason is to be found mainly in the lack of domestic expertise and

experience. There is, however, a growing awareness that technological needs must be identified on a systematic basis; that they must be split into their various components; the domestic absorptive and adaptive capabilities must be developed to take care of as many of them as possible, and that foreign technology must be acquired selectively to complement and strengthen domestic capabilities.

Once the nature and extent of technological inputs has been assessed, (whether precisely or in broad terms), the next question that arises for consideration is the identification and selection of the sources from which they can be obtained. This requires the building up of an adequate technology information system. At the outset, it must be mentioned that this is inevitably a continuous and dynamic process, given the nature and complexity of the world technology market. On one side, information on all aspects of the technologies needed by the country's economic, technical, financial, legal, social, environment, etc., will have to be built up as comprehensively as possible. This could be regarded as the "theoretical" side of the information process. On the other side, is the information needed from the practical standpoint such as the major technology suppliers, including machinery and equipment suppliers, their experience and reputation in the international arena, the view points of technology expertise on the merits and demerits of their technologies, the terms and conditions of technologies supply contracts concluded by them elsewhere and there technologies covered by patents and those that are exclusive and non-patented. The difficulties involved in building up such a comprehensive technological information system, cannot possibly be underestimated. Much of this kind of information may be of a secret nature and may not be easily available.

5.1 Commercial Sources

5.1.1 Large Enterprises: The developing countries' main sources of commercial technology, have so far been the large enterprises of developed countries, mainly because of their predominant role in direct investment or participation in production or the provision of services. It is noteworthy, that the number of the enterprises involved in the business of transferring technology in "high-tech" areas is relatively less (4), and

these firms are mostly Multinational Companies (MNCs). Licensing arrangements have also primarily involved large enterprises. In the case of consumer goods and services, such arrangements may reflect the desire of the licensee to obtain access to a well-known product or brand name, but in the primary production, they are often related to the control by large enterprises of marketing channels in world markets and their vast financial resources. Similarly, technology-services have so far been provided by primarily internationally renowned designs, consultancy and engineering companies, which are often linked to capital goods' producers and major financial institutions. The impact of technology-transfer by large enterprises on the economic and technological development of developing countries, however, has been a subject of much debate.

5.1.2. Small & Medium Enterprises (SMEs): There are many alternative sources of technologies, including small and medium enterprises, public institutions, the international information system etc., which Pakistan needs to explore and utilize much more actively. Research has shown SMEs play an important role in the economic development of the country (8).

The machinery and equipment, producers in most sectors, for example are small and medium-sized enterprises (SMEs), with notable exception such as transport, heavy electrical and telecommunications equipment. For most production activities, there are many alternative techniques available ranging from un-mechanized and labor-intensive methods to sophisticated and highly-automated technologies. Even though SMEs are known for their innovative capacity and often act as subcontractors to large enterprises in advanced technologies, the empirical research indicates that the less advanced or standard the technology, the more likely is the source of technology to be an SME. Furthermore, in their transactions, SMEs are usually more willing to transfer detailed information on the technologies and subsequent technological improvements, than are large enterprises, and are less

likely to include restrictive clauses in contractual arrangements. Their management style is also likely to be much closer and more compatible with that of the majority of Pakistani firms of similar size, and they would be willing to enter into majority joint ventures associate and with firms in Pakistan (3).

But, SMEs by their very nature are not well-known in international markets, at least in developing countries. As a matter of fact, their very size limits their strategies to addressing local or at the most selected country's markets. Their products, services and technologies are not known beyond limited geographical boundaries, their production capacity and their own financial assets are also limited, so that they do not figure prominently in developing countries. The question arises as to what are the obstacles, that have prevented a more active role by SMEs in technology-transfer. These appear to be related to corporate limitations on one side and to host country's constraints on the other. The former includes lack of information, insufficient finance and a low-risk approach by management.

