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ECLAC/UNIDO CAPITAL GOODS PROJECT

ANALYTICAL REPORT
ON THE FIRST MEETING OF EXPERTS
ON CAPITAL GOODS IN LATIN AMERICA

VIEWS EXPRESSED AND AGREEMENTS REACHED BY THE
PARTICIPATING EXPERTS

Santiago, Chile
5-7 December 1983

Sectoral Working Papers Series, No. 35

Sectoral Studies Branch
Division for Industrial Studies

SECTORAL WORKING PAPERS

In the course of the work on major sectoral studies carried out by the UNIDO Division for Industrial Studies, several working papers have been produced by the secretariat and by outside experts. Selected papers that are believed to be of interest to a wider audience are presented in the Sectoral Working Papers series. These papers are more explanatory and tentative than the sectoral studies. They are therefore subject to revision and modification before being incorporated into the sectoral studies.

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This paper was prepared by the Staff of the UNIDO Division for Industry and Technology, on the basis of the discussions at the first Meeting of experts on capital goods held at CIMESA (center for scientific study) on 5-7 December 1989. The views expressed do not necessarily reflect those of the secretariat of UNIDO or ECLAC.

Preface

The present document takes up the various topics of discussion analysed at the First Meeting of Experts on Capital Goods held at ECLAC headquarters, Santiago, Chile, from 5-7 December 1983. The meeting was organized within the framework of the Latin American Capital Goods Project (RLA/77/015) in which the Joint ECLAC/UNIDO Division for Industry and Technology acts as the executing agency and the Sectoral Studies Branch of UNIDO as associate agency.

The capital goods industry plays an important part in the process of industrialization of the developing countries. In the case of Latin America, this industry has been regarded by certain countries in the area as the most important to be promoted and the one in which the possibilities are increasing owing to the intersectoral relations of the economy. Nevertheless, as described in the present document this industry is passing through a very difficult period which calls for deliberate action by the region as a whole.

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EXPLANATORY NOTES

References to dollars (\$) are to United States dollars, unless otherwise stated.

A comma (,) is used to distinguish thousands and millions.

A slash between dates (e.g. 1970/71) indicates a crop year, financial year or academic year.

Use of a hyphen between dates (e.g. 1960-1965) indicates the full period involved, including the beginning and end years.

The following forms have been used in tables:

Three dots (...) indicate that data are not available or are not separately reported.

A dash (-) indicates that the amount is nil or negligible.

A blank indicates that the item is not applicable.

Totals may not add precisely because of rounding.

Besides the common abbreviations, symbols and terms, and those accepted by the International Unitary System (SI), the following have been used in this report:

Economic and technical abbreviations

ALABIC	Latin American Association of Capital Goods Industries
ALADI	Latin American Integration Association
BNDE	National Economic Development Bank, Brazil
CIEM	Itaipú Electro-Mechanical Consortium
CIER	Commission on Regional Integration in Electricity
FINAME	Financing Fund for the Purchase of Industrial Machinery and Equipment
IPEA	(New) Institute for Economic and Social Planning
LAFTA	Latin American Free Trade Association
NAFINSA	National Finance Corporation, Mexico
OLADE	Latin American Energy Organization
UNDP	United Nations Development Programme
GRT	Gross registered tons
h.p.	Horse power
MW	Megawatt

1. INTRODUCTION

The manufacture of capital goods has certain features which warrant special attention on the part of the national authorities responsible for the formulation and administration of economic policy. If a country possesses capacity for producing machinery, it is in a better position than another not having this capacity to assimilate, adapt and create technology, and ultimately to update its methods of production and consumption. This productive capacity reaches maturity when the capital goods industry participates not merely in supplying the internal market but also, and significantly, in exporting from the country.

In the course of the 1970s, the capital goods industry developed rapidly in Latin America, particularly in Brazil and Mexico. One of the reasons for this was the expansion in these countries of internal demand for equipment as a result of large-scale investment in the economic infrastructure and basic industries during the period. In addition, in both countries active policies were adopted which were designed to develop the internal production of capital goods. For this purpose, use was made among other instruments of the purchasing power generated by the investment projects in the public sector. In the other Latin American countries, the capital goods industry did not evolve with the same vigour, and in some countries there was actually a measure of backsliding. The causes cited for this include the small size of the internal market, the lack or abandonment of active support policies, and the stagnation of regional and subregional integration schemes.

In these circumstances, ECLAC and UNIDO submitted a regional project for consideration to the United Nations Development Programme. The object was to back up the efforts of the Governments to promote the countries' industrial development, providing them with information on the situation and the prospects for the sector handling the production of capital goods in the region. After ascertaining the opinion of the Governments, UNDP approved the project and designated ECLAC as the executing agency and UNIDO as associate agency. The project document stipulates in addition that the project's objectives should be carried out jointly by the personnel of ECLAC and UNIDO.

Half way through 1980, a start was made on the activities under the project. On the basis of background material prepared by the Joint ECLAC/UNIDO Division for Industrial Development, and in accordance with the terms of reference of the project, a series of studies and investigations were started up. These were aimed mainly at examining two aspects of the Latin American capital goods market: first of all, a projection of the demand for machinery and equipment originating from a group of economic sectors, and secondly, the formulation of a picture of the existing production capacity in a group of medium-sized and small countries in the region under certain capital goods headings. The project working team discussed various methodological alternatives. Basically, two options were envisaged. The first was to make headway in devising and perfecting a theory of development of the capital goods industry, in keeping with the conditions and specific potentialities of the Latin American countries and calculated to serve their economic authorities as a yardstick in formulating their policies. The second option was to concentrate more pragmatically on identifying the obstacles to the development of the capital goods industry in the countries while at the same time emphasizing certain sectors where a priori there would be greater and better possibilities of success. Although the two alternatives are not mutually exclusive, and indeed it could be argued that the one would have backed up or strengthened the other and vice versa, it was decided to concentrate (at least in the early stages of the project) on the second alternative. This decision in turn meant adopting a particular method of work which would consist of involving the economic agents producing capital goods, and the user sectors and their organizations, in the development of the project. This method, it was felt, would allow not only for identification of the main obstacles to the development of the industry under consideration but also for the design of appropriate measures and schemes for coping with them.

Studies on demand were focused on the infrastructural and basic industry sectors. Apart from being methodologically more accessible to analysis, these tend to be sectors where public undertakings predominate. It was felt that the implementation of active policies would be more feasible in this sphere of the economy than in others, since the State has direct legal and

administrative authority over public undertakings. On the supply side, examination of the industrial situation was effected, as pointed out already, in respect of a group of medium-sized and small countries, embracing the countries of ALADI (with the exception of Argentina, Brazil and Mexico), Central America, and the Dominican Republic.

The results achieved on the basis of these activities by the end of the year 1981, when the world economic recession had not yet had any major repercussions on the region, may be summarized as follows: first of all, a picture was obtained of the structure (in terms of products) of a substantial part of regional demand for capital goods covering the following 10 years. Secondly, it was observed that Latin America represents a very significant part of world demand in certain sectors such as iron and steel-making, hydro-electric stations and cement plants. Thirdly, a significant level of installed capacity was detected under certain important headings of capital goods in the medium-sized and small countries. Fourthly, there was a decided under-utilization of installed capacity in this group of countries, especially under the heading of boiler-making and heavy metal structures; and finally, a preliminary identification was made of obstacles to national production of capital goods for the region as a whole.

During this stage, the regional project received support from the Commission on Regional Integration in Electricity (CIER), an organization which brings together the electricity plants of 10 Latin American countries to schedule the national programmes of schemes and investments in this sector. This collaborative effort made it possible for the first time to obtain a picture of demand covering the region as a whole for equipment for the generation, transmission and primary conversion of electricity. The work carried out in common gave rise to collaboration which has continued and will be referred to further on.

In April 1982, ECLAC convened a meeting of Latin American entrepreneurs with a view to examining the work of the regional project. This meeting, basically designed to provide guidance for activities under the project, also acted as a fruitful gathering point for the outstanding Latin American

leaders and entrepreneurs who attended and reached the conclusion that the capital goods industry was facing similar problems in the various countries of the region and that the difficulties could be overcome more easily if Latin American producers acted as a body in relation to them. This led to the establishment of an active nucleus of firms which later was to crystallize in an association.

In October 1983, following a series of consultations, the chairman of the working group set up on the previous occasion convened a new meeting at Buenos Aires. Here it was resolved to set up the Latin American Association of Capital Goods Industries (ALABIC), and draft statutes were approved. Contacts between the regional project and the authorities of CIER had suggested the possibility of holding a meeting between senior executives of the electricity plants and representatives of the Latin American industrialists concerned with capital goods. A suitable occasion would be the forthcoming meeting of CIER at Viña del Mar. At the Buenos Aires meeting, the industrial delegation was designated, and an outline of the presentation to be made was agreed. When the meeting took place the following month, the attitude of ALABIC was to point out that the Latin American capital goods industry had modern production installations, skilled workers and a high degree of technology, which made it possible for it to meet a considerable part of the requirements of the basic industries, especially those of the sector concerned with the generation, conversion, transmission and distribution of electric energy. Stress was also laid on the significance of the electricity sector's being able to count on a home-made source of supply within the region in the present circumstances of economic crisis and shortage of foreign currency. Finally, an attitude of solidarity was presented by the undertakings in the association in the form of an undertaking by the group to place the industrial experience of its more advanced members at the service of those just beginning.

CIER gave all this a favourable reception. At the time, the secretariat of ECLAC was collaborating on the preparation of the Latin American Economic Conference, which had been convened by the then President of Ecuador, Don Osvaldo Hurtado. The analyses of the regional product and the views of the industrialists and large-scale users served as a basis for

substantive reference documents for this event.

The Latin American Economic Conference was held at Quito in January 1984, when the "Quito Declaration" and "Plan of Action" were signed. These instruments contained various measures for reactivating the economy, and particularly for giving a boost to participation by regional undertakings in the provision of the equipment required by the Latin American and Caribbean countries. In particular, the secretariats of ECLAC and OLADE were urged to adopt "the necessary measures for devising and introducing suitable concrete mechanisms to cope with the regional demand for capital goods in the electricity generation sector".

The information compiled by the regional project, its contacts with industrialists producing equipment, undertakings seeking supplies, and national figures representing the sector, thus culminated in specific recommendations at the highest political level. Although the various types of action necessarily take a long time to mature, the fact that they form part of community proposals for the region and are explicitly propounded shows that the work of the project is definitely making headway in a very difficult field.

These introductory remarks are intended merely to situate in a broad context the analysis of the concepts expressed by the meeting of experts which is the subject of this report. The meeting does not constitute an isolated event; it is a part of a whole series of activities of various types being undertaken in conjunction with the project relating to capital goods in Latin America.

UNIDO has been actively associated in the development of the project (through the Sectoral Studies Branch of the Division for Industrial Studies) during the entire period under consideration. Fact-finding missions, special consultants and an ad hoc document for the meeting in question culminated in participation in the development and orientation of the meeting discussions by the chief and one of the senior officials of the Sectoral Studies Branch. This UNIDO contribution to the regional project has been maintained.

The meeting of experts with which the present report is concerned was held at ECLAC headquarters, Santiago, Chile, between 5-7 December 1983. It was attended by experts from Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela, as well as representatives of UNIDO and ECLAC and the members of the regional project working team.

The sessions were presided over by Mr. Carlos Ceruti, former President of the Association of Industrial Metallurgists (ASIMET) of Chile. The rapporteur was Mr. Antonio Valeiras, consultant engineer, of Argentina. The report was prepared by the regional project working team on the basis of a transcription of the discussions as well as the documents contributed by the experts, those prepared by the project itself, and the UNIDO reference document.

The chapters of the present report cover the main topics analysed by the experts. Chapter 2 contains an analysis of capital goods supply and demand in Latin America. Basically, this consists of a summary of the main sectoral activities of the regional project. The situation in the capital goods industry of each of the Latin American countries in turn is examined on the basis of international comparison, the structure of the regional market both in geographical and in sectoral terms during the 1970s, projections of demand by certain basic economic sectors, and an analysis of production capacity, for a group of medium-sized and small countries in the region.

Chapter 3 deals with policies for the development of the capital goods industry and obstacles to them. The discussions in the meeting focused largely on this topic. The comments and views centred on the following: the need for an explicit and permanent policy; the formulation and coordination of policies; the exercise of the purchasing power of public undertakings; financing; engineering and scientific technological development; marketing; development strategy and entrepreneurial cooperation. Since the participants came from a wide variety of national and institutional backgrounds, it may be considered that these topics constitute the basic aspects of a policy of capital goods development in the context of Latin America today. Nevertheless, it should be pointed out that there was no

serious discussion of any other important aspects. Basically, these are themes or options not essentially exclusive to the development of the capital goods industry but bound up with economic and industrial policies in general. Among the themes, mention should be made, for example, of the role played by the State (apart from the role it can play through purchases of machinery and equipment); technical standardization and quality control; training and further training of staff and manpower; censuses and industrial statistics; and sub-contracting.

Chapter 4 outlines the experiences of two Latin American countries in developing a capital goods industry. For this purpose, the cases of Brazil and Paraguay were singled out. Brazil is an example of a country where policies aimed at the development of a capital goods industry have gradually been applied. These policies have attained a high level of sophistication and coherence, and hence they constitute, if not a model, at any rate a fine example for other Latin American countries. The case of Paraguay indicates that even a small country, relatively underdeveloped economically, can achieve substantial progress in its capital goods industry provided there is the political will and provided entrepreneurial capacity is likewise forthcoming. It also illustrates the potential of Latin American cooperation in a specific context.

The final chapter is devoted to the exploration of certain areas for regional and international cooperation. The proposals and suggestions are arranged under two subheadings, the first relating to the establishment of a preferential mechanism, confined initially to the area of electric energy undertakings, with a view to purchases of capital goods of national and regional origin, and the second relating to possible working areas for ECLAC and UNIDO, especially in regard to the regional projects of the two organizations.

The annex contains the final report of the meeting of experts.

2. CAPITAL GOODS: SUPPLY AND DEMAND IN LATIN AMERICA

2.1 The capital goods industry of the Latin American countries in the world context

Over the last 30 years, world economy has expanded at a rate which has few precedents in modern history. This economic expansion, which found considerable support in industrial development and in a rapid growth of international trade, has manifested itself in virtually all parts of the world. It has been an age of expansion, and no-one knows whether the last world economic recession marks its end or merely the accentuation of a cycle after which the period of rapid growth could start up all over again. For the developing countries, with their basic needs only partially satisfied and populations still on the increase, the recovery of the previous rates of growth is not just a possibility but an imperious necessity.

One of the sectors benefiting most from this favourable turn of events in the economy has naturally been the capital goods industry. High rates of economic growth were made possible by the fact that over a sustained period a high proportion of the product was earmarked for investment, and particularly for investment in machinery and equipment. Empirically, it is possible to argue that both Latin America and the group of developed market economy countries at least doubled their demand for capital goods over each 10-year period prior to the arrival of the last recession.

