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INTERNATIONAL MACHINERY FOR THE FINANCING OF SCIENTIFIC  
AND TECHNOLOGICAL DEVELOPMENT

Discussion Guidelines for its Analysis and Design

Document prepared for the Ad hoc Working Group co-ordinated by the CEPAL Executive Secretariat and SELA which is to meet in Lima, Peru, on 26 and 27 March 1979. Pursuant to the mandate contained in resolution 1 of the second Latin American Regional Preparatory Meeting for the United Nations Conference on Science and Technology for Development, the Group will study the possibilities and limitations of the existing financial machinery for scientific and technological development as well as new proposals in this respect.



# BIBLIOTECA NACIONES UNIDAS MEXICO

- iii -

## CONTENTS

	<u>Page</u>
INTRODUCTION .....	1
1. FINANCING FOR SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT .....	2
2. GENERAL CHARACTERISTICS AND COMPONENTS OF AN INTERNATIONAL FINANCING MECHANISM .....	10
3. INTERNATIONAL MACHINERY FOR CO-OPERATION AND FINANCING .....	17
A. THE UNITED NATIONS SYSTEM .....	17
1. United Nations Development Programme (UNDP) .....	18
2. World Bank .....	21
B. REGIONAL BODIES .....	24
1. Inter-American Development Bank (IDB) .....	24
2. Organization of American States .....	27
4. PROPOSALS AND COMMENTS RECEIVED CONCERNING NEW MACHINERY FOR THE FINANCING OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT .....	29
Annex I - General data on official development assistance .....	32
Annex II - Financing system for the technological development of the Third World .....	38

/INTRODUCTION



INTRODUCTION

The second Latin American Regional Preparatory Meeting for UNCSTD, held in Montevideo from 29 November to 1 December 1978, adopted a resolution in which, bearing in mind that suitable financial machinery should be available to secure more rapid scientific and technological progress in the developing countries, and having taken note of the document entitled "System of financing for the technological development of the Third World", submitted by the member countries of the Andean Group, it decided to convene an ad hoc Working Group, co-ordinated by the Executive Secretariat of CEPAL in conjunction with SELA, to consider before 1 April 1979 the possibilities and limitations of the existing machinery for the financing of scientific and technological development and new proposals in this respect, and forward its conclusions and recommendations to the eighteenth session of the Commission.

In this same resolution the Meeting recommended that the countries of the region should submit as rapidly as possible their proposals concerning financing machinery to the Executive Secretariat of CEPAL for consideration by the Working Group, and that the Secretariat of CEPAL should inform the governments in good time of the calendar of activities of the Working Group and of the proposals the secretariat received.

In convening this Working Group to analyse in greater depth the possibilities and limitations of the existing machinery and new proposals in this respect, the aim was to attempt to progress in shaping what might be the bases of a position for Latin America and the Caribbean on the topic of financing, as a contribution by the region to the World Conference.

In compliance with the above-mentioned resolution, the Executive Secretary of CEPAL requested the countries to submit their comments and proposals, and compiled some information in this field through contacts with other bodies and organizations.

Some comments were received in response to these requests, but no new proposals apart from that already submitted by the member countries of the Andean Group at the Montevideo meeting.

For its part, the CEPAL secretariat did not consider the possibility of preparing a fresh proposal on financing for submission to the Working Group, on the grounds that it was for the countries of the region themselves to progress further in jointly defining the central elements of the Latin American position on this question.

Consequently, the contents of this document are aimed at providing a brief presentation of some elements which may help to guide discussions and contribute to a clearer definition of the problem.

The conclusions and recommendations reached by the Working Group will be analysed and taken into account by the countries of the region at the eighteenth session of CEPAL in La Paz in April 1979.

#### 1. FINANCING FOR SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

In the course of the preparatory process for the United Nations Conference on Science and Technology for Development, various declarations have shown a clear consensus on the need to reduce the scientific and technological dependence of the developing countries and strengthen their domestic capacity for taking autonomous decisions concerning the generation of scientific and technical know-how and the adaptation, choice and application of technology in their development processes. However, differences are beginning to appear among the different groups of countries when attempting to secure a more precise definition of the contents of such a declaration, through the identification of the instruments and machinery needed to secure the self-reliance in question.

On the one hand, the developed countries persist in proposing forms of bilateral or multilateral co-operation as a result of which they will be able, inter alia:

(i) to continue centralizing in those countries the decision-making on the technological solutions needed by the developing countries;

(ii) to obtain direct benefits from the results of the research and development projects they help to finance, leaving only marginal benefits for the developing countries;

(iii) to use co-operation in the scientific and technological field as a means of cultural and political penetration of the mass of the population of the developing countries, and

/(iv) to

(iv) to obtain greater knowledge of the natural resources potential of the developing countries in order to programme their use in the interests of the developed countries.

On the other hand, the developing countries argue that the use of science and technology in their development processes should serve as an instrument for the achievement of the objectives of the New International Economic Order, based on fairness, interdependence, common interests and co-operation within a framework of balanced relations, with a view to correcting inequalities and injustice, eliminating the growing gap between the developed and the developing countries, accelerating economic and social development and safeguarding peace.

In this context, they view development as a global process which is endogenous and self-reliant, and stress the need for increasing their own domestic scientific and technological capacity. Emphasis is laid on this factor as a fundamental requisite to allow the effective application of science and technology to their development processes in the framework of the broader objective of national self-reliance, understood as the real capacity to adopt and apply autonomous decisions for the solution of national problems.

At the same time, they reaffirm the view that they should strengthen their co-operative links by promoting the creation, acquisition, adaptation, transfer and use in common of resources, know-how and experience for mutual benefit on the basis of collective self-reliance, which will stimulate the achievement of national self-reliance.

Finally, they argue that international co-operation should function as a vehicle for the strengthening of the individual and joint capacities of the developing countries, and not on the contrary as a mechanism which perpetuates the dependent relationships stemming from the present international economic structure. International co-operation can only be a valuable instrument for developing countries to the extent that it helps to satisfy without any preconditions the needs which they themselves identify and select as having top priority.

As a result, the strengthening of the scientific and technological capacity of the developing countries seems to the latter to be one of the

/central objectives

central objectives to which the Conference should address itself, and an essential factor for them to be able viably to implement global, self-reliant and non-imitative styles of development.

The importance of this objective must be duly recognized in the programme of action and reflected in the consideration of a series of concrete measures dealing in particular with instruments and machinery, both national and international, to contribute effectively to its achievement.

It is agreed that at the national level, scientific and technological development calls for the institutionalization of a set of policies providing for, inter alia, the domestic creation of scientific and technical know-how; the training of skilled human resources; the research for and purchase of properly selected foreign technology; the promotion of the domestic demand for technologies; the dissemination among enterprises or industrial branches of the available stock of technology; and the stimulation of local innovation and adaptation, particularly in favour of the more deprived sectors of the population.

The institutionalization and application of such policies, of course, is impossible without a clear national definition of self-determination in all fields, as a result of which due value will be attached to the role played by strengthening domestic scientific and technological capacity. It is this recognition of its value that causes these countries explicitly to incorporate the science and technology variable in their national development plans or strategies and to formulate specific policies, strategies and plans for scientific and technological development.

Their implementation, however, calls for the use of a series of instruments, in which the allocation of financial resources plays a fundamental role.

In Latin America, as in other developing regions, the funds available for scientific and technological research and development have traditionally fallen short of the needs of the countries, and continue to do so despite the rising trend in the funds earmarked for this purpose by governments in their budgets. As a result of this shortfall, attention has turned to progressing in the analysis of suitable financing and co-financing machinery in the field of technological policy instruments.

/In this



In this connexion, Latin America offers some interesting experience, which has been the object of a number of studies analysing and evaluating the efficiency of various specific financing mechanisms.<sup>1/</sup> These mechanisms operate in various ways, ranging from the encouragement of basic and applied research, and the promotion of activities for technological innovation and adaptation in industrial enterprises, to support for intermediary services, such as consultant and engineering services.<sup>2/</sup>

The shortfall has also caused emphasis to be placed at the international level on the need to restructure the existing machinery for co-operation so that, within the framework of the objectives of the New International Economic Order, it provides suitably for the financing needs of the developing countries in this field.

Broadly speaking it may be said that international co-operation in science and technology has been fragmentary, unco-ordinated and not integrated in socio-economic development efforts, or not adjusted to the scientific and technological priorities of the developing countries, even in cases where such priorities have been established. One of the main results of this situation has been that international co-operation in science and technology has not contributed significantly to the strengthening or creation of domestic scientific and technical capacity, although some action in this field has helped to create and strengthen R and D institutions, train high-level scientific and technical personnel or generate new scientific and technical knowledge of use for development, and apply it together with existing know-how to the solution of some problems.

The success of international co-operation has been limited by a lack of consensus both within and among countries, agencies and organizations

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<sup>1/</sup> See F. Sagasti, Ciencia y Tecnología para el Desarrollo: Informe Comparativo Central del Proyecto STPI, International Development Research Centre, Bogotá, 1978.

