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9. ABSTRACT

Technology transfers have been both a boon and a concern to the LDCs. Industrialization of the developing countries has been accelerated by these critical imports, but the cost in scarce foreign exchange has been rising at a rapid rate. Some LDC spokesmen are also troubled by the cost in politico-economic terms of an increasing national dependency on foreign technology. Capital-intensive technology, developed primarily to meet the needs of industrially advanced countries, is often not appropriate for most LDCs with surplus labor problems. However, in the absence of an indigenous scientific and technological capability, foreign technology is actively sought by LDCs, particularly those which are the most industrially advanced. This study finds that foreign financial aid could facilitate priority technology transfers to the LDCs through a number of practical program approaches. It would stimulate the development of institutional arrangements in LDCs that could accelerate technological development by encouraging innovative elements in the business community and by supporting selective imports of technology most appropriate to the special needs of a country. Preferential licensing terms and tax policies on technology exports are not considered feasible. As the predominant supplier of technology to LDCs, the initiative is up to the U.S. Other donor countries and international organizations would probably be responsive to such an initiative. Possible approaches and their implications are discussed in detail.

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FACILITATING TRANSFERS OF TECHNOLOGY  
TO DEVELOPING COUNTRIES

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## FOREWORD

This study was prepared for the Office of Science and Technology by Joseph Mintzes, an economic consultant.

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Summary and Conclusions:

Technology transfers have been both a boon and a concern to the LDCs. While these critical imports have accelerated industrialization of the developing countries, the cost in scarce foreign exchange has been rising at a rapid rate. Some LDC spokesmen are also troubled by the cost in politico-economic terms of an increasing national dependency on foreign technology. Some believe that the generally capital-intensive imported technology, which was developed primarily to meet needs of industrially advanced countries, is often not appropriate for most LDCs with surplus labor problems. However, in the absence of an indigenous scientific and technological capability, foreign technology is actively sought by LDCs, particularly those which are relatively the most industrially advanced.

Costs and Patterns of Technology Transfer

U.S. firms, which are by far the predominant source of technology for the developing countries, received \$715 million from LDCs for licensing fees and related technical services in 1974. This represented roughly between 70 and 80 percent of receipts for technology exports to LDCs by the developed countries. UNCTAD, which drew on more limited LDC data, estimated that total technology transfer payments by the developing countries amounted to \$1.5 billion annually in the early 1970s. It projected the level to an alarming \$9 billion by 1980.

Multinational companies (MNCs) supply the bulk of U.S. technology exports to the LDCs. Intra-firm payments from subsidiaries in the LDCs to MNC home offices in the U.S. represented 85 percent of total U.S. receipts for technology sales to LDCs in 1974. (Unaffiliated firms accounted for \$107 million, or 15 percent, of U.S. receipts for such transfers that year.) A major portion of these MNC receipts are for fees for technical and managerial services provided to subsidiaries. These transfer payments have become a controversial issue, particularly where the LDC dependency syndrome and economic nationalism are intense as in a number of Latin American countries.

The claim by some LDC authorities that the imported technology draws on resources that would otherwise be available for indigenous R & D cannot be substantiated. However,

more can be done to have the technology transfers develop local capabilities by encouraging adaptive R & D. Increasingly, LDCs have established procedures to screen out inappropriate and costly technology imports as well as help relatively weak LDC firms in licensing negotiations.

An examination of the patterns of licensing agreements points up the importance of the "know-how" element which often is the key to a successful transplant of patented technology. A common "most-favored licensee" clause in agreements is looked upon by some LDCs as a possible help in negotiations. It assures the licensee of terms equivalent to the best entered into by the licensor for supplying equivalent technology.

#### The Role of Foreign Aid

Bilateral and multilateral foreign aid have directly and indirectly supported a considerable amount of technology transfers to the LDCs. This technology is involved in aid-financed capital projects, import programs and technical assistance provided to developing countries. Foreign aid has also increased the total foreign exchange resources available to LDCs that could be used for technology and other imports in normal commercial transactions which account for the bulk of technology flows. Foreign aid has also helped the technological development of LDCs in its support of technical education and training and research activities.

Beyond the existing commitment to LDC technological development, a number of possibilities could be considered for a greater direct impact from foreign assistance -- if some aid funds were earmarked to support specific priority technology transfers. Such assistance would be limited to selected transfers to unaffiliated firms in LDCs that show innovative promise and a likelihood of having a significant impact in the private sector. This emphasis would make the required magnitudes manageable within the U.S. foreign assistance program. Eventually, other donor countries and the international assistance institutions could also be enlisted in this approach. However, the initiative would necessarily have to come from the U.S., the overwhelmingly predominant source of LDC technology imports.

Depending on local requirements, such assistance could be provided to LDCs on a conditional basis to permit qualified firms (which otherwise would be unable) to import priority technology. In the more industrially advanced

developing countries (e.g., Taiwan, Korea, Brazil, etc.), local financing by most technology importing firms would probably not be a problem. However, if required, partial subsidies in the form of grants or loans would be provided to selected LDC firms which have good prospects for successful transfers of significant technology. Preference for such assistance would be given to innovative firms and those meeting high priority development objectives. Such help could be extended during the critical start-up period of production employing the new technology. Local currency funds, which may be generated in some cases by aid-financed technology imports, could be used by LDCs for related technological development activities. For example, mutually agreed expenditures for adaptive R & D could be financed from such funds.

Proposed institutional arrangements call for the establishment of a focal point or center in each participating LDC that would serve as a clearing-house on technology import requirements that meet program criteria. Preliminary surveys of qualifications of applicant LDC firms and the technical and economic soundness of proposals would be carried out by expert staffs of these centers. The latter would also help local firms in negotiations of licensing agreements and would administer possible subsidies and related assistance. As one of its objectives, the servicing arrangement would seek to strengthen the indigenous scientific and technological community -- as, for example, in encouraging adaptive R & D. Locating competent and innovative local firms, a critical requirement for success of the program, would be an important task of the centers. A counterpart focal point would be established in the U.S. (and eventually in other prospective donor countries) to help locate available sources of technology requested by LDC firms.

Criteria for selecting firms that would be eligible for subsidies and other assistance should relate to agreed priorities in LDC technological development. In addition to "know-how", which is usually covered by initial lump-sum payments in licensing agreements, subsidy incentives might be considered for royalty payments by LDCs during the critical start-up period. Special problems such as quality control and the adaptation of licensed output to local requirements could also qualify for help.

Loans and grants could be serviced preferably through the special centers or through existing development banks in the LDCs. Provisions could be made for revolving funds on repayments of loans.

Sectors to be assisted and types of foreign technology to be imported under possible programs would depend on economic and technological development goals of the LDCs and the related characteristics of their scientific and technological communities. The strengthening of indigenous R & D capabilities, training and up-grading of technical personnel ( and possible incentives for expatriate technical professionals to return) could be sought as longer term goals in aid-supported technology transfers.

#### Cooperation of Multinational Corporations (MNCs)

Provided political problems can be overcome or possibly as a way of helping to overcome them, MNCs could be called upon to cooperate in possible aid-supported programs in the LDCs in view of their predominant role in the international transfer of technology. Voluntary arrangements might be established on a selective basis with MNC subsidiaries to help on specific bottleneck production and marketing problems. MNCs could open opportunities for participating LDC firms to provide supplies and parts to subsidiary operations. MNCs could also help on possible training and research problems of the local firms. The cooperation of MNCs in possible programs might be facilitated by U.S. overseas missions and by certain non-governmental organizations such as the Council of the Americas, the Committee for Economic Development and the U.S. Council of the International Chamber of Commerce.