Between the end of the 1970s and the beginning of the 1980s, Latin America and the Caribbean represented something like one-tenth of the demand for capital goods in the world, not counting the People's Republic of China. This estimate is merely approximate, since industrial production statistics do not make it possible to identify this category of products clearly. This participation by the region is decidedly higher than that based on a consideration of mechanical engineering products as a whole (defined as group 38 products in the International Standard Industrial Classification, second version, revised). One of the possible reasons is the relatively lower demand by the region for automobiles and other durable consumer goods. To get a clearer picture of the significance of Latin America and the Caribbean as markets for capital goods, it may also be observed that five countries in

the world: the United States, the Soviet Union, Japan, the Federal Republic of Germany and the United Kingdom, represent probably some 60-70 per cent of the world demand for capital goods. Thus Latin America and the Caribbean make up a third or fourth part of this demand if we exclude the five industrial Powers in question.

These figures provide an initial rough idea of the importance of the Latin American capital goods market in the world context. If we try to assess the dimensions of the market by considering the countries individually, a comparison may be made between the situation in the Latin American countries at the end of the 1960s, i.e. before the recession, and the situation in the industrialized countries going back 15 or 20 years in time. Thus we may find that at the end of the 1970s, Brazil represented the same market as the Federal Republic of Germany had about the year 1965. Mexico at the end of the same decade had a market comparable to that of the United Kingdom in 1960. Using the same terms of comparison, Argentina and Venezuela were the equivalent of Canada and Chile; Peru and Colombia, regarded separately, the equivalent of Denmark, Norway or Belgium. Latin America as a whole had a market similar in dimensions to that of the United States in 1965. The conclusion to be drawn from these comparisons is an important one: the market for capital goods in the Latin American countries, or at least that of the large and medium-sized countries of the region, is substantial and apparently sufficient to sustain the development of a machinery and equipment industry. It would be difficult to argue that the size of the market constitutes a serious limit on this industrial development. If there are limiting factors, they are likely to arise in other fields.

Going on to examine the situation of supply in the region, it may be noted that approximately half the demand for capital goods is met by imports. Naturally, this proportion varies considerably from country to country. Brazil and Argentina have attained high levels of self-supply - something like three-quarters or two-thirds of their needs. Mexico has reached somewhat lower levels, and as we look at smaller countries, the part represented by national industry in supplying the internal market gradually decreases. Hence there is a certain ratio in the region between the level of self-supply and the size of the market.

Apart from this, the internal markets are almost the only destination for capital goods production in the Latin American countries. The external markets are not yet significant, or they take only a small proportion of the production, even though in the case of some Latin American countries, particularly the Brazilian firms, exports have increased rapidly in the last few years.

Nevertheless, there was a need to assess the relative progress achieved by the various Latin American countries in regard to the production of capital goods. One way of approaching the problem was to compare the structures of industrial production and of external trade for a group of countries, including those which could be used as a base of reference. For this purpose, international statistical classifications offer a certain basis, although there are limitations on the identification of capital goods as a statistical category in the sense in which it is used in economic development: machinery and equipment manufactured by the mechanical engineering industry and intended essentially for investment.

One of the indicators roughly characterizing the production of capital goods is precisely that relating to the mechanical engineering industry as defined above. This industry covers a wider field than that of capital goods, since it includes the manufacture of consumer durables and some intermediate goods. A knowledge of the industrial situation in certain countries indicates that capital goods constitute a proportion varying between 40 and 60 per cent of mechanical production. Something similar occurs with the statistics of external trade. One of the headings similar to the concept of capital goods is section 7 of the Standard International Trade Classification (SITC), entitled "Machinery and transport equipment", although presumably the level of participation by capital goods is higher in this case.

Before we go on to comment on certain concrete situations, it may be well to recall certain factors necessary for a comparison of the industrial situations characteristic of the various countries, irrespective of their level of technological development. It might be thought that the countries relatively dependent on external sources for the supply of raw materials or

fuel would tend to emphasise exports of machinery and equipment. This supposition is justified by the observation that over the last 30 years, machinery and equipment have represented both a high and a growing percentage of world trade. Naturally, this emphasis within the export field would have to be reflected in the industrial structure of a country independently of its maturity or level of industrial development. One reflection on the other side might be made, of course, in relation to countries characterized by their rich natural resources. It would be reasonable to expect part of the income from exports of such riches to be utilized for the purchase of technologically sophisticated products, i.e. machinery and equipment, and these supplies would also be reflected finally in the industrial structure of the various countries.

The following assessment of the progress made in the production of capital goods in the Latin American countries is based on the situation of the whole list of countries in table 1. This shows four indicators. The first is the participation of the mechanical engineering industry in the manufacturing product of each country. It may be noted that Argentina, Brazil and Mexico have industrial structures similar to those of the developed countries. Brazil's situation is similar to that of Italy. Argentina is not unlike Spain or Finland, and Mexico can be compared to Portugal. In the other Latin American countries, the mechanical engineering industry has made less progress, although the countries with medium-sized markets, and even some small countries, show a significant development of such activity. Indicators B and C in the table show the participation of transport machinery and materials in total imports and in total exports of goods. Indicator D is the coefficient between exports and imports of transport machinery and materials. It may be noted that the Latin American countries are open to imports of such products to the same or a greater extent than the developed countries. The area where the Latin American countries differ decidedly from the developed countries is that of exports. In the latter countries, transport machinery and materials count for little in the export figures as compared with the situation in most of the developing countries. Brazil alone stands out among the Latin American countries as an exporter of transport machinery and material, and hence it is the only Latin American

Table 1. Indicators of development of the mechanical engineering industry ^{a/}

Country	A	B Percentages	C	D
<u>Latin America</u>				
Argentina	28.5	25.1	7.5	0.3457
Bolivia	4.9	42.8	0.0	0.0000
Brazil	34.8	23.3	18.2	0.5780
Chile	15.0	28.1	1.3	0.0381
Colombia	14.1	39.4	3.5	0.0443
Costa Rica	9.9	30.7	3.6	0.0766
Dominican Republic	7.1	22.2	0.1	0.0145
Ecuador	12.2	53.3	1.2	0.0187
El Salvador	7.4	24.2	2.0	0.0849
Mexico	22.8	36.5	4.5	0.1008
Paraguay	16.6	67.6	0.0	0.0000
Peru	14.6	30.3	1.8	0.0586
Uruguay	16.7	48.2	5.0	0.1189
Venezuela	15.4	29.7	0.3	0.0053
<u>Developed market economy countries</u>				
Australia	31.0	36.1	7.1	0.2163
Austria	32.9	28.9	27.1	0.6717
Belgium	33.1	22.5	21.6	0.8632
Canada	32.1	46.0	26.1	0.6213
Denmark	34.0	20.6	24.0	0.9932
Federal Republic of Germany	43.9	18.7	44.9	2.4721
Finland	26.6	26.6	17.7	0.6033
France	38.6	21.3	33.7	1.3046
Ireland	22.9	27.2	18.5	0.5171
Israel	40.8	25.7	12.1	0.2882
Italy	36.4	20.2	32.5	1.2601
Japan	41.2	6.0	58.4	9.0432
Netherlands	32.6	19.7	16.2	0.8148
New Zealand	25.0	27.7	4.3	0.1428
Norway	35.1	28.5	12.2	0.4654
Portugal	22.6	25.1	13.4	0.2649
Spain	29.3	17.9	26.3	0.9023
Sweden	42.8	26.8	39.7	1.3694
Switzerland		23.8	31.9	1.0918
United Kingdom	40.4	25.8	34.7	1.3064
United States of America	43.9	25.0	40.2	1.3944
Yugoslavia	32.5	28.0	28.4	0.5978

(Table I continued)

Country	A	B	C	D
	Percentages			
<u>Socialist countries</u>				
Czechoslovakia	40.0	36.1	46.7	1.2949
Hungary	36.0	29.2	32.1	1.0312
Poland	38.7	26.4	37.0	1.2935
Union of Soviet Socialist Republics		36.0	17.8	0.5537
<u>Developing countries</u>				
Republic of Korea	24.2	22.5	20.3	0.7110
Philippines	14.1	27.4	1.8	0.0460
Hong Kong	28.0	18.5	7.5	0.3302
Indonesia	15.1	33.5	0.5	0.0300
Singapore	51.6	29.4	26.4	0.7239
Turkey	20.7	28.1	1.9	0.0314

Source: ECLAC, Statistics Division; United Nations Yearbook of Industrial Statistics 1980, vol. I; Statistical Yearbook 1979/1980; Yearbook of International Trade Statistics 1980, vol. I.

a/ Column A : part played by value added for the mechanical engineering industry (heading 38 in the ISIC classification, Rev. 2) in manufacturing.

Column B : part played by mechanical engineering imports in total goods imports.

Column C : part played by mechanical engineering exports in total goods exports.

Column D : coefficient for mechanical engineering imports and exports.

country which can be compared to the developed countries. The situation in the Latin American countries is also eloquent if we examine the balance between exports and imports of transport machinery and material.

On the other hand, most of the developed countries export more than they import, or their exports amount to a substantial part of the imports of the products under consideration. Finally, it is interesting to note that the most industrialized developing countries in Asia, namely the Republic of Korea, Hong Kong and Singapore, already have structural indicators similar to those of the developed countries.

The external trade situation of the Latin American countries indicates a lack or inadequacy of reciprocal interchange of capital goods, unlike what occurs between developed countries. Also, this situation in the Latin American countries affects both the trade between them and their trade with the rest of the world, especially with the developed countries. While the Latin American countries, with the exception of the three largest countries, import most of their capital goods requirements, supplies come almost exclusively from third countries. This unsatisfactory relationship between the Latin American countries needs to be dealt with in the interests of greater industrial and technological specialization and complementation.

2.2 The regional market structure and the demand for heavy machinery and equipment

The identification of fields or sectors in which action can be concentrated at regional level for the development of the capital goods industry is one of the purposes of the regional project. In particular, possibilities of industrial development are sought for the medium-sized and small countries of the region. With these objectives in mind, an analysis was undertaken of the structure of the regional market calculated to provide a framework of reference for the specific investigation.

Below we look at the structure of the regional market from a twofold angle. In the first place, some comments are made in regard to the contribution of the various countries to this market. Basically, we are making a comparison of the dimensions of the national markets, which as we shall see means that we find once again at the capital goods sector level much the same differences as exist between the markets of the Latin American countries with more aggregate levels. Secondly, we see the composition of the regional market by sectors of demand. The analysis is retrospective. It covers the period 1970-1981 in the first instance and basically the 1970s in the second. As indicators of magnitude, we take investment in machinery and equipment and the value of imports of capital goods.

The Latin American capital goods market has marked geographical differences according as the countries' investment in machinery and equipment or capital goods imports are taken as the reference point. The situation for a group of 19 Latin American countries is shown in table 2. As may be seen, there is a decided lack of symmetry between the two market structures. Brazil and Mexico, as a group, represent 64 per cent of internal demand for capital goods in the region, whereas the other Latin American countries have achieved a similar proportion in regional imports of such goods. Argentina and Venezuela - countries which come next on the internal market scale to Brazil and Mexico - together import capital goods to the same value as the former. Chile, Colombia and Peru, taken as a group, represent 9 per cent of the regional domestic demand and account for imports of capital goods equivalent to those of Brazil or Mexico. In short, from the point of view of purchases of capital goods made by the Latin American countries abroad, the market constituting all the countries of the region except for the three industrially most advanced countries is substantially greater than that of any of the latter. In addition, looked at from the opposite angle, the share of the internal market absorbed by national production in Argentina, Brazil and Mexico as a whole is decidedly greater than the sum of imports of the other Latin American countries. Consequently, the development of production of capital goods in the medium-sized and small countries should be related not only to import substitution in each of their markets, but also, in a wider context, to possible participation in the

Table 2. Latin America^{a/}: Geographical structure of investment in machinery and equipment and of imports of capital goods

Country	Average investment in machinery and equipment b/ 1978 - 1981	Average imports of capital goods c/ 1978 - 1981
	(Percentages)	
Argentina	8.9	9.8
Bolivia	0.4	1.6
Brazil	38.1	17.5
Chile	2.5	5.5 -
Colombia	3.9	6.1 -
Costa Rica	0.7	1.3
Dominican Republic	1.0	1.0
Ecuador	1.4	4.3
El Salvador	0.5	0.8
Guatemala	1.0	1.4
Haiti	0.2	0.2
Honduras	0.5	1.0
Mexico	26.2	20.2
Nicaragua	0.3	0.5
Panama	0.5	1.0
Paraguay	0.6	0.7
Peru	2.4	5.0
Uruguay	0.8	1.2
Venezuela	10.1	20.9
<u>Total</u>	100.0	100.0

Source: Drawn up by the ECLAC/UNIDO/UNDP Capital Goods Project on the basis of information from the Division of Statistics and Quantitative Analysis of ECLAC.

a/ 19 countries.

b/ At 1982 prices, converted to the import exchange rate and readjusted to the value of the dollar according to the United States index of prices for capital goods.

c/ On the basis of the Clasificación por Uso o Destino Económico (CUODE).

internal markets of the three main countries without prejudice to any closer relationship between them.

Investment in machinery and equipment carried out by a group representing the economic and industrial sectors of one or several countries constitutes the sectoral structure of their internal demand for capital goods. Table 3 indicates the situation prevailing in Latin America in the 1970s according to an estimate of investment in machinery and equipment by 13 economic and industrial sectors. All in all, these represent approximately 70 per cent of the total investment in machinery and equipment of the national economies in question. In addition, it may be observed that the majority of these are sectors where business activities, and also purchases of capital goods, are concentrated in a small number of undertakings. Frequently, the predominant factor in these sectors is the public undertaking, which makes it possible to visualize the achievement of certain objectives of industrial development through administrative measures taken by the economic authorities. The table in question indicates that at least half the investment in machinery and equipment by the sectors identified corresponds to those characterized by a concentration of purchases of capital goods. In addition, it may be deduced that 80 per cent of the value of purchases by these sectors represents those under public control. Finally, it may be said that purchases by most of the sectors with the characteristics in question largely constitute machinery and heavy equipment, normally manufactured to order and in accordance with the specifications of the particular project.

Among the sectors which possess the characteristics mentioned is that of energy, because of its demand for capital goods. The electric energy sector alone represents 13 per cent of the financial demand identified. This sector and the petroleum sector combined constitute almost 30 per cent of the demand if we include oil refining and basic chemistry as part of the oil business. Mining and civil engineering, which in part of their operations use similar machinery, likewise represent all in all an interesting level of investment in machinery and equipment.

Table 3. Latin America. Geographical structure of investment in machinery and equipment and of imports of capital goods in 19 countries a/

Country	Investment in machinery and equipment 1976 b/	Imports of capital goods 1979 c/
	(Percentages)	
Argentina	10.8 ^{d/}	10.2
Bolivia	0.6 ^{d/}	1.5
Brazil	46.3 ^{d/}	16.2
Chile	1.8	5.1
Colombia	4.1 ^{d/}	5.5
Costa Rica	0.8 ^{d/}	1.3
Dominican Republic	0.9	1.0
Ecuador	0.8	4.2
El Salvador	0.6 ^{d/}	0.9
Guatemala	1.1 ^{d/}	1.8
Haiti	0.1 ^{d/}	0.1
Honduras	0.4 ^{d/}	0.9
Mexico	16.0	25.3
Nicaragua	0.3	0.2
Panama	0.6	1.0
Paraguay	0.6	0.8
Peru	3.1	3.5
Uruguay	0.6 ^{d/}	1.2
Venezuela	10.5 ^{d/}	19.3
Total	100.0	100.0

Source: Drawn up by the ECLAC/UNIDO/UNDP Capital Goods Project on the basis of information from ECLAC, Division of Statistics and Quantitative Analysis (Annexes III and IV).

a/ Based on the Clasificación por Uso y Destino Económico (CUODE).

b/ In dollars at 1970 user prices. Values in national currencies converted into dollars at the countries' import exchange rate.

c/ In dollars CIF at 1979 prices.

d/ Estimated on the basis of the average proportion of total fixed gross investment represented by investment in machinery and equipment in the period 1970-1975 (Document CEPAL/E/1021).

