

UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL



GENERAL

E/CN.12/570
FAO/ETAP/1346
TAO/LAT/30
10 April 1961

ORIGINAL: ENGLISH

ECONOMIC COMMISSION FOR LATIN AMERICA
Ninth Session
Caracas, May 1961

PULP AND PAPER IN LATIN AMERICA: PRESENT SITUATION AND
FUTURE TRENDS OF DEMAND, PRODUCTION AND TRADE

(Document prepared by the ECLA/FAO/BTAO Pulp and Paper
Advisory Group for Latin America)

Note: This text is provisional and subject to changes in substance
and form, which will be incorporated in the printed version
to be published in 1961.

CONTENTS

	Page
I. GENERAL OBSERVATIONS	1
1. Introduction	1
2. Summary and conclusions	4
II. PRESENT SITUATION	9
1. Pulp and paper consumption.....	9
2. Imports	13
3. The pulp industry	19
4. The paper and board industry	26
5. The fibrous resources of Latin America	32
(a) Wood	32
(b) Sugar-cane bagasse	34
(c) Other fresh fibrous materials	36
(d) Waste paper	39
6. Supply of chemicals	41
III. ANALYSIS AND PROJECTIONS OF DEMAND	44
1. Outline of previous projections	44
2. Method used in the present report	47
3. Projection results	49
IV. MEETING FUTURE DEMAND	53
1. Additional requirements	53
2. Volume and investments needed	62
3. Prospects for intra-regional trade	66
(a) Southern region	66
(b) Greater Colombia region	73
(c) The Central American common market	75
(d) Mexico	78
(e) Caribbean area	80
(f) Summary	80
4. Estimates of world supply	82
V. EFFECTS OF A FREE TRADE AREA OR COMMON MARKET	88
1. General considerations	88
2. Special aspects concerning pulp and paper	89

	<u>Page</u>
VI. OTHER REQUIREMENTS FOR ADDITIONAL CAPACITY	91
1. Manufacture of pulp and paper-making machinery in the region	91
(a) Argentina	91
(b) Brazil	92
(c) Chile	92
(d) Mexico	92
2. Educational, training and research aspects	93
(a) Education and training	93
(b) Research	95
Annex I.	97
Annex II.	100
Annex III.	106
Annex IV.	110
Annex V.	119

I. GENERAL OBSERVATIONS

1. Introduction

The United Nations and its specialized agencies have devoted considerable time to Latin American problems, and it became evident at an early stage that questions relating to the region's paper supply deserved special attention. The first review of production possibilities was a joint study by the Economic Commission for Latin America (ECLA) and the Food and Agriculture Organization (FAO), presented to the Commission at its fourth Session at Rio de Janeiro in 1953.^{1/}

FAO and ECLA continued their work on this subject and sent field missions to various countries to investigate existing possibilities. The results of these studies were placed before Latin American Governments, industrialists and experts during the Latin American Meeting of Experts on the Pulp and Paper Industry, held at Buenos Aires in 1954 under the auspices of ECLA, FAO and the United Nations Technical Assistance Administration.

This meeting devoted itself to examining the following problems:

- (a) Present and probable future demand for pulp and paper in Latin America; in the region as a whole and in individual countries.
- (b) The processes and costs of meeting current requirements.
- (c) The probability, taking into consideration all fibre resources available for pulp and paper, of satisfying future requirements from Latin American resources alone or in combination with necessary and available imports.
- (d) The suitability of known technical processes, their costs and their probable results when applied to Latin American woods and fibre crops with a view to producing the necessary kinds and qualities of paper to meet present Latin American needs.
- (e) The areas requiring co-ordinated technical research in forestry in order to realize a development programme.

^{1/} Possibilities for the development of the pulp and paper industry in Latin America, United Nations Publications, Sales No.: 1953.II.C.2.

- (f) The economic, political and social obstacles to the expansion of existing industry and the creation of new industry to meet present and future needs.
- (g) The criteria by which new projects should be evaluated.
- (h) Available sources of financing for developing pulp and paper industries.

The report of the meeting was published in 1955,^{2/} and contains an extensive amount of information on the pulp and paper industry in general and Latin American problems in particular.

The meeting approved a list of recommendations, and decided, inter alia, that it would be necessary to place a group of experts on the pulp and paper industry at the disposal of the Latin American countries. The United Nations (ECLA/FAO/TAO) Pulp and Paper Advisory Group for Latin America was therefore formed in 1955 with the following terms of reference:

- (a) Assistance to governments or semi-official bodies in the preparation of general plans for developing the pulp and paper industry;
- (b) Assistance to individuals or firms regarding the preliminary studies and surveys needed before pulp and paper projects are prepared; and
- (c) Assistance to governments or private enterprises in formulating and presenting projects which will contain the information needed by the technicians in charge of programming a given country's economic development, and the financing agencies, either public, private or international.

Since its inception the Group has been preparing various country

^{2/} Pulp and Paper Prospects in Latin America, United Nations Publications, Sales No. 1955.II.G.4.

studies by governmental request,^{3/} each of which includes an assessment of the factors of production, projections of future consumption and an evaluation of possible projects.

During the last few years the Latin American pulp and paper industry has made vigorous progress; in five years its production has doubled, and, in particular, the use of sugar cane bagasse and eucalyts for paper pulp has gained considerably in importance. At the same time, plans for economic integration schemes within the region have begun to take shape, and it is believed that this new economic co-operation between the different countries of the area will greatly facilitate economic development as well as substantially changing the traditional pattern of production and distribution.

In view of these circumstances, it has been thought necessary to make a fresh analysis of pulp and paper problems in Latin America as a whole, through a compilation of the information on new trends in production, consumption and trade.

-
- 3/ (a) Resumen de la Situación del Papel y la Celulosa en la Argentina: Posibilidades de Desarrollo y Aspectos Económicos (E/CN.12/485; FAO/ETAP No. 711), 1957.
- (b) Chile: potential pulp and paper exporter (E/CN.12/424; FAO/ETAP No. 560; TAA/CHI/3), 1957.
- (c) Estudio del Papel y de la Celulosa en el Ecuador (E/CN.12/534; FAO/ETAP/1118; TAO/ECU/10), 1959.
- (d) La Industria Mexicana de Papel y Celulosa: Situación Actual y Tendencias Futuras (E/CN.12/535; FAO/ETAP/1117; TAO/MEX/4), 1959.
- (e) La Industria Peruana del Papel y la Celulosa: Situación Actual y Tendencias Futuras (E/CN.12/537; FAO/ETAP/1116; TAO/PER/10), 1959.
- (f) La Industria del Papel y la Celulosa en Venezuela (E/CN.12/536; FAO/ETAP/1115; TAO/VEN/12), 1959.
- (g) La Industria Colombiana del Papel y la Celulosa: Situación Actual y Tendencias Futuras (E/CN.12/540; FAO/ETAP/1219; TAO/COL/9), 1960.
- (h) Report to the Surinam Government on the prospects of the pulp and paper industry in Surinam (E/CN.12/539; FAO/ETAP/1220; TAO/SUR/1), 1960.
- (i) La Industria del Papel y la Celulosa en America Latina (E/CN.12/543; FAO/ETAP/1221; TAO/LAT/9), 1960.
- (j) La Industria del Papel y la Celulosa en Cuba: Situación Actual y Sugerencias para su desarrollo (in preparation).
- (k) The Group has also taken an active part in the preparation of the Relatorio do Grupo de Trabalho de Celulose e Papel, Conselho do Desenvolvimento, Rio de Janeiro, 1957.

/The present

The present study deals with the latest developments of the pulp and paper industry, thus complementing the highly detailed information published in the report of the meeting. An attempt is also made to project future demand for paper and board in the countries of the region, as well as to analyse the possibilities of supplying that demand, with regard to economic integration projects.

In the preparation of this study the Group has made use of all the afore-mentioned publications, bringing the information up to date by direct consultations with the authorities in the respective countries. The recent United Nations series on population and income growth have been adopted as a basis for the projections and ample use has also been made of a recent FAO publication.

The present study does not pretend to be an exact and scientific forecast of coming events since the statistics available and method used are not accurate enough for that purpose, nor is it a prophecy based on intuition. It is an estimate of the possible development of the pulp and paper industry in a large region, an estimate based on the information that is extant on existing facilities and on the changes expected to take place in the near future.

In the course of time many unforeseen events are likely to occur which will considerably alter the predicted picture. It will therefore be necessary to follow up the trend of developments continuously and to analyse the new situations in order to provide the authorities and industry with useful information for the preparation of their future plans.

2. Summary and conclusions

Paper and board consumption in Latin America expanded from 1,225,000 tons in 1947 to 2,423,000 tons in 1959, i.e. it doubled in 12 years. Per capita consumption increased from 8.5 kg to 12.7 kg during the same period. In general, these movements also corresponded to the changes in world consumption. In those same years total production of papers and board

/in the

in the region trebled from 545,000 tons to 1,621,000 tons. Although the growth of domestic production has been appreciable, especially during the last few years, and there has even been a slight decrease in the volume and value of imports, the quality of the production is generally below international standards.

The changes in paper pulp production have been even more marked; the output of 154,000 tons in 1947 more than quadrupled by 1959, making a total of 664,000 tons.

The region has become much more self-sufficient; in 1959 approximately 55 per cent of the chemical pulp, 26 per cent of the newsprint and 82 per cent of the other paper and board consumed were locally produced. The domestic fibrous raw materials used for pulp production in that year were approximately 2.05 million cubic metres solid volume of wood, 0.5 million tons of fresh bagasse, 0.1 million tons of straw and small amounts of other agriculture plants and residues and approximately 0.66 million tons of waste paper.

It is estimated that in 1965 regional consumption will be approximately 3.7 million tons of paper and board and, in 1975, approximately 7 million tons.

Existing industry, and the expansion projects under way, which will be completed by 1961-62, will constitute a capacity of 2.27 million tons of paper and board and approximately 1.36 million tons of pulp of various kinds. Production may therefore be expected to grow at the same pace as in the last few years.

In view of the realistic expansion plans in existence and the general trends of the industry, it is estimated that by 1965 it would be possible to reach the following production targets: 0.64 million tons of mechanical pulp, 0.62 million tons of chemical coniferous pulp, 0.82 million tons of other pulps, 0.63 million tons of newsprint, 0.56 million tons of printing and writing paper, and 1.85 million tons of other papers and board -- in all, 2.1 million tons of pulp and 3.0 million tons of papers and boards. The following quantities of domestic fibrous raw materials would be needed for those levels of production: approximately 6.4 million cubic metres solid volume of wood with bark, of which about 5.2 million cubic metres would consist of softwood, 1.8 million
/tons of

tons of fresh bagasse, 0.4 million tons of straw and other agricultural residues and plants and approximately 1 million tons of waste paper. In addition, imports on the present scale would continue to be required.

This expansion programme, which is over and above estimated capacity for 1961-62 is in keeping with recent increases and would require a total investment of approximately 450 million dollars to enable the region to keep its imports slightly below the 1959 level. Additional investment will also be necessary to improve the quality of present production, which is often rather low.

An analysis of the region's imports shows that the largest volume of pulp brought in was in 1955 and of papers and board in 1957. As regards the total value of pulp and paper imports, the peak level of approximately 280 million dollars was reached in 1957; by 1959 it had dropped to approximately 260 million dollars.

It may also be seen that the bulk of the imports to the southern countries of the region used to come from Europe (mainly Scandinavia) and to the northern countries from North America.

Chile is already exporting to different parts of Latin America and some other countries have possibilities of developing an export industry. It has been assumed that the economic integration projects now under way in Latin America would greatly facilitate intra-regional trade in pulp and paper. From a more thorough analysis, however, it appears that the influence of these projects is likely to be rather limited; the principal pulp and paper products to be traded will be newsprint and kraft pulp, for which customs duties on the principal markets are either non-existent or very low. In the case of kraft paper and kraft liner, both of which are very suitable for large-scale production and are heavily protected, the formation of the Free-Trade Area may provide the necessary stimulus for export production.

The increase in consumption from 1965 to 1975 is estimated at 0.76 million tons of newsprint, 0.62 million tons of printing and writing paper, and 1.95 million tons of other papers and board. Estimates of the export

/prospects for

prospects for the traditional worlds suppliers of these products - North America and Europe - indicate that overseas exports are unlikely to expand. It therefore seems clear that the Latin American region will have to be able to produce at least a major proportion of the above-mentioned quantities in order to guarantee their availability for further economic and cultural development.

The necessary investment for the expansion programme outlined above (including pulp production) is estimated at 2,000 million dollars, which corresponds to an annual investment rate of 200 million dollars in 1965-75. If this programme is carried out, inputs of domestic fibrous raw materials in 1975 would be about 14 to 15 million cubic metres solid volume of wood with bark, of which about 9 million cubic metres would be softwood, 4 million tons of fresh bagasse 1 million tons of other vegetable raw materials, and possible almost 2 million tons of waste paper.

The whole programme suggested for the period 1965-75 would make it possible to keep imports from outside the region roughly at their present level, despite the rapid growth of consumption, by increasing production approximately 8 per cent annually.

The mainstay of this development programme will be Latin America's vast forest resources. Though it is true that the most accessible forests, especially the coniferous stands, are heavily over-cut in many places, the general economic development will undoubtedly open up new areas for exploitation. In addition, the forest plantations especially in the southern countries, will be able to supply a good deal of the wood required. A rough estimate indicates that, by the end of the present decade, these plantations alone will be able to supply approximately 7 million cubic metres of wood for pulping, roughly half of which will be coniferous. Apparently, however, there is a danger that the supply of coniferous trees for pulping purposes will be too limited by 1975, even if the amount of long-fibre pulp used in paper and board manufacturing is kept down to the minimum. It is also evident that the use of bagasse for paper-making purposes will increase, especially in countries that produce their own coal or fuel oil and/or where other easily obtainable fibre resources are scarce.

/The machinery

The machinery required for the new capacity will probably have to be imported for the most part, though Brazil will be able to manufacture a good deal itself.

In industrial programming, the human factor has to be taken into account. Without technically trained personnel even the biggest financial expenditure in production facilities would be useless. In general, Latin America lacks facilities for technical education, and specialized technical training, particularly for the pulp and paper industry, is almost unobtainable there.

As the development of educational activities is a slow process, it is even more urgent that measures should be taken as soon as possible to improve the situation.

The findings of this study lead to the following conclusions:

- (a) Importance should be attached to the continuous planting of suitable fast-growing species; the planting of coniferous trees in particular should be strongly encouraged.
- (b) Overall economic programmes should take into account the fact that the requisite development of the region's pulp and paper industry will call for an annual investment of 200 million dollars. This must be brought to the attention of Governments and international financing organizations.
- (c) The needs of the pulp and paper industry with respect to more advanced technical training should be considered. Mexico and Brazil, and Argentina, Chile and Uruguay combined, require one professorship each, preferably attached to an existing technical faculty.
The possibility of creating the industry's own training programme should be studied.
- (d) Attention should be drawn to the importance of regional industrial co-operation for facilitating the exchange of information, following up the development of regional projects and their possible effects on the pulp and paper industry, assisting in the promotion of local research work and, above all, helping in the preparation of educational and training programmes and subsequently in their implementation.
- (e) Possibilities for producing pulp and paper machinery in the region should be studied.

II. PRESENT SITUATION

1. Pulp and paper consumption

The rapid upward trend of paper and board consumption throughout the world, especially after the Second World War, is also clearly discernible in Latin America. Among the countries of the region, Argentina is, however, a notable exception.

Table 1 shows the figures for the world production (and apparent consumption) during selected years, the Latin American statistics being given in tables 2 and 3.

It may be deduced from these tables that both world production (consumption) and Latin American consumption of all kinds of paper and board increased by slightly over 80 per cent between 1947 and 1957. There is, however, one obvious difference, namely that world production (consumption) of newsprint increased by 78 per cent, while Latin American consumption expanded by 64 per cent, the corresponding figures for other papers and board being 83 and 90 per cent.

The development of per capita consumption followed the same lines as that of overall consumption, the growth of population during the period under consideration having been approximately 27 per cent in Latin America as well as in the world. World per capita consumption of all papers and board was 15.5 kg in 1947 and 22 kg in 1957, while the Latin American figures were 8.5 and 12 kg respectively, the increment in both cases being approximately 41 per cent.

Latin American per capita consumption is well below the world average; in fact, only three countries within the area - Cuba, Uruguay and Argentina - have a consumption level corresponding to that average.

In this connexion it may be worth while to mention that joint per capita consumption in Western Europe and North America was approximately 70 kg in 1947 and approximately 110 kg in 1957. Hence, per capita consumption in these industrialized areas has increased about 57 per cent, and the gap between consumption in these areas and in Latin America has widened.

During the last decade there was a substantial improvement in the rate of self-sufficiency. This was partly due to the import restrictions

Table 1
WORLD PRODUCTION
(Millions of tons)

Year	Mechanical woodpulp	Chemical woodpulp	Newsprint	Other paper and board
1927 a/	6.2	7.9	5.8	8.8
1936 a/	8.8	12.8	7.5	11.7
1947 b/	8.8	16.9	7.0	26.8
1957 b/	16.8	36.0	12.4	48.9
1959 b/	18.0	37.0	13.1	55.2

a/ Welt-Papierstatistik, 1937.

b/ FAO, Yearbook of Forest Products Statistics.

Table 2

LATIN AMERICA: PRODUCTION, IMPORTS AND APPARENT CONSUMPTION OF PULP, PAPER AND BOARD

(Thousands of tons)

	Mechanical pulp	Chemical wood- pulp	Other chemical pulp	Total pulp	News- print	Other paper and board	Total paper and board	Per capita consumption (kilograms)
<u>1947</u>								
Production	70	45	39	154	25	520	545	
Imports	-	235	-	235	355	325	680	
Apparent consumption	70	280	39	389	380	845	1 225	8.5
<u>1950</u>								
Production	150	97	57	304	55	670	725	
Imports	15	280	-	295	335	310	645	
Apparent consumption	165	377	57	599	390	980	1 370	
<u>1954</u>								
Production	160	140	74	374	65	825	890	
Imports	30	460	-	490	350	285	635	
Apparent consumption	190	600	74	864	415	1 110	1 525	
<u>1957</u>								
Production	159	228	107	494	81	1 252	1 333	
Imports	28	380	-	408	541	354	895	
Apparent consumption	187	608	107	902	622	1 606	2 228	12.0
<u>1959</u>								
Production	215	304	145	664	143	1 478	1 621	
Imports	27	371	-	397	439	331	770	
Apparent consumption	242	675	145	1 061	582	1 809	2 391	

/Table 3

Table 3
LATIN AMERICA: TOTAL AND PER CAPITA CONSUMPTION OF PAPER AND BOARD
(Average 1955-57)

Country	Total consumption of paper and board (tons)			Popu- lation (in thou- sands)	Per capita consumption of paper and board (kilogrammes)			
	News- print	Printing and writing	Other paper and board		News- print	Printing and writing	Other paper and board	Total
Argentina	119 872	88 249	223 501	19 512	6.14	4.52	11.46	22.12
Bolivia	1 417	1 523	1 568	3 240	0.44	0.47	0.48	1.39
Brazil	189 420	131 731	313 021	59 905	3.16	2.20	5.23	10.59
Chile	24 787	17 089	38 640	6 909	3.59	2.47	5.59	11.65
Colombia	24 688	25 348	55 934	12 961	1.90	1.96	4.32	8.18
Costa Rica	2 909	1 169	4 215	983	2.96	1.19	4.29	8.44
Cuba	34 690	19 099	92 278	6 242	5.56	3.06	14.78	23.40
Dominican Republic	1 359	967	7 053	2 593	0.53	0.37	2.72	3.62
Ecuador	6 420	1 463	5 758	3 796	1.69	0.38	1.52	3.59
El Salvador	3 736	562	5 184	2 264	1.65	0.25	2.29	4.19
Guatemala	2 760	2 756	3 493	3 358	0.82	0.82	1.04	2.68
Haiti	365	350	1 772	3 351	0.11	0.10	0.53	0.74
Honduras	871	593	1 842	1 711	0.51	0.35	1.07	1.93
Mexico	67 483	64 710	224 934	30 526	2.21	2.12	7.37	11.70
Nicaragua	1 206	278	2 231	1 286	0.94	0.22	1.73	2.89
Panama	2 084	914	7 692	934	2.23	0.98	8.24	11.45
Paraguay	657	322	1 013	1 601	0.41	0.20	0.63	1.24
Peru	17 208	7 923	34 303	9 599	1.79	0.83	3.57	6.19
Uruguay	26 336	11 303	23 677	2 657	9.91	4.26	8.91	23.08
Venezuela	19 403	18 781	63 043	5 953	3.26	3.15	10.59	17.00
Total	547 671	395 130	1 111 152	179 361	3.05	2.20	6.20	11.45

/applied by

applied by many countries, which probably made it impossible to satisfy all consumption needs. The major role in this improvement has naturally been played by the growth of local industry, which is summarized in table 4.