#### Other Possibilities

With respect to other possible approaches to facilitating technology transfers to the LDCs, the idea of a broad preferential scheme on licensing terms for developing countries -- on the order of generalized special preferences (GSP) in trade -- does not appear feasible. Licensing negotiations between individual firms for highly differentiated technology and services are too complicated to be effectively governed by such a scheme within the existing international economic system.

Possible preferential tax policy on receipts from technology exports to LDCs would probably be closer to the GSP idea as far as the governmental role is concerned, but this possible approach would create intractable technical and political problems for the U.S. and probably other countries.

However, it is inconclusive as to whether existing U.S. tax policy has resulted in relatively higher charges to LDCs in intra-firm technology transfer payments by subsidiaries to MNCs, as is claimed by some observers. In any event, the MNC transfer price issue extends well beyond technology transfer matters and should be the concern of international negotiations dealing with foreign direct investment matters.

In concluding, this study finds that foreign financial aid could facilitate priority technology transfers to the LDCs through a number of practical program approaches. It would stimulate the development of institutional arrangements in the LDCs that could accelerate technological development by encouraging innovative elements in the business community and supporting selective imports of technology that are most appropriate to the special needs of developing countries. As the predominant supplier of technology to the LDCs, the initiative is up to the U.S. Other donor countries and international organizations would probably be responsive to such an initiative.

FACILITATING TRANSFERS OF TECHNOLOGY  
TO DEVELOPING COUNTRIES

1. The Setting:

Since the early 1960s, there has been an increasing awareness of the importance of imported technology to the economic prospects of the developing countries and the significance of its cost in scarce foreign exchange. U.S. firms which supply over 70 percent of all technology transfers to the LDCs, received \$715 million in licensing and related fees in 1974. (discussed below.) Concern over costs has prompted a closer scrutiny of the nature of technology transfers by development authorities and the governments of a number of LDCs. Attention has been directed to ways in which limited resources available for technology imports could make a greater contribution to economic and social development goals and how developing countries could reduce their reliance on foreign technology. Although these developments are largely a response to the alarming cost outlook, they also reflect politico-economic aspirations of LDCs to overcome their high degree of dependence on foreign technology. Thus some attention has also been directed at limitations of indigenous scientific and technological institutions of developing countries and ways to up-grade LDC capabilities in these spheres, including greater selectivity in technology imports.

With varying degrees of effectiveness, a number of developing countries have established procedures for reviewing calls on foreign exchange for imported technology. In some cases, these are part of licensing procedures involved in over-all import controls and are carried out by the central bank or similar authorities who oversee national foreign exchange resources. In other cases, more specialized screening is undertaken and in varying degrees officials become involved in the negotiation of licensing agreements and other arrangements between local firms and foreign licensors for technology transfers. Often these controls tend to be negative or defensive. Requirements for this purpose are perceived by the guardians of scarce foreign exchange to be excessive -- since outlays are to be made for ideas and talents that seemingly could better be used for tangible machinery and raw material imports.

Some overtones of economic nationalism are evident in

new regulations and related procedures governing LDC technology imports which come predominantly from multinational corporations. Such regulations recommended by the Andean Pact to member countries forbid payments of licensing fees by foreign subsidiaries to MNCs. Intra-firm payments for technology by foreign subsidiaries to MNCs represent 85 percent of U.S. total receipts for licensing and related fees from LDCs. This factor has aggravated the dependency syndrome of the LDCs and has added to the rhetoric in North-South debates in international fora. In the heat of these debates, sight may be lost of the positive contribution to development made by technology transfers and the opportunities to make the transfers more effective.

This paper examines costs and other issues relating to the transfer of technology to the LDCs. Background on the major features of licensing arrangements, the types of technology involved and the differing LDC patterns and policies on technology imports is also reviewed. In light of this analysis, the study will examine possible approaches for facilitating technology transfers that could be of interest to aid donors and the LDCs in having these imports contribute more effectively to development objectives.

## 2. Payments by Developing Countries for Technology Transfers:

In the absence of comparable country statistics in the LDCs, U.S. data on receipts of licensing fees, royalties and management fees have been employed in this study as the principal source for estimates on costs of commercial transfers of technology to developing countries.<sup>1/</sup> The U.S. data, which cover payments for the bulk of such transfers (probably between 70 and 80 percent of total payments to developed countries) are supplemented with more limited available statistics for other important supplying countries to provide as comprehensive an estimate as possible of total payments for commercial technology transfers to the LDCs.

In 1974, total receipts by U.S. firms for technology transferred to developing countries amounted to \$715 million. (See Table 1.)

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<sup>1/</sup> For a discussion of data problems in this sphere, see "Licensing, R & D and Technological Development in Selected Developing Countries," by Joseph Mintzes, prepared for the Office of Science and Technology, AID, August 1974, pp. 5 ff.

Essentially, Commerce Department's series have a long continuous history and benefit from common definitions and collection standards. Contrasting data published by UNCTAD are also presented in this study. UNCTAD's statistics are based on country replies to questionnaires and suffer from varying country statistical standards and coverages.

About 85 percent of this amount (or \$608 million) represented payments for imported technology by subsidiaries to multinational companies; the remainder of \$107 million (or 15 percent of U.S. technology export receipts from LDCs) were LDC payments for licensing fees, royalties and rentals paid to unaffiliated firms. Total U.S. receipts for technology exports rose 95 percent between 1967 and 1974; increases for licensing fees in current dollars were 114 percent over this period compared with 85 percent for management fees included in the totals. In the absence of a price index for these services, use of the U.S. export price deflator would reduce these percentages to roughly 10, 21, and 5, respectively. (During the same period, total U.S. exports of goods and services rose much more rapidly by roughly 200 percent in current dollars and about 69 percent in real terms.)

Table 1

PAYMENTS TO U.S. FIRMS FOR TECHNOLOGY TRANSFERS TO LDCs, 1967 to 1974

(millions of dollars)					
	<u>Royalties, Licensing fees and Rentals</u> <sup>1/</sup>			Management fees	Total
	U.S. Subsidiaries	Unaffiliated firms	Total (1)	from U.S. Subsidiaries <sup>2/</sup> (2)	(1&2)
1967	75	51	127	239	366
1968	75	63	138	267	405
1969	82	61	143	300	443
1970	99	68	167	319	486
1971	104	71	175	354	529
1972	113	80	193	351	544
1973	138	81	219	387	606
1974P	165	107	272	443	715
Percent increase 1967-74 <sup>3/</sup>	(117%)	(110%)	(114%)	(85%)	(95%)

P = Preliminary

1/ Represents U.S. receipts for use of intangible property such as patents, trademarks, copyrights, etc., and rentals for use of tangible property. (It does not include management fees and film and tape rentals.)

2/ Represents receipts of charges to U.S. subsidiaries by multinational firms for professional, administrative and management services.

3/ Payments are in current dollars; the export price deflator would reduce the percentages by roughly 78 percent for average U.S. export price charges over the period 1967-1974. (The GNP price deflator rose 45 percent for this period.)

Source: Computed from statistical materials prepared by the U.S. Department of Commerce, Social and Economic Statistics Division, Bureau of Economic Analysis, June 1975.

The preponderant role of the multinational corporations in technology transfers is brought out by the data on U.S. receipts. In 1974, fees for management and related technical services from U.S. subsidiaries in LDCs represented 62 percent of total U.S. receipts for transfers of technology to developing countries. Licensing and related fees bring the MNCs' share of total U.S. receipts for technology exports to the LDCs to 85 percent. When considering licensing fees alone, the relative shares of receipts from unaffiliated firms and MNC subsidiaries are closer at 39 and 61 percent, respectively. (See Table 2).

