

ECONOMIC COMMISSION FOR LATIN AMERICA

PRELIMINARY STUDY OF NEEDS FOR  
TECHNICAL ASSISTANCE IN LATIN AMERICA

Introduction.

The Resolution on Technical Assistance (Document E/CN.12/75) adopted by the First Session provides in Section (a) that

"the Executive Secretary shall undertake a preliminary study of the needs of Latin American countries for technical and administrative personnel, means and facilities, and the present availability including facilities for technical training; further, he shall transmit to member countries all information concerning existing facilities for training and exchange of staff."

The resolution further directs the Executive Secretary to prepare and transmit to the member countries lists of organizations, including international, national and private which might render technical assistance to the Latin American countries or have facilities for training and for exchange of staff.

There are several studies and reports which present valuable information on various aspects of this problem.

- a) The United Nations Department of Economic Affairs has published a booklet on "Technical Assistance for Economic Development", which describes the kinds of assistance available from the United Nations and the Specialized Agencies. 1/
- b) The Eighth Session of the Economic and Social Council adopted a resolution (see document E/1216) requesting the Secretary-General to prepare a report for the Ninth Council Session, setting forth "a comprehensive plan for

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1/ Copies of this report may be had by delegates upon request to the Secretariat.

an expanded co-operative programme of technical assistance for economic development through the United Nations and its specialized agencies, paying due attention to questions of a social nature which directly condition economic development".

c) At the request of the Executive Secretary of this Commission, the International Labour Office is making a survey of needs and facilities for training technical personnel in Latin America. <sup>1/</sup>

d) A Directory of academies, universities, scientific societies and institutions of Latin America is being prepared by the Inter-American Scientific Publications (231 Lombury Street, Boston, Mass., U.S.A.). The publication of this Directory is made possible with the financial help of the Pan-American Union.

In preparing this preliminary report every effort has been made to supplement rather than to duplicate the work of other United Nations organs and international or national agencies in this field. The report is divided into two main parts: part one discusses in general terms the nature of the problem and suggests various means for its solution — it describes the technical needs in particular fields, the means of securing technical personnel, and some of the available sources within Latin America; part two presents specific needs for technical assistance on certain projects which are now under way or planned for within the near future. The statement of these needs is based upon answers to a questionnaire sent out by the Executive Secretary to the Latin

1/ See Pro rease Report of the Expert of the International Labour Office on inquiries conducted into Vocational and Technical Training Requirements and Facilities in Latin America. (Document E/CN.12/80).

American governments on 24 January 1949 (see annex 1 for text of questionnaire). Answers were received from the governments of Bolivia, Chile, Ecuador, Guatemala, Panama and Venezuela.

The primary objective of technical assistance is to help raise the standard of living. It is difficult to generalize about the status of technology in Latin America since all stages of economic and social development may be found within nearly all the countries. Yet it may be observed that productivity is relatively low everywhere — in many areas it is extremely low, and even in the more advanced communities the per capita output of a large sector of the population is so small that it is directly responsible for the generally depressed standard of living. The analysis presented in the Economic Survey 1/ indicates that this is the basic economic problem of the region, and that only through the increased use of modern equipment and techniques can agriculture, industry, and the utilities be made to produce substantially more goods and services. 2/

No attempt is made in this report to relate specific technical needs to economic and sociological factors which profoundly influence technological development. However, it might be well to point out that a serious effort to solve this problem cannot ignore these factors. Social traditions and customs,

1/ Preliminary Draft of the Economic Survey of Latin America.  
United Nations Economic Commission for Latin America,  
(Document E/CN.12/C2)

2/ The problem may be illustrated in simple terms by citing a specific situation. There is a limestone quarry in one of the Latin American countries which employs 200 men whose total average daily output is 200 tons of limestone. Another quarry of comparable size located in the middle west of the United States is producing 200 tons of limestone every two hours with four men using machinery. Although the daily pay of the 200 labourers is barely enough for subsistence, their total wages per day are almost twice that of the four men who do their work with machines.

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general education and cultural attitudes determine to a considerable degree the desire and ability of a people to learn and to develop new techniques. In other words, it is not simply a problem of securing outside assistance or of training technicians, but also one of implanting through all layers of society new psychological attitudes that are associated with the efficient use of the machine. A farmer may be taught to drive a tractor but his productive capacity will not attain the desired level until it becomes second nature for him to take care of his machine and extend its uses. He is then acquiring a habit of mind which makes him receptive to the application of scientific techniques in every phase of his work — improved seeds and breeds, fertilizer, crop rotation, sound marketing practices, etc.

The urban worker perhaps learns more readily the skills of the factory, transport and communications. Nevertheless, his output may continue to be comparatively low if he does not grow up in an environment which rewards and gives social recognition to craftsmanship. Thus while the worker, as well as the farmer, under the supervision and tutelage of the professionally trained technician acquires the habit of scientific application, he becomes more and more imbued with the pride of workmanship which is an essential element in increasing productive capacity. For the purpose of raising the standard of living, it should be emphasized that increase in quality is as much an increase in production as is increase in quantity.

The ability of people to adapt themselves to new techniques will vary greatly from community to community; in certain situations it may be better to build upon present skills and improve existing techniques as a step towards more complete mechanization.

/The present

The present stage of economic development may have either a deterring or a stimulating effect. The economic situation may be such that it is practically impossible for a community to utilize fully its own technical resources. The primary lack may be of capital or natural resources, or there may be an uneconomic utilization of available resources and capital. It is not uncommon for Latin American specialists to go into work other than that for which they have spent years in training because of their inability to find professional opportunities. As a community moves forward it is not possible to know whether capital growth or technological development is cause or effect. Over a period of time there will be a reciprocal relationship between the two. An increase in machinery, equipment and laboratories provides an incentive for more and better training, which in turn makes possible an extended use of modern techniques and equipment.

The broad statement of interplay of forces presented above, suggests, first, that it is not enough to train technicians and skilled workers at the centre of economic activity — the entire population must be brought into the ambient of the technological process — and, second, that social traditions and customs as well as lack of capital and natural resources may retard technical progress.

PART I.

I

The Need for Planning and for Basic Studies of  
Technological Problems.

It is generally agreed that Latin America needs technical assistance. Technology in the form of specialists and knowledge is being imported more and more - usually along with machinery and equipment requiring new techniques. While such assistance has been and will undoubtedly continue to be an important element in the economic development of Latin America, it is nevertheless piece-meal and is not closely integrated with other sectors of industry and agriculture. The piece-meal character of imported techniques is manifest at both the local (factory and farm) and national levels.

Engineers are often brought in to assist in setting up a plant while weaknesses in subsequent operations are allowed to develop due to lack of well trained technicians. Thus the quality and efficiency of production may be low because of the failure to apply proper techniques at every stage of the production process. In other situations consultants are employed to advise on specific problems or supervise operations at a certain stage of processing, but other stages may continue to be operated by "rule-of-thumb" methods.

The core of the problem is the need for rigid control of the production process:

"One of the technical functions which industrialized nations consider indispensable is the daily laboratory control of its products as well as its purchases. A modern plant, even though it be a small one, insists upon daily, hourly, or perhaps even continuous laboratory examination of its product. Samples are taken at regular intervals and subjected to whatever chemical or physical tests may be necessary to

/determine

determine whether the product continues to meet a closely-drawn set of specifications for uniformity. Any deviation from these specifications calls for rejection of that portion of the day's output until adjustments and corrections can be made. "

"In modern purchasing of raw materials, it is customary to sample and analyze or test each shipment to be sure that the material supplied conforms to agreed specifications. Material which is below standard may be refused. If the low grade shipment is of a kind of material which can be improved, perhaps by purification, it may be accepted but at a lower price. Some materials such as coal are often purchased under a contract which provides that the price paid for each carload will be calculated on the basis of the laboratory analysis. Thus the supplier will make more profit by furnishing a good grade, with a double penalty for very poor shipments, or the purchaser may reserve the right of absolute refusal of any shipments whose quality falls below a certain minimum". <sup>1/</sup>

Industries established either by foreign corporations or with funds loaned by international or foreign agencies usually provide adequate technical personnel to control all stages of operations in a particular plant. It is evident, however, that industrialization in most of the countries will have to be carried forward by local entrepreneurs who must depend largely upon the technical resources of the community. Any assistance which they may receive would, therefore, be indirectly through the loan of personnel and the improvement of training and research facilities which may be effected with outside help.

Despite the fact that agriculture is an older and more wide-spread activity in the region than is industry, and that, as such, conditions would normally be expected to be better, the piece-meal character of applied techniques is ever present in this field also. Examples might be cited where an engineer has been called in to set up a new coffee mill but actual operation is left in the hands of unskilled personnel; or highly  
/ trained specialists

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<sup>1/</sup> Technological and Economic Survey of Argentine Industries,  
Armour Research Foundation. Page 349.

trained specialists are directing the operation of a sugar cane mill while in the field the varieties grown are still not developed for high yields and resistance to disease. In many instances the improvement of herds by the introduction of pure breeds has not given the expected results because parallel action was not taken in the improvement of feed and feeding methods.

Although technical efficiency produces immediate and tangible results through the individual industrial or agricultural unit, the interdependence of these units constitutes the foundation on which real progress can be made. The advantages of improved methods in a particular plant (or farm) or even in an entire industry may be largely lost if the economic units which serve it or are served by it are inefficient and backward. The efficient industry is penalized in two ways. First of all, the raw material or semi-finished products which it requires may be costly and of inferior quality. This may also be true of certain equipment which it must purchase locally, and of utilities such as power, transportation and communications. Secondly, its volume of output will be governed by the size of the market. An average low output for a community will mean low purchasing power and thereby limit possibilities of expansion of the efficient industry. Furthermore, all economic activities draw on the reservoir of technical manpower, knowledge and experience which is built up with a general advance in the community.

However, such an advance may be greatly accelerated by national plans which could direct technical assistance into the fields where the need is most urgent. National planning for technological development might also provide a method for

/ securing a more



securing a more balanced development both as between individual industries and as among industry, agriculture, mining, power, sanitation and health, transportation and communications.

