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**colombia**

**Preliminary Report  
on Science Policy**

(24 June-6 July 1968)

by Professor Harrison Brown

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Serial No.: 772/BMS.RD/SP/ADG  
Paris, August 1968

**unesco**

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## **I. - INTRODUCTION**

At the request of Unesco, I agreed to serve as a consultant on science policy to the Government of Colombia, through the Ministry of Education, and to consider in particular the following :

1. the mechanics of formulating a government policy for science and technology;
2. the creation of the necessary administrative structure (national central scientific organization or agency) whose task would be to help the Government in defining the national science policy;
3. the ways and means by which an appropriate milieu can be built up to create the requisite interest and appreciation in science and technology on the part of leaders of opinion and the public at large, especially with regard to the value of science and technology for socio-economic development.

This mission was outlined in three parts. The first was designated as a visit to meet with representatives of the various Ministries responsible for scientific and technological research in Colombia, with leaders of the scientific community, and with appropriate institutions sponsoring or performing research.

The second part of the mission is to be undertaken by an assistant who will spend approximately two months in Colombia collecting and synthesizing data on the organization of science and current research.

The final stage of the mission is to consist of a second visit to Colombia to advise the Government on the planning of a science policy closely related to the country's economic planning and development.

As part of the first phase of this project, I spent the period, 24 June - 6 July, in Bogotá, consulting with the Ministry of Education and other branches of the Colombian Government, concerning the establishment of appropriate governmental mechanisms for the development of science and research in Colombia. A list of persons visited is to be found in Annex I of this report.

This was my third visit to Colombia within a period of one year. In July 1967, I headed a small group for the President's Science Advisory Committee (US) studying US technical assistance programme in Colombia with special emphasis being placed upon programmes aimed at producing the kinds of technically trained persons needed for economic and social development. In that capacity I visited institutions and talked with numerous scientists, engineers and rectors in Bogotá, Cali, Medellín and Bucaramanga. From 26 February to 1 March 1968, I participated with over thirty Colombian and US scientists, engineers and educators in a workshop, held in Fusagasugá,

on science and technology for development. These earlier experiences proved to be extremely useful in this most recent effort, enabling me to emerge with what I believe to be feasible recommendations, the initial phases of which can be implemented with a minimum of delay.

I was fortunate in being assisted in my efforts by Miss Theresa Téllez, Head of Latin American Affairs, Office of the Foreign Secretary, National Academy of Sciences, who had served as a staff officer for the two previous activities and who knows the Colombian research and educational scene extremely well.

The Minister of Education, Dr. Gabriel Betancur, had appointed Capitán Alberto Ospina, Director of the Foundation for Educational Development, and Dr. Oliverio Phillips, a private industrial consultant, as coordinators for this project. Both worked out a schedule, made the necessary appointments, and one or the other attended most of the meetings.

Discussions were held with the Ministers \* of Education, Development, Mines and Health, the Director of Planning, the Economic Adviser to the President, the Directors of the Institute for Technological Research and the Institute of Nuclear Affairs, and the Director of the Colombian Institute of Technical Specialization in the Exterior (ICETEX). In the private sector, I met with members of the Colombian Academy of Exact, Physical and Natural Sciences and the Presidents of the associations which comprise the Colegio Máximo of the Academies (History, Sciences, Law, Medicine, Engineering, and Culture) as well as with several representatives of the Colombian Association of Universities. Separate talks were held with the National Coordinator of University Planning and private scientists and individuals from industry.

## II. - GENERAL OBSERVATIONS

### 1. The Need for Governmental Mechanisms

Colombia has numerous critical applied research and development needs which can be divided into two broad categories. First there is a complex of problems involving food, nutrition and health which require an integrated research and development programme designed to raise levels of individual well-being. A similarly integrated research and development programme is needed to assess resources, develop new products and processes, help diversify exports, create jobs and expand domestic markets. Applied research and development efforts in these two broad areas should be supported with adequate strengthening of basic research in the universities,

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\* The Minister of Agriculture and the Director of the Colombian Agriculture Institute were out of town during my visit; however, I have had occasion to visit both on a previous occasion.

expanded and improved programmes of educating scientists and engineers, intensified efforts aimed at faculty development and increased capacity for training sub-professional technical workers.

If science and technology are to grow in Colombia at rates commensurate with the needs, it is essential that the government establish policies and mechanisms which will provide for adequate scientific-technological advice at the highest levels, which will also provide for necessary financial support and which will facilitate adequate coordination between responsible agencies of the government and the sectors of the economy. The problems of developing a national scientific-technological competence are so enormously complex that virtually all levels of government as well as a substantial part of the private sector must be involved. No single governmental mechanism can, in the long-run, be adequate.

## 2. Policy Study and Formulation

A national science policy cannot be static. It must change as the economy changes, as the nation's needs change and as the scientific-technological competence of the nation grows. It is important, therefore that there be a body which will examine the nation's research and development status on a continuing basis and which will make recommendations for broad governmental policies related to science and technology. This group should attempt to answer such questions as the following :

How much government funding can be effectively channeled into research and development ?

In the light of competing demands for limited resources, what proportions of the gross national product and of the government's income should be reserved for research and development ?

What proportion of the nation's research and development expenditures should be reserved      basic research in the universities ?

