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PROGRESS REPORT ON STUDIES RELATING TO THE INVENTORY OF LATIN AMERICAN INDUSTRY

I. General Background

* Note: Documents E/CN.12/524/Add.1, Add.2 and Add.3 consist of index form containing technical data exclusively and are published in Spanish only.

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/NOTE BY

NOTE BY THE SECRETARIAT

1. The purpose of this document is to report on the progress of the work which the secretariat is carrying out in compliance with resolutions designed to promote studies on the prospects for greater economic integration among Latin American countries.

As early as its first session, the Trade Committee stressed the importance of preliminary studies as the best source of information for studying the co-operative procedures that might be adopted for introducing integration, the characteristics of a possible common market and the best ways of ensuring that such a market would operate with the necessary gradualness and flexibility. It therefore recommended to the secretariat that it "proceed to make an inventory of existing industries in Latin America with a view to determining what measures are advisable in order to remedy the situation described above" (resolution 2 (I) (E/CN.12/C.1/9) adopted on 28 November 1956).

The Working Group on the Latin American Common Market subsequently, approved this recommendation at its first session (Santiago, Chile, February 1958) and requested the secretariat to carry out two kinds of studies on industry: (a) an inventory of the main types of capital goods manufactured, of some durable consumer goods and of industrial raw materials of major importance for Latin America; (b) sectoral studies on each of the principal branches of capital goods and industrial raw materials.

2. During the last few months, the secretariat has forged ahead with both kinds of study. Among the sectoral studies, that on railway equipment, which led to the convening of a special meeting attended by the countries concerned at Córdoba (Argentina) in March 1959, is particularly worthy of mention.

3. With regard to the inventory itself, the emphasis in the first stage has been laid on the manufacture of metal products, other industrial lines being reserved for consideration at a later stage.

The work has been organized bearing in mind the need to provide the

/essential background

essential background information on which the sectoral studies could be based and to facilitate the task of projecting the scale of the Latin American common market as regards both items and countries. By indicating what activities exist, in which countries and what their characteristics are, it is possible to estimate the repercussions of the different integration formulae on each country's industry.

With this in mind, a start was made on the inventory of metal products by compiling all the more essential basic data on every factory whose technical and mechanical conditions are such that it may be assumed, although on the basis of empirical rather than other criteria, that they can export to other countries in the area or could export if the necessary adjustments were made in their organization.

4. The secretariat submitted a preliminary progress report to the Working Group on the Latin American Regional Market at its second session, held at Mexico City in February 1959 (E/CN.12/C.1/WG/2/8). The present report is in essence, a reissue of that document but with a large amount of additional information.

5. Annex I to the present report contains a list of the most important branches that have been dealt with in the initial stage of research in connexion with the Latin American industrial inventory. The nature and scope of the data which have been compiled may be ascertained in more detail from the model of the index form appended as Annex II.

6. The scanty nature of the resources at the secretariat's disposal has not only imposed an initial limitation on the number of industrial lines included, but also on the countries considered at this preliminary stage. The data being compiled refer, for the time being to Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay, although it has proved impossible to assemble all the pertinent information for presentation at this juncture.

The progress made in the work is largely the result of the collaboration of various national bodies with the secretariat. In Argentina, co-operation was extended by the Asociación de Industriales Metalúrgicos, in Brazil, by the Federação das Industrias do Estado de Sao Paulo, while in Chile, by the Instituto Chileno del Acero and the Development Corporation (Corporación de Fomento de la Producción), and in Colombia, by the Federación de Industriales Metalúrgicos.

/It is

It is hoped that equally generous co-operation will be forth coming not only as regards finisning the inventory but also in bringing it up to date and revising it periodically (possibly once or twice a year). Such collaboration should perhaps be channelled through an agency established for this purpose, in order to ensure that the inventory is kept up-to-date and transmitted periodically to member Governments for their information.

7. The inventory of Latin America's productive capacity has been supplemented by a concurrent study on Latin American imports of capital goods and specific durable consumer goods, with a view to covering a small number of countries during this first phase. The countries concerned coincide, generally speaking, with those included in the inventory: Argentina, Brazil, Chile, Mexico, Peru and Uruguay.

The ultimate purpose of this work, once it has been extended to other countries, is to tabulate imports in sufficient detail for them to be comparable with the items included in the inventory. This would facilitate an evaluation of the potential market open to Latin America's machinery, equipment and durable consumer goods industries. So far, however, they have not been strictly comparable owing to differences in national systems of statistical classification. It may therefore become necessary to call upon national organizations for certain amount of collaboration in order to overcome difficulties of this kind.

It might be useful to make certain reservations at this point as regards making assessments of the scale of the potential regional market for products of this kind on the basis of the tabulations. Since demand for these products, generally speaking, tends to expand very rapidly following any rise in income, and current of them imports are sometimes affected by a number of restrictions which may well determine the existence of compressed demand on a fairly large scale, any projection of demand, even for the near future, should take these factors into account together with the requirements and characteristics of each market which should be considered to some extent independently of the latter's current import possibilities.

8. A series of statistical tables is included in the present report for the sole purpose of showing the kind of information that is being compiled.

/As this

As this is incomplete or inadequately systematized, it is not yet suitable for analytical purposes or as a basis for conclusions however tentative. It is hoped, however, to perfect the compilation in the course of the next few months, once the secretariat has completed its initial research.

9. The tables in annex III show the information that has been accumulated so far on imports of capital goods and durable consumer goods by selected countries of the region.

Table 1 shows total imports in these categories in 1955, as well as the aggregate amount for 1955-57, which it has been possible to work out in respect of specific items and which will be given in more detail in subsequent tables. It may be noted that classification discrepancies lead to marked variations between one country and another in the percentage which it has been possible to work out.

In general terms, table 1 is in itself a justification for the choice of capital goods as the initial phase of the inventory, since imports of them by the six countries dealt with so far reached a total of 1 152 million dollars in 1955.

In table 2, imports of machinery for power generation are shown in greater detail, while in tables 3, 4, 5 and 6 there has been an attempt to distinguish more clearly between imports of machinery and agricultural implements, machinery for mining, construction and other uses, electric machinery, equipment and appliances, and transport and communication equipment. Lastly, table 7 gives import figures for some of the most important durable consumer goods.

10. Annex IV consists of a summary of industrial inventory data for Argentina, Brazil, Chile and Colombia according to a provisional classification based on the nature of the items concerned. The description will be amplified later with data on Mexico, Peru and Uruguay.

11. Annexes V, VI and VII, which comprise the index forms that have been assembled so far on relevant enterprises in Argentina, Brazil, Chile and Colombia respectively, are to be found in separate volumes (E/CN.12/524/Add.1, Add.2 and Add.3). Distributed in Spanish only. Needless to say, the information in them is only partial; the many obvious omissions will be borne

[illegible] intended to enlarge the inventory and bring it up to date. In addition, annex VII contains only a few of the first index forms compiled on Mexican industry. Indeed the information is of so tentative a nature that it is given simply for purposes of illustration. For this reason it has been felt advisable to omit Mexico from the summary in annex IV.

12. According to the inferences that may be drawn from the data presented, the degree of development already attained by several branches of Latin America's metal transforming industries is bringing about a new phase of industrial growth, especially in Argentina and Brazil. The production of numerous types of capital goods and durable consumer goods in more or less integrated plants is beginning to be supplemented by that of heavy industrial equipment, in accordance with a pattern which is characterized by the integration of existing resources, i.e. the combined utilization of industrial plants already to be found in the region, mainly for boilermaking, smelting and forging. According to this pattern, adopted particularly for the development of industry in Sao Paulo (Brazil), the various equipment components are being manufactured separately in existing industrial plants, which are thus acting as sub-contractors, and are then being assembled in conformity with the corresponding blueprints and plans.

The difficulties which have been impeding the more extensive manufacture of heavy plant such as iron and steel mills, petroleum refineries and sugar mills, up to now are thus beginning to be overcome. This sort of equipment does not usually have a broad enough market to justify the establishment of specialized plants; moreover, demand for it is irregular, which rules out the possibility of keeping the factories in operation permanently. Such equipment has been traditionally imported from abroad in toto, for one reason because the financing terms were made easier and, for another, because of the influence exerted by foreign firms responsible for the projects.

During the last 15 years, the large-scale expansion of light industry which concentrates on the production of non-durable and durable consumer goods, has increased the need for a group of basic industries to produce raw materials and intermediate goods. This explains why increasing attention is being paid to the basic sectors. In the case of Brazil, for example, a series of targets for the development of basic industries have been fixed and a Development

/Council established

Council established to stimulate private activity in these industries, with or without State intervention.

To sum up, it appears that the right conditions are being created to provide a large and stable market for heavy industrial equipment. However, in spite of these favourable trends, it is likely that in the near future the market for each kind of equipment taken separately will still be insufficient to justify the construction of highly specialized plants. The importance of Brazil's experience resides precisely in the fact that heavy industrial plants are being set up to use the facilities offered by the specialized factories already existing for the processing of many of their parts. The procedure itself is variable, since most of the output of the heavy industries - or at least a substantial volume of it - consits of iron and steel structural parts and other machine parts which require no special technique for their manufacture. For instance, a plant for washing coal is composed of a number of non-specialized pieces[1/] : a main structural part, electric motors, hydraulic pumps, conveyors and a relatively simple mechanical part.

The principal iron and steel transforming activities the collaboration of which is required for integrated manufacture are the following: boilermaking. forging, steel smelting, iron smelting, manufacture of control instruments, die-making, manufacture of electric motors and manufacture of machine parts. In the case of Brazil, its existing industry is capable of undertaking all the process for the manufacture of steel sheet up to three inches thick, of smelting iron and steel pieces of up to 25 tons, of producing electric motors of all kinds up to 200 HP (and above on request) and of manufacturing transformers up to 34,000 kWA and 270,000 volts. Similarly, free heavy forging capacity - not for mass production - is already sufficient for pieces of 500 kilogrammes, and plans are afoot to initiate medium and heavy die-forging. It is true that in the particular case of São Paulo industry the plants are

1/ I.e. parts which take the same form in the most varied plants.

already working at full capacity, which might turn out to be an obstacle to the inauguration of equipment production based on the utilization of existing resources, but the production lines in question are in full expansion and would be encouraged even more over the short term by the receipt of large orders for components for heavy plants.

