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ACTIVITIES OF THE JOINT ECLA/INSTITUTE/IDB PROGRAMME ON THE INTEGRATION OF INDUSTRIAL DEVELOPMENT

(October 1966 - December 1967)

Report of the Director of the Programme

Note: Translated from unedited Spanish text.

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I. BACKGROUND DATA ON THE PROGRAMME

Following the practice that has been observed since the establishment of the Joint ECLA/INSTITUTE/IDB Programme on the Integration of Industrial Development,[1] this document is intended as a brief progress report on the work of the Joint Programme from October 1966 to 31 December 1967.[2]

In contrast to the previous reports, however, it includes a brief summary of the work done since mid-1964 in relation to each branch of industry and the industrial economy, in addition to a detailed account of the work completed during the period under review and a description of current activities.

It was considered useful also to make a brief appraisal of the activities carried on under the Programme which are specifically connected with regional integration, and to indicate the significance ascribed to them, as part of the integration approach to each sector of industry that has been agreed upon. Section II, which deals with this overall appraisal, provides a general picture of the regional integration concepts and premises that have guided the Programme. In considering the reflections contained in that section, however, due account should be taken of certain circumstances which set definite limits to the regional integration activities of the Programme.

In the first place, because of the organization of the Joint Programme and the origin of its resources, it has been impossible to concentrate solely on areas directly related to regional integration, as such work had to be regarded as additional to that normally done by the Industrial Development Division, which embraced the whole vast field of industrial development in

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1/ Launched by ECLA, the Latin American Institute of Economic and Social Planning, and the Inter-American Development Bank (IDB) in the middle of 1964.

2/ For information on the first two years, see "Actividades del Programa Conjunto CEPAL/ILPES/BID de Integración del Desarrollo Industrial (junio 1964 - agosto 1965): Informe del Director del Programa" (E/CN.12/L.8), and "Activities of the Joint ECLA/INSTITUTE/IDB Programme on the Integration of Industrial Development (September 1965 - September 1966): Report of the Director of the Programme".

Latin America. This is borne out by the meagre increase in the resources of the Industrial Development Division at the time the Joint Programme was established. An average of 25 per cent of these funds is contributed by the Inter-American Bank (IDB), 5 per cent by the Latin American Institute for Economic and Social Planning, and the rest by ECLA through the inclusion of the Industrial Development Division in the Programme.

Nevertheless, these administrative reasons strengthen rather than conflict with other more substantive motives for carrying out studies on integration concurrently with others of more general interest, whether on technological matters, exports to world markets, or action to facilitate national programming. This is so because experience in recent years leaves no room for doubt that it is impossible to conceive of or to promote integration without taking such questions into account.

Secondly, the Joint Programme is not entirely free to choose the fields to be studied from the standpoint of integration or the questions to be included in the studies. Government bodies have expressed concern when studies on specific sectors of industry analyse the problems of the location of industries in the context of regional integration or elaborate on the comparative advantages of the different countries on the basis of cost estimates for alternative locations or other criteria. In line with this way of thinking, it has been said that these criteria should be prepared by the integration agencies - in the case of ALALC, by the Study Group of its Advisory Committee on Industrial Development (Comité Asesor de Desarrollo Industrial, CADI) - or in response to express requests from those agencies or the government bodies concerned.

Therefore, the comments set forth in section II on regional integration and the activities of the Joint Programme which are related to it, should be considered within the context of those limitations.

In more specific terms, reference might also be made to the collaboration of the Joint Programme staff in the work of the two integration agencies: the Central American system and the Latin American Free Trade Association (ALALC).

ECLA's studies on industry in Central America are carried out by the Mexico Office and are not, therefore, a responsibility of the Joint Programme. Nevertheless, there is a proposal that the Programme should co-operate with the Central American Research Institute for Industry

/(Instituto

(Instituto Centroamericano de Investigación y Tecnología Industrial - ICAITI) in 1968 in a broad appraisal of the development prospects for steelmaking in Central America. This co-operation will be facilitated by IDB's contribution to the Joint Programme, and can be repeated in the future for other branches of industry in so far as available resources and the programme in course of execution permit.

ECLA has recently concluded an agreement with ALALC to co-operate with it in various fields. The paragraphs on industrial development are as follows:

"(1) ECLA will continue to co-operate with the Study Groups of CADI on steelmaking, petrochemicals, and pulp and paper; its technical staff will participate in the meetings of the various Groups, and collaborate in any specific projects that may be required in connexion with their future activities.

"(2) ECLA will co-operate in the fullest possible extent in any new study groups which CADI may create in the future, either by preparing background data and criteria as a basis for the projects to be carried out by each group, or by furnishing technical collaboration in those projects. In its joint programme with IDB, ECLA is already working on the motor-vehicle, aluminium, and sodium alkali industries.

"(3) ECLA will try to meet ALALC's possible requirements for collaboration in industrial matters connected with the activities of the working group on problems of origin, either by sending experts to Montevideo to participate in these activities on a non-permanent basis, or by responding from Santiago, to requests for information on those sectors of industry where it has already accumulated some experience or is carrying out projects.

"(4) ECLA is engaged in the preliminary stages of a study on steelmaking prospects in the relatively less developed Latin American countries. ALALC could make use of its results either at a future stage of the work being done by the Study Group on Steelmaking or, more directly, in solving the problems of the relatively less developed countries.

"(5) As from March 1968, a staff member of the ECLA Industrial Development Division will be stationed at Montevideo. He will act as intermediary

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for the smooth channelling of increasing co-operation in all the industrial fields mentioned above, and in any others that may appear in the future through mutual agreement."*

Lastly, under the existing arrangement IDB's contribution to the Joint Programme in 1968 will be in the form of resources for the execution of specific projects, which in this case will relate to steelmaking in the relatively less developed countries, the motor-vehicle industry, and the transfer of technical know-how. The objectives and terms of reference of these projects are described in detail in the relevant sections of this report.

* Provisional translation.

II. ACTIVITIES OF THE PROGRAMME AND REGIONAL INTEGRATION

The studies on the various sectors of industry have progressed, depending on the resources available, the amount of knowledge gained from previous studies, the local co-operation it has been possible to enlist in each case, and the degree of complexity of each sector. This explains why the achievements during the three and a half years that the Programme has been in force and the work that still remains to the done to attain a fairly uniform level of knowledge in the whole field of industry, differ so widely from one sector to another. As mentioned previously, both the studies carried out in the early years of the Programme and the additional analyses that would be useful, whether they are prepared under the Programme or by other agencies, do not necessarily have a direct bearing on regional integration. They respond to the need for a wider knowledge of structure, growth trends, levels of operational efficiency and the impact of economies of scale on cost and investment, etc., since the only possible approach to regional integration is on the basis of all these data, and taking into account the different situations they reflect in the various countries. In this broad sense, the next few paragraphs deal briefly with the amount of knowledge accumulated on each sector of industry and the gaps in that knowledge which must somehow be bridged.

1. The steel industry

The advantage of regional integration for this industry lies in the tremendous effect of economies of scale and the creation of regional competition as an incentive to increasing efficiency and introducing better techniques. The three industrially most advanced countries of the region - Argentina, Brazil and Mexico - already have domestic markets which enable them to obtain some benefits from their large-scale production. Thanks to successive expansions of their plants, these countries are in a position where practically all their principal integrated steel plants will shortly attain - or can attain, once the institucional obstacles are swept away or the appropriate policies are adopted - a capacity larger than the minimum economic size, which is about one million tons for flat products, half a million tons for non-flat products, and a figure

/somewhere between

somewhere between the two for plants producing both flats and non-flats, as is the case for most of the Latin American plants. Other steelmaking countries, such as Chile, Colombia, Peru and Venezuela will have difficulty in exceeding the minimum economic size - at least over the short or medium term - because of their limited domestic markets. For these countries, regional integration would be a useful tool for expanding markets and increasing specialization in the various plants.

Moreover, as regards competition as an incentive to raising the level of operational efficiency and introducing modern techniques, regional integration would benefit the whole of Latin America's steel industry, irrespective of the size of the domestic markets or of the individual plants. Actually, there is an ever-widening technological gap, and a tendency to delay the introduction of known technological advances and improvements, which result in a "cost reduction potential" - the strongest argument for regional integration in those countries where the market factor and economies of scale have already lost most of their appeal.

The work of the Programme, in the three and a half years of its existence, has centred on the elaboration of data and the progressive elucidation of those two main facets. First, two reports were prepared on the influence of plant size on production costs and investment in hypothetical integrated steel plants in ideal locations, that is to say, using unit input prices which were not applicable to any specific place but represented an average of Latin American conditions in terms of expenditure on stocks of ore, coal, etc. Since all the analyses are based on physical inputs, the cost and investment calculations can easily be applied to prices of local inputs in any real location. The reports relate, respectively, to small plants producing non-flat rolled products (with a capacity of 25,000-300,000 tons of ingots per year) and medium-sized and large-scale plants producing both flats and non-flats (with a capacity of 300,000-2,500,000 tons of ingots per year), and using different production processes and equipment. These detailed data are expected to serve as an effective instrument - hitherto unavailable, at least with the same degree of up-to-date technological information and detail regarding plant sizes and production processes - with which

/countries and

countries and integration agencies can assess the benefits to be expected from specific regional integration schemes, on the basis of economies of scale.

The other aspect of steelmaking problems on which the Programme has been working is production costs and their relationship with different structures of production, stages of technological progress and levels of efficiency in the plants' daily operations. Until the relevant report was prepared and issued under the Programme, little or nothing was known about these relationships, or the subject was taboo because of the touchiness and reticence of certain enterprises in the region which were reluctant to have such aspects even studied or analyzed. As it was considered essential to have information about cost levels in Latin American steelmaking if any headway was to be made with the integration approach, an effort was made to overcome the difficulties and the opposition of some enterprises, and theoretical calculations were made of potential costs for plants whose structures of production and operational characteristics differed as little as possible from those of the real plants. In this way, a fund of reasonably accurate data was accumulated on the cost levels in the various departments of every major integrated plant, and on the extent to which they were affected by the negative factors implicit in the Latin American steel industry at the time the study was prepared, namely, the internal disequilibrium in the plants' production capacity, the use of outmoded production techniques, etc. It has been shown - of course, merely by way of example - how individual plants could reduce their costs, either by improving some aspects of their operation and reducing certain physical inputs, or by introducing technological improvements requiring a very low investment, or by ensuring a balance between the productive capacity of the various departments. This whole cost analysis, which, being the first of its kind for the Latin American steel industry, is only a preliminary estimate, is of key importance from the Programme's standpoint, inasmuch as such integration would be feasible only if an effort was made to keep the prices of Latin American steel products close to world market prices, and if methods and instruments were found which were suitable for attaining that goal and in keeping with the existing unfavourable position of the industry.

/The background

The background data prepared for the Programme, i.e., the reports on economies of scale and the study on costs and related factors, have been made available to ALALC, which has made a comprehensive study of the integration of the steel industry through the appropriate Study Group of CADI. No final decision on the conclusions reached has yet been taken by the integration agencies. The future activities of the Programme include an analysis of development prospects for steelmaking in countries where this industry has not yet been established: the relatively less developed countries, and those of Central America and the Caribbean. The programme of work to be implemented in 1968 and perhaps part of 1969 includes this analysis, which will start with Central America and proceed country by country or region by region, including the Caribbean Basin. It will comprise a study of the possibilities in regard to natural resources and their economic utilization by means of rerolling mills or by direct reduction processes of various kinds.

2. The copper industry

From the standpoint of regional integration, the problem of the copper industry is two-fold. Production of primary copper, which depends above all on the quality and abundance of the ore and its convenient location for economic exploitation, is concentrated in Chile, Mexico and Peru, which export a large proportion of their output to the world markets. There can be no doubt that economies of scale in the production of primary copper directly affect the costs of the large-scale export enterprises. The availability of natural resources is another very important factor. The regional integration of this industry would mean the creation of supply conditions in the region which would prompt the major consumer countries - particularly Argentina and Brazil - with their advanced processing industries, to obtain primary copper from the regional producers, without having to resort to the world market and thus expose themselves to its fluctuations and vicissitudes; and if they did so, this would remove the incentive to develop their own sources of primary copper, presumably at a high cost because of their low-grade ore.

The second phase of the copper industry - secondary processing - poses different problems with respect to integration. The processing industry is highly developed and covers practically all domestic needs in the most

industrialized countries with the largest domestic markets - Argentina, Brazil and Mexico -, the first two relying almost entirely on imported raw material. In Argentina and Brazil, in particular, the size of the market makes it possible for plants to be far larger than the minimum economic size, which is considerable in a capital-intensive activity of this kind. The levels of copper processing costs observed in those countries are also heavily influenced by factors which are generally grouped under the head of external economies and are associated with all highly industrialized communities. The approach to regional integration in secondary copper processing requires that due account be taken of the heavy impact of these two factors - plant size and external economies - on costs, the most favourable effects being found in relatively well-developed industrial communities. The difficulty arises when the factors favouring the establishment of the primary copper industry do not coincide with those warranting the development of the processing industry, and it is aggravated by uncertainty as to the weight attributed to the availability of resources, economies of scale and external economies in the locational distribution of long-term processing activities.