TABLE 2

PERCENT DISTRIBUTION OF U.S. RECEIPTS FOR TRANSFERS OF TECHNOLOGY TO LDCs, 1974

	<u>AMOUNT</u> (Millions of dollars)	<u>PERCENT DISTRIBUTION</u>	
		Overall	Licensing Fees, etc.
Unaffiliated Companies Licensing fees	107	15	(39)
U.S. Subsidiaries Licensing fees	608 (165)	85 (23)	(61)
Management and technical services fees	(443)	(62)	
Total	715	100	(100) <sup>1/</sup>

As indicated by Table 1, fees for management and technical services did not rise as rapidly as payments for licensing fees during the period 1967-74. The developing countries, particularly those that are the most industrialized, have probably been developing an increasing competence to handle technical and managerial requirements -- while continuing to rely on foreign technology reflected by imported licensed patents. LDC criticism and related

<sup>1/</sup> Corresponding dollar amount for total receipts for licensing fees is \$272 million.

Source: Same as Table 1.

screening of transfer payments to multinational companies for technology imports probably had a greater impact on the levels of management fees than on licensing fees paid by unaffiliated firms. Fees for imported managerial and related technical services supplied to unaffiliated firms cannot readily be identified in available statistics. These services are supplied by foreign experts and consultants who are recruited directly. Their salaries and fees would not necessarily be repatriated and, in any case, could not be identified from published aggregates.

It should be noted that the bulk of international transfers of technology occurs among developed countries. U.S. receipts for technology transfers from other developed countries represented 80 percent of U.S. total receipts for such transfers. Licensing fees represented a much larger proportion of total payments from developed countries (at 75 percent) than from LDCs (at 38 percent). Fees for management and technical services, on the contrary, were relatively much greater from the developing countries at 62 percent of the total compared with a corresponding 25 percent level for such payments from the developed countries. The differences partially offset each other with respect to the relative shares of total receipts that came from U.S. subsidiaries: these receipts represented 85 percent of total receipts for all payments for technology transfers to the LDCs and 76 percent in the case of developed countries.

In view of the magnitudes and relative importance of intra-multinational corporation transfer payments identified as payments for transfers of technology and related services, considerable controversy has evolved regarding such payments. There is a widespread view among expert observers of the multinational corporations that transfer pricing policies of MNCs are influenced considerably by the relative tax advantages with respect to corporate income in the host and home countries.

A recent unpublished study, based on a 1968 U.S. sample of corporate tax returns to the Internal Revenue Service, found that licensing fees and royalty payments by MNCs are significantly affected by the relative tax rates of the U.S. and host countries. It estimated that host countries suffered an aggregate tax revenue loss and deterioration of balance of payments of \$60 million in 1968. However, these losses were heavily concentrated in such developed countries as Germany and the U.K. (together accounting for 50 percent of the total) and Canada and France. Only India and the Philippines were mentioned as possible overpricing cases among LDCs. In general, there was less incidence of tax influenced intra-firm licensing fee and royalty payments

from subsidiaries in LDCs. These results would tend to refute critics of transfer pricing policies of MNCs in LDCs. The study suggests that this apparent contradiction may be due to LDC policies of rather close scrutiny of licensing fees and royalties, which are considered as a possible subterfuge for profit repatriation, while overlooking possible outflows due to artificial transfer pricing of tangible products.<sup>1/</sup>

As noted above, the absence of comparable data limits possibilities for international comparisons on payments by LDCs for transfers of technology. With this in mind, data from seven developed countries, that were supplied in response to an UNCTAD inquiry, may provide a rough idea of the magnitudes of such transfers from the principal supplying countries which received \$630 million for transfers to LDCs in 1969. (See Appen. Tab. 2).

Taking into account the major discrepancy of the German data, which cover receipts from developed countries as well as the developing countries, U.S. receipts for technology transfers to the LDCs in 1969 represented between 70 and 80 percent of the total for the seven developed countries. (The higher percentage is based on an adjustment of the German overall figures by the U.S. proportions for receipts from developed and developing countries.)

Not unexpectedly, replies by developing countries to the UNCTAD questionnaire on payments for imported technology show a wide discrepancy with information provided by supplying countries on receipts for the same technology. A total of slightly more than 900 million dollars was attributed by 19 LDCs to payments for technology imports for an average annual period mostly during the late 1960s.<sup>2/</sup> (See Appendix Table 1). This figure was adjusted upward by UNCTAD for "the known extent of undercoverage of six of the countries"....<sup>3/</sup> In turn the

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<sup>1/</sup> "Intrafirm Royalties Crossing Frontiers and Transfer Pricing Behavior" by George F. Kopits, November 1974 (processed), p.11.

<sup>2/</sup> The countries covered were Argentina, Brazil, Chile, Columbia, Mexico, Peru, Venezuela, Nigeria, India, Indonesia, Iran, Israel, Korea, Pakistan, Sri Lanka, Greece, Spain, Turkey, and Yugoslavia. (This sample tends to be weighted toward the more developed LDCs.)

<sup>3/</sup> "Major Issues Arising from the Transfer of Technology to Developing Countries", TD/B/AC 11/10/Rev. 2, (UNCTAD), United Nations, New York, 1975, p. 25.

average rate of 0.47 percent of GDP expenditures on technology imports was applied for LDCs as a whole to arrive at an estimate of \$1.5 billion. The discrepancy between the two sets of figures (i.e. receipts and payments) in absolute levels and rates of growth could not be explained by UNCTAD.<sup>1/</sup>

On rates of growth of payments for transfers of technology, LDC respondents reported a 20 percent per annum rate, while the replies of the developed countries on receipts showed a 12 percent rate for the late 1960s. (The current dollar data were not deflated for inflationary price trends during this period.) On the basis of the LDC submissions, UNCTAD unrealistically projected a huge \$9 billion level of payments for transfers of technology by 1980.

The LDC replies showed an average foreign exchange requirement of 3.8 percent of export earnings for a late 1969-early 1970 period. Differences in the foreign exchange impact among the LDCs are important. For example, Mexico reported that a level of 15.9 percent of export receipts are required to cover costs of imported technology, while Brazil's level was 3.8 percent and Korea's 0.3 percent. All three countries have rapid economic and industrialization growth rates and rapidly rising exports of manufactures. It is beyond the scope of this study to go into the factors behind the differences in foreign exchange burdens of technology imports of the LDCs. Trade, economic and technological development policies among others would have to be examined in some depth. To cite an example, in some cases the relatively high costs are due to import-substitution policies designed to reduce import requirements. In the short run, however, the technology import costs could be significant. Protected markets do not encourage needed efficiency and a competitive trade position which could lead to export possibilities. Similarly, requirements for increasingly higher levels of locally manufactured parts in assembly operations of foreign subsidiaries could also increase licensing cost requirements that are not necessarily compensated by augmented exports.

### 3. Factors Affecting LDC Technology Import Trends:

The level and nature of a developing country's technology imports are inter-related with such factors as: the pattern of its economic development; progress on industrialization; the

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<sup>1/</sup> Ibid., p. 27.

country's resource base; the size of the internal market; prospects for exports; the quality and availability of scientific and technical personnel and related infrastructure (e.g., educational institutions, laboratories, etc.); its related R & D and innovative capability; and national policies that affect technology imports directly or indirectly (e.g., screening policies on licensing agreements, foreign trade and investment policies, foreign exchange availabilities, etc.).

Imports of licensed technology tend to be concentrated in the more economically advanced developing countries. Latin American imports of roughly 50 percent of total U.S. technology exports to the LDCs can be attributed to this factor as well as the relatively close commercial relations and geographic proximity of countries in the Western Hemisphere. Within Latin America, the most industrialized countries of Argentina, Brazil and Mexico accounted for over 90 percent of U.S. receipts for licensing fees and royalties from that area in the early 1970s.<sup>1/</sup> However, these imports can still be important in terms of a lesser developed country's levels of GDP and foreign exchange earnings. For example, relative percentages of payments for imported technology were higher for Nigeria, Columbia and Pakistan than for the more industrialized countries of Brazil and Israel during periods in the 1960s. For important primary commodity exporting, but relatively underdeveloped, countries such as Iran, Chile, Peru and Venezuela, the apparent significance of costs of imported technology with respect to these indicators is minor -- running at near or less than one percent of export earnings and correspondingly low proportions of GDP, according to UNCTAD data. (See Appendix Table 1).