Manufacture based on the integration of resources by means of the sub-contracting of parts and pieces in the motor car industry is forging rapidly ahead in Argentina and Brazil, but presents a different sort of problem from that studied here as regards materials for heavy industry that are usually manufactured on request. Motor vehicle manufacture is a typical case of mass production, and the components and pieces which are combined in the final assembly are also mass produced by specialized factories under sub-contract. Conversely, materials for heavy industry are rarely mass produced[2/], and the system of individual orders prevails. Each plant is in practice quite separate from the others and constitutes a new case. For this reason, the manufacture of such equipment, always calls for a complete, detailed and highly reliable project, which is beyond the scope of the enterprises that will be using it. In practice, however great the degree of skill attained by the project-making services of an iron and steel enterprise, for example, they could hardly be expected to prepare a blueprint of the equipment required for expanding the installations, and still less to be capable of breaking down such a blueprint into several sub-divisions and distributing the manufactures involved among various metal transforming industries, foundries, etc.; setting standards for the execution of the project; and supervising the lines of manufacture concerned. All this is a specific task entirely separate from the work of projecting the installations themselves and supervising their manufacture by local industries.

The production of complete hydroelectric plants is another example of those activities which lend themselves to the system of sub-contracting for components, although it differs from the manufacture of materials for heavy

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2/ Excluding specific components of such installations, e.g., motors and other electrical equipment, hydraulic pumps, etc., which are already being mass-produced. But these elements generally constitute a relatively small part of a heavy electrical installation, in which parts that are not mass-produced predominate.

/industry. Turbines

industry. Turbines transformers, valves and taps, etc., are usually manufactures by enterprises specializing in each component and, as a rule, on a mass production basis. Thus, the complete installation project is neither as far-reaching nor as responsible a task as in the case of industrial equipment. Broadly speaking, all that is required is to specify the characteristics of the requisite components and distribute their production among the existing specialized enterprises. In default of local mass production of each of the component parts, integration efforts are doomed to failure. Where equipment for heavy industry is concerned, on the other hand, the existing specialized installations have much more flexibility in respect of accepting sub-contracts. Thus, for example, satisfactorily equipped metal transforming enterprise can equally well manufacture structural parts for plant for the iron and steel industry, pulp production, petroleum refineries, etc., provided that it is supplied with the designs, specifications and standards required for the execution of the work.

Since parts would not be domestically mass produced in local factories under the system of integration of resources, such manufactures could no doubt be combined to a large extent with normal and permanent lines of mass production in the existing industrial establishements themselves, and this would contribute to the fuller utilization of production capacity and skilled labour and to the achievement of a marked increase in average productivity in several sectors of the metal transforming and metallurgical industries.

In this context, attention must be called to the Associação Brasileira para o Desenvolvimento da Industria de Base (ABDIB),[3/] which was founded in 1956 by eight large metal transforming and metallurgical plants in São Paulo.

3/ Within the same trend towards collective effort, several other recent events of minor importance may be noted. In São Paulo the manufacture of trolley-buses is being organized with the co-operation of three large established factories which will produce, respectively, the metal coachwork, the motor and the electrical transmission system with its sub-stations and overhead cables. The new plant will merely assemble these various parts, and will therefore entail very modest investment. There is a project for manufacturing drills and petroleum extraction equipment in Rio de Janeiro, under a United States licence, on a similar co-operative system. As regads the construction of petroleum refineries it should be noted that the Kellog Corporation (United States) has opened a permanent office in Brazil to deal with such projects.

The enterprises concerned, whose installations and experience rendered them the most fitted for such and undertaking, formed a co-operative association to organize or sub-divide the manufacture of large scale equipment or plant by parts or type of equipment, on the basis of full and integrated utilization of existing production resources. The work which ABDIB has already carried out or has in hand includes parts of the Rio de Janeiro petroleum refinery, the expansion of the refinery at Matarife, a metallurgical establishment and other plants for the manufacture of chemicals and chemical products, an unloader for ores at the port of Rio de Janeiro, etc.

With respect to the manufacture of complex industrial installations, mention must also be made of the firm created by the Schneider group (France) in association with a Brazilian consortium, under the name of Mecánica Pesada S.A., with a plant at Taubaté, between Rio de Janeiro and São Paulo. This is an undertaking of great importance for the manufacture of several kinds of heavy equipment, such as hydroelectric turbines, equipment for the iron and steel industry, cement-manufacturing plant, etc.

It is becoming increasingly common for metal transforming enterprises possessing large-scale machinery, not customarily available in Brazil, to render services to third parties (mainly machining and stamping).

The manufacture of petroleum drilling extraction equipment is a particularly favourable field for combined utilization of the machinery, equipment and technical knowledge of several enterprises. Experiments are being made in this direction.

According to an approximate estimate a proportion equivalent to 60-70 per cent of the value of petroleum drilling and equipment with a depth capacity of 4,000 metres and a total value of 1 million dollars could be manufactured in Brazil by enterprises already in existence.

It is considered that the following parts of the drilling equipment could be produced locally: power generating unit; control panel; dredging pump; earth bores; tubing; tool-holders.

The following are the remaining parts of the drilling equipment which would still have to be imported for some time to come: turntables, derricks, drilling tools.

The parts and pieces subject to very heavy wear could also be manufactured locally, for replacement purposes. The economic soundness of such a proposition, however, would undoubtedly become much more apparent within the framework of a Latin American common market.

/Annex I

Annex I

MANUFACTURES TO BE INCLUDED IN THE INVENTORY OF GOODS PRODUCED BY THE METAL TRANSFORMING INDUSTRIES

Durable consumer goods

1. Electric household appliances (floor-polishers, liquidizers, fans and extractors)
2. Refrigerators for household and industrial use; heavy refrigerating equipment
3. Sewing-machines for household and industrial use
4. Typewriters, calculating-machines and cash registers
5. Weighing-machines for household and industrial use
6. Household clocks and master clocks
7. Optical instruments (binoculars, cameras, lenses)
8. Miscellaneous electrical appliances (radio receivers and transmitters, television sets, telephone equipment and switchboards; spare parts)

Capital goods

9. Electric motors of all types and powers
10. Internal combustion engines and low-power Diesel engines
11. Medium - and high-power Diesel engines
12. Hand-tools
13. Machine-tools(lathes, presses and milling machines)
14. Pneumatic drills, etc., for mining
15. Lorries, jeeps, passenger cars, omnibuses and trolley-buses
16. Tractors and accessories for agricultural use
17. Spare parts for motor-vehicles
18. Lifts, goods lifts and travelling cranes for industrial use
19. Cranes and other port equipment
20. Equipment for internal transport; other industrial transport equipment (installations for loading and unloading coal and ores, wheat, etc.)
21. Dockyard equipment
22. Road-building equipment
23. Petroleum extraction and drilling equipment (drills, derricks and pumping equipment)
24. Equipment for petroleum refining and the petrochemical industry
25. Machinery and equipment for the pulp and paper industry

/26. Railway

26. Railway goods wagons and passenger coaches; spare parts (trucks, couplings, wheels, air brakes and springs)
27. Diesel locomotives
28. Railway signalling equipment and equipment for electrification of railway lines
29. Hydraulic turbines
30. Boilers for industrial use
31. Transformers and other heavy electrical equipment
32. Pieces and parts for aircraft engines
33. Equipment for rural industries (skimmers, etc.)
34. Combines
35. Machinery and equipment for the textile industries
36. Machinery for saw-mills

The main raw materials and semi-manufactured goods might be subsequently added to the periodic inventory, as follows:

1. Products of the iron and steel industry, including non-current steels
2. Copper wire and rolled products
3. Pulp; newsprint
4. Forgings and raw castings
5. Basic petrochemical products
6. Fertilizers and insecticides
7. Steel and cast iron tubing
8. Veneer and plywood
9. Fibre board

Annex II

BACKGROUND DATA ON SELECTED INDUSTRIES OF INTEREST FOR STUDIES ON THE LATIN AMERICAN REGIONAL MARKET

Country

Commodity

Period or date to which the information refers

Source of data

1. (a) Name of enterprise
   (b) Location
   (c) Date at which manufacture of the article was begun

2. Characteristics of the article (model, dimensions and other specifications)

3. Supplementary data (manufacturing procedure, standards, similarity to known world-market makes and any other analogy which may help to give a more exact idea of characteristics and quality):

4. Foreign participation
   (a) Capital
   (b) Patents
   (c) Technical assistance
   (d) Experts or technicians

5. Other goods manufactured in the same plant

6. Indications of size of enterprise (one or more of the following)
   (a) Volume and/or value of annual production
   (b) Total number of personnel employed
   (c) Total investment

7. Approximate indication of degree of utilization of installed capacity (number of hours worked daily; number of days worked per year)

/8. Imported

8. Imported raw materials

(Percentage of final value of commodity represented by imports of raw materials, semi-finished products and parts)

9. Exports

(a) Previous sales abroad (volume, market of destination, etc.)

(b) Appraisal of regional market possibilities

(c) Availability of catalogues and/or price lists /Yes/ /No/

(d) Indications of sale prices (approximate relation to world market prices at a specific rate of exchange)

10. Expansion projects /Under way/ /Under study/

/Under negotiation/ /None/

Short description of projects (type of article, maximum capacity, probable date at which manufacture will be begun, foreign participation,etc.)