2. Imports

The volume of imports has expanded in spite of the slight decline registered in recent years (see again table 2). Thus, between 1947 and 1959 imports of chemical pulp increased by almost 60 per cent, those of newsprint by more than 20 per cent, while those of other papers and board generally maintained their 1947 level. The total outflow of foreign exchange rose steadily until 1957, when it reached 280 million dollars. By 1959 imports had decreased to approximately 260 million dollars. In 1957-59, imports of these commodities corresponded in roundwood equivalents to about 5 to 4.5 million cubic metres. It may be of interest to mention in this connexion that total removals of industrial wood in Latin America were approximately 26.4 million cubic metres in 1957, according to the FAO Yearbook of Forest Products Statistics.

Intra-regional trade in pulp and paper started in 1958 with the Chilean newsprint exports. The main suppliers of pulp and paper to Latin America, have, however, been Scandinavia and North America.

Chart 1 and table 5 show the inflow of pulp to the region from various sources. Europe supplied approximately 76 per cent of the total pulp imports effected by the Latin American countries in 1955-57 (approximately 424,000 tons), which may be considered as fairly normal years. Imports from Europe are almost exclusively of Scandinavian origin, except in the case of Argentina, which bought considerable quantities from the USSR and Yugoslavia during that period.

There is a remarkable difference in the origin of the pulp imported by the southern and by the northern countries of Latin America; the Scandinavian countries supply approximately 85 per cent of the imports effected by the southern countries, whereas North America provides over 70 per cent of the northern countries' imports. The domination of the markets by two such different sources is due to tradition, trade agreements and, in the northern zone, to the proximity of and traditionally close commercial ties with North America.

Table 4

LATIN AMERICA: RATE OF SELF-SUFFICIENCY. PRODUCTION AS PERCENTAGE
OF APPARENT CONSUMPTION

	1947	1957	1959
Chemical pulp	26	47	55
Newsprint	7	13	26
Other paper and board	61	77	82

/Chart 1

PULP IMPORTS BY LATIN AMERICAN COUNTRIES IN 1955/1957
FROM EUROPE AND NORTH AMERICA

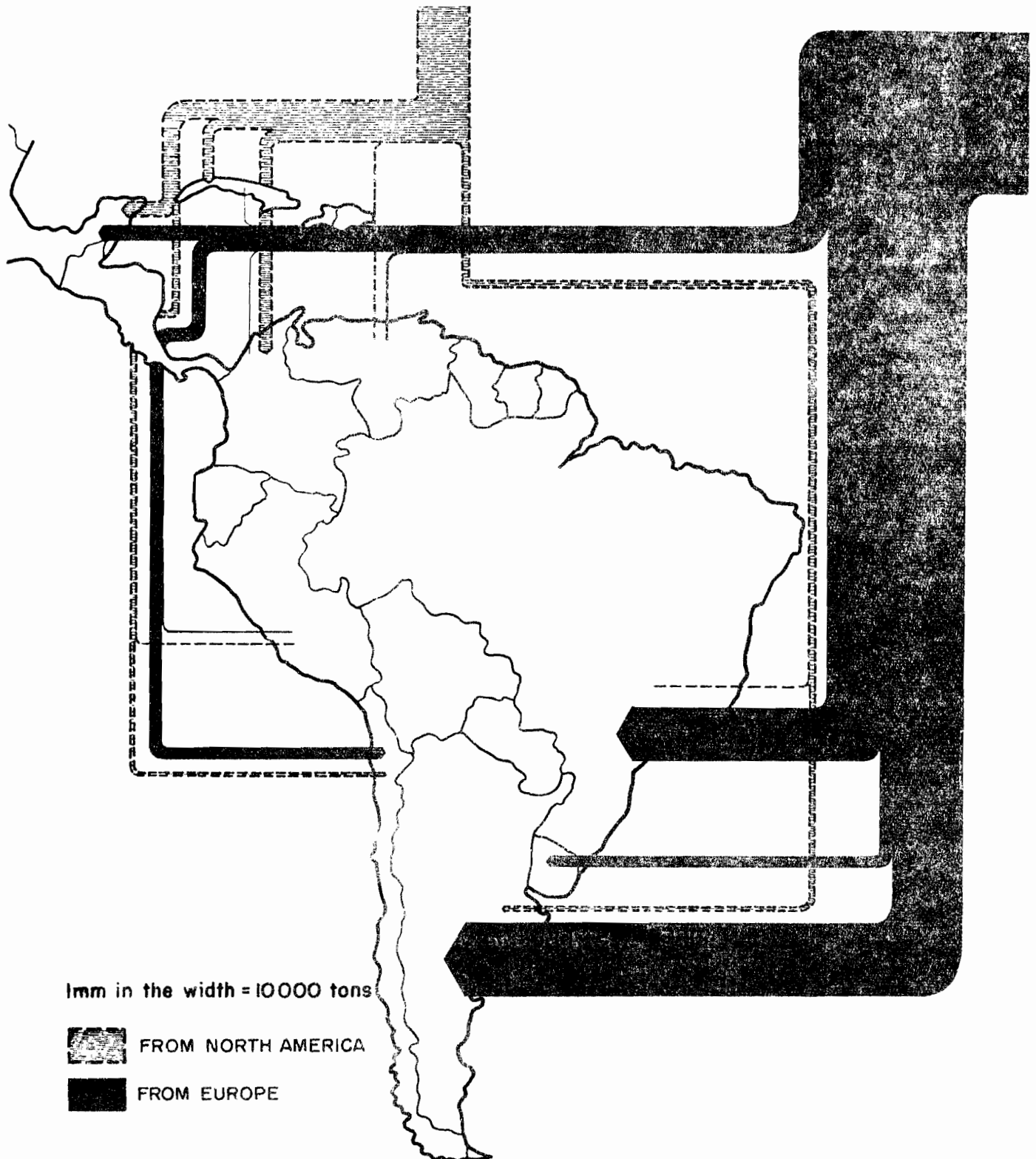


Table 5

LATIN AMERICA: IMPORTS OF PULP, BY COUNTRY OF ORIGIN, 1955-57

(Annual averages in thousands of tons)

Importer country	Canada	Finland	Norway	Sweden	United States	Others	Total
Argentina	2.3	50.6	10.5	79.9	8.0	19.0	160.3
Brazil	0.6	72.6	8.6	22.3	1.9	0.5	106.5
Chile	2.1	2.1	-	18.8	5.2	-	28.2
Colombia	9.4	0.7	-	0.2	13.8	-	24.1
Cuba	1.1	0.8	...	0.6	19.8	-	22.3
Mexico	5.1	3.6	...	18.3	21.3	...	48.6
Peru	3.1	0.5	-	2.1	0.9	0.1	6.7
Venezuela	0.9	0.6	-	3.9	2.9	0.2	8.5
Uruguay	1.0	3.9	...	11.1	1.2	0.1	<u>18.6</u>
Total 9 countries							423.8

/An analysis

An analysis by countries also indicates that, pulp imports from Sweden and the United States are generally of somewhat higher quality than those from the other major exporters (except rayon pulp).

Imports of newsprint in 1955-57, before Chile began to export, are shown in chart 2 and table 6. Of the total of 474,000 tons, 46 per cent came from Europe and 54 per cent from North America. The former were mainly of Scandinavian origin, though Argentina and Brazil bought a certain amount from Austria and Germany.

The seven southern countries received approximately 65 per cent of their newsprint imports from Europe; in the northern group, the North American contribution was again approximately 90 per cent. It should also be noted that, though the United States imported about 78 per cent of its newsprint during 1955-57, it also exported an average of 160,000 tons per year, of which slightly over 60 per cent was destined for Latin America.

With respect to printing and writing paper, the predominant position of Scandinavia and North America, though marked, is not as unchallengeable as in the case of pulp and newsprint. According to chart 3 and table 7, the other European countries exported approximately 28,000 tons to Latin America, which corresponded to 21 per cent of the region's total imports of these grades, the contribution of the Scandinavian countries having been approximately 41 per cent and that of North America approximately 37 per cent.

It is very difficult to summarize imports on the basis of value, as they are registered in national currencies, and conversion into dollars is hampered by the inflation in many countries. However, national statistics show that imports from the Federal Republic of Germany, the United Kingdom and the United States, for instance, have higher than average unit values, which indicates that they include better grades than the shipments from other countries.

Out of the approximate total of 55,000 tons of printing and writing paper imported in 1955-57 by the seven southern countries, all but 2,000 tons came from Europe. The imports were divided as follows: 58 per cent from Scandinavia, 38 per cent from other European countries and 4 per cent from North America. In the northern group (including all but the seven

CHART 2

E/CN.12/570

NEWSPRINT IMPORTS BY LATIN AMERICAN COUNTRIES IN 1955/1957
FROM EUROPE AND NORTH AMERICA

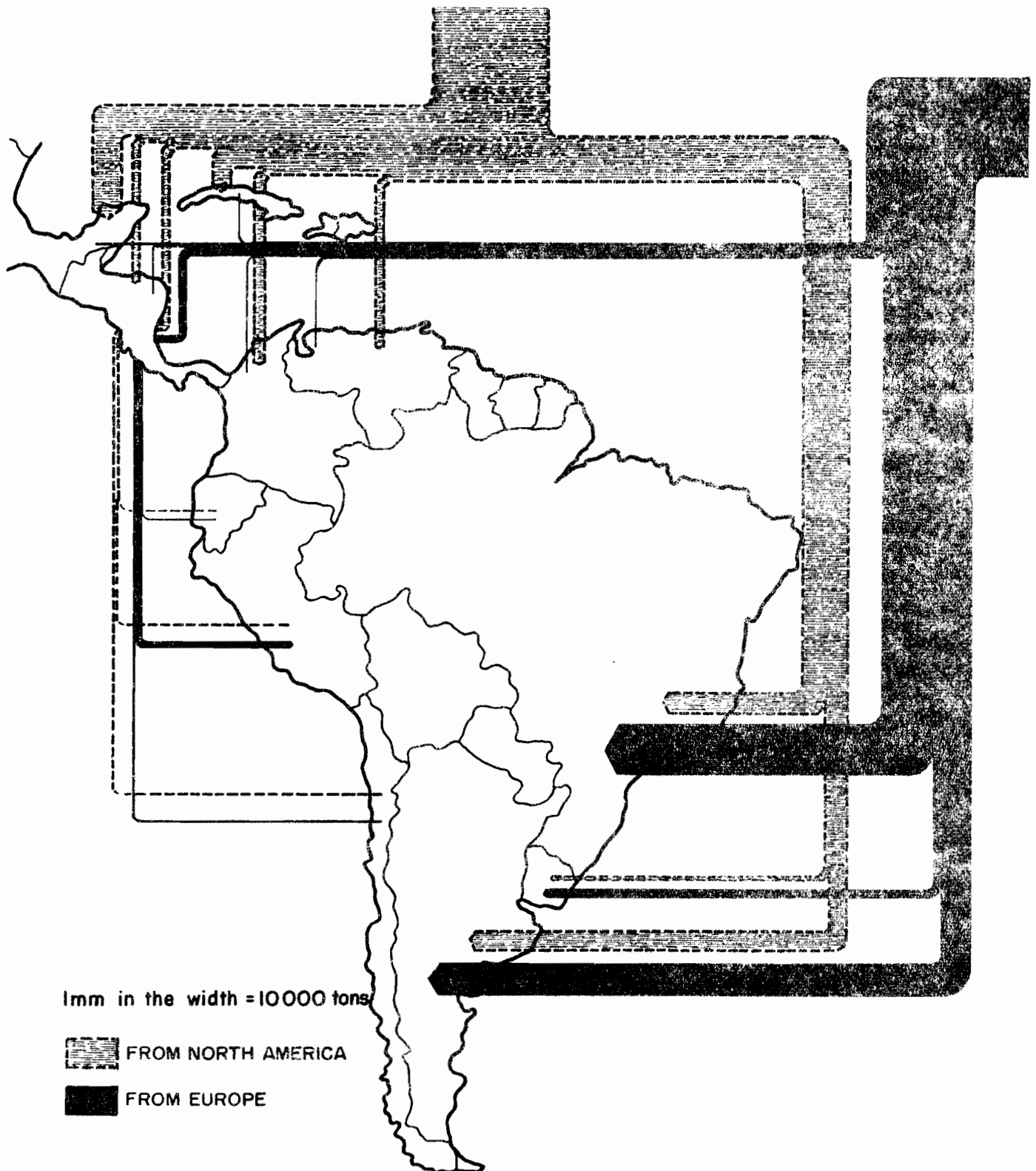


CHART 3

E/CN.12/570

IMPORTS OF PRINTING AND WRITING PAPERS BY LATIN AMERICAN COUNTRIES
IN 1955/1957 FROM EUROPE AND NORTH AMERICA

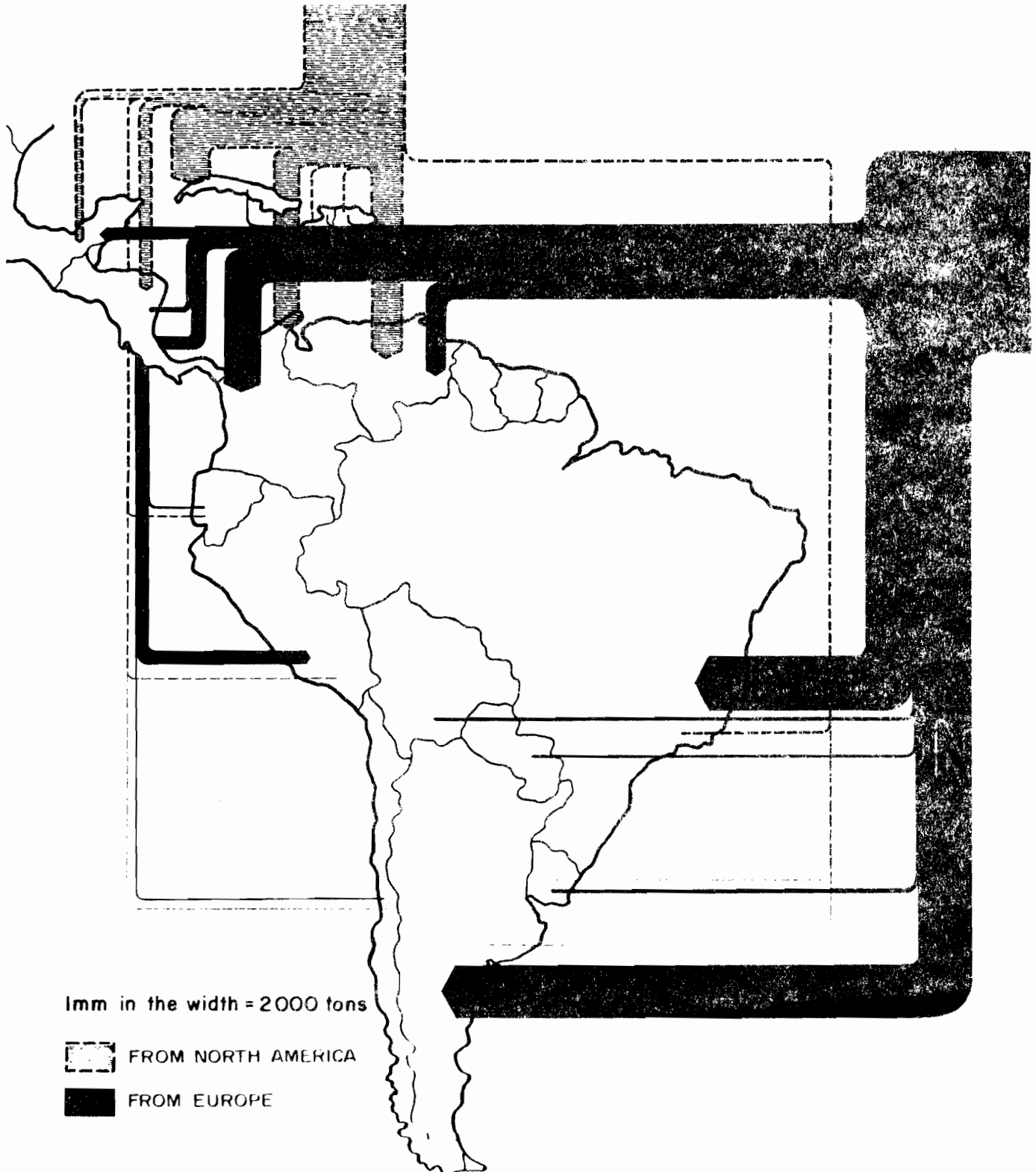


Table 6

LATIN AMERICA: IMPORTS OF NEWSPRINT BY COUNTRY OF ORIGIN, 1955-57

(Annual averages in thousands of tons)

Importer country	Canada	Finland	Norway	Sweden	United States	Others	Total
Argentina	16.8	28.3	8.3	10.3	23.8	15.5	103.0
Bolivia							1.4
Brazil	23.0	39.2	17.6	41.1	20.8	5.0	146.7
Chile	4.0	1.6	2.9	0.1	1.9		10.5
Colombia	13.7	0.9	0.3	1.2	6.5	2.1	24.7
Costa Rica							2.9
Cuba	20.5	0.4	0.2	0.3	11.6	1.7	34.7
Dominican Republic							1.4
Ecuador	1.1	0.1	0.4	2.1	2.4	0.3	6.4
El Salvador							3.7
Guatemala							2.8
Haiti							0.4
Honduras							0.9
Mexico	70.0	3.7	...	...	24.5	1.6	67.5
Nicaragua							1.2
Panama							2.1
Paraguay							0.7
Peru	2.8	7.9	0.7	0.3	5.1	0.4	17.2
Uruguay	6.5	5.0	...	12.8	1.7	0.3	26.3
Venezuela	12.1	0.9	...	0.2	6.0	0.2	19.4
Total							473.8