What would be a reasonable growth rate for the nation's research and development activities ?

How rapidly should post-graduate education and research in the universities, leading to the Ph.D. degree in science or engineering, be developed and expanded ?

Are the allocations for research and development among the various sectors such as agriculture, industry, health, transport, communications and defense reasonable, considering the state of the economy and the seriousness of the problems in each sector ?

Are scientific and technological change being adequately taken into account in national economic planning ?

Does each government agency have adequate mechanisms which permit it to undertake or sponsor research which is relevant to its mission ?

Are there adequate means for ensuring that the results of applied research are used to improve the effectiveness of operations and the efficiency of production in the various sectors of the economy ?

How can the government best make adequate determination of the needs for trained scientists and engineers in time-perspective and plan appropriate steps for training the requisite numbers ?

In what ways can curricula and teaching methods in science and mathematics in the primary and secondary schools and in the universities be improved ?

This list of questions is not intended to be exhaustive - it is intended simply to be illustrative of the kinds of problems which a body for policy study and formulation must consider.

### III. - COLOMBIAN PROPOSALS FOR A NATIONAL SCIENTIFIC INSTITUTION

In 1960 a National Council of Scientific Research was created by the government, composed of representatives from the Ministry of Education, Agustín Codazzi Institute, Caro y Cuervo Institute, Institute of Nuclear Affairs, Institute of Technical Research, Colombian Institute of Anthropology, Colombian Academy of Languages, Colombian Academy of Sciences, the National University and one representative from the private universities. This body met once or twice but never really functioned after that. In spite of this, a number of scientists and other individuals continue to be concerned with the Colombian lag in the scientific-technological areas and the dispersion of effort throughout the country among institutions and universities.

The OAS Punta del Este summit meeting in 1967 and the meeting in Maracay early this year have increased the interest and awareness in Colombia to move toward scientific-technological development. Immediately after the meeting in Maracay in February 1968, a science workshop was held in Fusagasugá, Colombia, co-sponsored by the Minister of Education and the United States National Academy of Sciences. The recommendations from this meeting, calling for a science policy for Colombia, were well received by the President of the Republic. Immediately following the meeting, the Fusagasugá recommendations were used by a small group of consultants, called together by the Minister of Education, as a basis for drafting a decree (see Annex II) which will empower the President to take the necessary steps toward the formulation and implementation of such a policy.

I purposely did not read the draft decree mentioned above until the termination of all consultations, as I wanted to draw my conclusions independently. It is significant, therefore, that in general the

recommendations I am submitting coincide well with the draft decree. The major diversion is in the level of the organizational structure being suggested. However, because I am convinced President Lleras and several persons with whom I spoke have a genuine interest in seeing an effective advisory body at the highest level, I believe that such a group should be under the Office of the President, rather than under a Ministry.

#### IV. - THE NATURE AND COMPOSITION OF A NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Leaving aside for the moment the question as to where within the governmental structure such a policy or "Council" should be located, let us consider briefly its mode of operation and composition. Clearly it should be a workind body. The number, scope and complexity of the problems with which it must come to grips would appear to necessitate its meeting regularly, perhaps (at least for the first year) once a month for two days at a time. Some work, such as reading, writing and criticizing draft "position papers" and familiarizing oneself with background information will be required between meetings.

Being that members of the Council will be able to devote only limited time to the studies, there should be a small but highly competent full-time staff. Also, elements of the policy studies can be contracted to individuals and groups in existing organizations both inside and outside the government. In order to profit from the experiences of the more technologically advanced countries, it would be advisable for the Council to retain consultative relationships with one or more of the Academies or Research Councils in those countries.

In the interest of getting the work done the Council should be kept as small as possible, consistent with having adequate representation from the diverse interested governmental and non-governmental groups. I suggest that the Council have as its nucleus one person from each of the five ministries which have the largest research and development interests and needs (Agriculture, Education, Health, Development and Mines and Petroleum). Other ministries should be entitled to send observers to the meetings, to submit position papers and to be kept fully informed of the Council's deliberations. Governmental representation should also include the Administrative Department of Planning.

The six governmental members of the Council should be supplemented by approximately seven members selected for their individual competence from the non-governmental communities of Colombian scientists, engineers, economists, university rectors and deans and industrialists. Selection should be made by the President from lists of suggestions solicited from interested organizations, such as the Society of Engineers, the Association of Universities, the Academy of Sciences, the Physical Society, the Chemical

Society, the Association of Electrical and Mechanical Engineers and the Association of Medical Faculties. Efforts should be made to provide reasonable geographic representation.

The non-governmental members of the Council might be given three-year terms, staggered in such a way that 2-3 members retire and 2-3 members are added each year. Although it would be inadvisable to provide permanent seats on the Council for specific organizations such as the Academy of Sciences and the Association of Universities, reasonable effort should be made to provide representation from these important groups on as continuous a basis as possible.

From many points of view the Science Policy Council would be most effective if it were attached directly to the Office of the President of the Republic. Were this the case, the governmental representative on the Council would be the Ministers themselves and the President should be prepared to participate in some of the more important policy sessions. In the absence of the President, the meetings might be chaired by the Minister of Education, whose Ministry will probably be involved in science development matters more heavily than other Ministries, especially insofar as the universities are concerned.