Other remarks:

/Annex III

Annex III

PRELIMINARY TABULATIONS OF IMPORTS OF CAPITAL GOODS AND DURABLE CONSUMER GOODS IN SELECTED LATIN AMERICAN COUNTRIES

Table 1

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS, 1955

(Thousands of dollars)

	Total	Specified in subsequent tables	Unspecified
Argentina			
Agricultural machinery and implements	43 420	40 489	2 931
Industrial machinery and equipment a/	111 099	96 004	15 095
Transport and communications	65 797	48 140	7 657
Total	220 316	184 633	35 683
Brazil			
Agricultural machinery and implements	42 544	22 728	19 816
Industrial machinery and equipment a/	204 440	93 311	111 129
Transport and communications	124 427	43 158	81 269
Total	371 411	159 197	212 214
Chile			
Agricultural machinery and implements	17 645	11 029	6 616
Industrial machinery and equipment a/	55 015	23 814	31 201
Transport and communications	35 270	14 557	20 713
Total	107 930	49 400	58 530
Mexico			
Agricultural machinery and implements	45 900	29 179	16 721
Industrial machinery and equipment a/	199 800	37 009	162 791
Transport and communications	48 300	13 877	34 423
Total	294 000	80 065	213 935
Peru			
Agricultural machinery and implements	13 317	8 118	5 199
Industrial machinery and equipment a/	63 271	31 827	31 444
Transport and communications	21 866	14 498	7 368
Total	98 454	54 443	44 011
Uruguay			
Agricultural machinery and implements	3 056	2 694	362
Industrial machinery and equipment a/	44 160	8 790	35 370
Transport and communications	12 181	7 460	4 721
Total	59 397	18 944	40 453
Gran total	1 151 508	546 682	104 826

a/ The following groups are included under the head of industrial machinery and equipment: power generators; machinery for mining, construction and other uses; and electrical machinery, equipment and appliances as specified in tables 2 to 6.

/Table 2

Table 2

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS
(POWER GENERATORS), 1955-57

(Thousands of dollars)

Branch of industry	Year	Argentina	Brazil	Chile	Mexico	Peru	Uruguay
Boilers	1955	629	2 559	399	875	1 029	1 592
	1956	1 693	1 193	236	1 404	1 273	696
	1957	1 136	1 850	180	1 809	1 394	226
Steam turbines and engines	1955		649	210	6 769	274	...
	1956		330	9	1 274	257	...
	1957		2 003	303	3 054	169	...
Petrol, paraffin, diesel and semi-diesel engines	1955		8 088	1 033	...	3 050	1 311
	1956		8 849	1 875	...	3 735	421
	1957		11 252	3 262	...	4 006	690

Table 3

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS
(AGRICULTURAL MACHINERY AND IMPLEMENTS), 1955-57

(Thousands of dollars)

Branch of industry	Year	Argentina	Brazil	Chile	Mexico	Peru	Uruguay
Machinery and equipment for agriculture (harvesters, seeding machines, etc.	1955	1 188	579	233	...	1 746	965
	1956	1 509	755	287	...	2 510	999
	1957	803	510	264	...	2 459	1 193
Tractors for agricultural machinery or other purposes: spare parts	1955	39 301	22 149	10 796	29 179	6 372	1 729
	1956	46 061	16 179	4 054	23 861	5 520	1 669
	1957	24 031	39 001	6 411	19 647	6 542	3 353

/Table 4

Table 4

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS (MACHINERY FOR MINING, CONSTRUCTION AND OTHER INDUSTRIAL USES), 1955-57

(Thousands of dollars)

Branch of industry	Year	Argentina	Brazil	Chile	Mexico	Perú	Uruguay
Machinery for construction	1955	2 767	15 331	4 790	9 366	13 660	1 464
	1956	2 781	14 565	4 999	16 052	15 589	682
	1957	3 109	42 071	5 978	16 435	16 998	1 043
Sewing machines and spare parts	1955	464	849	1 482	...	3 461	1 374
	1956	38	304	3 655	...	4 861	881
	1957	504	1 260	6 721	...	5 490	689
Typewriters and spare parts	1955	390	1 306	486	2 574	1 234	405
	1956	62	777	859	3 540	1 454	444
	1957	318	1 824	1 970	3 331	2 017	414
Calculating, and book-keeping machines, cash registers and spare parts	1955	1 081	3 039	1 376	4 719	1 308	1 245
	1956	511	3 498	1 732	6 095	1 621	1 196
	1957	2 668	6 512	2 848	5 240	1 822	1 609
Iron bearings: ball bearings	1955	3 615	...	...	...	...	...
	1956	5 063	...	...	...	...	...
	1957	4 722	...	...	...	...	...
Machinery and equipment for the textile industry	1955	1 404	15 140	2 130	2 231	2 996	...
	1956	708	13 187	1 056	2 286	3 833	...
	1957	458	12 034	1 558	1 981	4 800	...
Optical instruments and photographic equipment	1955	2 976	...	...	137	230	...
	1956	1 446	...	...	178	251	...
	1957	4 256	...	...	124	328	...
Miscellaneous machinery and motors, and spare parts	1955	80 711	...	...	...	...	...
	1956	93 006	...	...	...	...	...
	1957	81 209	...	...	...	...	...
Machine-tools for metal work	1955		16 080	600	...	314	...
	1956		11 591	687	...	402	...
	1957		22 627	1 172	...	301	...
Industrial tractors	1955	...	905	...	...	...	...
	1956	...	672	...	...	...	...
	1957	...	1 305	...	...	...	...
Machinery for wood work	1955	...	569	...	...	...	...
	1956	...	235	...	...	...	...
	1957	...	211	...	...	...	...
Pneumatic tools and machinery	1955	...	620	...	...	153	...
	1956	...	836	...	...	142	...
	1957	...	1 108	...	...	187	...
Machinery for the pulp and paper industry	1955	...	6 149	...	...	...	...
	1956	...	906	...	...	...	...
	1957	...	4 940	...	...	...	...
Sound recorders, proyectors and spare parts for cinematographic equipment	1955	...	412	170	908	198	...
	1956	...	308	131	729	252	...
	1957	...	380	262	684	219	...
Appliances and instruments for hydrography, navigation, meteorology, and geophysics. Scientific apparatus	1955	...	412	170	908	198	...
	1956	...	308	131	729	252	...
	1957	...	380	262	684	219	...
Calculating equipment, thermometers, taximeters, machinery and apparatus for testing	1955	...	726	274	2 632	...	224
	1956	...	600	479	3 462	...	204
	1957	...	1 178	545	4 761	...	232
Physical properties of industrial materials, gauges, pyrometers, etc.	1955	...	3 764	...	3 953	164	...
	1956	...	3 125	...	5 921	221	...
	1957	...	5 285	...	5 863	250	...

/Table 5

Table 5

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS
(ELECTRICAL MACHINERY EQUIPMENT, AND APPLIANCES
1955-57

(Thousands of dollars)

	Year	Argentina	Brazil	Chile	Mexico	Peru	Uruguay
Generators	1955	529	7 484	662	1 518	2 010	1 175
	1956	346	5 647	925	3 542	1 958	340
	1957	355	4 285	1 483	4 192	3 106	280
Electric motors and spare parts	1955	960	1 908	738	496	680	...
	1956	292	1 695	1 786	3 353	1 103	...
	1957	498	1 621	1 748	3 515	1 027	...
Switchboards, switches	1955	278	2 752	1 160	...	...	...
	1956	127	4 627	1 093	...	...	...
	1957	42	3 873	1 631	...	...	...
Transformers and convertors	1955	...	4 981	1 434	605	1 066	...
	1956	...	3 783	600	873	1 408	...
	1957	...	5 846	1 841	578	1 269	...
Rheostats	1955	...	...	...	226	...	...
	1956	...	...	...	214	...	...
	1957	...	...	...	358	...	...

/Table 6

Table 6

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF CAPITAL GOODS
(TRANSPORT AND COMMUNICATIONS EQUIPMENT), 1955-57

(Thousands of dollars)

Branch of industry	años	Argentina	Brazil	Chile	Mexico	Peru	Uruguay
Locomotives and spare parts	1955	21 142	547	4 549	935	258	420
	1956	9 067	4 521	1 810	126	350	999
	1957	20 166	16 214	3 338	6 369	425	1 733
Railway coaches and coachwork for motor-vehicles	1955	3 629	51	13	...	73	...
	1956	6 283	45	42	...	37	...
	1957	-	104	4	...	13	...
Railway wagons	1955	-	9 901	867	401	213	...
	1956	407	85	1 252	1 697	590	...
	1957	205	-	3 615	465	251	...
Tramway equipment	1955	306	...	...	...	...	...
	1956	76	...	...	...	...	...
	1957	-	...	...	...	...	...
Buses, including coachwork	1955	1 979	351	1 885	...	...	1 967
	1956	269	1 277	6 889	...	...	4 083
	1957	800	1 233	4 918	...	...	1 126
Lorries and delivery-vans, including coachwork	1955	6 855	8 969	3 222	3 087	3 862	221
	1956	44 672	11 149	7 102	2 710	4 977	78
	1957	106 210	25 375	15 238	1 245	7 071	139
Chassis for buses and lorries	1955	10 341	...	...	...	...	...
	1956	3 416	...	...	...	...	...
	1957	8 787	...	...	...	...	...
Accessories and spare parts for passenger cars and lorries	1955	438	8 531	2 566		5 171	4 355
	1956	473	7 012	2 593		6 808	4 692
	1957	178	12 193	4 524		7 532	8 219
Aircraft and accessories	1955	352	5 329	357	2 482	708	...
	1956	1 438	6 299	492	3 630	1 933	...
	1957	4 370	7 453	1 393	5 948	2 250	...
Other vehicles and spare parts	1955	69	...	...	...	...	...
	1956	55	...	...	...	...	...
	1957	215	...	...	...	...	...
Boats (assembled or unassembled)	1955	955	585	...	...	...	...
	1956	18 567	225	...	...	...	...
	1957	2 652	527	...	...	...	...
Anchors and grapnels, and dock equipment	1955	68	...	...	...	...	...
	1956	19	...	...	...	...	...
	1957	100	...	...	...	...	...
Radiotelephonic sets and their components. Television sets	1955	51	685	440	650	3 504	72
	1956	20	519	267	458	4 642	38
	1957	185	1 570	490	638	5 568	59
Telephone and telegraph equipment and spare parts	1955	1 965	8 209	658	6 322	404	425
	1956	5 098	7 936	1 013	4 888	1 582	201
	1957	1 967	7 884	1 543	9 263	1 984	295
Electrical measuring instruments	1955	...	...	...	...	305	...
	1956	...	...	...	...	331	...
	1957	...	...	...	...	355	...

