## OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.


## DISCLAIMER



## FAIR USE POLICY

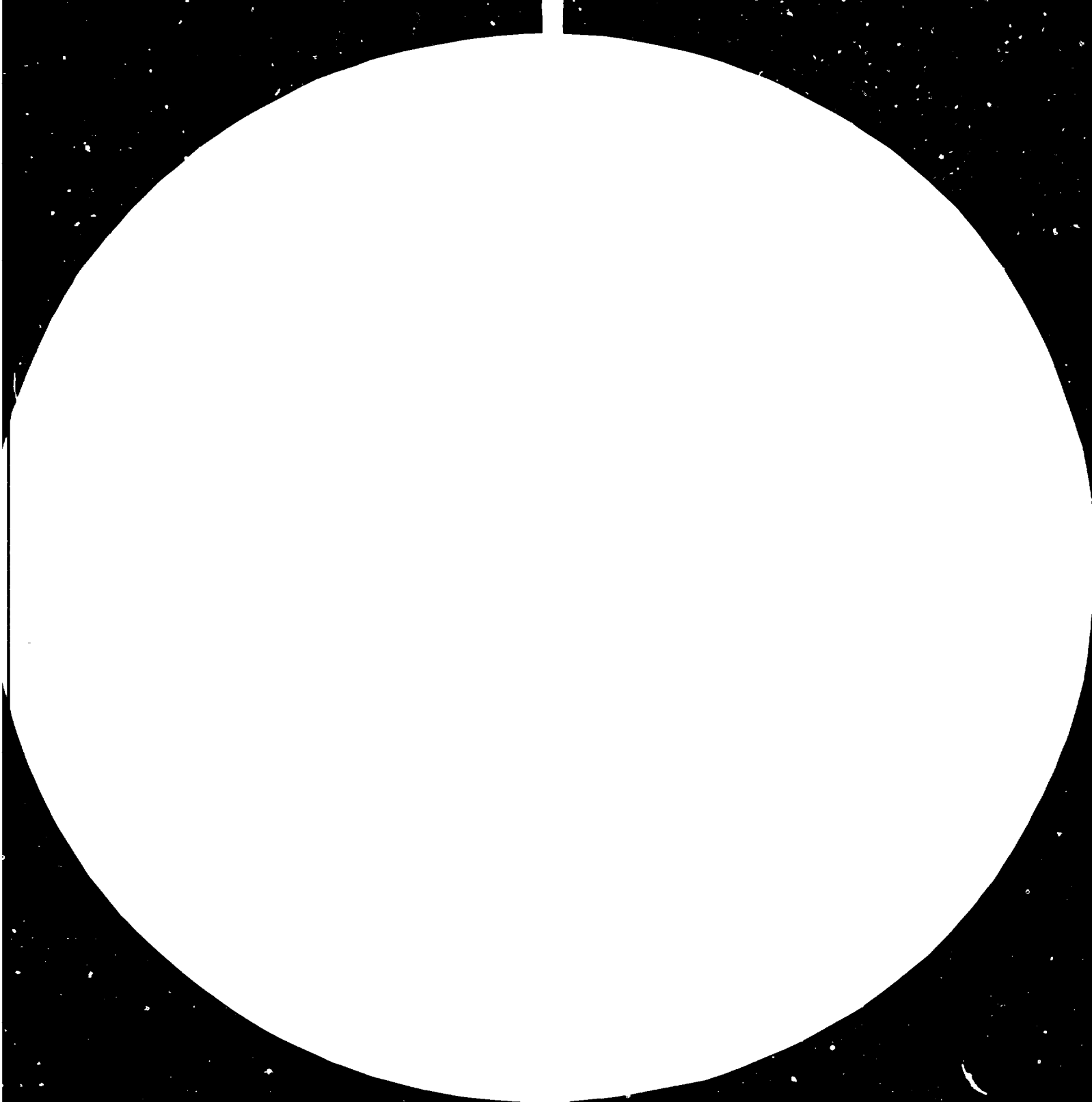


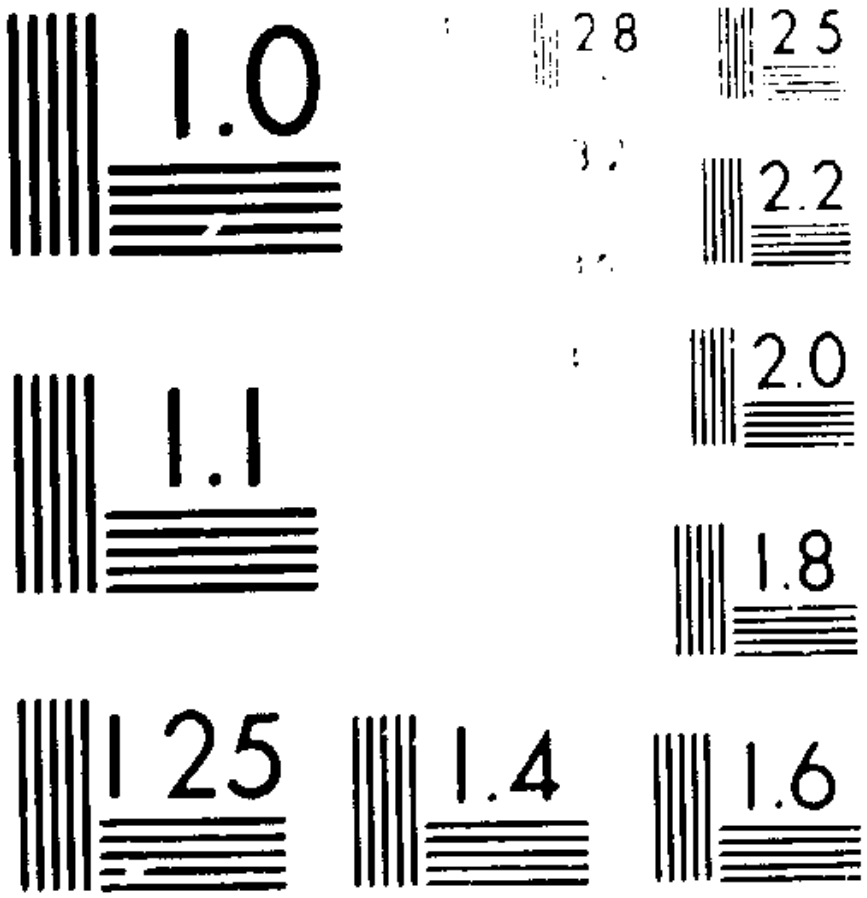
## CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org




1.0
2.8
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

10592

Distr.
LIMITED

UNIDO/IS.236
22 June 1981

English

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

High-Level ASEAN Meeting on the
Regulation of Technology Transfer

# ORGANIZATION, FUNCTIONS AND ACTIVITIES OF NATIONAL TECHNOLOGY TRANSFER REGULATORY AGENCIES*

Prepared

by the

Secretariat of UNIDO

*This document has been reproduced without formal editing.