<sup>2/</sup> This is the case of some original formulas - implemented by Argentina, Brazil, Colombia, Mexico and Peru - such as the allocation of a certain percentage of the credits granted by the industrial development banks to technological research, the creation of funds to promote technological innovation and the application of a percentage of company profits to research activities.

concerning not only development objectives but also the scientific and technological means needed to achieve them. In other words, the obstacles - in the broadest sense of the word - are both political and ideological and scientific and methodological.<sup>3/</sup>

This situation is further complicated by the fact that international co-operation in science and technology assumes various forms and takes place through a multitude of simultaneous unco-ordinated activities, through international agencies, governments, research and development institutions, professional associations and universities.

Some of the problems of a general nature which arise in relation to the availability and allocation of resources through this co-operation are linked with the scant concern on the part of the developed countries in helping the developing countries to create their own scientific and technological infrastructure, inadequate information in the developing countries on the availability of funds and other resources through bilateral and multilateral channels, and the lack of policies aimed towards this in the framework of the international institutions for co-operation and financing.

With regard to co-operation machinery itself, a first difficulty is that it is not specifically geared to the promotion of scientific and technological development. Some developing countries have set up special financial machinery for scientific and technological activities, but nothing of the kind exists at the international level. International resources are currently channelled through different kinds of instruments, usually set up to achieve a vast range of objectives; and only recently have some of them begun to consider explicitly, among those objectives, the promotion of activities to develop science and technology.

This gives rise to a second problem, namely, the measurement of the quantity of resources channelled through those mechanisms. In the absence of clear, shared definitions of what constitutes activities for scientific and technological development, suitably processed data cannot be obtained to measure the flow of funds directed towards strengthening the scientific

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<sup>3/</sup> Report of ACAST - A/Conf.81/PC.22.

and technological capacity of the developing countries. The difficulty is even greater if one wishes to identify and analyse the treatment given to the scientific and technological components of sectoral programmes and projects financed through these mechanisms and to evaluate to what extent they are aimed at strengthening them.

These difficulties may be clearly observed in the case of the co-operation channelled through the various bodies and agencies of the United Nations system. Even though the number of activities undertaken by them in the field of science and technology has increased in recent years, this growth has occurred in unco-ordinated fashion and has not always taken account of the real needs of the developing countries. The developing countries frequently have little effective participation in the definition of the forms, design, terms and duration for the execution of co-operation programmes; it is significant that a very large proportion of the contributions are used to finance experts from the developed countries.

With regard to the international financial institutions, ACAST states that

"103. Although it is among their purposes to finance programmes capable of overcoming obstacles to development and therefore to support the application of science and technology for development, this role is severely hampered by the inadequate attention and amount of resources made available as yet by the institutions. Thus, new obstacles arise from the fact that projects are often begun but not followed through to their essential conclusions or projects are never fully implemented or the integration of new programmes or projects into national development policies is not achieved. Some of these obstacles may have their roots in poor planning or in any number of other national constraints. They are also caused by the lack of enough funding to manage the complexity involved in implementing development projects and programmes that are endowed with technological content adequately reflecting the relative factor endowments and the overall socioeconomic goals and priorities of the developing countries.

104. A second kind of obstacle lies in the procedures governing the allocation of much of this international funding. Traditionally, most international financial institutions have relied on the expertise of developed countries only. This has the dual effect of not taking advantage of the local skilled persons available in many developing countries who are likely to be more familiar with the the complex of variables involved in implementing projects in their own countries, and of stunting the growth of local technology consulting and engineering firms."<sup>4/</sup>

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<sup>4/</sup> Report of ACAST - A/Conf.81/PC.22.

Furthermore, international financial institutions display a marked reticence in approving projects with a high content of scientific and technological research, even when these are clearly viable.<sup>5/</sup> It may also be observed that the cases where such projects have been approved are limited to some developing countries which have reached an intermediate level of development, and have not extended to the other relatively less developed countries.

With regard to the bilateral co-operation machinery fostered by the developed countries, this has traditionally had many shortcomings from the standpoint of the developing countries.<sup>6/</sup> Often the assistance provided through this machinery is accompanied by conditions and the obligation to purchase inputs, equipment and instruments and use technical personnel from the donor country in the execution of projects. Again, the projects themselves are limited in such a way that they do not generate technologies which could compete with their enterprises, and are restricted to marginal activities for large-scale projects being undertaken by the developed countries, as in the case of many projects undertaken in developing countries in connexion with the aerospace programmes of the major powers.

The consideration of these problems has led to a discussion of what would be the most suitable machinery to secure the channelling of a greater quantity of financial resources, in suitable conditions, specifically aimed towards strengthening the scientific and technological capacity of the developing countries.

Broadly speaking, this involves considering the possibility of changing the present forms of international co-operation in such a way that their actions are geared to this objective, as well as the possibility of setting up specific new machinery to make possible an additional flow of funds for this purpose.

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<sup>5/</sup> There are some exceptions, such as the loans granted by the Inter-American Development Bank to Brazil to expand its research infrastructure, and the group set up by IDB and CEPAL for research into technological development in the region.

<sup>6/</sup> However, some interesting modalities of co-operation may be found which constitute exceptions, such as the International Development Research Centre (IDRC) financed by the Government of Canada and SAREC set up by Sweden.

With regard to the first point, the main focus of concern is a possible rise, by an agreed percentage, in the proportion of assistance programmes administered by the United Nations, its bodies and specialized agencies, and their co-ordination for the purpose of promoting the strengthening of scientific and technological capacity. In addition, there should be a substantial increase in the funds allocated by international financial institutions; they should earmark a fixed proportion of their total loans for this purpose, and set up risk capital funds to finance technological projects in the developing countries.

With regard to the second point, action should be aimed at the creation of special funds whose constitution, administration and use should be determined through a process of negotiation during the Conference.<sup>7/</sup>

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<sup>7/</sup> This is in addition to the machinery which, as we have seen, could be set up at a national level without calling for the establishment of international agreements. Machinery of this kind could consist in obliging industrial enterprises to devote a percentage of their gross profits to the undertaking of scientific and technological activities; or obliging enterprises which pay royalties for licencing contracts to allocate an equal amount for carrying out scientific and technological activities. A calculation of the sums which might be available in Latin America as a result of the establishment of such machinery may be found in Francisco Sagasti, Hacia un desarrollo científico-tecnológico endógeno de América Latina, Comercio Exterior, Vol. 28, N° 12.

## 2. GENERAL CHARACTERISTICS AND COMPONENTS OF AN INTERNATIONAL FINANCING MECHANISM

As was pointed out in the previous section, the primary objective of the establishment of a New International Economic Order is to reduce the inequalities currently prevailing at the international level, and for this purpose the individual and collective self-reliance of the developing countries should be fostered, by putting an end to their present dependence on the central countries which limits their development possibilities.

Since the management of scientific and technological knowledge is one of the most important elements among the differences which separate the central from the peripheral countries, the development of autonomous scientific and technological capacity among the latter is a necessary condition for any effort to achieve the above-mentioned objectives.

It has already been seen that one of the major limitations on scientific and technological development in the developing countries is the shortage of financial resources for that purpose.

The efforts made at the international level for the developed countries to increase substantially and voluntarily their economic contributions to development in general and scientific and technological development in particular have failed, if one overlooks a number of honourable exceptions. Despite the 0.7% target recommended by the United Nations in 1970 for the Second Development Decade, official development assistance has remained practically at the same level in real terms during the last ten years and as a proportion of the gross national product of the industrialized countries, has dropped from 0.52% in 1960 to 0.31% in 1977.<sup>8/</sup>

The need to restructure the activities carried out in the field of science and technology by the bodies of the United Nations system is receiving careful scrutiny, and is included in the agenda for the United Nations Conference on Science and Technology for Development. For this restructuring to be effective, it must be based on policies whose objectives include the individual and collective strengthening of the scientific and technological capacity of the developing countries, giving rise to machinery

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<sup>8/</sup> See data in Annex I.

for co-ordination and decentralization which will secure a more effective interaction among national activities and a greater stimulus for subregional, regional and interregional programmes, in support of horizontal co-operation activities.

The contribution made by international financial institutions to strengthening the scientific and technological capacity of the developing countries is severely limited by the paucity of funds available for the purpose, the limitations imposed by the developed countries, the conditions they impose from the standpoint of financial profitability alone in their operations, and the tied nature of many of their contributions. For these institutions to be able to contribute suitably to the scientific and technological development of the developing countries, it has been argued that there must be a substantial increase in the funds they allocate for science and technology for development, and that they must devote a fixed proportion of their total loans to this purpose and earmark risk capital to finance technological projects in the developing countries.

In view of the size of the problem however, and bearing in mind the urgent need to redistribute world productive potential, as indicated in the Lima Declaration, the measures suggested above should be supplemented by specific machinery to finance the development of the individual and collective scientific and technological capacity of the developing countries.