/Table 7

Table 7

SELECTED LATIN AMERICAN COUNTRIES: IMPORTS OF DURABLE CONSUMER GOODS, 1955-57

(Thousands of dollar)

Branch of industry	Year	Argentina	Brazil	Chile	Mexico	Peru	Uruguay
Refrigerators and refrigerating machinery	1955	987	1 524	737	30	2 539	1 614
	1956	780	966	886	44	3 229	744
	1957	1 292	1 511	546	29	3 079	842
Passenger-cars and chassis	1955	11 989	4 627	5 521	28 169	6 840	4 655
	1956	14 750	4 357	5 042	78 168	10 210	1 512
	1957	25 733	7 354	4 535	71 301	11 028	4 361
Electric fans, blowers, etc.	1955	...	418	...	292	240	...
	1956	...	362	...	392	631	...
	1957	...	735	...	315	402	...
Air-conditioning equipment	1955	...	486	...	719	67	...
	1956	...	540	...	178	112	...
	1957	...	198	...	417	109	...
Clocks	1955	...	199	824	2 301	409	477
	1956	...	441	828	2 093	418	463
	1957	...	1 471	1 710	2 117	533	341
Heaters, stoves, ranges, hot-plates, rings, etc.	1955	...	...	123	64	446	...
	1956	...	...	97	79	1 140	...
	1957	...	...	111	50	585	...

/Annex IV

Annex IV

SUMMARY OF INDUSTRIAL INVENTORY DATA FOR ARGENTINA, BRAZIL, COLOMBIA AND CHILE

1. Motor-vehicles

Although the assembly and manufacture of coachwork had started before, the manufacture of motor-vehicles may be said to have begun in Argentina in the 'thirties, with the small-scale production of chassis for hispano-Argentina lorries and buses operated by Diesel engines.

This equipment was used with great success for urban and suburban passenger transport, but production was discontinued because the enterprise found it more profitable to manufacture small arms, which were exported during the Second World War.

The mass production of light delivery vans and jeeps was launched after the war in a plant annexed to the military factory producing aircraft equipment at Córdoba; in 1957 light passenger-cars were also produced, the engines being imported.

Early in 1956, a second factory (Kaiser Argentina, S.A.), also in Córdoba, began mass production of light motor-vehicles (jeeps, jeep vans and station-wagons) and the corresponding engines, while passenger-cars were added in 1958. Output figures for the last two years were as follows:

	1957	1958[a/]
	(Units)	
Kaiser Argentina, S.A.		
Jeeps (two-wheel and four-wheel drive)	6 252	7 221
Jeep vans	853	2 891
Station-wagons (two-wheel and four-wheel drive)	4 929	10 342
Passenger-cars (4-door saloons)	-	2 157
Dinfia		
Light delivery vans	2 965[a/]	
Passenger-cars and station-wagons	105[a/]	5 200
Total	15 104	29 011

a/ Provisional figures.

/Imports of

Imports of spare parts have been replaced to a steadily increasing extent by domestic production. According to estimates, the value of such imports in 1958 averaged 150 dollars per jeep and 425 dollars per station-wagon, but it is hoped that in 1959 these figures will be reduced to 50 and 250 dollars, respectively, or less than 3 and 10 per cent of the c.i.f. value of the vehicles concerned.

This expansion of production, and the correlative progress in import substitution, were possible by virtue of two developments. The first was the organization of a network of establishments engaged in the manufacture of parts, representing a foreign exchange investment of approximately 3 million dollars and employing about 25 000 workers. The second was a considerable enlargement of Argentina's foundry and forging capacity, which in the next few years should easily exceed the requirements of the motor-vehicle industry and its growth in the near future.

It is estimated that more than 35 000 units will be produced in 1959. A light Alfa-Romeo saloon car, output of which will amount to 10 000 units, will be added to the models hitherto manufactured.

Early in 1958 the military plant concluded an agreement with a German firm (borgward) for the joint production of lorries and passenger-cars (Isabella type). Under the terms of this agreement, immediate production targets are as follows: in the first year (1959), 4 000 lorries; in the second, 5 000 lorries and 1 000 passenger-cars; and in the third, 6 000 lorries and 4 000 passenger-cars, while output will total 50 000 units when the factory's maximum production level is reached.

Other projects for the installation of Ford lorry and Citroen passenger-car factories are still in their initial phase, so that possible production targets cannot be estimated as yet. A plant for the manufacture of Mercedes-Benz lorries has already been installed and will enter into production shortly.

To encourage the establishment of motor-vehicle industries in Argentina, a system has recently been introduced fixing import substitution targets in respect of spare parts in annual production programmes.

One factor which has a limiting effect on the expansion prospects of Argentina's motor-vehicle industry is the production capacity of the

/network of

network of spare-part manufacturers which will also have to supply the new enterprises producing tractors.

Argentina's motor-vehicle market has for many years been badly under-supplied as a result of import restrictions. When imports of motor-vehicles were permitted again, at the end of 1955, with heavy surcharges which were subsequently still further increased, purchases abroad were few in relation to demand.

At the present time the number of motor-vehicles per capita - including jeeps and station-wagons - is very little higher than in 1929, and the average age of the park exceeds 10 years. It is therefore unlikely that in the first few years output will suffice to allow of any very considerable exports to other Latin American countries.

Production of motor-cycles and motor-scooters amounted to 18 000 units in 1958, with approximately 35 per cent of imported parts. This industry has benefited considerably by the existence of the plants manufacturing motor-vehicle parts. No information is so far available as to whether it has significant expansion programmes, but the domestic market easily absorbs current output.

It is well known how thoroughly and on what broad bases the motor vehicle industry is being organized in Brazil, where it represents a total investment of 400 million dollars, half of which corresponds to assembly and half to the production of parts and components for the assembly lines. In the present report only a brief review of the current status of the programme will be attempted, and a more detailed study will be left for the next revision of this inventory.

Production in 1960, estimated on the basis of the projects approved, should exceed the targets proposed by the Government.

	Government target	Manufacturers' production forecast
Lorries	80 000 units	82 000 units
Jeeps	25 000 "	27 000 "
Station-wagons and similar vehicles	25 000 "	34 000 "
Passenger-cars	40 000 "	67 000 "
Total	170 000 units	210 000 units

/The 1958

The 1958 production figure - 67,000 vehicles - will rise to over 110,000 units in the course of the current year. Import coefficients (in terms of weight), which at present stand at 75 per cent for jeeps and 65 per cent for other vehicles, should increase by the end of the year to 90 and 75 per cent, respectively. Of the vehicles manufactured, several are already being fitted with Brazilian engines (Mercedes-Benz lorries and Willys products). During the present year it will be made compulsory for not only the engine but also the gear-box, gears, rear and front axles, etc., to be domestically-produced.

Since the changes recently introduced, the following are the models that are now being manufactured or for which the plant is under construction:

Lorries (medium-weight and heavy) and buses

5 types with petrol engines, which will be manufactured by the Ford, General Motors and International Harvester companies; and 4 types with Diesel engines, made by Mercedes-Benz, Vemag-Scania-Vabis and Fábrica Nacional de Motores Alfa-Romeo.

Jeeps

Willys, Vemag-DKW and Toyota will be the types manufactured. The Land Rover project was approved, but is apparently not being put into execution.

So-called utilitarian vehicles (light lorries, vans, light delivery vans and station-wagons)

The Ford, General Motors, Volkswagen, Vemag-DKW and Willys enterprises will produce five models.

Passenger-cars

The following 7 models will be manufactured: Romie, Volkswagen, Vemag-DKW, Renault (Dauphine), and Aero-Willys. The Borgward, Mercedes-Benz and Alfa Romeo projects for the Isabella, Mercedes 190 and Alfa-Romeo medium model were also approved, but there seems to be some doubt about their execution. The Renault (Dauphine) model will be manufactured by Willys-Overland, with the authorization of the French maker, while investment in equipment will be effected by Willys' own manufacturers in Brazil. This latter company has announced its intention of producing another type of passenger-car (the Aero-Willys).

/The following

The following vehicles are already being manufactured and are running on the roads of Brazil: FNM, General Motors and Mercedes-Benz lorries; Willys, Vemag-DKW and Toyota jeeps; utilitarian vehicles made by Volkswagen (Kombi vans), Willys (station-wagons for farm use), Vemag-DKW (station-wagons); and Vemag-DKW and Volkswagen passenger-cars.

A summarized account of the characteristics of some of the projects under way is given below.

Mercedes-Benz do Brasil, S.A.

Lorry, model 321, Diesel engine, 75 HP at 2,400 rpm.

Lorry, model 331, 125 HP, Diesel engine.

Projects are afoot for the manufacture of lorries and buses in the near future, with OM-326 and OM-336 engines (160 HP at 1,800 rpm and 42 HP at 3,400 rpm, respectively).

Willys-Overland do Brasil, S.A.

Willys jeep and station-wagon for farm use, petrol engine, 6 cylinders in line, cylinder capacity 161 cubic inches, maximum potential 60 and 90 HP at 2,400 and 4,200 rpm, respectively.

Manufacture of the first passenger-cars is expected to begin by the end of 1959.

General Motors do Brasil, S.A.

Chevrolet light delivery van.

Chevrolet lorry, model 6503.