V.81-26919

# CONTENTS

INTRODUCTION

Government regulation and promotion of transfer of technology is receiving increasing attention as awareness of the complexities of transferring technology grows in the developing countries, particularly in the context of their overall economic development.

National offices for the regulation of the transfer of technology or similar institutions occupy a key position within the governmental framework established for regulating the importation of technology, since they implement national technological policies in so far as imports of foreign technology are concerned. Such offices may bear a variety of names. For example, in Latin American countries they are often called "national registries for transfer of technology". Recently, the term "centres for transfer of technology" has been used in some of the countries. In principle, all these organizations provide the same services and have to a certain degree similar functions and scope of activities.

Regardless of whether special legislation regulating inflow of technology has been introduced or not, national offices for regulation of transfer of technology and similar institutions have been created or going to be created in several developing countries: Algeria, Argentina, Brazil, Colombia, Egypt, Ethiopia, Ecuador, Guatemala, India, Iraq, Malaysia, Mexico, Peru, Portugal, Spain, Philippines, Sri Lanka, Turkey and Venezuela among others.

Up to now, little literature exists on this subject and the present paper is an attempt to make up for this lack. The information contained is based on the rather extensive experience UNIDO has gained in advising countries on the establishment of national offices for the regulation of

transfer of technology and in drawing up guidelines for legislation or administrative measures regulating the inflow of foreign technology[1/].

It should be stressed that originally the national regulatory agencies has been created in many countries as purely defensive measure to protect the national economy and national industry against the negative effects of uncontrolled inflows of foreign technologies.

This was the case of Colombia which as early as 1967 created the Royalties Commission; the same was the case of Argentina where in 1970 the National Register of Licensing Agreements and Technology Transfer was created. Similar attempts have also been made in the Andean Group by way of the now famous Decision 24 creating national mechanisms regulating the inflow of foreign technologies.

However, with the growing experience and achieved results one can observe the gradual shifting of the main trust of the national regulatory agencies, from purely defensive and attempting to gain more equitable and just conditions for technology agreements into offensive wherein a long term technological independence is at stake and the agencies' role is particularly important in the area of promotion of local technological capabilities in the framework of national technological policy.

Experience of the functioning of such regulatory bodies, which may be referred to as Technology Regulation agencies or National offices for regulation of technology transfer indicates that a fairly similar pattern has generall evolved. Most agencies have hitherto primarily viewed the question of foreign technology in relation to specific contractual terms and conditions under which

---

[1/] The following countries received UNIDO assistance: 1972, Argentina; 1974, Ethiopia; 1973-76, Mexico; 1975, Uruguay; 1975-77, Guatemala; 1975-76, Turkey; 1975, Costa Rica; 1976, Philippines; 1976 and 1981, Malaysia; 1977-78, Spain and 1972-1978, Portugal. Three (3) recent UNIDO Publications that relate to acquisition of technology are: "Guidelines for the Evaluation of Technology Transfer Agreements", (ID/233); "Manual on the Establishment of Industrial Joint Venture Agreements in Developing Countries", (Sales No. 71.IIb.23); "National Approaches to Acquisition of Technology", (UNIDO ID/187) and "Functions and Organization of National Offices for Transfer of Technology", (UNIDO, ID/WG.228/3/Rev.1).

such technology is imported by enterprises operating within a country. Considerable literature has emerged in recent years on various restrictive conditions often imposed by licensors and technology suppliers and the need for strengthening the weak bargaining position of domestic enterprises, and regulatory agencies have largely tended to ensure that such restrictive conditions are excluded or minimized and that foreign technology inflow is consistent with certain broad national objectives. The degree to which such regulation can be effectively exercised without unduly affecting the inflow of required foreign technology inevitably depends on various factors, including the level of industrial development, the capacity of domestic enterprises, and policies on foreign investment with which technology inflow is often closely linked, particularly in earlier stages of industrial growth. Considerable knowledge and awareness has, however, undoubtedly developed in respect of the intricacies of technology contracting in countries where such regulation has been introduced, together with the implications and constraints of such regulation in the context of particular country situations.

The impact and experience of foreign technology regulation in most developing countries where such regulation has been introduced has been fairly positive and has, in fact, highlighted the essential need for such regulation. In most such countries, technology regulation has resulted in significant improvement in the terms and conditions of specific agreements for import of foreign technology and know-how, together with technological services. Apart from considerable savings in the direct costs of foreign technology agreements, various restrictive conditions sought to be imposed by technology suppliers have been excluded or minimized, placing domestic enterprises in a much stronger position to adequately absorb and adapt foreign technology for their effective growth. In some countries, such regulation has also greatly assisted the growth of technological service capacity. In several countries, technology regulation has also focused attention on the close relationship between foreign investment and technology and the technological implications in respect of enterprises having significant

foreign capital participation, including foreign-controlled subsidiaries and affiliates.

The issues and considerations relating to technology regulation in developing countries must, however, necessarily be viewed in the context of overall industrial strategy and policies relating to a country's industrial and technological development. The regulation of foreign technology constitutes an integral part of the overall framework of national technological development and it is necessary to relate the various issues and implications of technolotical development with the more detailed consideration of selection, evaluation and acquisition of foreign technology. It is consequently necessary to consider the role of National Technology Regulation Agencies against the broader canvas of overall technological development and to discuss the policy and institutional relationships between such regulation and the fulfillment of broader objectives of broad-based industrial growth and development of indigenuous technological capability.