Table 7

LATIN AMERICA: IMPORTS OF PRINTING AND WRITING PAPER, BY COUNTRY OF ORIGIN, 1955-57 ^{a/}

(Annual averages in thousands of tons)

Importer country	Canada	Finland	Norway	Sweden	United States	Others	Total
Argentina	-	4.3	1.9	3.0	0.2	13.4	22.8
Bolivia							1.5
Brazil	0.4	4.9	2.5	9.9	0.7	4.9	23.3
Chile							0.5
Colombia	1.4	4.0	2.0	7.0	8.9	2.0	25.3
Costa Rica							1.2
Cuba	1.5	0.1	...	...	14.7	0.4	16.7
Dominican Republic							1.0
Ecuador							1.5
El Salvador							0.6
Guatemala							2.8
Haiti							0.3
Honduras							0.6
Mexico	0.6	1.2	...	0.1	3.9	1.1	7.0
Nicaragua							0.3
Panama							0.9
Paraguay							0.3
Peru	...	0.8	1.2	2.0	0.2	0.6	4.8
Uruguay	...	0.2	0.2	0.3	0.1	0.8	1.6
Venezuela	1.8	2.5	1.8	2.1	9.6	1.0	18.8
Total							131.8

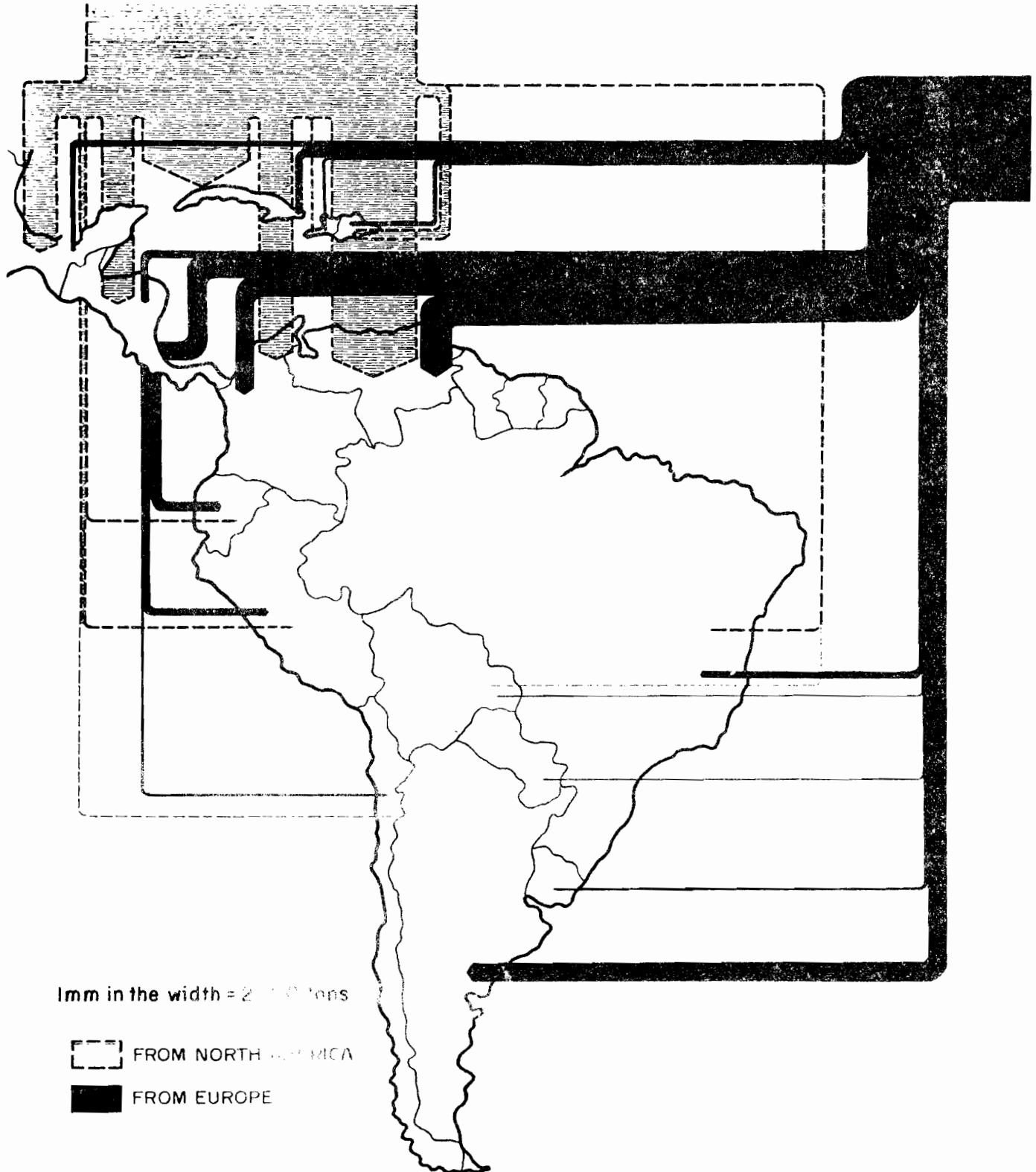
^{a/} Excluding imports of books, newspapers, periodicals and printed matter in general.

/southernmost countries

CHART 4

E/CN.12/570

IMPORTS OF "OTHER PAPERS" AND BOARD BY LATIN AMERICAN COUNTRIES
IN 1955/1957 FROM EUROPE AND NORTH AMERICA



southernmost countries). the picture is very different; of the approximate total of 77,000 tons imported, about 49,000 tons, or 64 per cent, were of North American origin.

Chart 4 and table 8 show the import distribution of other papers and board. Purchases by the southern area were very low, consisting for the most part of specialty papers, as there is a fairly well-developed local industry.

Of the Latin American imports of these grades, totalling about 194,000 tons, over 70 per cent was of North American origin in 1955-57. In the small imports of the southern area, the share of North America was about 17 per cent and in the imports of the northern area, almost 80 per cent. Of the European countries, other than Scandinavia, that supplied these grades, the Federal Republic of Germany and the United Kingdom are worthy of mention.

The pattern of Latin American imports will undoubtedly change; indeed, it has already done so to some extent. The most important factors are the growth of the domestic pulp industry in a number of countries which, in 1955-57 were heavy importers of this raw material (e.g., Brazil, Chile, Colombia and Cuba) - Chile, for instance, changing from a net importer to a net exporter -, the increasingly rapid rate at which self-sufficiency in other papers and board is being attained (particularly in Colombia, Cuba and Venezuela), and the recent initiation of newsprint exports from Chile. It is felt, however, that the salient features of the import pattern - the fact that Europe is the main source of imports to the southern area of Latin America while North America supplies the northern area - will remain the same for a long time to come.

3. The pulp industry

The pulp industry is concentrated in three countries in particular: Brazil, Mexico and Argentina. In 1955-57 these three together produced approximately 86 per cent of the mechanical pulp, 100 per cent of the chemical woodpulp and 75 per cent of other chemical pulps - in fact, 90 per cent of the pulp output (see table 9).

The industry differs fundamentally, however, in each of these countries. Brazil has a vast amount of small mechanical pulp mills (around 300), of which

Table 8

LATIN AMERICA: IMPORTS OF OTHER PAPER AND BOARD, BY COUNTRY
OF ORIGIN, 1955-57

(Annual averages in thousands of tons)

Importer country	Canada	Finland	Norway	Sweden	United States	Others	Total
Argentina	-	2.5	0.6	2.2	...	2.6	7.9
Bolivia							0.8
Brazil	-	0.9	...	0.1	1.3	1.6	3.9
Central America							16.1
Chile							1.4
Colombia	0.2	0.8	0.8	3.6	13.2	2.5	21.1
Cuba	0.7	0.4	0.6	0.5	44.5	1.5	48.2
Dominican Republic							7.0
Ecuador							5.2
Haiti							1.7
Mexico	0.1	...	...	0.1	16.8	2.0	19.1
Panama							7.7
Paraguay							0.6
Peru	...	0.4	0.7	0.8	1.5	1.0	4.5
Uruguay	...	0.1	...	0.4	...	0.8	1.3
Venezuela	0.6	2.2	1.3	6.3	34.6	2.7	47.7
Total							194.2

/Table 9

LATIN AMERICA: PRODUCTION, IMPORTS AND APPARENT CONSUMPTION OF PULP FOR PAPER,

1955, 1956, 1957, 1955-57, 1958 AND 1959

(Tons)

		Mechanical pulp	Chemical wood- pulp	Other chemical pulp	Total	Mechanical pulp	Chemical wood- pulp	Other chemical pulp	Total
		1955				1956			
Argentina	A	17 066	5 000	33 834	55 900	14 711	12 000	34 455	61 166
	B	34 805	167 548	-	202 353	32 919	97 713	-	130 632
	C	51 871	172 548	33 834	258 253	47 630	109 713	34 455	191 798
Brazil	A	89 038	84 569	13 902	187 509	92 392	94 930	21 482	208 804
	B	-	102 593	-	102 593	-	99 263	-	99 263
	C	89 038	187 162	13 902	290 102	92 392	194 193	21 482	308 067
Chile	A	17 845	-	2 206	20 051	17 432	-	2 576	20 008
	B	-	38 689	-	38 689	-	23 085	-	23 085
	C	17 845	38 689	2 206	58 740	17 432	23 085	2 576	43 093
Colombia	A	-	-	1 333	1 333	-	-	1 722	1 722
	B	-	23 800	-	23 800	-	20 622	-	20 622
	C	-	23 800	1 333	25 133	-	20 622	1 722	22 344
Cuba	B y C	-	15 444	-	15 444	-	27 460	-	27 460
Mexico	A	27 000	55 400	11 500	93 900	28 000	90 300	17 000	135 300
	B	300	58 900	-	59 200	500	58 000	-	58 500
	C	27 300	114 300	11 500	153 100	28 500	148 300	17 000	193 800
Peru	A	-	-	13 000	13 000	-	-	17 825	17 825
	B	-	8 556	-	8 556	303	4 636	-	4 939
	C	-	8 556	13 000	21 556	303	4 636	17 825	22 764
Uruguay	A	2 000	-	3 300	5 300	2 000	-	4 000	6 000
	B	423	14 947	-	15 370	158	16 657	-	16 815
	C	2 423	14 947	3 300	20 670	2 158	16 657	4 000	22 815
Venezuela	B y C	-	6 146	-	6 146	-	10 263	-	10 263
Total	A	152 949	144 969	79 075	376 993	154 535	197 230	99 060	450 825
	B	35 528	436 623	-	472 151	33 880	357 699	-	391 579
	C	188 477	581 592	79 075	849 144	188 415	554 929	99 060	842 404
		1957				1955-57			
Argentina	A	13 770	20 000	32 208	65 978	15 182	12 333	33 500	61 015
	B	25 500	122 314	-	147 814	31 075	129 192	-	160 267
	C	39 270	142 314	32 208	213 792	46 257	141 525	33 500	221 282
Brazil	A	90 660	106 050	24 050	220 760	90 697	95 183	19 811	205 691
	B	-	117 591	-	117 591	-	106 482	-	106 482
	C	90 660	223 641	24 050	338 351	90 697	201 665	19 811	312 173
Chile	A	20 815	-	2 918	23 733	18 697	-	2 567	21 264
	B	-	22 783	-	22 783	-	28 186	-	28 186
	C	20 815	22 783	2 918	46 516	18 697	28 186	2 567	49 450
Colombia	A	-	-	2 543	2 543	-	-	1 866	1 866
	B	-	27 970	-	27 970	-	24 130	-	24 130
	C	-	27 970	2 543	30 513	-	24 130	1 866	25 996
Cuba	B y C	-	24 111	-	24 111	-	22 338	-	22 338
Mexico	A	31 300	102 000	24 300	157 600	28 767	82 566	17 600	128 933
	B	1 000	27 100	-	28 100	600	48 000	-	48 600
	C	32 300	129 100	24 300	185 700	29 367	130 566	17 600	177 533
Peru	A	-	-	16 627	16 627	-	-	15 817	15 817
	B	-	6 577	-	6 577	101	6 590	-	6 691
	C	-	6 577	16 627	23 204	101	6 590	15 817	22 508
Uruguay	A	2 000	-	4 500	6 500	2 000	-	3 933	5 933
	B	1 029	22 666	-	23 695	537	18 090	-	18 627
	C	3 029	22 666	4 500	30 195	2 537	18 090	3 933	24 560
Venezuela	B y C	-	8 944	-	8 944	-	8 451	-	8 451
Total	A	158 545	228 050	107 146	493 741	155 343	190 082	95 094	440 519
	B	27 529	380 056	-	407 585	32 313	391 459	-	423 772
	C	186 074	608 106	107 146	901 326	187 656	581 541	95 094	864 291

Table 9 (continued)

Table 9 (continued)

		Mechan- ical pulp	Chemical wood pulp	Other chemical pulp	Total	Mechan- ical pulp	Chemical wood pulp	Other chemical pulp	Total
		1958				1959			
Argentina	A	18 511	24 000	32 573	75 084	16 699	33 000	36 595	86 294
	B	25 000	82 003	-	107 003	25 000	87 685	-	112 685
	C	43 511	106 003	32 573	182 087	41 699	120 685	36 595	198 979
Brazil	A	100 000	115 662	25 000	240 662	100 000	145 535	30 000	275 535
	B	-	103 834	-	103 834	-	107 395	-	107 395
	C	100 000	219 496	25 000	344 496	100 000	252 930	30 000	382 930
Chile	A	44 250	-	2 811	47 061	49 322	8 900	2 000	60 222
	B	-	29 233	-	29 233	-	40 799	-	40 799
	C	44 250	29 233	2 811	76 294	49 322	49 699	2 000	101 021
Colombia	A	-	-	2 640	2 640	-	-	2 800	2 800
	B	-	25 810	-	25 810	-	32 683	-	32 683
	C	-	25 810	2 640	28 450	-	32 683	2 800	35 483
Cuba	A	-	-	-	-	-	-	10 000	10 000
	B	-	-	-	-	-	25 000	-	25 000
	C	-	30 193	-	30 193	-	25 000	10 000	35 000
Mexico	A	31 000	111 000	33 800	175 800	47 000	114 000	37 500	198 500
	B	1 767	23 610	-	25 377	1 179	19 000	-	20 179
	C	32 767	134 610	33 800	201 177	48 179	133 000	37 500	218 679
Peru	A	-	-	20 684	20 684	-	-	25 782	25 782
	B	600	7 956	-	8 556	500	7 000	-	7 500
	C	600	7 956	20 684	29 240	500	7 000	25 782	33 282
Uruguay	A	1 900	-	3 000	4 900	1 800	-	3 000	4 800
	B	-	10 376	-	10 376	-	19 485	-	19 485
	C	1 900	10 376	3 000	15 276	1 800	19 485	3 000	24 285
Venezuela	B y C	-	14 544	-	14 544	-	31 704	-	31 704
Total	A	195 661	250 662	120 508	566 831	214 821	301 435	147 677	663 933
	B	27 367	327 559	-	354 926	26 679	370 751	-	397 430
	C	223 028	578 221	120 508	921 757	241 500	672 186	147 677	1 061 363

A = Production.

B = Imports.

C = Apparent consumption.

a/ The quantities imported were probably very small; they are included under "Chemical woodpulp".

/the great

the great majority have been closed down for lack of raw material; the total estimated capacity of these mills is over 300,000 tons per year but average production in 1955-57 was only about 90,000 tons. Of the chemical pulp produced in Brazil, approximately 50 per cent of the 115,000 tons obtained in 1955-57 came from coniferous trees (Paraná pine), 33 per cent from deciduous trees (eucalypts) and the remainder from a wide variety of plants (grasses, bagasse, bamboo, linters, etc.). The average annual production of chemical pulp was 4,000 tons per unit. It should also be pointed out that of all the pulp produced approximately 72 per cent came from conifers.

In Mexico, coniferous trees are also the main source of fibrous raw material. Of the total volume of pulp produced, 87 per cent came from that source, chemical coniferous pulp also playing an important role with 64 per cent. The other sources are chiefly wheat straw and bagasse. Chemical pulp production per unit was approximately 10,000 tons annually.

In Argentina, mechanical pulp is produced from poplars, and chemical pulp mainly from agricultural residues (straw, bagasse) and deciduous trees (poplar, eucalypts). Chemical coniferous pulp constituted only 9 per cent of the total chemical pulp production (46,000 tons) in 1955-57. Chemical pulp production per unit was approximately 3,500 tons yearly.

Of the other six countries with pulp-producing facilities in 1957, mention should be made of Chile, which produced a considerable amount of mechanical pine pulp, and of Peru, where bagasse is used as a raw material for chemical pulp production.

In Latin America there are altogether 75 pulp mills of various sizes and types, not including the hundreds of small groundwood mills lying idle in the southern States of Brazil. The total capacity of the mills in operation in 1958 was some 620,000 tons per year (see table 10), though the actual production was only about 370,000 tons. Large-scale expansion projects are under way in most of the countries, and it is expected that by 1961-62 the number of mills will have increased to 96 (five of which are not integrated with paper production), with a total capacity of 1,360,000 tons per year. This means that the average capacity of the chemical pulp mills, which used to be approximately 7,500 tons per year, will expand to about 13,500 tons by 1962; this is still very low, especially in comparison with mill capacity in the countries with a larger production. The biggest mills in the area will have a capacity of approximately 70,000 tons per year. It might be mentioned in this connexion that in Finland, for instance, the average capacity of the chemical pulp mills is now over 100,000 tons per year. The development of the mechanical pulp mills is closely related to the development of the newsprint industry.

/Table 10

Table 10
LATIN AMERICA: NUMBER AND CAPACITY OF PLANTS MANUFACTURING PULP FOR PAPER, 1958 AND 1961-62
(Capacity in thousands of tons)

	Chemical pulp from coniferous timber				Chemical pulp from deciduous timber				Mechanical pulp		Bagasse pulp		Other chemical pulp		Semi-chemical pulp		Total
	Sulphate		Sulphate		Sulphate		Sulphate		I	II	I	II	I	II	I	II	
	Sulphide		Sulphide		Sulphide		Sulphide										
	I	II	I	II	I	II	I	II									
	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962	1961- 1958 1962
Argentina		1 30	1 30	1 5	1 17	-	-	-	1 24	2 9	1 9	1 25	1 25	4 12	1 10	2 34	14 122
Brazil	3 14	1 13	1 13	-	1 41	1 150	-	4 152	6 27	1 8	2 12	1 15	3 48	1 12	5 19	-	35 209
Central America		-	-	-	-	-	-	-	-	-	-	-	-	1 1	-	-	611
Chile		-	-	-	1 70	-	-	-	1 40	3 63	-	-	1 40	-	-	-	5 146
Colombia		-	-	-	-	-	-	-	7 7	1 3	1 3	-	1 2	-	15 3	-	1 3
Cuba		-	-	-	-	-	-	-	-	-	-	-	2 60	-	-	-	2 60
Ecuador		-	-	-	-	-	-	-	-	-	-	-	1 1	-	-	-	1 1
Mexico	1 6	-	-	-	4 96	4 120	-	-	3 13	2 46	2 8	1 10	2 30	1 20	-	-	15 188
Paraguay		-	-	-	-	-	-	-	-	-	-	-	-	1 1	-	-	254
Peru		-	-	-	-	-	-	-	-	-	1 1	1 30	1 40	-	-	-	2 33
Uruguay		-	-	-	-	-	-	-	1 2	-	-	-	-	1 6	-	-	2 8
Venezuela		-	-	-	-	-	-	-	-	-	-	-	1 20	-	-	-	1 20
Total	4 20	2 43	1 5	6 137	9 357	1 12	1 12	4 152	11 49	6 140	7 31	3 238	1 25	21 41	3 55	9 31	75 617

I = Plants with annual capacity up to 10 000 tons.