This was made clear at the Regional Preparatory Meeting for UNCSTD with the result that the Latin American and Caribbean countries stressed the need to set up financial machinery for these purposes, which would have the following characteristics:

"This financial machinery should be controlled by the developing countries, accord preferential treatment to the relatively less developed countries and promote joint programmes of scientific and technological development aimed at solving the common problems of the developing countries in activities oriented towards:

- (a) mastering the know-how needed to generate and assimilate the technological processes essential for the solution of socio-economic problems;

/(b) developing

- (b) developing design and engineering capacity with respect to the processes, equipment and instruments needed for technological innovation;
- (c) developing national capacity to use local or imported technology;
- (d) undertaking the necessary scientific, technical and administrative training for the rational use of science and technology." 9/

This proposal indicates some of the major features the machinery should have:

In the first place, by clearly indicating that the funds in question should be used in the execution of scientific and technological development activities in the developing countries, the machinery becomes specific. This represents an advantage over the existing machinery for co-operation and financing which, by not being specific in this way, disperses its action in a great variety of activities and does not give suitable priority to science and technology.

Secondly, by recommending preferential treatment for the relatively less developed countries from the technological standpoint, and encouraging joint programmes of scientific and technological development aimed at solving common problems, solidarity is built into the machinery. This solidarity is in keeping with the provisions of General Assembly resolution 3405 (XXX) (New Dimensions of Technical Co-operation), which recognizes the need, within the spirit of the New International Economic Order, to pay special attention to the needs of the less advanced developing countries. It is also in keeping with the spirit of the Buenos Aires Plan of Action which establishes that co-operation among developing countries is a decisive force for them to be able to create, acquire, adapt, transfer and share knowledge and experience with mutual benefit and achieve national and collective self-reliance, which is essential for their social and economic development.10/

Thirdly, by stressing the need for the machinery to be controlled by the developing countries, the machinery becomes autonomous in nature,

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9/ See E/CEPAL/L.183/Rev.3/Add.1.

10/ See Report of the United Nations Conference on Technical Co-operation Among Developing Countries (A/Conf.79/13/Rev.1).

/which would



which would prevent influences alien to the interests of the developing countries from undermining its application to the objectives for which it was designed. This feature will distinguish it from other existing machinery that is largely controlled by the developed countries, which leads to "tied" co-operation from the standpoint of the acquisition of specific capital goods and inputs or the use of human resources from these countries.

In addition to eliminating these conditions, the direct control of the machinery will allow the developing countries to use it in projects designed and carried out in these countries.

To round off this summary of salient features advocated for the financing machinery, there are a number of further essential aspects which call for explicit comment.

With regard to the origin of the funds, the main guideline is provided by what amounts to a consensus on the part of the Latin American and Caribbean countries in their statement contained in the document adopted at the Montevideo Regional Meeting to the effect that "The Conference should take a clear and unequivocal position on the modalities to be adopted in order that those who benefit from international trade with the developing countries should also contribute to the implementation of scientific and technological activities planned and executed in those countries (developing countries)".<sup>11/</sup> This idea is subsequently reinforced in the document by the statement that "with the aim of correcting imbalances in international relations, the industrialized countries should compensate the developing countries by contributing more effectively to their technological development. One of the necessary roads is the formulation of specific financial alternatives that would gradually make it possible to reduce imbalances".<sup>12/</sup>

These ideas, besides being fair, pinpoint the responsibility of the developed countries in supplying the funds needed for the machinery, but it is also necessary to establish the form in which the contributions should be made and, even if only approximately, the sums required by the machinery at its present state of operation.

With regard to the form of contribution, this should be simple and easily calculated so that the contributors' commitments can be precisely

<sup>11/</sup> See E/CEPAL/L.183/Rev.3 .

<sup>12/</sup> Ibid.

established and their use programmed sufficiently in advance to avoid the disruption of programmes or projects due to sudden changes in the sums available. Since the implementation period for technological research projects is much more than one year, the developing countries must be able to calculate quite accurately the resources they will receive in the future in order to initiate the implementation of medium- or long-term projects.

In order to achieve simple and precise calculations, the calculation base used must be figures which are easily checked and widely available, and which cannot be the object of possible deliberate distortion.

One possibility might be that the contributions should be fixed as a percentage of the GNP of the developed countries, or of the annual growth in GNP. The possibility should also be considered of calculating them on the basis of the budgetary expenditures earmarked internally for scientific and technological activities or as a percentage of the surpluses they obtain in the international trade of manufactures with the developing countries. A comparative analysis should be carried out to establish the advantages and disadvantages of each of these possible calculation bases.

As to the amount of resources to be handled by the machinery, these should be significant in relation to the needs of the developing countries who will use them. In other words, neither so high that they are well in excess of each developing country's spending capacity on scientific and technological activities, nor so low that they do not allow projects to be carried through to their fundamental conclusions.

Various possibilities exist with regard to the constitution of the machinery, such as a centralized world fund, or various funds distributed geographically, or an allocation for each country based on a specific kind of calculation. This last possibility is not fully in keeping with the solidarity referred to above. In the case of a world fund, one possibility would be to set up an ad hoc body to administer it; or it could be administered by an existing financial institution such as UNDP or the World Bank. However, in this case there would be a conflict with the characteristics of autonomy mentioned earlier, which would make it necessary to find formulas providing the fund with a special statute so that it could be directly

/controlled by

controlled by the developing countries, such as through a trust fund with its own management and operating conditions.

If regional funds are chosen, again ad hoc bodies could be set up or existing regional institutions used, while ensuring that their control remains in the hands of the developing countries. Examples of such institutions would be the UNDP regional offices, the Regional Economic Commissions and the regional development banks.

In addition, in the case of regional funds it would be necessary to establish a formula for the distribution of resources by regions, and forms of financing interregional operations.

The distribution criteria should establish the percentages devoted to joint activities and those used to finance national activities. In addition, in keeping with the characteristic of solidarity, in both cases there should be suitable compensatory mechanisms which would specially favour the relatively less developed countries both in the selection of joint projects and in the individual allocation of funds.

Given the feature of solidarity in the machinery, the implementation of joint projects at the subregional or regional levels or by groups of countries with similar interests would help to make more rational use of the resources by avoiding unnecessary duplication in similar projects. In addition, it would facilitate horizontal co-operation among the countries and make it possible to use the scientific and technological capacities available in the relatively more developed countries in behalf of the relatively less developed countries. Again, the criteria of joint use of funds would ensure a form of control on the part of the developing countries themselves over the use of the funds for the purposes for which they were set up.

Finally, precise national, regional or world guidelines, as the case may be, should be established to guide the use made of the funds, i.e., to what extent they may be used for direct support to specific enterprises or to projects of national or regional interest (such as better use of natural resources or the solution of environmental problems) and directed towards meeting the needs of the deprived (such as housing, health, energy, education, etc.).

As a corollary, it is necessary to establish the financial modalities to be used by the funds. In the first case, where individual enterprises benefit from the results, one possibility might be to have a revolving fund where the investment could be recovered once the results had been built into productive activity. In the case of projects of national interest or social value, it would be more appropriate to consider it an irrecoverable contribution.

### 3. INTERNATIONAL MACHINERY FOR CO-OPERATION AND FINANCING

In view of the importance of science and technology for development, it is not surprising that all the bodies and programmes for co-operation and financing offer, in one form or another, contributions to scientific and technological development in the developing countries.

Unfortunately, these contributions are not classified and costed in a uniform manner, and this prevents proper assessment and comparison. Nevertheless, with the aim of showing the many forms in which international co-operation and financing are related to scientific and technological aspects, we present below some data and comments on co-operation and financing machinery, both international and regional.

#### A. THE UNITED NATIONS SYSTEM

Despite the broad range of activities related to science and technology covered by the United Nations system, it is very difficult to assess their full scope, largely because of:

(a) The absence of a clearly accepted definition of which of the system's activities belong to the field of science and technology.

Thus, for example, in its report on "Institutional Arrangements for Science and Technology", UNESCO includes virtually all the Natural Sciences programme as expenditure on science and technology, while in some of the annual reports of the Administrative Committee on Co-ordination of the expenditure within the United Nations system, some of these programmes are classified under the heading of natural resources. At the same time, when a Science and Technology heading exists, it often does not include activities which are directly linked to scientific and technological development, and which appear classified under other categories, such as, for example, Agriculture (agricultural research and extension) or Industry (industrial services, training). Furthermore, various organizations report that science and technology are viewed as integral parts of all their programmes, and cannot be identified separately.

/(b) The

(b) The poor co-ordination among the various organizations which make it up. The absence of clear and common definitions on what constitutes the category "science and technology" and of comparable data on the resources used, together with the existence of various differing systems of planning and implementation within the United Nations system, make it almost impossible to co-ordinate and harmonize the contributions which the system makes to strengthening the development of the national capabilities of the developing countries in the field of science and technology. This fact, pointed out many times during the preparations for the United Nations Conference on Science and Technology for Development, gives rise to a dispersion of both national and international efforts, and to the unsound use of resources.