With this regional approach to the problems affecting the copper industry, work under the Programme has proceeded along the two lines described above. For copper extraction and refining, a survey was made of the existing situation throughout Latin America as regards resources, production and markets, with special attention to the problems created by the producer countries' heavy reliance on an unstable world market. These questions are dealt with in a recent report, and it is hardly possible at this stage to go beyond the simple description of facts set forth therein.

Secondly, for the processing industry, a detailed report was prepared on the effects of the economies of scale, indicating the physical inputs, costs and investment in hypothetical plants with varying capacities, producing the articles currently consumed in Latin America, such as, electrical conductors, bars, shapes, tubes, and other flat and non-flat products. This report is a basis for estimating the cost levels obtainable under specific conditions in given countries, and for evaluating the resulting economies of scale in relation to probable transport costs; in other words, it is an

instrument for analysing the viability of particular regional integration procedures for products of the secondary copper processing industry.

What new studies are undertaken on the future regional integration of the copper industry will probably depend on the guidelines laid down by the integration agencies concerned.

3. The aluminium industry

This is one of the industries which is likely to benefit most from a regional co-ordination of its future development. As it is a capital-intensive industry, economies of scale have a very strong impact on production costs and investment. Moreover, as aluminium consumption is only just beginning to develop in Latin America as a whole, the minimum economic plant size - and much more so, the optimum economic size - is far larger than is required to meet the apparent consumption in every single one of the various domestic markets. Secondly, the uneven distribution of ore suitable for the production of alumina in Latin America, and the enormous differences in the unit cost of electric power, mean that some locations have significant advantages which make for appreciably lower costs in certain countries. These two factors - the strong impact of economies of scale and locational advantages - have created highly propitious circumstances for the regional integration of this industry, although the existence of a few rather small plants in some countries would undoubtedly be a complication.

Endorsing a suggestion of the Joint Programme, the secretariat of AIALC proposed at its third session that CADI should set up a study group on the aluminium industry, which could make use of the data already collected and analysed thus far in the Programme. Although the proposal was not adopted at the time, it does have undoubted merit.

In the Joint Programme's studies on the aluminium industry, published in two reports, an attempt is made to determine the full incidence of economies of scale on costs and investment in hypothetical plants of various sizes, in "theoretical" locations, and they contain a preliminary examination of the impact of locational factors on costs, the costs for plants that might be established in different real locations being estimated on the basis of the corresponding unit input costs.

/The report

The report on costs and investment in establishments of different sizes gives separate consideration to alumina plants, aluminium plants, plants producing different types of finished rolled products (cables, shapes, plate, etc.), and plants engaged in two or more of these stages of processing, according to the form of vertical integration adopted. Since very little economic and technical information, which is strictly controlled by the major international enterprises, has been published on this industry, the Programme study may well be useful as a basis not only for considering the regional integration problems but also for programming the sector at the national level.

The second report compares the minimum economic plant size with the size of the various domestic markets, at present and anticipated in the near future, with a view to showing the advantages of adopting an integration approach to the development of the aluminium industry.

These data seem sufficient, for the moment, to provide a preliminary insight into this branch of industry, and the Programme's activities in this field will not be resumed unless some project of the integration agencies so requires.

4. The chemical industry

This industry is composed of a group of sub-branches which differ widely both in characteristics and in the stage of development they have reached in the region. From the outset, therefore, the Programme activities have been conducted at the sub-sectoral level, in an attempt to determine the situation and prospects of sub-branches such as the petrochemical, fertilizer, and sodium alkali industries, while at the same time using economic and statistical criteria to appraise the evolution of the chemical industry as a whole.

These three sub-branches were chosen for a more careful examination of their problems precisely because it was recognized from the outset that they afforded the best prospects for regional integration. This was so, on the one hand, because of their large scale of production and the heavy investment required for their development, with the resulting economies of scale in costs and investment, and, on the other, because of the existence of appreciable gaps in supply, filled by imports from third countries, which opened the door to a policy of regional import substitution within the framework of appropriate integration arrangements. A third factor also favouring integration is the

/heavy reliance

heavy reliance of these industries on certain natural raw materials, for which there are great differences in availability, quality and cost of extraction between one country and another, a fact which highlights the advantages of strict regional specialization in the production of the relevant intermediate and finished products.

This potentially favourable situation from the standpoint of regional integration is nevertheless complicated by particular circumstances in each of these branches. In the petrochemical industry, the main difficulties lie in the fact that the countries with the largest domestic market and the biggest import deficit are precisely those in which the raw materials situation is least satisfactory. The possibility that these countries might absorb a sustained flow of imports from other countries of the region which are better endowed with basic resources for the petrochemical industry nevertheless conflicts with the desire to have their own petrochemical industry, which is considered as a key component of any economy based on a balanced industrial structure. A mere comparison of costs and profits is not a sound enough basis on which to decide whether it is economically advisable to develop the manufacture of petrochemical products in these countries regardless of the inadequacy of natural resources, since this weakness - which may be only temporary - might in given circumstances be more than offset by the economic advantages that might be derived from the local manufacture of the industrial equipment required, the creation of external economies for the development of certain regions, or the contribution that the new industry might make to the over-all balance of operations in heavy chemical industry complexes. The presence of these factors in the case of the petrochemical industry seems to point to the need to seek regional integration through the co-ordination and complementarity of national development plans, by a system of trial and error rather than by means of regional specialization schemes based solely on considerations of costs and investment.

The position of the fertilizer industry with respect to regional integration varies according to whether nitrogenous, phosphatic or potassic fertilizers are considered. The small size of the domestic markets in relation to the minimum economic scale of production - and even more, to the optimum scale - and therefore the savings in investment and production costs per ton

obtainable through regional specialization are factors which affect all three fertilizers alike; but the importance of the existing industry and of the expansions planned or under way, and therefore the balance of supply and demand which may be estimated for 1970-75, are different in each case. As to the production and use of nitrogenous fertilizers, it may be estimated on the basis of the existing industry and the projects in course of execution practically everywhere in the region - which vary widely in size and potential costs - that there will be an appreciable surplus of production over the maximum foreseeable demand over the medium term, if not over the short term. The regional objectives for this industry would probably have to be limited, in the initial stage, to achieving closer co-ordination between the various national plans, which would mean, in practice, reducing the number of new projects in course of preparation by eliminating - or postponing - those with the most unfavourable characteristics in regard to location and costs, and increasing the scale of the remaining projects. Although it might not be possible really to open up markets during this first stage, the improvement in internal conditions in every country of the region as regards the characteristics and competitive capacity of the individual plants might well be an important step towards securing a gradual liberalization of trade at a later stage. Such a trend throughout Latin America would not, of course, be incompatible with more clear-cut integration arrangements within sub-regional groupings, such as the Andean, the Central American or the Caribbean group of countries.

The phosphatic and potassic fertilizer industries hold out somewhat more favourable prospects for regional integration. A substantial shortfall in production is expected in the former, which will have to be covered by imports from the rest of the world or possibly by making use of the phosphate rock resources to be found in the region, particularly in Peru. The production of potassic fertilizers is more dependent than that of phosphatic fertilizers on renewed efforts to explore the natural resources required for their manufacture. Since the potassium industry is practically non-existent, it should be developed through the establishment of one or more plants on a regional scale.

/Lastly, the

Lastly, the prospects for regional integration of the sodium alkali industry are much the same as for phosphatic and potassic fertilizers: here too, there is a substantial shortfall in production covered by imports - despite the existence of plants in several countries of the region, although they do not always operate on a scale or at a level of efficiency that might be considered satisfactory; capital expenditure represents a high proportion of the costs, which means appreciable economies of scale; and the industry relies heavily on natural raw materials which are scattered throughout the region but whose extraction costs are extremely uneven.

In view of the favourable prospects the sodium alkali industry also holds out for regional integration, here again, the secretariat of ALALC endorsed the suggestion of the Joint Programme regarding the establishment of a study group as part of CADI to examine the procedures for achieving integration and complementarity that might be adopted.

The studies of the Joint Programme on these three sub-branches of the chemical industry - petrochemical products, fertilizers and sodium alkalis - show that the degree of complexity of the situation is different in each case, as has been briefly stated above. The corresponding reports show that the studies on sodium alkalis and fertilizers are more comprehensive and far-reaching than those on the petrochemical sector, for which there is only a preliminary survey of resources, demand, scale of production, and existing industry.

Whether or not the work of the Joint Programme will continue in this and other fields depends largely on the decisions taken by the integration agencies. The Programme has also participated actively in the Working Group of the Inter-American Committee on the Alliance for Progress (ICAP) on the use and production of fertilizers, and in the three meetings of ICAP that have thus far taken place, at which a set of guiding principles was prepared for the various international and inter-American agencies operating in this field, with a view to expanding the consumption of fertilizers and developing production along more rational lines. ICAP's decision to set up an ad hoc inter-agency group to co-ordinate the activities of the organizations represented opens up great possibilities and can have significant results if it is applied with persistency and energy. Through this flexible machinery a regional policy governing the use and production of fertilizers could

/gradually be

gradually be worked out by co-ordinating the necessary technical and financial assistance activities, assigning responsibility for their execution to the appropriate agencies, and designing and implementing new methods of co-operation, all within a regional framework. If ICAP were to adopt such a policy, the Joint Programme would be able to intensify its present co-operation.

5. The pulp and paper industry

The manufacture of pulp and paper may be classified, from the standpoint of the integration of markets, in two categories of industries with widely varying characteristics, depending on whether they produce the long-fibred or the short-fibred product. The industries manufacturing long-fibred pulp, obtained principally from softwoods, and the paper produced from it (newsprint and Kraft) are capital-intensive and are generally located close to the sources of raw material. Only a few countries of the region - Chile, Guatemala, Honduras, Nicaragua and Mexico - have fairly plentiful supplies of softwoods, but they are not exploited under the most favourable conditions - and these are unlikely to improve at least over the short and medium term - for want of the necessary infrastructure. The minimum economic size of plant and the heavy investment required, in both production and infrastructure, particularly when considered in relation to the respective domestic markets, unquestionably indicates the desirability of a regional integration of this industry, which would enable it to operate on a competitive footing and to supply the markets of Western Europe, where there is an increasing shortage of these products. Because of the region's present large gap in imports of this type of pulp and paper and the fact this gap is expected to widen rapidly, it would be advisable also that parallel efforts should be made to create other sources of softwoods in those parts of the region with the most favourable ecological conditions and locational possibilities in relation to the existing infrastructure and consumer centres. Lastly, if a regional integration approach to the development of this industry is to be adopted, the first step must be to solve the problem raised by the present policy of subsidizing imports of newsprint practised by nearly all the Latin American countries, whose negative implications for regional integration are aggravated by the policy of subsidizing exports or exporting at marginal cost, often followed by the major world exporters.

/Short-fibred

Short-fibred pulp and paper, produced mainly from hardwoods or bagasse, are usually manufactured in plants for which a smaller minimum economic size is required. Even in this category where the requirements are less stringent, however, the existing industry - which represents most of the Latin American pulp and paper industry - is usually unsatisfactory as regards size, techniques and operational efficiency. That is both the challenge and the problem of regional integration in this sub-branch of the pulp and paper industry. The creation of competition through the integration of markets would presumably prompt the industry to introduce improvements, to merge existing factories in larger production units, to replace completely obsolete equipment, and eventually to reduce production costs by a large-scale move to reorganize and improve the industry. If the efficiency and productivity potential inherent in the situation of this important sector of the pulp and paper industry is to be fulfilled, however, it is imperative to introduce sweeping changes in the existing industry, which would be accompanied by difficult, but inevitable, problems of conversion.

Regional integration therefore has two quite different aspects in the two branches of the pulp and paper industry: complementarity, with a view to maximum economies of scale and better utilization of the region's natural resources, in the first case; and competition as an incentive to improving the efficiency and productivity of existing industry, in the second.

The work of the Joint Programme on this industry has been carried out by the ECLA/FAO/BTAO Pulp and Paper Advisory Group for Latin America, which recently extended its sphere of activities to include forest industries in general, and was renamed ECLA/FAO/UNIDO Forest Industries Advisory Group.

In the three and a half years the Joint Programme has been operating, the Advisory Group has studied three main subjects: the evolution of apparent consumption and production capacity, by countries; the effect of economies of scale on production costs and investment for different finished products, according to the degree of vertical integration, the production processes, and the raw materials used; and, lastly, the position of small and medium-sized plants and the possibilities of modernization.

Several questions have not been sufficiently clarified and will entail further work in the next few years. In order to step up the region's self-sufficiency in newsprint, which is probably a high-priority problem, it will

/be necessary

be necessary to study the markets, present and future resources, and the economic policies relating to production and use. Increasing attention will then have to be given to the policies which should be applied to secure active participation in world export markets over the medium and long term. Lastly, it would be useful to make a more detailed study of the situation of medium and small-scale establishments as regards internal operating conditions and measures for their improvement, as an expansion of the pilot study which covered a sample of manufacturing establishments in Argentina and Brazil.

It will also be necessary to continue co-operating in the work on this industry being done by the Study Group of ALALC (CADI), which is to formulate its recommendations some time in 1968.