This evaluation of the structure of investment is based on the experience of the 1970s. The changes brought about during this period in the prices of energy products and the economic crisis which subsequently affected the region brought about a reorientation of investment the profundity and features of which are still unknown and difficult to foresee. The seriousness of the crisis has, among other things, invalidated a large part of the assumptions required for a projection of the overall and sectoral economic variables.

In these circumstances, all we need do is mention certain simple hypotheses in regard to possible changes in the structure of investment during the 1980s and later. It might be supposed that among the various sectors, energy would maintain its investment better than others. The consumption of energy is bound up with the maintenance and development of all economic activity and also constitutes basic consumption by the public, especially the rapidly growing urban public. In addition, the region possesses abundant energy resources and vast geographical areas which are still not exploited in this respect.

The mining sector is another of those which will sustain a certain level of investment in machinery and equipment if only because of its heavy demand for renewals and maintenance of equipment. While these reflections do not exhaust the topic, they do at least provide an initial indication in regard to certain possible pillars of demand for heavy machinery and equipment over the next few years.

2.3 Projections of demand by certain economic sectors

2.3.1 Demand by the electric energy sector

Working in collaboration with the Commission on Regional Integration in Electricity (CIER), the regional project carried out an investigation of schemes and investments in operation over the period 1980-2000 in 10 Latin American countries. The group of countries embraces those where there are

electricity undertakings members of CIER. In addition, data were compiled on programmes in Mexico and the Central American countries.

The programmes in question indicate an expansion of the generating capacity of the region by 147,000 MW in hydroelectric plants and 44,000 MW in thermoelectric plants. The analysis concentrated mainly on the assessment of stations with a capacity higher than 100 MW. Data on smaller stations were only compiled when they formed part of the information on large-scale stations.

An analysis of the programmes indicates for the decade 1991-2000 an increase in generating capacity less marked than that for the previous decade, a fact particularly noteworthy in the case of thermoelectric plants. The explanation would appear to be that for the final decade of the century, the programmes are defined only partially and for one or two countries. In addition, the construction of conventional thermoelectric plants requires a shorter planning period than that of hydroelectric plants.

Latin America has relatively high indices of growth of installed capacity for generation, especially in the hydroelectric sector. In the last three decades, the rate of annual growth of overall installed capacity has remained fairly steady at a level of approximately 10 per cent. Hydro installed capacity evolved from 1960 at a slightly higher rate. The plans for the expansion of installed capacity consolidated at regional level give an annual rate of growth of installed capacity for the 1980s of 9.1 per cent at the overall level, 10.3 per cent in the case of hydro plants, and 8.4 per cent for thermal stations. For the projection of installed capacities between 1979 and 2000, somewhat lower rates have been used.

The findings of this projection indicate for the period 1980-2000 an increase in generating capacity of 283,000 MW for hydroelectric plants and 112,000 MW for thermoelectric plants. The industrial significance of the demand for machinery and equipment deriving from this expansion can be illustrated by estimating the number of hydraulic turbines and thermal turbo

units installed during the period of reference. The data on the programmes relating to the period 1980-1990 indicate that hydraulic turbines have a mean rating of 142 MW and thermal turbo groups 172 MW. On the basis of these parameters, the demand for the period 1980-2000 can be estimated at 1913 hydraulic turbines and 647 thermal turbo groups.

Over the last few decades, the generation of electricity in Latin America has come mostly from the vast water power potential possessed by the region. In 1979, 60 per cent of the region's generating capacity came from this source. The results of the projection of electricity generation capacity to the year 2000 also reflect this situation. In contrast, the still unexploited hydroelectric potential of the industrialized market economy countries is steadily becoming exhausted. In these circumstances, Latin America represents at the present time an important proportion of the Western world's market for hydroelectric generation equipment. In addition, the region is tending to increase its importance rapidly in these markets. The following figures illustrate the trend: during the period 1961-1970, the region installed hydroelectric plants with a rating equal to 17 per cent of the total installed capacity in the OECD countries. During the period 1970-1979, the participation rose to 23 per cent. Estimates for the period 1981-1990 bring the figure up to 30 per cent, and for the period 1991-2000 to 42 per cent. By the year 2000, the region will still have substantial reserves of hydro resources.

Two further considerations need to be made in regard to hydroelectric generation programmes. In the first place, it may be mentioned that the geographical distribution of the programmed increases in the countries' generating capacity favours the medium-sized and small ones. Actually, 41 per cent of the increase in the region is accounted for by the group of countries not including Argentina, Brazil and Mexico. This non-typical situation in the demand for capital goods in the region opens up interesting prospects for an effort at industrial complementation, with countries of varying sizes taking part.

Secondly, an attempt has been made to evaluate the industrial significance of such joint action for the medium-sized and small countries. With this in mind, an analysis was made of the various components of concrete hydroelectric projects from the point of view of the real possibilities of manufacture existing in these countries. Although there are appreciable differences between various hydroelectric plants with regard to the type of turbines and other components, an examination of various projects has shown some coincidence as regards the importance of less complex equipment as part of the supply package. For example, an analysis was made of a station with two 150 MW turbines and a height of head of 180 metres, giving the following quantities of equipment, including those of relatively simple manufacture: 1070 tons of penstocks, 70 tons of gratings, 265 tons of crane structures, 740 tons of miscellaneous structures, and 4000 tons of pressure pipes. As regards this last component, it was found that the figure was abnormally high and that a more representative value would be 1500 tons. If we take this adjustment into account, the quantity of equipment relatively accessible to the capital goods industry of the medium-sized and small countries would amount to 3645 tons, or 12.2 tons per MW of installed capacity.

The remaining components, more complex and of higher value per ton, amount to some 3000 tons, the equivalent of 10 tons per MW.

2.3.2 Demand by the cement industry

The expansion of the Latin American cement industry would mean over the next 10 years a demand for 139 plants or kiln units with 104 million tons of production capacity annually. The total value of the machinery and equipment for these plants would amount to \$7 billion f.o.b. or \$9 billion in terms of investment cost.

The demand for new cement plants arises mainly in the three largest countries of the region. Nevertheless, the remainder of the countries taken jointly likewise represent a substantial volume of demand, bearing in mind

that it would mean two new plants each year over the next 10 years-

With regard to specific equipment, demand by the Latin American cement industry would consist of 139 rotary kilns, 243 limestone crushers and 278 ball mills for grinding crude metals and clinker. In addition, 834 heavy duty motors would be required (six per plant, generally speaking of upwards of 500 h.p., except for the main motor of the rotary kiln) with a total rating of 1.7 million h.p. and 556 large-scale speed reducers with a total of 1.3 million h.p. (for the ball mills, primary limestone crushers and rotary furnaces).

If we bear in mind the participation figures representing boiler-making, large-bore tubing, metal structures, conveyor belts and rotary kilns, it may be concluded that in the workshops of the medium-sized countries it would be possible to manufacture at least 40 per cent by weight and 20 per cent by value of the cement plant equipment, excluding refractories. Participation by the mechanical workshops of certain small countries in the supply of equipment and structures might also be important in certain cases.

These participation percentages could be increased if the manufacturers in the medium-sized and small countries could obtain technical support from the industries in the more advanced countries of the region.

2.3.3 Demand by the paper pulp (cellulose) industry

An analysis of the existing projects for production in Latin America indicates that the size of future expansion and new plants over the medium term is likely to amount to 110,000 tons per annum in the case of chemical pulp and 60,000 tons per annum in the case of mechanical pulp. On the basis of these findings, it can be estimated that during the period 1982-1991, 55 chemical pulp and 32 mechanical pulp plants will have to be constructed in the countries under consideration.

The demand for machinery and equipment for the manufacture of cellulose is estimated over the next 10 years at approximately 444,000 tons, the equivalent at ex-factory prices of \$2.3 billion. Of this, demand by the chemical pulp plants would represent 413,000 tons, equivalent to \$1.9 billion, the difference being the demand by the mechanical pulp plants.

Demand by the industrially less advanced countries of the region - the Andean Group countries, Chile, Uruguay and the countries of the Central American Isthmus - would amount to 116,000 tons, equivalent at ex-factory prices to \$614 million. If we bear in mind the technical manufacturing capacity at present available in these countries, local supply could amount to 26,400 tons, equivalent at market value to \$614 million over the next 10 years, representing 23 per cent and 26 per cent respectively of the total demand by the countries in question. In the event of conditions arising for cooperation with equipment manufacturers in the more advanced Latin American countries, the local participation level for some of the less advanced countries might amount to 65 per cent in terms of weight and 47 per cent in terms of value.

2.3.4 Demand by metal mining

Mining is a traditional and decidedly important economic sector in various countries of Latin America. In some of them, this sector not only contributes in a considerable measure to the formation of the gross domestic product, but through exports of their production constitutes the main source of foreign currency.

The maintenance and development of mining activities calls for the provision of large volumes of machinery and equipment, some very specific and others of a type common to various productive sectors and largely imported from the developed countries. In addition, mining purchases large quantities of spare parts and industrial consumer goods of metal. To ascertain the extent and composition of this demand, an investigation was carried out covering the metal mining industry, as the most important

activity of the sector in several Latin American countries.

The investigation covered both the preparation and working of the mines and also the processes of concentrating the mineral, including its transport between the various operational centres of the deposits and the services indispensable for the development of extractive and betterment activities (ventilation, compressed air, water, electric energy, etc.). The study was confined to five South American countries (Argentina, Brazil, Chile, Peru and Venezuela), and it covered copper, iron, aluminium and the so-called "polymetallic metals" (copper, lead, zinc and silver) which are of great relative significance in those countries. Mexico was not included, although it is a great mineral producer, since there already exists a study on the subject carried out by the Joint Capital Goods Project NAFINSA/UNIDO^{1/}.

The demand for mining machinery and equipment comes from various quarters: first of all from the opening up of new mines and the expansion of existing mines, and secondly from the exhaustion and obsolescence of operational units. Consequently, the features of the main investment projects, and the operating conditions in the existing mines, constituted important background material for the investigation. This information was obtained, following a study of the literature, through consultations with government officials and mining officers, and through visits to certain deposits being worked in the five countries.

The background material compiled on these occasions made it possible to analyse the technology applied and the installation of equipment in various operating conditions. In addition, an assessment was made of the criteria used by the mining companies for the renewal of equipment, and data were obtained on the specific consumption of various types of metallic waste. The results of this analysis were extrapolated for use in the inventory of

1/ National Financial Corporation (NAFINSA). La demanda de bienes de capital para la minería en México, Joint Capital Goods Project, NAFINSA/UNIDO, Mexico City, 1982.

investment projects and working mines. It may be mentioned that the only investment projects included in the list were those which were due to enter into commercial production within the period 1986-1995. There is a time-lag of three years between this period and that of demand for machinery and equipment, this being regarded as the average time lapse between the purchase of these materials and the beginnings of production of a mine, so that the investigation into demand for equipment covers the period 1983-1992.

The findings of the investigation reveal Latin America's importance as a market for mining machinery and equipment. Metal mining alone in the five countries represents over a period of 10 years a demand for 140 power shovels of over 10 cubic yards, 870 tip-up trucks of over 70 tons, 200 ball mills, bar mills, exogenous units of over 1000 h.p. and 550 caterpillar or wheel tractors of over 200 h.p. If we include replacements and grinders and perforators, demand amounts to \$6,250,000 f.o.b. Within this figure, machinery and equipment represents 53 per cent, and spares and other materials 47 per cent.

The demand for machinery and equipment comes largely from two medium-sized countries out of the five considered. Chile and Peru represent 65 per cent of the total demand for these goods, as generated by investment projects. This points to the desirability of exploiting the possible manufacture of mining equipment and materials by the economies of medium-size and small countries having the necessary resources.

The analysis of demand looked into a very wide variety of machinery and equipment, and in some instances even made a distinction between various sizes of material. The estimates refer to over 30 different items, which made it possible to carry out a preliminary study of the possibilities for local manufacture existing in the medium-sized countries. Although these possibilities have not so far been estimated in quantitative form, an identification was made of the equipment that could be manufactured from scratch or with a fairly considerable component of local material. The first group includes feeders, classifiers, vibrating screens, hydrocyclones, flotation equipment, thickeners, filters, conveyor belts and wagons. In

addition, certain not specifically mining equipment is included in this group, e.g. metallic structures, tanks, water pumps, ventilators, electrical transformers and switch-boards. The second group, covering partial manufacture, would include rotary perforators and track-laying perforator wagons, power shovels of 3-10 cu. yds., frontal loaders up to 7 cu. yds., off-the-road lorries up to 70 tons, cone-shaped grinders up to 7 ft., and ball mills or ball bars under 1000 h.p. Components which could be manufactured in medium-sized countries are basically chassis parts, hoppers, taps, scoops, steel cables, pulleys, cabins, hydraulic cylinders and various cast steel components.

2.3.5 Demand by the other economic sectors

Below are a number of very brief comments concerning other demand sectors. This information, added to that mentioned above, can help to give a picture of the dimensions of the market as a whole, or in individual cases to underline economic situations worthy of special attention.

A. Maritime transport. Adopting a fairly conservative attitude, it was considered that in the 1981-1990 decade the demand for craft by the regional merchant fleets would amount to 6.7 million gross registered tons (GRT).

B. Rail transport. For the same period, and taking account of rolling stock only, we reach an overall requirement of 4000 locomotives and 80,000 goods wagons.

C. Iron and steelmaking. The evolution of this highly dynamic sector brought the overall production capacity up from 4 million tons of steel in 1960 to 36 million in 1980. The analyses made at the beginning of the present decade showed a series of projects which, if they materialize, would add a capacity decidedly greater than 50 million annual tons of steel. The critical world situation and the circumstances of each project suggested a reduction of this forecast to the more likely figure of 39 million tons,

which since the middle of 1982 has been reduced to 33 million tons, a figure that had to be reduced still further by the time the meeting of experts was held.

Nevertheless, the sustained growth, combined with the excessive unsatisfied needs in the Latin American economies as a whole, makes it necessary to regard with some concern the suspension of projects on such a large scale. Economic recovery at the historic growth rate could be held up by the possible failure to supply steel. Everything suggests maintaining a close watch on the trend in a particularly critical sector, quite apart from the fact that its reactivation would create considerable demand for equipment which could be dealt with by regional industry.

D. Agricultural machinery. In the mid-1970s, the Latin American countries were importing annually some \$700 million worth of agricultural machinery. Of this figure, almost three-quarters represented tractors and some 14 per cent harvesters and threshers. On the other hand, round about 1974 regional production amounted to almost \$1000 million at that year's prices, and there was even some \$70 million of exports recorded, predominantly from Brazil and Argentina and almost entirely within the region itself (the item is included in the import figures in the previous section).