For this reason, one of the four items on the agenda of the Conference is aimed at the creation of a body within the system which will permit concerted action in the field of science and technology, which implies, among other things, the conceptual and methodological standardization of the various systems for programme classification and description, in order to achieve comparable budgetary presentations and synchronize the budgetary cycles of the different agencies.<sup>13/</sup>

Below appears a brief description of the activities being carried out in the field of financing by two of the principal components of the System: the United Nations Development Programme and the World Bank.

#### 1. United Nations Development Programme (UNDP)

The principal machinery in the United Nations system for financing programmes of international co-operation is the United Nations Development Programme (UNDP), which obtains its income from voluntary contributions from both developed and developing countries, which are committed each year by these countries.

These funds are used for three types of programme: National Programmes, Regional Programmes and Interregional Programmes.

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<sup>13/</sup> In this regard the General Assembly adopted resolution 32/197. Restructuring of the economic and social sectors of the United Nations system, which in its Annex, paragraph 43, refers to the problem.

/The funds

The funds for National Programmes are distributed among the developing countries on the basis of an index of distribution which is related to the factors of population and per capita income, thus producing the national indicative figure for each country. In recent years, and under this distribution formula, a relative drop in the share of Latin American countries in UNDP programmes has been taking place.

Each country, in keeping with the priorities which derive from its development plans, programmes for five years the use of the funds which may be available to it, according to the national indicative figure which has been assigned to it, with the co-operation of the office of the UNDP Resident Representative in each developing country. During the five-year period the national programme may be reviewed and reformulated at the request of the Government.

The projects financed using the resources of the National Programmes are approved by the Resident Representatives, by the Directors of the UNDP Regional Offices, or by the Administrator of the Programme, depending in each case on the value of each project.

The Regional Programmes are drawn up by the UNDP Regional Offices in the light of a range of criteria, including: the specific mandates emanating from United Nations bodies to attend to specific areas or sectors; the priorities arising from governmental forums of a regional or subregional type, and the national interests shared by three or more countries of the region. The Regional Offices submit their regional programmes by five-year periods to the UNDP Governing Council for information.

The Interregional Programmes are approved by the Governing Council on the basis of the proposal drawn by a UNDP Division especially responsible for Interregional and Global Programmes.

Among the projects approved up to 30 June 1977, the following data refer to the heading "Science and Technology":

/PROJECTS APPROVED

PROJECTS APPROVED AS OF 30 JUNE 1977

	Number of Projects	Estimated cost (US dollar equivalent)		
		Total	UNDP	Government counterpart contribution
<u>Science and technology</u>	430	412 890 885	148 938 460	263 952 425
Science and technology promotion	101	82 859 053	22 821 726	60 037 327
Life sciences	5	8 779 130	8 439 375	339 755
Physical sciences	40	19 276 562	4 178 870	15 097 692
Oceanography	16	4 354 108	3 412 897	941 211
Meteorology	118	111 229 362	43 947 605	67 281 756
Technical and engineering education	150	186 392 670	66 137 986	120 254 684

Source: Compendium of Approved Projects, June 1977.  
UNDP/MIS/Series A/N° 8.

These sums do not represent the total support provided by UNDP for scientific and technological development activities, since a very large percentage of the national and regional programmes it finances in the various sectors also have components of scientific and technological training and support for research.

UNDP funds are generally used for technical assistance by means of the engagement of experts and consultants, support for training programmes, both locally and abroad, scholarships for advanced training and specialization, purchase of equipment, design, negotiation, administration, and implementation of projects and total or partial financing of pre-investment studies through the agencies belonging to the United Nations system and others legally and technically capable of implementing projects.

In resolution 3405 (XXX) (New Dimensions in Technical Co-operation), the General Assembly of the United Nations endorsed a decision of the UNDP Governing Council which gives a series of guidelines designed to link the activities of the Programme closely to the objectives of the New International Economic Order and enhance the effectiveness of the Programme.

/Of particular



Of particular interest among the guidelines for the purposes of the present document are the following:

- "The basic purpose of technical co-operation should be the promotion of self-reliance in developing countries by building up, inter alia, their productive capability and their indigenous resources and by increasing the availability of the managerial, technical, administrative and research capabilities required in the development process;"
- "Technical co-operation should be seen in terms of output or the results to be achieved, rather than in terms of input;"
- "The United Nations Development Programme should diversify the sources of its supply from countries to enable it to mobilize in a prompt and efficient manner all available human and material resources for technical co-operation, including particularly those from developing countries;"
- "Governments and institutions in recipient countries should be increasingly entrusted with the responsibility for executing projects assisted by the United Nations Development Programme;"
- "In the context of new dimensions of technical co-operation, special attention should be paid to the requirements of the least developed among the developing countries."<sup>14/</sup>

## 2. World Bank

The term "the World Bank", as normally used, refers to three legally and financially distinct entities which operate in a co-ordinated manner: the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA) and the International Finance Corporation (IFC). The last-named operates specifically with the private sector in the developing countries.

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<sup>14/</sup> General Assembly resolution 3405 (XXX), New Dimensions in Technical Co-operation.

/In the

In the first report prepared for the United Nations Conference on Science and Technology for Development, the World Bank refers to the activities of the first two organizations, pointing out that the volume of resources mobilized by them has increased rapidly in recent years, with total loans granted in 1977 of 7,067 million dollars.

These funds are helping to support a wide variety of projects, large and small, public and private, chiefly in the following sectors: agriculture and rural development, education, energy, industry, population, transport, telecommunications, urban development, water supply and sanitation.

In its report on the treatment of science and technology in the development of its activities, the World Bank supplies no figures which make it possible to estimate the resources it uses to strengthen the domestic scientific and technological capacity of the developing countries. The report contains a description of the activities connected with the choice and transfer of technology, elimination of obstacles to its use, methods for integrating science and technology in development, support for national institutions and new forms of international co-operation.

Concerning the treatment of technology in its projects, the Bank indicates that its policy establishes the following criteria:

(a) that the technology used in the projects it finances should be appropriate to development goals and to local conditions;

(b) that the Bank, by itself or in collaboration with others, should promote innovations needed to make available to developing countries technology suitable to their needs; and

(c) that Bank-financed projects should develop local capacity to plan for, select, adapt, implement and, when necessary, to develop and design appropriate technologies.

In many projects, the Bank points out that the most advanced technologies are also the most appropriate, but that in other cases, the Bank seeks alternative technologies and, where they do not exist, promotes their development.

/It points

It points out that when a project financed by the Bank introduces new technology into an area, usually as part of a complex technical and social project package, several means are used to ensure that skills are transferred so that local specialists can apply the technology; these means include the training of local personnel to plan, manage and operate the project; involving, whenever possible, qualified local consultants in the development and implementation of the project; and creating and supporting institutions and programmes which can provide such training and services.

The World Bank points out in its report that it supports institutions that generate information and deliver technology at the national level in developing countries, and provides advice and technical assistance in the creation and operation of such institutions. Bank-financed projects train researchers, promote interdisciplinary research, and strengthen research management and co-ordination, as well as supporting the conduct of research.

The World Bank, UNDP and FAO are sponsors of the Consultative Group for International Agricultural Research, which finances 11 international agricultural research institutes. The centres have extended their work beyond their original biological research concerns into the areas of economic and social aspects of the improvement of farming systems. One of their aims is to strengthen the capabilities of national programmes, without which the international centres cannot be effective.

In the field of technological innovation, the World Bank has experimented in recent years with projects linked to the improvement of industrial technology in the developing countries. In this way it has provided funds for various purposes such as support for specific projects of applied research, construction and provision of equipment to government industrial technology institutes; official subsidy to private firms for the development of new products based on local technology.

Mention may be made among examples of these loans of those granted to Israel, for research and development in the field of industry; to Colombia, for a fund to finance technological innovation in firms; and to Uruguay, to support an industrial technology institute and a programme of professional training.

/However, doubts

However, doubts have been expressed on numerous occasions concerning the true influence of the Bank's activities on the effective development of an independent technological capability in the developing countries. These doubts are raised by a number of factors related to the structure of the Bank, notably:

(a) The voting rights in the Bank give a 61.5% majority to the developed countries compared with 38.5% for the developing countries. As a result, many programmes and activities of interest for the latter may easily be vetoed by the former.

(b) The tendency of the Bank's officials and experts to design projects and then urge the governments to accept them, instead of adopting a position of firm support for the projects and strategies selected by the developing countries.

(c) The pre-eminent use made of human and material resources from industrialized countries in the implementation of the projects.

## B. REGIONAL BODIES

### 1. Inter-American Development Bank (IDB) 15/

Since beginning its activities, the Bank has committed a total volume of loans of nearly 12 billion dollars. Its contribution to science and technology has traditionally taken the form of direct and indirect financing for educational institutions.

The Bank introduced an innovation in public international financing by including, from the outset, higher education and advanced training among its fields of action. By the end of 1977 the Bank had granted 88 loans for a total of about 527 million dollars in the sector of education, science and technology to finance projects whose total cost amounts to 1,130 million dollars.<sup>16/</sup> These loans have helped to modernize, expand and improve 780 study centres, of which 71 were universities, 80 schools and faculties of universities, 33 research centres and 549 vocational or technical schools.