National economic policies in LDCs can, of course, have a significant impact on technology imports. As noted above, import substitution policies in a number of Latin American countries probably resulted in some increase in payments for imported technology. These policies tended to encourage the establishment of subsidiaries of multinational companies and the introduction of foreign technology. Rapid industrialization policies such as those pursued in Brazil, Mexico, Taiwan, South Korea and Singapore obviously lead to increases in technology imports. In recent years, these countries have generally emphasized exports and thus foreign earnings have usually kept pace with costs of rising technology imports.

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<sup>1/</sup> Based on U.S. Commerce Department data.

Total foreign exchange requirements for capital imports, payments on foreign loans, remittances on foreign investment, and such high-priced imports as critically needed oil, grain and fertilizers have made all calls on foreign exchange onerous to most LDCs. Thus, a number of these countries are examining licensing and related technology imports more closely. In view of the ambitious industrialization goals of LDCs, technology import requirements could be enormous. The targets set by the UNIDO Conference in Lima in May 1975 called for an LDC increase to 25 percent of the world's industrial output by the year 2000. At present, LDCs account for only 7 percent of the world total. Such a shift would require huge LDC technology imports and would have a probably disruptive impact on world trade patterns to accommodate resulting LDC export needs.

#### 4. Patterns of Technology Transfers and Licensing Arrangements:

Before examining the elements of licensing arrangements which are the main focus of this section, mention should be made of other ways in which technology is transferred -- often in association with licensing arrangements: Among these are: (a) various forms of foreign direct investment--ranging from completely foreign-owned subsidiaries to joint ventures with minor foreign equity; (b) the purchase of equipment and machinery; (c) employment of foreign technical, engineering and managerial personnel and related services that could be secured under comprehensive management contracts or separately; (d) import of complete turn-key manufacturing facilities that include specialized personnel needed to assure operation during an initial production period; (e) joint research and development ventures; and (f) the training of specialized personnel required for operation and maintenance of imported technology.

The various means of technology transfers could involve a one-time purchase of a given technology or a continuing relationship between the supplier and recipient firm. Indigenous scientific and technical resources may, in some cases, be drawn upon to adapt the imported technology to local requirements or possibly use it in steps to develop new technology. In others, the foreign technology could be completely isolated from the host country's technological development. The patterns and related effectiveness of technology imports depend on such factors as: the local economic and social development structure, the state of human and natural resource development, the level and nature of industrialization, the local educational, scientific and technological structure, attitudes of the indigenous business community, technological policies of the government and the degree of competence of related

administrative services, etc.

Various elements in licensing agreements affect the nature and impact of technology transfers. The agreements specify the products and processes covered as well as the area in which the licensed rights are applied. Transfer of "know-how", included in agreements, covers a variety of proprietary rights, technical information and practical information. It is a vague term and requires careful definition in contracts. However, without the know-how element, LDC licensees in many cases would find it difficult if not impossible to utilize the licensed technology. Agreements define the royalty base upon which payments to the licensor will be based (e.g., on gross or net sales of licensed products, the production cost or price of individual units or the profits of the licensee). According to a study by the Conference Board of foreign licensing arrangements of U.S. firms, royalty rates ranged from 3 to 10 percent of sales with the most common rate reported at 5 percent. Provisions for initial lump-sum payments with or without percentage fees on sales are also common in licensing agreements. Licensors may specify a minimum annual royalty requirement and/or graduated royalty payments to stimulate sales and returns.<sup>1/</sup>

In the case of 15 percent of the firms replying to the Conference Board study, licensors received equity rights in addition to or in lieu of other forms of compensation. Foreign government objection to this type of provision was noted at the time of the study in 1959.<sup>2/</sup> The current political climate in many LDCs would preclude it today. The agreements may provide for the purchase of machinery and equipment needed for the licensed operation of the enterprise. Some agreements call for the procurement of materials and components through the licensor. LDC spokesmen have also objected to these provisions in recent years as being excessively costly due to monopolistic pricing policies. Countering this view, licensors claim that these provisions help assure quality control of trade-marked output.

Agreements can include a most favored licensee clause -- somewhat analagous to the most-favored nation (MFN) clause in

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<sup>1/</sup> "Foreign Licensing Agreements: II Contract Negotiation and Administration", The Conference Board, New York, 1959. pp.22 ff.

<sup>2/</sup> Ibid., p. 49.

foreign trade relations. It states that a licensee will receive as favorable terms as any other licensee for the particular technology. Licensing agreements generally specify the areas or countries in which foreign licensed output be produced and marketed. In some cases, the licensee can only export products through the licensor's international sales organization. Depending on the terms, this type of provision can affect the host country's trade in either direction. However, most LDC spokesmen have objected to exclusive sales provisions which they believe generally restrict their trade opportunities.

Agreements always specify the duration of the contract. The Conference Board study showed that agreements generally had five to ten year initial periods. Some have escape clauses of as short a period as a one year trial period. The length of time and termination provision depend on the nature of the agreement; if it calls for the setting up of a new enterprise that involves considerable investment, a relatively longer duration would be required. The duration factor would appear to be one which could also operate in both directions as far as relative advantages are concerned. In general, however, technology importing countries prefer short term agreements with the option for renewal as required.

Agreements can be comprehensive covering most of the forementioned elements as a package or they can be more limited. For example, a license agreement could be limited to a single type of technology such as preshrinking in textile manufacturing. LDC authorities tend to be critical of packaged agreements, claiming that a number of elements (particularly the tie-in sales of supplies and exclusive marketing limitations) are unfavorable to the host country.

##### 5. Technology Imports, Development and Dependence:

Much attention has been directed in recent years to the relationship between imported technology and economic and social development of the LDCs. The approach during the early post-World War II period of more or less indiscriminately encouraging imports of foreign technology to meet widespread deficiencies in LDCs has given way to a more critical examination of the possible impact of such transfers. This change reflects a concern over the growing foreign exchange burdens of such transfers and some second thoughts regarding the effect of these imports on the broad economic and social development goals of the LDCs. Some LDC spokesmen claim that imported technology often tends to inhibit rather than help develop technological

capabilities in their countries.<sup>1/</sup> Not least of the concerns expressed by development authorities is the limited capacity of many of the LDCs to absorb and assimilate advanced technologies. Inasmuch as largely capital intensive imported technology was developed to meet situations in industrially advanced countries, its appropriateness to the LDC scene has been questioned. As part of this questioning and in view of the seemingly endless upward trend in requirements there is a widespread view among LDC spokesmen that the technology imports lead to more rather than less national dependency. The predominant role of the U.S.-based multinational corporations in technology transfers to the LDCs reinforces this concern which has a prominent place in the rhetoric of LDC economic nationalism.

One of the LDC themes in the criticism of practices affecting the transfer of technology is the inadequacy of local firms dealing with the monopoly power of the sellers. Lack of technical and managerial competence is, of course, part of the syndrome of underdevelopment that lies behind the unequal bargaining power between LDC buyers and foreign sellers of technology. This limitation could also affect governmental attempts in LDCs to help redress the balance. Various efforts have also been undertaken by international organizations, oriented to LDC interests, and in the UN to strengthen the position of the LDCs in efforts to "bring about a transfer of technology and management skills to developing countries on equitable and favorable terms."<sup>2/</sup> UNCTAD has developed a set of guidelines intended to assist LDCs in exercising effective control over technology imports. These were reflected in a resolution passed by UNCTAD in Santiago in 1972 that advised developing countries to: (1) register and review all technology transfer agreements, (2) assist in negotiation of contracts, (3) help domestic enterprises find alternative supplies in line with national development priorities and (4) arrange for training personnel for the institutions which are to supervise the technology transfers.<sup>3/</sup>

Development authorities have stressed the importance of careful selection of technology that is appropriate for LDCs in light of resource patterns, priorities in economic

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<sup>1/</sup> "Latin America: Is Imported Technology Too Expensive?", Robert Gillette, Science, July 6, 1973, p. 42.