Ford Motors do Brasil, S.A.

Medium-weight lorry, F-350, V-8 petrol engine, Y block, 167 HP.

Heavy lorry, F-600.

Light delivery van, F-100.

The manufacture of Ford passenger-cars is under study, and would entail relatively modest additional investment.

Vemag, S.A. Agricultural vehicles and machinery

Vemag-DKW station-wagon, two-stroke engine, 40 HP at 4,250 rpm, cylinders in line, without valves, cylinder capacity 900 cubic centimetres.

Vemag-DKW passenger-car, with the same engine.

Vemag-DKW jeep.

Scania-Vabis 75 lorry.

/There is

There is a project for the manufacture of tractors with the authorization of Massey-Ferguson of Toronto (Canada).

Toyota do Brasil, S.A.

Jeep, Toyota "Land Cruiser" type, 6-cylinder engine of 120 HP at 3,600 rpm, cylinder capacity 3,888 cc.

Export prospects for Brazil's motor-vehicle industry are so extensive that this industry may suffice in itself to revolutionize the country's position in the intra-regional balance of payments. The possibilities concerned cover not only finished vehicles, but also parts and spares.

With the establishment of a large-scale motor-vehicle industry, demanding the manufacture of parts and spares to represent a high proportion - 90 to 95 per cent - of the value of the vehicles concerned, the manufacture of motor-vehicle parts in Brazil is undergoing a radical transformation. This long-established industry, which in the past confined its activities to the manufacture in small quantities of an immensely wide variety of parts for the different models in use, is now rapidly adapting itself to lower cost requirements, stricter adherence to specifications and punctual delivery to meet the motor-vehicle manufacturers' deadlines. To accustom themselves to a system of mass production, many enterprises are endeavouring to act upon the incentives offered by the Grupo Executivo da Indústria Automovilística (GEIA), a federal body to which they have submitted projects for the modernization and expansion of their plant. The time-limit for the presentation of such projects expired on 28 February 1959, but with respect to many of them no decision has as yet been reached. It is therefore preferable to postpone detailed description of Brazil's motor-vehicle parts industry until this inventory is revised in the near future.

Several activities ancillary to the motor-vehicle industry and capable of being turned to account in other sectors and for other goods are also being developed. A case in point is the medium forging industry, which must necessarily evolve in the direction of producing lorry axles, gear-boxes, etc., and will be able to supply the railway equipment industry, ship-building, petroleum drilling and extraction, and other activities.

To meet the needs of Brazil's motor-vehicle industry, three large forging establishments are under construction (Krupp, COBRASMA and SIFCO do Brasil), each of which has an approximate annual production capacity

/of 10,000-

of 10,000-12,000 tons, with an 8-hour work shift, in line with the requirements referred to. If these factories were expanded or worked double shifts, they would be able to supply other Latin American countries with forgings, either raw or processed (one of these enterprises - COBRASMA - will be able to deal with them in its own machine shop).

Bicycles and motor-scooters are also manufactured in Brazil. The relevant information will be given in the revised version of this report.

2. Electrical household appliances, refrigerators for commercial use, radio and television sets

Production of durable consumer goods of this type has been developed in all the countries under review, although to the greatest extent in those where demand has been steadiest and most intensive, while at the same time import difficulties have created a situation favourable to the growth of such industries.

Hence the manufacture of refrigerators, washing-machines and dryers, liquidizers, floor-polishers and other household appliances has attained very high figures in some countries.

In Argentina considerable impetus was given to these industries during the war, and at the present time domestic market supplies are satisfactory from the standpoints of both quantity and quality.

The following is a break-down of the establishments producing the goods in question on an industrial scale (apart from small assembly lines), almost all of which are situated in or around the city of Buenos Aires:

	Number of establishments
Refrigerators	55
Washing-machines	35
Liquidizers	37
Floor-polishers	24
Total	151 a/

	Number of units produced in 1957
Refrigerators b/	202,064 c/
Washing-machines	168,050 c/
Floor-polishers	70,000 d/
Liquidizers	130,000 d/

a/ As some establishments manufacture two or more of the articles listed, the total does not correspond to establishments of all kinds.

b/ Including absorption, paraffin, gas and commercial refrigerators. Manufactures of these four types are estimated to represent less than 10 per cent of the total.

c/ Official statistics supplied by the National Statistical Service (Dirección Nacional de Estadística).

d/ Estimate.

/All parts

All parts are manufactured, including motor and sealed units for refrigerators, and only the raw material is imported.

In previous years exports to neighbouring countries (especially Chile and Uruguay) were affected on a small scale. But there are establishments specializing in the production of commercial refrigerators, whose current capacity would enable substantial intra-regional exports to be made. Again, the expansion of production of other types of refrigerators to meet the requirements of the Latin American countries is a possibility conditional only upon adequate supplies of sheet.

The assembly of radio receivers and sound recorders, as well as the manufacture of many of their parts (including valves) is an industry of relatively long standing in Argentina, since it was established over twenty years ago. In recent years it has been expanded to handle the assembly of television sets.

Many of the parts that are manufactured in Argentina (dry and electrolytic condensers, carbon resistances, coils, transformers and tuning equipment) could be exported to other Latin American countries to supply their assembly industries.

Air-conditioning units are also manufactured for both residential and industrial use.

Although the manufacture of electrical household appliances (liquidizers, floor-polishers, vacuum-cleaners, mixers, etc.) has only recently been developed in Brazil, the industry has already reached an advanced stage, technically speaking, the size of the establishments and the internal organization of the leading enterprises being very satisfactory.

During recent years this industry has been meeting the whole of Brazil's requirements, and imports are virtually non-existent.

The following is an approximate estimate of the industry's output in 1958:

	Number of units
Liquidizers	300,000
Floor-polishers	150,000
Electric fans	350,000
Vacuum-cleaners	70,000
Electric mixers	40,000
Electric razors	50,000

/Internal production

Internal production costs for the first five items on the list place the industry in a position to compete on the world market without privileges or subsidies, provided that the Brazilian exporter can sell his export earnings on the free-exchange market, as has been the case recently.

On an average, 20 per cent of the final value of the article produced is represented by imported raw materials, intermediate products or supplementary parts. Broadly speaking, the proportion of imported materials - which varies for each item - is still so relatively high because of the large part played by non-ferrous metals and their alloys (zamack, etc.) in the manufacture of electrical household appliances, especially liquidizers.

The estimated annual increment of about 5-10 per cent in demand for electrical household appliances on the Brazilian market is attributable both to the growth of the population and to the rise in average real income. The dynamic quality imparted by this circumstance to the group of products concerned may afford a substantial margin for the supplementing of domestic production with imports of similar articles from other Latin American countries.

Production of refrigerators for household use is distributed among ten enterprises, most of which are situated in São Paulo. In 1958 their output amounted to 280,000 units, nearly 150,000 of which were equipped with domestically-manufactured compressors.

Imported raw materials and parts represent on an average 3 per cent of the value of refrigerators with a domestically-produced sealed unit, and 30 per cent in the case of those with an imported compressor. The latter relatively high import coefficient is also partly due, in some plants, to purchases of steel sheet from abroad, since the output of Volta Redonda, so far Brazil's only producer of steel sheet, is not large enough to meet all requirements.

(The manufacture of compressors in Brazil will be described later, in the paragraph on air-conditioning and heavy refrigerating equipment.)

Production of washing-machines is at present distributed among many industrial establishments with a considerable margin of idle capacity. Although their plant would enable them to produce 200,000 units yearly, effective output in the last few years was as follows:

1955	10,000 units
1956	16,000 "
1957	27,250 "
1958	55,000 "

/As compared

As compared with that of other electrical household appliances (both small - liquidizers, etc. - and large - refrigerators, etc. -), the production cost of washing machines is high because there are so many establishments whose volume of output is very small.

The installed capacity of the Brazilian plants manufacturing radio receivers, gramophones and television sets is sufficient for an annual output of 550,000 receivers and gramophones and 130,000 television sets, but effective production is far below this level.

Imported raw materials and supplementary parts show a high average coefficient of 49 per cent. Brazil still imports large quantities of electronic valves and TV tubes, which could be manufactured locally only if a number of technical problems were solved, apart from the need to organize this line of production in longer series than are warranted by Brazil's current output of finished sets. There are also technical reasons for the high import coefficient. As a result of the continued achievements of modern science (for example, colour television), most of the manufacturers of TV tubes prefer to wait until technical specifications have become stabilized. They are afraid that, if they began to manufacture them now, the sets leaving the assembly line will become out-of-date overnight. The same is true of electronic valves for the reception, transmission or amplification of sound. As the size of the manufacturing series of these technically more advanced articles is an important factor in their economic production, they may well form the subject of a regional agreement for the liberalization of trade between the principal industrial countries of Latin America.

Many firms make air conditioners. They comprise very different elements (apparatus for air-conditioning, ventilating, heating, humidifying, etc.) and are for both industrial and domestic use. The enterprises concerned do not always operate on a large scale and many of them serve as planning offices and assembly shops using components bought from specialist firms, such as fine-steel sheet structures, evaporaters or worms of copper tubing, steel-wire filters, heavy steel plate water condensers, copper tubes, motors, electric remote control switches, and "Freón" gas compressors. All these components are made in the country, although sometimes imported raw material, such as copper, is used.

/Brazilian industry

Brazilian industry turns out air and gas compressors, using a large proportion of domestic raw materials and satisfying all the needs of the internal market with the types (of various capacities) produced.

Air compressors are made in models of one or two phases, with air or water cooling, vertical or horizontal cylinders, some mounted on tanks, with a rating of up to 50 pounds per square inch (10 atmospheres) and with a capacity of up to 244 cubic feet per minute.

Gas compressors for cold storage plants are designed to operate at a rating of 120 pounds per square inch (8 atmospheres) and the models vary from 1/5 to 8 HP.