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<sup>15/</sup> The information on this point has been taken from the report of Ismael Escobar and Simon Teitel entitled "The work of the Inter-American Development Bank in support of the Scientific and Technological Development in Latin America", Washington D.C., November 1974.

<sup>16/</sup> These loans represent roughly 4% of the total granted by the Bank until the end of 1977 (IDB - Annual Report, 1977).

While IDB has had occasion to support scientific and technological development, it has usually done so indirectly by the incorporation of scientific and technological advances in its projects, and through the technical assistance operations it finances and support to university and, more recently, technical education. Exceptions are an operation undertaken in 1962 to finance laboratory equipment in the Mexican Institute for Technological Research, another in 1966 to equip the Metallurgy Department of the Argentinian National Energy Commission and the loan for the Development of Technological Research granted to Brazil in an amount of 32 million dollars, with a view to strengthening new institutes of applied technology, as well as some more recent loans.

In the science and technology sector proper, the programmes support specialized agencies and institutions which sponsor scientific and technological research not linked to teaching, but closely related to economic and social development. The Bank is in a position to collaborate with institutes of industrial and agricultural technology, standards, technical services such as cartography, geology, topography, hydrology, natural resources, etc., and also for the creation or strengthening of councils, foundations, academies or other bodies for the planning and co-ordination of policy on scientific and technological policy.

The Bank has also supported, together with other institutions (the United Nations, CEPAL, OAS) the undertaking of studies on the transfer of technology in various member countries. It has also collaborated with UNESCO in a study on the institutions concerned with the formulation of scientific policy in the member countries.

A large percentage of the loans granted by the Bank to the agricultural sector are aimed at research and extension activities. These represented a total of over 50 million dollars on 30 September 1974.

The loans granted by IDB are subject to conditions of a financial nature which are applied in general to all operations, although they may be slightly adjusted in each case according to the features of the project, the possibilities of the borrower, and the use of the different funds administered by the Bank. Some of the normal chief contractual conditions are the following:

/(a) Loans

- (a) Loans are granted to public and private sector bodies of member countries.
- (b) The minimum length of the loans is usually 15 years.
- (c) The interest on loans granted from the Fund for Special Operations varies between 2% and 4% on funds actually disbursed. Interest on loans granted from Ordinary Capital is based on the cost of the resources obtained by the Bank in the capital markets; currently it stands at around 8%.
- (d) A charge of 0.75% annually is applied to sums actually disbursed.
- (e) A charge of 0.50% is applied to the undisbursed part of the loan.
- (f) Generally a grace period is granted for amortization payments which is not less than the period of execution of the project.
- (g) Disbursements may be made in any of the currencies which form the Bank's capital. Repayment must be made in the currency or currencies of the loan.
- (h) Loans must usually be guaranteed by the corresponding government or by government agencies.
- (i) The borrower must always undertake to make a counterpart investment with its own funds, the amount of which varies according to, inter alia, its economic possibilities, the amount of the loan and the type of project.
- (j) The funds from the loans granted for educational, scientific or technological development may be invested to finance any of the following activities: engineering and administration; construction; equipment, materials and furniture; grants for higher studies (for teachers and researchers); student loans; technical assistance (consultant firms for management and accounting systems, library organization, institutional development, etc.). Funds from IDB loans cannot be used to refinance debts or for normal running expenses of the institution borrowing them.

/(k) The

- (k) The funds involved in the project, whether from a loan, the local contribution or other sources, must obey the above particulars governing their use, and be distributed in accordance with investment categories similar to those listed in point (j).
- (1) The goods and services financed by IDB loans are subject to the following rules:
- (i) In the case of financing from Ordinary Capital, goods may be purchased and services hired in the member countries of the International Monetary Fund declared eligible by the Bank.
  - (ii) The goods and services financed from the Fund for Special Operations may be acquired or hired in the borrower country, the United States of America and, with the express authorization of the Bank, in any other member country of IDB.
  - (iii) The Bank administers various trust funds for member and non-member countries. The conditions for the purchase of goods and the hiring of services vary according to the fund.

## 2. Organization of American States

One Latin American institution which has constantly been engaged in activities in the field of science and technology is the Organization of American States which, through its Regional Programme for Scientific and Technological Development, contributes to the financing of projects at the national and regional levels.

Of the total financing used for these purposes, 80% is invested in national activities, while the remaining 20% is earmarked for implementing regional activities. The financial resources are contributed by all the countries members of the Organization and redistributed according to the projects which the countries themselves submit to the OAS for consideration.

The multinational and national projects and regional activities are classified in five areas. These are: basic sciences, agricultural sciences, technological development, policy and planning and technical change. The annual adoption of the projects is the task of the Executive Committee for Education, Science and Culture (CEPCIECC).

/The table

The table given below shows the figures allocated during the period 1973-1977.

REGIONAL PROGRAMME FOR SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT  
(Thousands of US dollars)

Projects	1973/74	1974/75 a/	1975/76 a/	1976/77 a/
Basic sciences	926.3	1 239.2	1 340.3	1 086.1
Applied sciences	1 105.6	1 566.0	1 702.8	1 137.0
Technological development	1 092.3	1 437.1	1 705.7	1 278.0
Policy and planning	542.6	441.1	476.4	517.0
Technical change	235.7	599.6	668.1	497.8
Regional activities	1 021.6			
<u>Total</u>	<u>4 924.1</u>	<u>5 283.0</u>	<u>5 900.0</u>	<u>4 515.9</u>

a/ Including regional activities in each area.

The annual average of 5 million dollars is not significant for the region's needs in this field, but the permanent existence of the programme and its importance in generating a substantial current of opinion in scientific and technological matters should be stressed.

One of the important aspects of the programme is the policy of using human resources from the recipient country in the projects, and supplementing them with further resources from the region.

It is also interesting to observe that according to the provisions of a resolution adopted by the General Assembly of the OAS in 1976, a working group of government experts has been set up, and is engaged in the study of a co-operation programme in the field of the creation, adaptation and transfer of technology, including the analysis of the effective utilization of lines of financial credit for this purpose.



4. PROPOSALS AND COMMENTS RECEIVED CONCERNING NEW MACHINERY FOR THE FINANCING OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

As mentioned in the Introduction, the Executive Secretary of CEPAL, pursuant to the resolutions of the second Latin American Regional Preparatory Meeting for UNCSTD requested the countries to submit their proposals and comments on financial machinery for distribution to the other governments and particularly for consideration by the Ad Hoc Working Group convened to study them.

At the time of preparation of this report, the only proposal received is the one already submitted by the member countries of the Andean Group at the Montevideo Regional Meeting, with an additional variant which appears in the latest version received from the Board of the Cartagena Agreement.<sup>17/</sup>

The Andean proposal starts from the premise that one of the elements restricting the creation of an autonomous decision-making capacity on technological activities in the developing countries is the shortage of financial resources without conditions attached by decisions alien to the countries themselves.

It goes on to state that it is both possible and necessary to use as a criterion for defining the new machinery a method of calculation which takes account of the difference in the technological level - present and future - of the developing and the developed countries. Variables which are self-regulating over time should therefore be used, so that if the technological gap increases over the years, the contribution of the developed countries should increase, and vice versa.

It also stresses the need for a regional compensatory mechanism to correct the deviations which may occur in the distribution of funds for each country according to its relative level of development.

The objectives of the proposed system are defined in the form in which they were laid down in the recommendations for a programme of action for the use of science and technology in the development process adopted at the

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<sup>17/</sup> See Annex II.

second Latin American Regional Preparatory Meeting for UNCSTD in Montevideo at the end of 1978.

It is argued that the resources of the system should be provided by the developed countries and calculated on the basis of a percentage of the average deficit in the trade in manufactures of the Third World countries with the developed countries over the five-year period preceding the year in which the contribution is made. The variant mentioned above is that the calculation of the deficit should exclude the items corresponding to the purchase of armaments. It is also proposed that there should be a compensatory mechanism to redistribute the resources corresponding to the different countries.

The proposal includes a calculation of the amounts which would correspond to the countries of the Latin American region, and it is shown that these would have a significant effect in relation to the sums currently spent on research and development.

It may be observed that the proposal of the Andean Group does not explicitly mention whether the machinery should involve the participation of an intermediary institution for the flow of funds, nor does it cover the guidelines for, and manner of, the use of the funds, the only point mentioned being that a significant proportion should be used to implement joint regional projects.

In addition to this proposal, comments have been received on it from countries of the region. One of these expresses agreement with the proposal; the other raises the following points:

(a) Acceptance of the system would represent increased dependence. The argument is that the global operations of the transnational corporations in the 1970s accounted for 40% of the industrial output and 60% of the foreign trade of the developed capitalist countries.

(b) The developed capitalist countries have repeatedly obstructed the agreement on the integrated programme for commodities and the corresponding common fund, adopted in the framework of UNCTAD in order to stabilize the export earnings of the developing countries and the prices and supply of commodities.

/(c) The

(c) The obligations for the developed countries proposed by the system are hypothetical in that most of those countries have not complied with the 0.7% ODA target, and the United States, the region's main trading partner, states that it cannot comply with that target.