2.4 Regional production capacity

As already pointed out, the development of capital goods production has been very uneven from one country to another, depending on the development both of the domestic market and of the policies maintained by each country and the effectiveness with which in each instance specific promotional measures have been applied. Thus, in the years 1978-1981, Brazil attained a level of self-supply of something like 80 per cent. For the region as a whole, the figure is a great deal lower. The medium-sized and small countries import virtually all their equipment, even parts which their own industry would be capable of manufacturing. In addition, even the larger countries have recently had to reduce the proportion of local manufacture

for financial reasons, making it essential for them to suspend complete projects.

It is difficult to evaluate realistically the physical production capacity of the region as a whole. The unfavourable economic situation has reduced the percentage to which this capacity is exploited, both in the countries with large markets and in the medium-sized and small countries.

In some Latin American countries, capital goods production increased at an accelerated rate during the period prior to the economic recession which hit the region. This speed-up in production was brought about partly by a strong expansion in demand as a consequence of obtaining and investing abundant financial resources. The expansion of installed capacity was likewise given a boost by the Governments as part of their development strategies.

When the crisis occurred, there was a sudden fall in investments, even in economic sectors which were important for their demand for equipment of national origin. In view of the depth of the recession, it is possible that the recovery of the former investment levels may be slow, and it may be that the economic recovery of the countries implies changes in the sectoral direction of investments, which ultimately would be reflected in a change in the structure of demand for capital goods. These trends and circumstances would seem to indicate that the capital goods industry in certain Latin American countries may be over-dimensioned or ill-adapted to the new requirements. Export of capital goods as a means of using the installed capacity over the short term in this industry is only partially viable.

In the field of capital goods, the three large countries in the region possess production capacity which is well diversified and quantitatively considerable. Industry in these countries can in large measure meet the needs of the market, while the supply position of the other Latin American countries is considerably more restricted. Assessments made within the

framework of the regional project and as part of national efforts have made it possible to identify this supply to some extent in a number of medium-sized and small countries. Basically, a notion was obtained of the production capacity in terms of finished products and manufacturing installations in Central America as a group, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela and more recently, the Dominican Republic. The volume of supply varies naturally from one country to another, but they have certain features in common.

Tables 4 and 5 give information in summary form concerning indicators of production capacity for boiler-making in the countries in question. (No mention is made there of the mass products which were included in a special report on production capacity in certain countries.)

This partial reference is given to illustrate the manufacturing skills which already exist in a number of medium-sized and small countries, using processes which, although simpler, are at the same time extremely flexible for producing engineering products and needed for constructing a wide variety of final products.

Even though under the next heading we shall be looking more closely at the obstacles to the expansion of Latin American production of machinery and equipment, and a number of ways of overcoming them, it may be well here to make a few comments on the limitations on physical production capacity. Reference has already been made to the differences in this respect between countries, and it has been emphasised that there is no overall market; only the juxtaposition of miscellaneous national needs. The large extent to which the region is supplied by third countries, and the economic situation of under-utilization of installed capacity, reveals an interesting opportunity to turn a large proportion of its domestic demand inwards towards the region.

An effort in this direction will only be effective if the benefits to be derived reach the various countries and at the same time help those whose

Table 4. Indicators of capacity of the boilermaking industry in some Latin American countries

Country	Cold rolled plates (maximum thickness) a/	Far ends and headstocks (maximum diameter and thickness)	Lifting capacity c/	Tension relief furnace
Bolivia	19 mm (3/4")	2.5 m x 5/8"	10 t	
Central America (Guatemala)	19 mm (3/4")	2.5 m x 5/8"	10 t	
Chile	50 mm (2")	4.0 m x 7/8"	55 t	4.0 x 5.0 x 20.0 (750°C)
Colombia	60 mm (2.3/8")	4.5 m x 1.1/2"	120 t	5.6 x 5.6 x 23.0
Dominican Republic	32 mm (1.1/4")		30 t	3.0 x 2.5 x 10.0
Ecuador	45 mm (1.3/4")	3.0 m x 1.1/2"	30 t	
Paraguay	75 mm (3")	b/	60 t	6.0 x 4.0 x 10.0 (950°C)
Peru	80 mm (3.1/8")	4.0 m x 1.1/2"	60 t	6.0 x 5.0 x 8.5
Uruguay	19 mm (3/4")	...	20 t	2.5 x 2.5 x 10.5
Venezuela	75 mm (3")	5.0 m x 1.1/2"	200 t	6.5 x 6.5 x 18.0 (959°C)

Source: ECLAC, based on information supplied by the undertakings.

a/ Plates 3 m wide, except in the case of Paraguay and Venezuela where the width is 4 m.

b/ Three dots (...) means that data are not available or are not separately reported.

c/ Using auxiliary means.

Table 5. Estimated production capacity for boilers and structural products in selected Latin American countries (in tons per annum)

Country	Metal structures	Storage tanks and conduits	Pressure recipients, columns	Heat exchangers	Total
Bolivia	2,000	1,000	500	-	3,500
Central America	4,000	2,000	500	-	6,500
Chile	18,000	15,000 a/	3,000	1,000	44,000
Colombia	15,000	15,000	8,000	3,000	41,000
Dominican Republic	4,200	1,500	800	200	6,700
Ecuador	6,000	8,000	2,500	500	17,000
Paraguay	...	...	...	...	7,200c/
Peru	12,000	10,000	4,000	2,000	28,000
Uruguay	...	...	...	...	...
Venezuela	65,000	35,000	20,000	10,000	130,000

Source: ECLAC, information supplied by the undertakings.

a/ Including capacity existing at the CAP steel plant (5,000 tons per annum).

b/ Three dots (...) means that the data are not available or are not separately reported.

c/ Maximum production capacity of the largest boilermaking plant in the country.

activities in the sector are still incipient. It may be well at once to point out that this is not easy to bring about; but it is feasible provided a political decision is forthcoming.

As an illustrative example of the need for hydroelectric equipment, mention has been made of the extent to which, faced with a specific situation, the existing industries could play an important part in many medium-sized and small countries. With regard to the sectors which have already been the subject of analysis (and which as a whole represent a very substantial proportion - some 40 per cent - of the regional demand for capital goods), figures may be quoted relating to other cases which indicate that combined action by undertakings and countries at various levels of advancement can help to increase the level of activity on both sides. In other words, a well-structured collective intention to place regional demand at the service of progress of the industry would not be limited in its effect to the most advanced undertakings in the larger countries.

Merely for the purpose of justifying this assertion, it may be pointed out that the equipment for programmes for the expansion or construction of cellulose plants in the Andean Group countries and those of the Central American Isthmus could be supplied to the tune of some 30 per cent of its weight by the existing industry in those countries. If we presuppose close collaboration with sophisticated undertakings in the region itself, this participation could be higher than 40 per cent. Some 60 per cent by weight of the need for equipment for cement production, for example, could be handled by industry in the medium-sized countries. The requirements by way of iron and steel equipment could likewise be met to a considerable extent by medium-sized industries, even though the diversity of processes makes it difficult in this case to put forward an overall percentage figure.

3. POLICIES FOR THE DEVELOPMENT OF THE CAPITAL GOODS INDUSTRY, AND OBSTACLES TO THEM

3.1 Notes for a framework of reference

An examination of experience in different countries indicates that the origin of the capital goods industry in the Latin American countries is not of recent date. Because of the lack of external supply, this industry expanded considerably in a large part of the region during the Second World War. When trade was re-established with the industrialized countries in the post-war years, many capital goods industries faded out. In subsequent years, wholesale import restrictions were adopted in the region because of balance-of-payments problems. These measures gave a certain boost to the production of capital goods, although it was only slight because of its temporary nature and of a certain liberality in the granting of licences to import goods regarded as essential.

During the following stage, economic development policies based essentially on import substitution were adopted, so that the measures for restrictions on external trade took on a more definite and permanent character. These policies were not, however, clearly intended to promote specifically the production of capital goods. While there was marked customs protection, this was offset by the frequent tendency for incentives to development of certain sectors or projects to take the form of authorizations to import the necessary equipment, or by customs exemptions.

Around the mid-1960s, policies were adopted in the region to promote exports with a view to diversification of external trade and incorporation of non-traditional products, particularly manufactures. Among other measures, there was a certain liberalization of imports, and tariff reforms were applied which amounted to a reduction of the protection given to industry. During these years, some countries adopted measures to promote the capital goods industry, but circumscribed them to one or other specific activity or programme of national purchase by particular public undertakings. The scope of these initiatives was limited. At the same time, action was

taken to bring about liberalization of intra-regional trade within LAFTA in the form of sectoral programmes, including some branches of capital goods. During this period the Andean Group was set up; it rounded off the process of trade liberalization among its members by means of a programme of sectoral promotion of the mechanical engineering industry. This sectoral programme was essentially concerned with capital goods.

Ten years later, as a result of the first crisis in the oil market, the Latin American countries opted for a variety of development strategies. While some persisted in industrialization strategies, adopting more and more coherent policies for the promotion of the capital goods industry, others decided in favour of a neo-liberal approach, with opening up of their markets, emphasis on comparative advantages as a basis for the development of production, and the principle of the subsidiary role of the State in economic activity. Examples of the former approach are Brazil, Mexico and Venezuela. In Mexico and Venezuela, the oil bonanza stimulated investment in the national economies, which in turn stimulated local production of capital goods (even though imports of the latter grew more rapidly), while the second approach was adopted by the countries of the Southern Cone. Whereas the capital goods industry increased tremendously in the former group of countries, there was a notable decline in this type of activity in the others, where attempts to stabilize the currency led to the maintenance of the exchange rate over long periods, which brought about an over-valuation of the national currencies and ultimately depressed the manufacture of capital goods still further.

Towards the end of the 1970s there was a second extraordinary rise in oil prices - a fact which was to have profound consequences for the Latin American economies. The oil crisis affected not only the developing countries which imported oil, primarily from the industrialized market economy countries, the main centres with which the Latin American countries carry on their regular trade. Even though the former countries reacted rapidly to this crisis, one of its effects was its depressing influence on the economies, and this could have been one of the causes of the deterioration in the prices of raw materials affecting Latin American exports. One

of the ways in which the industrialized countries reacted was by intensifying their efforts to export manufactures, particularly capital goods on a mutual basis, using financing for this purpose as one of the most effective instruments.

A second occurrence which was to influence the destabilization of the Latin American economies was the extraordinary rise in interest rates in the main international financial markets as a consequence of the growing fiscal imbalance in the United States and the method adopted to finance this deficit. Already during this period, external financing by the Latin American countries was based largely on credits with private banks. A feature of these credits is the fluctuations in interest rates on the basis of the movements produced in international financial circles and in turn depending to a marked degree on the monetary policies of the United States.

Beginning with the last years of the 1970s, the Latin American countries began to have recourse in a more general and growing measure to external indebtedness. In the oil-exporting countries, where it was hoped to maintain or increase in the future the high level of revenue in foreign currencies, major development projects were put forward. Among the oil-importing countries, some had recourse to external debt to develop local energy sources which could help to replace imported oil. This group of countries, and various other countries of the region, also invested in a large number of projects for exploiting natural resources and basic industrial products with a view to increasing exports. Finally, there were countries which accepted external financing so as to bypass what was felt to be a cyclical situation and to offset the deterioration, allegedly transitory, of the terms of trade and savings.

In some countries in the region, the capital goods industry could have benefited at the beginning of this stage. However, the combined effect of the growing imbalance in the balance-of-payments situation, the policy of the industrial countries to use financing in preferential terms and conditions for the promotion of their own exports of capital goods, and the restrictive adjustment policies applied in the countries of the region,

rapidly depressed the situation in the Latin American capital goods industry, even in those countries where originally priority had been given to its development. In addition, the crisis caused changes in the sectoral structure of investment and hence in the composition of demand for capital goods, so that the impact of the recession on the various branches of the machinery and equipment industry was lopsided. It would appear that equipment manufactured to order, mainly that required for major development projects, was one of the branches most affected by the crisis.

Against this backdrop, sketched very roughly, the observations of the experts relating to the various obstacles to the capital goods industries need to be interpreted. The experts examined the economic and industrial situation in their particular countries, and also made comments on the promotion policies followed in some of them. The views expressed make it possible to identify a variety of obstacles to the development of the capital goods sector, and on the other hand to define criteria for sectoral promotion policies. The enumeration given below is based on the thematic arrangement of the deliberations, and it should be borne in mind that the comments of the experts frequently refer to situations specifically affecting capital goods manufactured to order and to purchases made by undertakings in the basic sectors.

3.2 Need for an explicit and permanent policy

The advantage of having a capital goods industry with official support for its development is a matter of controversy in the region. In some countries, the topic has fallen into oblivion or is not raised as a present-day issue. Some national sectors concerned with demand have not gone along with government efforts directed towards the development of a capital goods industry. In other instances, the discrepancies which have arisen between the various protagonists, or the apathy of some of them, have resulted in the abandonment of efforts which had already shown real promise.

Some experts coming from medium-sized countries considered that the limitation of the national market represents a real obstacle in the way of

undertaking production of a certain level of complexity or requiring elaborate installations. The efforts made in the region to bring about agreements making it possible to support the operation of a productive unit on various national markets opened up as a group have not given the results that were expected. Nevertheless, this would seem to be the only means of solving a basic problem, and in the view of the group of experts it will be essential to insist on it.

Because of the lack of an overall view of national demand, the inadequacy of the national markets tends to be more apparent than real. Projects are considered as isolated events, and neither the authorities nor the undertakings perceive the potential significance of a series of projects in a certain sector of demand, or the technological similarity between the requirements of various sectors. In addition, normally, no thought is given as a whole to projects which are carried out over a period of several years.

This lack of a multisectoral overview covering a number of years makes it impossible to envisage the real dimensions of the market. During the meeting it was noted that even countries in the region which have large markets have lost the opportunity to develop substantive industrial activities by failing to take advantage at the right time of the manufacturing promotion possibilities.

Over the last few years, efforts have been renewed in various countries to establish active policies making it possible to take advantage of the real possibilities of the individual markets. Mention might be made in chronological order of a specific project by National Finance Cooperation (NAFINSA) in Mexico City, the activities of the Ecuadorean Capital Goods Commission (CEBCA), the work of the National Council for the Development of the Capital Goods Industry (CONDIBIECA) in Venezuela, the programme of the Colombian Institute for External Trade, and the recent reactivation of the (private) Corporation for the Technological Development of Capital Goods in Chile.