Apart from the broader issues of technological development, it is increasingly being recognized that closer co-operation is necessary among developing countries in respect of technology policies and programmes. Such international co-operation can take various forms and such can and need to play a significant role in this regard.

## Basic Functions of a National Regulatory Agency for the Transfer of Technology:

A national regulatory agency for the transfer of technology in principle should execute government technological policies or policy

relating to the import of technology. It can also stimulate and influence, on the basis of its experience, the direction and formulation of those policies. On the basis of available experience in many developing countries, it should be given a central position within the bodies of government that are concerned in various degrees with technology transfer and should be accorded the highest possible status if it is to perform its functions effectively.

In some developing countries it has proven desirable and useful[1/] for the national agency also to provide information and advisory services to industry, both public and private.

The objectives of policy concerned with the acquisition of foreign technology may include, inter-alia, the following:

(a) To establish the most efficient means of selecting technology;
(b) To ensure that technology shall be obtained on the best possible terms, which means that negotiating skills must be developed;
(c) To ensure that the technology acquired shall flow into the essential sectors of industry;
(d) To improve the process of adapting and absorbing technology;
(e) To create and develop local technological capabilities.

In executing technological policies, as outlined above, the national agency performs regulatory, co-ordinatory, promotional and monitoring functions. In some circumstances the regulatory functions may predominate, while in others the co-ordinating or promotional functions may be more important. There is no single pattern that can be applied generally in organizing a national agency. Each

---

[1/] For example, in Portugal, the Philippines or Republic of South Korea.

developing country, after carefully analyzing its own needs and specific conditions, must develop its own model once it recognizes the necessity for such an office and corresponding administrative and legislative framework.

Regulatory Functions

One of the key functions of the national agency is to regulate the flow of imported technology. Government policy may be incorporated in legislation or decrees that state the explicit or implicit conditions under which technology may be imported. In carrying out policy, the national agency usually evaluates all agreements involving the transfer of technology, services and other kinds of intellectual and industrial property, including those involving foreign equity participation. It then registers the agreements approved.

It is recommended, however, in many instances that the national office gives an unofficial opinion on agreements before they are submitted formally for registration[1/]. Although such a procedure will add the office an extra deal of work, it will pay off handsomely in the long run in order to avoid unnecessary negotiations between parties concerned, after the agreement has been signed.

In addition, the national agency, in co-operation with other government agencies, may establish the priority areas of the economy into which the technology flow should be directed. The national office should establish criteria for evaluating foreign technology that take into account the country's needs and those of the specific industrial sectors.

---

1/ Such system of unofficial submission has proven to be extremely useful in such countries like the Philippines, Portugal or Mexico.

In principle, the national agencies regulating the flow of technologies are concerned with the following types of agreements:

- Use or exploitation of trademarks, patents and secret non-patented know-how;
- Technical information in the form of plans, diagrams, models, operating manuals, formulae, specifications and training of persons in computer-based systems;
- Consulting agreements of any type;
- Supply of basic or detailed engineering;
- Management or administrative systems;
- Franchising agreements[1/].

The evaluation, on the basis of which the decision to approve or reject agreements is made, has three (3) basic aspects:

(a) Legal - conformity with prescribed national legislation and generally acknowledged rules for international transfer of technology;

(b) Technical - possibility of adapting and utilizing technology, proper selection of technology to meet the requirements of industrialization, input for local research and development;

(c) Economic - analysis of the project's commercial viability, conformity to foreign exchange controls (if any), comparative analysis of prices and level of royalties.

---

[1/] In one country, that is Nigeria, the office deals also with engineering and turn-key agreements.

The national agency may also pay increasing attention to agreements providing for equity participation with capitalization of intangible rights, as well as, if possible, with agreements related to foreign investments in the country[1/]

From the experience of developing countries where national agencies have been established and operating for some time, the conclusion may be drawn that the national agency may be granted the sole responsibility for deciding all matters related to the transfer of technology and for implementing national technological policies. Attempts have been made in some countries to assign responsibility for making decisions to a designated group, usually consisting of high government officials (ministers or deputy ministers). However, experience has shown that after an initial period the officials have had difficulties in finding a time to meet, not to mention reaching decisions quickly. It is advised, therefore, to refrain from such "collective" practice and to assign the responsibility solely to the national office. Another practice is, for example, in the Philippines or Nigeria, wherein the decisions of the head of the national agency are reviewed by a collective board meeting in regular intervals.

Co-ordinating Functions

The transfer of technology affects many areas of the economy - balance of payments and trade, domestic and foreign investment, fiscal policies, industry as a whole and its specific branches, research and development and employment.

---

[1/] In many instances, for example in Mexico, Portugal or Argentina, the agency regulating the inflow of technology closely co-operates with another agency in charge of approving direct foreign investments. This way, greater consistency is secured in terms of treatment of foreign inputs with the national economy.

To be able to co-ordinate all aspects of technology transfer, the national agency must have direct contact with agencies in all related areas of the national economy from which it collects data that can be drawn upon in formulating and implementing technological policies. The office should be given direct access to those responsible for deciding on technological policy. Another field of activities of national agency in this context worth mentioning relates to securing the access to sources of information on available alternative suppliers of technology, their conditions both for use of industry as well as of other co-operating government agencies. Here one should mention that the national agency is usually a member of UNIDO's TIES system, from where it receives valuable information for its own use.

Promotional Functions

One of the most important functions of a national agency is to present and explain government policies and directives to both the foreign suppliers of technology and the domestic business community. The national agency enables a government to carry on direct and indirect promotional efforts in foreign business circles through both official and unofficial channels. Frequently, important business deals are negotiated best unofficially.

Promotional efforts in the domestic business community are specially important. In developing countries government regulatory policies are not always fully understood, particularly by private industry and affiliates of foreign companies. If these policies are to be executed efficiently, the co-operation of the domestic business community is essential. Such co-operation will be forthcoming only if the business community understands and supports the government's goals.