<sup>2/</sup> From the "Program of Action in the Establishment of A New International Economic Order," adopted by the UN General Assembly, May 1, 1974.

<sup>3/</sup> "UNCTAD Guidelines for the Study of the Transfer of Technology to Developing Countries", UN, New York, 1972, TD/B/AC. 11.9; and TD/III/RES/39.

development plans and the state of the indigenous scientific and technological community. A number of studies have focussed on these issues. Notable among them are the AID-sponsored studies at the Economic Growth Center of Yale University which have emphasized the LDC employment problems involved in choosing appropriate technologies. The OAS, ILO, UNITAR and the World Bank have in recent years examined facets with respect to specific industrial sectors. Industrial monographs, based on LDC experience, have been issued by UNIDO which has also conducted international seminars on the subject. A considerable amount of research has been completed or is underway that can be drawn upon by LDC officials to help in the selection<sup>1/</sup> of technology imports best-suited for their requirements.

An advisor to the Andean Common Market, Constantine Vaitzos, points out the following relative bargaining weakness of LDCs in negotiations of licensing agreements: (1) lack of knowledge of agreements, (2) the inexperience of government officials, (3) the absence of adequate legal sanctions in the host countries, and (4) the superior technical competence of the sellers. He recommends that LDCs seek clauses in the initial contracts for technology which facilitate reopening of negotiations at a later period when their position is stronger. The "most favored-licensee" clause<sup>2/</sup>, mentioned earlier, is cited as a device for this purpose. Presumably, this tactic is to be employed in a way that does not frighten away the prospective new investor or technology supplier.

Since it bears on possible human failings, science and technology dependency probably carry overtones that are more distressing to LDC political leaders, caught in the wave of economic nationalism, than financial and raw materials deficiencies. This is particularly true of some of the more advanced LDCs, as in Latin America, that are not in the newly emerging category.

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<sup>1/</sup> The following two reports provide descriptive accounts of recently completed and planned research in this sphere: "Appropriate Technologies for International Development: Preliminary Survey of Research Activities", Office of Science and Technology, AID, Washington, D.C., September 1972; and "Research Priorities on Technology Transfer to Developing Countries", A. H. Rubenstein, T.W. Schlie, and A.K. Chakrabarti, The Technological Institute, Northwestern University, Evanston, Ill., January 1974.

<sup>2/</sup> "Strategic Choices in the Commercialization of Technology: The Point of View of Developing Countries", by Constantine Vaitzos, August 1970. (Paper presented to Dubrovnick Conference of the Development Advisory Service of Harvard University, June 20-26, 1970).

A recent Foreign Affairs article traces the historical and cultural factors in the educational scientific and technological institutions that have contributed to this inadequacy in LDCs<sup>1/</sup> Short term goals have tended to take precedence over more meaningful longer range objectives that could strengthen LDC capabilities (i.e. the development of needed national infrastructure for science and technology would take a number of decades.) Selection of imported technology that can build on the indigenous science and technology rather than advanced and therefore isolated technology is recommended. In this respect, an adaptive role is envisaged for R & D in the host countries that can make use of talents that are frequently drained away by the competitive attractions of the developed countries.

Historical and related political factors have been blamed in the lack of innovations in university education needed to overcome technological dependence in Latin America. The example of Venezuela, is cited, where even after acquiring adequate foreign exchange resources from its oil exports, it is still deficient in scientific, technical and managerial personnel and the institutional framework for training and research.<sup>2/</sup>

In contrast, the "dependencia" theme has been emphasized by a number of Latin American spokesmen who mainly blame the multinational companies. Foreign technology inputs now come in indivisible packages contrasted with earlier decades in Latin America according to this viewpoint, when such technology was readily absorbed locally in a piecemeal fashion. The MNC packages now include management and technical skills, design, technology, and marketing elements. At the same time centralized decision-making and research in the MNC home country tend to widen the technological gap.<sup>3/</sup>

Along the same lines, a number of LDC spokesmen claim that outlays for imported technology tend to reduce resources available for indigenous R & D and thus impede technological development. Because of the weakness of data, particularly on R & D, it has not been possible to substantiate this claim.

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<sup>1/</sup> "Paradisias and Dominitia: Science and the Developing World" by Michael J. Moravcsik and J. M. Ziman, Foreign Affairs, July 1975, pp. 699-724.

<sup>2/</sup> "The Domestication of Science and Technology in Latin America," James H. Street, Rutgers University, November 1974, (processed).

<sup>3/</sup> "The Pattern of Latin America Dependence", by Oswaldo Sunkel, in "Latin America in the International Economy," Edited by Victor L. Urquidi, London, Macmillan, 1975, pp. 15 ff.

The postulated trade-off between R & D and imported technology could not be determined from trends in available statistics. It would appear that governmental budgetary policies and the degree to which the science and technology community is geared to service industry have a much more important bearing on R & D trends than do the levels of imported technology. In the case of Korea, a major function of the Korea Institute of Science and Technology is the adaptation of imported technology to local requirements. In that case, imports would serve to stimulate rather than dampen local R & D.

6. Possible Programs to Facilitate Technology Transfers to LDCs:

At the outset, it should be noted that although the bulk of technology imports into LDCs is represented by normal commercial transactions, foreign assistance programs support a considerable amount of technology transfers to the developing countries. Leaving aside technical assistance, which makes an important contribution, largely through the provision of outside experts and the training of LDC personnel, foreign financial aid has a significant direct and indirect impact on total transfers of technology to the LDCs.

Capital projects and program assistance financed by concessionary loans and grants, include important technology elements. These range from technology embodied in imports of machinery and equipment to "turn-key" projects. The latter provide complete industrial units which, in some cases, include rather advanced technology and a capability to operate the facilities for at least an initial demonstration period. In addition, aid support for technical education, training and research in developing countries has contributed to technological development. In effect, foreign aid underwrites some of the commercial technology imports which are met from largely fungible foreign exchange resources available to the LDCs and to which aid donors contribute. Thus the U.S. and other aid donors have an interest in the most effective use of limited LDC foreign exchange resources for technology imports and steps which may eventually reduce this growing requirement.

Starting from this premise, this section examines possibilities for increasing the effectiveness of foreign aid in this field by having some aid funds designated for support of

priority technology transfers which meet important development objectives. Possible related measures and institutional arrangements are also reviewed.

#### Scope of Possible Financial Assistance

As indicated earlier, the costs of foreign technology to LDCs are substantial -- even when employing the relatively lower estimates based on receipts of the supplying countries. However, selectivity in choosing categories of transfers for possible assistance to those which could have the greatest possible impact on technological development in the LDCs could reduce the requirements to manageable proportions. The main targets of possible assistance should be unaffiliated LDC firms which meet criteria discussed below. As noted above, U.S. receipts from unaffiliated firms in LDCs for technology transfer amounted to \$107 million in 1974. Subsidiaries of MNCs, which account for over 80 percent of licensing and related receipts by the U.S., would be eliminated from consideration in possible government-assisted programs for obvious political as well as economic considerations. New undertakings would take precedence over long-standing and commercially proven licensing arrangements. Licenses and royalties for highly advertised trade-marked products (e.g., soft drinks and similar consumer items) would not be considered. Those countries with adequate foreign exchange earnings would generally not be eligible for financial assistance on technology imports -- although they could still benefit from other aspects of possible programs in this sphere.

