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# TECHNOLOGICAL TRANSFER THROUGH INFORMATION - - SCOPE AND LIMITATIONS [1]

by

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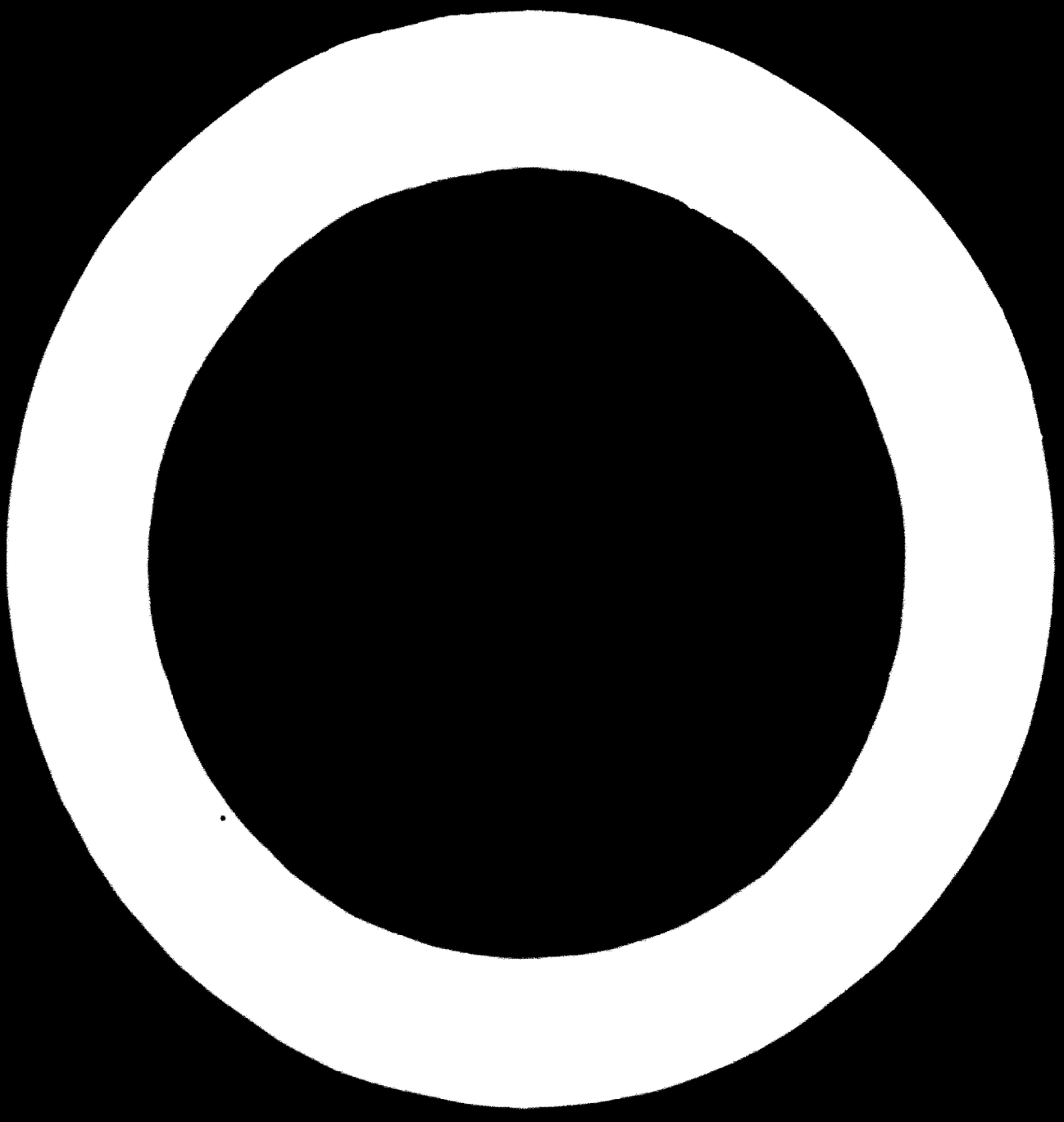

# TRANSFER OF TECHNOLOGY THROUGH INFORMATION

## I. What do we mean by technological transfer?

Transfer of technology might be defined as a communication of various elements of technological knowledge to practical application by a new user. For the purpose of this paper, we are mainly concerned with technology to be transferred to developing countries to strengthen the industrial sector of their economy. The United Nations Advisory Committee on the Application of Science and Technology to Development has adopted the following definition of technological transfer:

> "Application of know-how, primarily through the medium of people who, on the one hand, have knowledge of and access to relevant publications, and on the other, have knowledge of the user's problems, needs and limitations, and can communicate to the user what he needs and can apply". (See document E/4178, para 79).