Basic industrial research is urgently needed - especially in the more industrially advanced countries of Latin America - and should also be one of the primary objectives of national planning. Such research facilities might also be available to neighboring countries which have not yet been able to establish their own. While governments, no doubt, should take the initiative in establishing research laboratories, private industry might well support government institutes with funds as well as set up its own laboratories for research. In any case, research would seem to be a field of activity in which outside technical assistance could be most helpful. 1/

Agriculture, in contrast with industry, is as a rule a one-man enterprise and cannot generally afford to be otherwise. Under these conditions the farmer is helpless in matters of technical improvement, and research on a national basis becomes of paramount importance. On the other hand, each of the farmers who will constitute the backbone of a modernized Latin American agriculture will have to be able to direct properly his entire production process. Here is the basis of the necessity for properly financed, staffed and equipped extension services. One of the main problems pointed out by the ECLA/FAO Joint Working Party is the lack of research and extension services in Latin America and the fact that any plan for increased agricultural production will have to be based primarily on

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1/ The specific fields in which research is needed both for industry and agriculture in Latin America are indicated in the following section.

sound research and extension programmes.<sup>1/</sup>

A technical assistance programme based upon national planning should have as its starting point an accurate knowledge of existing resources - both natural and technical.

The natural resources of Latin America are only partially known. It will be difficult for any of the countries to evolve land-use programmes until scientific studies of soil, climate and topography are completed. In this connection, analogue studies of climate and soil which could be made at comparatively low cost would be most useful to begin with. By and large the timber resources have not been surveyed and frequently have been wastefully exploited. The same is true of fisheries. Although the mineral resources of Latin America constitute an important element in its foreign trade, and supply some of the necessary raw materials for industrial development, the fact remains that there is a great need to make scientific surveys and evaluate economically the mineral and petroleum resources of the region and to determine the best methods for their exploitation.

Perhaps even more important is the necessity for each country to assess precisely the present status of technology in all fields of economic activity. This involves detailed and exhaustive studies of each industry which would make known not only the resources but also the basic technical problems and needs of the community. Thus in a certain sense it may be said that the primary need is for technical assistance to

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<sup>1/</sup> For further details on this problem see ECLA/FAO Joint Working Party Preliminary Report on Agricultural Requisites. (Document E/CN.12/83).

determine what are the technical needs of Latin America.

To sum up, the government themselves should consider the advisability of formulating national plans to encourage technological development. This would enable them to utilize more effectively any technical assistance, which might be available to them.

The technical resources and needs of the Latin American countries should be studied and inventoried. The economic areas in which such studies may be needed are suggested in the next section of this report.

It must be realized that technological inventories and formulation of plans require relatively long periods of time. However, in the meantime governments might continue to make known through international organizations their technical needs for specific projects which are now under way or planned for in the near future. Part III of this report describes briefly certain projects for which technical assistance is now required.

## II.

### Economic Areas in which Technical Assistance may be Required <sup>1/</sup>

This section deals briefly with the principal technical needs of Latin America — in other words, the list from which such a selection must eventually be made by each country in view of its own circumstances. Thirty-nine major categories are given, with fifty-one subdivisions, all grouped under seven main headings: Agricultural Improvement, Improvement of Existing Industries, Establishment of New Industries, Development of Natural Resources, Transportation and Communications, Health and Sanitation, and Technical Education.

#### Agricultural Improvement.

- a) Communication with the farmer. One of the most urgent agricultural needs of Latin America is a method of conveying information to the individual farmer. Technical assistance and recommendations for improved agricultural methods are virtually useless if the details do not reach the man with the plough. Admittedly this problem is more difficult in countries where illiteracy is high; but if the farmer cannot be reached by printed matter, he will have to be reached by demonstrations and personal contact (which are in reality more effective) or by some other means.
- b) Better use of land now cultivated. The correct methods of farming are no more difficult than the wrong methods. Much of the farm land in Latin America is capable of producing a much higher yield of food crops, once it is restored to fertility and thereafter worked by proven scientific methods.

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<sup>1/</sup> Materials in Sections II, III and IV of Part I are taken from a special report prepared by the Armour Research Foundation for the Economic Commission for Latin America.

Land which has been planted to corn every year for hundreds of years cannot be expected to yield very much, and neither hybrid seed nor machinery will help in such cases. The basic principles of crop rotation, fallowing, soil testing, fertilization, liming, etc., must be applied.

c) Mechanization. All Latin American countries are aware that greater mechanization of their agriculture is a necessary factor in their economic development. Industrialization and the growth of urban population demand greater crop production from each farmer, and this in turn demands mechanical help to extend the labour of the individual. Tractors and improved implements and their proper use are needed for the most advanced use of the soil and efficient harvesting and handling of the crops, as well as for land reclamation. Effective mechanization cannot be achieved merely by the manufacture or importation of equipment, however. In all cases mechanization must be accompanied by sound principles of farming. In many countries the advantages of mechanical methods will have to be demonstrated to the farmer, and the problem of the farmer's capital investment will have to be overcome.

d) Soil conservation and land reclamation. Well-known studies have pointed out that destructive methods of farming and timber-cutting have already caused considerable damage to Latin America's productive land. This land is not irretrievably lost, but it will be unless immediate physical action is taken. Such measures as reforestation, contour ploughing and cover crops are needed to conserve topsoil from further unnecessary loss, while irrigation, soil-building and fertilization must be used to put lands back into service.

/e) Plant disease

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- e) Plant disease and insect control. 1/ Intensified research and combative programmes against destructive pests and plant diseases are needed in every Latin American country. Coordinated international action is also desirable.
- f) Crop storage methods. 2/ Because of insufficient or improper storage facilities, large percentages of Latin American food and industrial crops are lost each year through the destructive action of pests and weather. Some countries have built additional terminal storage capacity, but more often the major need is for proper storage at or near the farm. Lack of roads and transportation from the producing areas intensifies this need in many of the countries. Some of the existing storage facilities in the tropics have been designed without proper regard for the climatic conditions, and are themselves the cause of some loss.
- g) Animal disease. The ravages of aftosa and other animal diseases illustrate the necessity for greater cooperative research and organized preventive measures before the event. The cost of research to prevent a disease is often much less than the cost of controlling a single epidemic once it has started.
- h) Animal husbandry. In most of the Latin American countries there is as much need for technical improvement in livestock practices as in the use of the land. Greater work is necessary in animal breeding for adaptation to the conditions of climate, terrain and prevalent disease, and for higher yields of meat, milk, wool, etc. Improved methods of animal care are required; otherwise the importation of high-bred

1/ See Chapter IV of ECLA/FAO Joint Working Party Report on Agricultural Requisites. (Document E/CN.12/83).

2/ See Chapter V of same report.

stock may not yield the desired results.

Latin American dairy methods need to be improved.

Tuberculosis, undulant fever, typhoid and other diseases which can be transmitted to man through milk are common.

Sanitary conditions in the handling of milk are not found on many of the dairy farms. Pasteurization is not always properly controlled. Milk distribution needs technical policing. And finally, there is not sufficient development of the secondary industries based upon dairy products.

i) Agricultural Experiment Stations. A basic technical need of

each Latin American country is a more effective system of agricultural experiment stations, staffed with fully competent research personnel. These are needed for local studies of plant growth in relation to soils, climate, fertilization, etc., and for the development of hybrids, better-yielding varieties and new crops for diversification.

Such stations also serve in such matters as seed testing, weather records, advice to local farmers, and the preparation of farm bulletins. Each station should operate a series of small, well-distributed demonstration plots, placed where the farmers can see them.

A limited number of excellent experiment stations are in operation in Latin America which could be enlarged and serve as models for the establishment of others.

Improvement of Existing Industries.

a) Technical modernization. There are few industrial plants in Latin America that do not need modernization of methods.

New machinery is not always the answer; very often the important needs are reorganization of flow-lines, closer specifications for raw materials, additional training

/courses

courses for workers, technical process control and final product inspection. These are factors in achieving greater economy of production and in making products of uniform competitive quality.

b) Research to improve methods, quality and raw materials.

Latin American industry must undertake its share of research for constant improvement in methods of production, improved products, and the adaptation of new and more advantageous raw materials.

c) Research for waste recovery and profitable by-products. The

field of by-products in Latin American industries has hardly been touched. Very recently, research in one such industry uncovered a by-product whose total value almost equalled that of the main product. It is well known that the meat-packing industry in the industrialized countries utilizes fully the by-products; a much greater utilization of by-products in Latin America could be achieved with modern methods.

d) Diversification within individual industries. A one-product

industrial plant is subject to the same trouble that besets a country of monoculture: it is at the mercy of the market for that one product. If a one-product industry is the main support of a community, a drop in business is a disaster. Very often a technical study will show that the existing capital equipment of a factory and the same skills of its personnel can be used to make a second or third product which will smooth the total output curve and give a more satisfactory return on the plant investment.

e) Trouble-shooting. The shortage of technical personnel in

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#### Improvement of Existing Industries.

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research, is felt by almost all industries in the frequent delays and shut-downs caused by operating troubles, defective materials, etc. Trouble-shooting is the job of emergency engineers or research men who can quickly discover the reason for such difficulties and correct them.

- f) Practical operating pamphlets for small industries. In most Latin American countries there are certain industries of national importance which are made up of a great many small private units. These have a special technical need which is difficult to meet, because the units are too small to hire well-trained technologists. Often their only trouble is that they are not familiar with simple improvements in technique which they could easily apply.

One solution to this problem is the preparation of pamphlets outlining good operating techniques, with reasons for each step, special precautions, simplified tests, etc. Such pamphlets could be prepared by qualified experts, adapted to the conditions of the country and of the industry, and reduced to clear, non-technical language.

#### Establishment of New Industries.

- a) Technical and economic selection of feasible industries. The proper selection of new industries which can stand on their own feet is a determining factor in a sound programme of industrialization. The basis for such selection is a technological inventory, accompanied by all possible studies of natural resources.