The degree and duration of possible direct assistance to qualifying enterprises would depend on the level of resources available. Some indication of alternatives is reflected in the discussion of criteria on eligibility and priorities, discussed below. Support for related institutional arrangements and services should also be factored into overall costs. Considering the potential role of programs in this sphere in promoting important overall foreign assistance goals, an adequate level of financing should be secured for a significant impact on technological development in participating developing countries.

Within the scope of foreign aid, possible programs to facilitate selected technology transfers to LDCs could be accommodated along the following lines:

- (1) Funds earmarked to cover payments for selected imports of technology could be provided to eligible LDCs that agree to establish programs in this sphere. The funds would cover foreign exchange requirements

for certain transfers of technology meeting mutually agreed criteria. In this case, qualifying enterprises would pay normal contractual prices for the technology in local currency. By increasing the amount of foreign exchange available for such imports, the aid funds would permit transfers to qualifying enterprises which otherwise would be unable to obtain such technology.

- (2) For certain qualifying firms, the program could also provide grants or loans to assist them directly in importing priority technology. In this case, foreign exchange would not be the only impediment to the needed transfer. The characteristics of the enterprises and the technology in question would, in this case, be of such a nature to warrant the subsidy. (For example, the innovative nature of the undertaking and the problems of financing operations prior to successful commercialization of the technology could be among such factors.)

The determination of which category to place qualifying firms would depend on the mutually agreed criteria and resources made available for the program. Local currency generated by the technology imports could be used to help cover the operational costs of the program.

It is essential that an adequate funding be provided to assure a meaningful level of operations in participating countries during the initial program period. This could help assure a significant impact in the assisted firms and hopefully more widely in the technological developments of the country. An adequate level of programming would help attract a committed and competent staff in the institutional structure, discussed below.

U.S. could encourage other developed countries to undertake similar programs, possibly on a coordinated basis through the OECD's Development Advisory Committee. Bilateral programs would appear to have some advantages over possible multilateral programs under existing international organizations in securing the cooperation of the private sector. Eventually the World Bank's international Finance Corporation and some of the regional development banks could also be encouraged to support programs in this field.

An international technology transfer bank has been proposed by Sarak Tarapore (of the International Monetary Fund) mainly as a conduit for some bilateral aid on technology transfers to the LDCs. Tarapore recognizes that, because of the bilateral and inter-firm nature of technology transfers, the role of multinational institutions is necessarily limited. However, he believes that his bank proposal could facilitate needed transfers by: developing a group of experts who could be made available to LDCs on special technology problems, stimulating relevant R & D in LDCs, helping countries on their institutional structures in this field, and evaluating transfer proposals for "appropriateness".<sup>1/</sup> It would appear that a possible international bank of this type would depend on the prior successful functioning of a few bilateral programs.

#### Program Criteria

Selection of the industrial sectors, types of foreign technology to be imported and local firms that might be eligible for assistance would depend largely on the level of technological and economic development of the country, national planning goals in the economic and related science and technology fields, the receptivity of indigenous enterprises to new technology and production methods and the quality and related capacity of the local scientific and technological community. The potential contribution to overall export earnings or savings by a given technology transfer would be a major factor in the selection process. Considerable care would be needed in weighing these factors when developing criteria for possible programs.

Projects should be selected with the view to developing local technological capabilities. Thus, licensing arrangements which open the door to adaptive R & D opportunities in the recipient country should have precedence over the importation of complete foreign technology transplants. Similarly arrangements involving the training of local personnel in new production and maintenance skills with broad applicability in the economy should be supported. Encouragement could be given to possible projects which might involve the return of expatriate scientists and engineers for employment in the LDCs.

The choice of local firms to receive assistance could be the most important factor affecting the ultimate impact of possible programs on technology transfers. In the Conference

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<sup>1/</sup> "Financing Technological Transfer to Developing Countries", by Sarak S. Tarapore, International Development Review, 1974/2, pp. 19 ff.

Board survey, cited above, the selection of the licensee was considered, by most technology exporting firms queried, to be the single most important element affecting the viability of a licensing agreement.<sup>1/</sup> Attitudes as well as technical competence would enter into selection considerations in efforts to locate innovative individuals and firms that could have an impact on the entire business community.

Priorities in national economic and social development plans or policies should be an important factor in the selection of projects and the degree of subsidization provided. (The program could help stimulate LDCs in clarifying the role of technological development in achieving development objectives.) For example, depending on particular country development goals, preferential attention should be given technology imports which significantly expand employment opportunities, increase export earnings, help achieve food self-sufficiency, overcome industrial bottlenecks, meet energy and resource conservation and environmental protection requirements, etc.

#### Use of Incentives

Schemes for applying financial incentives to facilitate desired technology transfers would depend on the criteria developed for the program and the funding levels made available. Certain elements in licensing arrangements, discussed above, lend themselves for consideration for such possible subsidies and other support. Initial lump-sum payments, for example, usually related to the provision of know-how, would be a good candidate. Such assistance could be in the form of a partial grant or a low interest loan to be repaid after the successful marketing of the licensed production has begun. Along the same lines, royalties for the early years of commercialization of the transferred technology might be partially covered by a subsidy to help eligible licensees during a period when financial burdens and threats to solvency may be greatest, particularly for new enterprises.

Special grants and/or loans might also be considered to help meet unusual problems facing local innovative firms. For example, such assistance could be considered for qualifying firms having special quality control and supply problems that could delay planned production schedules; it might also be

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<sup>1/</sup> Op. cit., p. 6.

extended to qualifying firms to meet unanticipated marketing, distribution and maintenance problems that appear likely to be of short duration. Some help might usefully be provided to meet unusual training or retraining requirements for personnel needing up-graded skills for job tasks related to imported technology. Aid funds could also usefully support pilot projects involving the services of the institutional center, described above, and relating to technology of an innovative nature that could have a major impact on the technological development of the LDC. (For example, technology that could be adapted to meet a priority requirement such as food storage, etc.).

Varying rates of financial support could be applied for possible technology transfer schemes. As far as the individual firm is concerned, the incentives would primarily enable it to import technology more readily than would otherwise be possible by covering some of the costs either through grants or loans provided by the foreign aid. This aid would, as in the case of most other foreign financial assistance, result in foreign exchange being earmarked by the LDC for the designated purposes agreed upon with the donor countries. The payments (whether subsidized or not) for the technology imports by the LDC firms would normally be in local currency. Counterpart funds, made up by these payments, could cover local administrative and other services. A revolving fund principle could apply to repayments on the loans. Loans could be serviced through LDC development banks or through the special institutional focal point, discussed below. In either case, the latter could rule on the firm's eligibility as far as technological development criteria are concerned.

#### Institutional Aspects

The effectiveness of possible outside assistance would depend to a large degree on the institutional structure through which it might be channelled in the developing country. A focal point or center should be selected from among suitable institutions in the recipient country or new ones created, if none can be found. It should serve both as a clearing house for action on requests by LDC firms seeking assistance in acquiring essential foreign technology or locating firms best qualified to use imported priority technology. It could disseminate information on technology import opportunities meeting assistance criteria.

The LDC focal point should employ or have access to technical and marketing experts who could carry out preliminary surveys of the qualifications and related capabilities of LDC

firms requiring assistance in high priority fields or in locating firms which could benefit most from such assistance. The surveys should provide a preliminary objective assessment of the technical capacity of these firms and also examine the background on market and supply factors which could affect the outlook for successful transfers of technology. These would serve only as screening surveys; the basic responsibility for selecting the licensee would rest with the technology supplying companies. This type of servicing, therefore, can be of use to both the prospective licensee and the licensor. The clearing house function could also help screen out unwanted types of licensing arrangements by publicizing only those proposals calling for priority types of technology imports. Depending on the talents of its staff, it could also assist LDC firms in negotiating licensing agreements, particularly where the local firms lack the necessary technical competence or experience.