6. The metal-transforming industry

The advantages of regional integration in the metal-transforming industry vary with the different categories of products in this complex industrial sector. The manufacturing establishments are usually found in consumer centres or in areas linked with those centres by good transport services. The existence of raw materials, i.e., local production of steel, is not a factor determining their location, which is influenced far more by the existence of a sufficiently developed infrastructure and of external economies (possibilities for sub-contracting, availability of maintenance and other services, etc.). These circumstances favour a fairly broad distribution of metal-transforming activities throughout Latin America, particularly those lines of production which are less affected by economies of scale and transport costs.

The effect of plant size on production costs in this field is greatest in the heavy metal-transforming sector, such as, the motor-vehicle industry, the manufacture of rolling-stock, shipbuilding, and the production of complex industrial equipment, e.g., for power generation, petroleum extraction and refining, steelmaking, the manufacture of pulp and paper, etc. In these industries, costs and investment fall appreciably as the scale of production increases, although the reductions are not so great as in the continuous-process industries such as steelmaking, the manufacture of aluminium, copper refining and newsprint production. An important limiting factor in the heavy metal-transforming industry is the minimum economic scale compared with the size of the Latin American markets.

/In this

In this respect, this scale must really be considered as an obstacle to the development of activities such as the manufacture of heavy equipment. The production costs of these activities - and this is a general feature of discontinuous-process industries rather than of continous-process industries - are more affected by entrepreneurial ability, manpower training, the presence or absence of external economies, and even the amount of sub-contracting which is done, than by the actual scale of production, provided it is larger than the minimum technical scale predominating in the sector.

The foregoing observations must be qualified, however, in two important respects. First, the scale of production in the heavy metal-transforming industry can often have an indirect effect through engineering know-how, whether this originates in the enterprise itself or is imported and adapted to local conditions in the enterprise. Moreover, the scale of production can have a much greater influence on certain components than on the final assembly activities, whether they be motor-vehicle components or items widely used in the industry, such as motors and generators, compressors, electronic control equipment, etc. Nevertheless, these qualifications do nothing to alter the basic fact that the attainment of reasonable cost levels in the metal-transforming industry under existing Latin American conditions depends as much or more on essentially industrial factors, external economies and entrepreneurial ability as on the simple factor of plant size.

As regards the incidence of economies of scale, mention should also be made of the light metal-transforming industries, which manufacture intermediate products, standard or mass-produced capital goods (electric motors, hydraulic pumps, agricultural machinery, etc.), and the whole range of durable metal consumer goods (electrical household appliances, etc.). Here the minimum scale is much smaller in relation to the normal size of the Latin American markets (in the more developed countries or those which are at an intermediate stage), which has enabled these industries to spring up practically everywhere in the region, and the impact of the scale is generally less because the production equipment can be put to so many different uses. In these activities, too, entrepreneurial ability, manpower training and external economies are important factors.

These considerations, which represent an attempt to simplify in a few short paragraphs a highly complex and heterogeneous situation - which is a

/reflection of

reflection of the wide range of activities included in the category of metal-transforming industries - explain why it is so difficult to introduce a regional approach to the development of this sector or group of sectors. One general conclusion emerges, however: it is important that there should be national development programmes for the metal-transforming sector, which should be formulated in the first instance as programmes for substituting local goods for imports from the rest of the world, and should then be co-ordinated and harmonized at the Latin American level through the gradual application of regional efficiency and productivity criteria to the allocation of resources for the development of metal-transforming.

Accordingly, the promotion of regional integration in the metal-transforming sector requires simultaneous action in the two fields indicated above: the more highly capital-intensive manufacture of industrial machinery and equipment and transport equipment, with a view to favouring regional specialization in the future development of these industries; and other metal-transforming activities which are less affected by economies of scale than by rational and energetic promotion measures, with a view to regional programming for these industries as a whole.

The work of the Joint Programme in the past three and a half years has reflected this dual approach. On the one hand, a study was made of certain lines of production in the heavy metal-transforming industry, such as complex industrial equipment and machine-tools, in some of the more industrialized countries of the region, with special attention to markets, production capacity, levels of technology, and other factors. Secondly, studies were carried out on the metal-transforming industry as a whole in selected countries - Colombia, Ecuador, Uruguay and Venezuela - in order to provide the necessary criteria for programming the development of these industries at a national level, as a prerequisite for a regional integration that would truly benefit these countries.

It might be useful to continue along the two lines described above, that is, to carry on with the study of certain aspects of the manufacture of machinery (agricultural machinery), and the transport equipment industry (motor-vehicle and shipbuilding) in the whole of Latin America, and to extend the studies on the programming of metal-transforming activities in general to other countries, such as, Peru or Chile, or the Central American States.

Available resources, however, permit only one study in depth to be made in the near future. Accordingly, it has been decided that efforts will be centred in 1968, and possibly part of 1969, on a study of the development prospects and pattern of the motor-vehicle industry within the framework of a Latin American common market. This analysis, in which the Inter-American Development Bank is co-operating, will indicate the future structure of production which should be the target for this industry during a transition period (perhaps around 1975-80), the possible participation of each country in that future hypothetical structure, and the most suitable instruments for attaining it.

7. The textile industry

The industries producing non-metal consumer goods, whether for immediate or lasting consumption - textiles, clothing and the like, footwear, foods, and wood, rubber and other manufactures - are in a unique position with respect to regional integration. Not only is the minimum economic scale for these manufacturing activities very small - virtually within the dimensions of any Latin American market - but the economies of scale are generally negligible. Production costs are influenced by the factors normally grouped under the head of operational efficiency - the calibre of the managerial staff, the internal organization of the plant, manpower training and productivity, and the efficiency in the use of fixed capital - more than anything else.

On the whole, the level of operational efficiency of these industries, particularly textiles, is very low throughout Latin America. The only useful role that regional integration could play here is as a means of introducing competition and prompting changes in the form of rationalization, modernization and technological improvements. The state of virtual stagnation reached by these industries in many countries is a formidable obstacle to regional integration; but this very factor is a sign of the urgent need for improvements and for the benefits which integration would bring, in the form of cost and price reductions, and higher wages. Another argument for not excluding these industries from regional integration relates to exports to world markets. Since the industries producing non-metal consumer goods use local raw materials and predominantly labour-intensive techniques, in many countries of

the region they possess potential advantages over producers in the industrialized countries. A prerequisite for launching sustained export flows of manufactures, however, is to reorganize the consumer goods industries along more dynamic lines; and trade liberalization in the context of regional integration would be a highly effective instrument for attaining this objective.

Such trade liberalization should be accompanied, however, by the simultaneous provision of efficacious and large-scale technical assistance and financial support for the modernization of these industries.

In line with this approach, the work of the Joint Programme in its initial stages, which was concentrated on textiles - the major consumer goods industry - has been focused on problems of operational efficiency. A comprehensive picture has been given of the situation of the Latin American textile industry dealing with markets, structure, utilization of capacity, manpower productivity, efficiency in the use of machinery and equipment, and production costs; it also includes comparisons within the region, and between the region and countries outside it. Thus, the background data obtained give a clear idea of the nature and scope of the technical and financial assistance programmes that would have to be drawn up and put into practice to supplement and support any properly programmed liberalization of trade.

It is undoubtedly necessary and it is high time to extend this method of systematic analysis to other items of the consumer goods industries, such as leather and footwear and processed foods, but this would require more resources than are now available to the Programme.

8. Exports of manufactures

Just as it is impossible to conceive of regional integration apart from national programming - a relationship which is particularly close in the case of the metal-transforming industry, as was mentioned above - neither is it possible to design and promote regional integration without making express provision for the promotion of exports of manufactures to the world markets. In several branches of industry, such as those producing consumer goods, there are good prospects of selling to world markets. Furthermore, the expansion of production capacity with an eye to the export market would provide an impetus which would facilitate the indispensable reorganization and modernization of

the industry. Regional integration and exports to developed areas are to some extent interdependent. This may facilitate the achievement of both those objectives, and it is therefore advisable that the measures to attain them should be adopted simultaneously in certain sectors of industry.

Moreover, the promotion of exports of manufactures from developing to industrialized countries is already the subject of a vigorous development campaign launched by the United Nations Conference on Trade and Development (UNCTAD) for the improvement of the arrangements and policies of the importing countries. The idea of non-discriminatory and non-reciprocal tariff preferences in favour of developing countries has gained considerable ground in the last few months and is likely to be approved at the second session of UNCTAD, although the preferences may be limited as regards both the number of products affected and the amount of the tariff reduction granted. Thus, the Latin American countries would do well to devote more attention to the supply of manufactures for export, and to redouble their efforts to improve their position in this respect. Otherwise, such a vital decision as the adoption of a system of non-reciprocal preferences might remain a dead letter owing to the inefficiency and low productivity of the industries which might sustain new export flows.

Effective technical and financial assistance programmes must therefore be put into effect in order to develop exports of manufactures in a sufficient number of countries within the over-all framework of more favourable exchange, credit and fiscal policies than the developed countries have been applying hitherto. Such programmes, based on schedules of products and approximate quantitative targets, should also be compatible at least with the main objectives of regional integration in each sector of industry. This compatibility should not be passive, however; the development programmes should be deliberately aimed at exporting to world markets, so that regional integration would support the exportation of manufactures and vice versa. This general approach could undoubtedly be applied also to specific branches of industry.

The Programme's activities in relation to exports of manufactures have been conducted in accordance with these general guidelines. The first step was to prepare country studies - on Argentina, Brazil, Chile, Colombia and Venezuela - dealing with products and general policy. Secondly, in the

studies on branches of industry - pulp and paper, and textiles, for instance - which were mainly devoted to elucidating the present situation and future prospects of each industry, special consideration was given to the possibilities of competing on world markets.

As from 1968, the work of the Programme in this field will be designed to promote the formulation and practical implementation of national programmes for promoting exports of manufactures, with technical assistance from international agencies (UNCTAD, the United Nations Industrial Development Organization (UNIDO), and possibly IDB), and to ensure that, both in their initial formulation and in their continuing implementation, these programmes take the requirements of regional integration into account as fully as possible.

9. Development and transfer of technology

Technology is at the bottom of all the industrial development problems in Latin America, whether or not they are directly connected with regional integration, as has been shown in the Joint Programme's studies both on sectors and on the industrial economy as a whole. The lack of dynamism in certain branches of industry, such as those producing consumer goods, the expansion of whose markets has just kept pace with population growth, undoubtedly has its roots in the fact that, from the technological standpoint, these industries have, for various reasons, been in a state of virtual stagnation in regard to production processes and equipment, which has prevented them from bringing down their costs and prices to a level that might favour the expansion of their markets. This situation of high prices and difficulty in competing on the world markets, despite their obvious potential advantages of local supplies of raw materials and lower wages, may well be the result not only of an insufficient assimilation of technology but also of mistakes in the choice of production techniques and equipment, which have not been adapted to such local factors as the size of the market, the relative prices of production inputs, etc. Even in the more up-to-date and dynamic industries, such as those producing chemical or capital goods, the slow growth in many cases may be the result of obstacles of different kinds which limit access to more advanced technical know-how or make the choice of the most suitable types of know-how

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difficult. The obstacles and difficulties in these different spheres have been aggravated by the rapid evolution of technology in the developed world and by the increasing tendency to introduce larger scales of production and more complex and capital-intensive processes.

The problems of technical modernization in the Latin American countries do not, however, stem solely from the difficulties and vicissitudes inherent in the transfer of know-how from countries outside the region and its timely and efficient assimilation by local industry. An additional problem is the urgent need for industries to develop their own technologies, and the possible conflict between importing foreign know-how and the indispensable development of local technological research.

Problems such as those described above are difficult to handle in general terms, i.e., for industry as a whole and for all the Latin American countries, with their widely differing industrial structures. A sectoral approach has therefore been adopted for the Joint Programme studies, thanks to which it has been possible to gain a better knowledge of particular situations, such as those affecting the steel and textile industries in some countries, with the ultimate aim of drawing general conclusions from the results. In 1968, the work of the Programme will forge ahead on a new project, supported by IDB, in which an attempt will be made to combine the sectoral approach with an analysis of some features common to all sectors of industry, in countries like Argentina, Brazil, Colombia, Mexico, and the Central American States. The project will include a diagnosis of the following factors in selected sectors of industry: the level of technology, the sources from which technical know-how has been accumulated over the past ten or fifteen years, and probable needs in terms of new technical know-how arising from the industry's future development. The next step will be to analyse, for each sector, the possible sources of such know-how; the ways in which it can be transferred from abroad and the relevant policies and incentives; the margin of requirements which can be satisfied by means of local research on technology, whether adapted to or originating in the country, and the problems of its adaptation to and assimilation by local industry; the strengthening of the local technological set-up by importing the capacity to use technological know-how, rather than the end product of such knowledge.

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It is hoped that the conclusions drawn from this project will be useful not only for formulating national technological policies, under prevailing conditions in Latin America, but also to provide basic guidelines for regional co-ordination in these fields. This co-ordination is a necessary counterpart of the regional integration of each successive sector of industry. Other compelling reasons for such co-operation include the necessity of preventing the Latin American countries from competing among themselves to attract foreign know-how, and of achieving, through a process of co-operation, either a volume of demand or a bargaining power which would make it possible to reduce the cost and generally improve the terms of transferring know-how, so that the region would no longer be so dependent on other countries as the main source of know-how for the modernization of its industry.