3.3 Formulation and coordination of policies

The complexity of capital goods production calls for a high degree of specificity and coherence in promotional measures. In some cases, we find an undue confidence in the functioning of instruments which taken by themselves are inadequate, or are merely temporary or discretionary - a state of affairs incompatible with the development of an activity which requires a long time to mature. This is the case with tariffs and quantitative restrictions on imports. Industrial protection is only one of the objectives of customs tariffs, and in circumstances of crisis in the balance of payments it is not the most important.^{2/}

On the other hand, it is technically difficult to formulate coherent tariff structures, and they are frequently dictated by pressure groups rather than dependent on an economic rationale. In addition, purchases of capital goods for development projects or for national purposes are frequently exempt from payment of import duties. In the more specific case of projects financed by international credit organs, the comparison of offers to supply goods is established on the basis of a preferential margin of 15 per cent for the national supplier or the tariff, whichever is lower. Such arrangements rob tariffs which are higher than the official margin of preference of their effectiveness. These comments apply partly also to non-tariff barriers such as prior licences, import quotas, prohibited items, prior deposits and financing restrictions. At the present time, these measures are applied fairly widely in the case of capital goods and other mechanical engineering products in the region, at any rate between the countries members of ALADI. Nevertheless, they constitute emergency and hence temporary measures according to the GATT Agreement, to which a large

2/ Valenzuela, J.G., Non-Tariff Barriers in the ALADI Countries, Latin American Integration No. 87, January-February 1984, INTAL, Buenos Aires. See also Torres, J.A., Study on Non-Tariff Barriers in the ALADI Countries, ECLAC, LC/R.367, September 1984.

number of Latin American countries have become contracting parties^{3/}. In addition, the Quito Declaration and Plan of Action^{4/} require the Latin American countries not to introduce new non-tariff barriers on imports from the region and to eliminate or attenuate those already existing on a progressive basis. Within the framework of ALADI, resolution 5 (II)^{5/} is more specific and also entails the non-introduction of new non-tariff barriers over a maximum period of three years.

Tariffs are thus only effective as measures protecting the national production of capital goods if they are combined with other promotional instruments. This observation is particularly valid in the case of capital goods manufactured to order, in other words those which are preferably part of purchases made for large investment projects.

In the Latin American countries, industrial promotion has been largely based on the administration of fiscal incentives. These consist essentially of exemptions from or reductions of direct and indirect taxes. As such they reduce the price of the capital goods paid by the investor and also tend in one way or another to increase the economic return on the project or to reduce the investment risk. In practice, fiscal incentives to productive investment have had a counter-productive effect for the local

3/ Of the ALADI countries, Argentina, Brazil, Chile, Colombia, Peru and Uruguay are contracting parties to GATT. Of the Central American Common Market countries, Nicaragua is the only country which belongs to GATT. Others are the following Latin American and Caribbean countries: Barbados, Belize, Cuba, Guyana, Haiti, Jamaica, Dominican Republic, Suriname and Trinidad and Tobago.

4/ Quito Declaration and Plan of Action, Latin American Economic Conference, Quito, January 1984.

5/ ALADI/CM/II, Final Act of the Second Meeting of the Council of Ministers of Foreign Affairs of ALADI, Montevideo, April 1984.

production of capital goods. This has been particularly the case where the incentives consisted of exemption from import duties on capital goods, since these were applied without regard to the existence or otherwise of similar national products. The controls introduced to prevent discrimination against national production have often turned out to be ineffective. One cause of this is the dispersal of organs of enforcement, which are located in various government departments. Some countries have remedied this situation by setting up mechanisms for inter-ministerial coordination. On the other hand, the reduction of direct taxes, particularly in the form of authorization for rapid depreciation on machinery and equipment of national origin, would appear to have been more effective, although more restricted in its application in the region, than the other fiscal incentives.

The experts pointed out that in most of the Latin American countries there is no policy for encouraging the capital goods sector. With a very few noteworthy exceptions such as Brazil, the countries have not become clearly aware of the importance of the sector as a promoter of technological progress and a stimulus to economic activity. In some countries, provisions have been made for the protection of local production of machinery and equipment, but quite frequently these are not really effective.

On the other hand, the industrialized countries have and maintain promotional policies which give a boost to the development of their capital goods industry. These policies frequently aim at technical development and exports of machinery and equipment. Some also try to keep technical control over a vertically integrated chain of activities: prospecting for raw materials, extraction and processing, marketing of and technologies for using the goods produced. In the Latin American countries, the normal practice is to keep technical control at certain stages only or not to have any control at all.

The lack of explicit policies in the region is evident, for example, from the fact that only exceptionally do State undertakings or Governments

use their purchasing power in their external negotiations concerning investment projects. Thus it would be possible to obtain adequate participation by national industry in the supply of machinery and equipment. At the regional level, the possibility of joint negotiations is just beginning to be explored.

Promotion of the capital goods industry requires the coordination of a whole series of instruments, the chief among them being State purchase, financing of State purchases, financing of purchases and sales of capital goods, technological development and the dissemination of information on investment projects and analysis of such projects (technological disaggregation), as well as the "classic" instruments of tariff protection and fiscal incentives.

3.4 Exercise of the purchasing power of public undertakings. Need for support in local supply

In the Latin American context, there is a traditional preference for products imported from outside the region, and this applies to purchases of capital goods. The difficulties in encouraging purchases in the local market are increased in the case of transactions bound up with large-scale schemes or investment projects. In such cases, the purchaser feels that he is assuming additional risks and responsibilities if he has recourse to local suppliers, who in most cases do not have the prestige and the experience of the traditional undertakings which are his competitors.

Any number of efforts have been made in the region to change these attitudes, and one of the manifestations of this is the "buy national" legislation which has been enacted in most of the Latin American countries. In this context, special significance is attached to the effectiveness and proper direction given to undertakings which in addition to being important purchasers of machinery and equipment are the property or subsidiaries of the State. The responsibility of these undertakings, deriving from the very origin of their capital and the source of their directives, should

not be limited to the efficient production of the goods and services with which they are specifically concerned; they also can and should act as incentives to production and national technological progress.

The significance of State undertakings is considerable in the Latin American economies. Their concerted readiness to act as agents for stimulating local industry would have very positive effects, as has been shown on occasions when such policies have been promoted in this or that country. A regional agreement on the subject expressing on a unitary basis the State demand by a group of countries in a given sector, would increase and multiply the results obtainable. This desirable collective attitude has not materialized, however, in spite of past attempts in that direction.

But the exercise of the power of State purchasing on behalf of the industry itself, and even the many "buy national" laws, which are not limited to guidance for action by public undertakings but try to urge private undertakings along the same path, come up against numerous obstacles which have to be taken into account in proposing the application of this desirable policy. Apart from the financial problem, which will be mentioned further on, other difficulties arise in putting it into practice. Some of these difficulties derive from the general legal framework, which at times imposes restrictions preventing undertakings from exercising the purchasing power they objectively possess on behalf of the national industry. Others are related to the already noted inadequacy of the engineering available at national level, or in a more general way, to inexperience in regard to the administration of large-scale projects, which is frequently reflected in subcontracting of work or basic technical studies and ultimately in a loss of autonomy to decide where the equipment is to come from.

The difficulties referred to of directing purchases towards local sources of supply are still greater in the case of implementing a regional preference. The debates during the meeting likewise revealed that purchasing bodies tend to maintain their traditional sources of supply

which have given satisfactory results, often over very long periods, and also, the fact that the purchasing body has in its installations material of a particular origin and type generates a type of "technical linkage".

This attitude derives from a lack of confidence on the part of the technical teams in purchasing divisions in making experiments with alternative local suppliers. Apart from this, although there is always a possibility of problems arising with equipment, whatever the source, a defect in a spare part of local manufacture tends to become magnified, and this generates difficulties for the purchasers which would not have arisen if the same defect had shown up in an operation using traditional suppliers.

Unless there is an explicit, well-defined, stable policy, it is natural that those responsible for the purchase of machinery and equipment tend not to realize their potential capacity to stimulate local industrial activity but sit back and enjoy the security and efficiency of the work they are doing.

On the other hand, the inclusion of local suppliers in purchasing increases the number of sources of supply, and hence calls for greater coordination efforts which are reflected in the engineering costs. In many instances, purchasing bodies do not feel themselves capable of ensuring the coordination of suppliers and the necessary engineering, so that they tend to fall back on the "ready for use" type of contract, which eliminates local participation or reduces it to the status of sub-contracting. In this type of sales contract, it is common to find parts delivered from outside when construction by local firms in the country where the project is situated would be easy from the technical point of view and economically advantageous.

Nevertheless, experience in Latin America makes it clear that it is also possible to negotiate contract terms with a foreign supplier which ensure a given level of participation in supplying by local industry, without this affecting the guarantees as a whole, and even to stipulate that the industry must be enabled to produce complex components. Examples of

such practices are the work of the nuclear plant at Atucha in Argentina and the hydroelectric plant at Itaipú. In the discussions it was emphasised that technological disaggregation constitutes a prerequisite for negotiation. The purchasing bodies must carry out this operation or at least participate actively in it. In some Latin American countries, an attempt is being made to provide legal guarantees that technological disaggregation will be carried out in due course. Thus it was decided recently in Ecuador that there was a legal requirement in State purchasing to undertake technological disaggregation before any tendering or call for bids was accepted.

Generally speaking, the tendering process provides purchasing bodies with a wide margin of discretion. Thus the bodies in charge of projects tend to be extremely exacting in regard to the conditions to be fulfilled by undertakings wishing to submit tenders, even for providing relatively secondary equipment of no great complexity or importance. It is usual to require that the organizations in question have carried out a substantial number of similar orders. Naturally, this requirement inhibits firms which are just setting up in business, even though they may have the necessary technical expertise and adequate productive installations.

Another obstacle to greater local participation pointed out by the experts is the dissemination of information on projects. Before one can hope to cope with a given level of demand, one must know beforehand what the demand entails. Yet local undertakings tend to hear about the existence of projects in their own countries later than the larger foreign undertakings, which have the support of effective national information systems.

Apart from this difficulty, there is the fact that local undertakings tend not to be given certain background details concerning the project. In such circumstances, they cannot possibly pinpoint or correctly evaluate their own capacity to participate in the operations involved. This difficulty is at times due to the fact that the general project contractors are outsiders and know nothing of the capacities of local manufacturers.

Finally, one additional weakness on the part of local undertakings is that they are usually ignorant of the procedures used for their operations by bodies which regularly carry out large-scale projects.

3.5 Financing

The marketing of capital goods depends to a large extent on the availability of medium-term and short-term credit. In the case of custom-made equipment, which requires fairly long-drawn out manufacturing periods, credits are also contracted for the expenditure incurred during these periods by the manufacturer. Because of this, special credit lines and credit insurance are among the instruments most used by the industrialized countries to promote their exports of machinery and equipment. The majority of industrialized countries have financial systems and credit insurance arrangements making it possible to offer rates of interest, depreciation periods and other conditions which are more favourable than the credit conditions prevailing in their own markets. Some Latin American countries, including several medium-sized and small countries, have instruments for promoting their exports of capital goods. On the other hand, both in these countries and in others in the region it is exceptional to find mechanisms making it possible to extend financing on adequate terms and conditions for internal sales of capital goods. Paradoxically, for the Latin American countries in their present stage of industrial development, the domestic market is far more important than the potential export markets - unlike the situation in many industrialized countries. In addition, the present economic situation has brought with it for the Latin American countries the virtual disappearance of promotional credit, not only as a stimulus to investment in machinery and equipment but also as a means of making greater use of the installed capacity of the national capital goods industry.

In the case of certain large-scale investment projects, some countries have managed to arrange in their negotiations with foreign contractors for the inclusion of supplies of national origin in external financing.

However, it would appear that only the larger countries in the region have had sufficient negotiating power to obtain concessions of this type. In such circumstances, the existence of flexible credit mechanisms at the service of foreign suppliers, combined with a lack or insufficiency of national resources, curbs or rules out participation by local suppliers, even though their quality and price conditions may be genuinely competitive.

The international financing agencies have been gaining steadily in importance as sources of funds for financing infrastructure schemes and heavy industry in the Latin American countries. Nevertheless, the experts felt that the conditions laid down for the utilization of such credits limit or exclude participation by the local capital goods industry. These limiting factors are manifested in a variety of ways. One of them is the obligation to compare offers of supply without reference to the tariff duties and other charges on imports of machinery and equipment. Yet the national supplier of machinery and equipment enjoys (as already mentioned) a margin of preference of 15 per cent on the c.i.f. value of the supplies offered by foreign suppliers. When the capital goods tariffs are above this margin, the national producers are exposed to more severe competitive conditions in the case of international tenders. Another limiting factor is that in comparing offers, purchasing bodies at times disregard the right to deduct from the quotations submitted by national suppliers the charges paid on imports of inputs and other internal taxes charged on production. One further difficulty faced by national producers is that at times the purchasing bodies defer payment, whereas foreign suppliers can demand payment automatically. This is a serious drawback for national producers in countries characterized by a high level of inflation and the high cost of commercial credit. Another obstacle for national industry has to do with credits not covered by the international financing agencies at the equipment production stage. Thus national producers find themselves obliged to have recourse to domestic credit, which tends to be costly as compared with the credit conditions prevailing in the industrialized countries. Finally, the experts pointed out that the price readjustment formulas used in tendering do not always reflect the real breakdown of manufacturing costs.

3.6 Engineering and scientific/technological development

There was consensus among the experts in pointing out that the design of projects and the technical solutions adopted very frequently of themselves prevent local undertakings from taking any part in the supply of machinery and equipment. In large-scale projects there is a very wide field of options, in regard both to the choice of basic processes and the general disposition of construction and machinery, and to the design and manufacture of the machinery as such. Some equipment and spare parts are relatively simple to fabricate and make it perfectly possible for undertakings of various sizes and different technological capacity to take part in their execution. This possibility, however, depends not merely on the intrinsic complexity of the equipment but also on the fact that the participation of small or local suppliers has been considered from the outset. Thus, for example, the variety of products available in an industrialized country can lead to specifying in the technical documentation on the project certain products not made in the original country, whereas others are manufactured there which could have acted as replacements without having an adverse influence on the price or the conditions of service. A knowledge of the possibilities of local production, and a genuine desire to use this production, are the key to participation by national producers. In consequence, industrial complementation in large-scale projects will be more or less feasible to the extent that their design has or has not been adapted to achieve this.

In a large number of Latin American countries there is sufficient engineering capacity to enable a project seeking an optimum combination of resources to make use of the possibilities of local manufacture. Consequently, efforts at manufacturing complementation could be based on this capacity. Engineering and the manufacture of equipment are actually the two inseparable facets of one single economic truth.

Regional engineering, made use of with a full knowledge of the facts, could help Latin American purchasing to turn towards the local industry of the zone. In the face of this effort, apart from the already mentioned

lack of explicit and stable policies, two main difficulties arise: first of all, the serious lack of mutual information, since the countries are unaware of each other's capacities, and frequently even of their own, in regard both to engineering and to physical production. At the same time - and this is a problem which is far more difficult to remedy - in the large majority of cases regional engineering does not dominate the design of complex mechanical and electromechanical equipment. This widespread situation (although there are exceptions) leaves the regional industry producing capital goods in a situation of dependency which is difficult to remedy over the short term.

Of all the obstacles to the development of the capital goods industry mentioned up to now, perhaps the last-named is the most difficult to overcome. For this reason, time is required and a whole series of sustained efforts over long periods, including the creation of an infrastructure which as a rule is very costly.

The group of experts likewise agreed that in the medium-sized and small countries in particular, there is not an adequate rapport between the engineering undertakings and the local scientific and technological system, so that there is a loss of back-up opportunity for the former and failure to adapt the latter adequately to the national needs.