While this definition might be improved by substituting "body of technological data and know-how" for "publication" - on the understanding that a substantial part of the technological knowledge required by new industrial ventures is not accessible through publications, but is kept secret and not even published in patents - it has the advantage of covering, in addition to the aspect of communicating specific parts of technical knowledge, a most important factor, namely the recipient's capacity to apply technological knowledge and to exploit it economically.

The specific items of technical knowledge to be transferred are all those required for the setting up and operating of new production units; they can be roughly broken down into three categories of "know-how":

1) Product design
2) Choice and design of production facilities
3) Management and marketing

In line with these definitions, the supply of technical information on a specific product and its productinn process should - if successfully applied - result in "technology transfer".

## II. Why "technology transfer ?"

The application of more advanced technology is one of the essential prereq'i ites for industrial development and thus for economic growth. To catch up with the economically advanced countries, developing nations have to adopt more advanced technologies. As a rule, these can be more rapidly acquired from industrially advanced countries by utilizing their accumulated stock of knowledge than they can be newly developed locally. The problem - apart from the price to be paid for proprietary technology - is one of selection, adaptation and assimilation. The selection will be determined by the ultimate objective of the transfer, be it economic growth, profit, rise in employment or the creation of centres of technological or industrial excellence, with due regard to the resources available (raw materials, capital, labour).

## III. What are the main means (vehicles) for the transfer of technology?

In examining the main means by which transfer of technology actually takes place, a distinction should be made between those vehicles providing primary technical information in a general way and those supplying pertinent information and know-how on a defined technological subject in response to a specific demand.

Books, trade journals, sales literature, technical fairs, conferences, meetings, study missions and training courses fall into the first category; they are responsible for initiating greater awareness of technological advances in general and are essential instruments toward creating and reinforcing the demand for new technology among economic and industrial decision makers. These means by themselves, however, do not - as a rule - lead to an effective transfer of operative technology, for the simple reason that the technical and managerial skills required for the successful selection and assimilation of technology from these primary sources of information are extremely rare, particularly in developing countries.

The second category of "transfer-vehicles" comprises individual experts, consultant companies, equipment suppliers, engineering and design offices, institutes for applied research and development, plant manufacturers and production companies. These secondary vehicles combine the supply of information with the technical and organisational skill required for assuring its practical application. While the price of obtaining information from primary sources is nominal, the services of the intermediate suppliers in the second category have

to be obtained for a fee and are usually provided within the framework of a formal agreement, be it a purchasing or servicing contract, or a licensing agreement. Another characteristic of these "secondary" suppliers of technological information is the disadvantage inherent in their function of pre-selection, which allows for the introduction of a non-technical bias such as national preferences in the choice of technologies and equipment. This latter characteristic often has implications on the costs by inducing the customer to hire the services of several sources of engineering advice in order to obtain a more balanced view.

There is a rather wide range of commercial agreements under which technology transfers are carried out. The amount of technology put to use is usually in direct proportion to the fee or reciprocal to the control relinquished by the recipient to the supplier over the industrial venture in question. In this order the list might begin with consultancy contracts and turnkey-agreements, and go on from there to engineering and construction agreements, purchasing and servicing agreements with equipment suppliers with and without equity participation, management or technical assistance contracts, franchising and, finally, licensing and joint-venture agreements with terms ranging from royalty payments on the basis of sales to various degrees of participation and control through restrictive provisions with regard to marketing, procurement and management.

Obviously, the choice between these different means of transfer and the assessment of their respective advantages and disadvantages is not an easy task but a highly complex one. The average recipient of technology in a developing country is not up to this task, hence the necessity for authorities in developing countries to help him and to improve his bargaining position through proper institutional arrangements and legislative measures.

## IV. How is technology available?

(proprietary and non-proprietary technology)

To use the terminology of the computer trade, a distinction might be made between the hard-ware and the soft-ware required in the transfer of technology.

For a number of industries (cement, food-processing, pulp and paper, petrochemicals) the hard-ware to be transferred is often available from equipment and plant manufacturers or through engineering and construction firms which do not detain a proprietary or exclusive knowledge of the technology. The equipment prices of the supplier therefore, are rather competitive and do not, as a rule, include any "overcharging" for technological know-how.

On the other hand, there are important branches of advanced industry, such as the automotive, electrical, electronic and pharmaceutical industries, with a supply of hard-ware restricted and controlled by the companies making use of the technology in their main line of production ("producer dominated technology"). The prospective buyer of such equipment is usually in a weak bargaining position and the price to be paid might well be to release to the supplier part of the managerial and/or marketing control of the recipient enterprise in the framework of a licensing agreement or through equity participation.

The soft-ware in the transfer of technology is information, knowledge and know-how. A great part of it is accessible, most of it even free.

By freely accessible we mean non-proprietary technology. The term "proprietary" covers both patented and secret technological knowledge. There is no clear line of demarcation between secret and freely accessible technological know-how; a great deal of knowledge is in a grey area to be labelled "difficult of access", especially for a potential recipient in a developing country.