- b) Research to create new industries from available materials.

Applied research of this kind is needed throughout Latin America. Many available raw materials are capable of

modification to meet the requirements of known processes. New uses can be found for existing materials or products, and these can form the basis of entirely new industries. New markets can be found for products of indigenous wild plants, which then become important agricultural crops. Processes can be developed for the industrialization of national products now handled only by crude and unsatisfactory methods.

- c) Research or advice on by-products and wastes. The possibility of utilizing the wastes and by-products from a contemplated new industry is sometimes the deciding factor whether an industry should be established.
- d) Selection, or evaluation of applicability, of known processes. Experienced technical assistance is needed in choosing which of several available processes will be the best adapted to the existing conditions in a new industry. Similarly, such assistance is required in many cases to indicate whether a certain process can function with the available raw materials, and therefore whether it should be established at all.
- e) Technico-economic studies for plant location. In much of Latin America the available transportation, power, water, labour supply, etc., are such that a very careful technico-economic study is necessary to determine where a new industry should be located for successful operation. Alternative supplies of raw materials must be examined beforehand for traces of unsuspected impurities which might require changes in the process in one location or another.
- f) Engineering and construction of plants. Specialized engineering skills are needed for modern design, construction and installation of new industrial plants. Qualified advice  
/on installations

- on installations will avoid the purchase of out-dated equipment, as has happened in numerous cases in Latin America.
- g) Technical and skilled-worker training. No new industry should be established without adequate provision for training of personnel in the necessary skills and in technical control.
- h) Design and installation of control laboratories. A new industry usually must provide for process control and product inspection in advance, prior to the completion of personnel training programmes. Technical assistance may be needed at this stage to insure testing facilities that will be adequate for the result desired.
- i) Technical review of projects offered for financing. In all Latin American countries undergoing industrialization, there is urgent need for an experienced, well-rounded, organized technical service to which projects can be referred for confidential opinion, especially when they involve domestic loan applications for new industrial processes. By this method it is possible to eliminate many projects which can be shown to be unsound or untested.

#### Development of Natural Resources.

Studies and statistical compilations on the natural resources of Latin America are constantly being made. Practical technical assistance is needed for the one type of study of natural resources which has hardly been touched to date, and the only type that means anything: that which involves actual inspection and measurement of the resources themselves. This must be followed by studies and laboratory research to determine their actual usefulness and best methods of

/development.

development. The specific technical needs include the following:

a) Minerals. Lacking geological exploration, a large part of the mining in Latin America is done only at outcroppings which are not necessarily the best deposits. Systematic, long-range geological surveys should be made in the field, supplemented by test-borings and the new rapid aerial magnetic methods of locating ore-bodies. Furthermore, recent advances in chemistry, metallurgy and radioactivity have created demands for minerals previously not considered important.

Laboratory and pilot plant studies are required for beneficiation, concentration and processing of ores. Specialists in mining engineering are needed for final industrialization on a safe and sound basis.

b) Forests and forest products. Scientific area-sampling methods, with actual counting of trees and botanical identification of species, should form the basis of a census of quantity, types and distribution of forest resources in each country. The fact that many Latin American forests are "mixed stands" makes this even more important. Technical assistance on conservation with planned utilization is needed, and systematic reforestation must be started in many regions. Lumbering methods need a complete modernization to reduce waste and to make the finished lumber more usable. Laboratory research is needed to make available the unquestionable wealth of valuable extracts, waxes, oils, tanning and similar products now hidden in these forests, especially in the equatorial belt. Pilot plant studies on paper and cellulose processes should be conducted to discover new types of raw materials for these commodities.

/c) Fisheries.

c) Fisheries. <sup>1/</sup> For the development of commercial fishing and its derived industries the first necessary step is a fish population census to learn the kinds, quantities and distribution of fish available in various areas. This is a standard procedure that has been undertaken in some regions and should be extended. Engineering aid is needed for the establishment of canning and oil-extraction plants and adequate refrigeration facilities. Studies are needed on the recovery and utilization of by-products such as special fish-liver oils, vitamins, glues, proteins, feed, fertilizer, etc.

d) Fuels. While a few Latin American countries have become important producers of fuel, there are no doubt other countries which could explore and develop fuel resources.

Modern geophysical prospecting for new petroleum pools is needed in many unexplored areas. It is reasonable to believe that there are numerous undiscovered sources of petroleum and natural gas. Systematic geological surveys are required for discovery and estimation of coal reserves. Assistance in mining technology is clearly needed for better extraction of coal, both in present workings and in newly discovered deposits.

The establishment of reliable fuel analytical laboratories is a requisite for any successful development of solid fuel resources. Laboratory tests and research are needed to reduce the ash and sulphur content of most of the known Latin American coals, and to determine the best method and equipment for making coke and semi-coke from these coals.

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<sup>1/</sup> See Chapter VII of ECLA/FAO Working Party Report on Agricultural Requisites. (Document E/CN.12/83).

Full-scale research is also needed on the proper industrial combustion of certain unusual fuels such as agricultural products which are often used in a number of these countries.

- e) Hydro-electric power and water supply. Field engineering surveys of year-around stream flow and hydro-electric potential are first steps in the planned development of power from this source. These should be related to estimated future regional power demands based upon realistic technical opinion of expected industrial, urban and rural development. National or regional power network calculations are needed for planned development of electrical networks to balance generating capacity, loads, losses, etc., and to reduce industrial stoppages now often caused by temporary local power shortages. Uniform standards of frequency and voltage are needed for this, and the longer they are delayed the more costly they will become.

Experienced and specialized technical assistance should be used in the consideration of large multi-purpose projects similar to the Tennessee Valley and Bonneville developments in the United States. Elaborate planning and cross-checking are required on such projects to reach a proper balance between seasonal water supplies, irrigation and power needs, etc.

Competent impartial technical reviews and reports on the economic need and technical feasibility of newly proposed hydro-electric projects are urgently needed. Engineering assistance is required in many cases for the design and construction of the projected works.



Transportation and Communication.

Lack of adequate lines of transportation and communication is retarding economic development of certain Latin American countries perhaps as much as any other single factor. This results in idle resources, uneconomic location of industries, inefficient agriculture and maldistribution of food supplies. Not even educational programmes can be effective until there is better communication.

- a) Highways and secondary roads. Technical work is needed in the planning of road systems. These should be designed not only to join major cities and resorts, but to enable farmers to get their crops to market and to open new undeveloped areas. Planning must be based on technological inventories and resource surveys, and not solely on the work of highway experts. The latter are urgently needed, however, for improved layout, design and construction methods and for better systems of road maintenance. Closer work between technical and financial specialists can assist in developing methods of financing new road-building programmes.
- b) Railroads. Much of what is said about highways above applies equally to railroad development. New lines require not only expert engineering help in route surveys, but also parallel impartial studies of future revenue potential. There must be compromise between economic desirability and engineering feasibility if new railroad projects are to be self-liquidating.

Existing Latin American railroads need modernization and technical improvement in operation and maintenance, as well as the addition of refrigeration facilities. Efficient national and international railway service demands standardization of track gauges to eliminate costly delays

/and trans-shipments.

and trans-shipments. Several Latin American countries are operating three or four different gauges.

- c) Aviation. National and international commercial aviation is now developing rapidly throughout Latin America. Much expert technical help has already been obtained, but in some cases improvement is needed in traffic control and airport operation. Further specialized assistance in weather reporting, radio aids to navigation, and flight training will continue to be necessary. The new faster and heavier equipment calls for engineering help in airport re-design, construction and maintenance.
- d) Waterways. Some countries may benefit from surveys of their navigable waterways, in relation to regional transportation requirements by various means. As a second step, the dredging of rivers and harbours, construction of port works, canals, etc., may call for specialized engineering help.
- e) Telephone, telegraph and postal systems. While it is true that these facilities are improving, some of the Latin American countries are in great need of experienced technical assistance in the extension and operation of their internal wire and postal services.

#### Health and Sanitation.

The productivity of a country can be no better than the general health of its people. Aside from the desirability of good health for its own sake, some of the richest regions of Latin America cannot be developed until they are cleared of malaria, yellow fever, etc. Excellent work of this kind is going forward and should be intensified in every possible way.

Meanwhile nationwide engineering programmes are needed to create local pure water supplies and proper disposal of sewage

/and garbage.

and garbage. Local sanitary regulations on foods (especially milk and meat) must be enforced. In industry, specialists on industrial safety and health are needed to reduce hazards and increase production.

Technical Education.

This subject is treated more fully in Section III of Part I of this report. It may be said here that Latin America needs more specialized technical help in the following:

- a) University courses. Detailed studies are needed to modernize the technical departments of universities for practical technical training on a level equivalent to that of the more highly developed countries.
- b) University laboratories. Instructional laboratories must be designed and installed to meet the needs of a).
- c) Professors. Under present conditions a part of the instructional staff needed for a) will have to be obtained either by direct importation or by sending professors to other countries for additional training in recent advances in applied industrial technology. Salaries of professors may have to be raised in order to attract the most able men.
- d) Agricultural and trade schools. Better facilities are needed for the training of large numbers of skilled workers and agricultural technologists of intermediate levels.
- e) Technical translations. Because their sale at present is usually not large enough to make them self-supporting, most of the available Spanish and Portuguese translations of standard technical textbooks are published with the help of subsidies from private foundations and governmental agencies. For this reason the number of such books is

/limited.

limited. Further financial support by the Latin American countries, their more prosperous private industries and citizens, and perhaps international organizations, would make a greater number of these books available to Latin American technical students.

## III

Technical Personnel and Four Ways to Obtain It.

Technical personnel comes in various types and grades. There are skilled workers and technicians, engineers and technologists for routine practice, engineers for design and construction, research engineers and scientists, etc. Some of these groups need only manual technique; others require chiefly attention to minute detail; still others demand natural inquisitiveness, imagination and perseverance. Because two men are both organic chemists does not necessarily mean that they are interchangeable; one might be an excellent routine analyst with no imagination for research, and the other a research man without any desire for routine analytical work. For each Latin American country the real questions to be answered are:

- a) What types of technical personnel are needed?
- b) How can they be obtained, both now and in the future?