III. THE IRON AND STEEL INDUSTRY

A. PREVIOUS ACTIVITIES

Given the development of the iron and steel industry in Latin America, the problems connected with its future expansion, and the possibilities for its incorporation in the regional integration movement, the need arose to assemble the most important background data on this industry in a single document, which would provide an over-all picture of its economic and technical features for the information of Governments, planning agencies, entrepreneurs in the sector, and international credit institutions.

Accordingly, the document entitled "La economía siderúrgica de América Latina" (E/CN.12/727) was prepared, and appeared in mimeographed form in February 1966. It was given a favourable reception by agencies and enterprises concerned in the iron and steel sector, and has been complemented by a series of separate publications which take up some of the major topics and issues it discusses, analysing them more thoroughly and in greater depth. So far, the questions it raises have prompted the appearance of studies on the obstacles to the assimilation of contemporary technology in the Latin American iron and steel industry; the problems calling for technological research; export development prospects; and economies of scale in steel-making.

With the aim of providing information on the level of technology attained in the iron and steel industry in Latin America, identifying the factors by which it is handicapped and measuring their effects, and expounding the problems connected with the transfer of technical know-how and their probable solutions, a document entitled "La tecnología actual y los obstáculos a su incorporación en la industria siderúrgica latinoamericana" (ST/ECLA/Conf.23/L.34) was issued in August 1965.

The iron and steel industry in Latin America, as in other parts of the world where knowledge of the raw materials concerned and of their behaviour in steelworks is limited, is beset by a number of problems whose solution depends upon technological research. This made it necessary to obtain information on these difficulties as they arose in the various steelworks, to group together those common to two or more mills and, lastly, to offer suggestions as to how

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they might be tackled. To this end, a document was prepared under the title "Problemas que requerem pesquisas tecnológicas na indústria siderurgica latino-americana e reflexões sobre ação necesaria" (ST/ECLA/Conf.23/L.44), and was distributed in March 1966.

The situation with respect to intra-regional trade in steel products, and the prospects for its expansion, were the subjects discussed in "La exportación como perspectiva del desarrollo siderúrgico latinoamericano" (ST/ECLA/Conf.23/L.49), which appeared in March 1966.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

1. Economies of scale in steelmaking

Steel production in Latin America needs to be perpetually expanding if it is to keep pace with the region's demand; but in most of the Latin American countries, serious obstacles to this expansion exist, the most formidable being the lack of capital for installing new plants. As integrated steelworks are highly capital-intensive, it is essential for the development of the sector that maximum advantage should be taken of the benefits deriving from larger scales of production and that the new techniques discovered in recent years should be rapidly assimilated and applied. Consequently, ECLA has carried out studies aimed at assessing, with a reasonable degree of accuracy, the influence exerted by economies of scale, technological progress and the industrial-scale introduction of new processes on ivestment and production costs in hypothetical steelworks with different annual production capacities. The method adopted also makes it possible to assemble a collection of data that can usefully be applied for the purposes of specific case studies; all that is needed is to reformulate the estimates on the basis of real input prices in the location proposed for a projected plant.

Economies of scale in the iron and steel industry are discussed in two papers. "Economies of scale at small integrated steelworks" (E/CN.12/764) deals with small mills with an annual output of 25,000, 50,000, 100,000, 200,000 and 300,000 tons of steel, used solely for non-flat rolled products.

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In each of the cases considered, an account is given of the main and ancillary plant comprised in each steelworks, and estimates of investment and production costs and of manpower requirements are presented.

The second document, entitled "Las economías de escala en plantas siderúrgicas de tamaño medio y grande y la influencia de los adelantos tecnológicos en las inversiones y costos de producción" (E/CN.12/766), is concerned with plants whose annual capacity ranges from 100 000 to 2 500 000 tons, and which manufacture both flat and non-flat rolled steel products. An attempt is made to evaluate the specific effects of new techniques in the direction of improving plant and manpower productivity and reducing consumption of particular raw materials and equipment that represent a significant proportion of operational costs.

These studies on economies of scale in the iron and steel industry were distributed in mimeographed form early in 1967.

2. Technological research in the iron and steel industry

A study that appeared in 1966 - "Problemas que requerem pesquisas tecnológicas na indústria siderúrgica latinoamericana e reflexões sobre ação necessaria" (ST/ECLA/Conf.23/L.44) - reviewed the current status of research on the iron and steel industry in Latin America. The suggestions it contained included a proposal that a Latin American centre for metallurgical research might be established, specifically with a view to the development of the steel industry in the region. To that end, a document based on the foregoing study was prepared, under the title of "Un centro latinoamericano para la investigación del fierro y del acero", putting forward definite proposals for tackling the problem of technological research in the iron and steel sector. Further details on this document will be found in the section on "General activities in relation to the industrial economy".

C. CURRENT ACTIVITIES

A document now in course of preparation analyses the possibilities for the relatively less developed Latin American countries to develop steel-making industries of their own, in the form of either integrated or semi-integrated

steelworks, or simply of plants which would use imported billet for the manufacture of steel bars and small shapes.

At the present time some countries, such as Bolivia, Ecuador, Paraguay and the Central American group, do not yet possess steel industries of their own, but are planning to establish them up to a point. The findings of the study will be of particular interest to them, inasmuch as their markets are small and their natural resources are neither adequate in quantity nor of optimum quality. Perhaps it may be possible to devise a satisfactory arrangement, based on integration agreements for the iron and steel industry, which will enable the less developed countries to fulfil their laudable and natural aspirations to solve their supply problem in respect of certain steel products.

Several alternative possibilities may present themselves. For example, a country may provide part of the investment required for a new plant which may or may not be located in its territory, but which will be designed to serve a regional market; or it may even contribute funds to one or more of the existing plants whose expansion will help to supply it with steel products; or again, a small steelworks may be built on the understanding that the country or group of countries concerned will be allowed to give it adequate protection against regional competition during a growth period long enough for it to be placed on the same footing as the rest.

In the 1967 work programme, provision was made for a study on the sources of supply of cast iron for machine parts in Latin America. The aim was to make a survey of the sources of pig iron currently drawn upon by the metal-transforming industry in each of the Latin American countries, and to analyse the possibilities of creating other sources, either national or regional in character. It proved impossible to carry out this study during 1967 for want of the necessary resources, but it is still programmed for preparation at a later date.

IV. THE NON-FERROUS METALS INDUSTRY

A. PREVIOUS ACTIVITIES

Studies in the field of non-ferrous metals were started concurrently with the establishment of the Joint ECLA/INSTITUTE/IDB Programme on the Integration of Industrial Development, and the first to be undertaken were those on aluminium and copper.

Aluminium is at present in very short supply in Latin America, with the result that an increasing amount of foreign exchange is spent on importing it. On the other hand, the region possesses large deposits of bauxite, of which it is the world's leading producer; but they are not located near other basic resources required for the aluminium industry, such as electric power and caustic soda.

The consumption of aluminium, in its turn, is concentrated mainly in two or three of the more highly industrialized Latin American countries. It was thus clear that the development of this industry should be studied with a view to gearing it to a regional market in the future.

The foregoing facts also suggested the feasibility of differing degrees of vertical integration, in terms of the different stages in the process of obtaining finished aluminium products on the basis of bauxite. Such an approach necessarily implies the desirability of inter-Latin American integration agreements, for which a prerequisite would be a fuller knowledge of the amounts of investment required for plants with different production capacities, and of their probable cost structures.

Outstanding among the practical results of the research on this sector are the studies entitled "Perspectivas de la industria de aluminio primario en América Latina y posibilidades de integración regional" (ST/ECLA/Conf.23/L.26) and "Influencias de las economías de escala en la metalurgia del aluminio y en la industria de transformación del metal y sus aleaciones" (E/CN.12/793), which appeared in 1966 and 1967, respectively.

As regards copper, Latin America is characterized by the abundance of its supplies of ore, since it is one of the world's biggest primary copper producers and at the same time shows one of the lowest per capita consumption figures. On the other hand, whereas the primary copper industry is

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concentrated in two or three countries and is directly linked to world markets, the copper transforming and processing industries have developed in Latin America on the basis of individual country markets, which in many cases are too small for the copper-transforming plants to be of economic size or to operate under optimum manufacturing conditions.

The problem of the copper industry's future development at the regional level may be summed up as follows. There are some countries which have large-scale transforming plants, and which might, as a means of reducing their industry's vulnerability to external supply fluctuations, embark upon the development of primary copper production on a basis of low yields and high costs, without the backing of adequate reserves of ore; and there are others, rich in mineral resources, but possessing only small internal markets, which are finding it very difficult to develop a transforming industry whose characteristic features include heavy investment requirements and the need for a fairly broad and diversified market.

The studies already issued under the titles of "Influencias de las economías de escala en la industria de transformación del cobre y sus aleaciones" (E/CN.12/765) and "La industria de cobre primario en América Latina" (provisional text), together with those currently under way, represent first steps towards amassing background information that will facilitate the search for appropriate ways and means of developing the copper industry on a regional and co-ordinated basis. Such a development programme should cover all operations from the mining of the ore to the manufacture of the final product, and at the same time should be adapted both to the characteristics and requirements of the Latin American countries and to the world market situation, while strengthening the competitive position of the region.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

1. "Influencia de las economías de escala en la industria de transformación del cobre y sus aleaciones" (E/CN.12/765)

The object of this study, which was prepared by Mr. Armando Martijena, consultant to the Joint ECLA/INSTITUTE/IDB Programme, was to define the influence of plant size on the economics of the various processes involved in the rolling or wire-drawing of copper and its alloys.

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After an introductory chapter, setting forth, inter alia, the principles adopted in the conduct of the research, the report devotes a chapter to each of the following processes: wire-drawing of high-conductivity copper and manufacture of bars, shapes and tubes by extrusion and wire-drawing; and, lastly, processes used in the rolling of plate, sheet, strip and skelp.

A final chapter presents general conclusions both on cost components and on investment and economies of scale.

The study represents a major piece of research work, and its findings will be extremely useful because of the completeness of the data given on the cost structures of the various processes, the degree of detail in which investment requirements for the various plants are described, and the technological account of the processes whose cost structure is analysed.

2. "Influencia de las economías de escala en la metalurgia del aluminio y en la industria de transformación del metal y sus aleaciones" (E/CN.12/793)

Like the previous document, this study was prepared for the Joint ECIA/INSTITUTE/IDB Programme by Mr. Armando P. Martijena, secretariat consultant. As the title indicates, the purpose of the study was to measure and evaluate the effects of plant size on investment and costs in each stage of the process which begins with the manufacture of alumina from bauxite and culminates in the production of aluminium semi-manufactures and rolled, wire-drawn or extruded products.

This document is complementary to the earlier study on regional development prospects for the aluminium industry referred to in the previous progress report, not only because it discusses relevant questions not analysed on that occasion, but also because it adds further material relating to projections of aluminium production and consumption in Latin America.

The bulk of the study consists in a series of chapters analysing the influence of plant size on investment requirements and cost structures in non-integrated mills which undertake only the processing or reduction of alumina or the smelting, rolling and wire-drawing of aluminium.

In separate chapters, the same questions are considered, but in relation to integrated plants carrying out all operations from the processing or reduction of alumina to the manufacture of wire-drawn products or flats and

/non-flats.

non-flats. Thus, the study effectively paves the way for the evaluation of the development plans for this industry which have been or are being drawn up in Latin America.

3. The primary copper industry in Latin America

A provisional text of this document was submitted for comment and discussion in December 1967.

As foreseen in the previous progress report, as the work advanced it became clear than in studying the situation of the copper industry in Latin America, primary copper production would have to be dealt with first, and the analysis of the transforming industry left for a later stage.

Thus, the study under consideration covers precisely the part relating to primary copper production, tracing world market trends from the post-war period up to 1966 and indicating the role played by Latin America in the evolution described. A detailed account is given of the region's copper ore resources, followed by a description of the situation in Latin America's main producer centres, the characteristics of production, and the investment effected, with some reference to production costs and to existing plans for the expansion of the Latin American primary copper industry over the next five years.

In the second part of the study, Latin American consumption of primary copper is analysed and projections for 1975 and 1980 are formulated. Attention is also given to questions bearing on the competition from substitutes that copper has to face in the world market.

C. CURRENT ACTIVITIES

At the present time, a start is being made on the compilation of data for the second part of the projected study on the copper industry, relating to the transforming process and to copper manufactures.

The aim is to describe and evaluate the existing industry in terms of future development prospects and regional integration possibilities. To this end, the first step will be to make an inventory of the plants installed and of operational conditions in the copper transforming industry in the various countries of the region. At the same time, the requisite technical and

economic data will also have to be prepared. Those already available in the above-mentioned study on economies of scale provide a valuable basis for determining the technico-economic coefficients which reflect the real situation in the region. The possibility of making headway in this project is, however, contingent upon the availability of additional resources.

V. THE CHEMICAL INDUSTRY

A. PREVIOUS ACTIVITIES

At the end of 1964 the secretariat decided to convene a seminar on the development of the chemical industry in Latin America, in order to review the status of this industry in each of the countries of the region in the light of earlier ECLA studies and the information contributed by the governmental and industrial experts who were participating. This seminar, which was held at Caracas in December 1964, afforded the first opportunity of bringing together a large group of entrepreneurs, professionals, experts and government officials connected with the chemical sector, to discuss its situation and the programmes and projects announced, and thus to consider its future development within the framework of regional integration.