Technology described in patents is accessible but protected in the country or countries where patent protection was granted. According to the Paris Convention for the Protection of Industrial Property, patent rights should be granted "in exchange for full disclosure of the invention to the extent necessary for it to be carried out by a person skilled in the art". Also, most modern national laws provide for compulsory licensing of patented inventions in cases of failure to work the invention in a way which meets the local demand for the product and unreasonable refusal of the patentee to grant contractual licences.

In practice, however, patent registrations of production equipment and processes do not fully describe technical details which are often essential for the practical utilization of the patent. Hence the small practical value of patent registrations, even after expiration of their protection period or outside their territory of protection, without a licensing contract securing the necessary know-how from the patent holder.

True enough, knowledge on more than 50% of the operative technology in use today is freely accessible, somewhere in the vast store-houses of knowledge in the industrialized countries. The search and selection process required, however, for the transfer of a given item of know-how to an industrial "consumer" of this technological knowledge in a developing country, is difficult and costly; and, finally, the recipient might lack the managerial skill to exploit it economically.

Those are the reasons for the growing number of joint ventures and licensing arrangements between enterprises in developed and developing countries.

The total cost of these contractual arrangements are enormous and probably well above the most pessimistic current estimates. Their full appreciation is complicated by the complex "package-deal" nature of most agreements, royalty payments be being only one among many terms to be considered. In 1966, for instance, the cost of royalties and other technical services to Colombia was at least US$ 20 million, or 0.4 per cent of its gross domestic product; the costs of foreign consultancy and other services for Pakistan are thought to be over US$ 100 million. And in general these costs seem to be doubling about every five years. According to one estimate, if in the developing world payments for patents, trademarks, licenses and know-how were to increase by 20 per cent a year - as they did in Japan during 1957-65 - the total would rise to some US$ 1500 million by 1980, and to much more if all the hidden costs were included.

So the information gap poses two quite separate problems to developing countries: first, to identify those pieces of relevant knowledge more or less freely available to anyone who can find them and, second, to afford to pay for that specially selected knowledge to which someone else already holds the title.

For the first there can be no substitute for effective action by governments themselves. Probably every country would benefit from the setting up of a national technology transfer centre, closely linked on the one hand with the appropriate planning authority and on the other with industry and the universities. The nature of such centres would vary from country to country but they would all have one thing in common: an aggressive attitude to information. It is not sufficient for a centre of this nature to collect information; it has also to bring it to the notice of potential users and to encourage them to make their requests known. Also, each of these centres should tie in with each other and be well connected in a world-wide system of an information exchange.

The way to answer the second problem is much clearer. The cost of privileged technical information to the developing world must be drastically reduced. Restrictive practices that surround so many licensing agreements must be removed and there must be an international trend towards liberating the flow of information from the stranglehold of market demands and profit in order to use it fully towards progress in industrialization.

But the means of doing this are far from clear. Hopefully the recent recognition of the problem by UNCTAD will lead to the identification of some practical means for international action.

## V. What are the pre-conditions for a successful transfer?

Certain conditions are essential for the successful transfer of technology.

Firstly, there must exist a demand for technological innovation, plus the will to innovate and the entrepreneurial spirit to introduce better and less expensive products and production methods. Socio-economic factors are responsible for the nature and the strength of this demand. Government policies should be instrumental in provoking, strengthening and responding to this demand within a coherent programme for the promotion of technological progress throughout the country's educational system and with the help of public information media. A sound national policy for economic growth has to provide opportunities and incentives for technological change and should be geared towards overcoming the factors which inhibit innovation, such as lack of competition and built-in resistance to change. To this end, full use should be made of the inherent pressure of the consumer market for new and better products.

Secondly, the availability of indigenous capacities and skills to select, adapt and absorb new technologies is necessary. This is probably the most important, as well as the most deficient, prerequisite for the successful assimiliation of new technologies in developing countries. The skills required are not so much of a scientific as of a technical and managerial character; they appear to be quite inaccessible through conventional education curricula (teaching the "know-why") but have to be acquired through practical demonstration and experience (teaching the "Know-how"). It also appears that the disposition or the talent for the acquisition of these skills is unevenly distributed among countries and that therefore a differentiated approach is required for its promotion.

The third condition involves a national infrastructure of supporting services, such as information and extension services, productivity centres, applied research institutes, export promotion agencies and offices for technical testing and standards. The combined strength of these services has to make up for the deficiencies previously referred to, namely, the often insufficient awareness of, and demand for, new technology, and the lack of local experience and skill. The primary function of these supporting services is, therefore, to act as promoters of technological awareness and as focal points for the pooling and multiplication of local technolo-

gical experience and know-how. Consequently, a strong network of supporting services is very important in the initial stages of technological development, particularly for the transfer of more advanced technology to small- and medium-sized enterprises. The intermediary and "watch-dog" role of these services is greater, the wider the disparity in the technical level between suppliers and recipients of new technology. Hence the necessity for these services to differ in their functions and priorities from their counterparts in industrially advanced countries. They should give absolute priority to the immediate needs of local industry and include a high component of evaluation, assessment and adaptation work.