Meetings of the Council might be of two types. There will be meetings dealing with policy formulation and in such cases it would be essential that the Ministers themselves and the President participate. There will be meetings dealing with the formulation and analysis of specific problems, and in such cases, the Ministers should be represented by technically competent personnel from within the Ministries. Under the proposed administrative reforms, it appears very likely that more technically-trained persons will be employed at higher levels within the Ministries thus making it possible to utilize their talents in the decision-making process. But, as pointed out previously, where technical advice is concerned, the Council should utilize expert consultants from whatever field is necessary.

#### V. - OPERATIONAL SECRETARIAT OR OFFICE OF SCIENCE AND TECHNOLOGY

Given general policy guidance along the lines suggested above, governmental mechanisms should be created for carrying out the policies which are finally adopted. I suggest that a key element in those mechanisms should be a new operating agency of the government, such as an Office of Science and Technology. The draft decree regarding science and technology (see Annex II) calls for a "National/Institute for Science and Technology", but the word "Institute" is completely misleading. It is therefore referred to in this document as an "Office of Science and Technology", although this decision is, of course, a Colombian one.



The proposed office should have the following responsibilities :

a) To administer a special Science Development Fund, to be created by the government (see p. 9 ). This Fund should be used to support research generally and in particular to help develop research and graduate training in science and engineering in the universities, to strengthen non-governmental research institutions, to stimulate research and development activities which are judged to be of national importance but which are not deemed appropriate for sponsorship by any one of the existing ministries.

b) To coordinate the research and development activities of the various ministries; to advise on proposed research and development budgets for individual ministries; to advise on the establishment by individual ministries of internal research and development facilities; to establish uniform government-wide procedures and policies for contracting for research and development projects with universities and with private and governmental research institutes (including the establishment of uniform procedures for estimating costs, overhead rates and salary reimbursements).

c) To conduct or sponsor studies which will provide an inventory of research facilities and of research in progress and to keep such an inventory current; and to conduct a study which will lead to estimates of future technical manpower needs as well as estimates of the prospects of balancing supply and demand.

d) To create and sponsor mechanisms for transplanting selected first-class research now in progress in the more advanced countries to Colombia; to arrange and sponsor relationships between Colombian research institutions and comparable institutions overseas (i.e., university departments, technological research institutes, institutes of health) to bring to Colombia visiting professors from overseas; to work with ICETEX in planning programmes for providing selected Colombian students with graduate training and research experience overseas; to make possible participation by Colombian professors in overseas "university associates" programmes such as are proposed by the UN Advisory Committee on the Application of Science and Technology to Development of the ECOSOC; to devise appropriate techniques for combatting the "brain drain" and persuading Colombian scientists and engineers now overseas to return to Colombia.

e) To provide the Administrative Department of Planning with objective evaluations of and priority assignments for science development projects which are proposed for loans, grants or technical assistance from international and bilateral assistance programmes. In view of the fact the Department of Planning must compare needs in this area with other critical needs for outside assistance, it is important that a very close working relationship be developed between the Department and the new Agency.

f) To ensure that there is appropriate Colombian participation in the international scientific organizations and programmes, such as the International Council of Scientific Unions, its fifteen constituent unions,

and its varied international collaborative programmes; to provide travel funds to ensure competent Colombian participation in international congresses; to encourage the holding of international scientific meetings and symposia in Colombia.

g) To encourage, financially and otherwise, the development of the Colombian Academy of Sciences so that it can 1) serve effectively as an advisory body both to the new Agency and to the Council, 2) engage in national science planning activities 3) criticize objectively government programmes and policies, and 4) ensure that world standards of scientific performance are used in Colombia.

h) To encourage, financially and otherwise, the formation of a Colombian Association for the Advancement of Science which can help create a national awareness of the importance of science and research to the economic and social development of the country and which can also help bring about a much-needed cohesiveness within the Colombian scientific and engineering community.

i) To encourage, financially and otherwise other non-governmental foundations and organisations dedicated to such goals as the improvement of science teaching, and the stimulation of interest on the part of young people in science.

j) To create mechanisms whereby research workers in governmental and non-governmental research institutes, industry and the universities interact with each other much more than at present.

This new agency should be provided with a full-time staff of perhaps 4 or 5 professionals, headed by a competent, imaginative and dedicated Director preferably with a technical background. The Director should be responsible to a Board, appointed by the President, which in the interest of efficiency should have no more than seven members selected from appropriate ministries, industry and the universities. The non-governmental members should outnumber the governmental members. Terms should be fixed and membership should be rotated.

The Ministry of Education will be particularly heavily involved with programmes of science development, for the most urgent tasks initially will be to build up science faculties, research and graduate education in the universities and develop science programmes at low levels in the educational system. It would therefore appear reasonable to place the secretariat of the Office of Science and Technology within the Ministry of Education. It should however enjoy special status as the operating arm of the Council of Science and Technology, which would be directly attached to the Office of the President of the Republic. It should be well staffed and enjoy a reasonable amount of autonomy and flexibility.