The national agency advises domestic businessmen on all issues related to the transfer of technology, starting with the selection

and evaluation of the technology and ending with the negotiation of the agreements. It collects and analyzes information on sources of alternative technologies and on the terms of the agreements and disseminates this information among businessmen. The advisory services of the national agency provides and demonstrates its usefullness even in the early days of its operation.

It is recommended that the national agency organizes also training courses for government officials and businessmen dealing with key issues of government policies in this field and issues related to transfer of technology agreements. In this way the national agency can increase skills in this specialized field.

Within the promotional functions of the national agency one should mention the potential inputs of this agency into the development of local, indigenuous R and D capabilities by way of careful directing of foreign technology inputs.

Monitoring Functions

Recent years have proven that the role of the national agency should not stop the moment it accepts the given individual agreement. With this in mind, agencies like the Technology Transfer Board in the Philippines or the Foreign Investment Institute in Portugal, are monitoring the progress of the absorption of foreign technology by local licensees, and when necessary, are in a position to intervene in the process of real absorption of such technology, thus providing effective mechanisms enhancing the growth of the technological level of the local industry.

National policies on foreign investment can have significant effects on the nature of technology flows and the pattern of technological relationships at the enterprise level. Thus, for certain "high" technologies such as sophisticated electronic or chemical processes, foreign technology may not be available without substantial

foreign investment, often in the form of wholly-owned subsidiaries. In other sectors, foreign technologies and know-how may only be forthcoming if accompanied by majority or signif t foreign holdings.

Technology Regulation Agencies must necessarily view the role of foreign investment in relation to technology inflow and in determining the detailed contractual terms for such inflow. This is obviously easier when the regulatory agency for foreign investment is the same as that for technology, as is the case in India, Portugal or since 1979 in Mexico. When the governmental agencies are different, it is necessary to ensure close co-ordination. The nature of such co-ordination and the experience of such agencies in this regard needs to be elaborated.

A related question is that of capitalization of know-how costs. By and large, such capitalization should be viewed with care. Even where technology costs are high and constitute a heavy burden on licensee enterprises, especially in new production units, the balance of advantage lies in charging such costs to the cost of manufacture rather than to permit such costs to be converted into equity, constituting a burden on the dividends of the enterprise in perpetuity. The fact that much of the know-how may be in the form of intangible items is an added reason for non-capitalization. Even where capitalization becomes inevitable because of the oligopolistic situation of the technology supplier, such capitalization should be kept to a minimum and should not exceed a small percentage of the total equity capital involved.

The question of sectoral priorities also assumes considerable significance in technological development. The emphasis on particular sectors may vary significantly in the context of policy objectives such as import substitution or a high degree of export-orientation in particular countries. In general, however, certain industrial sectors have a high degree of priority in most countries. These include industries based on natural resources, agro-industries, basic industries related to local factor endowments and certain other sectors of common interest to most developing countries. National Technology Regulation Agencies

should ensure that inflow of processes and techniques in such sectors takes place to an adequate extent and is, at the same time, consistent with domestic technological development in these sectors.

In recent years, considerable emphasis is being given to decentralization of industry to semi-urban and under-developed regions in developing countries. This aspect of industrial strategy can also have a significant effect on technological needs. With increasing emphasis being placed on the need for dispersal of industries to semi-urban and rural areas, developing countries will need to place greater emphasis on processes and techniques more closely related to the needs of such a policy. Certain sectors, such as food products, agricultural imports such as implements, pesticides, most fertilizers and the like, agro-industries, building materials, and a wide range of consumer items including clothing, shoes, household items, etc., would need to be given greater emphasis in terms of dispersed or decentralized manufacture. The greater the extent to which such demands can be served by production units located away from areas of industrial concentration, the greater the direct impact of increased employment income and fulfilment of basic needs is likely to be for a wider section of the population. Technological needs for such dispersed and decentralized sectors could vary significantly as production scales would be different, unit investment outlays considerably reduced and greater adjustment required to factor situations, including human skills. It may well be that less sophisticated production techniques already utilized in developing countries or being used by small-scale units in developed economies may be more appropriate in this context, both from the viewpoint of costs and other economic criteria. The identification of such appropriate processes and techniques would necessitate a systematic search for such technology in specific sectors, and even the development of appropriate processes through research and development efforts. It is necessary to those agencies to assess technological requirements for the dispersed or decentralized sector in the above context.

In the above context the issues relating to domestic technological development need to be considered on a comprehensive basis and highlight the essential need for technology planning as an essential aspect of industrial strategy. Such planning must essentially cover an assessment of projected technology needs in the context of a country's socio-economic objectives, factor endowments and level of development, and should thereafter proceed to create the necessary technological infrastructure and institutional mechanisms which are necessary in order that technological needs and objectives are adequately fulfilled within a reasonable time span. Technology Regulation Agencies need to be fully involved in the above process.

The essential ingredients of a programme of technological development should comprise:

i) the identification of technological needs and objectives;
ii) the development of an adequate technological infrastructure, including a comprehensive information system and the growth of technological service capability and specialized manpower skills;
iii) the creation of institutional mechanisms for evaluation, selection and acquisition of technology considered most appropriate in a given set of circumstances;
iv) the establishment and development of appropriate institutional mechanisms for monitoring the impact, absorption and adaptation of various processes and techniques;
v) the growth of research and development activities in significant industrial sectors and in basic infrastructural fields such as energy, in close linkage with industrial activities;
vi) the defining of policies and guidelines in terms

of fiscal or regulatory instruments to encourage indigenuous technological development and to ensure adequate inflow of appropriate foreign processes and techniques in critical and priority sectors.

These aspects are closely interlinked and, although the institutional and policy mechanisms may be covered by several institutions and instruments, an essential feature of technology programming is to effectively dovetail the functioning of such mechanisms so that the various basic issues receive adequate consideration. Such a co-ordinating role may need to be performed by the National Technology Regulation Agencies.