An under-developed country can obtain more technically trained people in at least four ways:

- 1) Temporary Importation of Specialized Personnel and Technical Organizations from Another Country.

This, if properly handled, is the most satisfactory way for an under-developed country to obtain immediate technical assistance. In the present stage of development every Latin American country needs this type of importation of technology while building its own source of supply for the future.

Like any imported commodity or service, its availability to the importing country at any time is of course limited by the extent to which the exporting countries are willing and able to export it. None of the highly developed economies

/ would have achieved

would have achieved and maintained their development without their production and use of extensive technical personnel, and a great deal of it is constantly needed at home. Such countries even import it themselves at times.

In a number of Latin American countries the central banks, national development corporations, various governmental agencies, and similar public or semi-public institutions are already importing foreign technologists under contract for special purposes. The number is small, but when they have been wisely chosen the results have been impressive to date. Among private industries in Latin America, those having appreciable amounts of capital from other industrially developed countries have almost always imported the necessary technical specialists to insure both the desired production and adequate local training. In the same areas, industries of purely domestic capital have done this sometimes; but it must be admitted that in this latter group the practice is relatively rare, and many have no technical personnel of any kind.

2) Allowing or Encouraging Immigration.

The immigration policy of each nation must be governed by a great many factors, and cannot be considered solely from the standpoint of technological needs. Generally speaking, the Latin American countries which in the past have had substantial immigration from more highly developed areas have enjoyed visible progress from it. Similar results may come from a number of more recent experiments of this kind, although it is too early to make positive observations.

Since the more economically developed countries contain a higher percentage of technically trained people as well as

/skilled workers

skilled workers, and since the agricultural techniques in those countries are also generally more advanced, it seems reasonable to expect that immigration of their people would bring to an under-developed nation an increase in technology. This would certainly be the case if the immigrants were a true cross-section of the populations from which they came, and even more if the immigrants were subjected to a process of vocational and educational selection.

3) Sending Students and Experienced Technicians to the More Highly Developed Countries for Technical Training.

Although in Latin America the principal reason for utilizing this method of technical training at present is the lack of adequate training facilities at home, the need for it will always exist. No country ever acquires a monopoly of advanced technical education. The countries of the highest technical development continue to send students to other countries, in order to benefit from the technological progress of others as well as from their own. At the same time, such interchange adds greatly to international understanding in all fields.

Latin America already sends a good number of students to the universities of the United States, Canada and elsewhere, and should send as many as possible. Also to be encouraged is the practice of sending industrial personnel for periods of practical training in comparable industrial plants in the more highly developed countries, when this can be arranged. Costs in either case may be borne by the students themselves, by Latin American industrial companies, or through fellowships granted by international organizations, governments, or private institutions.

As good as it is, however, this method of training also

/has its limitations

has its limitations. To rely upon it solely is to continue ultimate dependence upon the more highly developed countries.

In the sending of Latin American technical students to foreign countries for study, there are several practices which could be improved. The most important of these is that they should be sent earlier, and for longer periods. Too frequently such students are granted fellowships in foreign universities for only one or two years, and are expected to return to their home lands as fully trained in the foreign technology as are their schoolmates who have devoted from four to eight years in the same work. More often than not they return with a superficial training in their specialities, inadequate to cope with the really basic and practical technical problems of an under-developed country. Their one or two years of foreign study may often be for post-graduate work, after having completed a course in a Latin American university; but until there is a marked increase in emphasis upon applied technology in Latin American universities, such students will not be in a position to realize the full benefits of this foreign post-graduate work.

Perhaps more attention should be paid to the selection of technicians, who have already had practical experience, for further study and observation abroad. If a technician is chosen who already has a position in agriculture, industry, finance, transportation, etc., to which it is understood that he will return, he would be able to adapt his learning abroad to the specific needs of his job. Thus there would be a reasonable certainty that the results of his study abroad will in fact add its measure towards the economic development of the country. Whether the technician should go abroad to study at a university,

/technical school,



technical school, private industry, institute, etc., or would go to observe technical developments in his special field, would depend on the particular problems involved and on the training and experience of the technician.

In selecting fields of study for which fellowships are to be offered, much depends upon the funds available. With unlimited funds, a free choice can be offered and all fields encouraged. Insofar as funds are limited, it might be well to emphasize the fields of immediate application such as agricultural research, industrial chemistry, and the various branches of engineering. Furthermore, certain technical schools in the industrialized countries have a plan of education which gives the student training not only in the school but also in some actual industry.

Yet the fields of specialization should not be too narrow. Just as a heart specialist must first have complete general training as a medical doctor, so also a man cannot be a competent specialist in the manufacture of caustic soda until he has a broad practical knowledge of chemical engineering.

Every Latin American country has a difficult problem in knowing which fields of technical specialization are most urgently needed, which foreign universities can give the most appropriate training in these fields, how to select the most promising candidates for this foreign study, and finally how to evaluate and assist the progress of each student in these distant institutions.

The most helpful solution to these problems found thus far has been the assistance of impartial non-profit institutions of international scope, for purposes of liaison.

4) Creating More Adequate Technical Training Facilities at Home. <sup>1/</sup>

Many of the Latin American countries have sought to create within their own borders such basic industries as steel production, chemicals, petroleum refining and electric power generation, calling for huge capital investment. Yet they have done very little to develop the most basic industry of all: the domestic production of top-grade technical personnel to plan, construct and operate these and the other industries.

Latin America has some of the oldest universities and schools, of distinguished tradition, and is justifiably proud of their excellence. But in the technical field they have tended to over-emphasize the theoretical aspects of professional studies. The universities should be encouraged to broaden their curricula and improve their staffs and laboratories - especially in the field of practical engineering courses. It is observed that in all cases the necessary adjustments in curricula, teaching staff, equipment, supplies and maintenance involve additional funds. The amounts needed, however, are in many cases much smaller than might be expected. Under the circumstances there are very few investments which a Latin American country could make which would bring as great a return.

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<sup>1/</sup> See progress Report of the Expert of the International Labour Office on Enquiries Conducted into Vocational and Technical Training Requirements and Facilities in Latin America. (Document E/CN 12/90).

## IV

Sources of Technical Assistance Within the Region Itself

Latin America actually has a substantial number of expert individual technical consultants ready to serve in certain specialities, a few technical organizations qualified for the purpose, and a somewhat larger number of organizations established for these purposes which are not yet fully prepared to render some of the practical services needed, but with proper development they will represent an important future addition to Latin America's own technological forces. <sup>1/</sup>

It may be presumed that each Latin American country already knows which of its own technical agencies it has been able to call upon for satisfactory progress and results in solving its technical problems. Whether such agencies are in all cases prepared to serve other Latin American countries is a question that cannot be answered here. It is, however, possible to mention certain agencies and types of agencies which are technically qualified to do so.

Industrial Research Institute.

At the present stage of development there is at least one wholly Latin American industrial research institute of importance which has demonstrated its preparation to undertake

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<sup>1/</sup> These are mostly assorted research institutes in various countries, sometimes formed without sufficient access to proven operating methods and frequently without adequate provision for the special types of technical personnel needed. Because this kind of research is relatively new to Latin America, such personnel is virtually non-existent domestically. It is best trained through practice, using a small nucleus of imported personnel. The natural desire of a country to want to develop the entire institution by itself is understandable, but such new institutions in the more highly developed countries invariably seek the help of successful existing institutions.

laboratory research and tests of the kind normally associated with such institutions. This organization - the Instituto de Pesquisas Tecnologicas of Sao Paulo, Brazil - conducts tests and research for both government and private industries in a variety of fields, and is well-equipped. About one-third of its income is received from the State of Sao Paulo, and the remainder from private industry. Its Administrative Board consists of representatives of industry and the engineering profession, and professors of the Escuela Politecnica with which it is affiliated.

Also operating within Latin America, with both Latin American and United States technical personnel, is the Armour Research Foundation. Although nominally a United States organization, it is mentioned here because its International Division actually functions through Latin American headquarters. A part of its research costs do not require dollars.

#### Agricultural Experiment Stations.

As far as is known, no Latin American country today has enough of its own properly-functioning agricultural experiment stations. Yet, as a whole, Latin America has an assortment of such stations located in various climates and conditions. At the same time, many individual countries have within their borders different regions with a variety of climates, altitudes and other environmental conditions.

There is no completely satisfactory substitute for an agricultural experiment station situated in the region which it is intended to serve, with soil, climate and general environment as nearly typical as possible. Lacking the ideal condition, however, it is felt that there could be a much closer cooperation between the existing experiment stations of Latin America. There are many cases in which a station in

in one country can conduct work for the account of another, under a variety of financial arrangements, and perhaps with a simultaneous exchange of technical personnel.

Such arrangements are not entirely new. Yet there can be a great deal more international service of this kind, and with a more complete coordination toward the common goals of the family of nations. As one aspect, it is observed that only a relatively small portion of the detailed experimental work and results of these stations is freely and fully published. Regular international dissemination of this work would not only benefit all of the countries directly, but would also acquaint them with the individual work of agricultural specialists of each country who are qualified to assist others within Latin America.

The top agricultural experts of Latin America have much information which is not reaching the farmers. There could be more printed bulletins on good farm practices, for free distribution. Also, there are some problems in which the best equipped agricultural experiment stations can assist private industry. This might be encouraged, in the manner that has been tried successfully in Puerto Rico.

#### Governmental Agencies.

The various governmental agencies of individual Latin American countries contain specialists and experts on problems which are sometimes common to other countries of the region. It is presumed that their experts are available to each other in the same way that those of the United States are available to Latin America.

What is lacking, perhaps, is the coordinating mechanism for finding the proper government expert quickly in these cases.

/ Only rarely

Only rarely does one find an interdepartmental committee of governmental agencies for this specific purpose. This is a field in which international agencies might be helpful.