In Chile the industries producing refrigerators, washing-machines, floor-polishers, liquidizers and other electrical appliances for domestic use are undergoing intensive development in response to increasing demand. The country now turns out annually some 10,000 refrigerators, 11,000 washing-machines, 9,000 floor-polishers and relatively large quantities of other appliances.

The production of these articles is expected to rise sharply mainly because more domestic steel will be available as a result of the enlargement of the Huachipato steel mill. Using this cheaper steel, Chile will be able to build up a large export sector offering attractive prices on the international market.

With the aid of four refrigerator factories, an establishment producing sealed units for refrigerators will start production at the end of this year. It is expected to make 12,000 units per year and could increase this figure in response to demand. At the moment sealed units are imported, but when they are made locally, the proportion of imported parts in the manufacture of refrigerators will fall to 5 per cent of their value.

The manufacture of clothes-driers and electric razors has already been launched with success.

In Colombia the production of electrical appliances for domestic use has only just been started. Some items like refrigerators, washing-machines, kitchen stoves and heaters are turned out in different towns in small but steadily increasing quantities.

Although the imported content is high because steel sheet must be

/bought abroad,

bought abroad, it will fall considerably when sheet is produced locally, perhaps as a result of the enlargement of the Paz del Río steel mill.

Physical conditions divide Colombia into separate markets between which communications are difficult and costly. Industry is therefore scattered in small centres which, precisely because of their position, can supply areas of neighbouring countries which are equally isolated from each other. In this way the flow of local exports has already begun on a small scale.

3. Typewriters and accounting machines

The manufacture of such machines in Latin America is just starting.

In Argentina, there are two typewriter factories which cover market needs but only with standard models (commercial and portable). All the parts are domestically-produced but the raw materials are imported. The production of simple calculating machines has begun, but the establishment of a factory for accounting machines is only in the planning stage.

In Brazil, there are seven specialist firms, although the volume of production is still inadequate. As in Argentina, it is confined to a small number of models and sizes. Imports of raw materials, and finished and semi-finished parts do not exceed 10 per cent in the case of typewriters, a proportion which will be reduced in the course of the present year. Simple calculating machines are being turned out.

In Chile and Colombia, this line of production does not exist.

The fact that certain producing firms have been established simultaneously in various countries suggests that the time is ripe for specializing in the manufacture of various types as soon as there is a régime guaranteeing the freedom and stability of Latin American trade.

4. Sewing-machines

Although this line of production is fairly recent in Latin America, it has developed rapidly to the point where there is now an export surplus.

In Argentina, 11 establishments cover local demand for domestic sewing-machines. One of them is expanding its plant.

The first attempt made in Brazil to manufacture sewing-machines dates back to 1936, when the first domestic factory was built in the

/State of

State of Rio Grande do Sul. However, this early move failed in the face of foreign competition. Subsequently, the industry developed considerably and today is represented by 10 factories producing sewing-machines. Another two manufacture exclusively components and spare parts, while ten or twelve firms supply assembly shops with parts and raw materials.

The ten factories represent a total investment of about 20 million dollars and altogether employ 13,000 persons.

There are two specialized auxiliary industries, both Japanese enterprises. One of them, situated in Mogidas Cruzes, State of São Paulo, make sewing-machine cabinets, using a new process for preparing the wood. Another factory, in São Paulo, has begun turning out two of the most complex pieces in a sewing-machine - the shuttle and the bobbin box. Its initial output is 20,000 units a month.

One of the sewing-machine factories is completely self-sufficient since it produces all the pieces it needs. Another has all the material necessary, including that for making shuttles and other precision pieces but so far has preferred to import them.

Almost all the sewing-machine factories import needles (production of which is only just beginning in Brazil) and at least two other pieces: the bobbin box and the shuttle.

While the import coefficient for raw materials and additional parts is nil in some establishments, in others it varies between 1.5 and 2 per cent, with a tendency to fall.

The rapid progress made in this sector has given rise to a production capacity which far exceeds the present needs of the domestic market. It amounts to more than 500,000 units per year and leaves a wide margin of idle capacity. The real output of domestic sewing-machines is now estimated at 350,000 with a consumption not surpassing 300,000. Exports and stocks make up the difference.

Trends in production, consumption and imports are estimated rougly as follows:

/Year

Year	Production	Consumption	Imports
1939	5,000	100,000	?
1954	156,000	215,000	58,000
1957-58	350,000	300,000	nil

In 1952, import, mainly from Japan, amounted to 336,000 units; in 1953, they fell to 42,000 units; in 1954, they recovered slightly, slumped in 1955 and disappeared in 1956. At the moment only a few sewing-machines for industrial use are imported.

Domestic sewing-machines are made neither in Chile nor in Colombia.

The manufacture of industrial sewing-machines, which has not yet started in Latin America, would be boosted by the establishment of a common market. In all the countries of the region there is a very dynamic ready-made clothing industry, generally operating with antiquated machinery. Hence, the potential market for industrial sewing-machines is very large.

/5. Agricultural

5. Agricultural machinery

In Argentina, more than 240 factories, almost all of them situated around the capital and in the provinces of Córdoba, Santa Fé and Buenos Aires, produce agricultural machinery and spares. Some of them operate on a very large scale, with more than 1,000 workers, and produce other types of capital goods and consumer durables. Most of them, however, are medium-size establishments (between 30 and 100 workers) and small workshops (with less than 30).

Apart from the large factories which produce other goods, the remainder employ some 8,000 workers. They turn out all types of agricultural machines and implements, importing only the raw material and some bearings.

Eighteen establishments manufacture harvesters, generally in small series of between 20 and 30 units per year. Certain factories have larger series and one in particular turns out 500 units per year. At present, annual capacity is reckoned at 1,200 units. The motors are imported and the machines are provided with interchangeable accessories for various types of grain.

In recent years, a few motorized harvesters have been exported to countries of the region, especially Uruguay.

Potato harvesters are also manufactured on a small scale and experiments have been made with the production of cotton harvesters.

The industry is situated mainly in the consumption areas and is designed to cover local demand. But some larger establishments could concentrate their output and have an export surplus for other Latin American countries.

Other types of implements are made under special license and internationally-known trademarks.

As this sector of production is so extensive, it has been impossible to review the situation in the other countries under consideration.

6. Machine-tools

In Argentina, the machine-tools branch is one of the oldest in the capital-goods sector. Before 1930 parallel lathes of up to one metre between the centres were produced, as well as certain types of milling-machines and drills.

Manufacture was then complementary in certain large workshops

/specializing in

specializing in the casting and repair of machine parts.

Following the severe import restrictions applied during the crisis of the thirties medium series of certain types of more commonly used machine-tools were launched. Later, during the Second World War, specialized establishments began to spring up.

At the moment there are 173 establishments, providing employment for more than 5,000 workers. About 30 per cent are skilled and 45 per cent semi-skilled.

There are 125 establishments in Buenos Aires and its vicinity, 16 in Rosario, 14 in the province of Córdoba, while the remaining 19, which are small-scale, are in various provinces. The siting of the factories is determined by their proximity to consumer centres.

Some 75 per cent of the total are exclusively engaged in the production of machine-tools. In the others, especially the biggest, which are also devoted to the casting of iron and other metals, machine-tools are only one line of production, although usually the most important.

Most of the establishments produce large or medium series. Only special large-scale machinery or tools made in small workshops are made to order. The oldest and most representative firms have confined their activities to one or two types of machine-tools. In the others, the trend is towards increasing specialization.

Most of the equipment in the factories was acquired during the immediate post-war years. Between 1953 and 1956, over two million dollars' worth of modern equipment (automatic and semi-automatic machines) was imported, and in 1957 orders were placed abroad for three million dollars' worth. Deliveries began in 1958. The bulk of this equipment is designed to complete existing production lines.

Output in 1958 is valued at 900 million Argentine pesos and consists mainly of universal-type machines for maintenance and production. The quantities produced in that year are as follows:

/Bench and

Bench and pillar drills	5,000
Pillar and radial drills	650
Universal sharpeners	90
Hard-metal sharpeners	60
Grinders	5,100
Planing machines	55
Single-pulley milling machines	400
Plane rectifiers	100
Universal and parallel rectifiers	80
Threading machines	70
Parallel lathes	4,800
Turret lathes	1,120
Folders and doublers	55
Plates for lathes	4,200

The proportion of imports in the value of production is usually small. On the average, it amounts to only 35 per cent of the value of the raw material, which in its turn is only 30 per cent of the sales price (this includes 12 per cent tax).

It is estimated that production normally covers domestic demand for the type of machine-tools listed above. The establishment of a common market would help this industry by boosting demand, thus facilitating larger series, increased specialization and economy, as well as paving the way for the manufacture of automatic and semi-automatic equipment.

This increase in the volume of production and in the degree of specialization would also encourage the development of an industry producing parts for the manufacture of machine-tools. In the absence of such an industry, machine-tool factories are at present forced to turn out many parts and spares which could be produced to advantage in more specialized establishments.

Lathes are the main type of machine-tool made in Brazil. At the moment, more than 60 types of universal parallel lathes are produced, which can be equipped with copying equipment. Distances between the centres vary between 1 and 5 metres and the height above the base-plate between 175 and 500 mm.

/Domestic production,

Domestic production, which amounts to about 3,000 units, exceeds internal demand and leaves an ample margin of capacity for export.

The main producing firm has many of its own improvement patents for Norton boxes, gear-boxes, automatic support-pillars for tools, etc.

Lathe turrets are also produced, weighing up to 3,000 kilogrammes.

The various types of lathes manufactured in Brazil are particularly suited for general maintenance and production. However, entirely automatic types or copying-machines are not produced, although it is planned to start making them at an early stage.

In Chile and Colombia, the production of machine-tools has hardly begun.