Finally, the establishment, operation and direction of these services brings up the fourth major pre-requisite for the successful transfer of technology to developing countries with the definition of technological goals by each country in line with its overall policy for economic development. The economic and social implications of technological transfer operations call for national policy-making bodies to see that national interests are taken into account, to advise on the subject and thus to allow for government participation in the decision making.

## VI. What might be the role of authorities in recipient countries?

To protect their nationals against the pitfalls of uncontrolled technology transfer, authorities of developing countries should, in the first instance, define their national policies for technological development within the framework of their general development objectives.

In line with the successful experience of Japan, authorities of developing countries might further envisage interposing themselves between suppliers and recipients of technology through proper institutional arrangements, with the aim of safeguarding the economic and social interests of the country and of assuring that the choice of alternative technologies is based on a thorough and unbiased cost-benefit analysis going beyond the mere calculation of profits.

In addition, two complementary sets of measures should be developed to become integral parts of a coherent national policy on technology.

One set of measures should be directed towards improving the terms of transfer, the other toward developing the national infrastructure for technology with a view to reducing technological dependence from abroad.

Measures for improving the terms of technology transfer might include:

1. A national body to assist in the screening of imported technology, particularly in the evaluation of technical factors;
2. Legislation prohibiting technology transfer agreements with restrictive clauses such as:
   (a) limitation of exports,
   (b) stipulations with regard to the purchase of equipment,
   (c) fixing the price of the products to be sold,
   (d) restricting the volume of production;
3. Legislation to:
   (a) set price ceilings for royalty payments and other connected fees,
   (b) ban - in case of failure - lump-sum minimum payments to the licensor,
   (c) restrict foreign equity to minority participation,
   (d) limit dividend payments on equity received for the provision of technological know-how, and
   (e) compel foreign patent owners, having no production in the country, to license local producers (compulsory licensing)

The measures to be applied toward strengthening local skills as well as capacities for the development, adaptation and economic exploitation of technology, might comprise the following:

1. Designation of a national body to act as a focal point in the field of technology transfer by registering, activating and pooling local sources of technical expertise (individual experts, consultant companies, research institutions);
2. Establishment of technological information services with an active approach to local industry through highly qualified field advisory officers;
3. Tax incentives to promote local research and development to encourage import substitution in the field of technology as well as the build-up of local assessment capacity for the selection of technology;
4. No, or reduced, depreciation for imported capital intensive machinery in order to promote the development of local design;
5. No protection for monopoly production of foreign subsidiaries;
6. Measures to widen and diversify the range of potential foreign suppliers of technology, in order to reduce unilateral dependencies and to improve bargaining position;
7. Introduction of new selective training methods for the upgrading of the local labour force;

8. Legislation to enforce the progressive reduction of expatriates in foreign subsidiaries; and
9. Tax incentives to promote training schemes in foreign subsidiaries.

VII. What is being done in the UN-system?

Several bodies in the United Nations system of organizations are actively engaged in the field of technology transfer.

Just recently in its 51st Session (5-30 July), the Economic and Social Council (ECOSOC) commended the UN Advisory Committee for the Application of Science and Technology to Development (ACAST) on a review carried out with the assistance of UNIDO, UNCTAD and ILO, presented in document E/4967 and entitled "Technology appropriate for industrial development".

The document contains a number of specific action proposals such as:

1. Increase understanding of the problems related to the selection and utilization of industrial technologies in the developing countries.

The Advisory Committee suggested that the Economic and Social Council should consider ways of attracting more public attention to these problems and of promoting a better understanding of them.

2. Design policy instruments that will accelerate industrial growth by providing adequate incentives for more appropriate industrial designs and production technologies.

(a) arrange for field studies designed to improve policy instruments;
(b) provide technical assistance to developing countries in the formulation and the implementation of improved policy instruments;
(c) encourage international financing institutions to promote the development and adoption of more appropriate industrial technologies for the developing countries;
(d) encourage financing institutions to untie loans and grants for industrial equipment; and
(e) review the financial and legal conditions at present being applied to the use of patents by, and the transfer of industrial property rights to, developing countries.

3. Strengthen the skills required to select and adapt technologies and to improve the design of products and plants

(a) encourage and assist the orientation of educational policies, particularly for industrial managers, engineers and technicians, towards the use of local human and material resources; and

(b) provide assistance to developing countries for practical technical training in industrial design and in the selection and adaptation of appropriate industrial technologies.