#### Universities.

The staffs of a number of universities include experienced specialists who can serve internationally on a consulting basis. These staff members also occasionally accept routine analytical and testing work, which they perform using the university laboratories.

Because of the prevailing system of most Latin American universities, in which professors serve part-time and hold important outside positions also, it is probable that the universities are the agencies best prepared to find Latin American experts and consultants in specific technical fields when they are wanted. When such experts are attached to their governments or are private consultants, or even when they hold industrial positions, very often they are also professors. Others not connected, but known by international reputation, are at least in contact with the universities.

#### Engineering Companies.

For construction, land surveying, mining and certain other specialties, there are competent Latin American engineers and engineering firms in a number of the principal cities. In recent years some excellent men have been trained in industrial management engineering. There are also a few branches or subsidiaries of foreign engineering companies operating in Latin America, employing domestic as well as foreign personnel.

#### Technical Societies.

The various technical societies of Latin America are cooperating increasingly in establishing international contact. It is felt that these organizations can render a still greater

/ service to

service to regional development by sponsoring the presentation and publication of more informative technical papers in the style of the world's principal technical literature. Many of the societies do no publishing, or else their papers are of a more general nature rather than disclosures of specific new scientific works.

Technical Libraries.

All of the existing technical agencies within Latin America will become more effective when more centralized and complete technical reference library facilities are made available to them. It is desirable that each country should have at least one adequate central technical library, well-catalogued, staffed with trained librarians, and kept open in the evening as well as in the daytime. The importance of this cannot be over-stressed.







PART II

TECHNICAL ASSISTANCE REQUIRED ON CERTAIN SPECIFIC PROJECTS

In order to collect the necessary information for this report, the Executive Secretary sent a questionnaire (see annexe 1) on 24 January 1949 to the Latin American governments, requesting them to state their needs for technical assistance for specific projects now under way or planned for the near future. It is evident that more time is required for the governments to prepare the detailed answers requested. However, the Executive Secretary believes that the Commission would wish to have a brief description of the projects presented by the countries which have already answered the questionnaire, since this may aid the deliberations of the members during the Second Session.

It should be pointed out that the answers are incomplete in certain respects -- some more than others of course -- and therefore the statement of needs presented below should be considered as tentative rather than final. In certain situations a more thorough examination of the specified needs would have to be made in order to evaluate the possibilities of satisfying them through technical assistance.

/GUATEMALA.

GUATEMALA

I. Technical Assistance for Current Programmes.

The most important development programmes are being carried out at present by the Government sponsored institution called Instituto de Fomento de la Producción de Guatemala. The Institute has engaged the services of a group of foreign and local experts and is receiving technical assistance from various local and foreign research organizations. The current programmes for which further technical assistance would be required are:

a) Mechanization of Agriculture. The Instituto de Fomento de la Producción is planning to stimulate agricultural mechanization in two ways: by granting loans especially designed for the acquisition of mechanical equipment and by establishing mechanization stations from which agricultural machinery, owned by the Institute, will be placed at the farmers' disposal.

The Institute needs one technician to help in the proper selection of the equipment required, to compare costs of production with and without the use of tractors and tractor-drawn implements, and to teach and demonstrate to the Institute's employees methods for the efficient operation of the new equipment.

It might be advisable in this case to consider: 1) the training of operators and mechanics, the establishment of properly located repair shops, and the maintenance of stocks of spare parts; and 2) to make studies of land use possibilities in order to select the areas and the crops which may be mechanized.

b) Improvement of the most important existing industries.

It has been considered that among the existing industries the following are in greater need of technical assistance: 1) spinning and weaving; 2) leather industry; 3) manufacturing of local

curios; 4) milling industry; and 5) dairy products.

With reference to the first one, the Institute would require an expert on both spinning and weaving. His main task would be to make a critical survey of existing conditions in this industry, from which to derive conclusions and recommendations to modernize it. He would also have to establish the capital requirements to carry out suggested improvements.

The textile industry of Guatemala is of two kinds: one, which is practiced by the women of the indigenous population, represents the most elementary form of industrial activity and employs primitive types of machines or simple hand weaving tools; the other, is the more advanced mechanized textile industry, that produces mainly cotton yarn and cloth on a larger scale and applies better techniques. There are at least four important textile mills of this kind in Guatemala.

It should be pointed out that cotton production in Guatemala has increased considerably during the last few years. Also that electric power is largely utilized by the textile industry, although there are no special industrial electric tariffs. This problem needs a satisfactory solution.

Another expert is wanted to do a similar job in the leather industry. He would have to make a critical survey of the industry, recommend necessary improvements, and evaluate the needs for capital investment.

Both the Instituto Indigenista Nacional and the Instituto Técnico Industrial are working on the improvement of methods of production of Guatemalan handicrafts. They will continue to help the Instituto de Fomento in its endeavour to improve conditions in this industry. Arrangements are also under way to obtain the collaboration of a U.S. technician.

/The technical work

The technical work that needs to be carried out for the improvement of the milling and dairy industries will be accomplished by the native and foreign specialized personnel that exists in the country at present.

The continuous rise of local production costs and the high degree of efficiency and productivity per worker which has been attained in large foreign industrial centres, will make it impossible for some of the Guatemalan industries to compete with imported products unless steps are taken to modernize existing plants and methods.

The Instituto de Fomento de la Producción is aware of the problem and plans: 1) to study the technical and economic conditions in which some national industries are producing; and 2) to give technical and financial assistance to local entrepreneurs for the purpose of introducing the changes necessary for improvement.

c) Establishment (or expansion) of industries using available local raw materials. The Institute intends to create, among others, the following industries: 1) Vegetable oils; 2) Lumber and related forest products industries; 3) Glass containers; 4) Fertilizers.

For the establishment of all the projected industries the Institute plans to carry out first the pertinent technical and economic surveys. Only when such studies show a project to be sound will plants be built and production initiated.

In the case of lumber and forest industries, technical assistance is required to: 1) make an inventory of the most valuable forest species; 2) select the best areas for exploitation; 3) recommend the proper forest management

/practices;

practices; 4) criticize present systems and methods of forest utilization; 5) indicate the most convenient and feasible industries that could be established; 6) determine the amounts of capital which would be needed for the establishment of each of the proposed industries. A mission consisting of 3 to 4 technicians who are specialists in the different fields of forestry would probably be required.

There are large undeveloped areas which need to be surveyed in order to determine the possibility of the utilization of their forests. Most of them are at present inaccessible for lack of communications. In any plan for future development due consideration might be given to highway construction.

For the vegetable-oils industry the Institute requires the presence of two specialists: one to study the agricultural aspect of the problem, and the other the techniques of industrialization.

The extraction of essential oil contained in the leaves of the citronella or lemon grass is the most important of the vegetable-oil industries of Guatemala. There are several small installations for this industry and the experience of the present producers might be fully utilized.

For the other two industries, glass containers and fertilizers, two experts, one for each industry, will also be required. They will have to investigate the possible sources of raw materials and the economic possibilities for development.

d) Hydro-electric development. Guatemala is asking for technical assistance which would enable her to utilize her available hydro-electric resources. The Instituto de Fomento de la Producción states that it is necessary: 1) to make a

survey of the hydro-electric potentialities of the country; 2) to locate the waterfalls which could be developed economically within a reasonable time; and 3) to estimate the capital requirements for such developments. It has been established that two or three experts would be needed to carry out the proposed task.

e) Construction of low-cost housing projects. A plan for the construction of low-cost dwellings is of considerable importance for Guatemala. Such a plan should take into consideration the following questions: 1) the development of cheap construction materials from local sources; 2) the determination of construction costs; 3) the investigation of the most suitable locations for the housing projects; and 4) the procedures for their financing.

## II. Technical Assistance for Future Programmes.

Needs for technical personnel who would be engaged in the Institute's future development programmes have not been specifically stated. There are no details as regards these plans either. However, as an illustration, the following are projects which the Institute may consider carrying out in the near future:

- 1) General economic survey of Guatemala;
- 2) Study of the national income, gross national product, net national product, real income, consumer expenditures and investment;
- 3) Economic classification of rural property and study of rural administration;
- 4) Study of the regions that offer irrigation possibilities;
- 5) Study of the geographical distribution of population in relation to regional natural resources.

ECUADORI. Technical Assistance for the Improvement of Public Administration Organizations and Procedures.

a) Public Finance. The government wants an expert who would be required to do the following tasks: 1) a study of tax legislation and the formulation of plans to simplify taxation; 2) an economic study of the sources, forms and possibilities of taxation; 3) the planning for a taxation system suitable to present economic conditions; 4) a study of government expenditures; and 5) an economic budgetary analysis and recommendations on the preparation of the national budget.

No plans for the economic development of Ecuador, or any other country, would be possible without a rational and equitable taxation system. This would provide the basis for a solid internal and external credit, would afford the means to support public administration expenses and would represent the basis for any programme to increase production.

The Ecuadorian authorities want not only an investigation of the present problems in order to find solutions that would improve their taxation system but also the total reform of it and of the methods employed.

The President of Ecuador has stated the problem as follows:

"The problems of the national economy cannot be treated in an empirical or irresponsible manner. It has been expressed by the Minister of the Treasury that there are some serious anomalies in our present taxation system; that the methods used for tax collection are anachronistic; that the budgetary disorder we live in is quite noticeable and harmful; and that we are overwhelmed by the lack of proportion in the disbursement of national /expenditures.

expenditures. In order to complete the picture, I would add that, within this complexity and disorder, it is remarkably easy to elude tax paying...."

"... Urgent needs were satisfied through the application of a new obligation, a new rate, or an additional tax, but a revision of the whole body of tax legislation or a survey of the changes in the capacity of production and consumption of the Ecuadorian people was never made." <sup>1/</sup>

The President's statement is an evidence of the imperative need to reorganize and improve public finance in Ecuador.