II = Plants with annual capacity over 10 000 tons.

There are at present 285 mechanical pulp plants in Brazil, mostly very small and at a standstill. Total daily output of mechanical pulp is estimated at 1 000 tons, but in 1957 it amounted to 91 000 tons only.

As stated before, there are only three countries in Latin America which produce pulp in significant quantities. After the present period of expansion, it is expected that by 1961-62 Chile and three other countries will have joined the group of major producers, but there will still be eleven countries without any pulp-producing facilities and two (Guatemala and Uruguay) with a purely nominal output.

Perhaps the most important of the new producers will be Chile, where an industry is being established on the basis of raw material from the extremely fast-growing pinus radiata plantations. Kraft pulp began to be exported in 1959. The Chilean plantations could support an industry with a pulping capacity of approximately 700,000 tons per year, and leave a margin for the sawmilling industry. The Central American pine area, especially the forests in Honduras, may also play an important part in the future as a source of raw material for the pulp industry.

In 1955-57 Latin America imported about 800,000 tons of the paper and board needed for consumption, and produced about 1,250,000 tons itself. In order to manufacture this quantity of paper and board, the region had to import about 470,000 tons of fibrous materials, of which about 45,000 tons were waste paper. Thus, Latin America was obliged to import about 60 per cent of the fibrous raw material it required during the period in question. In 1959, however, this proportion decreased to approximately 50 per cent.

The lack of pulp production and the import restrictions in many countries have forced the paper industry to use a high percentage of waste paper in its fibre production. As this paper is often of poor quality, it was inevitable that the paper produced should also frequently be of inferior quality. It is of the utmost importance for the whole region to develop its own pulp industry, not only in order to reduce the outflow of foreign exchange for imports of the fibrous raw materials required to increase paper production, but also to improve the quality of the paper. Fortunately, the latest developments indicate that, in percentage terms, the pulp industry is now expanding faster than the paper industry and, in absolute terms, at almost the same rate. This means that more virgin fibre will be available in future for the manufacture of paper than during the past years, and that paper quality will probably improve.

/The Latin

The Latin American region has untapped fibrous resources, as well as the pine forests and plantations of temperate broadleaved species which form the mainstay of the present industry.

4. The paper and board industry

As in the case of pulp, the three major producers of paper and board in 1955-57 were Brazil, Argentina and Mexico. Their total output was approximately 82 per cent of regional production and their consumption approximately 69 per cent of total consumption.

As may be seen from table 11, paper and board have been manufactured in 14 countries, of which some have had only a nominal production. The number of paper mills is close to 200, (apart from the small artisan type of unit). The nominal capacities of the existing mills are given in table 12. Over 50 per cent had a capacity of less than 5,000 tons annually, the average being slightly under 8,000 tons per mill. If newsprint production is excluded, total capacity was 7,000 tons per year.

Many of the countries have already expanded their industry considerably since 1958, and some are making sizable new investments, especially Brazil, Mexico, Chile and Colombia. It is estimated that by 1961-62 capacity will be 700,000 tons over the previously quoted figures. This means that average capacity would be approximately 11,000 tons annually per mill, while the capacity of newsprint mills would be about 65,000 tons annually per unit, and that of other mills approximately 10,000 tons per year per unit.

Total Latin American consumption of papers and board in 1955-57 was 2,054,000 tons, of which 1,253,000 tons, or 61 per cent, were produced locally but partly from imported fibre. Approximately 67 per cent of the amount consumed in 1959, i.e. 2,423,000 tons, was produced within the region. There are wide variations in self-sufficiency as regards grades; of the total amount of newsprint consumed in 1955-57 only 13 per cent was produced locally, while in the case of printing and writing paper the proportion was approximately 67 per cent, and in that of other papers and board 83 per cent. In 1959 the percentages were 23, 72 and 85 respectively.

The reasons for this discrepancy are easily explained. As newsprint is a basic cost factor of one of the most important mass communication media -- the press -- cheapness is a characteristic of paramount importance, in

Table 11

LATIN AMERICA: PRODUCTION, IMPORTS AND APPARENT CONSUMPTION OF PAPER AND BOARD,
1955, 1956, 1957, 1955-57, 1958 AND 1959

(Tons)

Country		1955				1956			
		News- print	Print- ing and writing a/	Other paper and board	Total	News- print	Print- ing and writing a/	Other paper and board	Total
Argentina	Production	21 591	60 300	201 743	283 634	17 177	66 800	223 523	307 500
	Imports	89 372	31 435	5 646	126 453	94 210	18 974	4 309	117 493
	Apparent consumption	110 963	91 735	207 389	410 087	111 387	85 774	227 832	424 993
Bolivia	Production	-	-	800	800	-	-	800	800
	Imports	1 350	2 762	846	4 958	1 300	923	608	2 831
	Apparent consumption	1 350	2 762	1 646	5 758	1 300	923	1 408	3 631
Brazil	Production	39 504	106 348	280 562	426 414	39 398	111 782	334 882	486 062
	Imports	130 371	12 839	3 297	146 507	136 460	24 777	3 969	165 206
	Apparent consumption	169 875	119 187	283 859	572 921	175 858	136 559	338 851	651 268
Chile	Production	11 462	17 351	38 503	67 316	11 214	17 481	37 538	66 233
	Imports	13 915	667	1 202	15 784	13 189	465	1 347	15 001
	Apparent consumption	25 377	18 018	39 705	83 100	24 403	17 946	38 885	81 234
Colombia	Production	-	-	29 236	29 236	-	-	35 338	35 338
	Imports	21 657	22 578	22 644	66 879	28 430	27 631	23 197	79 258
	Apparent consumption	21 657	22 578	51 880	96 115	28 430	27 631	58 535	114 596
Costa Rica	Production	-	-	-	-	-	-	-	-
	Imports	2 691	1 022	3 649	7 362	2 827	1 040	4 792	8 659
	Apparent consumption	2 691	1 022	3 649	7 362	2 827	1 040	4 792	8 659
Cuba	Production	-	2 400	41 245	43 645	-	2 400	42 603	45 003
	Imports	30 863	13 519	43 966	88 348	41 984	19 766	52 357	114 107
	Apparent consumption	30 863	15 919	85 211	131 993	41 984	22 166	94 960	159 110
Dominican Republic	Production	-	-	-	-	-	-	-	-
	Imports	1 365	644	6 174	8 183	1 570	1 316	7 420	10 306
	Apparent consumption	1 365	644	6 174	8 183	1 570	1 316	7 420	10 306
Ecuador	Production	-	-	600	600	-	-	600	600
	Imports	7 377	665	4 780	12 822	5 836	1 190	5 087	12 113
	Apparent consumption	7 377	665	5 380	13 422	5 836	1 190	5 687	12 713
El Salvador	Production	-	-	300	300	-	-	300	300
	Imports	2 723	527	3 988	7 238	3 909	536	4 773	9 218
	Apparent consumption	2 723	527	4 288	7 538	3 909	536	5 073	9 518
Guatemala	Production	-	-	300	300	-	-	300	300
	Imports	2 335	1 777	2 465	6 577	2 711	2 739	3 210	8 660
	Apparent consumption	2 335	1 777	2 765	6 877	2 711	2 739	3 510	8 960
Haiti	Production	-	-	-	-	-	-	-	-
	Imports	270	300	1 700	2 270	395	350	1 816	2 561
	Apparent consumption	270	300	1 700	2 270	395	350	1 816	2 561
Honduras	Production	-	-	-	-	-	-	-	-
	Imports	720	500	1 500	2 720	1 055	625	1 552	3 232
	Apparent consumption	720	500	1 500	2 720	1 055	625	1 552	3 232
Mexico	Production	-	54 000	174 623	228 623	-	57 000	197 948	254 948
	Imports	47 323	6 870	15 020	69 213	67 224	7 750	21 520	96 494
	Apparent consumption	47 323	60 870	189 643	297 836	67 224	64 750	219 468	351 442
Nicaragua	Production	-	-	-	-	-	-	-	-
	Imports	1 149	272	2 211	3 632	1 419	277	2 091	3 787
	Apparent consumption	1 149	272	2 211	3 632	1 419	277	2 091	3 787
Panama	Production	-	-	-	-	-	-	-	-
	Imports	2 099	704	7 489	10 292	1 866	1 002	7 022	9 890
	Apparent consumption	2 099	704	7 489	10 292	1 866	1 002	7 022	9 890
Paraguay	Production	-	-	400	400	-	-	400	400
	Imports	500	300	550	1 350	651	315	587	1 553
	Apparent consumption	500	300	950	1 750	651	315	907	1 953
Peru	Production	15 418	2 808	23 764	41 990	18 408	3 150	30 635	52 193
	Imports	15 418	4 864	4 287	24 569	18 408	2 320	5 052	25 780
	Apparent consumption	15 418	7 772	28 051	51 241	18 408	7 480	35 687	61 575
Uruguay	Production	-	9 000	21 000	30 000	-	9 000	21 000	30 000
	Imports	24 505	1 732	1 950	28 187	25 408	1 701	956	28 065
	Apparent consumption	24 505	10 732	22 950	58 187	25 408	10 701	21 956	58 065
Venezuela	Production	-	-	12 263	12 263	-	-	14 871	14 871
	Imports	16 090	16 942	44 547	77 579	19 727	18 254	42 543	80 524
	Apparent consumption	16 090	16 942	56 810	89 842	19 727	18 254	57 414	95 395
Total	Production	72 557	252 307	825 339	1150 203	67 789	267 613	940 738	1276 140
	Imports	412 093	120 919	177 911	710 923	468 579	133 961	194 208	796 748
	Apparent consumption	484 650	373 226	1003 250	1861 126	536 368	401 574	1134 946	2072 888

Table 11 (continued)

Table 11 (continued) 2

Country		1957				1955-57			
		News- print	Print- ing and writing a/ board	Other paper and board	Total	News- print	Print- ing and writing a/ board	Other paper and board	Total
Argentina	Production	11 972	69 182	221 459	302 613	16 913	65 427	215 575	297 915
	Imports	125 294	18 057	13 822	157 173	102 959	22 822	7 926	133 707
	Apparent consumption	137 266	87 239	235 281	459 786	119 872	88 249	223 501	431 622
Bolivia	Production	-	-	800	800	-	-	800	800
	Imports	1 600	883	852	3 335	1 417	1 523	1 768	3 708
	Apparent consumption	1 600	883	1 652	4 135	1 417	1 523	1 568	4 508
Brazil	Production	49 029	107 316	312 078	468 423	42 644	108 482	309 107	460 233
	Imports	173 498	32 132	4 477	210 107	146 776	23 249	3 914	173 939
	Apparent consumption	222 527	139 448	316 555	678 530	189 420	131 731	313 021	634 172
Chile	Production	20 195	14 963	35 665	70 823	14 290	16 598	37 236	68 124
	Imports	4 308	342	1 663	6 393	10 497	491	1 404	12 392
	Apparent consumption	24 583	15 305	37 328	77 216	24 787	17 089	38 640	80 516
Colombia	Production	-	-	39 992	39 992	-	-	34 852	34 852
	Imports	23 976	25 835	17 405	67 216	24 688	25 348	21 082	71 118
	Apparent consumption	23 976	25 835	57 397	107 208	24 688	25 348	55 934	105 970
Costa Rica	Production	-	-	-	-	-	-	-	-
	Imports	3 208	1 444	4 205	8 857	2 909	1 169	4 215	8 293
	Apparent consumption	3 208	1 444	4 205	8 857	2 909	1 169	4 215	8 293
Cuba	Production	-	2 400	48 350	50 750	-	2 400	44 066	46 466
	Imports	31 223	16 813	48 314	96 350	34 690	16 699	48 212	99 601
	Apparent consumption	31 223	19 213	96 664	147 100	34 690	19 099	92 278	146 067
Dominican Republic	Production	-	-	-	-	-	-	-	-
	Imports	1 141	942	7 565	9 648	1 359	967	7 053	9 379
	Apparent consumption	1 141	942	7 565	9 648	359	967	7 053	9 379
Ecuador	Production	-	-	600	600	-	-	600	600
	Imports	6 048	2 535	5 607	14 190	6 420	1 463	5 158	13 041
	Apparent consumption	6 048	2 535	6 207	14 790	6 420	1 463	5 758	13 641
El Salvador	Production	-	-	300	300	-	-	300	300
	Imports	4 576	624	5 892	11 092	3 736	562	4 884	9 182
	Apparent consumption	4 576	624	6 192	11 392	3 736	562	5 184	9 482
Guatemala	Production	-	-	600	600	-	-	400	400
	Imports	3 233	3 752	3 605	10 590	2 760	2 756	3 093	8 609
	Apparent consumption	3 233	3 752	4 205	11 190	2 760	2 756	3 493	9 009
Haiti	Production	-	-	-	-	-	-	-	-
	Imports	430	400	1 800	2 630	365	350	1 772	2 487
	Apparent consumption	430	400	1 800	2 630	365	350	1 772	2 487
Honduras	Production	-	-	-	-	-	-	-	-
	Imports	838	654	2 473	3 965	871	593	1 842	3 306
	Apparent consumption	838	654	2 473	3 965	871	593	1 842	3 306
Mexico	Production	-	62 000	245 000	307 000	-	57 667	205 857	263 524
	Imports	87 903	6 510	20 690	115 103	67 483	7 043	19 077	93 603
	Apparent consumption	87 903	68 510	265 690	422 103	67 483	64 710	224 934	357 127
Nicaragua	Production	-	-	-	-	-	-	-	-
	Imports	1 050	284	2 392	3 726	1 206	278	2 231	3 715
	Apparent consumption	1 050	284	2 392	3 726	1 206	278	2 231	3 715
Panama	Production	-	-	-	-	-	-	-	-
	Imports	2 288	1 036	8 562	11 886	2 084	914	7 692	10 690
	Apparent consumption	2 288	1 036	8 562	11 886	2 084	914	7 692	10 690
Paraguay	Production	-	-	400	400	-	-	400	400
	Imports	820	350	700	1 870	657	322	613	1 592
	Apparent consumption	820	350	1 100	2 270	657	322	1 013	1 992
Peru	Production	-	3 200	33 069	36 269	-	3 086	29 156	32 242
	Imports	17 798	5 317	6 101	29 216	17 208	4 837	5 147	27 192
	Apparent consumption	17 798	8 517	39 170	65 485	17 208	7 923	34 303	59 434
Uruguay	Production	-	11 000	25 000	36 000	-	9 667	22 333	32 000
	Imports	29 094	1 476	1 125	31 695	26 336	1 636	1 344	29 316
	Apparent consumption	29 094	12 476	26 125	67 695	26 336	11 303	23 677	61 316
Venezuela	Production	-	-	18 944	18 944	-	-	15 359	15 359
	Imports	22 392	21 146	55 963	99 501	19 403	18 781	47 684	85 868
	Apparent consumption	22 392	21 146	74 907	118 445	19 403	18 781	63 043	101 227
Total	Production	81 196	270 061	982 257	1333 514	73 847	263 327	916 041	1253 215
	Imports	540 798	140 532	213 213	894 543	473 824	131 803	195 111	800 738
	Apparent consumption	621 994	410 593	1195 470	2228 057	547 671	395 130	1111 152	2053 953

Table 11 (continued)

Table 11 (concluded)³

Country		1958				1959			
		News- print	Print- ing and writing a/	Other paper and board	Total	News- print	Print- ing and writing a/	Other paper and board	Total
Argentina	Production	11 472	80 000	265 552	357 024	12 000	80 000	254 274	346 274
	Imports	160 791	7 471	7 517	175 779	126 815	6 000	7 000	139 815
	Apparent consumption	172 263	87 471	273 069	532 803	138 815	86 000	261 274	486 089
Bolivia	Production	-	-	800	800	-	-	900	900
	Imports	1 700	1 000	900	3 600	1 800	1 000	900	3 700
	Apparent consumption	1 700	1 000	1 700	4 400	1 800	1 000	1 800	4 600
Brazil	Production	60 000	120 000	346 450	526 450	60 000	125 000	380 464	565 484
	Imports	140 816	30 542	4 971	176 329	144 863	23 777	5 265	173 905
	Apparent consumption	200 816	150 542	351 421	702 779	204 863	148 777	385 749	739 389
Chile	Production	43 898	12 048	36 655	92 601	48 552	14 000	42 716	105 268
	Imports	-15 536 b/	491	3 941	-11 104	-31 957 b/	1 127	3 865	-26 965
	Apparent consumption	28 362	12 539	40 596	81 497	16 595	15 127	46 581	78 303
Colombia	Production	-	-	43 089	43 089	-	-	48 741	48 741
	Imports	21 752	20 713	11 756	54 221	21 557	26 079	11 858	59 494
	Apparent consumption	21 752	20 713	54 845	97 310	21 557	26 079	60 599	108 235
Costa Rica	Production	-	-	-	-	-	-	-	-
	Imports	3 100	1 500	4 500	9 100	3 400	1 500	4 800	9 700
	Apparent consumption	3 100	1 500	4 500	9 100	3 400	1 500	4 800	9 700
Cuba	Production	-	2 400	49 000	51 400	8 000	3 000	54 300	65 300
	Imports	41 185	22 631	54 148	117 964	20 000	15 000	45 000	80 000
	Apparent consumption	41 185	25 031	103 148	169 364	28 000	18 000	99 300	145 300
Dominican Republic	Production	-	-	-	-	-	-	-	-
	Imports	2 585	1 639	9 460	13 684	2 500	1 700	9 800	14 000
	Apparent consumption	2 585	1 639	9 460	13 684	2 500	1 700	9 800	14 000
Ecuador	Production	-	-	800	800	-	-	800	800
	Imports	6 000	2 500	6 000	14 500	6 000	2 500	7 000	15 500
	Apparent consumption	6 000	2 500	6 800	15 300	6 000	2 500	7 800	16 300
El Salvador	Production	-	-	400	400	-	-	500	500
	Imports	4 500	700	6 000	11 200	4 500	1 000	6 500	12 000
	Apparent consumption	4 500	700	6 400	11 600	4 500	1 000	7 000	12 500
Guatemala	Production	-	-	600	600	-	-	600	600
	Imports	3 500	3 000	4 000	10 500	3 500	3 000	5 000	11 500
	Apparent consumption	3 500	3 000	4 600	11 100	3 500	3 000	5 600	12 100
Haiti	Production	-	-	-	-	-	-	-	-
	Imports	450	400	1 900	2 750	500	500	2 000	3 000
	Apparent consumption	450	400	1 900	2 750	500	500	2 000	3 000
Honduras	Production	-	-	-	-	-	-	-	-
	Imports	900	600	2 500	4 000	1 000	700	2 500	4 200
	Apparent consumption	900	600	2 500	4 000	1 000	700	2 500	4 200
Mexico	Production	-	65 000	256 820	321 820	14 000	70 000	276 892	360 892
	Imports	54 847	15 289	15 243	85 379	90 871	9 540	16 538	116 949
	Apparent consumption	54 847	80 289	272 063	407 199	104 871	79 540	293 430	477 841
Nicaragua	Production	-	-	-	-	-	-	-	-
	Imports	1 300	300	2 500	4 100	1 400	350	2 800	4 550
	Apparent consumption	1 300	300	2 500	4 100	1 400	350	2 800	4 550
Panama	Production	-	-	-	-	-	-	-	-
	Imports	2 500	1 200	9 000	12 700	2 800	1 300	9 500	13 600
	Apparent consumption	2 500	1 200	9 000	12 700	2 800	1 300	9 500	13 600
Paraguay	Production	-	-	500	500	-	-	500	500
	Imports	900	350	700	1 950	950	400	800	2 150
	Apparent consumption	900	350	1 200	2 450	950	400	1 300	2 650
Peru	Production	-	3 483	32 450	35 933	-	5 979	39 111	45 090
	Imports	13 031	4 878	6 500	24 409	16 000	3 500	5 900	25 400
	Apparent consumption	13 031	8 361	38 950	60 342	16 000	9 479	45 011	70 490
Uruguay	Production	-	11 800	23 000	34 800	-	11 200	24 400	35 600
	Imports	27 509	341	214	28 064	23 364	890	634	24 888
	Apparent consumption	27 509	12 141	23 214	62 864	23 364	12 090	25 034	60 488
Venezuela	Production	-	-	23 000	23 000	-	-	45 000	45 000
	Imports	13 560	25 792	67 858	107 210	31 086	21 165	62 258	114 509
	Apparent consumption	13 560	25 792	90 858	130 210	31 086	21 165	107 258	159 509
Total	Production	115 370	294 731	1079 116	1489 217	142 552	309 179	1169 218	1620 949
	Imports	485 390	141 337	219 508	846 335	470 949	121 028	209 918	801 895
	Apparent consumption	600 760	436 068	1298 724	2335 552	613 501	430 207	1379 136	2422 844

a/ Excluding books, newspapers, periodicals and printed matter in general

b/ In Chile since newsprint exports exceeded imports the figure here actually refers to net exports as explained in the following calculation:

	1958	1959
Exports	20 228	35 392
Imports	4 692	3 435
Net exports	15 536	31 957

Table 12

Table 12
LATIN AMERICA: NUMBER AND CAPACITY OF PAPER AND BOARD PLANTS, 1958 AND 1961-62
(Capacity in thousands of tons per year)

		Other paper and board										Total			
		Newsprint		Under 5 000		2 000-19 000		10 000-29 000		20 000-49 000					
		1958	1961-62	1958	1961-62	1958	1961-62	1958	1961-62	1958	1961-62	1958	1961-62	1958	1961-62
Argentina	Number	1	-	40	40	13	13	8	8	-	-	2	3	64	64
	Capacity	20	-	100	100	90	90	95	90	-	-	100	180	405	460
Bolivia	Number	-	-	1	1	-	-	-	-	-	-	-	-	1	1
	Capacity	-	-	1	1	-	-	-	-	-	-	-	-	1	1
Brazil	Number	1	1	36a/	29	15	19	8	13	-	2	-	2	60	66
	Capacity	50	125	90	70	110	140	135	200	-	50	90	280	385	675
Central America	Number	-	-	3	2	-	-	-	-	-	-	-	-	3	3
	Capacity	-	-	5	2	-	-	-	11	-	-	-	-	5	13
Chile	Number	2	1	2	2	1	1	-	-	1	-	-	1	6	5
	Capacity	50	60	4	4	7	9	-	-	28	-	40	40	89	113
Colombia	Number	-	-	5	5	-	-	-	-	-	1	1	1	6	7
	Capacity	-	-	9	9	-	-	-	-	-	35	45	60	54	104
Cuba	Number	-	1	2	2	-	-	1	1	1	2	-	1	4	7
	Capacity	30	30	5	5	-	-	15	15	39	52	-	41	59	143
Ecuador	Number	-	-	3	3	-	-	-	-	-	-	-	-	3	3
	Capacity	-	-	4	4	-	-	-	-	-	-	-	-	4	4
Mexico	Number	1	1	18	13	8	8	3	9	4	2	1	5	35	38
	Capacity	35	40	55	35	65	55	45	120	115	55	70	280	385	585
Paraguay	Number	-	-	1	2	-	-	-	-	-	-	-	-	1	2
	Capacity	-	-	0.5	1	-	-	-	-	-	-	-	-	0.5	1
Peru	Number	-	-	2	2	1	1	-	-	1	1	-	-	4	4
	Capacity	-	-	5	5	7	7	-	-	27	35	-	-	39	47
Uruguay	Number	-	-	1	1	1	1	3	3	-	-	-	-	5	5
	Capacity	-	-	1	1	8	8	38	38	-	-	-	-	47	47
Venezuela	Number	-	-	-	-	3	3	-	-	1	2	-	-	4	5
	Capacity	-	-	-	-	20	20	-	-	35	55	-	-	55	75
Total	Number	5	4	114	102	42	96	23	35	8	10	4	13	196	210
	Capacity	155	255	280	237	307	329	328	474	244	282	215	691	1 529	2 268

a/ Excluding heavy board called "papelao" in Brazil.

/conjunction, of

conjunction, of course, with acceptable printing and strength properties. The product which best complies with these requirements is manufactured from coniferous trees, with a very high percentage of mechanical pulp, the cheapest virgin fibre known. Newsprint manufacture is heavily concentrated in the industrialized countries of the northern hemisphere; production for export is mostly in Canada and the Scandinavian countries, which combine good and abundant raw material, a well-developed transport system, a large supply of relatively cheap energy, the necessary skills and huge production units.

Because import duties for newsprint have been low or non-existent for various reasons - newsprint even being imported in some countries at a preferential rate of exchange -, and competition on the part of established manufacturers in traditional producer countries is intense, it is understandable that investors have not been willing to enter the newsprint business in certain countries despite the existence of coniferous forests there. Lately, however, the situation has changed considerably, new production facilities being constructed in Brazil, Mexico and, particularly, Chile.

With respect to printing and writing papers, countries such as Argentina, Brazil, Chile, Mexico and Uruguay have been self-sufficient to a high degree, generally importing only special papers and grades for which demand is too small to justify domestic production. Their rate of self-sufficiency in 1955-57 was approximately 82 per cent and in 1959 approximately 88 per cent.

Of the other countries, only Cuba and Peru produce these grades. In both these countries, and in Colombia as well, old mills are being expanded and new plants constructed, some of which were already in use in 1960. Elsewhere, with the exception of Venezuela, local demand has been too small to justify domestic production.

In the main consumer countries, production of other papers and board is in very much the same situation as that of printing and writing papers. The southern group of countries - Argentina, Brazil, Chile and Uruguay - covered 98 per cent of their requirements, importing only specialties such as cigarette paper, greaseproof paper, and a certain amount of kraft paper. This is also true of Mexico.

In Colombia, Cuba, Peru and Venezuela, domestic production has been appreciable and capacity is expanding considerably. In the other countries, consumption in itself is very limited and existing production is merely of the artisan type on the basis of waste paper.

5. The fibrous resources of Latin America

(a) Wood

Though Latin America is richly endowed with forests, its entire forest area being approximately 9.2 million square kilometres or about 24 per cent of the world total, the forests are unevenly distributed within the region, vast areas are still inaccessible (approximately 5.9 million square kilometres) and the traditional sources of fibre for paper pulp - coniferous trees - are by no means abundant.

Table 13 lists the forested areas in the Latin American countries. The biggest country of the region, Brazil, has approximately 55 per cent of the forests though its share of the land area is lower, being 42 per cent. Approximately 66 per cent of its land area is forested. Apart from the dependent territories of the metropolitan powers, the most heavily forested countries are Costa Rica and Panama, over 70 per cent of whose total land area is tree-covered. The poorest in this sense are Uruguay and Cuba. If the forest area is calculated on per capita terms, the highest figures correspond to Bolivia and Paraguay and the lowest to Cuba, Haiti and Uruguay. An attempt has also been made to calculate the accessible forest area per inhabitant, though the meaning of accessibility in this respect is by no means well-defined. Here the highest figures correspond to Paraguay, Colombia and Argentina and the lowest to Cuba and Uruguay again.

The mere existence of forests, even those that are accessible, is not, however, a reliable indication of their potential for paper-making purposes. The forest increment and composition, the quality of the trees and the cost of transport, together with the general economic development of the country or area and other forest uses, are all factors of paramount importance when evaluating the possibilities of these fibrous resources. Thus, Chile, for example, has already begun to export newsprint and long-fibre pulp on the basis of a forest area which though only about 225,000 hectares in size, consists of fast-growing, high-standing pinus radiata plantations, whose other uses are limited. On the other hand, Honduras, with 1.1 hectares of coniferous forest per capita, still has to import all the paper consumed in the country. In Brazil, too, with its

Table 13
LATIN AMERICAN FORESTS

Country	Area (thousands of ha.)	Forest area		Access- ible forests	Forests in use	Coniferous forests	Thousands of ha.	Forest area per capita	Area of accessible forest per capita	Popula- tion in 1958 a/ (thousands)
		(Thou- sands of ha.)	In per- centage of land area							
Argentina	274 821	70 000	25	60 000	10 250	250b/	250	3.5	3.0	20 250
Bolivia	109 858	47 000	43	6 000	...	9 000c/	6 000	17.9	2.3	3 311
Brazil	846 988	561 656	66	140 000	40 000	400d/	300e/	8.9	2.2	62 725
Chile	73 377	20 443	28	10 077	4 641	...	...	2.9	1.4	7 298
Colombia	112 036	69 000	62	62 000	411	...	...	5.7	5.1	13 522
Costa Rica	5 020	3 617	72	1 691	...	...	...	3.4	1.6	1 072
Cuba	11 452	1 300	11	1 300	1 090	458f/	109	0.2	0.2	6 466
Dominican Republic	4 733	2 225	47	905	200	...	125	0.8	0.8	2 797
Ecuador	27 179	14 845	55	4 500	300	...	25	3.7	1.1	4 007
El Salvador	1 955	275	14	275	275	...	840	0.1	0.1	2 434
Guatemala	10 510	5 350	51	4 460	2 650	1 600g/	100	1.6	1.3	3 546
Haiti	3 700	700	26	600	600	...	700	0.2	0.2	3 424
Honduras	10 649	6 860	64	1 580	1 080	2 000h/	2 500i/	3.8	0.9	1 828
Mexico	196 927	38 836	20	38 836	1 339	10 000j/	750	1.5	1.5	32 348
Nicaragua	13 700	6 450	47	1 502	1 502	800h/	...	5.7	1.3	1 378
Paraguay	7 447	5 270	71	1 181	1 181	...	...	7.0	1.6	995
Peru	40 675	20 906	51	6 272	5 017	...	...	14.3	4.3	1 677
Uruguay	124 457	70 000	56	15 000	1 000	...	10	6.8	1.5	10 213
Venezuela	16 760	554	3	554	538	...	...	0.2	0.2	2 679
	91 205	45 000	49	7 600	1 100	...	...	6.3	1.2	6 320
Subtotal	1 982 349	990 287	50	364 333	...	24 508	11 309	5.3	1.9	188 296
British Honduras	2 253	1 813	80	1 378	1 378	250j/	178	21.6	16.4	701/
British Guiana	21 497	18 130	84	3 626	260	...	...	35.2	7.0	533
French Guiana	8 800	7 000	80	1 500	50	...	...	233.3	50.0	301/
Surinam	13 882	11 721	84	1 000	10	...	...	51.4	4.4	233
Total	46 432	38 664	83	7 504	1 698	250	178	44.8	9.8	866
Grand total	2 028 781	1 028 951	51	371 837	...	24 758	11 887	5.5	2.0	189 162

Source: Unless otherwise indicated, all figures are taken from FAO, World Forest Inventory, 1959.

a/ J. Stieffert, World Timber Trends and Prospects, Stockholm, 1959.

b/ United Nations, Monthly Bulletin of Statistics, August 1959.

c/ United Nations and FAO, Pulp and Paper Prospects in Latin America (Sales No. 1955, II. A.4).

d/ FAO Forestry Mission Report to the Government of Chile, 1959.

e/ Estimate.

f/ Informe del gobierno de Cuba sobre politica forestal y su ejecucion, FAO 876/1958, p. 24.

g/ J. Ignacio Aguilar, Pinos de Guatemala, Ministry of Agriculture, La Aurora, Guatemala, 1958.

h/ Informe sobre los recursos Forestales y las Posibilidades de Produccion de Celulosa y Papel en Centroamerica, FAO, 1954.

i/ La Industria Mexicana de Papel y Celulosa (FAO/ETAP 1 115).

j/ FAO, Report to the Caribbean Commission on a Preliminary Pulp and Paper Survey.

vast forest area of which approximately 140 million hectares are classified as accessible, all the wood pulp comes from either rather depleted coniferous stands or eucalypt plantations, the natural deciduous forests playing no part as yet in pulp manufacturing.

The technico-economic factors seem to indicate that, at least in the foreseeable future, most of the raw material for wood pulp produced in Latin America will come from coniferous forests and plantations of deciduous trees, especially Eucalyptus and Salicaceae. In this respect, mention should be made of the plantation-grown pine of Chile, the pine forests of Central America (in the Olancho area of Honduras) and Mexico (in the States of Michoacan and Guerrero), the pine forests and eucalypt plantations of southern Brazil and the poplar plantations in the Paraná delta. Interesting results have also been obtained from planting tests with some pine species in southern Brazil. Though pinus radiata does not seem to thrive there, other species have shown an extremely high increment.

It is estimated that the forest plantations in the southern countries will, by the end of this decade, yield at least 11 million cubic metres solid volume of wood per year (approximately 4 million cubic metres of Chilean pinus radiata, 5 million cubic metres of Brazilian Eucalyptus and 2 million cubic metres of Argentine Salicaceae). Approximately 7 million cubic metres in all would be available for pulping.

As the plantations can yield cheap and abundant wood, and industrial wood requirements are certain to increase enormously in the future, it is important to stimulate planting activities, especially in respect to coniferous species.

In Colombia, the planning and construction of the first commercial-scale semi-chemical pulp mill, based on tropical hardwoods, is well under way. If the actual operation of this mill is as satisfactory as the laboratory tests, it may mean a big step towards the more extensive use of tropical forests, and the vast forest resources of Latin America would gain greatly in importance.

(b) Sugar-cane bagasse

Bagasse constitutes an important source of fibre, and in the last few years interest in this source has been greatly intensified.

/Bagasse fibre

Bagasse fibre has good paper-making characteristics; it is regularly produced in certain areas, it is available in large quantities at sugar-mill sites and many cane-producing countries lack other fibrous raw materials for paper production.

The sugar industry uses bagasse as fuel, the heat value of fresh bagasse being approximately 1,600 - 1,700 Kcal/kg. Though in modern raw sugar mills all the bagasse is not required for fuel, in numerous older and small mills it is all used for steam production, and some even need wood or other fuels in addition. Moreover, many sugar mills are small and their entire bagasse production is not enough to supply a pulp mill of economic size. ^{4/}

If bagasse is replaced by some other reasonably-priced fuel, the larger sugar mills could each supply the bagasse requirements of a medium-size pulp mill. In this case, the price of bagasse would be determined by the price of the substitute fuel.

If bagasse were available as a surplus from the sugar mills, its price would be low since it would not comprise more than a bonus to the sugar mills plus baling, transport and storage costs. In such a case bagasse could even be transported for fairly long distances, and large enough quantities could therefore be collected at a central mill site for pulp production on an economic scale. However, it is very rare to find a real surplus of bagasse available for pulping purposes. Even if the bagasse is not needed to provide energy for the sugar mills, it can be used in most cases to generate energy for sale. Thus its price is always determined by the price of energy.

Latin America is the world's largest cane producer. During the 1957/58 crop year, the Latin American countries produced approximately 12,900,000 tons of sugar, i.e. about 44 per cent of the world's sugar-cane output. The other areas within the region produced an additional 1.3 million tons, thereby raising its total share of world production to about 49 per cent.

^{4/} A pulp mill with a capacity of 100 tons per day requires approximately 160,000 to 180,000 tons of fresh bagasse per year, corresponding to a sugar production of 60,000 to 65,000 tons and to 600,000 to 650,000 tons of cane ground.

Production of sugar from cane is widespread in Latin America (the figures for recent years are given in table 14). It should, however, be pointed out that the figures for individual countries may or may not include local production for the home market.

Direct statistics on the volume of bagasse produced are generally non-existent, and production therefore has to be estimated on the basis of known data on sugar output, average sugar yield in relation to cane ground and average fibre content of cane.

As indicated in table 14, many of the Latin American countries have an abundant supply of bagasse. Some of them, such as Venezuela, Colombia, Peru and Mexico, have cheap domestic fuels, which can replace bagasse in the sugar mills, while in Cuba it may be possible to obtain surplus bagasse in considerable quantities from the large sugar mills (in 1958, seven mills produced more than 100,000 tons of sugar each, corresponding to well over 200,000 tons of fresh bagasse per mill).

In Latin America, pulp for paper-making was produced from bagasse in the following quantities in 1959: Argentina (approximately 6,000 tons), Brazil (about 15,000 tons), Peru (26,000 tons), Mexico (23,000), Colombia (3,000) and Cuba (production started in 1959, with a capacity of 60,000 tons). Capacity is being expanded in all these countries.

It seems reasonable to assume that bagasse as a source of pulp for paper-making will gain in importance in Latin America, especially as more experience and knowledge are being acquired every year on the technico-economic aspects of production. For purposes of illustration, it may be mentioned that a newsprint mill, which will use both mechanical and chemical pulp made from bagasse, is under construction in India.

(c) Other fresh fibrous materials

Straw, grasses, bamboo, sisal and banana stalks are all used to some extent as a source of pulp for paper-making.