4. Establish the capability for more appropriate product and plant design

(a) assist individual enterprises to improve product design capability

(b) make available technical assistance on a vastly increased scale to assist in the establishment of both public and private organizations that will undertake plant design activities, or product design activities, or both; and

(c) encourage bilateral technical assistance organizations within their countries and in the developing countries to design more appropriate products and plants for the developing countries.

5. Promote action on an expanded information system designed particularly to improve the flow of more appropriate industrial technologies to the developing countries.

(a) assist in the establishment of technology information activites in both the developing and the industrialized countries; and

(b) further develop and implement as soon as practically possible UNIDO's proposal for the establishment of an international equipment specification service operating in co-operation with the developing and industrialized countries.

The relevant resolution of ECOSOC is attached in Annex I.

The Advisory Service for the supply of industrial equipment to developing countries called for in ECOSOC resolution 1183/XLI was put into operation by UNIDO in 1969. Apart from the continuous provision of advice in answer to specific questions, a manual on the pruchasing of industrial equipment as well as a guide to industrial directories were compiled to meet the special needs of developing countries. A study group on licensing practices in the transfer of technology

from enterprises in developed to those of developing countries identified practical measures towards improving the bargaining position of industrial licensees in developing countries (ID/WG.64).

A guide for use in drawing up contracts relating to the international transfer of know-how in the engineering industry was prepared in 1969 by the ad hoc working party on Contract Practices in Engineering and is now published with the UN Sales No. E.70.II.E.15.

In accordance with resolution 74/X (see Annex II) the Trade and Development Board of UNCTAD established an Intergovernmental Group on the Transfer of Technology in May 1971. In its firts organizational session in June 1971, the Group adopted a comprehensive programme of work towards initiating international and national action to overcome obstacles to the transfer of technology to developing countries (see Annex III).

The basic problems involved in the "transfer of operative technology at the enterprise level" have been brought to light by the UN Division of Public Finance and Financial Institutions through case studies on a country by country basis.

Research undertaken by the United Nations Institute for Training and Research (UNITAR) has also been concerned with the transfer of technology and skills from developed to developing countries in order to provide principles and criteria for setting up new arrangements which would enable foreign technology to be applied more effectively.

Four of the studies analyse the circumstances which govern technology transfer in the pharmaceutical, petrochemical, automotive and electronic components industries, on the assumption that the type of experience varies with the sector. The other studies complement this group, dealing first with the experience of Japan as an exporter o industrial technology to developing countries, secondly, with the transfer of technology through direct foreign investment and the factor proportions problem in the developing countries, with special reference to the experience of the Philippines and Mexico, and thirdly, with the transfer of "commercial", that is, marketed, technology through enterprise-to-enterprise arrangements, including joint venture, licensing, management contracts and servicing of purchased industrial equipment.

UNITAR has also commissioned a survey of the experience of the Soviet Union in transferring technology to developing countries. This is being carried out for UNITAR by a team of experts at the Institute of Economics of World Socialist

Systems in Moscow.

Low cost methods for the transfer of management and production techniques were identified on the basis of the above mentioned studies in an interregional meeting convened for this purpose in New York, in June 1971.

Economic and Social Council (ECOSOC) Resolution

1. Congratulates the Advisory Committee on the Application of Science and Technology to Development on its reports on technologies appropriate for industrial development (E/4967) and on factors affecting the effectiveness of existing industrial research organizations in developing countries (E/4960), commends them to the attention of all member governments and invites them to have its recommendations considered and, where appropriate, implemented by scientific, technical and management bodies concerned with industry in their countries and to report on the steps taken to encourage such consideration and implementation;

2. Requests the specialized agencies concerned and the regional economic commissions to consider the reports in relation to their own activities, including arrangements to promote the exchange of information between the developing countries on their experience in the field of appropriate technology and product and plant designs, and to report to the Council on the steps taken on the matters covered by the report;

3. Requests the Advisory Committee to continue its consideration of appropriate technology for other sectors of the economy in addition to the industrial sector;

4. Recommends that the United Nations Industrial Development Organization, the International Labour Organization, the United Nations Conference on Trade and Development and the Food and Agriculture Organization of the United Nations study in close collaboration ways in which reliable information on known alternative technologies for selected major industries of interest to developing countries could be best provided in a systematic way to Governments, enterprises and industrial consultants; such information should include relevant data on the requirements for capital, labour, raw materials and other factors of production;

5. Recommends to the United Nations Development Programme, the World Bank and its affiliates, the regional development banks and other sources of financial and other assistance, that favourable consideration should be given to requests from Governments of the developing countries that are desirous of strengthening their capability for plant and product design, including the establishment of design centres, information services and other appropriate institutions and the training of personnel;

6. Recommends to Governments of States, Members of the United Nations and members of the specialized agencies that more attention should be given to the matters referred to in the report within the framework of their higher engineering education and managerial training activities and asks the United Nations Industrial Development Organisation, the International Labour Organization and the United Nations Educational, Scientific and Cultural Organization to promote the application of the above recommendations in their contacts with member Governments.