7. Electric motors

In Argentina the production of small and medium electric motors (up to 10 HP) represented in 1956 a total horsepower of 220,000. Thirty-five per cent of them were of under 1 HP and 65 per cent between 1 and 10 HP. All the parts are made in Argentina. Imported raw materials and bearings represent on the average 20 per cent of the sales value. The capacity of this industry is such that it could only supply the domestic market in 1956. However, since then, the volume of production has diminished, leaving a certain margin of idle capacity.

In Brazil, there are 8 principal establishments with an annual production of between 250,000 and 270,000 industrial motors per year. This total does not include motors of less than 1 HP which are used mainly to operate domestic appliances and whose production is close to 1 million units. Manufacture is not based entirely on domestic materials because partial imports of aluminium ingots, copper bars and bearings are necessary. Silicon steel sheets, now produced in sufficient quantities by ACESITA, and electrolytic condensers, now made by a local firm were imported up to a short time ago. It is estimated that the internal demand for electric motors will soon reach 400,000 units annually. Although Brazilian factories are probably planning to meet this additional demand, it is unlikely that they will be able to export many electric motors to the rest of Latin America in the near future.

/In Chile,

In Chile, the manufacture of electric motors began in 1948 and has developed in response to a steady demand. Production has been concentrated on motors of less than 1 HP. Apart from very small quantities of aluminium, the raw materials are of domestic origin, an advantage which heralds a marked expansion should the trade system allow a broadening of the market.

The supply of bearings - the manufacture of which is complex, patented and requires large series to be economic - constitutes a problem for this and other industries in all the Latin American countries. It might be solved within the framework of a common market.

8. Diesel and petrol engines

Argentina possesses 30 factories producing stationary petrol engines (up to 10 HP) and diesel engines (up to 150 HP, although most of them do not exceed 30 HP. Some of the diesel engines are produced under special licence with trademarks of world-wide repute.

The enlargement of Argentina's casting and forging capacity, mentioned earlier with reference to motor-vehicles, will benefit this industry. At the moment, it produces nearly all of the parts required and imports only ignition and starting mechanisms and certain injection accessories. The imported raw material represents on the average 16 per cent of the sales value.

The production of low-power engines regularly supplies the domestic market and may be enlarged so as to leave an export surplus for other Latin American countries.

A factory for diesel engines of 1,500 HP has recently been built. At a later stage, it is to produce several models of between 800 and 2,050 HP as well as high-speed low-power motors (2,100 rpm and 60-75 HP). The requirements of rail traction, the electrification of small rural centres, and shipbuilding will possibly absorb the bulk of production.

The production of combustion and diesel engines is in its infancy in Brazil and is confined to small-capacity units. Two firms, holding foreign patents, produce petrol engines of 1, 1-1/2 and 2 HP for stationary use, bicycles, etc. but so far have not succeeded in achieving complete import substitution.

/A Brazilian-German

A Brazilian-German firm has just begun to produce diesel engines, using between 50 and 60 per cent of domestically-made parts, a figure which will soon become 100 per cent. It turns out engines of 1 to 4 cylinders with capacities ranging from 5 to 44 HP for industrial uses, agricultural machinery, generating units and ships.

Large-capacity Diesel engines are not yet made in Brazil, nor are there specific projects for their manufacture in the near future. However, in this sector too, the productive resources of Latin America might be pooled. Countries like Argentina and Mexico can find in Brazil a large market for the Diesel and combustion engines they produce.

Increased production in this industrial sector is highly desirable for the region, not only because of the generating needs of the large power stations as well as traction requirements in general but also and more particularly because of the existence of numerous small towns and rural establishments which are far away from the public grids and require a steady supply of small power units.

9. Boilers

The total number of boilers of up to 70 atmospheres required in Argentina for heating and industrial purposes is supplied from the domestic production of 40 establishments which import only raw materials and certain control devices.

Some of the factories are very modern and use foreign patents and trademarks.

Sporadic exports have been effected to neighbouring countries, and production may possibly rise substantially to meet Latin American needs.

Certain European firms intend to build factories for the manufacture of power-generating, high-pressure and steam boilers, but such projects are only in the initial stage. It is therefore impossible to make a practical estimate of their probable volume of production. If these projects materialize, the large internal demand will certainly absorb the limited production.

In Brazil industrial boilers are built, but it has been impossible to make a detailed review of this sector.

Chile has recently started to make industrial boilers of medium capacity.

/10. Hydraulic and

10. Hydraulic and steam turbines

In Brazil two or three firms make hydraulic turbines, although still with a high proportion of imports. One of them is about to start manufacturing units of up to 20,000 HP. Within a year, another firm will begin turning out turbine-blades which are now imported. Brazilian consumption of steam turbines seems insufficient to justify domestic production. Steam turbines, as well as most hydraulic turbines, are still imported. The replacement of these imports might be stimulated by the regional market.

In Argentina a project for making hydraulic turbines under patent from Ansaldo (Italy) is pending approval.

11. Electric generators and motors over 10 HP and transformers

In Argentina there are various factories which turn out high-power electric motors (up to 900 HP) for industry, variable-speed combinations such as the Leonard Ward (up to 250 HP), three-phase generators (up to 1,400 kVA) and rotary converters (up to 300 HP) with control panels.

The lack of prime movers has constituted a serious obstacle to increased production which in 1958 absorbed only 70 per cent of the capacity of one shift.

In Brazil this type of manufacture has shown a marked increase. Recently, motors of up to 800 HP have been produced. There are plants capable of producing high-power generators of up to 30,000 kW.

Brazil already produces transformers of up to 34,000 kVA and is planning to make others up to 58,000 kVA.

Since before the Second World War, Chile has produced distribution transformers with a capacity of up to 5,000 kVA. As it uses domestic raw materials, it will be in a good competitive position for a future common market.

12. Electric communication equipment

Both Argentina and Brazil produce equipment for telephone services which include transmission apparatus and switchboards. At present, imports of raw materials represent 30 per cent of their value.

/As these

As these public services operate with antiquated equipment in many Latin American countries, the prospects in this sector are favourable. Argentina has already shipped important consignments to Cuba.

In the case of radio-transmitting equipment, both countries manufacture certain parts but, owing to their great variety and the continual introduction of improved types, this seems to be a sector which will lend itself to regional specialization under the stimulus of gradual trade liberalization.

Chile has already begun to manufacture parts for telephones and radio-transmitters.

In Colombia there are so far only certain projects for this sector.

13. Machinery for civil engineering and road-building

The manufacture of machinery for civil engineering and the transport of earth and materials is a well-established activity in Argentina. It is carried on either in specialized establishments or in large metallurgical workshops, as one of several lines of production.

The manufacture of simple accessories and equipment for road-building (levellers, sheepsfoot rollers, moulds, drag-scrapers, wheel-barrows, etc.) have also been a sideline for many years in the large metal works and those concerned with the manufacture of construction equipment in general.

Recently, two establishments have made plans to produce motorized rollers; one of them will build the Caterpillar No. 12 type and the other will operate under patents granted by Avelin Badfords of the United Kingdom.

The present annual output capacity of the former establishment is 10 machines - it plans to raise this figure to 80 - and that of the second 40.

Scarifiers, mobile concrete mixers and spreaders, as well as similar machines for asphalt, are also made.

Brazil manufactures self-propelled cranes mounted on wheels or tracks.

It also produces machines for the excavation and transport of earth both for civil engineering and laying road beds. They include mechanical shovels, various types of excavators and motorized rollers, and scarifiers.

Mobile units for preparing asphalt, with a capacity of under 50 hour/tons, are also made. Larger units, whether mobile or fixed, are not yet manufactured in Brazil.

/Various types

Various types of equipment for pulverizing, grinding and stone-sorting (for road metal) are produced, apparently in sufficient volume to satisfy market needs.

14. Machinery and equipment for industry

In Argentina the manufacture of industrial machinery and equipment began with simple repairs. After the crisis of the 'thirties and during the Second World War, the industry began to turn out machines and equipment to meet needs which could not be covered because of import restrictions.

At the moment there are 105 establishments producing general machinery and equipment for industry. Of these, 101 are specialized and four are large firms turning out other items such as consumer durables, agricultural and road-building machinery.

The following table gives the employment break-down for this industry:

	Number of establishments	Workers employed
Large establishments	4	16,602
More than 100 and less than 1,000 workers	25	5,628
More than 50 and less than 100 workers	16	1,198
More than 10 and less than 60 workers	60	1,484
	105	24,812

The main items covered are as follows: hydraulic presses, various apparatus and devices for the internal transport of materials and for construction and mining, various kinds of machinery for extraction, distillation, and other processes (drying, concentration, etc.) employed by industries producing foodstuffs, dairy products, beverages, oils and chemicals in general.

A smaller number of establishments included in the total have specialized in equipment for the beverage industry (machines for filling,

/washing and

washing and capping bottles), the food industry (machines for filling and sealing containers), dyeing, grinding of minerals and grains, rubber (rollers, presses and moulding machines), plastics (presses, moulding and injection machines), health services (digesters, disinfectors, apparatus for sterilizing and filling ampoules), cold storage (compressors, evaporators), service stations, graphic arts (printing and bookbinding), and petroleum extraction and distillation.

For the textile industry, three specialized establishments manufacture continuous spinning and twisting cards (for wool up to count 40 and for cotton up to count 60), winders, cone winders, warpers and looms for wool, cotton and silk.

About ten establishments, which are not fully specialized, make nearly all the equipment required by the pulp and paper industry. Recently, a continuous machine for making paper 220 metres wide at a speed of 150 metres per minute was built.

In most establishments production is to order and only very few maintain stocks for immediate sales.

This is an industrial activity where the existence of a common market would help to reduce the high costs implicit in the wide variety of types and would allow increased specialization and the establishment of medium series.

Since the Second World War, there have been some exports to neighbouring countries.

In Brazil the manufacture of industrial machinery and equipment has followed a similar trend to that in Argentina, conditions in the two countries being generally alike.

The following is the main industrial transport equipment manufactured: travelling cranes, gantries, power shovels, single cableways, pulleys and similar equipment.