Technical assistance for accomplishment of the proposed objective will, undoubtedly, be beneficial to the economy of the country.

b) Fiscal Administration. An expert is required to work on the following: 1) a study of the forms of authorizing fiscal receipts and expenditures that would include an analysis of the process, from the time of the assessment of the tax to the actual payment of it; 2) an analysis of the process involved in the payments made by the Government; and, 3) planning of the rules and regulations needed to simplify procedures and to attain greater efficiency.

c) Customs Administration. A technician is also needed to report on general and specific methods of organization and administration of customs, as well as on legislation improvement. His main tasks would be: 1) a study of customs legislation and procedure; 2) an analysis of the present import and export procedures; 3) a study of the administrative techniques used at

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<sup>1/</sup> "La Cuestión Tributaria y la Economía Fiscal". Discurso del Presidente de la República, Sr. Galo Plaza, al posesionarse de la Función Ejecutiva en la noche del 31 de Agosto. (1948-1952). Talleres Gráficos Nacionales, Quito, Ecuador.



present in the Customs Department; and 4) a plan for a simplified system of customs procedure and organization.

The importance of the proper organization of the custom's services cannot be overemphasized. The degree of efficiency which may be obtained with the technical assistance solicited will have beneficial effects on the balancing of the national budget and on most public activities of the country.

d) Census of Population. An expert is needed to cooperate in the preparatory work of the 1950 Census. He would be required to head the Ecuadorian Technical Bureau of the Census. Some elementary equipment for census preliminary work has also been requested.

Ecuador has never taken a complete population census. Efforts have been made on different occasions but unfortunately none of them crystallized. Since the launching of the 1950 census programme Ecuador has been increasingly interested in the planning of the first nation-wide enumeration of her people.

e) Municipal Administration. An expert is needed to cooperate in the organization and administration of municipalities and in the improvement of the administrative, financial and economic services of the provinces. He would be required to:

- 1) assist the National Economic Council in administrative matters in all provinces and municipalities of Ecuador; and, 2) study the present fiscal and municipal administrative systems of the provinces for the purpose of obtaining a better coordination with the national system.

f) Civil Service. Ecuador needs an expert to cooperate in the drafting of the laws, rules and regulations that will safeguard the career of government employees. In addition to

/this technical

this technical assistance is needed for the training of the personnel for the proper and efficient administration of civil service organization.

II. Technical Assistance for the Improvement of Industry and Agriculture.

a) Textile Industries. The need for technical assistance on this matter is evidenced by the government's wish that one or several foreign technicians make a survey of all textile mills in Ecuador in order to select the best ones for efficient operation. Government officials regard the industries' present situation as critical.

b) Cotton. Cotton production has declined since prewar. In the period 1934-1938 production averaged about 2,600 metric tons whereas in 1947 it was only 1,100 metric tons, approximately. In addition to this decrease in quantity there has also been a decrease in the quality of the product. The low quality of the cotton affects not only the agricultural situation but the textile industry as well.

In spite of the fact that Ecuador has already contracted a Peruvian expert on cotton cultivation to work in the Portoviejo valley, in a recently irrigated zone, the official authorities are requesting technical assistance for further study and investigation in other important cotton producing regions.

Since the country has exceptional agricultural conditions to develop a large scale cotton production, perhaps a thorough investigation of the other possibilities for developing some of the most important prospective regions would be of great value. There will be excellent opportunities to increase cotton production when the three irrigation projects now under construction are finished.

/c) Sigatoka.

c) Sigatoka. The Government is interested in increasing banana production. Technical help is being asked for to carry out investigations on existence of the "sigatoka" disease. Some preliminary technical work has already been carried out and it appears that "sigatoka" does not exist in Ecuador, or if it does its effects are so mild that production is practically not affected by it.

Ecuador is requesting a Plant Pathologist for the investigation of "sigatoka". It might be pertinent to point out that generally diseases in agriculture do not show their presence until the crop they attack is planted extensively. It might be convenient to consider the establishment of preventive control measures for "sigatoka" in any programme for the enlargement of the banana plantations.

d) Credit for Agricultural Development. The Government is ready to commence the establishment of credit facilities for farmers. One or several technicians who are thoroughly familiar with the theory and practice of agricultural credit will be required.

e) Fertilizers. The Government is requiring the presence of one or several experts on fertilizers to direct operations in a programme for the increased production and use of these agricultural requisites. As an additional function, they would eventually be required to train a considerable number of native personnel.

f) Selection of Seeds, Utilization of the Highlands and Sheep Raising. The Government, in cooperation with the Corporación de Fomento is planning to: 1) create a research organization for the selection of seeds; 2) transform the at

/present

present unproductive highlands into pasture lands for cattle raising; and, 3) re-establish the Merino sheep herds which during the colonial times used to be the basis for an industry of considerable importance.

The needs for technical personnel to carry out these projects have not been specifically stated.

CHILEI. Current Programmes.a) Metallurgy of Iron and Steel:1) Compañía Electro-Siderúrgica e Industrial de Valdivia.

It is stated that the technical assistance required should be used for the transformation and improved utilization, on the basis of the use of charcoal, of the ingot iron produced by this company's metallurgical plant. The personnel that would be needed has not been specified.

At present, there are at least three iron and steel metallurgical plants in Chile. That of Corral, belonging to Compañía Electro-Siderúrgica e Industrial de Valdivia S.A., is the oldest one. It was built about 40 years ago by a French syndicate to produce ingot iron to be exported to Europe. Charcoal was used (and is still being used) as fuel and also as a reducing element in the manufacture of the product. It was for this reason that a wooded district was chosen for the location of the plant. Operation had temporarily to be stopped, however, due to technical problems.

It was not until 1924 that the Compañía Electro-Siderúrgica e Industrial de Valdivia was formed with Government financial and technical support. The proposed industrial project considered the construction of a hydro-electric plant at Huilo Huilo and an electro-metallurgical plant at Valdivia. Its planned capacity was 40,000 tons of rolled steel per year. This capacity, however, was not attained.

Up to 1939, after completion of the steel rolling mill and other works, the output had to be limited on account of the high cost of production obtained. This was a consequence of the

/difficulty

difficulty in solving the various technical problems which had arisen.

With the advent of the Corporación de Fomento de la Producción in 1939 — a Government sponsored corporation specially created to promote national production — effective assistance was given to the metallurgical industry through both economic cooperation and more advanced technical processes. A special effort has been made to develop iron and steel production in Valdivia. In 1939 a blast furnace was constructed and some favourable changes were made at the plant. A reduction of the unit costs by the improved mechanization of the plant and a larger scale production was pursued through the fulfilment of a new plan in 1942. About 20 per cent of the estimated 125,000 tons of iron and steel requirements of the country could be supplied by the Valdivia metallurgical installations at that time.

The proposed scientific investigation which will be carried out through the technical assistance required will establish the best procedure to be followed for the improved utilization of the ingot iron now produced. The chemical composition of the product obtained at present is not constant, so that there is no uniformity in quality.

2) Compañía de Acero del Pacifico (CAP). It is believed that this company may require for some time the kind of technical assistance which it has been receiving from abroad, especially from the United States. The kind and number of personnel required is not mentioned, as it is considered that it will be utilized in accordance with future technical problems which may arise.

This enterprise in 1944 contracted the services of a North American engineering firm to make a study of its project for

/the establishment

the establishment of a steel plant in Chile. In addition to this, the Compañía de Acero del Pacífico has employed the services of a number of American experts, as consultants on the special problems which arise.

The Compañía de Acero del Pacífico was formed in 1943 with an original capital stock of 50 million pesos, which could be raised to 200 million. It was not definitely formed until 1946, when the preliminary stage of the metallurgical project was finished. After all essential raw materials had been secured, construction work on the metallurgical plant at Hunchipato, Concepción, started in 1947. By May 1948 the blast furnace foundation and the rolling mill installation were finished. The brick manufacturing plant is already under operation and the pipe construction plant is planned for completion by the end of 1949.

Studies on Chilean coal samples were made in the United States in 1943. The United States Bureau of Mines and two private engineering companies were engaged to explore the possibilities of production of metallurgical coke.

In order to determine the most advantageous process for the reduction of iron ores, a Norwegian, firm which specializes in electric furnace construction and operation, was also consulted by the Compañía de Acero del Pacífico.

In order to provide facilities for obtaining the services of experts and technical organizations, the Compañía de Acero del Pacífico supplemented its New York agency with a special Steel Department, where a group of North American technicians, specialists in the most important aspects of the metallurgy of iron and steel, work jointly with Chilean engineers.

b) Other Metallurgical Industries:

1) Establishment of a zinc electrolytic refinery. Technical assistance is required for the proposed plan to establish a plant for the production of electrolytic zinc, with an annual capacity of 2,000 tons. The number of personnel which would be required has not been stated.

Valuable zinc ore has been located and studied by the Corporación de Fomento at Ocoa, Salamanca, Batuco, and other places. On account of the low market prices obtained for this metal, Chile was not particularly interested in the development of its natural sources of zinc. Nevertheless, the ever increasing domestic and industrial consumption, and the difficulty of importing it during the war — zinc was classified as a strategic metal — considerably stimulated its production.

As a result of the studies made on zinc consumption requirements, local production and availability of its natural sources, the Corporación decided on the installation of an electrolytic refinery. This would furnish all the metallic zinc necessary to satisfy the local demand.

2) Sulphuric Acid and Litophone manufacturing plants. The technical assistance that could be given to the establishment of the zinc electrolytic refinery could also be extended to the production of sulphuric acid and litophone. These two products are obtained from subsidiary plants which utilize the by-products of zinc refineries. (Litophone is a white pigment, consisting chiefly of a mixture of zinc sulphide and barium sulphate).

3) Establishment of a copper electrolytic refinery. It is intended to install a plant of this kind to complement the Paipote copper smelting works which are now under construction. These works have been designed for the production of 20,000 tons of



copper, 5,000 kilogrammes of gold and 10,000 kilogrammes of silver. Technical advice is required for this purpose. No estimate of personnel requirements has been made.