United Nations Conference on Trade and Development (UNCTAD) Resolution 74 (X)

The Trade and Development Board,

Considering the importance of the transfer of technology to all countries, and in particular to the developing countries,

Considering the urgent necessity for an adequate transfer of technology to all countries, and in particular to the developing countries, in order to accelerate their economic development and attain the objectives of UNCTAD,

Recognising that the transfer of technology to developing countries requires a clear understanding of obstacles to this transfer and that UNCTAD, within its competence, has a specific role in identifying obstacles, in recommending measures for overcoming them and for facilitating access to modern technology by developing countries as elaborated in the present resolution,

Noting that concerted measures and the implementation of a programme by developed and developing countries and competent international organizations for promoting the transfer of technology to developing countries will be an important element of the international development strategy for the Second United Nations Development Decade,

Bearing in mind the fact that several international organizations in their respective fields of competence have specific programmes for the application of science and technology to development, for the transfer of operative technology and for facilitating access to, and effective utilization of, appropriate available technology in developing countries,

Recognizing at the same time that none of the existing United Nations bodies deals exclusively with the specific question of the transfer of operative technology to developing countries,

Recalling Economic and Social Council resolution 1454 (XLVII) of 8 August 1969 on future institutional arrangements for science and technology, in which the Council considered that the United Nations Conference on Trade and Development was competent to take any action, including appropriate institutional arrangements within its framework, in connexion with those aspects of the transfer of operative technologythat fall within its jurisdiction,

Recalling also Economic and Social Council resolution 1544 (XLIX) of 30 July 1970 on the same subject, in which the Council attached the highest importance to

the strengthening of the activities, including the elimination of any prevailing institutional gaps, of the bodies and organizations of the United Nations system dealing with specific problems of the application of science and technology to development and with the question of the transfer of operative technology to developing countries,

Recalling further that in its resolution 1544 (XLIX) the Economic and Social Council recognized that so far no consensus or majority opinion had emerged on how best to meet the need for the reinforcement and co-ordination or on the place and role of any intergovernmental machinery to be set up,

Recalling further Board resolutions 48 (VII) of 21 September 1968 and 62 (IX) 12 September 1969 on the transfer of technology, including know-how and patents,

Noting the study by the secretariat of UNCTAD on elements of a programme of work for UNCTAD in this field,[a/] and in particular the initial work on the identification, in chapter II of that document, of problems of and obstacles to the transfer that may exist in developing and developed countries, including the limitations that may exist in developing countries to the effective utilization of technology,

1. Decides that, within the limits of its competence, the functions of UNCTAD in the field of the transfer of technology include:

(a) Continuing the identification of obstacles and problems that may limit the transfer of technology to developing countries;

(b) Considering studies and proposals in the field of transfer of technology, inter alia in the areas indicated below, keeping in mind the objectives of accelerating the economic development in particular of the developing countries, benefits flowing from the transfer of such technology, and also taking fully into account the requirements of the least developed among these countries;

(c) Considering various forms of the foreign exchange costs of the transfer of technology and, if appropriate, suggesting measures to promote an easier, wider and more rapid transfer to the developing countries of modern technology through concerted action at the international, regional and national levels;

(d) Considering licensing and similar arrangements, giving particular attention to feature which may hamper the expansion of the industries and exports of the developing countries and also the limitations that may exist in developing countries to the effective utilization of technology;

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a/ Document TD/B/310.

(e) Identifying, in co-operation with specialized agencies as appropriate, additional factors within UNCTAD's field of competence governing the choice by the suppliers and recipients of operative technology of particular channels and forms for the transfer;

2. Decides that, in performing these functions, UNCTAD will co-operate and co-ordinate with other bodies in the United Nations system and other international organizations with the aim of avoiding any overlapping and unnecessary duplication of activities in this field, in conformity with the responsibilities of the Economic and Social Council, particularly those of co-ordination, and with the agreements governing the relationship between the United Nations and the agencies concerned;

3. Agrees that, in the light of paragraph 1 above, UNCTAD will pursue its work in the field of transfer of technology on a continuing basis;

4. Decides to establish an Intergovernmental Group on Transfer of Technology:

(a) To make as comprehensive as possible an identification of the obstacles and problems limiting the transfer of operative technology to developing countries;

(b) To consider the possibilities for the development of international and national action to overcome obstacles to the transfer of technology to developing countries;

(c) To prepare a programme of work based on operative paragraph 1 above taking into account:

(i) The documentation submitted by the UNCTAD secretariat;

(ii) The scope of the activities of the bodies in the United Nations system and other intergovernmental organizations whose terms of reference and work programmes concern the transfer of technology to developing countries;