Despite the constraints, SMEs of developed countries have emerged in recent years as increasingly important suppliers of international investment capital and technology. Many factors have contributed to this, such as slower growth-rates and high-labour costs in developed countries, which have pushed SMEs to seek new markets. A major factor has probably been increased of home country government support to SMEs. Thus, during the 1970s, Development Finance Corporation was established in various countries with the aim of promoting private investment in developing countries by providing risk and long-term loan capital, which SMEs are seemingly taking advantage of. Some countries have also adopted credit programmes for facilitating foreign investment by national firms, which include special measures dedicated to projects of SMEs. Many mechanisms related to public-aid policies, are also instrumental in directly affecting the transfer of technology by SMEs to

developing countries like Pakistan.

5.2 Non-Commercial Sources: Technologies originating from public-fund, apply equally to bodies in developing countries and international organizations. The mechanism of commercialization and diffusion, appear to be even weaker in these cases. Particularly surprising, is the lack of information on the use made of results stemming from the multiple R&D programmes and projects financed by the United Nations. Indeed, many of the technologies and R&D results originating in connection with United Nations' programmes are very likely to be exploited by small and medium-sized enterprises, and thus, constitute an alternative source of technology for them. The "public" technologies may also offer a vast potential as alternative sources for developing countries.

The non-commercial sources of technology are mainly the international organizations and non-governmental organizations, financed by the developed countries. In the agricultural sector, the best example is of the R&D organizations working under the CGIAR system, which are mandated to transfer the technologies and skills free of cost to developing nations (11).

There are also organizations of technologically-advanced nations, which are inclined to transfer technology, which are, prima-facie free. However, the commercial interest of these organizations in terms of regular supply of equipment, including spare parts, consultancy and repair and maintenance services cannot be ruled out.

6. PROBLEMS RELEVANT TO THE ACQUISITION OF TECHNOLOGY

Potential technologies' acquirers in Pakistan, like other developing frequently face serious obstacles in their dealings with technology-holders in developed countries.

These obstacles are basically of three kinds: those which arise from the imperfection of the market for technology, those attributable to the relative lack of experience and skill for enterprises and institution in concluding adequate legal arrangements for the acquisition of technology, and those government procedures, legislative and administrative, in both developed and developing countries which

influenced the implementation of national policies and plans designed to encourage the flow of technology to, and its acquisition by developing countries.

Following is the detail about some major problems faced by developing countries like Pakistan during the process of technology transfer from the developed countries:

6.1 Lack of Information and Expertise: The enterprises or institutions in developing countries, frequently lack information about sources of technology and opportunities for its exploitation, and do not possess the means to assess and make a choice among alternative technologies, to determine the appropriateness of the technology for their needs, and to negotiate fair and reasonable terms for its acquisition. As a consequence, prospective technology acquirers in developing countries may find that their bargaining position in their dealing with technology-holders in developed countries is relatively weak and as a result the latter may present the former with a technology "package" tied to commercial, financial, and other inputs.

Due to absence of national institutions in Pakistan to assist in carrying out the function of identifying evaluating and selecting technology, the local enterprises must often turn to international consultants, many of whom are already closely associated or have established relations with certain technology-holders in developed countries, thus, leading to a further state of external dependence.

For the adaptation and absorption of the technology, technical, engineering and managerial skills are among the basic prerequisite. Developing countries generally lack these skills. In the developing countries the skill formation should also be carried out through the training components of the technology-transfer transaction.

Similarly, while the basic national infrastructure of science and technology, in the developing countries can be strengthened and research and development programme expanded, with particular stress on applied research and the creation of indigenous technology, enterprises in developing countries must have access to advances in existing technology, as well as to

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new product or process technologies, developed by technology-holders in developed countries.

The reluctance of technology-transferers to provide information on technological advancement and new technology, and to complement that information with adequate technological services and assistance is not only detrimental to the technology-transferee, but also works against the general interest of a developing country in as much as enterprises and institutions in developing countries, need to develop alternative technologies and to enhance their indigenous growth capabilities.