3.7 Marketing, development strategy and entrepreneurial cooperation

The experts pointed out that in the medium-sized and small countries in particular, national manufacturers of capital goods shy away from presenting themselves at public supply tenders and that there is even a certain lack of aggression on the part of the local undertakings in other marketing operations. This attitude is in marked contrast to that of the foreign undertakings, which maintain close relations with their potential clients, providing them regularly with technical and commercial information and collaborating with them from the project conception stage.

Mention was also made of the fact that it is quite common to observe an unduly large number of undertakings competing for a single segment of the market, which indicates a lack of specialization on the part of the productive units. Naturally, this behaviour on the part of undertakings can to some extent at least be attributed to the fluctuations in sectoral demand observed in the Latin American economies. In these circumstances, diversification of the production programmes constitutes one line of defence.

Finally, it was observed that Latin American machinery manufacturers often maintain very close contact with producing firms in the more advanced countries without actually knowing much about each other. As a consequence, there are virtually no industrial cooperation activities between Latin American manufacturers, such as the formation of supply consortia, co-production agreements and other arrangements which could help to improve their competitiveness.

4. NATIONAL EXPERIENCES IN DEVELOPING A CAPITAL GOODS INDUSTRY

This chapter contains an account of the experiences of two Latin American countries in developing their capital goods industry. The cases chosen - those of Brazil and Paraguay - represent countries whose economic situation is dissimilar. Characteristic of both, nevertheless, is the decided existence of a political will in favour of developing such an industry. A second feature they have in common is the degree of linkage or articulation between the State and the private sector. The case of Paraguay likewise shows the important role played by Brazilian cooperation at the diplomatic level and that of undertakings in achieving the goals of industrialization of the country. The example illustrates also the feasibility of one of the theses of regional projects, namely that it would be possible to attain substantial success with the development of the capital goods industry in the medium-sized and small countries by combining the production resources and entrepreneurial efforts of these countries with others even larger at regional level to put together local investment projects under the former group of countries.

4.1 Integration of the Brazilian machinery and equipment industry

The Brazilian case constitutes a good example at the Latin American level of a successful development of policies and schemes designed to achieve effective industrialization in the capital goods sector. In spite of the specific interest of this experiment, it is essential to point out that it cannot be repeated lock, stock and barrel. Brazil is a country with about 130 million inhabitants, of whom approximately 35 per cent are economically active, so that it represents an appreciable market.

On the other hand, the dimensions of the territory are tremendous, which has meant the construction of a network of highways of great length and the building up of a fleet of vehicles consisting of more than 15 million units. The extent of the need for vehicles has provided the backing for an important automobile industry.

The energy crisis, on the other hand, made it necessary to seek technical solutions, and there are one million vehicles running on alcohol as a fuel, while the remaining gasoline vehicles use 20 per cent of alcohol. This is an example of the technological effort made, and it is also illustrated, along with the question of investment, by the fact that the installed capacity of capital goods production can be estimated at \$18 billion per annum.

In 1955, a Brazilian Association for the Development of Basic Industries was set up. Subsequently, two other associations were founded: the Brazilian Machinery and Equipment Association, and more recently, the Brazilian Association of Electrical and Electronic Equipment Industries. The three together cover the entire range of capital goods. The Brazilian Association for the Development of Basic Industries represents essentially the sector of custom-made goods, and the other two handle catalogue items. All Brazilian entrepreneurs, both those with national capital and those with foreign capital, are affiliated to these bodies.

In 1955 an engineering trade union was set up for the country. This body reflected the American standards of the American Society of Mechanical Engineers and the American Petroleum Institute. There was then a period of instruction given to the Brazilian entrepreneurs to teach them how to proceed in manufacturing petroleum-refining equipment. Other standards were adapted as time went on, and national participation in the production of equipment for other sectors naturally began to grow.

Round about this date, the first attempt at planned development in the country took place under the so-called "Goals Programme" during the Presidency of Juscelino Kubitschek de Oliveira. This programme was a balanced effort (tentatively, as far as it was possible) to achieve expansion of the mechanical engineering industries. The Goals Programme tried to keep the expansion of the State infrastructure in balance with the processing industries, which were private enterprises. At the end of the programme, some thought was given to the establishment of a number of capital goods industries, which would look into the manufacture of electric

energy and railway equipment. Thought was also given to setting up a shipping industry and to the first large iron and steel plants in the country. The first iron and steel plant had already been installed - the National Iron and Steel Company - and two others - USIMINAS and COSIPA - were started.

The main development of the mechanical engineering industries in Brazil is attributable to the installation of the motor vehicle industry. When the plan for the motor industry was designed, a thorough analysis was made of the level of integration of vehicles which would be manufactured in the country. This level is referred to in Brazil as the "index of nationalization", and it is progressive. A start was made with integration of some 60 per cent, and it reached the figure of 95 per cent. But the main point about this progressive nationalization programme was that it did not refer to the value of the equipment or the vehicle but to its actual weight. This made it necessary (and it was a very important decision at the time) to undertake the overall manufacture of cast and forged parts. In this way a type of infrastructure was built up which was the starting-point for the manufacture of components of other equipment to be constructed. At the present time, total integration has been achieved in regard to motor vehicles, including the engines of heavy lorries. Casting was developed to the point where today, one of the main export items of the motor vehicle industry is engine units. All vehicles manufactured in Brazil, even the heaviest, now are integrated (nationalized) at a level of 90 per cent as a minimum, and in the case of private cars, over 95 per cent.

Achievement of this goal meant a very considerable development in all matters related to the specification and production of cast and forged parts. Both the metallurgical sector and the standards for industrial production specifications were developed. This series of solutions underpinned the development of the mechanical engineering technology needed for the manufacture of capital goods. At this stage, the machine-tool industries were given an enormous boost. Not that the industries set up used this Brazilian machinery. Almost all the initial machinery in the

motor industry was imported. Subsequently, other machinery manufactured in Brazil and specially designed to cope with production bottlenecks was added. Emphasis must be placed on the importance of national machine-tools in the manufacture not only of automobiles but also of consumer durables and capital goods. Machine-tools are the machines used for making machinery, and their engineering is the basis of all mechanical technology used in the production of capital goods.

Thus the question was not the manufacture of capital goods but the establishment of a support infrastructure for the industry. This is what happened and has gone on in large-scale programmes, some of them extremely successful and others difficult to get under way. The problem of standardization is still a serious matter in Brazil today; since the technology came from countries all over the world, it was difficult to bring all the standards into line so as to cope with Brazil's peculiarities and available raw materials. Just as road haulage gave a fillip to the motor vehicle industry, so shipbuilding gave a great stimulus to the capital goods industry. Since a ship is not merely a shell but also contains various types of equipment: motors, loading apparatus, compressors, pumps, etc., these are capital goods important in bulk and complexity. There was also manufacture of railway wagons. The first installations for oil refineries were given a great boost by the State undertaking PETROBRAS, which of its own accord began to purchase increasing amounts of material within the country. PETROBRAS began the programme of custom-made capital goods, in particular, boilers, pressure pipes, heat exchangers, tubes, pumps, etc., all naturally bound up with a continuous effort at standardization and quality control.

During this period, a start was made with the protection of the capital goods industry through the "national counterpart" legislation, which required State undertakings to purchase a certain percentage within the country. But to speak of "national counterparts" may be very difficult depending on whether the goods are custom-made or large or heavy capital goods from the catalogue. It is not merely a question of price or delivery period or quality, but also a question of performance of the equipment.

This is not measured in instantaneous terms, but over long periods. Not merely does output count, but so does long-lasting quality. It is very difficult to appreciate fully whether such a thing as a national counterpart exists. There has always been external pressure to eliminate them, and the law on national counterparts has not always been able to be applied. The situation evolved, and in November 1966 another law was enacted complementing the former and speaking of agreements on participation with the industry. Every integrated programme includes a quantity of simple equipment which is normally purchased within the country, if only for reasons of price and delivery date. Other equipment is so complex that inevitably it has to be imported. Then there is an intermediate category, a third strand, which calls for discussion and negotiation.

At the outset (between 1967 and 1968) it was difficult to reach agreement, since there was external pressure to import and internal pressure for local manufacture. As time went on, the foreign industries themselves began to find it convenient to manufacture parts in Brazil. To begin with, it might be said that a given project had a component manufactured by national industry; today, 15 years later, the contrary is the case. The imported component is the extra part. At the time, the imported part was a relatively low priced component in dollars per ton. Today, technologically complex parts are imported whose value in dollars per ton is extremely high.

The change came about in a relatively smooth way. There was understanding on both sides, and the foreign undertakings proceeded to complement each other in the normal way. Today it is cheaper to manufacture certain types of capital goods in Brazil.

At times when there is a lack of orders for capital goods on the international market, some undertakings quote very low prices. What happens then is that prices on the international market are greatly reduced, below what they should normally be on the basis of negotiations under the law mentioned above.

Capital goods, machinery as such, are the combination of a series of elements partly manufactured in the undertaking itself, but in general purchased from third parties. If we take the case of a travelling crane, we see that it is made up of a whole collection of equipment: electric motors, central switchboard, magnetic brakes, large forged grabs, roller bearings, etc. All these components are purchased from third parties and not manufactured by the undertaking which constructs the crane.

In general, the first time that a piece of capital equipment is constructed, it does not have the degree of integration it will have five years later. There is a progressive nationalization. The same principle that was followed in the motor industry continued to be followed in the tractor industry, in the industry for the construction of large earth-moving machinery, in the large tip-up trucks of the mining industry, and in all the capital goods industries.

Obviously, it is not time which is the yardstick for progressive nationalization; it is the market. But markets fluctuate; progressive nationalization as applied depends on development or the number of units sold each year. Once we admit that capital goods are an amalgam of a whole series of components, of mechanical and electrical elements, we get a picture of the capital goods industries, taken as a whole, as a highly complex entity which it is impossible to analyse as such. It is not possible to establish an incentive or a protectionist law common to a machine for moving earth, a computer, or an electric transformer. Each has its own different characteristics. Hence, thought must be given to the classification of such goods making for a better analysis of components which are usually much more sophisticated and complex than the end product. Capital goods should be classified according to the technology applied in their manufacture. In Brazil, capital goods have been divided into several groups: first of all, boiler-making, which is given two points for complexity; then come mixed goods, partly involving boiler-making and partly mechanical engineering; and so we get a whole series of groups. In this way, it is possible to arrive more easily at complementation agreements, since two industries in the same group will be highly complementary.

using the same type of raw materials and the same manpower resources.

With this in mind, a study was carried out in IPEA on capital goods used in State undertakings and hence in infrastructure schemes and basic industry. A list was made of 14 groups, each with its own specific characteristics, ranging from capital/product ratio to the number of man/hours worked per ton produced, etc. The data produced by such a classification are strikingly similar throughout the entire world. In Brazil there was an opportunity to make a comparison, and highly significant results were achieved by collating the data on boiler-making A, boiler-making B, man/hours per ton or dollars per ton produced, and also return on capital.

One of the variables sought was the incidence of engineering services on the final price of the product, with the surprising finding that the industry making most use of or having the greatest impact on engineering services in the final price is the machine-tool industry, since it concentrates the technology used in all capital goods. Next come products where engineering services are virtually non-existent. In the case of the mass-produced capital goods industry, engineering services are spread over a whole series of units. Participation by this service in each unit is less than in the case of goods designed and manufactured in unit form. This analysis is essential if we are to understand the human resources and the infrastructure needed by the country to sustain the expansion of the capital goods industry.

It is precisely because a start was made with exporting five years ago that there was a sort of breakthrough in the form of sales to Brazilian State undertakings which purchased equipment. To this end, Brazil set up nuclei for articulation with industry. Thus an attempt was made to study the local conditions and to adapt the engineering which a given undertaking specified in its equipment in such a way that this equipment would fit the conditions obtaining in the country. These conditions are not merely climatic, but also involve the replacement of spare parts and particularly

the manpower needed to operate the equipment. In the engineering of the product, these peculiar conditions will have the effect of adjusting the product to the conditions obtaining in the country, thus increasing the return and taking greater account of local circumstances.

There is also the problem of components, which are always subject to the question of scale. Economies of scale are intimately bound up with standardization. If we have one particular component manufactured to three different standards, there is no way of achieving scale; but if we can arrange for the three components to conform to a single standard, it may be then possible to achieve economies of scale and to produce the goods.

Brazil had an annual economic growth of over 8 per cent. The mechanical engineering industries grew at rates of 13 and 14 per cent until 1973-1974, when the first oil crisis occurred. A rapid import substitution programme had to be set up. No import substitution programme during its first or second year reduces imports; indeed it increases them, since it is necessary to import more of the products which it is desired to substitute. In Brazil, this import substitution programme was carried on with the items of greatest importance at the period; the volume was of the order of \$4 billion in capital goods imports. At that time, some \$8 billion worth were manufactured in the country, twice the amount imported.

The programme goals were in actual fact optimistic. The programme included production of 25 million tons of steel in 1985. Similarly, the electric energy programmed at Itaipú was not to be used in its entirety at the outset, but it was necessary for the industrial development programme envisaged. Similarly, a series of other projects were programmed and put into operation. But over those years the second oil crisis came about, raising the cost per barrel from \$10 to \$30. In addition to this, there was the problem of interest on the credits contracted to complement domestic savings.

At that time, a difficult situation arose, and it was found necessary to suspend certain projects. There was under-employment of production capacity for custom-built goods of approximately 40 to 50 per cent. Other sectors were not idle, and others were only partially idle. The situation was not homogeneous. To generate the expansion that took place at this time, capital was offered at very favourable rates. Interest was negative, even taking indexation into account. If the monetary adjustment was 40 per cent, interest was 20 per cent. Obviously there was some expectation that use would be made of fixed capital represented by machinery, constructions, auxiliary installations etc., which was excessive in relation to the real level of demand.

The approach to reducing this under-employment was that of launching into complementation. It was known that all the other Latin American countries had similar ideas on capital goods. In the case of Paraguay, for example, the possibility arose of complementation with Brazil at the Itaipú plant.

At the present time, this export drive is continuing. Exports are being sent to the Arab countries and the African countries. It is interesting to note that the export of capital goods to these countries is not done directly by the capital goods manufacturers. The engineering services are sold, so that it constitutes indirect export. There are projects in Africa where the services are sold and the equipment goes along with them.

Serious thought must be given to the return on the capital invested in the capital goods industry. The solution at present is to export, and what has been done recently is to provide equipment for the re-updating of the production technologies. These are not composite projects requiring very high expenditure in machinery and equipment, but small-scale adaptations.

The motor industries are always on the look out for one or two additional types of machinery to cope with their manufacturing bottlenecks.

The same is true of alternative energy sources - for example, when in cement factories fuel was replaced by pulverized coal. Here we get a modification of a process which was started for another purpose, but which helped to alleviate a crisis in demand in the capital goods industry. The same is occurring in various industries which are turning over their oil-burning boilers to coal burning, or using thermoelectric processes.

The item left until last is perhaps the most interesting, namely the financing of capital goods. Development processes, basically, are all processes concerned with the accumulation of knowledge, human resources and even, indeed principally, capital. When a start was made in Brazil with the first industries in the 1950s, there was no capital in Brazil capable of handling capital goods. A start was made with the financing of consumer durables such as automobiles. As they grew they formed "acceptance companies", which later became credit companies and finally were regulated; and this is where the first machinery financing took place. Later came the establishment of BNDE, and from it, that of FINAME. Actually, the main sponsor of capital goods manufacture in Brazil is FINAME.