Annex I

GENERAL DATA ON OFFICIAL DEVELOPMENT ASSISTANCE

According to OECD statistics, in 1977 the developing countries received 19,540 million dollars as Official Development Assistance (ODA), understood as official (non-private) grants and loans for the promotion of economic and social development granted on concessionary terms (loans with a grant element of at least 25%).<sup>1/</sup> In addition to financial flows, ODA includes technical co-operation in the form of study fellowships and training grants for nationals of the developing countries and the payment of experts, teachers and consultants carrying out advisory work in those countries.

The distribution of ODA by origin is as follows:

	<u>Millions of dollars</u>
Bilateral assistance of member countries of the Development Assistance Committee (DAC)	10 080
Multilateral agencies	(5 000)
Bilateral assistance of OPEC countries	3 760
Centrally planned economies	700
<u>Total</u>	<u>19 540</u>

(Source: 1978 Review - Development Co-operation, OECD, page 189.)

Official Development Assistance (ODA) provided by member countries of the OECD/DAC in 1977 to the developing countries, whether bilaterally or as contributions to multilateral institutions, amounted to 14,696 million dollars. This represented an 8% rise over 1976 in dollar terms; but in real terms the increase was marginal.

<sup>1/</sup> GRANT ELEMENT: reflects the financial terms of a transaction: interest rate, maturity (interval to final repayment) and grace period (interval to first repayment of capital). It measures the concessionality (i.e., softness) of a loan, in the form of the present value of an interest rate below the market rate over the life of a loan. Conventionally the market rate is taken as 10%. Thus, the grant element is nil for a loan carrying an interest rate of 10%; it is 100% for a grant; and it lies between these two limits for a soft loan. Generally speaking, a loan will not convey a grant element of over 25% if its maturity is less than 10 years, unless its interest rate is well below 5%. If the face value of a loan is multiplied by its grant element, the result is referred to as the grant equivalent of that loan.

Estimated as a percentage of the Gross National Product of the DAC countries, this assistance dropped from 0.33% in 1976 to 0.31% in 1977. This is the lowest percentage since statistics on development assistance began to be kept in the mid-1950s, with the exception of 0.30% in 1973.

OFFICIAL DEVELOPMENT ASSISTANCE OF OECD MEMBER COUNTRIES

(Percentage of GNP of the donor countries)

1960	1965	1970	1971	1972	1973	1974	1975	1976	1977
0.52	0.44	0.34	0.35	0.33	0.30	0.33	0.36	0.33	0.31

Source: World Bank, World Development Report, 1978, pp.98-99.

These results indicate a growing divergence from the target of 0.7% recommended by the United Nations in 1977 for the Second Development Decade. While the majority of the DAC countries have accepted this target, and some of them have even surpassed it, the general decline in assistance as a percentage of GNP stems from a growing disparity between the co-operation efforts of the different countries.<sup>2/</sup>

<sup>2/</sup> Holland, Norway and Sweden have introduced plans to reach this target and have exceeded it. Australia, Belgium, Canada, Denmark, Finland, France and New Zealand have accepted it and are using it as a benchmark in their internal budget planning. Germany, Japan and the United Kingdom have accepted it without setting a date for achieving it. Austria, Italy, Switzerland and the United States have not accepted the target.

ODA OF DAC COUNTRIES

	1977	
	\$ m.	% of GNP
Australia	427	0.45
Austria	118	0.24
Belgium	371	0.46
Canada	991	0.51
Denmark	258	0.60
Finland	49	0.17
France	2 267	0.60
Germany	1 386	0.27
Italy	186	0.10
Japan	1 424	0.21
Netherlands	900	0.85
New Zealand	53	0.39
Norway	295	0.82
Sweden	779	0.99
Switzerland	119	0.19
United Kingdom	914	0.37
United States	4 159	0.22
<u>Total DAC</u>	<u>14 696</u>	<u>0.31</u>

Source: 1978 Review - Development Cooperation, OECD, p. 191.

The following table shows a comparison of the different channels through which total official development assistance of the DAC countries was distributed in 1977.

NET DISBURSEMENT

	<u>Total DAC countries</u>
I. Official development Assistance (ODA), (A+B)	14 695.7
A. Bilateral Official Development Assistance (1+2)	10 083.7
1. Grants and grant-like contributions	7 202.7
1.1 Technical assistance	3 066.4
1.2 Food aid	705.4
1.3 Debt forgiveness	167.6
1.4 Other grants	3 263.3
2. Development lending and Capital	2 881.1
2.1 New development lending	2 029.0
2.2 Food aid loans	(700.0)
2.3 Debt reorganization	133.3
2.4 Equities and other bilateral assets	18.8
B. Contributions to multilateral institutions (1+2+3)	4 611.9
1. Grants	2 234.9
1.1 UN Agencies	1 303.0
1.2 EEC	718.7
1.3 Other	213.1
<u>of which:</u> Food aid grants, total	507.1
2. Capital subscription payments and similar to	2 338.1
2.1 IBRD	75.0
2.2 IDA	1 414.4
2.3 Regional Development Banks	804.7
2.4 Other	44.1
3. Concessional lending	38.8

Source: 1978 Review-Development and Cooperation, OECD, p. 202.

There appears below a comparative table of the typing status of total ODA disbursed by DAC countries in 1977.

Finally, a table is given on loans and grants by multilateral agencies in recent years.

Table B.4  
 TYING STATUS OF TOTAL ODA, 1977<sup>a/</sup>  
 (Gross disbursements/Millions US dollars)

Country	Total ODA	Untied					Partially tied					Tied				
		Total	Multi-lateral	Bilateral			Total	Multi-lateral	Bilateral			Total	Multi-lateral b/	Bilateral		
				Total	Loans	Grants			Total	Loans	Grants			Total	Loans	Grants
Australia	429.5	337.6	77.9	259.7	-	259.7	0.1	-	0.1	-	0.1	91.8	-	91.8	-	91.8
Austria	118.6	93.6	31.3	62.3	62.2	0.1	-	-	-	-	-	25.0	-	25.0	-	25.0
Belgium	372.7	105.8	36.2	69.6	5.6	64.0	72.9	72.9	-	-	-	194.0	-	194.0	37.0	157.0
Canada	995.2	512.9	435.6	77.3	(37.3)	(40.0)	0.1	0.1	-	-	-	482.2	80.5	401.7	(142.7)	(259.0)
Denmark	263.3	139.6	82.9	56.7	7.3	49.4	25.7	17.6	8.1	-	8.1	98.0	10.3	87.7	61.4	26.3
Finland	49.9	22.3	15.9	6.4	2.5	3.9	3.7	3.7	-	-	-	23.9	2.2	21.7	7.5	14.2
France	2 793.1	1 140.1	114.7	1 025.4	98.0	927.4	484.4	235.2	249.2	170.1	79.1	1 168.6	-	1 168.6	108.8	1 059.8
Germany	1 732.9	1 322.2	293.8	1 028.4	712.6	315.8	77.0	75.9	1.1	1.1	-	333.7	-	333.7	55.8	277.9
Italy	254.8	207.0	151.2	55.8	12.4	43.4	-	-	-	-	-	47.8	-	47.8	25.7	22.1
Japan	1 591.8	697.4	531.0	166.4	166.4	-	327.4	-	327.4	312.3	15.1	567.0	-	567.0	345.4	221.6
Netherlands	954.2	457.7	181.3	276.4	245.2	31.1	170.0	71.2	98.8	98.8	-	326.5	3.4	323.1	36.0	287.1
New Zealand	52.6	(37.0)	(9.2)	(27.8)	-	(27.8)	-	-	-	-	-	(15.6)	(1.6)	(14.0)	-	(14.0)
Norway	295.3	235.0	130.2	104.8	-	104.8	-	-	-	-	-	60.3	-	60.3	-	60.3
Sweden	781.9	632.4	251.1	381.3	21.0	360.3	12.6	12.6	-	-	-	136.9	30.4	106.5	-	106.5
Switzerland	182.3	137.8	44.4	93.4	7.2	86.2	8.5	-	8.5	-	8.5	36.0	5.4	30.6	4.4	26.2
United Kingdom	1 015.3	473.7	322.0	151.7	45.4	106.3	212.6	37.0	175.6	13.2	162.4	329.0	0.4	328.6	57.8	270.8
United States	4 778.0	1 305.0	821.0	484.0	70.0	414.0	913.0	349.0	564.0	564.0	-	2 560.0	92.0	2 468.0	930.0	1 538.0
<u>Total DAC countries</u>	<u>16 661.4</u>	<u>7 857.1</u>	<u>3 529.7</u>	<u>4 327.4</u>	<u>1 493.1</u>	<u>2 834.2</u>	<u>2 308.0</u>	<u>875.2</u>	<u>1 432.8</u>	<u>1 159.5</u>	<u>273.3</u>	<u>3 496.3</u>	<u>226.2</u>	<u>6 270.1</u>	<u>1 812.5</u>	<u>4 457.6</u>

Source: 1978 Review - Development Cooperation, OECD, page 221.

a/ TIED-AID: includes all aid transactions for which procurement is limited to the donor country; aid is said to be untied when procurement may be undertaken in substantially all countries.

b/ Mainly emergency and other food aid supplies through World Food Programme.