Wheat straw is pulped in Argentina, Brazil, Chile, Mexico and Uruguay, but the difficulties of collecting and transporting it hamper the possibility for development on a larger scale. Once the expansion projects now under way in some countries have been completed, the mills using straw as raw material will have an annual capacity of approximately

Table 14
LATIN AMERICA: ESTIMATE OF BAGASSE PRODUCED IN 1956/57 AND 1957/58
(Thousands of tons)

Country	Sugar production (thousands of tons) ^{a/}		Sugar yield from crushed cane ^{b/} (in per- cents)	Crushed cane		Bagasse with 50% humidity (percentage of crushed cane) ^{b/}	Bagasse production (thousands of tons)		Total fibre in ba- gasse (percent- age)
	1957/ 1958	1956/ 1957		1957/ 1958	1956/ 1957		1957/ 1958	1956 1957	
Argentina	703	660	7.2	9 764	9 167	28.4	2 773	2 603	45.8
Brazil	2 688	2 248	10.5	25 600	21 410	27.7	7 091	5 931	45.7
Colombia	269	269	10.5	2 562	2 562	28.7	735	735	46.4
Cuba	5 785	5 671	12.7	47 500 ^{a/}	44 300 ^{a/}	26.8	12 730	11 872	46.6
Dominican Republic	906	737	10.3	8 796	7 155	28.3	2 489	2 025	46.4
Ecuador	76	72	10.5	724	686	28.7	208	197	46.4
El Salvador	49	41	10.6	519	387	28.7	149	111	46.4
Guatemala	62	63	10.5	590	600	28.7	169	172	46.4
Haiti	51	64	10.5	462	610	28.7	133	175	46.4
Mexico	1 219	1 050	9.1	13 396	11 538	28.3	3 791	3 265	46.5
Peru	742	708	11.3	6 566	6 265	31.4	2 062	1 967	47.3
Venezuela	161	202	11.0	1 464	1 896	27.6	404	507	46.6
Other republics	213	202	10.5	2 029	1 924	28.7	582	552	46.4
Other areas	1 283	1 330	10.5	12 219	12 667	28.7	3 507	3 635	
Total	14 207	13 317		132 191	121 107	27.9	96 823	33 747	

^{a/} Anuario Azucarero de Cuba, 1958, page 228.

^{b/} Pulp and paper prospects in Latin America, United Nations Publications Sales No.: 1955, II. G. 4, p. 251.

/ 60,000 tons,

60,000 tons, of which Argentina and Mexico will have over 20,000 tons each. Nothing is known of other expansion plans for the future.

Elephant grass is pulped in Brazil and lemon grass in Guatemala, both on a very small scale. It is understood that economically exploitable grass sources are also limited.

Bamboo is found along the river banks in the tropical and even subtropical areas of Latin America. At present it is used fairly extensively for building purposes at a rather high price.

Bamboo yields a long-fibre pulp with very good characteristics, which is suitable for wrapping, printing and writing paper. Bamboo pulp can also be blended with poor types of pulp to make acceptable grades of board and other papers.

Though good pulp can be produced from bamboo, the high extraction costs have proved a stumbling block to efforts to use it as raw material for the paper industry in Latin America. At present, bamboo is pulped in Brazil only, on a very limited scale. Even though it will be used to a greater extent in the near future, it is very doubtful whether it will ever become an important source of paper pulp in the region, especially as it is in rather heavy demand for other purposes in some areas.

The leaf fibres (sisal, henequen, abaca) constitute a potential source of long-fibre pulp. Today they are used almost exclusively for making ropes and bags. The price of these fibres is generally too high for paper pulp purposes, but there are signs that, in some areas, the costs of planting, growing and harvesting might be reduced sufficiently to enable these plants to be used for pulping. It should be pointed out that one hectare of sisal can yield 2.5 tons of pulp per year.

Sisal is already utilized in Brazil to a certain extent, and some mills are planning to use sisal fibre or bagasse. The plantations in Central America (including Yucatán) and Cuba may also play a part in this respect in future.

In the big banana plantations of Central America and Ecuador, the banana stalks are left in the soil after harvest. The fibre is long and strong. Though the moisture content of the fresh stalks is very high (up to 93 per cent), one hectare of banana plantation could yield 0.8 tons of pulp per year.

One of the main difficulties of using banana stalks is the high moisture content, which makes it impossible to transport the stalks for long distances and therefore entails the collection of a sufficient quantity of stalks at pulp mills - in itself a problem. Another difficulty is the tendency of the stored stalks to ferment.

/Pulp from

Pulp from banana stalks has been produced on a limited scale in Ecuador and Mexico.

(d) Waste paper

Waste paper is one of the principal components in the fibre furnish for papers and board, except newsprint, kraft and kraft liner and one or two other types. It may be estimated that the fibre furnish for printing and writing papers normally contains approximately 10 per cent waste paper, that for other papers about 30 per cent and that for board approximately 70 per cent.

Waste paper is mainly collected in the big towns. In general, no statistics are available on the use of waste paper in industry, but some estimates can be made on the basis of known fibre supply, paper and board production and consumption. Table 15 shows the estimated average percentages of waste paper in fibre furnish and waste paper recovery rates. Waste paper constitutes approximately 37 per cent of the total fibre supply for paper and board mills. On the assumption that no waste paper is used in newsprint production and that the proportion of waste paper in the fibre furnish for printing and writing papers is 10 per cent, it may be estimated that in the case of other papers and board the proportion of waste in the fibre furnish is close to 50 per cent.

With respect to the recovery of paper and board for reuse, the countries in the region may be divided roughly into two categories: (a) those which satisfy the majority or a substantial amount of their paper and board requirements themselves, and (b) those where the paper industry is not well developed in relation to the needs of the country, and which consequently have to import a good deal to cover their requirements.

In the countries belonging to the first group, the recovery rate is usually fairly high, and the paper recovered often of rather poor quality owing to the fact that a considerable amount of waste is used in the production of the collected paper itself; the repeated beatings naturally weaken the strength of the fibres.

In the countries of the second group, the needs of domestic industry are small in comparison with total paper and board consumption, the recovery rate of paper is low and the recovered paper usually consists to a great extent of originally imported paper made almost entirely of virgin fibre.

The region's average recovery rate for industrial purposes is over 22 per cent of paper and board consumption: this corresponds to the

/Table 15

Table 15
LATIN AMERICA: ESTIMATED USE OF WASTE PAPER, 1955-57

Country	Total produc- tion of paper and board	News- print produc- tion	Fibre require- ments for news- print	Produc- tion of printing and writing paper	Fibre require- ments for printing and writing paper	Produc- tion of other paper and board	Fibre require- ments for other paper and board	Total fibre require- ments for other paper and board	Supply of virgin fibre	Estimate of waste paper used in total fibre fur- nish			Waste paper in fibre fur- nish for manufac- ture of printing and writ- ing paper (10%) (ton)	Percent- age	Imports Collected of waste paper			Con- sump- tion of paper and board (tons)	Rate of recovery (per- cent- age)				
										Tons	Per- cent- age	Tons			Percent- age	Tons	Percent- age						
																				Tons	Percent- age	Tons	Percent- age
Argentina	297 915	16 913	17 759	65 427	70 661	215 575	237 133	325 553	221 282	104 271	32.0	7 066	97 205	41.0	-	104 271	431 622	24.2					
Bolivia	800	-	-	-	-	800	880	880	-	880	100.0	-	880	100.0	-	880	4 508	19.5					
Brazil	460 233	42 644	44 776	108 482	117 161	309 107	340 018	501 955	312 173	189 782	37.8	11 716	178 066	57.6	-	189 782	634 172	29.9					
Chile	68 124	14 290	15 005	16 598	17 926	37 236	40 960	73 891	49 450	24 441	33.1	1 793	22 648	55.3	-	24 441	80 516	30.4					
Colombia	34 852	-	-	-	-	34 852	38 337	38 337	25 996	12 341	32.2	-	12 341	32.2	3 373	8 968	105 970	8.4					
Costa Rica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 293	-					
Cuba	46 466	-	-	2 400	2 592	44 066	48 473	51 065	22 338	28 727	56.3	259	28 468	58.7	9 588	19 139	146 067	13.1					
Dominican Republic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9 379	-					
Ecuador	600	-	-	-	-	600	660	660	-	660	100.0	-	660	100.0	-	660	13 641	4.8					
El Salvador	300	-	-	-	-	300	330	330	-	330	100.0	-	330	100.0	-	330	9 482	3.5					
Guatemala	400	-	-	-	-	400	440	440	-	440	100.0	-	440	100.0	-	440	9 009	4.9					
Haiti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 487	-					
Honduras	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 306	-					
Mexico	263 524	-	-	57 667	62 280	205 857	226 443	288 723	177 533	111 190	38.5	6 228	104 962	46.4	32 479	78 711	357 127	22.0					
Nicaragua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 715	-					
Panama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 690	-					
Paraguay	400	-	-	-	-	400	440	440	-	440	100.0	-	440	100.0	-	440	1 992	22.1					
Peru	32 242	-	-	3 086	3 333	29 156	32 072	35 405	22 508	12 897	36.4	333	12 564	39.2	1	12 896	59 434	21.7					
Uruguay	32,000	-	-	9 667	10 440	22 333	24 566	35 006	24 560	10 446	29.8	1 044	9 402	38.3	-	10 446	61 316	17.0					
Venezuela	15 359	-	-	-	-	15 359	16 895	16 895	8 451	8 444	50.0	-	8 444	50.0	-	8 444	101 227	8.3					
Total	1 253 215	73 847	77 540	263 327	284 393	916 041	1 007 647	1 369 580	864 291	505 289	36.9	28 439	476 850	47.3	45 441	459 848	2 053 953	22.4					

/ recovery rates

recovery rates in North America, Europe and Japan.^{5/}

Total recovery of waste paper is undoubtedly greater than it would seem from these calculations. For example, in most countries old newspapers are used to a great extent as wrappings, and it is rather doubtful whether any significant proportion of these directly reused papers is recovered for industrial purposes.

Though pulp production capacity in Latin America is growing relatively faster than that of paper and board at present, it is estimated that in future the need for waste paper will keep approximately abreast of paper and board consumption, partly because local pulp will replace some of the present pulp imports, and partly because the board industry may be expected to grow more rapidly from now on.

The rise in per capita consumption will facilitate the salvage of old papers, and though some countries of the region already have fairly high recovery rates, notably Brazil and Chile, it seems reasonable to assume that the rate for the region will be somewhat higher than at present, and that there will therefore be a sufficient supply of waste paper.

6. Supply of chemicals

In accordance with the process used, the basic chemicals needed for the production of pulp are caustic soda, sodium sulphate, chlorine, limestone and sulphur. For paper-making some additional chemicals such as alum are needed, together with clay, resins and colours.

The quantity of chemicals needed in the sulphate process is approximately 90 kg of sodium sulphate and 250 kg of limestone without lime reburning (50 kg with reburning), per ton of unbleached pulp. Thus, for Latin America's production of approximately 110,000 tons of sulphate pulp in 1957, about 10,000 tons of sodium sulphate and some 25,000 tons of limestone were used.

In the sulphite process, approximately 120 kg of sulphur and 150 kg of limestone are required for one ton of unbleached pulp. Therefore, for

^{5/} See Food and Agriculture Organization, Report of the World Consultation on pulp and paper demand, supply and trade, (59/9/6788), p.15.

the total output of approximately 95,000 tons of sulphite pulp in 1957, about 11,500 tons of sulphur and 14,000 tons of limestone were needed.

Of the chemical woodpulp produced in 1957, approximately 60,000 tons were bleached; in the bleaching process about 80 kg of chlorine and 25 kg of caustic soda were used per ton of pulp. Thus requirements of chemicals were about 5,000 tons of chlorine and 1,500 tons of caustic soda.

The production of other types of pulp (semi-chemical from wood and other raw materials, chemical from straw, grasses and bagasse) was approximately 130,000 tons in 1957, of which some was bleached. It may be roughly estimated that the consumption of chemicals for this purpose was 20,000 tons of caustic soda, 5,000 tons of chlorine and a few thousand tons of limestone.

Thus, in 1957, the overall requirements of basic chemicals were as follows: over 20,000 tons of caustic soda, approximately 10,000 tons of sodium sulphate, 11,000 tons of sulphur, 10,000 tons of chlorine and 40,000 to 50,000 tons of limestone.

Limestone for pulping purposes is obtained locally. The output of caustic soda has generally been insufficient for the different requirements of the industry, apart from pulping itself, and most countries in the region have had to import it. One of the reasons for the relatively low production of caustic soda has been the difficulty of disposing of the chlorine generated in electrolysis. The chlorine supply has therefore been sufficient, and none has been imported for the pulp industry. As a matter of fact, many pulp mills have their own electrolysis plant scaled according to their chlorine requirements, the caustic soda surplus being sold to the domestic market.

Many countries in the area have sulphur deposits. However, Brazil, which is the main producer of sulphite pulp, has had to import the bulk of the sulphur needed in the preparation of the cooking liquor.

Sodium sulphate is produced in Chile and is also exported. Argentina has good quality deposits. All the other countries have had to import their saltcake requirements. Salt is generally available locally.

/The present

The present expansion of the Latin American chemical pulp industry will add over 600,000 tons to existing capacity in 1957-58. A little over 400,000 tons of the new capacity, which will be in operation by 1961-62, will be used for making sulphate pulp, the remaining 200,000 tons being mainly based on the soda process. Approximately one third of the new production will be bleached.

The requirements of key chemicals, over and above the quantities used in 1957, will thus be approximately 35,000 to 40,000 tons of sodium sulphate, 15,000 to 20,000 tons of chlorine, 35,000 to 40,000 tons of caustic soda, and 30,000 to 40,000 tons of limestone. It is evident that, though new alkali-chloride-electrolysis plants have been and will be built in many countries, caustic soda will still have to be imported to a great extent, not only for the purposes of the pulp industry but also for a variety of other uses, such as the manufacturing of soaps, dyes, cleansers, rayon, textiles, sugar and chemical products, the refining of petroleum and vegetable oils, the processing of rubber and for many metallurgical industries. Chlorine will probably be in local supply.

The most important user of sodium sulphate is the pulp industry, followed by the textile, glass, ceramics and detergent industries. The current expansion of salt-cake production in Chile, together with Argentina's output, will be sufficient to supply all Latin America's requirements provided that trade can be developed.

The chemicals for paper-making are imported, with the exception of clay in some countries.

III. ANALYSIS

III. ANALYSIS AND PROJECTIONS OF DEMAND

1. Outline of previous projections

All projections of Latin American paper and board demand published by the United Nations in the last few years are based on the assumption of a more or less close relationship between the growth of the product and the increase in paper and board consumption. In the case of paper for educational purposes,^{6/} other independent variables - apart from the growth of the product - have been tested, such as indices of literacy, educational activities, printing, and, in general, of educational progress, but the results have not been satisfactory owing to the dearth of statistics.

In the case of each Latin American country the first projection was based on a general correlation between paper and board consumption and the per capita product for a group of countries comprising all those in Latin America and several outside.^{7/} On the assumption that a linear relationship existed between the aforementioned variables, a constant elasticity coefficient was used for all income levels and all countries.

The calculations prepared on the basis of this correlation formulated various hypotheses on the per capita growth of the product ranging from 1 to 5 per cent annually, 3 per cent being finally chosen as a working hypothesis.

These projections were followed by another set which made important innovations in the methodology used.^{8/} In the first place, it was considered that the relationship between paper and board consumption and the

^{6/} Newsprint and printing and writing paper.

^{7/} See Possibilities for the development of the pulp and paper industry in Latin America, United Nations Publications, Sales No.: 1953.II.G.2.

^{8/} See Pulp and paper prospects in Latin America, United Nations Publications, Sales No.: 1955.II.G.4. This is a compendium of all the studies submitted to the Latin American Meeting of Experts on the Pulp and Paper Industry held at Buenos Aires in 1954.

per capita product would be better represented by a second-degree curve than by a straight line as before. The use of this relationship enables a proven fact to be taken into account, namely, that income-elasticity ^{9/} is greater when the level of income is low, and decreases as the latter rises.

Secondly, the hypothesis that the product grows at the same rate in all Latin American countries was discarded in favour of a separate analysis of its progression in each one. Two hypotheses were formulated in each case: one that might be termed optimistic and the other pessimistic. The first varied from 0.5 to 2 per cent and the second from 1.5 to 3 per cent.

Demand thus projected for 1960 and 1965 was respectively 12 and 18 per cent less than when it was calculated in accordance with the first method described.

When the World Consultation on Pulp and Paper Demand, Supply and Trade was held at Rome, the secretariat of the Food and Agriculture Organization of the United Nations (FAO) presented a forecast of world demand ^{10/} prepared by a new method based on two fundamental assumptions: one, that consumption of paper and board will reach saturation with the indefinite growth of income and, two, that consumption will increase in accordance with a logistic curve determined by means of inter-country comparisons. The forecast adduces further proofs in support of the theory of decreasing elasticity coefficients. This theory is particularly important for projections of a fairly long period when the product may be expected to vary considerably. For shorter periods, and when sufficient information is available on paper and board consumption by specific categories as well as on the main economic factors that influence demand for each category, a logarithmic linear relation may be used in the certainty that the ensuing result will be very much the same as that obtainable by using a function of demand, with a decreasing elasticity coefficient.

^{9/} When a curve is fitted to two series of consumption and income observations, income-elasticity is determined by the slope of the curve at the point corresponding to a given income.

^{10/} World demand for paper to 1975, FAO/WPPC-59/2.

The estimates of Latin American demand prepared by this method fall midway between the results of the other two projections mentioned.

In the different reports prepared by the Group on the industry's situation and prospects in various Latin American countries,^{11/} demand was projected by one or more of the methods described, in accordance with the amount of statistical data available and other circumstances peculiar to the case in point.

Thus, in the report on Argentina^{12/} the elasticity coefficients were estimated by the second of the two methods explained in this chapter. Initially, an attempt was made to obtain a historic correlation, but the sharp fluctuations in consumption during the postwar decade as a result of the restrictions placed on imports made it impossible to obtain satisfactory results. For Brazil, Ecuador, Mexico, Peru and Venezuela, the respective historic correlations were used, supplemented in some cases - such as that of Mexico - by a general correlation covering all the Latin American countries. In the case of Ecuador, it was decided, for purposes of comparison, to use elasticity coefficients calculated according to the method presented for consideration at the World Consultation in Rome.

For the projections of demand in Colombia and Cuba a general correlation covering all the Latin American countries, Canada and the United States was used, based on average consumption and the gross product in 1955-57. As this is the method adopted for the projections in the present document, it will be dealt with separately in the following section.

^{11/} Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Peru and Venezuela.

^{12/} Resumen de la situación del papel y la celulosa en la Argentina: posibilidades de desarrollo y aspectos económicos (E/CN.12/485; FAC/ETAP No. 711).

2. Method used in the present report

The method of projection is essentially the same as that adopted for the study submitted to the Latin American Meeting of Experts at Buenos Aires.

Although the projections effected for each country were at hand in the reports published by the Advisory Group, this method was preferred for the following reasons:

1. Most of the projections made in the Group's reports were based on the extrapolation of a logarithmic linear relation (with constant elasticity) between the historic consumption series and the product, covering 10 or 12 years at the most, i.e. a fairly short period. As the projection period is nearly 20 years (1955-57/75) in the present case, it was considered that more realistic results would be obtained if decreasing elasticity coefficients were used.
2. Although the projection formulated by FAO^{13/} also assumes a decreasing elasticity, preference was given to a different kind of projection which, although embodying the same principle, would facilitate the formulation of individual country projections. Moreover, a comparison of the two kinds of projection for the region as a whole shows that they give very similar results. The projection chosen for the present report was only 5 and 8 per cent higher than that used by FAO for 1965 and 1975 respectively.