## THE ORGANIZATION OF THE NATIONAL TECHNOLOGY REGULATORY AGENCY

Because the national agency engages in a substantial amount of analysis and evaluation, three (3) basic units responsible for legal, economic and technical evaluation, respectively, should be incorporated in its structure. They will, in fact, form the core of the structure, and through them the office will carry out its regulatory, co-ordinating promotional and monitoring functions.

In addition to the key evaluation units, it is advisable to establish an information unit to carry on the various supporting activities described earlier. In addition, such unit will help to increase the efficiency of the office by seeing that agreements under review are processed promptly.

It is also advisable to establish a unit within the national agency to co-ordinate the office's activities with those of other administrative units of the government (for instance, Central Bank, Ministry of Trade, Ministry of Foreign Affairs or Ministry of Finance).

Figure 1 gives the organization chart of the National Registry

for the Transfer of Technology in Mexico established by the Law for the Registration of the Transfer of Technology of December 1972 as per the situation till 1978. Figure 2 shows the organization chart of the Technology Transfer Board of the Philippines created in October 1978.

As may clearly be seen, the organization of the Mexican National Registry and the Technology Transfer Board reflect their basic regulatory functions. Such a structure leaves no doubt that the final responsibility for making decisions rests with the director general (or his deputies), in the case of the office in Mexico and with the Board in the case of the Philippines.

This type of organization, which has proved efficient in the Mexican and Philippine environments, leaves plenty of room for the functions of promotion, co-ordination and monitoring. The National Registry in Mexico was attached to the Ministry of Industry and Trade (at present Ministerio de Patrimonio) (which is logical, since technology transfer affects those sectors of the economy in particular); and the director general reports direct to the minister, which indicates the importance attached to this office. Figure 3 gives the flow sheet for processing contracts submitted to the National Registry for Registration (i. e. approval). It shows that agreements that are rejected after evaluation may be renegotiated. At this stage the government may take a direct part in the negotiations to ensure that the agreements shall conform with its policies.

The Mexican law on technology transfer also provides that contracts may be submitted for "information". This provision was included because the Mexican law applied retroactively to all technology contracts signed earlier. Over 10,000 existing agreements were submitted for information. Those that did not conform to the provisions of the law had to be modified within two (2) years. The submission-for-information procedure also permits parties intending to enter into an agreement to ascertain the Registry's position

before signing. They can thereby avoid the expense and complication of lengthy renegotiation.

In the case of the Philippines the submission of approval is made by the Executive Director to the Board which makes the final decision as to the approval and registration of the agreement according to Presidential Decree No. 1520 of 11 June 1978. Similarly, parties not agreeing with the decision, have fifteen (15) days time limit to take the recourse action in connexion with such decision.

In Argentina, the national office is called the National Registry of Contracts for Licenses and Transfer of Technology and is under the National Institute of Industrial Technology. The decisions of the National Registry are reviewed by an advisory committee composed of officials of the Secretariat of Industrial Development, the Secretariat of Science and Technology and the National Development Bank before they are submitted to the Secretary of State for Industrial Development for final approval or rejection. Thus, in Argentina the national office does not occupy as important a position as it does in Mexico. It evaluates and advises but does not make decisions. The law No. 21.617 of 12 August 1977, has slightly modified the organizational structure in Argentina in a sense that responsibility of approval of agreements rests at present with the Technical Undersecretariat subordinated to the Secretariat of State for Industrial Development. Furthermore, the above-mentioned law has relaxed to a degree as to rather strict provisions for contract approval which were provided by earlier laws 19.231 and 20.794. At present in Argentina further relaxation has taken place by the interpretation of said Law and the office regulatory functions diminished on account of the promotional and monitoring functions.

In Sri Lanka, the evaluation of license agreements is the responsibility of the Ministry of Industry. The agreements are then submitted to the Advisory Committee on Foreign Investment, composed of representatives of the Ministries of Planning, Industry, Finance, Trade and Exchange Control, for the final decision.

It should be emphasized that in Mexico, in contrast to other countries, the issue of foreign exchange control does not arise, since Mexico has been able to maintain its currency freely convertible: no restrictions on foreign currencies are imposed.

The close link between the treatment of license agreements and the policy on patents has led some countries to prefer to assign the registration and evaluation of such agreements to bodies responsible for implementing the regulations governing industrial property. In Brazil, this duty is discharged by the National Institute of Industrial Property. In Peru, such duties were given to the Industrial Property Office under the Ministry of Industry and Tourism, which evaluates contracts related to imported technology. Recently, in Peru some organizational changes took place whereby a special body called CONITE (National Commission for Foreign Investments and Technology) was charged on the basis of the Decree 21501 with the evaluation and approval of transfer of technology agreements by implementing Decision 24 of the Andean Pact.

Nevertheless, since over 80% of the trade in technology concerns know-how arrangements and only 15%-20% exclusively to patent and trademark agreements, the national office should not necessarily be attached to an office for industrial property or patent office. The long-term trends would seem to indicate that patent protection and patent policy, in particular from the point of view of developing countries, will occupy a less important position in a transfer-of-technology agreement. It should also be stressed that industrial property offices do not fully perform all the functions of the national agency for the transfer of technology as described earlier in this paper.

It should also be mentioned that a very efficient specialized agency in this field has been established in Portugal by Decree-Law No. 348/77 of 24 August 1977 called Foreign Investment Institute which, inter-alia, is given responsibility for evaluation and final approval of all agreements related to transfer of technology. This

office draws on experience of such agencies like the Mexican or Brazilian governments.

Figure 4, an organizational chart for a national agency performing the functions described in this paper, is based on the structure of the national offices in Argentina, Brazil and Mexico and takes into account information obtained from officials in Malaysia, the Philippines and Turkey. The structure shown may, of course, be modified to suit conditions in a given country or to be adapted to existing administrative institutions.

The evaluation carried on by the three (3) key divisions (legal, economic and technical) forms the basis for the decisions the office takes concerning particular agreements. The information office lends its support by providing necessary data and information from both domestic and outside sources, as well as carries out monitoring functions.

The office of the director maintains working contacts with all other government institutions and with the domestic and foreign business communities.