(iii) The existence of any prevailing gaps within the United Nations system regarding the transfer of technology to developing countries;

(iv) The work relevant to transfer of technology being done by the main committees of the Board and other subsidiary organs;

(d) To make suggestions regarding the performance of UNCTAD's functions as set out in paragraph 1 above;

5. Decides that the Intergovernmental Group shall report on its work to the Board, that the Group shall be composed for forty-five members, on the basis of an equitable geographical distribution, and that, as far as possible, the representation in the Group shall be at an expert level;

6. Decides that the work done by the Intergovernmental Group will be the subject of a major review after two substantive sessions and, in the light of that review, the Board will decide about further work in the field of the transfer of operative technology to developing countries, including the question of institutional arrangement in UNCTAD;

7. Requests the Secretary-General of UNCTAD:

(a) To prepare the necessary documentation required to assist the Intergovernmental Group in discharging its functions;

(b) To seek from the Governments of States members of UNCTAD information about specific problems encountered in the transfer of technology to developing countries and steps taken to overcome them.

261rd plenary meeting,
18 September 1970.

## Programme of work of the Intergovernmental Group on the Transfer of Technology

1. **Main areas**

(i) Channels and mechanisms for the transfer

(a) Identification of the channels, mechanisms and obstacles - both direct and indirect - of the transfer of technology;

(b) Examination of the factors determining the choice of one or a combination of these mechanisms and channels, including the choice of a particular mechanism for technology transfer by the technology suppliers;

(c) Analysis of the economic implications of the various types of transfer, including contractual agreements;

(d) Analyses of reasons why technology-receiving enterprises sometimes receive all the elements of know-how from a single source, and sometimes draw upon diverse sources for this purpose;

(e) Study of the economic implications of national legislations and multi-national legal instruments concerning the transfer of technology.

(ii) Costs of the transfer

(a) Determination of the elements included in foreign exchange and domestic costs, and the factors governing the substitution of one for the other;

(b) Study of the methodology of measuring these costs - both direct and indirect;

(c) Assembling available estimates of costs of the transfer and checking them for comparability, taking into account the different costs through the various transfer mechanisms; preparing the basis for improved data on foreign exchange payments made by individual developing countries in respect of transfers of technology during a certain period;

(d) Analysis of the costs and economic implications of the transfer;

(e) Examination of factors influencing the level and the trends of the costs of the transfer; estimating such costs during the Second United Nations Development Decade;

(f) Study of possible methods of reducing these costs.

(iii) Access to the technology

(a) National level A comprehensive survey of national policies and other pertinent factors in the developed and the developing countries affecting the relationship between the policies for the transfer of technology and other policies concerning trade and development;

(b) An examination of national policies designed to overcome the obstacles to such transfer and to secure a wider, faster and easier access to foreign technology on reasonable terms; study or examination of measures that might be taken by the developed countries and by the developing countries to encourage an increase in the transfer of technology;

(c) Analysis of the effects of the transfer of technology on the savings mobilisation process in developing countries;

(d) Regional and international level: Exploration of proposals for multinational action to improve access of the developing countries to technology (e.g. institutional arrangements), including multilateral mechanisms for linking demand to supply of technology;

(e) Other studies: improving access to technology through exploration of means of ensuring like treatment to all developing countries in respect of transfer of technology; intensified regional co-operation among the developing countries, including measures for transfer of technology among these countries; international or regional arrangements for improving access to technology through adoption of measures designed to ensure equal or preferential treatment for the developing countries; co-operate with competent international organisations in the preparation of surveys of the technological alternatives, possibilities and conditions by sector of activity;

(f) Technical assistance activities designed to overcome the obstacles to the transfer of technology and improve the access of the developing countries to modern technology. These activities may include the training of national personnel for the formulation and implementation of policies relating to the transfer of technology in developing countries.

(iv) Trade and the transfer of technology

(a) Examination of restrictions and restrictive clauses in licensing agreements involving transfer of technology, and consideration of a series of proposals to alleviate any restrictions and restrictive conditions imposed under these agreements which might hamper the expansion of the industries and exports of the developing countries;[1/]

(b) Effects of trade policies of developed countries on the exports of industries in developing countries which have received a substantial transfer of technology taking into account, inter alia, the use of labour-intensive technology;

(c) Study of influence of mark-up of prices of intermediate products and equipment, scale factors and other characteristics of transferred technology on competitiveness in world markets of goods produced with the aid of transferred technology, and on possibilities of industrial specialisation within regional or sub-regional groupings of developing countries;

(d) Examination of contractual arrangements linking transfer of technology to exports by the recipient enterprises of intermediate and finished products including, where pertinent, the effects of the operations of multi-national corporations and foreign subsidiaries on the exports of such industries in developing countries.

(e) Effect of the existing forms of transfer of technology on the terms of trade of developing countries.