FINAME was set up as a department of BNDE and given the name of Financing Fund for the Purchase of Industrial Machinery and Equipment, the original name of FINAME. Today it is a subsidiary of BNDE. It has its own separate status, although it comes under the administration of BNDE. It was founded in 1964, but it was not until 1966 that it became financially independent. In 1971, it became a subsidiary of BNDE.

FINAME charges reasonable interest and is completely sound from the monetary point of view. FINAME does not merely finance the total project; it has a financial agent - usually a private bank. It requires an initial payment by the purchaser, and the financing bank, the agent, provides the credit for the operation. Hence FINAME expanded at a tremendous rate, especially in regard to capital goods purchased for day-to-day use in all industries. It was enlarged to cater for large projects, and gradually it undertook the financing of these as well. Thus FINAME expanded enormously, granting long-term credits, but always subject to sound monetary policy.

Similarly, for export purposes, a special fund was set up, controlled by CACEX, the External Trade Portfolio of the Bank of Brazil, which provided financing for exported capital goods.

There is one requirement for all large-scale products, namely the "performance bond" which in the final analysis is a guarantee of the functioning of the equipment. In general, well-respected firms obtain a "performance bond" without any difficulty, while national undertakings have greater difficulty. But as time has gone on, ways and means have been found to provide these guarantees of functioning in accordance with international standards.

All these export facilities are completely valid within the country itself and create great confidence for undertakings wishing to purchase. In Brazil. State undertakings represent more than 50 per cent of the demand for capital goods manufactured to order. It should be understood that at the time when State resources for investment are scarce a period of idleness automatically occurs.

4.2 The installation of a heavy engineering industry in Paraguay

As a culmination of a number of years of diplomatic and technical activities between the Governments of Brazil and Paraguay, on 26 April 1966 the "Treaty of Itaipú" was signed at Brasilia, envisaging the hydroelectric exploitation of the River Paraná in one of the sectors bordering on the two countries. It stipulated equality of participation for Paraguayan and Brazilian undertakings in the supply of goods and services intended for the hydroelectric scheme.

The two Governments also expressed their intention to join forces to obtain the highest possible level of participation for Paraguayan and Brazilian suppliers of goods and services, since this would be an effective formula for stimulating the economic and social development of the two countries.

The policy was given a boost through the Itaipú Binational Cooperation, which acted as executing agency for the project. This body included in the bases for tendering a number of clauses requiring bidders to ensure a certain participation for Paraguayan industry. The clauses contained provisions relating to reservation of the market for Paraguayan suppliers, and it also stipulated certain formulas requiring mandatory association by Brazilian and Paraguayan suppliers.

In response to the policy delineated, in Paraguay the Electro-Mechanical Engineering Consortium (CIE) was set up to cope with the supply of equipment. The aim of this body was to take over a substantial part of the equipment machinery which the Itaipú project would generate, and to provide support for the installation of new industries to be set up as a consequence of the future large-scale availability of electric energy in the country.

At the initial stage, CIE embarked on the manufacture of capital goods intended for infrastructure schemes. This was carried out in a series of small workshops already existing at the time in the country. During a second stage, following the transfer of the assets of CIE to another entrepreneurial group, a new plant was constructed in which a start was made with the manufacture essentially of pressure conduits and components of penstocks and generators for the Itaipú project.

With a view to identifying the products which would be manufactured in the new industrial plant, technical disaggregation was carried out in relation to the Itaipú project, and an analysis was also made, on the basis of operational time-sheets, of the delivery time required for the various types of equipment. In this study, special attention was paid to hydro-mechanical equipment, since it was felt that this offered greater possibilities of manufacture than other types, even though it was only partly manufactured in the country. This equipment was characterized also by its large size, which would have involved heavy expenditure for transport if the decision had been taken to import it in its entirety.

Side by side with this, additional studies were carried out to determine the country's potential market. Of these, the following may be mentioned:

- a) The demand for equipment other than hydromechanical equipment by the Itaipú project and the feasibility of producing it;
- b) The demand for equipment by other large-scale hydroelectric projects, especially those of Yaciretá and Corpus;
- c) The demand for equipment by projects set up by CIE clients apart from Itaipú, and the possibility of manufacturing it along with the hydro-mechanical equipment of the Itaipú plant;
- d) The economic viability of the various economic and financial options.

These elements made it possible to put forward a list of locally manufactured equipment, and this was incorporated in the supply contract agreed between the Itaipú Binational Corporation and the Itaipú Electro-Mechanical Consortium (CIEM). The latter consortium brought together 13 Brazilian and European suppliers.^{6/}

The same list was used as the starting-point for the study of the question of installing the new CIE factory. An analysis was made of the manufacturing process for each of the more important components of the programme such as the spiral casing of the turbine, the generator support ring, the tank lining and the suction tube. It was decided that the annual processing capacity could fluctuate between 4,800 and 7,200 tons according

6/ BARDELLA S.A., Indústria Mecânica (Brazil); BSI, Industrias Mecánicas S.A. (Brazil); MECANICA PESADA S.A. (Brazil); Industria Eléctrica BROWN BOVERI (Brazil); SIEMENS S.A. (Brazil); VOITH S.A. Máquinas y Equipamientos (Brazil); NEYRPIC (France); CREUSOT-LOIRE (France); ALSTHOM ATLANTIQUE (France); SIEMENS AG (Federal Republic of Germany); J.M. VOITH GmbH (Federal Republic of Germany); BBC-BROWN BOVERI CIE AG (Federal Republic of Germany) and BBC-BROWN CO. LTD. (Switzerland).

to the product to be manufactured. In view of the need for in-house training of factory staff, an estimate was also made of the additional operating time that would be needed. The administration of the plan for installing and constructing the plant was left entirely in the hands of the directing personnel of CIE. Since for practical purposes the country had no previous experience in the manufacture of electromechanical components, CIE had to go outside the country to seek assistance for the installation and starting up of the factory. In recognition of this need, the CIEM undertakings provided their fullest collaboration from the very outset. In a common effort, an intensive technological transfer operation was set in motion.

This transfer was required not only for the technological disaggregation referred to at the outset but also for the selection of the machine-tools and other industrial installations, the study of the installation of the factory and the organization of production in regard to analysis of manufacturing processes and methods, programming, quality control and selection and training of personnel. The transfer mechanisms consisted mainly of visits by CIE executive staff to the Brazilian and European plants of the undertakings grouped together in CIEM, the formulation and carrying out of consultations, the delivery of technical documentation, the training of CIE factory personnel in Brazilian plants, and the dispatch of Brazilian technicians to the Paraguayan factory. In the factory installation stage, a working party was also set up with technicians from CIE and CIEM which regularly examined the progress achieved.

The lack of an industrial tradition in Paraguay made it desirable to contract a factory manager outside the country. A person was found with adequate experience in the manufacture of heavy equipment, and he spent four years as head of production management in CIE. At the end of the period a Paraguayan engineer was appointed to the post.

Special care also had to be taken in the selection and training of personnel for other posts. For this, post descriptions were prepared for each of them, special attention being paid to the selection of candidates, and a large number of training courses were set up. A special unit was also created for the implementation of the training system. One of the

responsibilities of this unit was to create conditions for the transmission to the rest of the personnel of the knowledge acquired by the technicians and operatives who worked stints in Brazilian plants.

In short, the installation of an industry of this magnitude in Paraguay was made possible as a result of the following factors:

- The existence of a definite market (Itaipú) and the prospect of other potential markets (Yaciretá and Corpus), all of them large-scale projects.

- The determination of the Brazilian and Paraguayan Governments to achieve a high degree of local participation, both on the part of Brazilian industry and on that of Paraguay. This was reflected in Paraguay, for example, in the recognition that a new industry involves "apprenticeship" costs which cannot be absorbed by the private sector.

- This favourable attitude on the part of the Governments was likewise reflected in an adjustment of the payments arrangements to the financing needs of an industry until such time as it is installed and in operation.

- Dynamic entrepreneurial action, characterized by the desire to achieve something and capable of mobilizing all the resources needed for the enterprise.

- The organization of a large-scale manpower training programme.

5. IDENTIFICATION OF AREAS FOR REGIONAL AND INTERNATIONAL COOPERATION

5.1 Preliminary remarks

The meeting of experts singled out a number of specific areas for regional and international cooperation and also suggested certain types of action which might be initiated by the sponsoring international organs. The indications and suggestions were basically concerned with the following:

a) Establishment of a preferential mechanism, located in the first instance in the electricity undertakings, for purchases of capital goods of national or regional origin, and

b) Working areas for ECLAC and UNIDO. The agenda did not include a discussion of the existing regional and international cooperation mechanisms, nor were any statements made on this subject. The contributions made to each of the topics in question are analysed below.

5.2 Establishment of a sectoral preferential mechanism for purchases of capital goods of Latin American origin

There is no preferential system which operates in favour of regional production of machinery and equipment. ALADI has established a "regional tariff preference", but it is not only quantitatively on a very small scale; its effects are also greatly restricted by the fact that the most important purchasers of capital goods are exempt from customs dues, and also because the countries have submitted very wide-ranging lists of exceptions.

One preferential margin which has worked, at least in part, is that permitted by IDB for purchases made subject to its financing, in other words 15 per cent in favour of national production or that of an associate country in an integration process. Only a few countries have made use of

this facility, and they have limited it to national production. Its regional application, although it gives rise to problems of compensation which have not been solved, opens up an important field for collective action.

Purchases by public undertakings represent a high proportion of the demand for capital goods in the Latin American countries. For this reason, a policy of national purchasing, and by extension regional purchasing, would have a stimulating and reactivating effect on the Latin American capital goods industry. Previously, various obstacles were identified as standing in the way of the implementation of these policies. Analysis of these obstacles makes it clear that they are not trivial and that a considerable effort will be required to overcome them, especially in regard to the establishment of regional preferential arrangements. In the latter case, the advantages are not obvious for countries which do not possess great industrial capacity. For such countries, it is essential that formulas should be found to ensure them of an adequate participation in the benefits.

Another aspect of the problem is that the conditions governing the purchase and utilization of machinery and equipment differ widely between one economic sector and another. In addition, the purchasers play a central role in building up the various measures, and it is obviously desirable to have the support of the existing regional and sectoral organizations in defining measures going beyond the purely national framework. For these reasons, it would be desirable for initiatives aimed at establishing a regional preference in State purchasing not to be applied to all sectors at the same time.

Bearing in mind the progress made by the ECLAC/UNIDO regional project in the study of demand by each of these sectors, the experts came to the conclusion that the electricity undertakings could constitute a starting-point for the formulation of a whole series of measures for Latin American purchase. Such a scheme would be justified also by the following arguments:

First, the demand for equipment by the sector is quantitatively considerable. It would represent more than 9 per cent of the region's requirements in capital goods.

Second, investment by the sector has been less affected by the crisis than that of a number of other sectors. It must be borne in mind that a certain margin of generating capacity, above the present levels, is essential to cater for the greater consumption of electricity that will derive from the recovery of economic development. In addition, there are areas in the region where, in spite of the recession situation, poles of development are being constructed which call for large-scale investment in economic infrastructure, including systems of generation, transmission and distribution of electricity. There are likewise large urban and rural zones which are under-supplied or still have no networks. In addition, electrical inter-connection at national level and the substitution of sources of primary energy for the generation of electricity are a matter of urgency in Latin America.

Third, the machinery and equipment making up the hydroelectric and thermoelectric plants is of varying levels of complexity. Consequently, supplies of capital goods could come from industries, and in the long run countries, at various grades of technological advancement.

Fourth, as regards hydroelectricity generation, which in the region absorbs a substantial part of the investment of the electric energy sector in machinery and equipment, we can single out the balanced distribution among the Latin American countries of projects for the construction of plants, a fact which also makes it possible to imagine that the benefits accruing would reach many countries in the region.

Fifth, the electricity undertakings in 10 Latin American countries are grouped together in CIER (Commission on Regional Integration in Electricity), which over two decades of functioning has done excellent work. The question of the Mexican electricity undertaking becoming a member of CIER

is under study, and the same is true of the Central American electricity undertakings. Thus there is some institutional support for the study and promotion of preferential measures, and this is a great boon.

In the course of the discussion, the experts put forward a number of regional preferential measures for purchases by electricity undertakings. The working team for the project subsequently systematized this information, and the outcome was the tentative list of measures given below.

1. The initiation of systematic efforts designed to reveal regional requirements as a single demand item, or at least a related series. To this end, two types of action are suggested:

1.1 An explicit statement, as a basis of every tender, of the intention to maintain active contact and a joint outlook by all undertakings in the region involved in purchase of equipment.

1.2 Designation of a small group of high-level technicians (the ideal number might be two), who would:

a) Be physically present at each and every tendering session, thus presenting a picture of coherence and continuity;

b) Collaborate in the examination of supply conditions and provide a network of information enabling the highest possible level to be achieved in the circumstances obtaining.

2. Initiatives designed to show each tender as part of a programme would strengthen the negotiating capacity, which would be used both to improve the financing conditions and to stimulate participation in local industry schemes. It should be pointed out specifically that preference would be given to bids paying most attention to this participation and covering its financing.

3. In order to facilitate this combined activity, tendering forms would be so worded that it would be possible to submit bids by equipment packages of different levels of complexity.

4. The above presupposes that at the preparatory stages of the project, and from the earliest engineering designs, what would be envisaged would be participation, at the highest level technically possible, by local industry.

5. The electricity undertakings would intensify their efforts at mutual collaboration with a view to taking advantage of the experience gained by some of them in industrial promotion.

6. In the evaluation of local bids, the utmost possible use would be made of the preference margins authorized by the international financing agencies, and it would be borne in mind that for comparative purposes, the national price could be reduced by the sum of the internal taxes and customs duties on the product.

7. On the basis of the bidding it would be established that, other things being equal, the purchasing body would reserve the right to give preference to offers by Latin American undertakings.

8. As a more sophisticated formula, an active preference could be established; its application is now being studied by a number of members of ALADI in the iron and steel sector. The purchasing body would reserve the right to invite Latin American undertakings which have come second in the biddings to others from outside the area, provided the difference is less than 10 per cent, to match the terms offered by the former, and to award the contract on that basis.

9. The bases for bidding could contain differential clauses in favour of Latin American bids. Such clauses could include special payments formulas based on specific projects or lists of projects during predetermined periods.

10. The Latin American countries would explore the possibility of establishing agreements between themselves covering periods of several years and groups of projects, not subject to bidding but subject to counter-parts such as the special payment formulas referred to above, specific action in the industrial field, etc.

11. The Latin American countries would initiate joint contacts with external supplier countries with a view to looking into the possibility of introducing differential treatment in relation to the electricity programme as a whole and evaluating what compensation might be granted on that basis.

12. The national bodies responsible for the development of the electricity sector in the countries of the region would initiate at once an analysis of the progress made in the basic design of equipment for generating, transmitting and processing electricity, with a view to finding formulas for allowing common enjoyment of the progress achieved and better multisectoral coordination with a view to overcoming the high level of external dependence to which Latin America is subject in this matter.