Consequently, it is incumbent upon technology transferees and government authorities administering laws governing the transfer of technology and responsible for overseeing the import of technology, to carefully examine the proposed terms and condition of the technology-transfer transaction, to ensure that the basic technology to be supplied is appropriately defined, that adequate guarantees of its effectiveness are included, that access to technological advances and new technology is facilitated and that the undue restrictions are not placed on the disclosure by the technology transferee, or the communication to and use by the third person of information, about such advances and technologies.

6.2 Technology-Holders: The willingness of the enterprises (technology-vendors) in developed countries, to allow others access to the technology or to permit its exploitation, is motivated by technological, commercial, economic and sometimes even political considerations. One of the more important of these, is an assessment of the advantages and disadvantages if the technology was to be exploited in the technology holder's country and the resulting product exported to the developing countries, rather than exploited in the developing countries with the resulting product sold in that and in other countries. These facts are among the policy considerations of the enterprises and institutions of the technology-buying countries.

6.3 Financial Implications of the Technology: A further obstacle to acquisition of appropriate technology by enterprises in

developing countries, is that such countries have scarce financial resources to exchange for that technology.

For those enterprises and institutions in developing countries, which will not have the benefit of external financing, the acquisition of technology on international commercial terms, will impose a burden on the local economy unless the price of the technology can be brought within manageable limits.

As the value of technology varies from industry to industry, the process of determining the fair price for technology-importing firms, is very tricky. The situation is more difficult in developing countries, who lack the institutional support in this regard.

In addition, for a given technology-transfer transaction, there may not be a readily available measuring stick to determine the price of the technology to be transferred. Among the factors which will be taken into account, are the cost of the research and development activities of the technology transferer that are associated with the creation of the technology to be transferred, and with the possible future technological advances, as well as with new technology, the possibility of multiple sales of the same types of technology, the need to design the technology specially to meet the particular requirements of the technology transferee, and the extent to which the technology transferor is to receive the price in whole or in part from an allocated part of the technology transferee's return in exploiting that technology, a method of payment which may be intended, on the one hand, to reflect a credit facility by the technology transferor, or, on the other hand, its willingness to share with the technology transferee the risk of a business venture.

Further, the fact must not be overlooked that a technology-transferer may derive substantial indirect gains from the technology-transfer transaction, as a result of the supply by it or other inputs necessarily related to the technology transferred, such as plant or machinery, raw materials or intermediate goods or components required in the exploitation of the product or process technology. It is for this reason that tie in arrangements which link the sale of such

capital goods or inputs to the technology transferred must be scrutinized not only from the perspective of the added benefits to the technology transferer but also from the point of view, of their impact in narrowing the latitude of the technology transferee to explore alternative and more economical international sources of supply, as well as from their undesirable effect in discouraging participation by the potential local suppliers.

Similarly, technology transferers may stand to benefit from controlling the output of the technology exploited, such as by limiting the purpose for which the technology may be used, or by attempting to impose quantity or price restriction on the sale of the product or by efforts to confine the marketing of the product to the developing country where the manufacture takes place or to channel that production into the hands of the technology transferer or away from markets being serviced by it with its own production or with the production of other technology recipients. Here again, such restriction must be viewed from the perspective of the added gains to the technology transferer, the freedom of the technology transferer, and the impact on the economy of the developing country and its posture as an emerging trading power.

6.4 Inadequate Legal Framework for the Technology Transfer Transaction: An important prerequisite to the successful commercial transfer or acquisition of technology, is an adequate legal framework within which the parties to the transaction can fix their respective rights and obligations, and which permits an equitable balance to be struck between, on the one hand, the interests of these parties and, on the other, the interests of the state or the public.

A successful technology-transfer transaction (in legal perspective) involves technical, financial, and commercial matters and relevant stake-holders, under the existing legal framework, of the importing nation. The implementation rests on an adequate legal framework for commercial transactions - i.e. laws concerning contracts, business association, fair trade practices and industrial property - yet in many developing countries these laws need to be modernized and institutions for their administration need to be

established or strengthened.