The choice of hypothesis on the growth of the product is recognized to be of vital importance for estimates of future demand. In the present case, the rates of growth adopted were calculated on the basis of the following factors: (a) historic rates of growth; (b) an analysis of the situation for programming purposes in the countries where ECLA or other official bodies have undertaken or are undertaking economic development studies; and (c) the arbitrary assumption that no country would have a per capita rate of development lower than 1.5 per cent annually. In the particular case of Venezuela, a rate of 3 per cent - which is considerably less than the historic rate of 5 per cent - was

^{13/} World demand for paper to 1975, op.cit.

decided upon on the supposition that diverse circumstances, including the international petroleum situation, would make it impossible for such an intensive rate of growth to be maintained.^{14/}

With respect to population growth, a United Nations projection was used ^{15/}which has been amended to a certain extent by ECLA and is now used as a working estimate by that organization.

The method of general correlation, which has been adopted for the projections in this report, was chosen on the assumption that the present relationships among the countries included in the correlation estimate would persist in every case. ^{16/}

The procedure, which resembles that followed in the document submitted to the Buenos Aires conference ^{17/}was as follows. Consumption of paper and

^{14/} Nearly all the projections undertaken up to now consist of two or more hypotheses on the growth of the product. In this case, however, it has been decided to work with one only, on the ground that if the possibilities differ widely the projection will lose much of its validity, whereas if they are very close to one another, it is almost as advantageous to formulate a single hypothesis that reflects economic development prospects as fully as possible.

^{15/} See The future growth of world population (ST/SOA/Series A/28).

^{16/} Nevertheless, if a comparison is made between the elasticity coefficients thus obtained for a country with those deriving from a historic correlation between consumption and the product in the same country, the last-named would be slightly higher. The difference - known as the time trend - is attributable to the influence exercised in one sense or the other by factors that are unrelated to the growth of income, such as changes in consumption patterns and in the relative price of paper, or more rapid progress in the field of education, all of which have a bearing on elasticity when calculated by the historic method. The document submitted to the World Consultation at Rome contained a preliminary analysis of this subject. It had found that the time trend was positive in the cases studied (which included Latin America), i.e. paper and board consumption increased more rapidly than might have been expected if the growth of the product alone had been taken into account.

^{17/} Pulp and paper prospects in Latin America, op.cit.

board was divided into three categories - newsprint, printing and writing paper and other papers and board - and the per capita average for 1955-57 worked out. These series, which included the 20 Latin American countries, Canada and the United States, were used, together with the series for the gross national product, to make the relevant logarithmic adjustments in the parabolas. Then, in order to obtain the elasticity coefficients, the first derivatives (slopes) of the function corresponding to the two levels of income at either end of the projection (1955-57 and 1975) were ascertained; thereafter the arithmetic average of the coefficients thus obtained was calculated and applied to average consumption in 1955-57. With the aid of the projections of the gross product and population, estimates of demand could then be made up to 1975 for each country. There was one exception to the rule - Venezuela. In this case, on the assumption that the unusually high level of the product was not a true indication of the degree of economic development reached by the country, it was considered that, if the same hypothesis with respect to decreasing elasticity had been applied, the growth of paper and board demand would have been underestimated. Demand was therefore projected by means of the product-consumption relationships calculated in the report by the Advisory Group on Venezuela. ^{18/}

Table 16 shows the results of the projection of demand made on the above-mentioned assumptions. ^{19/}

3. Projection results

According to the results of the projection, demand would rise at an annual average rate of nearly 7 per cent between 1955-57 and 1975. As it increased at the rate of 7.5 per cent in 1955-59, the projection assumes that the pace achieved in the last few years would slow down somewhat.

Table 17 gives an idea of the position of the projection on which the present report is based in relation to those effected earlier and

^{18/} La industria del papel y la celulosa en Venezuela (E/CN.12/536; FAO/ETAP/1115; TAO/VEN/12.)

^{19/} The basic series and details of the procedure appear in annex IV.

Table 16
LATIN AMERICA: PROJECTIONS OF DEMAND FOR PAPER AND BOARD, 1965, 1970 AND 1975
(Thousands of tons)

Country	1955-57 a/				1965				1970				1975			
	News- print	Print- ing and writing board	Other paper and board	Total	News- print	Print- ing and writing board	Other paper and board	Total	News- print	Print- ing and writing board	Other paper and board	Total	News- print	Print- ing and writing board	Other paper and board	Total
Argentina	120	88	224	432	175	134	339	648	214	168	424	806	263	211	530	1 004
Bolivia	1	2	2	5	2	3	3	8	3	3	4	10	4	4	5	13
Brazil	189	132	313	634	334	235	571	1 140	461	325	801	1 587	636	451	1 125	2 212
Chile	25	17	39	81	40	28	64	132	52	37	85	174	67	48	111	226
Colombia	25	25	56	106	44	46	102	192	60	62	142	264	77	81	186	344
Costa Rica	3	1	4	8	5	2	8	15	7	3	11	21	10	3	15	28
Cuba	35	19	92	146	59	34	166	259	79	47	230	356	106	65	316	487
Dominican Republic	1	1	7	9	2	2	12	16	3	2	17	22	5	3	25	33
Ecuador	6	2	6	14	12	3	11	26	18	4	16	38	25	5	24	54
El Salvador	4	1	5	10	6	1	9	16	8	1	12	21	11	2	16	29
Guatemala	3	3	4	10	5	5	6	16	7	7	9	23	9	9	12	30
Haiti	-	-	2	2	1	1	3	5	1	1	4	6	1	1	6	8
Honduras	1	1	2	4	2	1	3	6	2	1	4	7	3	2	6	11
Mexico	67	65	225	357	135	132	468	735	190	188	675	1 053	275	274	995	1 544
Nicaragua	1	-	2	3	2	1	4	7	3	1	7	11	4	1	8	13
Panama	3	1	9	13	4	2	13	19	5	2	18	25	6	3	24	33
Paraguay	1	-	1	2	1	-	2	3	1	1	2	4	2	1	3	6
Peru	17	8	34	59	30	14	62	106	42	19	85	146	57	26	117	200
Uruguay	26	11	24	61	35	15	32	82	40	18	37	95	45	20	42	107
Venezuela	19	19	63	101	44	49	162	255	64	80	261	405	95	130	419	644
Total	547	396	1 114	2 057	998	708	2 040	3 686	1 260	970	2 844	5 074	1 701	1 340	3 985	7 026

Note: A dash means that the figure is below 500 tons.

a/ Actual figures.

/ mentioned in

mentioned in this chapter. The estimates presented in table 17 constitute an average of the alternative hypotheses comprised in each of the projections.

As may be seen, the figures in projection 4 for 1960 and 1965 fall between the extremes of projection 1 (highest) and projection 2 (lowest), but are much nearer the former. In 1965, projection 3 is virtually equidistant between the two estimates in question.

To judge by the magnitude of real consumption in 1959 - nearly 2.5 million tons - it may be estimated that its level would rise to slightly over 2.6 million in 1960. This being so, projection 2 would be as much as 12 per cent below the real figure. In actual fact, the average hypothesis made by that projection for 1960 had already been exceeded in 1959.

Projection 1, on the other hand, would be very close to the probable real figure in 1960 and not far removed from the estimate for 1965.

Table 17
LATIN AMERICA: COMPARISON OF PROJECTIONS OF DEMAND FOR
PAPER AND BOARD
(Thousands of tons)

Projection	1960	1965	1975
1. ECLA/FAO	2 681	3 807	-
2. ECLA/FAO/BTAO	2 346	3 126	-
3. FAO	-	3 500	6 500
4. Advisory Group	2 671 <u>a/</u>	3 686	7 026

Note: Projection 1: Posibilidades de desarrollo de la industria, op. cit.

Projection 2: Pulp and Paper Prospects in Latin America, op. cit.

Projection 3: Forecast of demand up to 1975;

Projection 4: as used in the present report.

a/ Included for purposes of comparison only.

/IV. MEETING

IV. MEETING FUTURE DEMAND

1. Additional requirements

As stated in chapter III, Latin American demand for paper and board will amount to approximately 3.7 million tons in 1965 and to approximately 7.0 million tons ten years later. Present capacity together with the expansion projects that are being carried out will amount in 1961-62 to around 2.2 million tons. On the assumption of 95-per-cent utilization of capacity, the additional production or import requirements in 1965 would be approximately 1.55 million tons, of which about 715,000 tons, or almost half, would be newsprint. The seven countries of the Free-Trade Area account for approximately 550,000 tons of this import demand for newsprint, and approximately 390,000 tons of the 840,000 tons import demand for other papers and board.

The additional amounts needed in 1975, over and above 1965 requirements, would be approximately 0.76 million tons of newsprint and 2.6 million tons of other papers and board.

Pulp requirements in 1961-62 can be computed on the basis of the above-mentioned estimates for paper and pulp production, it being assumed that waste paper will constitute 35 per cent of the fibre furnish or slightly less than the average percentage in 1955-57 (see table 18).

In Annex I, the possibilities of meeting the demand projected for 1965 are analysed by countries. The analysis indicates that, if sufficient emphasis is given to the pulp and paper industries, the region could produce the following quantities:

Newsprint	approximately	655,000 tons
Printing and writing papers	" " "	560,000 "
Other papers and board	" " "	1,850,000 "

Even so, it would still be necessary to import more or less the same amounts as in the last years of the '50's. Newsprint purchases would drop considerably, however, and less printing and writing papers would be required.

Table 18

LATIN AMERICA: PULP REQUIREMENTS IN 1961 AND 1962

(Thousands of tons)

<u>Estimated paper production</u>		
(95% of capacity)		2 150
<u>Fibre requirements</u>		
(1.07 ton/ton paper)		2 300
<u>Mechanical pulp supply</u>		
Production (95% of the capacity of 300 000 tons)	285	
Imports	<u>30</u>	315
Ton/ton paper produced	0.15	
<u>Chemical coniferous pulp supply</u>		
Production (95% of the capacity of 430 000 tons)	410	
Imports	<u>160</u>	570
Ton/ton paper produced	0.26	
<u>Other chemical pulp production</u>		
(95% of the capacity of 670 000 tons)		610
Ton/ton of paper produced	0.29	
<u>Waste paper</u>		
35% of the fibre requirements	<u>805</u>	2 300
Ton/ton of paper produced	0.37	

/Estimated fibre

Estimated fibre production is as follows:

Groundwood	approximately	635,000 tons
Chemical coniferous pulp	" " "	572,000 "
Other chemical pulps	" " "	825,000 "

If these production targets are reached by 1965, it will be possible for the fibre requirements for the above-mentioned paper production to be largely met. The necessary imports would be approximately 40,000 tons of groundwood and 250,000 tons of chemical pulp.

In table 19 an analysis is made of Latin America's pattern of fibre consumption in 1965. When this is compared with the figures in table 20 the only apparent change is the higher share of groundwood in the fibre furnish in 1965. The share of waste paper will decrease in proportion. This is attributable to the big advances which newsprint production is expected to make between 1961-62 and 1965.

As regards the fresh raw materials to be used for the assumed volume of fibre production in 1965, the coniferous trees required for chemical pulp (5.5 cubic metres solid volume with bark per ton of pulp) and for groundwood (2.8 cubic metres per ton) will be approximately 5.0 million cubic metres. In the production of short-fibre chemical pulp, including semi-chemical pulp, about 325,000 tons will come from broadleaved trees, and wood consumption (4.5 cubic metres solid volume with bark per ton of pulp) will be approximately 1.46 million cubic metres. Approximately 375,000 tons will be from bagasse, the amount required (6.0 tons wet bagasse per ton of pulp) being approximately 2.25 million tons. About 125,000 tons will be produced on the basis of agricultural residues, grasses, etc. and the raw material requirements will be about 0.3 million tons.

To forecast the development of production up to 1975 is an ungrateful task. During the period in question, many a new or incipient process may be brought into commercial operation, thus widening the base of industry in Latin America as well as in other regions. However, from the given forecast of 1975 demand, and with due consideration for future production possibilities in the other regions of the world (see section 4), it appears that Latin America must at least double its production of paper and fibres between 1965 and 1975 if it is to have a sufficient quantity of these commodities for further cultural and economic development.

/Table 19

Table 19
LATIN AMERICA: ESTIMATED FIBRE CONSUMPTION IN 1965

Use of fibre	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste a/ paper	Total
<u>Newsprint</u>					
Tons/ton paper	0.20		0.85		1.05
Total (estimated pro- duction 633 000 tons)	127 000.00		538 000.00		665 000.00
<u>Printing and writing papers</u>					
Tons/ton paper	0.25	0.50	0.10	0.15	1.00
Total (estimated pro- duction 559 000 tons)	140 000.00	280 000.00	56 000.00	84 000.00	560 000.00
<u>Other paper and board</u>					
Tons/ton paper	0.30	0.30	0.04	0.46	1.10
Total (estimated pro- duction 1 852 000 tons)	556 000.00	556 000.00	74 000.00	852 000.00	2 038 000.00
Total					
Tons/ton paper	0.27	0.28	0.21	0.31	1.07
In tons	823 000.00	836 000.00	668 000.00	936 000.00	3 263 000.00
a/ Waste paper recovery rate 25.5.					

On the assumption that in 1975, as in 1965, newsprint imports from outside the region would amount to approximately 300,000 tons, the requisite regional production would be 1,400,000 tons, an increase of 120 per cent over the estimated 1965 level. As the estimates for printing and writing papers are roughly the same as current imports (140,000 tons), local production would have to be approximately 1,200,000 tons in 1975. This figure is 115 per cent above the estimated production for 1965. With respect to other papers and board, it would be necessary for local production to reach some 3,700,000 tons, 300,000 tons being imported from outside the region. This involves a duplication of the 1965 production estimate.

In calculating the fibre requirements for the above-mentioned paper production, attention should be paid to the special features of the region:

- (a) The supply of coniferous trees is limited. Though there are flourishing coniferous plantations in Chile, the other sources are either rather depleted (southern States of Brazil, mesa central in Mexico, Cuba) or, at present at least, inaccessible (Central America, the Mexican mountains);
- (b) With the economic development of the region, the vast tropical forest will become more accessible and play a more important part as a source of raw material for the pulp industry;
- (c) The cultivation of poplars (Argentina) and eucalypts (Brazil) yields a very high increment;
- (d) Sugar-cane bagasse will certainly provide an increasingly large proportion of the industry's fibre supply;
- (e) Waste paper is already used in rather large amounts in paper production and it is not likely that its share in fibre furnish will increase.

It is evident that the present tendency to use increasing quantities of short-fibre raw materials will continue in future and acquire greater momentum. In table 20 an estimate is made of Latin America's fibre consumption in 1975, due allowance being made for the large-scale replacement of long-fibre chemical pulp (mostly coniferous) by pulps of other types (see Annex V for details). It has also been assumed that approximately 20 per cent of the groundwood type pulp will be produced from broadleaved species (poplar and eucalypts). If these figures are compared with those in table 19, it may be seen that the increase in the consumption of long-fibre chemical pulp is estimated at approximately

Table 20
LATIN AMERICA: ESTIMATED FIBRE CONSUMPTION FOR THE REGION IN 1975 IF
DEVELOPMENT PLAN COULD BE EXECUTED ^{a/}

Use of fibre	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste ^{b/} paper	Total
<u>Newsprint</u>					
Tons/ton paper	0.20	0.05	0.80		1.05
Total (estimated pro- duction 1 400 000)	280 000.00	70 000.00	1 120 000.00		1 470 000.00
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.57	0.08	0.15	1.00
Total (estimated pro- duction 1 200 000)	240 000.00	680 000.00	100 000.00	180 000.00	1 200 000.00
<u>Other paper and board</u>					
Tons/ton paper	0.25	0.37	0.03	0.43	1.08
Total (estimated pro- duction 3 700 000)	925 000.00	1 390 000.00	90 000.00	1 590 000.00	3 995 000.00
<u>Total</u>					
Tons/ton paper	0.23	0.34	0.21	0.28	1.06
In tons	1 445 000.00	2 140 000.00	1 310 000.00	1 770 000.00	6 665 000.00

a/ See Annex V.

b/ Waste paper recovery rate 25.2.

65 per cent, of short-fibre chemical and semi-chemical pulps at approximately 150 per cent, of groundwood pulp at approximately 100 per cent, and of waste paper at approximately 90 per cent.

On the assumption of 300,000 tons of imports of long-fibre chemical pulp, production requirements of this type of fibre will be 1,145,000 tons; as no imports of other types from outside the region are foreseen, estimated consumption corresponds to production needs. The necessary percentage increase in production from its 1965 level to that foreseen for 1975 corresponds to the percentage increase in consumption, except in the case of chemical long-fibre pulp in which, owing to a relative decrease in imports, the requisite production is more than 80 per cent over the estimated level for 1965.

From a calculation of the raw material needs of the pulp industry it appears that if the development outlined above could take place, the consumption of coniferous trees for long-fibre pulp production would be approximately 6.3 million cubic metres solid volume with bark. It is also very probable that a certain amount of bamboo and sisal will be used for producing long-fibre chemical pulp. However, this production is not likely to be very significant.

With respect to the production of short-fibre chemical and semi-chemical pulp it has been estimated that about 1.15 million tons (an increase of 250 per cent over estimated production for 1965) would be from broadleaved trees, and average consumption per ton of pulp 4.0 cubic metres solid volume with bark. The consumption of broadleaved trees for this purpose would thus be approximately 4.6 million cubic metres. The quantity of bagasse pulp is assumed to be 0.85 million tons (an increase of 110 per cent over the 1965 figure), corresponding to 5.1 million tons of wet bagasse. Approximately 0.15 million tons of pulp is expected to be made from agricultural residues, grasses, etc. (an increase of 20 per cent over the production estimate for 1965). As regards groundwood, it is assumed that 0.3 million tons will be produced from broadleaved trees, mainly plantation grown. This corresponds to a consumption of 0.7 million cubic metres solid volume with bark. The major part of the groundwood produced - 1.0 million tons - will be from coniferous trees, and consumption is estimated at 2.8 million cubic metres.

/Thus total

Thus total consumption of fresh raw materials will be approximately 9 million cubic metres of coniferous trees, 5.3 million cubic metres of broadleaved trees, 5.1 million tons of wet bagasse and 0.4 million tons of agricultural residues, grasses, etc.

From a comparison of these figures with those of raw material demand in 1965 it appears that the additional requirements over and above 1965 demand will by 1975 be approximately 4 million cubic metres of coniferous trees, approximately 3 million cubic metres of broadleaved trees, 2.9 million tons of wet bagasse and 0.1 million tons of agricultural residues, grasses, etc.

Apart from the problem of how to finance the estimated necessary expansion in the production capacity of the pulp and paper industry, it may be asked whether the region will be able to produce the large quantities of raw material required.

As regards raw material for long-fibre chemical pulp, by far the greatest amount of which will come from coniferous trees, it is estimated that by the end of this decade the Chilean pine plantations could supply 3.5 million cubic metres of wood for pulping purposes. It seems reasonable to assume that the growing demand for wood will enhance interest in planting, and that by 1975 the Chilean plantations could yield 3.8 million cubic metres of wood for pulping, even with the development of the sawmilling industry.