The nature and location of these services depend, of course, on the experience of the particular LDC with imported technology and whether regulatory or other functions vis-a-vis such imported technology already exists. Some of the most industrially advanced LDCs, such as Brazil and Korea, could probably append the proposed functions to existing institutions. In less advanced countries or those with less experience and without suitable administrative structures in this sphere, new institutions would need to be established. It is essential that the institutional structure be oriented toward servicing the private business sector. In general, if the LDC science and technology community is oriented toward academic and/or non-applied research and has little contact with the private sector, it would probably not play a constructive role in this type of program.

The proposed program activities on technology transfers could help stimulate the development of more comprehensive policy planning by LDCs in this field. As a result, science and technology policies in the educational and governmental sphere could be more closely related with economic planning and the servicing of the private sector. Korean experience along these lines could be of some interest. The government's Korea Institute of Science and Technology (KIST) which carries out a function of facilitating technology imports (particularly for small and medium sized enterprises) is guided by the science and technology priorities set forth in the Korean national economic plans. Goals of the national economic plans also help guide Korean scientific and technical education and related research activities.

The size, orientation and quality of the science and technology community in the particular LDC, of course, has an important bearing on the institutional structure. A major objective of possible program activities in this field should be the strengthening of the indigenous science and technological community. KIST, for example, undertakes adaptive R & D and depends on the availability and quality of scientific and engineering talent coming from Korean educational institutions. Outlays to fund equipment and operations of KIST facilities would, of course, be pointless without such essential human resources.

Counterpart institutional arrangements should be established or selected among existing institutions in the U.S. and other developing countries that may consider programs for facilitating technology transfers to the LDCs. These should serve as focal points for servicing priority needs of LDCs by helping to locate companies which could supply the required technology and related services.<sup>1/</sup> Information could be supplied on a periodic basis by the institutional center to interested firms on the likely needs of LDCs based on the latter's development plans and related science and technology policies.

Relation of Multinational Companies  
to Possible Programs

In view of their relative importance in such transfers, much attention has been devoted to the role of multinational companies in technology transfers both with respect to costs and appropriateness. One authority, after reviewing the difficulties of technological transfers to LDCs, particularly the long run-in period (before a plant becomes economically viable), suggests that MNCs could provide opportunities for LDCs to specialize in types of production meeting their capacities. The MNCs, with their manufacturing and engineering capabilities and a world-wide production and marketing role, could downgrade advanced technology to meet local industrial abilities and adapt the product to local requirements.<sup>2/</sup>

Although possible subsidy and related assistance on technology transfers, discussed above, should be limited to unaffiliated firms, the possible collaboration of multinational companies in the program should be sought. Local firms

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<sup>1/</sup> Standard competitive practices would be employed in selecting supplier firms.

<sup>2/</sup> "Transfer of Technical Knowledge by International Corporations to Developing Countries", by Jack Baranson, American Economic Review, May 1966, p. 256.

frequently service multinational companies. They provide supplies and services needed in the manufacturing, marketing and distribution of output of MNC affiliated firms located in the LDC. These inputs could vary in degree of sophistication from raw materials and semi-processed products and relatively unskilled services up to important components used in the assembly of final products of the local MNC subsidiary.

In the number of LDCs, the local relationships with MNC subsidiaries are one of the principal channels for the diffusion of imported technology into the economy. There could be a considerable area of mutual interest to expand and deepen this transfer process: the MNCs could gain by obtaining better quality inputs (possibly at lower costs); the LDCs could benefit from greater local output, reduced foreign exchange outlays and further economic development. If the political climate permits, a collaborative arrangement might be established on a selective basis with MNC subsidiaries to assist on individual projects with respect to specific bottleneck problems such as quality control, marketing and distribution in which the MNCs have particular competence. Arrangements might also be made within the scope of the program to draw on training and other facilities of MNC subsidiaries to help local firms in introducing new technologies.

Possibly the scope of such collaboration might be established in the course of MNC entry negotiations with LDCs. Such collaboration could be facilitated by the U.S. business communities in LDCs with the help of U.S. missions. Non-governmental organizations such as the Council of the Americas and the U.S. Council of the International Chamber of Commerce that are oriented toward improving relations between U.S. overseas enterprises and host countries could play a positive role in securing MNC collaboration in possible programs. Besides the possible direct economic benefit, these contributions can help improve MNC relations with the LDCs, hopefully reducing political tensions and harassment.

#### Preferential Licensing Terms for LDCs?

An analogous approach to the generalized special preferences (GSP) accorded to certain exports of manufactures from LDCs by developed countries does not appear feasible with respect to licensed technology. For one thing, the issue on technology transfers is not access to markets which is the focus of GSP. Access to supplies, which GATT is only beginning to consider seriously as a result of the Arab oil boycott of 1973-74 and recent restrictions on grain and coal exports, would be more applicable. In any event, technology is not considered

as a commodity subject to trade regulations although the economic decisions on the production and sale of technology may have some similarities to traded goods. The marketing of licensed technology differs significantly in that technology is a highly differentiated product. Each licensing agreement is separately negotiated and takes into account a wide range of complicated factors. Unlike the body of rules for trade and related compensatory features for violations found in GATT, it would appear almost impossible to handle such an important and yet elusive element as "know-how" in a licensing agreement.

Alternatively, the private exporters of technology might be encouraged to provide technology at special discounts to LDCs on a voluntary basis. In view of the lack of clear pricing criteria for technology (unlike goods off the shelf), it would be difficult to know if and to what extent a discount actually were applied. With respect to intra-firm transactions of the MNCs, discounts to subsidiaries might pose some tax problems (see discussion below). Thus a program along these lines would probably be heavy on exhortation and light on results.

#### Tax Policy

The governmental role in the trade sphere that permitted the development of GSP might be considered with respect to tax policies on payments for technology transfers to the LDCs. It may be theoretically possible, but in practice unlikely, that these payments flows could be affected by tax policies. Unless it were possible to have some of the taxes on receipts for technology exports to the LDCs rebated, it would be difficult to work out a scheme that would clearly benefit the developing countries and not the supplying firms. In any event, it would be more effective to transfer the equivalent resources through official financial assistance that could maintain much more control over the type of technology to be affected and the beneficiaries.

As an example, based on observations of authorities on MNC transfer price policies, a possible lower U.S. tax on such receipts from LDCs might paradoxically lead to an increase in the prices of exported technology to LDCs (or the identification of more transfer payments from LDCs with technology transfers). MNCs, which receive the lion's share of such payments from the LDCs, would probably find it advantageous to raise transfer prices charged to their subsidiaries, if corporate profit taxes in the host country were higher than the new net U.S. taxes on receipts for licensing and related

fees from the LDCs. Such a hypothetical move by the MNCs would be contrary to U.S. tax regulations, but as with transfer prices generally policing this area would be a complicated task. Aside from these major technical obstacles to possible tax incentives, formidable domestic political problems would probably arise in any preferential tax scheme that might, as in the case of technology exports, appear to increase foreign trade competition during slack U.S. economic conditions. The latter concern has resulted in a number of proposed tax disincentives to foreign direct investments.

The impact of national tax policies affecting technology transfers could be examined bilaterally and possibly multilaterally to assure equitable treatment for the LDCs. Probably, this issue could best be considered in broader international examinations of questions relating to foreign direct investment in view of the importance of the MNCs in total technology transfers. These receipts represent only a fraction of overall transactions of MNCs.