The documents presented by the secretariat and the participants[3/] constitute a valuable contribution to the analysis of this industry's development prospects.[4/]

According to the conclusions and recommendations emanating from the Caracas Seminar, there is an urgent need for surveys to be conducted at regular intervals through chemical manufacturers' associations, leading enterprises and government agencies in each country, with a view to keeping the over-all picture of the chemical industry up to date and producing periodic reports on its current status. Furthermore, studies on the chemical

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3/ Thirty-nine documents, listed in the "Report of the Seminar on the Development of the Chemical Industry in Latin America" (ST/ECLA/Conf.23/L.5; E/CN.12/719/Rev.1).

4/ The following were the main documents prepared by the secretariat (revised texts): "Evolución de las industrias químicas en América Latina en el período 1959-62" (E/CN.12/726), 5 April 1965; "Desarrollo de la industria de álcalis sódicos en América Latina" (ST/ECLA/Conf.15/L.5/Rev.1). 20 April 1965; "La industria petroquímica en América Latina" (ST/ECLA/Conf.15/L.6/Rev.1); "La industria de fertilizantes en América Latina" (ST/ECLA/Conf.15/L.7/Rev.1), 25 March 1965; "Las industrias químicas y la integración económica regional" (ST/ECLA/Conf.15/L.8/Rev.1), 20 April 1965; "Centralización y actualización de informaciones estadísticas sobre las industrias químicas en América Latina" (ST/ECLA/Conf.15/L.9), 7 December 1964.

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industry should at the same time be channelled towards specific branches of production, including, in order of priority, the fertilizer, sodium alkali and basic petrochemical industries.

As regards over-all reports on the situation in the chemical sector, a document entitled "La industria química latinoamericana en 1962-64" (E/CN.12/756) was prepared and distributed in July 1966. It updates information on production, imports, apparent consumption, expansion projects, etc., at the level of countries and of major groups and sub-groups of chemical products, to the year 1964. On the basis of the data presented, an attempt is made to analyse the evolution of the chemical sector in the following respects: the relative shares of the various groups in production and apparent consumption; import trends; and levels of self-sufficiency. From the standpoint of regional integration, particular interest attaches to the inter-country comparison of production and consumption growth rates and of degrees of dependence on imports for supplies of staple groups of products.

The continuing research required to keep the analysis of the industry's development up to date is at present focused on a study of the changes that occurred between 1959 and 1965, with provisional data for 1966.

In the studies on specific branches of production, undertaken with the aim of providing more detailed bases for programming the development of particular activities, a country-by-country analysis is followed by the presentation of conclusions at the regional level. As was stated in previous progress reports, certain branches of the chemical industry were selected as subjects for the first of these studies, and regional reports on the petrochemical and fertilizer industries have already been issued. Concurrently, headway has been made in field research on the sodium alkali industry. This series of studies will be continued with an analysis of other branches of the industry in which a measure of regional co-ordination of development is advisable, and which also help to enlarge the market for those basic chemical products that must be processed on a relatively large scale if costs compatible with world market prices are to be achieved.

Priority has been given to the question of economies of scale in the chemical industry,[5/] which is discussed in the specific studies on petrochemical products, fertilizers and, recently, sodium alkalis.

5/ "Economías de escala en la industria química" (ST/ECLA/Conf.11/L.17), presented at the Seminar on Industrial Programming held at São Paulo in March 1963.

/In addition

In addition, these sub-sectoral studies have made an important contribution to the work of the study groups set up by CADI,[6] especially in the case of the report on petrochemical products (E/CN.12/744, March 1966), in the discussion of which experts from the Chemical Industries Unit took part (Montevideo, June-August 1966).

B. WORK COMPLETED IN THE PERIOD

1. Fertilizers

A report entitled "La oferta de fertilizantes en América Latina" (E/CN.12/761) was distributed in November 1966. The Chemical Industries Unit has continued to devote attention to this subject, with a view to the timely evaluation of changes and adjustments in national programmes and projects.

2. Sodium alkalis

A provisional version of the study on the sodium alkali industry was distributed early in 1967. Many suggestions and comments made by enterprises and national agencies operating in this field are being taken up in the preparation of a regional report,[7] designed to define the main trends in the soda ash, caustic soda and chloride market, and to evaluate the conditions afforded by the most promising sites for the installation of one or several regional soda ash plants.

3. Rubber

In the field of petroleum products, a report was prepared on synthetic rubber production and the synthetic rubber market in Latin America, for presentation at the nineteenth assembly of the International Rubber Study Group, held at Sao Paulo, Brazil, in October 1967. A reprint of this study,

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6/ Latin American Free-Trade Association (ALALC), Advisory Committee on Industrial Development (Comisión Asesora para el Desarrollo Industrial).

7/ "La industria de álcalis sódicos en América Latina" (E/CN.12/804).

/incorporating additional

incorporating additional information and suggestions received at the meeting in question, was subsequently distributed under the title of "El caucho en América Latina" (E/CN.12/792, November 1967).

C. CURRENT ACTIVITIES

Work on the over-all study series proceeded in 1967 with the preparation of a new report updating information on the sector to the year 1965, and presenting a few provisional figures for 1966. This report - "Evolución de la industria química latinoamericana en 1959-65" - will assemble in a single document the copious data available from 1959 onwards, and will thus give some idea of the changes that have taken place over a period of six or seven years.

In this connexion, a detailed country-by-country survey was carried out during the year on production, consumption, installed capacity and foreign trade throughout the period under review, with provisional information for 1966, at the level of groups of products and individual products.

Although this report is constructed on the same lines as the preceding studies, its content and analytical approach are broader and more comprehensive. In the first part, with reference to the evolution of the chemical industry in Latin America, it is compared with other branches of manufacturing in order to highlight the dynamic role it has played in the region's industrial development. It is also viewed in the world perspective, specific comparisons being drawn with countries at more advanced stages of economic development (some of the European countries, Japan, the United States, etc.). The second part of the study comprises a detailed analysis of the chemical industry at the level of individual countries, giving a picture of its comparative development in each, its trends and its future prospects. Lastly, a third part will contain monographs on certain specific branches of production, such as the fertilizer, alkali, rubber and synthetic fibre industries. Generally speaking, the objective pursued in this report is to improve upon the degree of accuracy attained in earlier studies by presenting statistical series for 1959-65 on production, imports and apparent consumption. An attempt is also made to quantify, as far as the available data permit, other aspects of the chemical sector in Latin America, such as employment of manpower, current price levels, present and future production capacities, institutional and

/legal questions

legal questions bearing on the development of the chemical industry in certain countries, world market export prospects, etc.

The inherent complexity of the chemical industry, and the fact that some countries are lagging behind in the compilation of production and consumption statistics, have made it necessary to consider additional field missions. On that account, and because of the shortage of personnel for such purposes, this project is being carried over into the early months of the current year, and it is expected that the study will be distributed in mid-1968.

It is also planned to start research on operational conditions in establishments manufacturing basic products of major importance in a selected group of countries. The aim would be to make a comparative analysis of such features as efficiency and productivity, levels of technology, plant sizes, and costs of the main factors of production. This programme would entail field research during the second half of 1968, the findings of which would be presented in a series of monographs towards mid-1969.

The recent agreements reached at Bogotá by the countries forming the Andean Group, with a view to securing the complementarity of their chemical industries, will be the object of special attention on the part of the Chemical Industries Unit, which will prepare a preliminary evaluation of the impact of this complementarity on the development of the chemical industry at the regional level.

VI. FOREST INDUSTRIES

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In mid-1967 the ECLA/FAO/BTAO Pulp and Paper Advisory Group for Latin America broadened its sphere of action to include other primary wood-processing industries, particularly sawmilling and the manufacture of wood-based panels. The Group thereupon changed its name to ECLA/FAO/UNIDO Forest Industries Advisory Group for Latin America, and took over the experts who had been working in that field since 1963 at the FAO Regional Office in Santiago. References to work done during 1967 will therefore include the other primary wood-processing industries besides the pulp and paper sector.

A. PREVIOUS ACTIVITIES

During the early stages of its work, the Group concentrated on preparing a series of national studies. Its aim was to obtain a sufficient knowledge of the pulp and paper industry in different Latin American countries to be able to advise Governments on ways of improving it, and to plan the industry's future development on rational lines in the light of forecasts of demand for the different types of paper and pulp.

In view of the need to frame development policies for Latin America as a whole, the data assembled in the national studies were used as the basis for a regional report, which has been twice brought up to date since the inauguration of the Joint Programme.[8/] The report contains detailed information on paper and pulp consumption, production and trade, projections of demand, data on shortages or surpluses of the different kinds of paper and pulp in the individual countries and the region as a whole, and estimates of investment requirements up to 1975. Current capacity and natural resources are also assessed, and the major problems of regional development are given very general treatment.

The main conclusions of the report deal with some adverse factors that are common to most of the Latin American countries, although the stage of development reached by the industry varies enormously from one to another.

8/ "El papel y la celulosa en América Latina: situación actual y tendencias futuras de su demanda, producción e intercambio" (E/CN.12/570/Rev. 2 and Rev. 3).

/These factors

These factors are largely a question of limited plant size, low operational efficiency, the existence of idle capacity and the lack of up-to-date technology. This study has formed the basis for a large number of studies in the region and is often used as reference material by persons and institutions interested in this sector.

Meanwhile, advice and assistance have continued to be given to the countries and institutions requesting them. Further information on this point is given in earlier reports on the Joint Programme's activities.

As one of the industry's most common problems in Latin America is the prevalence of large numbers of small and inefficient plants, various studies have been undertaken to obtain full information on the operating conditions of these plants and to explore the possibilities of making structural alterations. Two of those papers are particularly noteworthy, one analysing the incidence of economies of scale on production costs for a selected number of products, in accordance with their degree of vertical integration and the processes and raw materials employed,[9/] and the other examining operating conditions and the possibilities of modernization in a sample of mills in Argentina and Brazil.[10/]

Research, education and training facilities for pulp and paper personnel were also found to be sadly lacking in Latin America. Two studies were published on this subject,[11/] one expounding the principal technological problems faced by the industry, which research on lines better suited to local conditions could do much to solve, and the other dealing with the need to establish a co-ordinated network of technical training schools at the university technical and vocational levels.

9/ "Economics of pulp and paper manufacture under average Latin American conditions" (ECLA/BTAO/FAO PREP/CONS/PAPER II/1).

10/ "Aspectos económicos de la modernización y expansión de pequeñas plantas de celulosa y papel, con especial énfasis en los casos de Argentina y Brasil", by the consultants P. Vicien and G. Krogh.

11/ "Research on pulp and paper in Latin America" (ECLA/BTAO/FAO PREP/CONS/PAPER III/1) and "Needs of technological education and training for personnel of the Latin American pulp and paper industry" (ECLA/BTAO/FAO PREP/CONS/PAPER III/3).

/In March

In March 1966, the Review Consultation on the Development of the Pulp and Paper Industry in Latin America was held at Santiago in conjunction with the Latin American Symposium on Industrial Development. A number of documents were submitted to the Review Consultation and served as a focus for the discussions.[12/] The conclusions reached at the meeting are being used by the Advisory Group as a guide for its present and future activities, particularly as regards the solution of the region's difficulties in satisfying its growing requirements for imported newsprint, wrapping paper and long-fibre chemical pulp, all products that contain a large proportion of softwood.

It is hoped that future studies will continue to present up-to-date information on the development of the industry, while paying increasing attention to advisory activities whose main object is to establish multinational projects for making better use of the wider markets opened up by regional integration. In this connexion it should be mentioned that the Group is already working in close co-operation with the ALALC Pulp and Paper Study Group, which was set up in July 1964 to study integration problems in this sector.

Lastly, if resources permit, further studies will be made of the possibilities open to certain pulp and paper products in overseas markets.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

1. "Las industrias forestales en América Latina y sus perspectivas de desarrollo" (FAO: LAFC - 67/4)

This document, which was prepared for the tenth section of the Latin American Forestry Commission held in Trinidad and Tobago from 4 to 9 December 1967, was concluded in August of that year. It underlines the fact that consumption of sawnwood increased at a very sluggish pace during the last decade, whereas the wood-based panel industry and, in particular the pulp and paper sector, expanded rapidly. It also points out that Latin America, despite

12/ "Final report of the Review Consultation on the Development of the Pulp and Paper Industry in Latin America" (ST/ECLA/Conf.23/L.66/Add.1).

its abundant forest resources, is in the anomalous position of being a net importer of wood products (some 200 million dollars' worth a year, purely because of the state of its pulp and paper industry.

The forest industries are operating under unsatisfactory conditions, and changes must be made if they are to cover the growing demand for their products and, at the same time, increase their share of world trade. These changes will relate to: (a) a better infrastructure; (b) larger credits; (c) technological research; (d) more training facilities for the labour force; (e) better treatment for Latin American exports by the developed countries; and (f) proper forestry legislation.

2. Preliminary survey of the wood-based panel industry in Latin America (LA/FIDC/Doc.1)

This study, issued in mid-1967, gives an account of the wood-based panel industry in some of the Latin American countries.

It lays special stress on the need for close collaboration among small-scale industrialists, especially in the plywood sector, where there are a large number of small and inefficient plants. It also emphasizes the need for trained technical staff and better production planning. In addition, it recommends that some kind of independent association or body should be formed to set standards of quality and trade-mark control for the whole region.