II. Other areas [2/]

(v) Substitution of domestic for imported technology

(a) Identification of possibilities for such substitution;

(b) Assessment of the organization and scale of research and development (R and D) in the developing countries, and of the problems encountered in this field;

(c) Technical assistance in setting up and organising national research and development activities;

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1/ Work in these areas will be carried out in co-ordination, as appropriate, with relevant activities of the Committee on Manufacturers.

2/ These areas are of concern to various agencies and organizations and UNCTAD's contribution, within its competence, would be to supplement their activities in close co-operation with them.

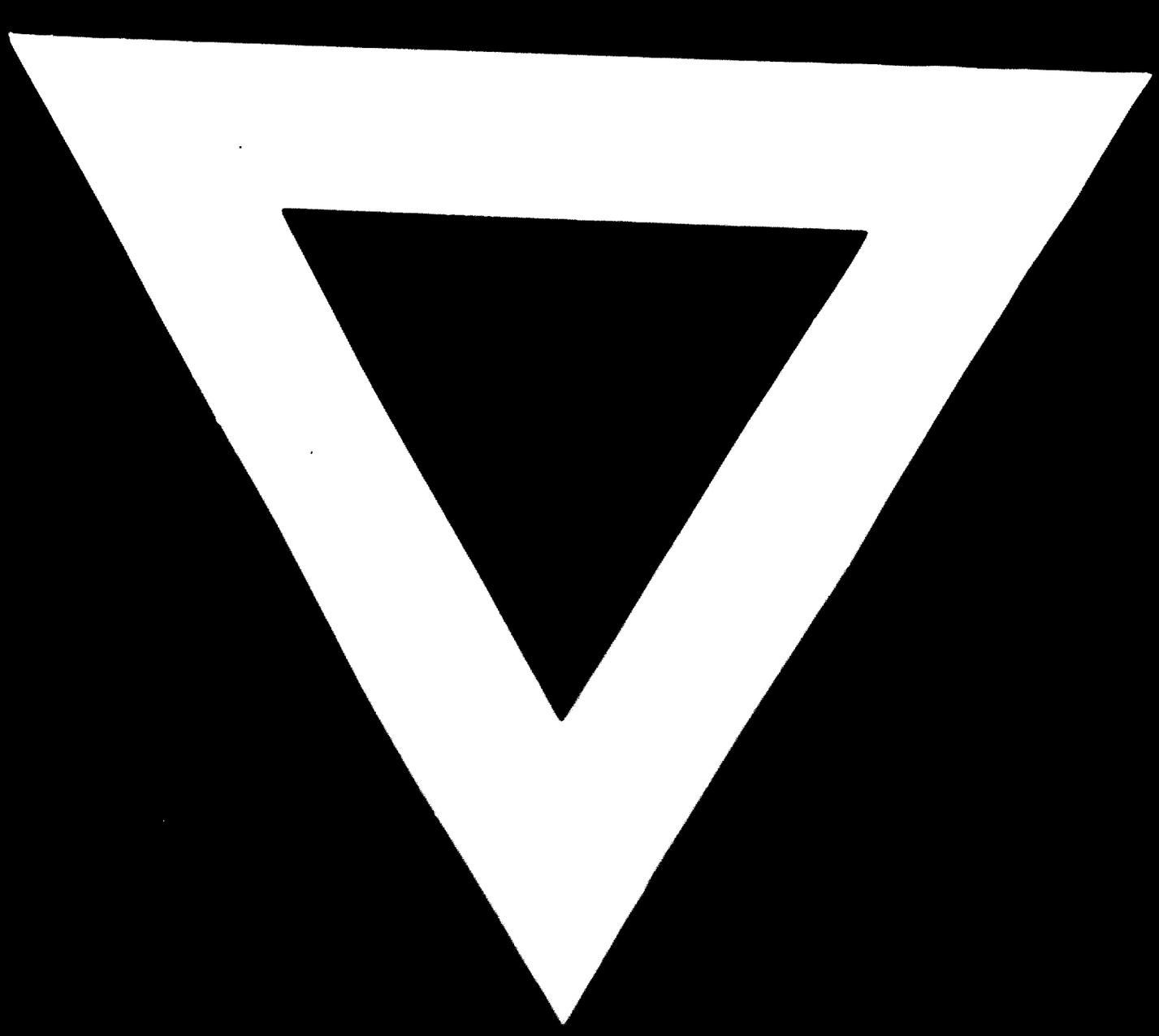
(d) Allocation of research and development resources of the developed countries to problems of specific importance to the developing countries;

(vi) Choice of technology

(a) Relation between the availability of productive resources and the appropriate choice of production methods;

(b) Impact of technological choice on the growth of productive resources of the developing countries,

(c) Impact of a present choice of technology on the availability of techniques of production in future years.



22. 6. 72