Copper ore is one of Chile's most abundant raw materials. A large amount of copper products used to be imported, however. Before the war, about 2,500 tons of copper and brass bars, sheets, pipes, tubes, wire and cable were imported annually. At present a considerable quantity of these products is being manufactured locally.

Considering that domestic and industrial consumption of these and other copper products is greatly increasing as a consequence of Chile's industrial development, the establishment of the projected new copper industries is considered essential by the Corporación.

c) Petroleum.-- The Corporación de Fomento de la Producción states that continued technical assistance is needed for the development of a petroleum industry. No statement is made of the personnel needed or the specific tasks which such personnel would perform.

Geological and geophysical prospecting in the Magallanes region has been done by a private petroleum prospecting company from 1943 to 1946. Well drilling was also carried out by the Livermore Corporation after 1945. During 1947 geophysical work at Tierra del Fuego was resumed by the Corporación. A North American petroleum engineer was contracted in 1948 to start exploitation in the Cerro Manantiales oil field (Tierra del Fuego) and William Brothers have been working on the project for the oil pipeline which will be laid from Cerro Manantiales to Puerto Clarence.

/d) Electric Power

d) Electric Power Development. A list of the various projects undertaken is presented although no specification is made with reference to the kind of technical assistance and the personnel necessary for this industry.

The Energy and Fuel Department of the Corporación de Fomento devised a preliminary five year plan for electric power development, which was approved by its Administrative Council on 23 August 1939. The main purpose of this plan was to finance and carry out immediately the execution of those projects which had already been studied carefully, and also to finance the technical preparation of important new projects. This preliminary plan was to be carried out while a general planning for electric power utilization was prepared. On 9 April 1943 the Council approved the "Plan for Primary Electrification of the Country".

In accordance with this plan, the Pilmaiquen and Abanico hydro-electric plants have already been constructed. The Pilmaiquen plant can develop 12,000 H.P. and it will be possible to enlarge it to 48,000 H.P. The power generating units of the Abanico hydro-electric plant at Rio Laja (Bio-Bio) will be able to develop 125,000 H.P. to supply energy demands of the provinces of Bio-Bio, Ñuble, Concepción, Arauco and Malleco, and also that required by the Huachipato metallurgical industry.

In addition to this, the first stage of the Sauzal project, at the Cachapoal river (O'Higgins), has been finished. This development is interconnected with the Compañía Chilena de Electricidad Ltda. and the Compañía General de Electricidad Industrial. The former serves the provinces of Aconcagua, Valparaiso and Santiago, and the latter that of Colchagua.

Studies are being carried out on the projects for Los Molles, Puclaro, Sotaquí, Cogotí, Guayacán and Juntas del Carmen hydro-electric plants to supply the energy demand of the

Chico provinces.

e) Coal Industry. Modern additional installations are being considered for the improved utilization of the Lota and Schwager coal deposits, while the Arauco, Lebu, Collico Sur, Pilpilco and Magallanes deposits will probably be exploited for the purpose of increasing coal production. Technical assistance will be required but no statement has been made regarding the specific personnel wanted.

f) Technological Study on Sulphur Saltpeter Treatment. The technical assistance that is required will have to undertake an investigation to determine which is the best method to treat this special kind of Chilean saltpeter for further utilization. The personnel that would be needed has not been stated.

g) Other Necessary Studies. The Government states that assistance will also be needed on the following projects:

1) exploration and exploitation of some of the tungsten, molybdenum and cobalt mines of the country; 2) sulphur recovery as a by-product from several industries; 3) increase in the production of phosphate, potash, calcareous and nitrogenous fertilizers; 4) further utilization of saltpeter for chemical industries.

h) Agriculture. Technical cooperation is required for the following projects:

1) Soundings for underground water. In 1946 a North American commission of experts was contracted to investigate the possibilities of utilizing underground water. The Chilean Government has an extensive programme for developing irrigation and requires further technical assistance for this purpose.

2) Sugar industry. A technical consultant is wanted to study the main problems that will be presented for the establishment of a beet sugar industry. The total volume of sugar consumed in

Chile is imported. According to expert opinion, conditions are not favourable for the local production of sugar-cane.

3) Selection of mechanical equipment. An expert for the proper selection of the various types of imported agricultural machines and spare parts will be needed to assist the Corporación in its farm machinery programme. This expert should train local personnel in the efficient selection and operation of mechanical equipment.

In addition to the above, the Department of Agricultural Investigation of the Ministry of Agriculture has presented the following list:

4) Plant physiology. A technician on this subject is required to study the best means of combating the brambleberry <sup>1/</sup>genace. This weed has invaded large areas of land, estimated by the Department of Agricultural Investigation as over one million hectares.

5) Farm management. One specialist is needed to determine the best method of economic management of the farms located in the central and southern regions of the country, between the Aconcagua and Llanquihue provinces. It is also suggested that, in order to accomplish the best results, a general survey of the present situation in these regions and a sampling of farms should be made. In addition a study of the existing agricultural experiment stations, consisting of the farms belonging to the Consorcio de Administraciones Agrícolas and those of the agricultural cooperatives, be carried out.

It is estimated that it would require one year to complete this project.

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<sup>1/</sup> Zarzamora.

6) Agricultural analysis. A chemist, specialized in this kind of work, is required. He should be in charge of setting up laboratories where modern equipment and procedures could be applied for analysis of soils, fertilizers, insecticides, fungicides, herbicides, vegetable matter, etc.

One expert for each of the following is required by the Livestock Department: 7) Animal genetics; 8) Physiology; 9) Bacteriology; 10) Dairy industry; 11) Livestock raising; 12) Meat marketing and cold storage; 13) Sterility of cattle; 14) Poultry disease; 15) Endocrinology; 16) Micology.

## II. Future Programmes.

- a) Long distance electric transmission.
- b) Utilization of large hydro-electric power for electro-chemical industries.
- c) Establishment of large laboratories: 1) electric; 2) hydraulic; 3) testing materials.

## III. Other Suggestions.

a) Technical Assistance to train specialized technicians abroad. The Corporación de Fomento de la Producción is greatly interested in receiving further cooperation from universities, schools and industrial concerns for training new technicians, especially in electricity, metallurgy, petroleum, and in the chemical, preserving, timber and leather industries.

b) Lack of skilled labour. As expressed by the Sociedad de Fomento Fabril, an old Chilean institution for the promotion of industry in the country, there is a lack of skilled labour in all branches of industry but especially in the metallurgical industries. The Chilean Government is trying to reform its elementary and secondary education.

The Sociedad de Fomento Fabril suggests that an arrangement be worked out whereby the more industrially advanced countries could exchange information regarding technical education programmes. Furthermore, it is proposed that a special service of vocational guidance, under the combined direction of qualified specialists and school teachers, be created for the purpose of training Chilean skilled workers.

BOLIVIA

a) Irrigation: The Bolivian Government states that it needs three construction engineers, of whom "one should be a mechanical technician". This personnel would be employed mainly in the Pilcomayo River irrigation project at Villamontes. It is estimated that their services would be required for a period of five years.

The Government had contracted the services of a Mexican irrigation engineer up to December 1948. This specialist, together with another two Mexican engineers and one agronomist, initiated in 1940 the study of an irrigation programme for the country and started work on the Angostura project at Cochabamba.

Although precise statistical data are not available, it is estimated that approximately 12,000 hectares are under irrigation at present. Besides this the cultivated area of Bolivia (about 300,000 hectares) depends on rainfall, which is very erratic and unevenly distributed. Agricultural production is frequently lost and yields are usually very poor. These conditions together with the fact that large regions are almost exclusively used for subsistence farming, make Bolivian food production insufficient to supply the country's own needs. Large quantities of foodstuffs, around 30 per cent of the total, have to be imported yearly

The government has an ambitious programme to put an additional 170,000 hectares under irrigation. Two projects for the irrigation of 12,000 hectares, one in Cochabamba and the other in Challapata, are under construction and, of this total, a little over 3,000 hectares have already been put under irrigation. One of the projects is nearly completed. Their cost will be over 140 million bolivianos. From twelve to fourteen other projects are to be undertaken. Seven of these, which will utilize the

/Pilcomayo river

Pilcomayo river and other sources, are to be started as soon as they are financed. These projects would add 39,000 hectares of new land for cultivation, at an estimated cost of 526 million bolivianos. Special mention should be made of the important Huarina Peñas project, for which extensive investigations have been made. Another project (a diversion of the Desgüadoro River is scheduled for later construction for the irrigation of 26,000 hectares and will require an estimated investment of 20 million bolivianos. Four more long-range projects will put under irrigation at least 70,500 hectares.

The Bolivian Government has also studied the possibility of developing hydro-electric power in connection with irrigation projects. The utilization of water-power tends, not only to lower the cost of construction and to increase the benefit obtained from the project, but contributes greatly to the success of agricultural development and colonization of the new land through the acquisition of cheap energy for numerous purposes. Further studies of this nature might be of value in relation to present projects.

b) Railroads: The Bolivian Government has stated that the following personnel are needed to assist in its railroad construction program: 3 engineers specialized in traction and shopwork technique; 4 engineers for the organization of traffic and establishment of proper freight and passenger rates; 3 engineers for the Arica-La Paz, Villazón-Atocha, Cochabamba-Vila Vila and Potosí-Sucre railways. It is estimated that their services would be required for approximately 2 years

It has also been stated that as soon as the Corumbá-Santa Cruz railway is finished the Bolivian Government will need one engineer to organize the services of this line and to train local personnel.

/It is pointed out



It is pointed out that private railway concerns have their own foreign technicians on special private contract basis.

The mediterranean situation of Bolivia makes it almost entirely dependent on land transportation for its economic development. Its railway system has been mainly directed toward the servicing of its international communications with the objective of providing an outlet for its main export product - minerals. Internal railroa communication, due to enormous difficulties of terrain and other reasons, are less developed. Large potentially rich regions indispensable for the economic development of the country have been left practically isolated. Present plans, however, include the construction of two railroads from the highlands to the orient, and three railroads from Brazil and the Argentine to Santa Cruz. The first two (La Paz-Beni and Cochabamba-Santa Cruz) are being constructed by the Bolivian Company. The third one (Columba-Santa Cruz) is being constructed with the technical and financial cooperation of the Brazilian Government. The other two (Yacuiba-Santa Cruz and Tarabuco - Boyuibe) are being constructed with the cooperation of the Argentine Government.