Furthermore, from the standpoint of the potential technology-acquirer, there is often a lack of information and skill to deal with many legal aspects of industrial property licenses and technology-transfer agreements - the two principal mechanisms through which the commercial transfer of technology takes place.

Both mechanisms sketch the legal, commercial, financial and technical parameters of the transaction, and set the operating procedures for the transfer of the technology, its application, absorption and exploitation.

6.5 Inadequate Government Controls and Lack of Understanding of the Commercial Aspects of Technology-Transfer: From the standpoint of the government in a developing country, there are many broader considerations than those at issue, between the potential technology transferer and the prospective technology, the effect on the balance of payments of the country, the need for parallel negotiations on final matters, foreign exchange transfers and foreign investment.

In some developing countries the technology-transfer transaction, itself may be the subject of scrutiny by a government authority charged with approving the terms and conditions of the legal arrangements, which the parties have concluded or intend to conclude.

In such countries the technology-transfer transaction must, thus be regarded in the light of not simply whether, as a commercial transaction, it strikes a fair balance between the interests of the transferer and transferee, but also whether its technical, financial, commercial and legal aspects are consistent with the objectives sought to be achieved by the government and, whether they will result in an inflow of technology that will appropriately promote the scientific technological and economic development of that country.

In developing countries, which set up or desire to set up machinery to control the commercial transfer of technology, difficulties have arisen however, in establishing the appropriate government policies, and in formulating the government procedure and criteria. Further, enhanced coordination of diverse government

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sectoral policies plans and programmes, the clearer identification of the appropriate decision making authorities, the stabilization of the legal base for the commercial transfer of the technology and its control, greater flexibility in the approvable technical financial and commercial terms of the technology-transfer, transaction and continued improvement of the fiscal incentives for investment can lead to a more favorable climate for the transfer of technology from enterprises in developed countries and its acquisition by enterprises and institutions in developing countries(3).

7. INTELLECTUAL PROPERTY (IP) AND TECHNOLOGY-TRANSFER

The contemporary evidence suggests that, because developing countries are large net-importers of technology from the developed world, the globalization of IP protection will result in very substantial additional net-transfers from developing to developed countries. The benefits to developing countries from IP protection, would have to come from an offsetting dynamic stimulus to trade, the development of technology, investment, and growth. Moreover, the developed nations feel easier in transferring technology and investment in the nation, which have stronger intellectual property protection laws. In the recent past, the OECD countries made significant investment and transferred technologies to China in various sectors, after the proper promulgation and enforcement of intellectual property laws (12).

Worldwide, intellectual property is being more and more extensively protected through the implementation of Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. Viewed in terms of welfare economics, neither constant stiffening of rules in industrialized countries, nor the international expansion of intellectual property rights, effected by the TRIPS agreement can qualify for unreserved endorsement. The impacts on technology-transfer to developing countries are mixed: advanced developing countries stand to benefit, while less developed countries are almost certain to lose (6). In view of the fact that knowledge is a crucial factor in reaching the Millennium Development Goals and setting an economic development process in motion, industrialized countries are called upon to promote technology-transfer to developing countries. Indeed, they have to this end a broad set of instruments extending from public-sector

research financing and tax incentive to innovative fund solutions. Development cooperation, too, can provide an important contribution here, provided that, it is embedded in the education and research strategies of given partner countries.

In today's liberalized and competitive environment, companies in developing countries can no longer compete on the basis of importing "mature" technologies from developed countries and producing them behind tariff barriers. Companies are more wary of transferring technology in ways that may increase the competition they face. The problem is less about obtaining mature technologies on fair and balanced terms, but more about accessing the sophisticated technologies that are required to be competitive in today's global economy. TRIPS has strengthened the global protection offered to suppliers of technology, but without any counterbalancing and strengthening of competition policies globally. Therefore, it may be unwise to focus on TRIPS as a principal means of facilitating technology-transfer. A wider agenda needs to be pursued, as is currently being done in the WTO. Developed countries including Pakistan, need to give serious consideration to their policies for encouraging technology-transfer (7). In addition, they should promote more effective research and cooperation with and among developing countries to strengthen their scientific and technological capabilities.