## VI. - THE ROLE OF THE MINISTRIES

One of the most important governmental policies with respect to research should be that each Ministry which has research and development needs should establish mechanisms for seeing to it that their needs are met. Most often these will involve mechanisms which will enable Ministries to contract with private or governmental research institutions and universities for the solution of specific problems. Often a Ministry will wish to contract directly with universities for fundamental research related to the interests of the Ministry.

Example 1 The Ministry of Health, in consultation with the Ministry of Development, might wish to contract with the Institute for Technological Research (IIT) for the development of a soft drink, palatable to Colombian tastes, inexpensive and marketable, which contains a high concentration of protein with a satisfactory distribution of amino acids.

Example 2 The Ministry of Mines and Petroleum might wish to contract jointly with the Institute of Nuclear Affairs and the Institute for Technological Research for the development of a new ore beneficiation process, the studies to make use of radioactive isotopes.

Example 3 The Ministry of Agriculture might wish to contract with the National University for basic studies of certain indigenous species of plant which might be of eventual commercial use.

In certain very special cases it will be desirable, or even necessary, for a Ministry to establish research facilities for the solution of some of its problems. In general, however, this practice should be discouraged and primary effort should be placed upon the development of non-governmental facilities and upon the use of contracting procedures.

## VII. - THE SCIENCE DEVELOPMENT FUND

If it is to be effective, the special fund for science development should be established initially at a level of about 150 million pesos (about US \$ 2 million). It should be increased each year, as the national absorptive capacity for research funds increases, until the annual expenditure of the country on research and experimental development (R & D) amounts to about one percent of the gross national product. This will probably take at least ten years, and perhaps longer.

One of the most important uses of the Science Development Fund should be to encourage and support research and experimental development in the universities. At the present time very little research is being undertaken in the universities, in part because research funds are not available, and in part because faculty members who might undertake research have such heavy teaching loads that there is virtually no time left over which can be devoted to research. The Science Development Fund should be used, in

carefully selected cases, to remedy this situation.

All faculty members in mathematics, science and engineering at both government-supported and private universities in Colombia should be eligible to apply for research support from the Science Development Fund. Applications for grants should include the following items : a) the capital costs of the research including laboratory facilities and equipment; b) the operating costs of the research including supplies and salaries for assistants; c) university overhead charges (amounting to a fixed percentage of the total grant); d) reimbursement to the university of the salary of the research worker for that proportion of his time which is spent on research activities.

Considering the high costs of research, it is clear that not many research grants can be awarded. The Board which oversees the Science Development Fund should establish mechanisms, making use of advisory panels of scientists and others, which will enable grants to be awarded fairly with the first consideration being the effect of the grant upon the development of first-class research in Colombia.

In awarding research grants numerous questions must be asked such as the following :

Has the applicant demonstrated his ability to do research which is up to world standards of scientific excellence ?

Does the applicant show promise of further intellectual growth ?

Does the applicant seem likely to attract and excite students who will undertake research leading to the Ph.D. under the applicants supervision ?

Is the applicant proposing research which has unreasonably high capital costs per research worker ?

Does the applicant's field of inquiry complement other developments in his university ?

It might well develop that in the interest of encouraging excellence in research, a substantial proportion of the grants should be used to encourage Colombian research scientists now working overseas to return home. Another proportion might be used to support the research of foreign scientists of high quality who are willing to work in Colombia for a few years training graduate students in new areas of research.

It is important that research funding have continuity. If the faculty member does not continue to produce important research and train first-class Ph.D.'s, his funds should be cut off. But as long as he is performing well his funding should be continued on as stable a basis as possible. In view of this an initial commitment for research funding will, in most cases, be a long-term commitment.

The Science Development Fund might also be used to encourage the development of research institutions which are not a part of the university system. Research workers should be eligible for grants, provided they have joint appointments with the universities and accept graduate students. Further, industries and private individuals should be encouraged to make contributions for the development of institutional facilities perhaps through a system of matching grants from the Fund.

The Science Development Fund should provide for institutional grants to universities and private organizations promoting science and research. In the cases of universities the grants would in general be capital grants for the creation of new facilities such as science buildings and technical libraries. In the cases of private organizations, grants might be given for such activities as curricula studies, scientific meetings, scientific publications, and educational radio and television shows dealing with scientific subjects.

The field of research which require national priority can only be identified at this time in a most general way. Within the physical and biological sciences, basic and applied, special study groups should be set up to determine the more specific areas which would be applicable to Colombia's development. In this regard, Colombia might establish joint panels of Colombian and foreign scientists to review in depth such fields as Chemistry, Biology, Physics, and Engineering, or areas such as Food Technology, Industrial Research, Natural Resources, and so on. The task of selection would be simplified by an inventory of resources already available because certain areas ready for expansion would be identified.