3. Preliminary report on the sawmilling industry in Latin America (FIA&LA/Doc.3)

This report, which is the first to deal with the sawmilling industry on a regional scale, was published in October 1967. Among other things, it discusses output, consumption and trade, the raw materials used, and certain aspects of production. It draws attention to the gap between sawnwood output in Latin America, which increased by only 4.5 per cent between 1956 and 1965, and in other countries, where it has risen substantially. In other words, although Latin America's forest resources are some of the greatest in the world, its share of world sawnwood production dropped by 4 per cent in 1956 and 3.5 per cent in 1965.

/There are

There are roughly 19,000 sawmills in the region. Using only about 65 per cent of their capacity, these produced approximately 13 million cubic metres of sawnwood in 1965.

This document is regarded as merely the first step towards a fuller knowledge and understanding of the operating conditions and of the problems inherent in the sawmilling industry in Latin America, and it will be used as the basis for further studies.

4. Advisory services

Assistance has continued to be given to the AIALC Pulp and Paper Study Group, and the Programme took an active part in the Study Group's latest meeting at Montevideo.

Two members of the Advisory Group visited Argentina and Paraguay to study the pulp and paper markets there, and advise the United Nations expert stationed in Uruguay on the possibility of establishing a pulp mill in that country to supply the home market and sell its surplus output to the countries in the River Plate basin.

At the request of the United States Economic Mission in Chile, an analysis was made of the study on the regional pulp market that has been carried out by the Mission in order to assess the competitive position of the pulp mill to be built near Constitución in Chile.

Lastly, assistance was provided for a mission that was sent to Colombia to study the development of forest resources in the Magdalena valley.

C. CURRENT ACTIVITIES

In response to a request made during the Review Consultation on the Development of the Pulp and Paper Industry in Latin America, further efforts have been made to organize meetings on newsprint supply problems in the region. It is hoped that meetings of this kind will give a new impetus to newsprint production in Latin America, which is now stationary at around 250,000 tons a year, while imports are rising continually. (In 1967 they are estimated to have amounted to 620,000 tons, which represented a cost of over 90 million dollars). Although doubts are felt about certain technical and economic

aspects of the use of non-conventional raw materials such as bagasse and broadleaved species, the slowness with which production capacity is expanding must be imputed to financial and price problems rather than to a lack of raw materials.

The work programme provides for two meetings. The first would be held in connexion with the twenty-fourth general meeting of the Inter-American Press Association at Buenos Aires in October 1968, and the second would be held as part of the conference on the development of the pulp and paper industry in Latin America to be held at Mexico City in 1969 or 1970. Whether or not the two meetings can be held will depend on the availability of funds.

The documents for the first meeting are expected to contain data on the current situation and future trends of newsprint production, trade and consumption in Latin America and a summary of the same information at the world level. A study of price trends will probably be included also.

It is planned that the second meeting should consider the resolutions adopted at the first. A document will also be submitted on the possibilities of producing newsprint in the countries where newsprint consumption is expected to exceed 50,000 tons in 1970.

A study on the development prospects for local newsprint manufacture would be very helpful to international financing institutions in financing both industrial development and regional integration.

Research work is being undertaken in the different countries with a view to preparing a detailed study on wrapping paper and board in the region, and its main uses and projections of demand, production and trade. It is hoped to conclude the national surveys in 1968 and to have the final report ready early in 1969.

The Advisory Group is now engaged in drafting the second part of the report on the sawmilling industry. During this stage, it will deal with the aspects that have not been covered, such as production costs, the utilization of waste, the classification and preservation of sawnwood, and projections of demand. It is also revising the report on wood-based panels, and will add data on the countries which could not be included in the preliminary report for lack of time.

As is customary at this time of year, information is being collected on the output, consumption, trade and capacity of Latin America's forest industries in 1967 so that the most up-to-date information is available on developments in the sector.

/VII. METAL-TRANSFORMING

VII. METAL-TRANSFORMING INDUSTRIES

A. PREVIOUS ACTIVITIES

Up to now, activities in this field have mainly consisted of a series of studies designed to obtain a thorough knowledge of the situation in the metal-transforming industries in Latin America and to provide criteria for framing future national and regional development policies. These studies have been supplemented by the provision of advisory services and the preparation of methodological studies connected with the programming and development of specific sub-branches of metal transforming.

The metal-transforming industries have a particularly wide range because of the immense variety of products that they turn out and the different means and methods of production open to them. As a result, it is virtually impossible to make a study that gives a picture of the whole sector and is equally useful for drawing up definite development programmes. For this reason, and also because the industry's stage of development in the different countries is far from uniform, it was thought better and more practical to study it along two clearly-defined lines, viz., by sub-sectors and by countries. The wisdom of this decision has been confirmed by the results of the studies undertaken.

The sub-sectoral studies have been based on homogeneous branches of activity, appearing in the manufacturing techniques, the form of production organization and the technological characteristics of the establishment concerned rather than in the use or economic destination of the products. Four main groups of products have been covered so far: equipment for the basic industries (steel making, electric energy generation, cement, pulp and paper, petroleum refining, etc.); machine tools; textile machinery and equipment, and motor-vehicle equipment (passenger cars, lorries, etc.). A study on the first group, entitled "La fabricación de maquinarias y equipos para las industrias básicas en algunos países de América Latina" (E/CN.12/805), has recently been concluded. The substance of this study will be described later under the head of work completed in 1967. The period under consideration also saw the consluion of a study on the machine-tool industry in Argentina (E/CN.12/747) on the same lines as the previous study on Brazil.

/Apart from

Apart from serving as a guide for the development of the machine-tool industries in those countries, these studies have also been used as a basis for ALALC's negotiations on machine-tools. The study on Brazil, in particular, has given rise to a request for assistance in implementing one of its conclusions, namely, that an organization should be formed to provide technical assistance to manufacturers, to undertake research on the adaptation of metal-working techniques and equipment to conditions in Brazil, and to give the industry ample facilities for metallurgical testing. At the request of the National Economic Development Bank the following study was consequently prepared: "Consideraciones y antecedentes relativos a la creación de un instituto de máquinas-herramientas en el Brasil" (E/CN.12/L.16). This describes the proposed Institute's functions and work programme and estimates the staff and investment needed for its establishment and operation. A similar study will be prepared for Argentina. In Chile, the Metallurgical Productivity Commission has been given co-operation and technical assistance in making an inventory of the machine-tools installed in the metal-transforming industry there. This study will be used by the organizations concerned in deciding on future policy for the manufacture of machine-tools and for the development of metal transforming in general. The studies on the manufacture of textile machinery and equipment are closely linked with those on the textile industry itself, particularly in relation to the estimates of replacement requirements for obsolete machinery. A preliminary report was drafted some time ago, and this is now to be revised and expanded in accordance with the conclusions of the recently-completed regional study on the Latin American textile industry. A study of the motor-vehicle industry in the region was begun in 1967, and will be described later under "Current activities".

Side by side with the sub-sectoral studies, others have been carried out on metal-transforming activities as a whole in the relatively less developed countries and in those with inadequate markets, as it is firmly believed that these countries must make a vigorous effort to develop and improve their own metal-transforming industries before they can hope to share in regional integration on a larger scale. These studies are therefore intended to supply them with the necessary information for drawing up programmes to improve methods of work and introduce new techniques and equipment, especially in the

/areas that

areas that are of key importance in raising the industry's technological level and increasing its capacity to take on more responsible work. It must be equipped to do so if it is to embark on more complex production lines for export to a regional market. Studies of this kind have been completed on Venezuela (E/CN.12/737), Uruguay (E/CN.12/743), Colombia (E/CN.12/791) and Ecuador (E/CN.12/797). Although all four studies have basically the same aims, they naturally differ as to the best way of achieving them. In Venezuela, for instance, the sector's development is founded on an import substitution programme, and in Uruguay on the export trade. In Colombia, the emphasis has been laid on the introduction of new methods of production and the rationalization of the existing production structure, particularly for capital goods, while in Ecuador the small domestic market and the embryonic state of the metal-transforming industry have made it necessary to view the industry's development prospects in terms of the specialization possibilities offered by a sub-regional common market. The studies have been welcomed in these countries, and have been either incorporated into their sectoral development programmes, or drawn on extensively for them, as in Venezuela and Colombia. In the first case, the Venezuelan Development Corporation prepared and applied a development programme based directly on the recommendations of the report, and, in the second, a committee for the development of the metallurgical industry was set up in Colombia to frame a development programme in the light of the aims and conclusions of the study prepared by the Joint Programme.

Work will continue on both types of study, as resources permit (that is, new sub-sectors such as shipbuilding, agricultural machinery, electronics and so on will be added), and the general development of metal transforming will be examined in individual countries or groups of countries, as expedient.

On the basis of the information compiled and experience gained in the machine-tool studies, two methodological papers were prepared to determine the most suitable methods and criteria to be used in drawing up development programmes for the machine tool-industry.[13/] The first of these, "Aspectos

13/ These studies were specially prepared by the Inter-Regional Symposium on the Development of the Metal-Working Industries in the Developing Countries, held at Moscow in September 1966 under the auspices of the United Nations.

metodológicos y operativos de los estudios sobre las máquinas-herramientas en los países en desarrollo" (E/CN.12/L.14), relates mainly to the problems of estimating future machine-tool requirements, and discusses the questions of calculating the machine-tool inventory, projecting demand and obtaining information through field work. The second study, "Criterios y antecedentes para la programación de la industria de máquinas-herramientas" (E/CN.12/L.15), attempts to provide preinvestment estimates for the machine-tool industry with special reference to definitions of machine type and model, the measurement of qualitative variations through a complexity index, production series, etc.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

The previous report on the activities of the Joint Programme stated that the country studies would be continued and more data collected on the machine-tool industry with the aim of ultimately producing a consolidated regional report. Unfortunately, this has proved impossible owing to lack of funds and the difficulty of obtaining the necessary local co-operation. For the same reason, the other regional document, "La fabricación de maquinarias y equipos para las industrias básicas", had to be limited to a review of the situation in four Latin American countries, as will be described later.

1. "La industria mecánica del Ecuador" (E/CN.12/797)

The starting-date for this study was put forward at the request of the planning bodies in Ecuador, and valuable assistance was obtained locally from the National Board for Economic Planning and Co-ordination, the Development Centre, the Association of Metallurgists and the Chambers of Industry. In appraising the industry's development prospects, four aims have been pursued: to project metal-transforming production in the light of the capacity of the domestic market; to investigate new possibilities of diversifying production; to set forth the technical alternatives for the regional integration of the industry; and to examine the possibilities of establishing an infrastructure of basic metal trades in Ecuador to facilitate the integrated development of the sector. The report stresses the urgent need to expand the industry on a long-term basis, and points out the advantages of industrial estates and decentralization. It suggests that the heavy and more complex branches should

/be centralized

be centralized in Quito and Guayaquil, while the light industries and assembly plants should be located on the main communication routes or near airports. In conclusion, it points out that it is important in project evaluation to gauge the extent to which a particular project will help to spread know-how on the technology and industrial practices that are vital to the sector's development.

2. "Consideraciones y antecedentes relativos a la creación de un instituto de máquinas-herramientas en el Brasil" (E/CN.12/L.16)

As indicated before, this study was prepared at the request of the National Economic Development Bank of Brazil to guide the future discussions of the working group that has been set up to decide whether or not a technological research centre on machine-tools should be established in Brazil. The document gives a detailed description of the functions and work programme of this institution, which will be concerned with the mechanical testing of machine-tools, both static and dynamic; technical assistance for manufacturers; technological research; in its capacity as a technical body collaboration with and assistance to public and private agencies on subjects connected with the machine-tool industry; and publication and information activities. An assessment is also made of the manpower and funds that would be required to establish and operate the institution. Information on similar institutions in Europe is given for purposes of illustration in an annex to the document.

3. "La fabricación de maquinarias y equipos para las industrias básicas en algunos países de América Latina" (E/CN.12/805)

This study was originally planned as a regional report covering most of the Latin American countries; but as some of these countries were unable to make arrangements for the necessary field work and research, it had to be confined to an analysis of the situation in four countries, namely, Argentina, Brazil, Chile and Colombia. In each of these, the fullest possible evaluation was made of basic equipment demand and supply in order to gauge the possibilities for the industry's development both locally and as part of a complementary or regionally-integrated network. The institutional and other factors

/that are

that are currently restricting the supply of and trade in these goods were also examined, and the best lines of action for developing production and trade sketched out. The manufacturing sectors chosen for study cover equipment for electric energy generation, transmission and distribution; petroleum and gas drilling; pulp and paper production; petroleum refining; the basic metals industries (mainly production of pig iron and rolled steel); cement manufacture; and shipping and land transport. The evaluation followed the same lines for each country but it varied in depth depending on local conditions.

C. CURRENT ACTIVITIES

A study of the motor-vehicle industry was begun in 1967. The object of this study is to make a long-term evaluation of the industry's prospects, the possible ways in which it might be regionally integrated and the best ways of achieving its integration.