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APPENDIX TABLE 1

Payments<sup>a</sup> by developing countries for the transfer of technology and their relationship to GDP and exports

Country and region	Most recent year available	Payments for transfer of technology for			GDP	Exports	Payments for transfer of technology as proportion of	
		Patents, licences, know-how and trademarks (1)	Management and other technical services (2)	Total (3)			GDP (6)	Exports (7)
		(Millions of dollars)			(Billions of dollars)		(Per cent)	
<i>Latin America:</i>								
Argentina .....	1970	70.5	45.3	15.8	23.4 <sup>b</sup>	1.8	0.49	6.5
Brazil .....	1970	..	..	104.0	35.3	2.7	0.29	3.8
Chile .....	1969	8.2	..	(8.2)	6.1	1.1	0.13	0.8
Colombia .....	1966	..	..	26.7	5.4	0.5	0.49	5.3
Mexico .....	1968	..	..	200.0	27.1	1.3	0.74	15.9
Peru .....	1971	9.9	1.1	11.0	5.8 <sup>b</sup>	0.9	0.19	1.2
Venezuela .....	1966	14.8	..	(14.8)	8.8	2.7	0.17	0.5
Sub-total .....		..	..	(480.5)	111.9	10.9	0.43	4.4
<i>Africa:</i>								
Nigeria .....	1965	19.0	14.8	33.8	4.7	0.8	0.72	4.5
<i>Asia:</i>								
India .....	1969	6.4	43.2	49.6	49.1	1.8	0.1	2.7
Indonesia .....	1968	25.0	..	(25.0)	11.0	0.7	0.23	3.6
Iran .....	1970	1.7	1.6	3.3	11.2	2.4	0.03	0.1
Israel .....	1961-1965 <sup>c</sup>	1.6	2.3	3.9	2.6	0.3	0.15	1.2
Republic of Korea .....	1970	2.1	..	(2.1)	8.1	0.8	0.03	0.3
Pakistan .....	1965-1970 <sup>c</sup>	2.1	(100)	(102.1)	14.5	0.6	0.7	15.7
Sri Lanka .....	1970	0.1	9.2	9.3	2.2	0.3	0.42	2.7
Sub-total .....		39.0	(156.3)	(195.3)	98.7	7.0	0.2	2.8
<i>Southern Europe:</i>								
Greece ..	1966	..	..	2.6	6.4	0.4	0.04	0.6
Spain .....	1970	81.6	52.2	133.8	32.4	2.4	0.41	5.6
Turkey .....	1968	..	..	49.1	12.6	0.5	0.39	9.9
Yugoslavia .....	1970	5.4	..	(5.4)	12.3	1.7	0.04	0.3
Sub-total .....		..	..	(190.9)	63.7	5.0	0.3	3.8
TOTAL, excluding Southern Europe .....		..	..	709.6	215.3	18.7	0.33	3.8
TOTAL, including Southern Europe .....		..	..	900.5	279.0	23.7	0.32	3.8

Sources: Replies to the UNCTAD secretariat's questionnaire and other sources shown in the annex to document TD/106, *loc. cit.* (cf. foot-note 4 above). For Venezuela: Oficina Central de Coordinación y Planificación (CORDIPLAN), Departamento Industrial, *II Encuesta Industrial: Documento Básico* (Caracas, November 1968)

NOTE: Parentheses indicate that the information available is incomplete.

<sup>a</sup> In most cases payments refer to the foreign exchange cost (in dollars, at current prices) of the transfer. For further details, see the annex to document TD/106, *loc. cit.* (cf. foot-note 4 above).

<sup>b</sup> UNCTAD secretariat estimate.

<sup>c</sup> Annual average.

Note: Copy of Table 10, TD/B/AC.11/10/Rev.2, (UNCTAD)UN, New York, 1975

APPENDIX TABLE 2

Relationship between increase in payments for transfer of technology, manufacturing output and GDP for selected countries

Country	Period	Payments for transfer of technology		Annual average growth rate of			Relationship of growth rates of	
		Initial year (1)	End year (2)	payments for transfer of technology (PTT) (3)	manu- factu- ring output (MO) (4)	real GDP (5)	PTT MO (Le. column 3 divided by column 4) (6)	PTT GDP (Le. column 3 divided by column 5) (7)
		Millions of dollars		Per cent per year			Ratios	
<i>Developing countries</i>								
Nigeria	1963-1965	13.8	33.8	55.5	9.3 <sup>a</sup>	4.0	6.0	13.9
Korea (Republic of)	1967-1970	0.7	2.1	43.0	24.2	12.5 <sup>b</sup>	1.8	3.4
Sri Lanka	1965-1970	2.0	9.2	36.0	8.6 <sup>a,c</sup>	3.9	4.2	9.2
Argentina	1965-1970	35.1	115.8	26.9	5.0	3.9 <sup>c</sup>	5.4	6.9
Brazil	1965-1969	42.5	91.0	20.9	9.7 <sup>d</sup>	6.2	2.1	3.4
India	1959-1969	12.0	49.6	15.2	5.8	9.2 <sup>a</sup>	2.6	1.7
Mexico	1953-1968	14.7 <sup>f</sup>	120.0 <sup>f</sup>	15.0	8.5	6.7 <sup>b</sup>	1.8	2.2
Iran	1965-1970	1.1	1.7	10.1	11.8	10.4 <sup>c</sup>	0.9	1.0
<i>Other technology-receiving countries</i>								
Turkey	1964-1968	6.2	49.1	65.5	10.5 <sup>a</sup>	6.6	6.2	9.9
Yugoslavia	1965-1970	0.6	5.4	50.5	6.3	5.3 <sup>c</sup>	8.0	9.5
Ireland	1963-1969	0.2	2.2	49.0	6.6	4.3	7.4	11.4
Greece	1959-1966	0.7	2.6	19.8	8.6 <sup>h</sup>	9.4 <sup>h</sup>	2.3	2.1
Spain	1965-1969	79.9	133.0	13.6	11.0	6.5	1.2	2.1
<i>Developed market-economy countries</i>								
		Receipts from developing countries for the transfer of technology						
France <sup>i</sup>	1967-1969	23.2	32.2	17.8				
Germany (Federal Republic of) <sup>j</sup>	1963-1969	50.3	105.4	13.1				
Belgium	1966-1970	5.6	8.8	11.6				
United States of America	1960-1969	175.6	442.3	10.8				
United Kingdom <sup>k</sup>	1965-1969	19.6	29.3	10.6				
Sweden	1965-1970	0.2	0.2	1.9				
Japan <sup>l</sup>	1968-1969	12.4	11.3	-				

Sources: As for table 10.

NOTE Countries in each group have been arranged in descending order of their annual growth rates of payments for the transfer of technology.

<sup>a</sup> Real GDP in manufacturing.

<sup>b</sup> 1966-1969.

<sup>c</sup> 1965-1969.

<sup>d</sup> 1965-1968.

<sup>e</sup> 1960-1968.

<sup>f</sup> In contrast to table 10, these figures have not been adjusted for their limited coverage.

<sup>g</sup> 1953-1967.

<sup>h</sup> 1960-1966.

<sup>i</sup> Excluding \$36.4 million in lump-sum receipts in the petroleum sector from the Algerian Government.

<sup>j</sup> Receipts from developed and developing countries.

<sup>k</sup> Excluding receipts by petroleum companies, including receipts from Southern European countries.

<sup>l</sup> For the period 1963-1968 Japan's receipts from all countries, developed and developing, rose from \$9.1 to \$34 million for an annual growth rate of 30 per cent, according to figures shown by T. Ozawa, *Transfer of Technology from Japan to Developing Countries*, UNIFAR Research Report No. 7 (New York, 1971).

Note: Copy of Table 12, TD/B/AC.11/10/Rev.2, (UNCTAD) UN, New York, 1975