8. INSTITUTIONAL ARRANGEMENTS IN PAKISTAN

In Pakistan a National Center for Technology Transfer (NCTT) was created in early eighties to deal with the technology-transfer related affairs. The government in 1993, due to certain administrative reasons, however, abolished this center. Since then no alternate arrangements have been made to tackle the problems related to foreign technology-transfer to the country. However, some of the following institutions are providing a limited assistance in terms of foreign technology-transfer.

- Pakistan Scientific and Technological Information Center (PASTIC) is mandated to provide the information about the latest technologies covering all important industrial sectors. In this regard PASTIC under its TIPS (Technology Information Promotion System) programme, disseminates information (through publications and internet) regularly.
- At the international level, technology

information services are also provided by the Asian and Pacific Center for Technology-Transfer (APCTT) through its publications and website.

- The Government of Pakistan established Pakistan Technology Board (PTB) (in 2000) which is, inter-alia, mandated to conduct technology assessment and forecasting studies. The Board is not operating its functions due to lack of manpower and funding. However, the board with the collaboration of UNIDO is conducting technology foresight studies.
- The Government of Pakistan recently (2005) established the Technology Up-gradation and Skill Development Company (TUSDEC). The scope of this company, however, is very limited in regards to technology-transfer related matters.

9. CONCLUSIONS AND PROPOSALS

From the above discussion, it becomes evident that the technology-transfer from the developed countries to the developing countries is not a straightforward mechanism and it is skewed towards the economic benefits of the technology-supplier countries. Keeping in view the importance of problems relevant to the technology transfer, many developing countries have established institutions for public support. In India, National Institute of Science and Technologies and Development Studies (NISTADS), Technology Information, and Forecasting and Assessment Council (TIFAC), are working on various aspects of technology-transfer (9). Unfortunately, in Pakistan the only center (NCTT) that was mandated to provide technical assistance in terms of technology transfer, was abolished.

The almost total lack of institutions facilitating technology-transfer in countries like Pakistan has created certain complexities for SMEs and even for major industrial enterprises. It is impeding the efforts of our local industry for being more competitive. The situation demands that the government of Pakistan establish institutions, with proper technical manpower to deal with the problems relevant to foreign technology-transfer. The institution(s) may facilitate the local industry and other technology-users in the following ways:

- Locating the proper information sources of foreign technologies.
- Making proper arrangements for assessment and evaluation of technology in terms of its

effect on environment and society.

- Facilitating industrial sector in pricing the international technologies.
- Making arrangements for legal support in technology-contract negotiations.
- Establishing a complete coordination between technology venders and users through entering in all technology-transfer related proposals and agreements.
- Conducting research studies for technology transfer in various sectors.

Special attention is needed for undertaking technology-assessment, monitoring and forecasting studies. Through forecasting exercise, the country may be able to get information about the life cycle of imported technologies. For this purpose the capacity-building of Pakistan Technology Board (PTB), through manpower and funding is required on immediate basis.

Due to investment-friendly policy of the government, the volume of direct foreign investment is expanding with time, and more and more multinational companies are establishing their industrial unit in Pakistan in various sectors. The government of Pakistan may persuade the MNCs to transfer their technologies to Pakistan after milking profit from their enterprises. This step, however, needs a proper institutional assistance.

Finally, the assistance from international organizations like: UNIDO, APCTT, UNDP, and other relevant organizations, can be sought for developing effective technology-transfer measures in the country.

Need-assessment studies of potential foreign technologies importing enterprises may be conducted keeping in view their absorbing capacity of foreign technology.

On the basis of the above-mentioned discussions it is concluded that for any successful technology transfer there is an urgent need for the establishment of some institutions in Pakistan to deal with various aspects of technology-transfer.

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