#### VIII. - RECOMMENDATIONS

The principal recommendations contained in this report consist of the following :

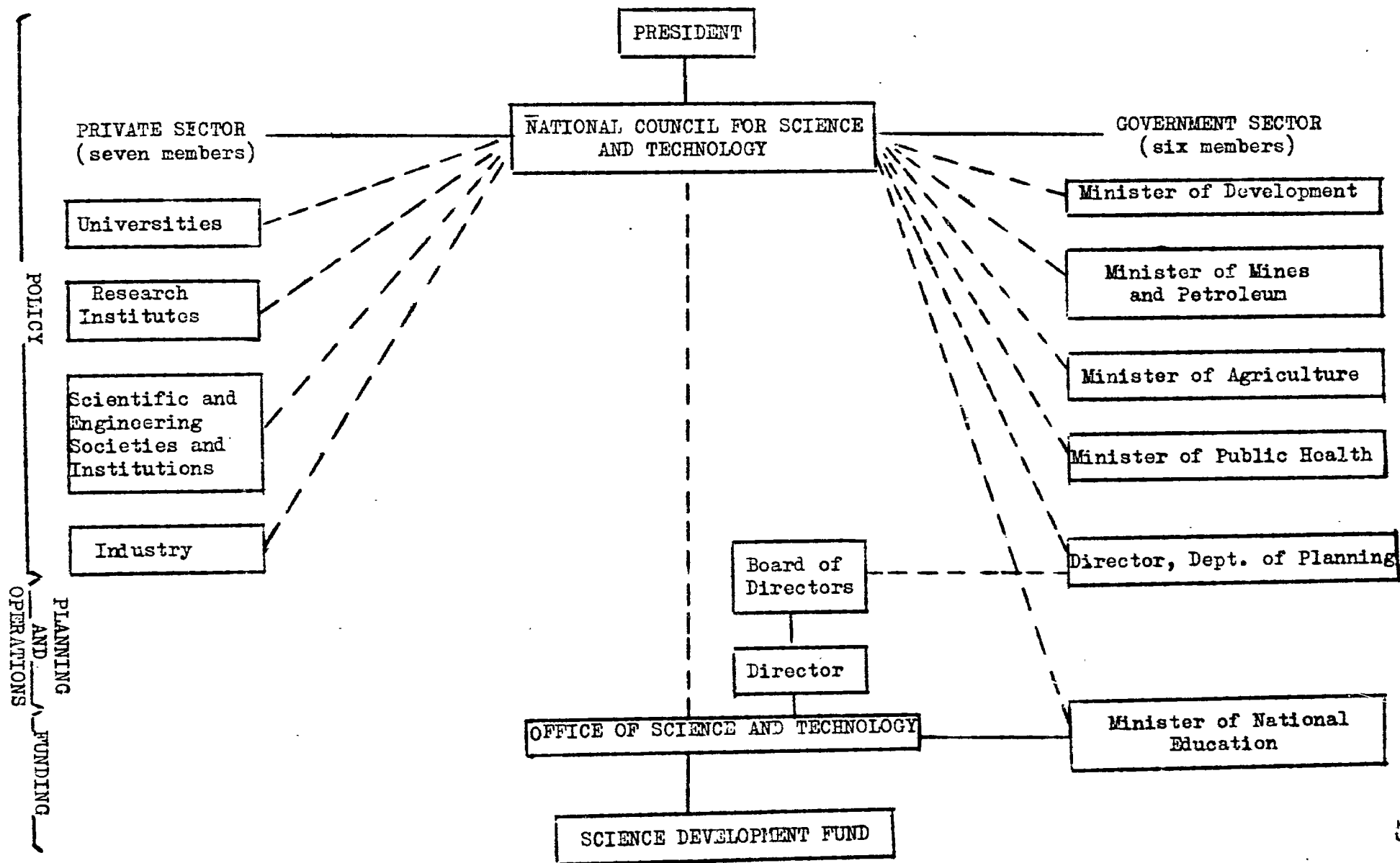
1. A National Council for Science and Technology should be created, attached to the Office of the President of the Republic. This body should formulate basic government policies with respect to creating a Colombian research and development capability.
2. An Office for Science and Technology, an operating agency, should be created within the Colombian government to carry out the science policies which are adopted. This agency should be administratively attached to the Ministry of Education, but should be given effective support and allowed maximum flexibility.
3. A Science Development Fund should be created, initially at a level of about 150 million pesos for the purpose of developing research facilities, supporting research and graduate training, and supporting science development generally. This fund would be administered by the new agency, referred to in Recommendation No.2 above, and would be subject

to the guidance of a Board whose members would be selected from appropriate ministries, industry and the universities.

4. All Ministries which have research and development needs should create mechanisms which will enable them to meet those needs. In order to insure greater coordination of activities already under way, the Ministries should be encouraged to contract with research institutes and universities.

5. The role of universities should be taken into full account in the development of scientific and technological competence. Whenever feasible, research activities should be encouraged and financially supported in universities, judging their qualification solely by departmental or faculty competence, rather than on the merits of the institution as a whole.

6. Joint panels of Colombian and foreign scientists should be established to identify fields of research important to Colombia and establish national priorities.