Depending on the amount of work, the staffing of the national office varies substantially. In countries where the average number of agreements per year does not exceed 100, the staff should not in principle be more than 10-15 professionals. Some activities (information, co-ordination, etc.) may in such cases be performed by other agencies. Where the number of new agreements per year reaches 250-350 or more, a professional staff of 35-45 persons may be needed, however, staffing may depend on the depth of evaluation and regulatory functions of such agency.

The cost of running a large office may be rather high; but as analyses have shown in Mexico, the total savings on payments of technology in the course of two (2) years have been twenty (20) times as great as operating costs. An office carefully designed

according to the actual and future needs will no doubt operate profitably from the national point of view.

The staff employed in the national agency should be of the highest possible calibre. Some of the staff should be well acquainted with all aspects of technology transfer, finance and fiscal policies and possibly have had some experience in private or public enterprises.

EVALUATION ACTIVITIES

The national agency decides itself the number and type of documents that must be submitted with agreements that are to be evaluated and registered. The documents and agreements should be evaluated simultaneously by the legal, technical and economic units. Internal guidelines for evaluation should be continuously improved and updated for the purpose of reviewing the evaluation process itself and for analyzing the effect of a large flow of technology on the economy.

Guidelines and evaluation systems may well be used for purposes of comparative analysis and for renegotiation of agreements. The results of such analyses can lead to modifications of national technology policy and to improvements in existing or planned legislation.

It is recommended that guidelines for evaluation and internal check lists be drawn up according to sector, since the technology flow and the terms of technology agreements vary considerably from sector to sector. Here, in particular, the information service in the office can play an extremely important role, as well as access by the office to the TIES data operated by UNIDO.

In evaluating agreements, not only their terms should be examined but also their wider implications. Some basic points to be raised are listed below:

(a) The transfer of know-how or technical knowledge from licensor to licensee will be permanent;

(b) The licensee acquiring technology is fully aware of all its critical and competitive aspects and can manage its operation;

(c) "Know-how", "technical information", etc. are clearly defined in the agreement;

(d) The licensor is to be compensated on the basis of the principal defined elements of transfer of technology (know-how, patents);

(e) Compensation and the form of payments take into account the nature of the technology transferred;

(f) The licensee is adequately protected in terms of the technical performance of the process or production scheme through process guarantees and warrantees;

(g) The agreement specifies the responsibility of the licensee and licensor in achieving performance of the technology;

(h) The licensor provides information on marketing techniques so that the licensee will be able to operate effectively in the market place;

(i) Information on process improvements will flow steadily;

(j) Provisions are made for the speedy settlement of disputes on technical matters:

(k) The licensee is given a reasonable period in which to absorb the technology;

(l) The licensee will be able to operate his plant efficiently and possibly without need of further external inputs after the agreement formally expires.

Three (3) steps can be taken to facilitate the smooth operation of the evaluation process. First, a deadline can be set for handing

down decisions on agreements submitted for evaluation, which might be 60-90 days after the date of submission. Second, either party (domestic or foreign) to an agreement can be required to submit it for evaluation within a stipulated period (15-30 days after signature of the agreement). Third, the national agency can establish a system of fees (paid by the parties to the agreement) for evaluation and registration of agreements.

It should again be stressed that a national agency for the regulation of transfer of technology should be established in countries where industrial development plays or is going to play an important role in overall development and where the existing system for the flow of technology does not function efficiently.

If the national agency is to play a positive role in industrial development in general and in the regulation of transfer of technology in particular, a specific government framework should be created and support and understanding won from businessmen, both private and public.

Finally, it must be stressed that while the national agency for the transfer of technology appears to be the most efficient means of protecting the legitimate interest of developing countries and of contributing to the increase of the flow of technology on better terms would be the case without it, its organization and functions should be continuously evaluated and modified so that the agencies will perform efficiently as conditions and long-term objectives change.

In the broader context of evaluation activities, the following possible activities may also be taken into consideration:

It is necessary for the Technology Regulatory Agency to play a significant role in the "unpackaging" of technology and reducing the size and magnitude of the imported technology package. The pre-investment stage comprising the initial feasibility study and the detailed

project report covering the principal techno-economic aspects should increasingly be undertaken by national agencies. Where this is not possible for reasons of project complexity, the agency should ensure that domestic agencies should be closely associated with the preparation of the detailed project studies. Basic and detailed engineering, including plant designs, would initially need to be imported, but domestic agencies should be increasingly associated. Civil construction and ancillary services should normally be provided by domestic agencies and enterprises, to the maximum extent feasible. Such services are usually available and the induction of foreign agencies often constitutes a major disincentive to domestic consultancy services and construction capability. In machinery selection, erection and installation also, such agency should ensure that foreign technological services are kept to the minimum necessary. It is principally in respect of manufacturing technology that acquisition of foreign processes and know-how becomes necessary, and in this regard it is necessary that acquisition is full and complete. In respect of the post-installation stage covering management, including marketing and distribution, it is common practice in many developing countries to enter into management contracts with foreign agencies. While this may be initially necessary, the period of such contracts should be kept to a minimum and adequate training and association in management must be ensured. These functions are, of course, closely inter-related and merge into one another. It is, however, necessary for the agency to define the specific role and responsibilities at each stage, so that foreign expertise and technological services are secured only to the extent necessary, to complement domestic capability as may be available or as can be developed.

A significant issue that also needs to be considered is the relationship between agency and recipient enterprises in developing countries. It must be stressed that the use and application of acquired technology is at the enterprise level, either in the private sector or in state enterprises, which are assuming considerable significance in several developing countries. Consequently, negotiations with technology

suppliers should normally be conducted at enterprise level, with the agency exercising primarily second-check functions to ensure that technology inflow is consistent with overall national interests and policy objectives and that the technology is suitable from an overall policy viewpoint and is acquired on equitable terms and conditions. While the latter aspect operates normally to the advantage of the recipient enterprise, there may be considerable divergence of approach and views between agency and recipient enterprises on the former.