Table C.4

## LOANS AND GRANTS BY MULTILATERAL AGENCIES

(Commitments /Million US dollars)

Agencies	Concessional								Non-concessional							
	1970	1971	1972	1973	1974	1975	1976	1977	1970	1971	1972	1973	1974	1975	1976	1977
	<u>Loans</u>															
International Bank for Reconstruction and Development	-	-	-	-	-	-	599	98	1 508	1 603	2 091	2 266	3 183	3 938	4 911	4 985
International Development Association	594	566	928	1 643	1 268	1 651	1 674	1 833	-	-	-	-	-	-	-	-
International Financing Corporation	-	-	-	-	-	-	-	-	113	102	126	125	253	158	203	201
Inter-American Development Bank	440	314	322	366	448	580	648	(560)	192	347	414	490	675	635	(500)	(300)
African Development Bank	-	-	-	-	-	-	-	-	11	25	28	46	87	105	(97)	(150)
African Development Fund	-	-	-	-	38	101	80	(142)	-	-	-	-	-	-	-	-
Asian Development Bank	34	52	94	118	173	166	236	272	212	202	222	303	375	494	540	615
Caribbean Development Bank	-	4	10	8	24	22	16	(28)	-	-	8	12	17	2	(6)	(2)
European Economic Community/European Development Fund	1	8	6	32	38	11	85	...	-	-	-	-	-	-	-	...
European Investment Bank	-	-	-	-	-	42	-	...	(2)	32	14	104	165	58	159	...
Arab Bank for Economic Development in Africa	-	-	-	-	-	-	79	46	-	-	-	-	-	-	-	30
Arab Fund for Economic and Social Development	-	-	-	-	101	168	336	258	-	-	-	-	25	25	-	105
Gulf Organization for Development in Egypt	-	-	-	-	-	-	250	1 475	-	-	-	-	-	-	-	-
Islamic Development Bank	-	-	-	-	-	-	-	58	-	-	-	-	-	-	-	62
Special Account of the Organization for Arab Petroleum Exporting Countries	-	-	-	-	79	-	37	-	-	-	-	-	-	-	-	-
Special Arab Aid Fund for Africa	-	-	-	-	24	132	57	13	-	-	-	-	-	-	-	-
OPEC Special Fund	-	-	-	-	-	-	43	243	-	-	-	-	-	-	-	-
Other OPEC	-	-	-	-	-	-	-	-	-	-	-	-	24	56	186	(400)
<u>Total Loans</u>	<u>1 069</u>	<u>944</u>	<u>1 360</u>	<u>2 167</u>	<u>2 193</u>	<u>2 873</u>	<u>4 140</u>	<u>(5 026)</u>	<u>2 038</u>	<u>2 311</u>	<u>2 903</u>	<u>3 346</u>	<u>4 804</u>	<u>5 471</u>	<u>6 602</u>	<u>(6 850)</u>
	<u>Grants</u>															
European Economic Community/European Development Fund	92	256	283	420	623	433	706	...								
United Nations	499	561	602	720	939	1 457	1 252									
Islamic Solidarity Fund	-	-	-	-	-	-	6	8								
Arab Fund for Economic and Social Development	-	-	-	-	1	7	1	-								
Arab Fund for technical Assistance to African and Arab Countries	-	-	-	-	-	-	-	6								
<u>Total Grants</u>	<u>591</u>	<u>817</u>	<u>885</u>	<u>1 140</u>	<u>1 563</u>	<u>1 897</u>	<u>1 965</u>	<u>...</u>								
<u>Total Loans and Grants</u>	<u>1 660</u>	<u>1 761</u>	<u>2 245</u>	<u>3 307</u>	<u>3 756</u>	<u>4 770</u>	<u>6 105</u>	<u>...</u>	<u>2 038</u>	<u>2 311</u>	<u>2 903</u>	<u>3 346</u>	<u>4 804</u>	<u>5 471</u>	<u>6 602</u>	<u>(6 850)</u>

Annex II

FINANCING SYSTEM FOR THE TECHNOLOGICAL DEVELOPMENT  
OF THE THIRD WORLD

Proposal presented by the member countries of the Andean Group 1/

1. Bases

There is a clear consensus that one of the most significant restrictions faced by the countries of the Third World in the generation of their own technological capacity is the shortage of financial resources, which makes it impossible to carry out permanent scientific and technological activities and establish and expand research and development institutes, organized on a national, subregional and regional basis.

To date, attempts at international collaboration to strengthen the technological capacity of the countries of the Third World have also suffered from a lack of continuity in the supply of funds; in addition, much of the economic and financial assistance possesses ties which often convert it into an instrument benefiting its suppliers rather than its recipients.

New systems of financing must therefore be found which will make it possible to obviate these obstacles and genuinely and effectively transfer to the Third World countries the decision-making relating to the creation, adaptation and selection of technologies required to meet their social and economic needs. Financing machinery of adequate quality and continuity must be set up to enable the countries of the Third World to make their own decisions.

The result of the different degrees of technological development of the industrialized and the Third World countries may be measured by the difference existing in the trade of manufactures, which reveals very objectively the influence of the technological variable on international trade. Manufactures in the industrialized countries generally use raw materials supplied by the countries of the Third World which have not been able to process them owing to the lack of the appropriate technical know-how.

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1/ The text of this proposal was prepared by the Board of the Cartagena Agreement and presented by the member countries of the Andean Group at the second Latin American Regional Preparatory Meeting for the United Nations Conference on Science and Technology for Development.

It is therefore proposed to set up financing machinery based on the transfer of a percentage of the surplus of the developed countries with Third World countries in the trade of manufactures.

Many of the countries of the Third World spent substantial sums on arms purchases each year, and this often contributes to increasing the negative balance on manufactures considerably. In order not to encourage this phenomenon it is proposed that the corresponding items should be excluded from the calculation.

The system would also have the advantage of being self-regulating in time, i.e., if the technological gap widens over time, the quantities will be greater and the amounts to be transferred from the developed to the underdeveloped countries larger. Similarly, if the technological gap shrinks, the quantities become smaller and finally disappear, if the distortions are really corrected.

Among the Third World countries, however, there are also differences of scientific and technological development which it is both necessary and desirable to correct, in order to ensure that situations like those existing between the developed and the Third World countries are not generated.

If the contribution of each developed country to each Third World country were proportional, this distribution would tend to accentuate the technological underdevelopment of the relatively less developed countries. Similarly, a distortion would occur in favour of the countries with a greater supply of foreign currency (oil-exporting countries) which give them a greater capacity for importing products, often luxuries, from the developed countries.

In order to rectify this situation, a compensatory mechanism is proposed at the level of the regions (Asia, Africa and Latin America and the Caribbean), which would allow for larger contributions to the Third World countries with fewer resources, by shifting to the latter part of the resources which should fall to the countries with stronger economies.

It must also be recognized that solidarity and co-operation among the countries of the Third World will also be one of the most important bases for their development. One means of giving practical form to this co-operation is the development of joint technological projects among such countries.

A particular case is that of Third World countries which have embarked upon integration processes as a form of improving their bargaining power vis-a-vis the developed countries and with the object

of making joint efforts to solve common problems. As part of these integration processes, each of the participating countries makes a contribution in proportion to its available resources, and thus it is considered necessary that each country should contribute through the proposed financing system, a percentage of the real contribution which it will receive to joint technological development programmes.

On the basis of the foregoing and bearing in mind the necessary redistribution of the world effort in scientific and technological development, a financing scheme for the technological development of the Third World dealing with the question of the contributions which the industrialized countries should make for this purpose, is proposed below.

#### Objectives of the system

The Third World countries which receive financial resources from the developed countries to carry out scientific and technological activities, should channel them through their national institutions or through subregional, regional and inter-regional co-operation machinery in order to implement individual or joint programmes aimed at:

- (a) the mastery of the basic and applied knowledge required to assimilate the technological processes needed to solve socioeconomic problems,
- (b) the development of the capacity to engineer, design and construct the processes, equipment and instruments for technological innovation,
- (c) the development of local capacity to use the technologies generated locally or imported, and
- (d) the technical and administrative training required for the successful operation of the technologies selected.

#### 2. Constitution of the system

##### (a) Financial resources of the system

The system will consist of annual transfers of funds from developed to Third World countries, calculated on the basis of a percentage of the average deficit of the Third World countries in the trade of manufactures with the developed countries during the five-year period preceding the year in which the contribution is made.

These percentages will increase progressively; very high transfers will therefore not be made in the first years, which might cause the system to fail for lack of an adequate ability on the part of the Third World countries to administer and use the financial resources. At the same time, these percentages must be large enough for the resulting amounts to be significant in relation to current investment by Third World countries in research and development.