Many of them are manufactured under licence granted by United States firms to which royalties are paid.

Estimated annual production for 1958 was 400 units for travelling cranes, cableways and gantries, and 1,000 units for electric pulleys. Some 2,000 workers and 600 technical and administrative staff are engaged in this sector which is often associated with the manufacture of other mechanical equipment.

/Among the

Among the larger travelling cranes recently constructed for the Brazilian industry the following were most important:

For the River Pardo Hydroelectric Company, one crane (capacity - 100 tons, clearance - 12 metres);

For the Laminaçao de Artefactos de Ferro S.A., one crane (40 tons, 28 metres);

For the Water and Electric Power Department of Sao Paulo, one crane (125 tons, 15 metres);

For the Ore and Coal Port of Rio de Janeiro, 5 cranes (25 tons, 80 metres);

For the Carris Power and Light Company of Rio de Janeiro, one crane (230 tons, 16.5 metres).

All types of manual and mechanical saws for the timber industry are manufactured in Brazil. However, Brazil still imports substantial quantities of similar products for price reasons in spite of the ad valorem tariff of 60 per cent levied on imports. (This tariff is only 40 per cent for metal cutters.)

There are 50 or more firms which turn out pumps of all kinds, in some cases at the same time as other manufactured products, and also do repair work. Brazilian manufacturers have patented several of the improvements which they have introduced, such as the centripetal system which eliminates the use of impellers in the ordinary kind of blades:

The following types of pump are manufactured:

(1) Centrifugal pumps for domestic use with a capacity of 1,000-2,000 litres per hour, suction up to 50 m, lift up to 30 m.

(2) Centrifugal pumps for large buildings (skyscrapers), 5,000-30,000 litres per hour, lift up to 180 m.

(3) Centrifugal pumps for irrigation 20,000-1,800,000 litres per hour, lift 10-160 m.

(4) Centrifugal pumps for urban water supplies, 20,000-1,800,000 litres per hour, driven by electric motors of up to 350 HP.

(5) Centrifugal pumps for sewage, 10,000-1,800,000 litres per hour, driven by electric motors of up to 350 HP.

(6) Centrifugal pumps for general industrial purposes and for the absorption of pulp, 5,000-800,000 litres per hour, lift up to 100 m.

/(7)Centrifugal pumps

(7) Centrifugal pumps driven by motors of up to 350 HP.

(8) Centrifugal high-pressure pumps, cold and hot water(for feeding boilers), 2,000-120,000 litres per hour, lift up to 400 m.

(9) Centrifugal pumps for tubular wells with and without injector, 5,000-50,000 litres per hour, for wells up to 100 m deep.

(10) Centrifugal pumps for the chemical industry, of various materials.

(11) Geared pumps for oil.

(12) High-pressure piston pumps.

(13) Piston pumps for domestic use.

The electric motors used in these pumps are also produced in Brazil.

It is estimated that the total production of pumps in 1958 was 50,000 units, valued at 130 million cruzeiros. This production has covered domestic requirements, except for certain units with a capacity higher than the above-mentioned limits, which continue to be imported.

There are also establishments for the production of highly specialized equipment, for the textile and pulp and paper industries.

At the moment various types of loom used in the textile industry are made in Brazil. The main models are as follows:

Dobbies

Automatic mechanical looms

Non-automatic mechanical looms

Jacquard looms

Brazil also produces other textile machinery and equipment, including machines for printing and mercerizing fabrics, etc., spinners and twisters, non-automatic winders, warpers, card clothing, shuttles for automatic and non-automatic looms, machinery and apparatus for the finishing of yarns and fabrics (printers, sizers, mercerizers, etc.).

For some years now this production has met all domestic requirements.

Annual output of the main factories is reckoned at 10,000 units (each unit represents a spindle) and more than 300 workers are employed.

The essential elements of the three main types of bobbin (ordinary, self-automatic and automatic) are patented in Brazil.

/Brazil also

Brazil also manufactures waste-collectors of the pneumafil and other similar types in sufficient numbers to meet domestic demand. The largest firm turns out 30 units a month for 400 winders.

Nearly all the machinery used for the recent development of the Brazilian pulp and paper industry has been built by domestic industry.

Brazilian firms have built paper machines with a utilizable width of up to 3,200 mm and can cast driers of up to 20,000 kg.

On the average 90 per cent of the raw materials and components used are of domestic origin.

The firms which produce these materials operate under licence from foreign companies and pay them royalties. They employ more than 2,000 workers and have an operating capital of 820 million cruzeiros.

Besides the specialized firms referred to, there are metal transforming industries which, according to the plans of the specialized companies, are capable of manufacturing the washing and recovery units required by the pulp factories.

In Chile and Colombia machinery for this industry is produced on a very small scale. It is to be hoped that this sector will be given great encouragement as industrial development progresses.

15. Railway rolling-stock

In Argentina there are various factories which produce rolling-stock but their present capacity would have to be enlarged if a programme for modernizing the existing park were to be carried out.

In Brazil this sector has undergone considerable development and has achieved a surplus capacity which enables it to export under favourable conditions.

Chile, like Brazil, has developed this branch of manufacture to the point where it can satisfy its domestic needs and leave an export balance.

16. Shipbuilding

The shipyards of Argentina number 270 and at present employ more than 10,000 workers. However, 80 per cent of their activities consist of maintenance and repairs.

/A shipyard

A shipyard belonging to the Ministry of Marine has installations for building ships of up to 10,000 gross tons. This is a recent organization which is now constructing a river-boat to carry passengers and freight on the Buenos Aires - Asunción (Paraguay) route. It has signed a contract for three vessels of 5,000 gross tons to be used for long-distance coastal traffic. Building began this year.

There is also a privately-owned shipyard with a capacity for ships of up to 5,000 gross tons. This firm, which has been in operation for 20 years, has built a petrol tanker of 2,500 tons and many smaller ships and tow-barges for river navigation.

Various other firms have also built smaller ships (of up to 1,000 tons) and the others undertake maintenance.

The shipbuilding industry requires for its full operation other complementary activities, such as metallurgy and the manufacture of engines. The metal industry in general is sufficiently advanced to supply its requirements. (During the Second World War, Argentina made a heavy steel plate doubler for shipbuilding which was exported to the United Kingdom.) Argentina has ample experience in soldering and manufacturing equipment for the shipbuilding industry but the lack of propelling equipment is a serious drawback. There is only one factory which turns out engines of medium power (from the point of view of shipbuilding). This was already dealt with under the heading of engines. Its entire production is absorbed in the manufacture of locomotives.

In Brazil the establishment of a shipbuilding industry of appreciable size is now being actively encouraged by the Government through the Grupo Executivo da Industria da Construcao Naval (GEICON). This is an inter-departmental organization with wide powers and with functions similar to those of GEIA in the motor-vehicle industry.

The promotion of new shipbuilding activities is the responsibility of GEICON. It grants customs and exchange facilities for imports of the necessary equipment and of the parts and spares required for shipbuilding during the period of transition until projects are approved. In return, it requires a commitment from shipbuilders to reduce gradually the proportion of imported elements for each unit constructed over a given number of years.

/Thus, the

Thus, the establishment of new activities promoted by GEICON involves not only shipbuilding but also the manufacture of the equipment, parts and spares used in that industry.

At the moment, it is possible to obtain about 33 per cent of the materials used to build a freighter from domestic sources. This percentage should gradually increase until import substitution is almost complete.

The needs of the Brazilian merchant fleet as regards replacing old ships and achieving a moderate increase in present tonnage, were estimated by GEICON at 130,000 gross displacement tons per year. The annual production of those shipyards whose plans have already been approved must slightly exceed that estimate, which is rather conservative.

Up to March 1959, GEICON had received 38 tenders for the construction of small, medium and large shipyards, as well as for the manufacture of ship components. Among the six tenders already approved, two are of outstanding importance. One involves the investment by a Japanese firm of capital and technical knowledge, and another comes from a well-known Netherlands shipyard (Verolme). The Japanese shipyard will build ships between 5,000 and 10,000 gross tons, with an annual production of 60,000 tons. This will be divided up among six ships of 5,000 gross tons and three of 10,000 gross tons each. The first is to be delivered in December 1960. The shipyard built by the Netherlands firm will be somewhat smaller in capacity (40,000 gross tons per year).

The main projects already approved represent an annual capacity of 138,000 gross tons per year broken down as follows:

Ishikawajima shipyard		60,000	gross	tons
Verolme	"	40,000	"	"
Toque-Toque	"	25,000	"	"
Emaq	"	8,000	"	"
Sá	"	4,000	"	"
Niigatabrás	"	1,000	"	"
		138,000	"	"

The shipyards to be established, besides those mentioned, will build only small ships and fishing craft (e.g., the Sá shipyard included above).

/GEICON will

GEICON will in future consider projects for the manufacture of equipment and parts for use in shipbuilding. These are important for the success of the programme because this industry, like the motor-vehicle industry, is mainly one of assembly. In this respect, it is well to mention the important move made by certain Sao Paulo industrialists for the establishment of a private company designed to co-ordinate the activities of firms producing components for shipbuilding. It is to be called the Associaçao das Industrias Complementares da Construçao Naval (ADICCON). The five founding enterprises, with a total capital of 500 million cruzeiros, are in a position to produce, depending on the specifications of the shipyards, the following series of parts and equipment for ships:

(a) Hatches, mains, blocks (starting on the principle of 100 per cent domestic construction);

(b) Main rudder axes and various pumps (30 per cent domestic material to start with and 100 per cent by 1963);

(c) Electric generators and motors, electric wiring and accessories, and cold-storage equipment (60 per cent domestic material in 1959 and 95 per cent in 1963).

It is still impossible to estimate the possibilities that this sector offers for Latin American integration because GEICON still has to decide on more than 20 projects.

In Chile there are plans for the development of this industry, while Colombia has a shipyard on the Atlantic coast (Barranquilla) for the construction and repair of small tugs.