Recipient enterprises should, however, be made aware of the policies and guidelines regarding the nature of technology which would be permitted to be imported and terms and conditions which may be acceptable to the national agency. They should also have access to the information system, which would provide adequate data and material regarding technological alternatives both within the country and from alternative external sources. Thus, TRAs have to set out the broad policy framework and guidelines for foreign technology inflow, while the related information system should provide the necessary technology information base regarding alternatives, so that recipient enterprises can select and negotiate suitable arrangements. In some countries, guidelines are prescribed but are not published for general information. This may place both potential licensors and licensees in difficulty and may prolong the negotiation process. Such guidelines are necessary so that no undue advantage is taken of the weak bargaining position of developing country licensees; at the same time, these prescribe the policy framework for foreign technology inflow. In most developing countries where regulatory agencies have been set up, such guidelines tend to follow a fairly similar pattern. A model set of guidelines, however, needs to be prepared for the use of developing countries which may be proposing to establish regulatory arrangements.

The methodology for evaluating technological alternatives in developing countries also requires significant improvement. With

limited knowledge and awareness of such alternatives and their implications, recipient enterprises often do not evaluate technology costs in cost-benefit terms. In certain national regulatory bodies, attempts are made towards evaluation of individual technology proposals in terms of foreign exchange costs of direct payments and future imports of materials and components as against foreign exchange savings in the form of export earnings or import substitution. Appropriate methodology needs, however, to be developed, both at the level of recipient enterprises and agency, to evaluate alternative technologies in terms of overall costs and benefits. This could necessitate the defining of numerical values for critical parameters such as labour costs and shadow wage rates, foreign exchange costs and shadow prices and thereafter the application of a discounted cash-flow approach. While the information network should provide the basic information regarding alternative production techniques, the evaluation of alternatives would necessarily require to be carried out by recipient enterprises, with the agency exercising review functions.

## PERSPECTIVES FOR FURTHER DEVELOPMENT OF NATIONAL OFFICES FOR TECHNOLOGY TRANSFER

According to previous paragraphs, the functions of national agencies for technology transfer may be characterized in principle as static which means that their activities are geared towards certain statis functions in implementing government regulations regarding the inflow of foreign technology.

It seems, however, that as time goes on and with more experience acquired, the present functions of these and similar institutions should further develop in order to meet increasing demands of national economic growth and specifically needs of growing and expanding industry.

In this connexion, on the basis of acquired experience, it seems right to predict for the relatively near future a further

enlargement and expansion of activities of national offices for transfer of technologies parallel to increasing efficiency of their functions as well as sophistication of their operations.

At least, two (2) directions seem to clearly emerge towards where further evolution is going: one is the increasing co-operation and exchange of experience and information among these institutions in different developing countries, and second the enlargement of their services both for industry and co-operating government agencies.

Co-operation among national offices for technology transfer in developing countries may bring about such important developments like exchange of experience in operating the office, visits and training of personnel, exchange and improvement of evaluation procedures and finally exchange of information on sources of alternative technologies in selected sectors including terms and conditions of their acquisition[1/].

On the other hand, enlargement and further sophistication of services of national agencies both for industry and government may lead ultimately to the creation of very effective instruments for the formulation and implementation of national technological policies and plans at the country level.

As at present the role of these offices is limited, in principle, to regulation of technology inflow to a country, by virtue of their knowledge and experience these offices should increasingly pay their attention to encouragement of indigenuous technological development and finally to the formulation and possible implementation as leading agencies of national technological plans and policies.

These new functions of national agencies may gradually be achieved

---

1/ The UNIDO TIES scheme could be considered as a pattern of such co-operation.

by incorporating, inter-alia, the following specific activities:

(a) Monitoring of implementation of projects based on approved and registered technology agreements;
(b) Analysis of implemented projects with a view to up-dating the scope of alternative sources of technologies;
(c) Continuous sector-based analysis of approved agreements with a view to establish long-term trends in relation to prices, royalty rates, profit margin as well as technological developments, etc.;
(d) Identification of technological gaps and establishment of systems of technology for bridging these gaps;
(e) Development of guidelines for the promotion of indigenuous technology;
(f) Development and elaboration of directives for technology policies at the national level;
(g) Enlarging the scope of use and utilization of information and expertise available at national technology offices and similar institutions among governments and industrial communities both for the technological development and improvement of negotiating possibilities and capacities.

As it is s :, while at the beginning of the existence of such agencies the regulatory functions usually prevail, with their monitoring function of promotional character will play more and more significant role.

In view of the above, the role of national technology transfer regulatory offices are likely to change in keeping with the continuous evolution of national technological policies. It is clear that these policies will not only encompass the regulation and promotion of foreign technology inflow, but will also include policies pertaining to industrial

property rights (trade-marks, patents) as well as to the development of indigenuous technological capabilities and services.

In this connexion, linkage should be established not only between institutions dealing with different but related activities but also in terms of policy evolution, joint co-ordinating and implementation.

Being to the fore of technological developments, national offices regulating the technology transfer should have some impact in the area of industrial property systems in a country and even more important, they should play a decisive role in the development of indigenuous technological capabilities and services.

The ultimate goal of national technological policies is the achievement of technological independence. Consequently, in the long run, local technological capabilities and services would appear to be the cornerstone of such strategies. Whereas every country has to import technology, the role and strength of indigenuous technological capabilities will determine to a great degree a country's position vis-á-vis outside suppliers of technology and its likely achievement of technological independence. The national agencies regulating technology transfer play a major role in this process, particularly since they stimulate the development of such capabilities and in turn use such services for their own activities and functions.

In conclusion, it can be expected that in the future national regulating agencies for technology transfer and similar institutions in the developing countries have an even more important and broader role to play in the overall economic development of their individual countries.