Since the annual deficit may involve short-term distortions stemming from internal economic measures, it is proposed to overcome this difficulty by calculating the average deficit over the five years immediately preceding the year in which the contribution falls due. The contributions would thus be a percentage of this average quinquennial deficit, calculated as in the following example:

If A is a developed country and S a Third World country, then:

$$X_{A-S} - X_{S-A} = D$$

where:

$X_{A-S}$  = exports of manufactures from country A to country S

$X_{S-A}$  = exports of manufactures from country S to country A

D = deficit on the trade balance in manufactures between country A and country S

then:

$$N_{A-S} = X \frac{D_1 + D_2 + D_3 + D_4 + D_5}{5}$$

where:

$N_{A-S}$  = theoretical contribution for technological development from country A to country S

X = variable percentage to be defined

$D_1 \dots D_5$  = annual deficits over a five-year period

Each developed country will calculate the theoretical contribution which it should make for the technological development of each Third World country with which it maintains a permanent trade in manufactures. The sum of all the theoretical contributions calculated in this way will constitute the total financial resources of the system.

(b) Compensatory mechanism among Third World countries

The compensatory mechanism would be applied to the individual contributions from each developed country to the Third World countries, as in the following example:

$$N_{AP} = \frac{N_{A-S} + N_{A-T} + \dots + N_{A-Z}}{S-Z} = \frac{N_{AT}}{S-Z} \quad (1)$$

where:

$N_{AP}$  = average theoretical contribution of country A

$N_{A-S}$  = theoretical contribution of A to S

$N_{A-Z}$  = theoretical contribution of A to Z

S-Z = number of countries in the region

$N_{AT}$  = total contribution of country A to the region

The redistribution factor of the contributions to each Third World country will be calculated as follows:

$$K_{A-S} = \frac{N_{AP}}{N_{AP} + N_{A-S}} N_{A-S} \quad (2)$$

where:

$K_{A-S}$  = redistribution factor for each country

$N_{AP}$  = average theoretical contribution of country A

$N_{A-S}$  = theoretical contribution of A to S

The real contribution which each Third World country will receive from industrialized country A will be:

$$N_S = \frac{K_{A-S}}{K_{A-S} + K_{A-T} + \dots + K_{A-Z}} N_{AT} = \frac{K_{A-S}}{K_A} N_{AT} \quad (3)$$

$$N_S = \frac{K_{A-S}}{K_A} N_{AT} \quad (4)$$

where:

$N_S$  = real contribution of country A to S

$K_{A-S}$  = redistribution factor calculated according to (2)

$K_A$  = sum of the redistribution factors as shown in (3)

$N_{AT}$  = total contribution of country A to the region

Appendix

ESTIMATED CALCULATION OF THE FINANCING SYSTEM

In order to demonstrate the application of this system of calculation of the financing machinery for the technological development of the Third World, an example is given below using the figures corresponding to the balance of trade in manufactures of the countries of Latin America and the Caribbean for the period 1969-1973.

Owing to the limitations of the statistics, the sums obtained for each country include imports from and exports to all the countries of the world, which means that it cannot be said that the total value would correspond to the contributions which the developed countries would have made to the Third World countries; however, it is considered that the example shows that the redistribution machinery considerably increases the contributions which the relatively less developed countries would receive.

Table 1 shows the contribution which each country would receive if the financing system were calculated exclusively as a percentage of the deficit on the trade balance in manufactures of each country, and gives the amount which would correspond to each country after applying the proposed redistribution mechanism.

In the case of the example, the average annual amount of the deficit on the balance of trade in manufactures for Latin America and the Caribbean amounts to 11,141 million dollars for the period 1969-1973. On the assumption that the proposed contribution would have been 2% of the deficit, the countries of the region would have received 222.8 million dollars. To give an idea of the deficit on the balance of trade in manufactures between developed and Third World countries, table 2 gives the data for 1975. Comparing the sum of 27,220 million dollars with that of the period used in the example, it may be seen that in the case of Latin America and the Caribbean a rapid deterioration is apparently taking place in the balance of trade in manufactures.

The same table shows the amounts of the deficits of other Third World regions for which a similar exercise could be carried out.

Lastly, table 3 gives the figures for the expenditure on research and development for 1971 in some countries of the region. From this it may be deduced that the amounts calculated on the basis of 2% of the deficit on the trade balance in manufactures constitutes in the majority of cases a sum which can perfectly well be administered by the countries of the region.



Table 1

CONTRIBUTION TO THE FINANCING SYSTEM WITH AND WITHOUT THE INTRODUCTION OF A MECHANISM OF  
REDISTRIBUTION AMONG THE COUNTRIES OF THE THIRD WORLD, 1969-1973

(Thousands of US dollars)

Country	Average annual deficit a/	Theoretical annual contribution (%)	Redis- tribution factor	Real contribution	Observations
1. Argentina	1 006 414	20 128	5 600	15 689	
2. Bahamas	136 455	2 729	2 019	5 656	
3. Barbados	59 260	1 185	1 028	2 880	Average 1969 to 1971
4. Belize	18 722	374	357	1 000	Average 1969 and 1970
5. Bolivia	24 161	483	470	1 317	Average 1969 and 1972
6. Brazil	2 293 082	45 862	6 636	18 591	
7. Chile	571 272	11 425	4 621	12 946	
8. Colombia	565 611	11 312	4 602	12 893	
9. Costa Rica	220 608	4 412	2 813	7 881	Average 1969 to 1972
10. Dominican Republic	184 372	3 687	2 499	7 001	Average 1969 to 1971
11. Ecuador	227 698	4 554	2 870	8 041	Average 1969, 1972 and 1973
12. El Salvador	115 223	2 304	1 776	4 976	Average 1969 to 1972
13. Guatemala	161 530	3 231	2 281	6 390	Average 1969 to 1972
14. Guyana	95 023	1 900	1 526	4 275	
15. Haiti	26 334	527	493	1 381	
16. Honduras	145 348	2 907	2 115	5 925	Average 1969 to 1972
17. Jamaica	359 541	7 191	3 732	10 456	
18. Mexico	1 518 951	30 379	6 180	17 314	
19. Netherlands Antilles	155 838	3 117	2 224	6 231	
20. Nicaragua	149 501	2 990	2 158	6 046	
21. Panama	255 502	5 110	3 081	8 632	Average 1969 to 1972
22. Paraguay	43 063	861	775	2 171	Average 1969
23. Peru	164 296	3 286	2 308	6 466	Average 1969 to 1971
24. Suriname	57 387	1 148	1 000	2 802	Average 1969 to 1972
25. Trinidad and Tobago	172 251	3 445	2 386	6 685	
26. Uruguay	82 114	1 642	1 355	3 796	Average 1969 to 1972
27. Venezuela	1 531 923	30 638	6 191	17 345	
28. Cuba	520 876	10 418	4 447	12 459	Average 1969 to 1972
<u>Total</u>	<u>10 862 356</u>	<u>217 245</u>	<u>77 543</u>	<u>217 245</u>	

Sources: 1) Yearbook of International Trade Statistics 1975. Department of Economic and Social Affairs, United Nations, New York, 1976.

2) World Military Expenditure and Arms Transfer 1967-1976 USA Arms Control and Disarmament Agency, 1978.

a/ In order to find the annual average deficit, the products appearing in groups 5 to 8 of the Standard International Trade Classification (SITC) have been considered as manufacture, using source (1) as a basis. The amounts corresponding to the arms trade have been excluded, on the basis of source (2).

Table 2  
BALANCE OF TRADE IN MANUFACTURES (X's - M's), 1975

(Millions of US dollars)

With regard to Of	Europe	South Africa	Canada	United States	Japan	Australia, New Zealand	Union of Soviet Socialist Republics	Total
America <u>a/</u>	-10 745	33	-835	-10 570	-4 303	-142	-658	-27 220
Middle East	-16 227	2	-245	-5 151	-5 280	-75	-681	-27 657
Others, Asia <u>b/</u>	-2 625	94	234	456	-9 745	162	-26	-11 450
Oceania	-79	-	-3	-44	-126	-192	-	-444
Africa	-17 439	11	-147	-2 122	-4 343	-53	-51	-24 144
<u>Total developing countries</u>	<u>-47 115</u>	<u>140</u>	<u>-996</u>	<u>-17 431</u>	<u>-23 797</u>	<u>-300</u>	<u>-1 416</u>	<u>-90 915</u>

Source: Statistical Yearbook 1976, United Nations Publication, pp. 450-461.

a/ Excludes United States and Canada.

b/ Excludes the countries with planned economies.

Table 3  
EXPENDITURE ON RESEARCH AND DEVELOPMENT, 1971

Country	Thousands of US dollars
Argentina	33 200
Bolivia	3 129
Colombia	7 280
Costa Rica	2 187
Ecuador	3 332
El Salvador	4 472
Guatemala	3 990
Honduras	1 338
Nicaragua	1 187
Paraguay	173
Peru	8 200
Venezuela <u>a/</u>	23 866
Mexico <u>a/</u>	82 729
Trinidad and Tobago <u>a/</u>	5 171

Source: Estadísticas Científico-Tecnológicas de América Latina, OAS.

a/ Data supplied by UNESCO.