At present Bolivia has 1,459 kilometres of railroads; a large part of which is operated by the British owned "Bolivian Railway Company." Comparatively small portions of other railroads are operated either by the Government itself or by private mining companies.

c) Highways: The Bolivian Government states that the services of six civil engineers specialized in road construction are required to help the Dirección General de Vialidad in the study, construction and maintenance of highways.

/According

According to the U.S. Department of Commerce: 1/

"Highways have become increasingly important in Bolivia largely because of the inadequacy of the railroads. Road traffic is very heavy throughout the country. Even though the highways can only be used during certain times of the year 2/, they are the chief means of transportation. In the remote areas of Bolivia, where there are no railways, the highways are the only means by which certain produce may be moved. Consequently, roads, regardless of their condition, play a large part in the economy of the country.

"Nevertheless, there has been little development of the highway system."

The present system of highways in the country is far from adequate. The highway network has not yet reached many of the potentially rich regions of the country. Penetration roads are inadequate and usable only during dry seasons.

The more permanent highways of the plateau region are dirt or gravel roads which are costly to maintain and which cause equipment to wear out rapidly.

d) Statistics:- The Dirección General de Estadística has been receiving assistance from the Bureau of Census, United States Government, with particular reference to the 1950 census. The Office of Vital Statistics has also assisted the Dirección General de Estadística in its work.

They now require a sampling expert.

e) Mining: The Dirección General de Minas y Petróleo requires

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1/ Industrial Reference Service. U.S. Department of Commerce. Office of International Trade. Part I. Transportation and Public Utilities. (Vol.4 - Part I - No.20) (September 1946).  
2/ In the departments of La Paz, Oruro and Cochabamba there are some roads which are usable all the year round.

technical assistance for the direction and control of mining activities in the country. It is stated that the following personnel are needed:

- 1) From 2 to 5 geologists
- 2) From 2 to 5 engineers, specialized in mining prospecting and appraising
- 3) 2 hydraulic engineers
- 4) 2 experts for gold mining
- 5) 2 experts for mining economics
- 6) 3 experts for mining inspection
- 7) 2 experts for petroleum economics
- 8) 2 metallurgists
- 9) 2 chemical engineers
- 10) 2 experts for mining administration

f) Aerial Transportation: The Lloyd Aéreo Boliviano will require technical assistance for the realization of its plans. The personnel needed will be utilized to make periodic inspection of the control, revision and traffic departments. It is also stated that the experts required should come from recognized international agencies.

The Dirección General de Aeronáutica Civil y Comercial has been assisted by a special technical mission from the United States which was contracted for one year. With the cooperation of this mission, a plan for the organization of its services was devised. It is stated that in order to carry out such a plan technical personnel will be required for the following departments:

- 1) Commercial and economic
- 2) Aeronautic security
- 3) Airports
- 4) Aeronautic facilities

- 5) Communication and traffic control
- 6) Meteorology
- 7) Technical training of pilots
- g) Telecommunication: Two radiocommunication engineers are needed to assist the Dirección General de Radiocomunicaciones. It is stated that two years should be the minimum time required for this work.
- h) Petroleum: The Yacimientos Petrolíferos Fiscales Bolivianos need technical assistance for well-drilling and refining of petroleum. It has been simply stated that a number of oil engineers will be required.
- i) Health and Social Security: The Caja de Seguro y Ahorro obrero requires actuaries, statisticians, industrial engineers and experts for administrative organization, hospital administration, technical education and training of personnel. No statement is made with reference to the number of technicians needed. It is stated that one year would be the minimum time required for these services.

Three sanitary engineers for a three year period are needed for hospital construction and for sanitation work.

PANAMA

a) Consular Service. Although the specific personnel required is not given, technical assistance is needed to modernize the Consular Service. The Consular Service of Panamá works with the Ministry of Foreign Affairs, the Ministry of the Treasury and the Contraloría General de la República (Office of the Controller General). The Government feels that there should be better coordination of the agencies in order to eliminate duplication and inefficiency.

It is felt that a more efficient Consular Service may promote better economic relations with other countries and increase imports and exports.

b) Tax Collection. One or several experts are wanted to organize a modern tax collection system.

In 1946 the Panamanian government contracted the services of two experts to study the present taxation system. Their reports contain specific recommendations for improving the present system of tax collection. The office of the Comptroller-General asked for the approval of the National Economic Council to create a tax collection department. The technical assistance needed would be for the purpose of carrying out this project.

c) Cartography for the 1950 Census. Panamá has already begun preparatory work for the 1950 census, but needs technical assistance for the preparation and use of maps, charts and plans. The U. S. Government has been supplying cartographic information of the territory to the Inter-American High-way Office (Panamanian), but the government does not have expert personnel capable of interpreting the maps for

/census purposes.

census purposes.

d) Statistics. Technical assistance is needed to improve the statistical work done in Panamá, specially on the following: 1) cost of living; 2) labour; 3) foreign trade; 4) balance of payments and 5) national income. In addition one expert is needed to train junior statisticians in the preparation of statistical tables.

An employee from the Dirección de Estadística y Censo is at present receiving some educational training on statistical work in the offices of the International Monetary Fund at Washington. Two other employees are also being partially trained in cost of living and labor statistics. It is stated that these will be a valuable help for the personnel that may be sent to Panamá.

e) Commercial Aviation. The Government would like to receive assistance in developing its commercial aviation. No details were given.

f) Tourism. Specialists are wanted to assist in promoting tourist trade.

VENEZUELA

The following statement of needs is based on a partial reply received from the Venezuelan government which informed the Executive Secretary that thus far only the Instituto Nacional de Minería y Geología has specified its needs for technical assistance.

Training schools for skilled labour: The government states that technical assistance is needed for the purpose of organizing a special type of school to train technical personnel for the mining industry. Plans are now being prepared to develop this type of education -- this project will be submitted for approval to the Ministry of National Education.

Venezuela needs skilled workers, formen, appraisers, surveyors, etc, especially for those regions recently opened to mining activities. This need is principally found in the medium and small mining companies which have neither the necessary specialized technicians and skilled workers nor the funds to train them properly. The larger mining companies, operating in Venezuela, usually have their own technicians but lack skilled labour. It is believed that the larger mining companies will be able to train most of the specialized workers which they may need.

ANNEXE

NEEDS OF THE COUNTRY FOR TECHNICAL ASSISTANCE AND TECHNICAL  
TRAINING FOR ECONOMIC DEVELOPMENT.

Introductory Note.

For the purpose of assisting Governments to develop better technical methods in agriculture, industry, mining, finance, etc., the First Session of the Economic Commission for Latin America, held at Santiago, adopted a Resolution (E/CN.12/75) instructing the Executive Secretary to make a study of the needs of the Latin American countries for technical and administrative personnel and of the means and facilities for satisfying these needs.

In compliance with this Resolution, the Executive Secretary requests your Government to furnish him with as complete a statement as possible of the needs for technical assistance on specific problems or projects. It is also requested that your Government give a full description of the availability of technical assistance and facilities for technical and administrative training that could be offered to other Latin American countries.

For the purposes of this survey, technical assistance means the assistance that foreign Governments, international organizations or private institutions from other countries may render to your Government or to a private agency engaged in an economic activity supported by your Government, by sending experts or technicians.

It also means the assistance government agencies or private enterprises or organizations in your country could render by receiving citizens from other Latin American countries to be trained in specific technical or administrative matters.

/This could refer



This could refer to the fields of industry in general, to agriculture, forestry, fishing, engineering, transportation, communication, and, in general, public utilities, as well as to economics, finance, statistics, banking, public or business administration, etc.

You will appreciate the importance to the economic development of your country of access to advanced technical methods and scientific knowledge and of the application of these methods to agricultural and industrial production, as well as to financial, economic or statistical organization. This preliminary survey is designed to estimate the actual needs of each Latin American country for the kind of foreign help described, in order that the Economic Commission for Latin America may review the requirements and make concrete recommendations in its Second Session.

It would be appreciated if replies to this questionnaire could be returned by 15 February 1949, or as soon thereafter as possible.

#### Questionnaire

1. What are the present needs of the country for technical assistance from abroad?

This question relates to the needs of specific economic enterprises now in existence, as well as to new projects already under way or to be initiated in the very near future.

If technical assistance is required at this time for several enterprises or projects, each need has to be described separately and should be given in the order of its urgency.

Answers to this question are expected to be specific; they would have to cover, as far as it may be possible, the following points for each enterprise or project:

- a) Description of the specific enterprise or project for  
/which technical

for which technical assistance is needed:

- b) Kind and approximate number of experts required:
- c) For how long approximately are the services of the expert or experts required?
- d) Include any other concrete information that could be considered relevant to evaluate the needs for specific types of technical assistance.

2. What kind of technical assistance has been rendered to the Government of your country or to a private agency engaged in an economic activity supported by your Government by a foreign Government, an International Organization, or a private institution from another country?

This question requires a brief description of the kind of technical assistance received according to our definition in recent years, indicating the source and the year it was rendered. It would also be useful to describe the way in which such assistance was financed.

3. What are the facilities available in your country for giving technical assistance to other Latin American countries?

This question should be answered by describing Government or private organizations or institutions that could send experts to assist other Latin American countries in economic development or could receive for training citizens of those countries.

#### Publications

The Economic Commission for Latin America would like to receive, if possible, a list of technical periodicals published in your country, as well as copies of publications,

/annual reports,

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annual reports, working plans, etc. which deal with technical education and training. The publications should be wrapped securely, addressed to Mr. Eugenio Castillo, Economic Commission for Latin America, 2475 Fio Décimo, Santiago, Chile, and shipped by air express freight collect.