13. Another type of action designed to show regional requirements as related demand would consist of the adoption by the electricity undertakings of standard contract for the supply of engineering equipment and services.

5.3 Working areas for ECLAC and UNIDO

One of the interpretations of the situation through which the economy is now passing is that it is a change of direction rather than an economic crisis. This thesis is supported by the depth and extent of the economic perturbations and their social and political repercussions, and the suspicion that a fairly long period could elapse before a new sense of balance occurred in international economic relations and internally within each country. One further argument is that this balance will be qualitatively distinct from what existed previously.

Obviously, the view of what is likely to occur with the capital goods sector should be regarded as part of an interpretation of the future of the economy as a whole at world, regional and national level. The outlook facing this sector is perhaps more than in any other circumstances intimately bound up with the progress and transformation of the economy.

A forward-looking view of what is happening and what is likely to happen with the economies and with the capital goods industries at national, regional and world level is a task which the international organizations will have to face. At the same time, this view is a prerequisite if technical assistance by the international organizations is to be directed into the field of the capital goods industry.

The change in direction referred to in the discussions of the experts would require the Latin American countries to look back in on themselves, and as a corollary on the region itself. Basically, this would mean a reaffirmation of the urgent need for regional economic cooperation which would not bypass the capital goods sector - indeed on the contrary, it would have a dynamic role to play there. If we take into account the past experience of Latin America, regional cooperation initiatives should be governed by the following criteria:

a) Specific measures and specific instruments must be defined, however limited in scope, to give some content to the well-known propositions on cooperation and integration.

b) The measures must be equitable, in other words all the countries participating in common action must reap the benefits.

c) The sacrifices made must be offset by benefits in almost immediate form; in other words the pari passu principle must be applied.

On the basis of these considerations, the following suggestions were made in regard to the work of ECLAC and UNIDO in the field of the capital goods industry.

First of all, both organizations should collaborate with the existing national projects for industrial development. Their role can and should consist of acting as a catalyser for scattered national efforts, and the assistance must not cease or diminish once a project has been established. In addition, national projects need also to receive substantive and not merely technical support, since they are faced with an extreme degree of internal inertia. The main contribution which the international organizations can make in this direction is to contribute perspectives and information and to provide an exchange of experience.

Second, a statement needs to be made on the usefulness or efficacy of national projects as an instrument for creating awareness in the political and public spheres and as a means of promotion in the conditions in which the capital goods industry is developing in the countries of the region. A regional statement could help towards a national definition in this direction in the case of countries where measures of active support for this industry are being considered. Nevertheless, it is essential to avoid rigid formulations or recipes. In the conditions obtaining in Brazil, for example, the institution of a national project could be an inappropriate solution. In addition, care would have to be taken to avoid a mechanical reproduction of solutions which could easily lead to bureaucratic structures.

Third, there is a need for progress in Latin American industrial thinking, and it is a responsibility which falls particularly on organizations such as ECLAC and UNIDO. When in the national spheres of the countries of the region positions are taken in industrial matters, local interests tend to take precedence over the interests of Latin America generally, whether the actors or arbiters are ministries of industry, industrial promotion banks or entrepreneurial sectors. It would be very desirable indeed if ECLAC were to become the Latin American conscience, with UNIDO acting as industrial conscience and analysing certain critical aspects of industrialization and cooperation. Among these aspects, mention was expressly made of instruments of policy, mobilization of inventive capacity, machinery for marketing, and the formation of cooperative links of partial scope.

Fourth, it was suggested that the work of ECLAC and UNIDO would support and guide the nascent group of Latin American manufacturers of capital goods. The establishment of this group shows that in the economic integration schemes which have been attempted in the region, the entrepreneurial factor has been missing. The group is not at the moment representative of the capital goods sector of the various countries, and hence it would also be important from this angle for the international organizations to provide it with a framework of reference.

Annex 1

Report on the First ECLAC/UNIDO Expert Group Meeting on Capital Goods in Latin America organized by the United Nations Development Organization (UNIDO) and the Economic Commission for Latin America (ECLAC), Santiago, Chile, 5-7 December 1983.^{1/}

I. ORGANIZATION OF WORK

Place and Date of the Meeting

A meeting of experts on capital goods industries in Latin America was held from 5-7 December 1983 at ECLAC headquarters, Santiago, Chile, under the joint auspices of UNIDO and ECLAC.

Attendance^{2/}

Experts from Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela attended the meeting, as did representatives of UNIDO and ECLAC and the members of the working team for the ECLAC/UNIDO Regional Project on Capital Goods (RIA/77/015).

Election of Officers

The meetings were presided over by Mr. Carlos Ceruti, former President of the Association of Metalworking Industrialists (ASIMET) of Chile. The rapporteur was Mr. Antonio Valeiras, consultant engineer, of Argentina.

Agenda

The participants approved the following agenda:

1. The Latin American capital goods market and its significance for the industrial and technological development of the countries of the region.
2. Examination of some national experiences in terms of programmes and projects for the development of the sector.

1/ E/CEPAL/SEM.13/R.3.

2/ See List of Participants (Annex 2)

3. Obstacles to participation by national producers of machinery and equipment in the achievement of investment projects.
4. Promotion mechanisms and national support.
5. Identification of areas for regional and international cooperation and for technical assistance by international organizations.

II. SUMMARY OF THE DEBATES

At the inaugural meeting, the participants listened to statements by the Executive Secretary of ECLAC and the representative of UNIDO. In the working meetings, statements were made by officials of UNIDO and ECLAC, consultants and experts.

Likewise available were the documents "La situación y las perspectivas de la producción y el abastecimiento de bienes de capital en América Latina" (The Situation and Prospects for Production and Supply of Capital Goods in Latin America)^{3/} and "The Capital Goods Industry in Latin America: Present Situation and Prospects"^{4/} and a series of information documents. The list of documents is given in annex 3.

The deliberations of the experts produced the following conclusions and recommendations:

Conclusions

1. The meeting made it possible:
 - a) To obtain an overall picture making for an assessment of the national situations in relation to the reality of the region as a whole;
 - b) To appreciate the importance of the Latin American capital goods market and the negotiating capacity this would give to the countries of the region if they acted in a coordinated manner;
 - c) To establish contacts which will be most helpful in improving the efficiency of the work both of the national project and of the regional project, and to direct the technical assistance of the international organizations.

3/ E/CEPAL/SEM.13/R2.

4/ UNIDO/IS, November 1983.

2. The deliberations underlined the importance of the capital goods producing sector and engineering activities:

- as activators of the economy;
- as creators of jobs;
- as factors in the economics and generation of foreign currency;
- as guidance and stimulus for the technological advancement of the region.

3. It became clear that at least with a view to coping with the demand of the basic sectors already analysed by the regional project, there is a wide area of productive activities which can be developed by the medium-sized countries and many of the small countries of Latin America.

4. There is a great deal of concern about the recession affecting the region and generating a paralysis of investment projects and a high level of idleness in the machinery and equipment industry and in engineering activities. This situation coincides with the maintenance of still considerable flows of imported capital goods which could largely be supplied by manufacturers within the region.

5. The importance was stressed of selective economic policy machinery which has been identified by the regional project, stress being placed on the relevance of State purchasing, financing of the market reserve, all within a framework of concerted action.

6. Financing, with few exceptions, has been inadequate for the promotion and utilization of local capital goods capacity. The most noteworthy deficiencies are a shortage of resources and mechanisms for the financing of sales in the internal market and discrimination against local industry as a result of the conditions governing foreign credit, including that from the international financing agencies.

7. The State has an extremely important part to play in purchases of capital goods and engineering services in all countries of the region. This purchasing power has not yet been fully utilized for the development of capital goods and engineering because of the subsistence in certain cases of the following:

- the persistence of importing attitudes on the part of those in public agencies who conceive projects and take the decisions concerning the purchase of the relevant capital goods;
- the lack of investment programmes in which the respective projects should be incorporated, providing an integrated framework for the planning of local supplies of machinery and equipment;
- delay in obtaining information about the preliminary stages of design and financial management of a project, which inhibits the analysis of alternative options calculated to favour local participation.

8. It is pointed out that the present crisis is part of a profound change in direction affecting the entire world economy and coinciding with rapid changes in capital goods technology: product design, methods of manufacture, utilization of raw materials, machinery operation, etc. These are important changes which must be taken into account if the gap between the region and the industrialized countries is not to be widened still further.

9. The follow-up to these changes, and in particular mastery over them, is only possible if there is available an industrial and engineering structure and a scientific and technical apparatus, elements now lacking in the developing countries or inadequately used.

10. The capital goods producing sector has made very little use of the possibilities derived from a framework of protection at regional level, with a few limited experiences at subregional level.

11. The crystallization of participation by the capital goods industry is closely related with the development of engineering in the region in its various facets: basic, processing, products and manufacturing. It is pointed out that to a greater or lesser extent all sectors of the countries of the region are still dependent to an excessive degree on engineering contributions from outside the region.

12. There was agreement in pointing to the electricity generating sector as the greatest and most immediate priority in regard to the possibilities opened up to the capital goods industry of the region. This priority derives from the following factors:

- it is a sector which consists very largely of public undertakings;
- the volume of its purchases of equipment is highly concentrated and regular;
- there has been a high level of relative stability in investment over a period of time;
- there has been a balanced distribution of demand for equipment for hydroelectric generation as between the various countries of the region, including the small and medium-sized countries.

13. Stress was laid on the growing importance assumed by the organs specifically set up to promote the capital goods industry and engineering in some countries of the region and the success they have achieved.

Recommendations

For all the above reasons, the meeting of experts recommended that:

1. Within the institutional and legal framework of each country in the region, agencies or mechanisms should be set up for specifically sectoral promotion, where representatives of the public and private sectors would debate topics relating to local participation in engineering projects and in the supply of capital goods.

2. The agencies referred to under 1 above should band together in a regional organization.
3. Resources should be assigned at national level, and internal financial mechanisms should be designed, to make it possible to dispose of the local production of capital goods.
4. The financing conditions of the international agencies governing investments should be reviewed so as to eliminate clauses or practices preventing greater participation by local industries in the provision of capital goods for use in projects.
5. Conditions should be studied to ensure that regional protection mechanisms favour the competitiveness of local production so as to meet the equipment needs of the various countries.
6. Governments should be made aware of the vital importance of electric energy generation as a pilot sector for the utilization of capacity in the fields of capital goods and Latin American engineering and consultancy, within the framework of adequate reciprocity making for participation by all countries, especially the small and medium-sized countries.
7. Bearing in mind that the Latin American countries need to adopt marketing mechanisms and practices in keeping with the conditions in which capital goods tend to be bought and sold, in their own markets and the export markets, international organizations should divulge information on this matter and include it in their technical assistance programmes.
8. UNIDO and ECLAC should explore possible ways and means of giving continuity to the interchange of experience and information among the Latin American countries in regard to the development of the capital goods industry and engineering in the national and regional context in the form of periodic meetings of experts and other appropriate mechanisms.
9. It is regarded as desirable with a view to ensuring the continuity referred to in the previous paragraph that the first of these meetings should take place in the course of next year and that its agenda should include an examination of the progress made in the topics discussed at the present meeting and others which might emerge later on, at both national and regional level.
10. The secretariat of ECLAC should bring the conclusions and recommendations of this meeting to the attention of Governments by such means as it deems most appropriate.

Annex 2

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Annex 3

List of documents for the First ECLAC/UNIDO Meeting of Experts

I. Working documents

1. Temario provisional y notas sobre la reunión y el temario/Provisional agenda and notes on the meeting and the agenda (E/CEPAL/SEM.13/R.1)
2. La situación y las perspectivas de la producción y el abastecimiento de bienes de capital en América Latina. Informe de progreso del Proyecto. CEPAL/ONUDI, RLA/77/015. (E/CEPAL/SEM.13/R.2)
3. The capital goods industry in Latin America: Present situation and prospects (UNIDO/IS, November 1983)

II. Information documents

1. Notas sobre la demanda de bienes de capital de los países del Caribe/Notes on the demand for capital goods of the Caribbean countries
2. Identificación de obstáculos al desarrollo del sector productor de bienes de capital
3. Mecanismos de incentivo a la producción y comercialización de bienes pital y servicios conexos en América Latina
4. Demanda de turbinas hidráulicas de algunos países latinoamericanos en el período 1980-1990

III. Documentation relating to regional project RLA/77/015: Capital goods

1. Demanda de equipos para generación, transmisión y transformación eléctrica en América Latina. Cuadernos de la CEPAL, No. 46. (E/CEPAL/G.1241)
2. La demanda de maquinaria y equipo de la industria latinoamericana del cemento (E/CEPAL/L.292)
3. Notas sobre la capacidad de producción de bienes de capital en algunos países latinoamericanos (E/CEPAL/L/296)

Annex 4

Documents submitted by the participants

- LERMITTE, Pedro Charles, Suministro de transformadores de distribución de industria nacional, a la empresa estatal uruguaya de energía eléctrica (UTE), mediante un sistema de contratos de suministros plurianuales, Montevideo, 1983.
- LIMA, Luis Alberto, Implantación de una industria de bienes de capital en el Paraguay, Asunción, 1983.
- TIRADO, Getulio, Estrategia de Desarrollo de la industria de bienes de capital venezolana, CONDIBIECA, Caracas, 1983.
- TIRONI, Luis Fernando, Evolução recente e problemas atuais na industria brasileira e bens de capital (Versao preliminar), Brasilia, 1983.
- VILADRICH, Alberto; DONNI, N., JUAN, A., Programa hidroeléctrico argentino: sus impactos en la ingeniería y el desarrollo nacional hacia el año 2000. Ponencia presentada al IX Seminario de grandes obras hidroeléctricas. Resistencia, Argentina, 4 al 6 de noviembre de 1982.
- Comisión Ecuatoriana de Bienes de Capital (CEBCA), Marco legal de la Comisión Ecuatoriana de Bienes de Capital.
- Comisión Ecuatoriana de Bienes de Capital (CEBCA), Proyectos de inversión en el sector público.
- Consejo Nacional de Desarrollo de la Industria de Bienes de Capital (CONDIBIECA), Posibilidades y restricciones de cinco ramas industriales de bienes de capital en Venezuela, Caracas, 1983.
- Consejo Nacional de Desarrollo de la Industria de Bienes de Capital (CONDIBIECA), Demanda de bienes de capital en el sector eléctrico, Caracas, 1983.
- Fondo de Promoción de Exportaciones no Tradicionales (FOPEX), Planta conservera para productos del mar, Lima.
- Fondo de Promoción de Exportaciones no Tradicionales (FOPEX), Despiece de una planta concentradora para minerales, Lima.
- Fondo de Promoción de Exportaciones no Tradicionales (FOPEX), Despiece de una planta de lavado para el procesamiento de gravas auríferas aluviales.
- Fondo de Promoción de Exportaciones no Tradicionales (FOPEX), Despiece de una planta de harina de pescado, Lima.
- Fondo de Promoción de Exportaciones no Tradicionales (FOPEX), Generación, transmisión y distribución de energía eléctrica, Lima.

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Q U E S T I O N N A I R E

Analytical Report on the First Meeting of Experts on Capital Goods in Latin America. Views and meeting of minds of the participating experts. UNIDO/ECLAC, Santiago, Chile, 5-7 December 1985.

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