List of persons visited in Colombia  
by Professor Harrison Brown, June 24 - July 6, 1968

Coordinators for the Minister of Education :

Capitán Alberto Ospina, Director, Foundation for Educational  
Development

Dr. Oliverio Phillips, Consulting Chemical Engineer

Office of the President of the Republic

President Carlos Lleras Restrepo  
Rodrigo Botero, Economic Adviser  
Mr. Pidal, Administrative Assistant

Administrative Department of Planning

Edgar Gutiérrez, Director

Ministries

Gabriel Betancur Mejía, Minister of Education  
Alberto Castaño, Private Secretary to the Minister  
Antonio Alvarez Restrepo, Minister of Development  
Antonio Ordóñez Plaza, Minister of Health  
Carlos Gustavo Arrieta, Minister of Mines  
Andros Jimeno V., Mining Inventory and National Geological  
Service

Higher Education

Colombian Association of Universities

Daniel Henao, Colombian Association of Universities  
Zven Zetbelius, National University of Colombia  
Arturo Ramírez Montufar, Nacional and Colegio Mayor de Nuestra  
Sra. del Rosario  
Juan Herkrath, Dean of Sciences, National University of Colombia  
Hernando Groot, Universidad de Los Andes  
Fernando Galvis Gaitán, Colombian Association of Universities  
Alberto Combariza, Universidad de América  
Antonio Borrero, Universidad Javeriana  
A. Cardona Londoño, Universidad de América  
Augusto Franco, National Coordinator of University Planning  
Joaquín Piñeros, Executive Director, Commission for  
Educational Exchange



Colegio Máximo de las Academias de Colombia

Presidents of the :

Colombian Academy of Exact, Physical and Natural Sciences  
Colombian Academy of History  
Colombian Academy of Jurisprudence  
Colombian Patronage of Arts and Sciences  
Colombian Society of Engineers  
Caro y Cuervo Institute  
National Academy of Medicine

UNESCO, UN

G. Makovsky, Acting Resident Representative, UN Development Programme  
Guillermo Fernández, Unesco Technical Assistance Expert  
Eduardo Nicholson, Chief Technical Adviser on Agricultural  
Education, Unesco  
Alfonso Venegas, Assistant to Mr. Makovsky

Institutes and Individuals

Norton Young, Director Institute of Technological Research  
Gerardo Eusse, Director, Colombian Institute for Advanced Training  
Abroad (ICETEX)  
Hernán Ramírez, Director, Institute of Nuclear Affairs  
Jorge Rodríguez A. and Nester H. Parra, organizers of the proposed  
Institute of Cultural Integration  
Jorge Arias de Groiff, Director, National Astronomical Observatory  
and Treasurer, Colombian Academy of Exact,  
Physical and Natural Sciences

Translation from Spanish

June 1968

DRAFT OF A PROPOSED DECREE TO CREATE A NATIONAL COUNCIL, AN INSTITUTE  
AND A FUND FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY IN COLOMBIA,

prepared by a Group of consultants called together by  
the Minister of Education of the Republic of  
Colombia

The President of the Republic of Colombia, in accordance with his  
legal powers and especially those afforded by Law 65 of 1967.

CONSIDERING :

That Science and Technology are factors indispensable for national  
development;

That the planning of scientific and technological development should  
be integrated with the social and economic development of the country;

That, as a consequence, it is desirable to formulate a national policy  
for science and technology incorporated with the national policy of  
development, which would guide government action and stimulate private  
action toward a continuing and effective development of science and  
technology;

That scientific research, the training of high level personnel and the  
coordination of scientific activities, national and international,  
are essential factors for scientific and technological development;

That national policy in these matters should be formulated at the  
highest level, with wide participation of the scientific and techno-  
logical community of the country, and in concert with agencies which  
administer the more important activities of the country.

DECREES :

CHAPTER I

POLICY FOR SCIENCE AND TECHNOLOGY

- Art. 1. The Government will incorporate the development of science  
and technology in the national development policy of the  
country, and will include in budget allocations the necessary  
amounts to carry out the plans and programs.
- Art. 2. Establish the decade 1970-1980 as the Decade for the  
Scientific and Technological Development of Colombia. The  
lapse from 1968-1970 will be devoted to preparing the  
objectives and program for the Decade.

- Art. 3. The Government, with the advice of the National Council of Science and Technology, described in Chapter II of this Decree, will define the national policy for Science and Technology and determine the goals and objectives in this field.
- Art. 4. To execute the official policy in Science and Technology to obtain the necessary coordination with the various national and international bodies, the Government will depend upon the services of a National Institute of Science and Technology.
- Art. 5. To finance the development of Science and Technology in Colombia, a National Fund for the Development of Science and Technology will be created.
- Art. 6. The Government will organize, when considered appropriate, a National Center for Scientific Research within the structure of the National Institute of Science and Technology taking into account the resources and existing organisms in the country.

## CHAPTER II

### NATIONAL COUNCIL OF SCIENCE AND TECHNOLOGY

- Art. 7. A National Council of Science and Technology is hereby created as an advisory body of the National Government, under the Ministry of Education.
- Art. 8. The National Council of Science and Technology will have the following functions :
- a. Advise the National Government in the formulation of a policy for Science and Technology.
  - b. Pass judgement on plans and projects in the fields of Science and Technology especially on the Decade plan, referred to in Art. 2. of this Decree. Likewise, the Director of the Institute will also be subject to the Council.
  - c. Recommend to the Government plans and programs for investment in the fields of science and technology.
  - d. Pass judgement on the adequate use of public funds in the different programs of basic and applied research, and recommend that they be oriented toward research in universities and specialized institutes whose organization permits their use of available resources.