Before undertaking an evaluation of this kind, a number of studies and enquiries must first be made to identify and quantify the factors involved, particularly those relating to the probable size of the future motor-vehicle markets in individual countries, sub-regions and the region as a whole; the industry's current situation and characteristics, as regards assembly and terminal plants, on the one hand, and the manufacture of spare parts, on the other, and, above all, the technico-economic relationships in motor-vehicle manufacture. In view of the industry's complexity and the volume of studies and research required, it was decided to divide the work into two stages and to allow at least a year for it. The first stage would be devoted entirely to collecting data and evolving the necessary criteria for tackling the question of the industry's integration, while the second would be spent in constructing alternative development models and analysing the factors which have a bearing on regional integration.

The project would be mainly concerned with the following four aspects: the market, present state of the industry, its technico-economic relations, and possible regional models for its future development. Although the first three are to some extent independent of each other, they will be discussed together, and make up what has been termed the first stage. The fourth, or final stage of the project, will be embarked upon once the results of the preliminary studies and research are available.

/VIII. TEXTILE INDUSTRY

VIII. TEXTILE INDUSTRY

A. PREVIOUS ACTIVITIES

In view of the importance of the textile industry for Latin America's manufacturing sector and the fact that there is such an industry in most of the countries in the region, the studies on this sector, unlike those on other industries, have been focused on analysing its structure and operating conditions. Import substitution is not an obstacle to the satisfaction of domestic demand for textiles in this sector because the region is now largely self-sufficient and possibilities of substitution are few and far between. On the other hand, the fact that natural resources and labour are easily obtainable has a very favourable effect on textile costs and opens up possibilities of exporting to the rest of the world. Although such exports have been on a very modest scale up to now, they may well become substantial in the future. As the textile industry is one of the so-called "traditional" group and its employment and production indexes are high in comparison with those in the rest of the manufacturing sector, it has been thought desirable to take a fairly close look at its operating conditions. Accordingly, an evaluation has been made of labour productivity, the efficiency and degree of obsolescence of the machinery and the extent to which capacity is being utilized.

Eleven studies of similar methodology and structure have been carried out on Brazil, Chile, Colombia, Uruguay, Peru, Bolivia, Paraguay, Argentina, Ecuador, Venezuela and Mexico.[14/] In all cases, assistance has been forthcoming from both public and private bodies, and especially from the associations of textile manufacturers, who co-operated by supplying local staff to help the ECLA staff members and by taking part in the surveys of the mills that form the case studies.

14/ "ECLA, The textile industry in Latin America", Vol. II. Brazil (United Nations publication, Sales N°:62.II.G.2); "La industria textil en América Latina", (Spanish only) Vol. I. Chile (United Nations publication, Sales N°:63.II.G.5) and Vols. III to IX (United Nations publications, Sales Nos.:64.II.G/Mim.1 and 4-9).

/In short

In short, the aim of the reports is to present an analysis of present and future market trends, the industry's characteristics in terms of plant size, its degree of specialization, internal organization, labour productivity, machinery efficiency, and production costs, etc. Special attention was given to the machinery inventory, and an analysis made of its age, technical characteristics, degree of obsolescence and utilization. This analysis, and the measurements of labour productivity and machine utilization, were undertaken separately for each of the different fibres and major production processes.

These studies have shown that the textile industry in Latin America is in a state of virtual stagnation, and that its rate of development is not even on a par with population growth in certain countries. In fact, in some cases, the per capita consumption of textile fibres has declined, or, at best, the increase has been fractional in comparison with the low absolute level of consumption in the region. This means that the Latin American countries are not turning their natural advantages in textile production to good account, either by broadening their internal markets or by supplying the markets of the industrialized countries, which have expanded considerably in the last few years. It is quite clear from these studies that the difficulties besetting the industry in Latin America stem from the low productivity of the factors of production. It has been found that obsolete machinery, badly-planned production programmes in the mills, lack of management skills, and the use of unsuitable raw materials are the main reasons for the under-utilization of the factors of production, and each one naturally has a different incidence, depending on the type of fibre, the product, and the country concerned. As a result, textile consumption in Latin America is kept down by the high relative prices of textile products, which are usually fixed by the least efficient industries operating in an uncompetitive market under the protection of heavy tariffs and internal incentives of various kinds.

The only way to rehabilitate the industry and give it impetus so that it grows at a rate that is commensurate with the rest of the economy is through large-scale re-equipment programmes which, as has been pointed out in the ECIA studies, would entail heavy investment. In view of the economic situation in Latin America and, more specifically, in the textile industry, any

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allocation of resources will have to be governed by an investment policy that is in keeping with the aims of integration. The policy should provide for the investment needed both to widen the market and to modernize the textile industry, so as to lower production costs and enable it to keep its footing in a more strongly competitive market than it now has to face. While the investment to expand the industry will have to be supplemented by domestic capital, the funds earmarked for modernization should come under a sectoral agreement, which should also cover technical assistance and trade policy measures. The members of the future Latin American common market should therefore take a regional view of the investment needed to remedy the inequalities that still exist among them, mainly because of the age of the machinery.

In addition to the country studies, a report has been prepared on economies of scale in the cotton spinning and weaving industry in which the influence of plant size on costs and investment is examined.15/

The data compiled showed a disquieting lack of uniformity in the size of the plants operating in the region, which made it all the more essential to have a sound knowledge of investment and cost trends in relation to production scales. Eight plant sizes were selected and applied to three types of products, thus providing twenty-four cases for analysis. It appears from this study that, although economies of scale are less marked in the textile industry than in other sectors, there is unquestionably a minimum economic size at which substantial savings can be made in investment per unit produced and in production costs. Many of the textile mills in Latin America have turned out to be under the minimum size, and by merely doubling their production capacity would greatly reduce their manufacturing costs, although this does not mean much in absolute terms because they are so small at present.

Another study was prepared on the technological alternatives open to the textile industry as regards the choice of equipment to modernize the machinery inventory or enlarge production capacity. This is a key question in Latin America, where the absorption of labour is one of the main concerns of economic development in general. On the other hand, modern production techniques tend to be more capital-intensive and to use less and less labour, thereby largely

15/ "Economies of scale in the cotton spinning and weaving industry" (E/CN.12/748).

/reflecting the

reflecting the supply and cost conditions for capital and labour in the highly industrialized countries. The study in question[16/] examines several textile manufacturing technologies, since a feature of the industry is its use of a variety of techniques in the same production process. The conclusions on investment requirements, production costs and levels of employment for each of the different technologies afford a useful guide in programming the development of the industry.

As both studies are based on practical experience and factual information gathered in the region, their results may be assumed to present a fairly accurate picture of the situation. It is vitally important to have a knowledge of economies of scale and the different techniques available in framing a policy for reorganizing the textile industry, and both questions should be given their due weight.

The information assembled in the country studies and the technico-economic reports mentioned above was used as background material for a regional report on the textile industry in Latin America, which was completed at the end of 1967. In 1966 and 1967 the Textile Unit of the ECLA/INSTITUTE/IDB Joint Programme twice co-operated with the Latin American Institute on Economic and Social Planning by lecturing on industrial planning as part of the Institute's Training Course, with the textile industry as a case study. Thanks to ECLA's experience in this field, the Training Course has thus had an opportunity of discussing the industry's problems and their possible solution during the special course on industrial planning.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

"La industria textil en América Latina. XII. Informe regional" (E/CN.12/796)

The regional report on the Latin American textile industry was concluded at the end of 1967. It was mainly based on preliminary surveys undertaken in each country, and also included information on Central America compiled by the

16/ "The choice of technologies in the Latin American textile industry" (E/CN.12/746).

/Central American

Central American Economic Co-operation Programme on the basis of the outline used for the country studies. In addition, data were furnished on other regions so as to provide standards of comparison for evaluating the situation of the textile industry in Latin America and in other parts of the world. Production costs in the different countries were also indicated, together with possible ways of reducing the disparities between them and thus facilitating agreements to increase intra-regional textile trade.

The report also included an analysis of past market trends for textile products, and the first picture of the changes in the composition of fibre consumption. It went on to explore the possibilities of exporting to overseas markets in view of the countries' natural advantages in textile production. Lastly, it estimated the investment required to satisfy the forecasts of demand, with due regard for different programming criteria, economies of scale, and the techniques available. The estimates included the investment needed to keep production capacity growing in step with the expansion of demand, and to modernize the industry in the ways indicated by the country studies.

Calculations of the total investment required by the textile industry have thus been made in both physical and financial terms, and they can be used as a basis for programming both textile production and the manufacture of textile machinery on a regional scale in Latin America.

C. CURRENT ACTIVITIES

As a result of the country studies, a number of countries requested assistance in determining the steps they should take to solve the problems pinpointed in those studies. Brazil and Chile, in particular, inquired about the possibility of obtaining continuing technical assistance in programming, reorganizing and modernizing the textile industry. For want of funds, the Programme has been unable to carry out the activities that had been planned as a sequel to the diagnoses made in the reports.

IX. THE PROMOTION OF THE EXPORT TRADE IN MANUFACTURES

A. PREVIOUS ACTIVITIES

Since the middle of 1965 the Joint Programme has been paying increasing attention to the development of exports of manufactured goods, a subject which is generally acknowledged to have become one of the main concerns of the developing countries and of the international organizations that provide technical assistance in this field.

The Joint Programme tackled the question from two angles: the first, or sectoral approach, consisted of an extensive study on the openings in the world market for exports of steel, pulp and paper, and textile products. These studies, together with other material served as a basis for the discussions on the subject during the Latin American Symposium on Industrial Development held at Santiago in March 1966.[17/]

Side by side with these sectoral studies, a systematic examination was made of the possibilities of exporting industrial goods from several of the more important countries of the region. This survey was carried out as a joint project with UNCTAD.

The sectoral studies, which covered Argentina, Brazil, Central America, Chile, Colombia and Venezuela, dealt almost entirely with the question of the supply of manufactured goods in those countries, partly in order to examine one aspect of the problem - the ready availability of industrial goods - which was not receiving the attention that its strategic importance warranted. In fact, in all the negotiations conducted in such international forums as UNCTAD, in the hope of making it possible for a permanent flow of manufactures from the developing countries to enter the industrialized markets, it is assumed that the developing countries can take advantage of any market openings that may appear. The main consideration in preparing studies on the supply of

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17/ See "La exportación como perspectiva del desarrollo siderúrgico latinoamericano" (ST/ECLA/Conf.23/L.49), "Prospects for Latin American pulp and paper exports overseas" (ST/ECLA/Conf.23/L.40) and "La exportación al mercado mundial: una perspectiva para el desarrollo de la industria textil latinoamericana" (ST/ECLA/Conf.23/L.43).

Latin American manufactures was therefore to provide the Governments and other bodies concerned in each country with the necessary criteria to enable them to formulate a policy or programme for the export of manufactures.

The country studies are thus a first stage, which might be called the reconnaissance of the problem, during which an attempt is made also to give some idea of the export potential in each country, pointing out the major obstacles and advantages in relation to the possibilities of each export product or group of products. The studies also offer a bird's-eye view of the institutional framework of these export activities, allotting praise or criticism when this appeared advisable to the measures and provisions embodied in incentives and organizations to promote the export trade. Owing to the rapid developments in this field and the urgent appeals of the Governments for technical assistance in promoting exports of manufactures, the next stage of the work was embarked upon although studies corresponding to the initial stage had not all been completed, i.e., the report on Central America. The Joint Programme's new phase of action in this field is regarded as operational. In fact, as the preliminary studies have identified the obstacles and shortcomings that must be overcome for the export trade to reach a significant level, it is natural that the main task during the next phase should be to define those shortcomings as accurately as possible in relation to specific products and then to furnish the countries concerned with the necessary technical co-operation to remedy them.

The technical assistance would be given by the Joint Programme in conjunction with UNCTAD and UNIDO, as part of the United Nations Export Promotion Programme which took shape at the meetings of Executive Secretaries of the regional economic commissions held in February and July 1967. During this new stage the technical co-operation would be broadened to include, in addition to aspects of supply, factors with a direct bearing on demand, such as market studies, sales promotion abroad, etc.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

Country studies

As indicated before, studies were completed on the current export trade in manufactures and its short and medium-term prospects in Argentina, Brazil,

/Chile, Colombia

Chile, Colombia and Venezuela.[18] They were all submitted to the second session of the UNCTAD Committee on Manufactures in July 1967, which expressed its satisfaction with them and recommended that similar studies should be made of other developing countries. The Committee also agreed that the countries in which the studies had been carried out should report after a certain length of time on the results of those studies and on any deficiencies that they might have brought to light.

The studies on Argentina, Brazil and Chile, which were the first to be completed, were submitted also to the recent International Symposium on Industrial Development, held at Athens under the auspices of UNIDO from 20 November to 20 December 1967.

C. CURRENT ACTIVITIES

A study is under way on Central America's short and medium-term export potential, covering the five countries that have signed the Integration Treaty, to wit, Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua. The study will have the same structure as the others, that is, it will contain a statistical analysis of exports during the last few years, export trends, salient export items and their markets of destination, followed by a review of the institutional factors that influence export trade, and suggestions on the improvements that might be made to promote it. The study will then present the findings of the surveys of selected products, which were made in order to determine the volume of exportable surpluses of those products and the factors that limit or favour their sale abroad, and will conclude with an estimate of export possibilities over the short and medium term.

New studies of general export possibilities by country are likely to be undertaken in the near future in compliance with the recommendations of the UNCTAD Committee on Manufactures.