FIGURE 1 = Organization Chart of the National Registry for Transfer of Technology in Mexico (until 1978)

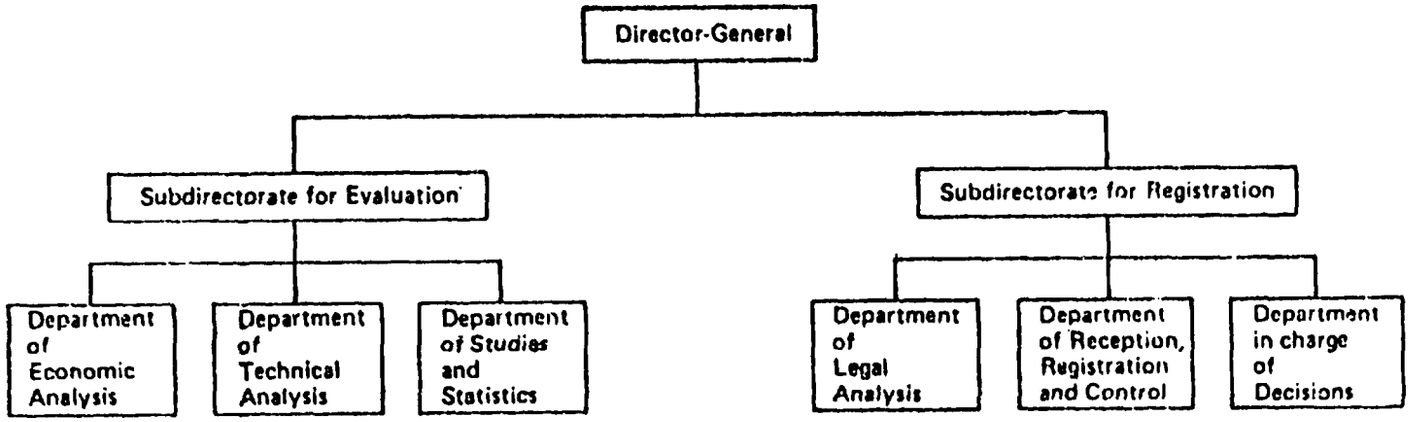


FIGURE 2 = Organizational Chart of the Technology Transfer Board of the Philippines

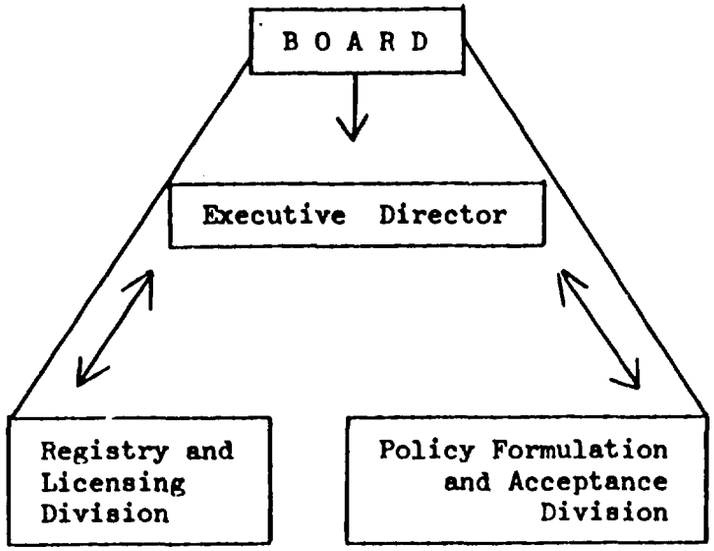


FIGURE 3 = Flowsheet of the Process for Approving or Rejecting Agreements Presented to the Mexican National Registry of Technology Transfer (till 1978)

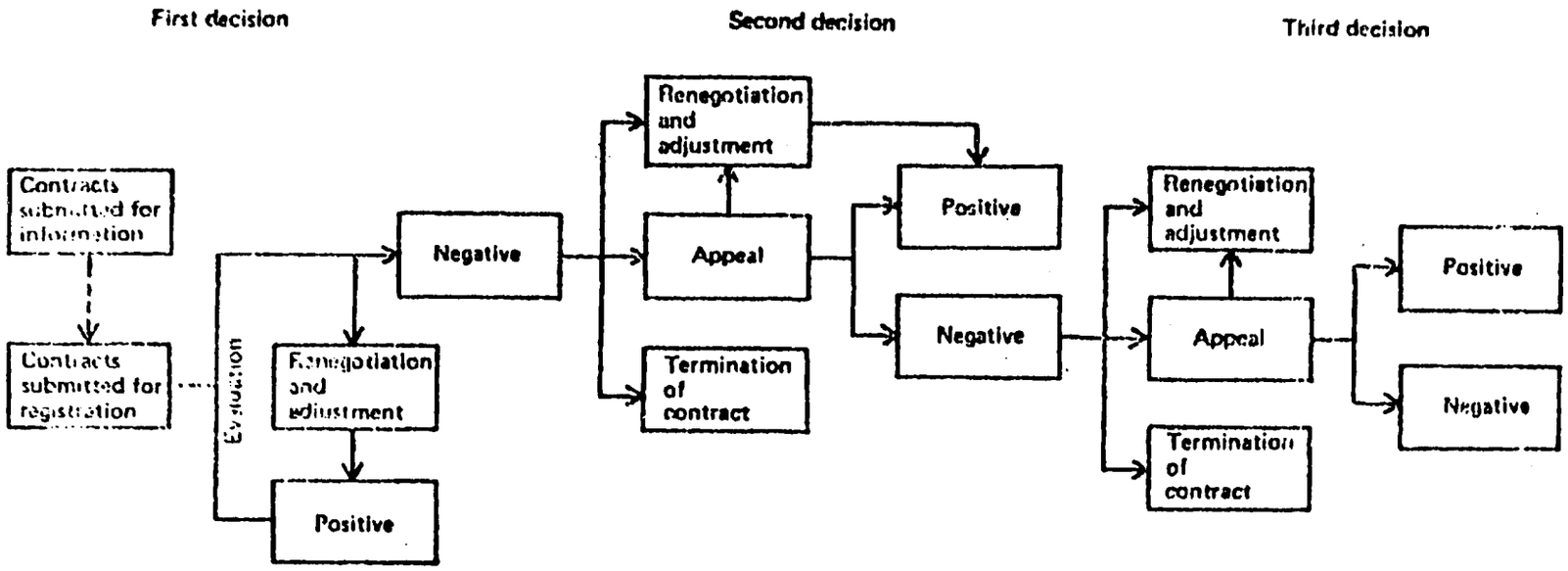


FIGURE 4 = Organization Chart for a National Agency for Regulation and Promotion of Transfer of Technology