- e. Advise the National Government in its relations with international organizations in the fields of science and technology.
- f. Provide counsel on the means necessary to assure the optimum use of professionals and experts and on the return of Colombian scientists and engineers abroad.
- g. Study affairs related to the policy of Latin America integration in the fields of science and technology and make pertinent recommendations to the Government.
- h. Consult academies, universities, professional associations and private research centers in order to make full use of all elements of wisdom necessary for the assessment described in this Article, and to listen, at special sessions, to representatives of the various sectors concerned with Science and Technology in the country.
- i. Other objectives set forth by the Government.

Art. 9. The National Council of Science and Technology will consist of the following :

- a. Ministry of Education.
- b. The Head of the Administrative Department of Planning.
- c. The Manager of the Institute of Industrial Development.
- d. The General Director of the Colombian Agricultural Institute (ICA).
- e. The Director of the National Institute of Health.
- f. The Director of the Institute of Nuclear Affairs.
- g. The Director of the National Institute of Science and Technology.
- h. The Director of the Survey of Mines.
- i. A scientist of the Colombian Academies designated by Colegio Maximo of the Academies.
- j. Two representatives from Colombian universities, designated by the Colombian Association of Universities.
- k. Four members of the private sector, named by the President of the Republic, representing the national scientific and technological community.

Art. 10. The Council will work out its by laws, in complete accordance with the rules set forth in this Decree. The by laws of the Council should be approved by the Government through Common Decree.

Art. 11. The Council will meet in ordinary sessions four times a year in its own right, in extraordinary sessions convened by the Chairman, or as may be indicated by its by laws.

- Art. 12. The Council shall name advisory committees, or contract technical advice in accordance with its necessities. In particular, it will have a Permanent Technical Advisory Committee, constituted by seven members of the scientific community and representatives of research centers in the country.
- Art. 13. The members of the Council shall not receive honoraria for time spent at ordinary and extraordinary sessions, except for sessions of the Governing Board of the Institute when they shall receive honoraria as set forth in the Statutes.
- Art. 14. Article 2. of decree number 1637 of 1960 is abolished, concerned with the National Council of Scientific Research, and articles 61 and 62 of the same Decree, as well as all other legal dispositions contrary to that established in the present Decree.

### CHAPTER III

#### NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

- Art. 15. The National Institute of Science and Technology (INCTEC), a decentralized, self-supporting body with administrative autonomy and legal status, is hereby created with headquarters in the city of Bogota.
- Art. 16. The National Institute of Science and Technology will have the following objectives :
- a. Execute plans and programs of scientific and technological development established by the Government;
  - b. Make and maintain up-to-date an inventory of Colombian scientific and technological resources;
  - c. Promote the coordination of governmental research programs within the Government and also with the private sector;
  - d. Maintain close and permanent relations with similar organizations in other countries, in order to benefit from their contributions and experiences;
  - e. Assure that the development of science and technology officially subsidized is carried out in accordance with the goals and objectives of nation-wide plans for development;
  - f. Cooperate with the Ministry of Education (National University Fund) in the development of post-graduate education in the basic sciences which are most directly related to national development;

- g. Undertake to see that the educational system prepares, in quality and quantity at all levels, the professional and technical experts necessary for the development of science and technology;
- h. Promote and seek through all available means the return to Colombia of its scientists and engineers currently residing abroad.
- i. Assure at all times a high quality of research work which would promote, sponsor or undertake to reach similar levels attained by other entities;
- j. Facilitate, through various governmental agencies, the means to assure the extension of research, in order to obtain maximum effectiveness in production by the various economic sectors, with the support of the private sector;
- k. Other objectives which may be assigned by the National Government in relation to the promotion of Science and Technology.

Art. 17. In furtherance of the objectives set forth in the previous Article, the National Institute of Science and Technology will carry out the following fundamental activities :

- a. Advise on the creation or improvement of administrative mechanisms that will permit each governmental sector to start, support, or develop research related to its own objectives;
- b. Advise equally on the creation of mechanisms within the public and private sectors destined to carry out industrial research of importance to the national economy;
- c. Collaborate with the Ministry of Education and the Department of Planning in the preparation of the 10-year plan for scientific and technological development to which Article 2. of this Decree refers;
- d. Establish relations with Academies and private professional associations in order to obtain the benefit of their contributions, recommendations, and criticisms;
- e. Promote with or through the DANE, the compilation of statistics necessary to its work;
- f. Study and assist in all areas related to scientific documentation and its necessary organization and diffusion;
- g. Organize every two years a national Congress on Science and Technology/which will serve as a forum for the public and private sectors for information on plans and projects, for the evaluation of the progress realized, and for the identification of obstacles and the search for solutions;