As regards the operational stage, the preparatory studies on the formulation of a programme of technical co-operation with the Brazilian Government for promoting exports of manufactures are well advanced. This may be regarded to some extent as a pilot or demonstration project.

18/ "Short and medium-term prospects for export of manufactures from selected developing countries" (Argentina, TD/B/C.2/34, Brazil, TD/B/C.2/35, Chile, TD/B/C.2/33, Colombia, TD/B/C.2/45, Venezuela (Spanish only), TD/B/C.2/40).

A preliminary selection has been made of the areas for technical assistance, namely, the metal-transforming industry (machine-tools, machinery and equipment for other industries and for road construction and similar uses, electrical household appliances and related products, sewing machines and special steels), the leather and leather goods industry (hides and footwear) and the textile industry (unbleached cotton yarns and fabrics and cotton and ramie goods).

The final form of the project is now being discussed with UNCTAD and UNIDO, which are also taking part in it. Consultations are also under way with the Argentine Government regarding the possibility of starting a similar programme in Argentina. The fields that have been mentioned so far as possibilities for technical co-operation are the industries producing foodstuffs, leather and leather manufactures, machine-tools and agricultural machinery.

There is likelihood that technical co-operation will be given also to promote the export of manufactures from Argentina to other Latin American countries.

X. GENERAL STUDIES ON THE INDUSTRIAL ECONOMY

A. PREVIOUS ACTIVITIES

In addition to its work in specific industrial sectors, the Joint Programme has studied the more general aspects of industrial development. Its activities have covered a wide range, but have mainly consisted in the preparation of documents on industrial problems in Latin America, the organization of the Latin American Symposium on Industrial Development and the Seminar on Small-Scale Industry in Latin America, the re-examination of the general aspects of some sectoral studies, participation in the preparation of the ECLA annual Economic Survey and collaboration with the Institute in its training programmes.

Prior to the period of activity covered by this report, the Joint Programme completed a number of documents on Latin American industry. The final touches were put to the revised version of the report entitled The process of industrial development in Latin America (United Nations publication, Sales No.: 66.II.G.4), which was distributed as a working document at the Latin American Symposium on Industrial Development.

A document was prepared under the title of "Los principales sectores de la industria latinoamericana: problemas y perspectivas" (E/CN.12/718/Rev.1 and Add.1), which reviews the situation and prospects of the principal branches of industry.

A study entitled "El crédito para financiamiento de la industria de bienes de capital en algunos países de América Latina" (E/CN.12/749) was prepared also for submission to the Latin American Symposium, and subsequently revised.

Besides organizing and co-ordinating the Symposium, the Joint Programme prepared a number of documents for it. The industrial monographs drafted by Governments in accordance with a uniform scheme of presentation were revised and amplified for submission, and the conclusions of the Symposium were embodied in the Report of the Symposium on Industrial Development in Latin America (United Nations publication, E/CN.12/755/Rev.1-E/CONF.54/R.R./3).

The Joint Programme collaborated with the Latin American Institute for Economic and Social Planning in giving courses and lectures as part of the training programmes in 1965 and 1966.

/The Joint

The Joint Programme's activities have included the study of problems connected with the transfer of technical know-how in industry and applied technological research. The papers requested from consultants on these subjects up to 1967 include: "La tecnología actual y los obstáculos a su incoporación en la industria siderúrgica latinoamericana" (ST/ECLA/Conf.23/L.34);[19/] "O nivel técnico e as modalidades de transferencia de conhecimento técnico do exterior na indústria química do Brasil" (ST/ECLA/Conf.23/L.48); "Conocimiento técnico necesario para la industrialización de países poco desarrollados y obstáculos que se oponen a su transferencia" (ST/ECLA/Conf.23/L.12); "Problemas que requerem pesquisas tecnológicas na indústria siderúrgica latinoamericana a reflexões sobre ação necessaria" (ST/ECLA/Conf.23/L.44);[19/] and "Research on pulp and paper in Latin America" (ECLA/BTAO/FAO PREP/CONS/PAPER III-1). These studies have been supplemented by the provision of advice and assistance on specific problems of technological research in certain countries.

B. WORK COMPLETED IN THE PERIOD UNDER REVIEW

The Industrial Economy Unit was called upon to take part in the organization and co-ordination of the Seminar on Small-Scale Industry in Latin America, which was held at Quito between 28 November and 3 December 1966.

A number of documents were prepared for the Seminar, such as "La pequeña industria en Argentina" (ST/ECLA/Conf.25/L.31). Similar studies were made on Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela. These were in the form of monographs prepared by the Governments, which were subsequently revised and expanded for submission to the Seminar.

A document entitled "La pequeña industria en América Latina" (ST/ECLA/Conf.25/L.17) was submitted to the Seminar as a preliminary analysis of the subject, and was later revised and enlarged in the light of the criticisms and comments received during and after the meeting. This study assesses the importance of the lower stratum of the manufacturing industry in terms of employment and value added, and analyses its role in the industrial

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19/ This document has already been mentioned in the section on the steel industry.

development process. It also reviews the problems of small-scale industry and the main economic policy measures taken, with special reference to those on the planning of the industry's development, technical and financial assistance and international co-operation.

The Seminar's conclusions and the observations made during the meetings have been incorporated into the "Report of the Seminar on Small-Scale Industry in Latin America" (E/CN.12/763), which gives an account of its proceedings and results.

A document entitled "América Latina y el simposio internacional sobre desarrollo industrial" was prepared for the International Symposium on Industrial Development, to help Governments in defining their position on the different agenda items. A preliminary version of this paper was submitted to government organs and a group of experts serving in a personal capacity, which was specially convened for the purpose. In the light of their observations, a final version of the document was drafted and submitted to the International Symposium at Athens.[20/] It comprises four sections: the first consists of a review of current industrial development in Latin America and an appraisal of its future possibilities, and the second gives an account of the situation, problems and prospects of the salient branches of industry: steelmaking, non-ferrous metals, metal transforming, chemicals and petrochemicals, chemical fertilizers, food products, textiles, wood, pulp and paper, and building. The third section is devoted to general questions of industrial policy, such as programme planning and execution, employment, financing, the administrative machinery required for the development of industry, technological research and other technical services, exports of manufactures, and small-scale industry. The fourth section is focused on the regional and international aspects of financial and technical co-operation, and the form that such assistance should take to ensure that it can be used to full advantage by the Latin American countries.

The document on the main sectors of Latin American industry (E/CN.12/718/Rev.1 and Rev.1/Add.1) was brought up to date and expanded for submission to the International Symposium under the symbol ID/Conf.1/R.B.P./4,

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20/ Document E/CN.12/L.34 (Spanish only).

August 1967. Some of the industrial monographs that had been sent in by Latin American Governments were also revised.

Apart from these activities, the Joint Programme also helped to co-ordinate the work of the sectoral units in the Industrial Division on the general aspects of industrial economy in certain sectoral studies.

It again assisted in the drafting of the chapter on industry in the annual Economic Survey for 1966 and 1967, and also collaborated with the Latin American Institute for Economic and Social Planning by lecturing on industrial planning as part of the Training Courses.

Lastly, the Joint Programme has continued to give advice and assistance on technological research in the region. Its main object is to develop such research in the area, and for that purpose it works in close contact with the United Nations Advisory Committee on the Application of Science and Technology to Development. In relation to steelmaking in Latin America, it analysed the industry's technical level and its facilities for transferring and obtaining know-how, and evaluated the efficiency with which these facilities operate in practice. In April and May 1967, it submitted to a meeting of the Advisory Committee a document on the establishment of a Latin American centre for iron and steel research, in which it stressed the need for more studies on three subjects: the possibility of using and processing local natural resources; the processes, equipment and patterns of production at all stages of steelmaking; and the possibility of adapting Latin American steel production to the increasingly diversified requirements of the metal-transforming industry.

C. CURRENT ACTIVITIES

Some studies planned for 1967 had to be postponed for lack of resources and, in some cases, because of the limited co-operation offered in the countries concerned.

It has been possible, however, to make a start on the analysis of the machinery for transferring industrial know-how to the Latin American countries.

In 1967 the first steps were taken to study the ways in which modern technology is introduced into Latin American industry, the problems involved, and the means best calculated to ensure that the industry obtains the maximum benefit therefrom.

/With the

With the analysis of the different methods of transferring foreign technical know-how as a starting point, a searching study will be made of such questions as the adaptation of that know-how to the conditions prevailing in the countries that import it (market size, relative costs of the factors of production, characteristics of the raw materials and other basic resources, etc.); the relationship between the transfer of modern technology from abroad and the increasing development of local inventiveness which will gradually reduce the region's technical dependence on foreign countries; and the definition of the action that should be taken at both the national and international levels to facilitate and speed up the transfer of know-how between enterprises, thereby promoting the industrial development of the Latin American countries and, at the same time, enabling them to increase their own technical capacity. The importance of this project for the economic integration of the region derives from the close connexion between regional investment policy and the policies and institutions concerned with the introduction of production techniques, since any attempt to develop capital formation in Latin America must pay due attention to the factor of technology and its implications for the Latin American countries at the different stages of industrialization. The first comprehensive and detailed analysis of these questions will be made in Brazil, where they can be studied exhaustively because of the advanced stage of industrialization reached by that country. The analysis will subsequently be extended to Argentina, Mexico, Colombia and Central America, which make up a representative sample of the different stages and characteristics of the manufacturing industry in the region. It is not intended to cover all branches of industry. A few will be chosen on the basis of existing diagnoses not only of economic characteristics and trends but also of the techniques used and the new technologies whose introduction can be foreseen with a reasonable degree of likelihood. In Brazil the steel, chemical, machine-tool and basic equipment industries are thought to be suitable areas of study. It is hoped to carry out this study in 1968.

ANNEX

STUDIES COMPLETED BETWEEN OCTOBER 1966 AND DECEMBER 1967

I. Iron and steel industry

E/CN.12/764 January 1967	Economies of scale at small integrated steelworks. Prepared for ECLA by M.N. Dastur and Co. Private Ltd. Consulting Engineers, Calcutta, India
E/CN.12/766 January 1967	Las economías de escala en plantas siderúrgicas de tamaño medio y grande y la influencia de los adelantos tecnológicos en las inversiones y costos de producción. Prepared for ECLA by A. Martijena, consultant

II. Non-ferrous metals industry

E/CN.12/765 December 1966	Influencia de las economías de escala en la industria de transformación del cobre y sus aleaciones. Prepared for ECLA by A. Martijena, consultant
E/CN.12/793 and Add.1 29 September 1967	Influencia de las economías de escala en la metalurgia del aluminio y en la industria de transformación del metal y sus aleaciones (2 vols.). Prepared for ECLA by A. Martijena, consultant
Preliminary report December 1967	La industria del cobre primario en América Latina

III. Chemical industry

E/CN.12/761 November 1966	La oferta de fertilizantes en América Latina
E/CN.12/792 11 November 1967	El caucho en América Latina
E/CN.12/804	La industria de álcalis sódicos en América Latina

IV. Forest industries

FO:LAFC-67/4 August 1967	Las industrias forestales en América Latina y sus perspectivas de desarrollo
LAFIDG-Doc.1 June 1967	Preliminary survey of the wood-based panel industry in Latin America
FIAGLA/Doc.3 October 1967	Preliminary report on the sawmilling industry in Latin America

/V. Metal-transforming

V. Metal-transforming industry

E/CN.12/797 30 November 1967	La industria mecánica del Ecuador
E/CN.12/L.16 June 1967	Consideraciones y antecedentes relativos a la creación de un Instituto de Máquinas-Herramientas en el Brasil
E/CN.12/805 December 1967	La fabricación de maquinarias y equipos para las industrias básicas en algunos países de América Latina

VI. Textile industry

E/CN.12/796	La industria textil en América Latina. XII. Informe regional

VII. The promotion of the export trade in manufactures

TD/B/C.2/34 28 April 1967	Short and medium-term prospects for export of manufactures from selected developing countries: Argentina
TD/B/C.2/35 28 April 1967	Short and medium-term prospects for export of manufactures from selected developing countries: Brazil
TD/B/C.2/33 20 April 1967	Short and medium-term prospects for export of manufactures from selected developing countries: Chile
TD/B/C.2/45 12 June 1967	Short and medium-term prospects for export of manufactures from selected developing countries: Colombia
TD/B/C.2/40 22 June 1967	La exportación de manufacturas, sus antecedentes y sus posibilidades: Venezuela

VIII. General studies on the industrial economy

ST/ECIA/Conf.25/L.17 3 November 1966	La pequeña industria en América Latina
Preliminary report April 1966	A Latin American Centre for Iron and Steel Research. Prepared by Bruno Leuschner for the Advisory Committee on the Application of Science and Technology to Development
E/CN.12/763 11 April 1967	Report of the Seminar on Small-Scale Industry in Latin America (Quito, 28 November - 3 December 1966)

ID/CONF.1/R.B.P./4 August 1967	Los principales sectores de la industria latinoamericana: Problemas y perspectivas (2 vols.)[21]
E/CN.12/L.34 31 October 1967	América Latina y el Simposio Internacional sobre el Desarrollo Industrial

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21/ This version was specially prepared for submission to the International Symposium on Industrial Development (Athens, 29 November - 20 December 1967). A preliminary version was issued earlier under the symbol E/CN.12/718/Rev.1 and Rev.1/Add.1.