/which

- h. Organize seminars, work groups and other similar initiatives, with participation of foreign luminaries when this is felt to be useful ;
  - i. Promote the attendance of Colombian delegates at scientific and technological international meetings, whether public or private, and assure them the opportune study of the respective agendas and the study and distribution of the reports or papers that they present. In the same manner, to support through the appropriate organization, meetings of this type the seat of which has been designated in Colombia;
  - j. Cooperate with the Min/Ed in the development of plans, programs of study, and teaching methods in the sciences, especially in mathematics, at the primary and secondary school levels;
  - k. Determine the current level of investment in research, seek out and direct the resources necessary to accelerate the development of research;
  - l. Work so that public and private funds, including those available through external financial assistance, dedicated to scientific research might be increased until they reach 1% of gross national product during the first ten years;
  - m. Establish and administer a National Scientific Research Fund with the objective of financing research projects important to national development and employing personnel of an internationally acceptable scientific standing;
  - n. Finance, in accordance with their development plans and with the cooperation of the universities, agricultural research by the ICA and the programs of other scientific bodies having legal standing;
  - o. Contract with the universities and institutions of a recognized scientific standing, for the development of graduate studies and undergraduate programs in the Human, Social, and Administrative Sciences, Mathematics, Physics, Chemistry, Natural Sciences, and Engineering, for the maintenance of scientific and technological research in accordance with the plans that might have been established in that respect;
  - p. Procure funds for carrying out its objectives.
- Art. 18. The statutes under which the Institute will operate will be established by the Government through ordinary Decree in accordance with the standards of this Decree ;
- Art. 19. The direction of the Institute will be the responsibility of the following agencies :
- a. A governing board
  - b. A director general

- Art. 20. The governing board will be made up of 7 members named thus : 4 members from candidates presented by the national scientific and technological council and three named and removed freely by the President of the Republic. The members of the governing board will have terms of two years and will be eligible for reelection, with the intent that changes be made with a partial objective of assuring continuity;
- Art. 21. The director general will be named by the President of the Republic in accordance with the standards contained in the present decree and will be the legal and social representative of the Institute;
- Art. 22. In order to be director general the person must be Colombian, have a university degree in engineering or science, good administrative experience and, besides, have participated in scientific activities of national and international significance;
- Art. 23. The governing board is empowered to establish the administrative structure of the Institute, develop the personnel complement, and assign functions to it;
- Art. 24. The functions of the governing board are :
- a. Organize the Institute in agreement with the Executive Director;
  - b. Create the necessary positions within the Institute and identify their functions;
  - c. Cooperate with the Institute Director in executing the scientific and technological policy established by the Government;
  - d. Set the corresponding salaries and appropriate expenses reimbursable in accord with established norms for public agencies;
  - e. Name and remove Institute personnel basing such actions on the recommendations of the Executive Director, taking into consideration aptitude, experience and merits; in the same fashion, make the removals that might be necessary, based on reasonable cause;
  - f. Prepare the administrative regulations and submit them to the Government for its approval, suggest modifications in them when they might be necessary;
  - g. Authorize the temporary absences of the Executive Director, and name an Acting Director during those periods;
  - h. Approve the annual and special budgets of the Institute;
  - i. Take any necessary measures, within the limits of the present statute, to further the institutional objectives;



Art. 25. The Functions of the Director General are:

- a. Represent the Institute in all its activities and before national and international authorities and institutions in accordance with the powers and limitations that the statutes confer upon him;
- b. Assure compliance with the statutes, regulations and resolutions of the governing board and the National Council on Science and Technology;
- c. Prepare the budget of income and expenditures of the Institute, submit it to the governing board for approval and execute it after its approval;
- d. Attend the sessions of the National Council on Science and Technology as a permanent member of it.
- e. Organize the internal work and direct administrative, budgetary, and personnel affairs of the institution;
- f. Present to the governing board, for its ratification, candidates for positions in the Institute, basing the nominations on aptitudes, experience, and merits and likewise, dismissals would be subject to the governing board;
- g. Evaluate the results of projects and campaigns, investigate those aspects in which the Institute might carry forward effective actions and take the initiative or lend its cooperation in accordance with the activities enumerated in the Third Article;
- h. Contract, with the approval of the governing board, studies and tasks with individuals and legal associations;
- i. Anything else determined by the Statutes.

Art. 26. The functioning of the National Institute of Science and Technology shall begin 60 days after the publication of this decree;

Art. 27. The State will support the National Scientific Research Fund of the Institute initially with funds amounting to no less than .2% of the gross national product of the year 1967;

Art. 28. The resources of the National Institute of Science and Technology will consist of :

- a. The physical and movable property that might be transferred to it by the nation;
- b. Donations and bequests made to the Institute by individuals and national and international institutions;
- c. Income that it might acquire in the future for services performed or by any other means, in accordance with the goals of the Institute; and
- d. The sums assigned in virtue of the Article.

- Art. 29. The Income of the National Institute of Science and Technology is:
- a. The amounts assigned to it by the Government in the annual budget;
  - b. The income that it might acquire in the future as a result of services provided or by whatever other means, in accordance with the ends of the Institute;
  - c. The financial rights that it may have through utilization of patents resulting from the research carried out with its funds; and
  - d. The balances not (unexpended funds?— incomplete on Spanish version).
- Art. 30. The Institute will prepare a project of incentives and exemptions to protect those persons who might make donations to the universities recognized by the State and to the Research Institutes of recognized scientific quality which might have programs of research approved by the National Council of Science and Technology. In the same fashion, the Institute will prepare a proposal of methods of financing its activities in order to supplement its budget;
- Art. 31. The overseeing of official funds that the National Institute of Science and Technology handles will be in the hands of the General Comptroller of the Republic;
- Art. 32. Evaluation of the activities of the Institute will be performed by the Minister of Education.

RELACIONES ENTRE EL MINISTERIO DE EDUCACION, EL CONSEJO NACIONAL  
DE CIENCIA Y TECNOLOGIA Y EL INSTITUTO