It is estimated that in 1961-62 approximately 1.35 million cubic metres of coniferous wood will be used for pulping in Brazil; this quantity is expected to increase to approximately 2.0 million cubic metres by 1965. The Brazilian coniferous forests are rather depleted, and only the inventory being carried out at present will be able to give an answer regarding their future possibilities. It is assumed, however, that with rational forest management and continuous planting it will be possible to obtain at least the yield foreseen for 1965 by 1975.

In Mexico, it is estimated that consumption of conifers for pulping will reach the figure of 1.3 million cubic metres in 1965. Mexico has extensive coniferous stands, a large part of which is classified as inaccessible today. It is reasonable to assume that in a fast-developing country the hinterland

/will be

will be opened up and that substantially larger forest areas will be exploited in the near future. The Mexican forests ought to yield at least 2.5 million cubic metres of coniferous wood for pulping purposes by 1975, in accordance with Mexican requirements.

The Central American coniferous forests are already capable of yielding at least 0.5 million cubic metres and will probably supply a great deal more by 1975. In this respect it should be pointed out that the development of the pulp and paper industry in these countries is closely connected with the development of sawmilling. Owing to the nature of the Central American forests, forest industry there should consist of integrated sawmilling and pulping activities.

If the Araucaria stands in Argentina and pine plantations in Argentina, Cuba and Uruguay are taken into consideration, over 9 million cubic metres of coniferous wood might be available for pulping purposes by 1975.

Though this corresponds in the aggregate to estimated demand, it may be impossible to exploit some of the stands for export purposes because of the cost. It is therefore strongly recommended that a vigorous campaign for planting fast-growing coniferous trees should be launched.

The supply of broadleaved trees will not present greater problems. Of the estimated demand of 5.3 million cubic metres, over 4 million will be supplied by the plantations in the southern countries of the region. By 1975 there will probably be mature eucalypt plantations elsewhere as well (e.g. Cuba and Venezuela), and the tropical forests will contribute their share of pulpwood.

With the increasing production of cane sugar in the region, the growing size of the sugar mills, and the modernization of their techniques, more and more sugar-cane bagasse will be economically available. The estimated bagasse consumption of 5.1 million tons constitutes no more than a very small percentage of the anticipated "production" of wet bagasse in 1975, which is approximately 70 million tons.

Only a very modest expansion is foreseen in the use of agricultural residues, grasses, canes, etc., and 0.4 million tons of this raw material can easily be collected in Argentina, Brazil and Mexico, which are and will probably continue to be the main producers of these types of pulp.

/It is

It is estimated that waste paper demand for industrial purposes will be 1.8 million tons in 1975. This corresponds to a recovery rate of approximately 25 per cent. The figure seems rather high -- the calculated recovery rate for 1955-57 being 22.4 per cent (see again table 15) -- but is feasible in view of the structure of paper consumption in Latin America and the increasing use of paper.

To sum up, it may be stated that, apart from the doubts expressed with respect to the supply of coniferous trees, there will be plenty of raw material available on which to base the proposed industrial development. However, the conifer supply is likely to give rise to serious difficulties unless proper attention is paid to this problem.

2. Volume and investments needed

In the previous chapter, comparing the projected demand in 1965 with existing capacity and expansion plans now being carried out, the conclusion was drawn that by 1965 the additional annual paper and board requirements would amount to approximately 1.55 million tons of which 720,000 tons would be newsprint. The requirements of the countries of the Free-Trade Area represent approximately 75 per cent of the newsprint demand mentioned and approximately 45 per cent of the demand for other qualities.

The known plans for expansion of newsprint capacity, which could be realised by 1965, include approximately 150,000 tons in Chile, 175,000 tons in Brazil and 55,000 tons in Mexico, for a total of about 380,000 tons. Impressive as these plans are, representing an increase of 150 per cent over the estimated 1961-62 capacity (table 12), they still represent only half of the additional demand. The plans will be carried out in the form of three expansions and four new mills. Assuming that the investment needed (including mechanical pulp production) is about 100,000 dollars per daily ton for expansion of existing facilities and 150,000 dollars per daily ton for new mills, the total investment necessary for carrying out the plans referred to above would be about 160 million dollars.

As regards the other qualities the industry is expected to be able to maintain in the future roughly the present rate of self-sufficiency. The additional production which might be needed for this purpose, over and

/above the

above the 1961-62 capacity (tables 12 and 16) will be: 220,000 tons in Brazil, 38,000 tons in Chile, 25,000 tons in Mexico, 25,000 tons in Peru, 65,000 tons in Venezuela and 23,000 tons in Cuba, for a total of about 400,000 tons, corresponding to a capacity of 420,000 tons. These additional amounts were included in the production when table 21 was prepared, on the basis of Annex I.

Assuming that an investment of 80,000 dollars per daily ton is necessary for new paper and board production (excluding pulp production), the total investment for the above programme would be approximately 120 million dollars.

The programme for expanding newsprint, paper and board production in order to meet the greatest part of the future demand also requires an increase in pulp production.

The fibre requirements for the paper and board production are given in table 19.

Considering the prospects for the realistic development of the pulp industry as well as the possibility of intra-regional trade (e.g. Venezuela and Cuba most probably would have to import considerable quantities from outside the region) the additional production needed is approximately 390,000 tons of chemical pulp and 60,000 tons of mechanical pulp. These quantities were also included in the production figures, when table 21 was prepared. The capacity needed for this production will be approximately 410,000 tons for chemical pulp and 65,000 tons for mechanical pulp, and will represent an investment of approximately 150 million dollars for chemical pulp and 6 million dollars for mechanical pulp.

If the whole programme presented above could be achieved before 1965, the amount of investment needed would be approximately 440 million dollars, and the imports of the region would still be approximately 240,000 tons of pulp (approximately 400,000 tons in 1959), 300,000 tons of newsprint (470,000 tons in 1959), 150,000 tons of printing and writing papers (120,000 tons in 1959) and 190,000 tons of other qualities (210,000 tons in 1959).

Charts 5, 6, 7 and 8 show in graphical form the production and import situation in 1955-57 and the estimated situation in 1961-62.

/Very little

Very little is known of the plans of the industry beyond the year 1965. As a matter of fact, the production estimates for 1965 are already based to a certain extent on wishful thinking.

In planning for the future development of the industry it must, however, be borne in mind that to expect any significant increase in future imports (see section 4) would not be realistic. Thus, to ensure that paper and board in the region will be available in quantities corresponding to the projected demand, the above-mentioned additional quantities have to be produced within the area (see Annex I for details).

In estimating the investment necessary for expansion during the period 1965-75, the basis is very vague. It can, however, be assumed with some certainty that pulp and paper production will in most cases be an integrated operation, and that though there will be a large-scale expansion of existing factories, most of the additional production will come from new mills. It is also very probable that the size of the new mills will be somewhere between 100 and 200 tons a day.

The following estimate is made on the basis of the above-mentioned points and of the production figures in tables 19 and 21.

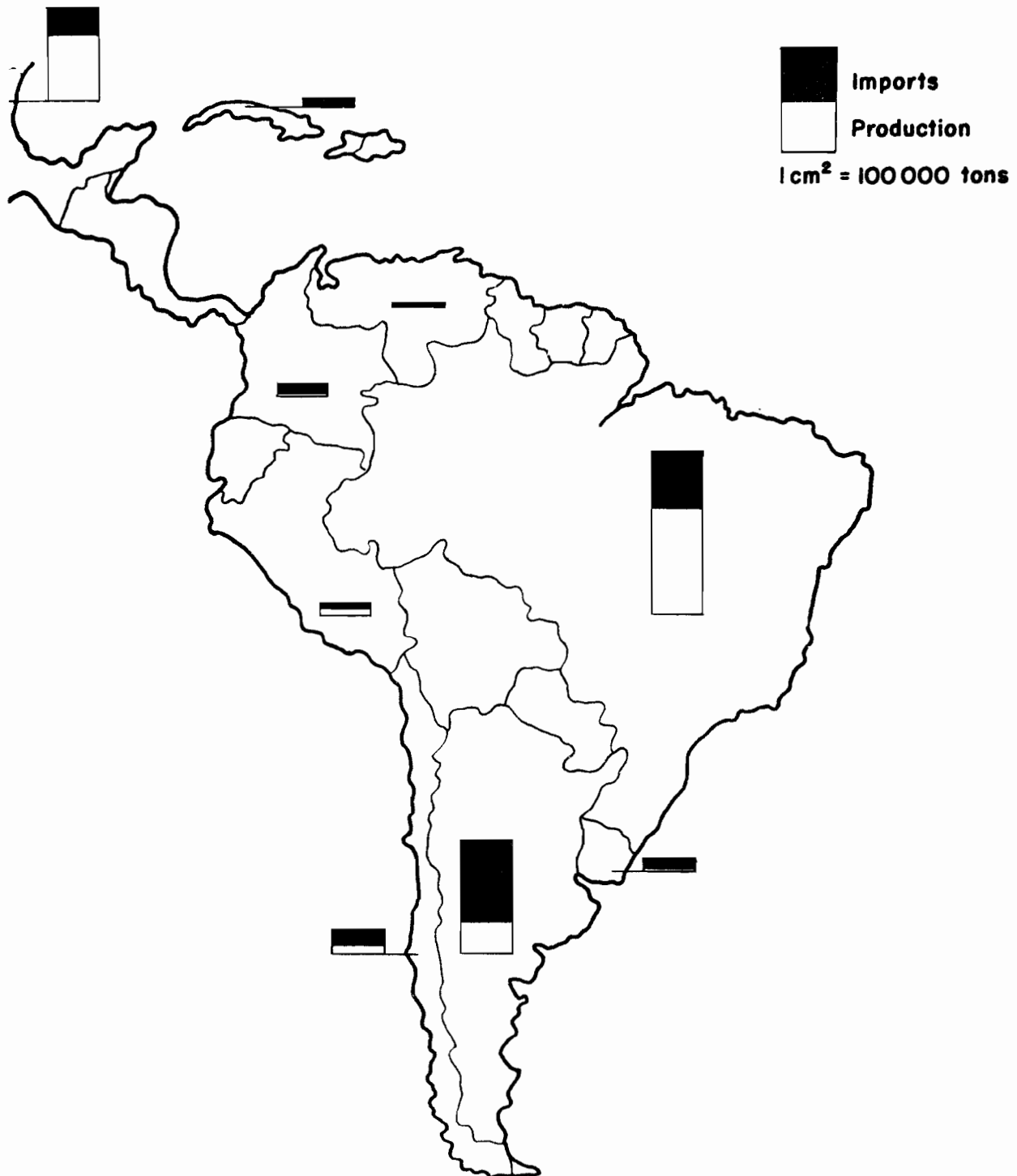
Newsprint

Additional production:	767,000 tons
Capacity required:	800,000 tons = 2,670 daily tons
Investment, including mechanical pulp production:	US\$ 150,000 per daily ton US\$ 410 million

Papers and board

Additional production:	2,483,000 tons
Capacity required:	2,600,000 tons = 8,670 daily tons
Investment, including pulp production:	US\$ 170,000 per daily ton US\$ 1,560 million
	US\$ 1,970 million

PULP PRODUCTION AND IMPORTS BY LATIN AMERICAN
COUNTRIES IN 1955/1957



ESTIMATED PULP PRODUCTION AND IMPORTS BY LATIN AMERICAN COUNTRIES IN 1965

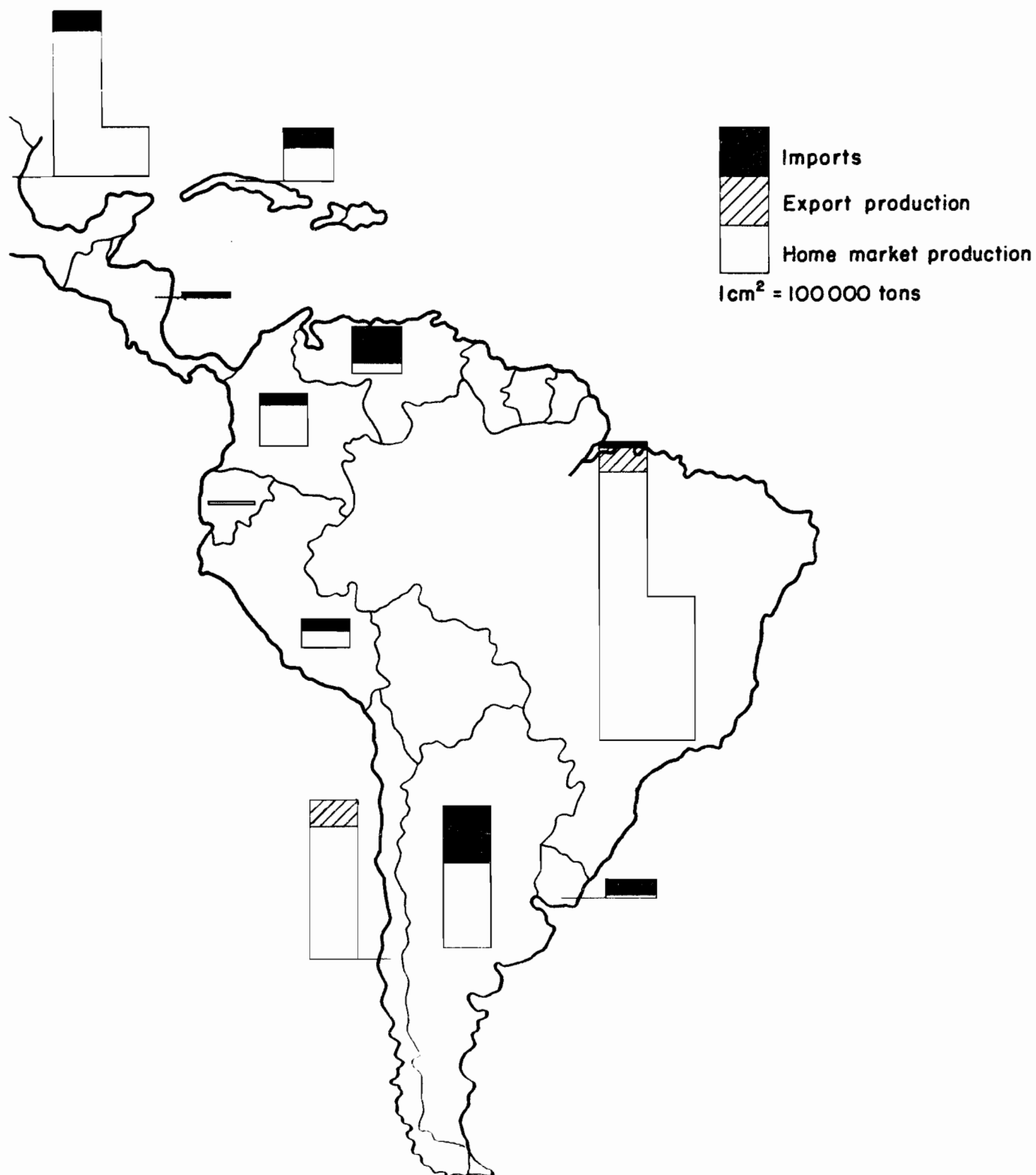
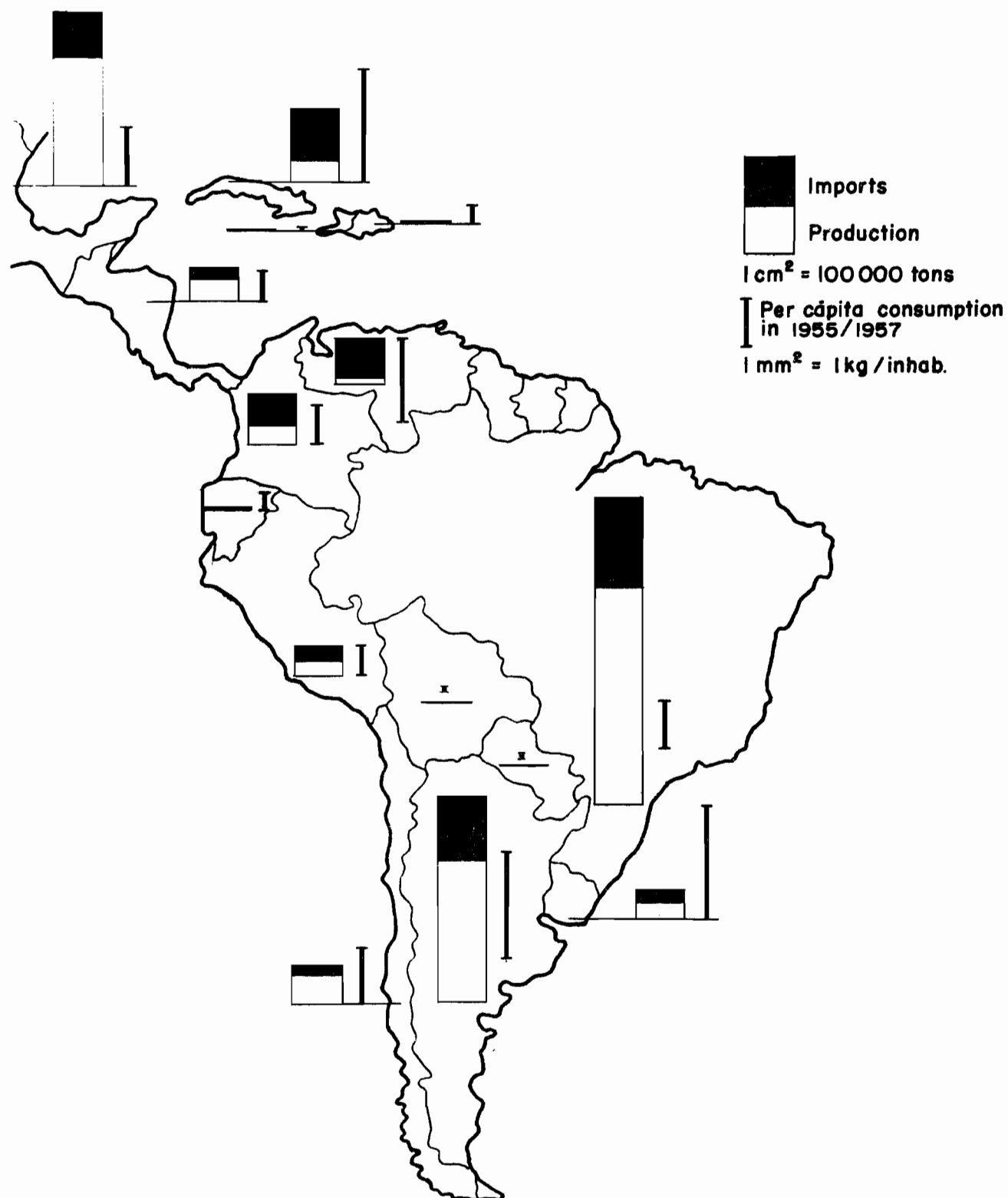


CHART 7

E/CN.12/570

PRODUCTION AND IMPORTS OF PAPER AND BOARD BY LATIN AMERICAN COUNTRIES IN 1955/1957



ESTIMATED PAPER SITUATION IN LATIN AMERICAN
COUNTRIES IN 1965

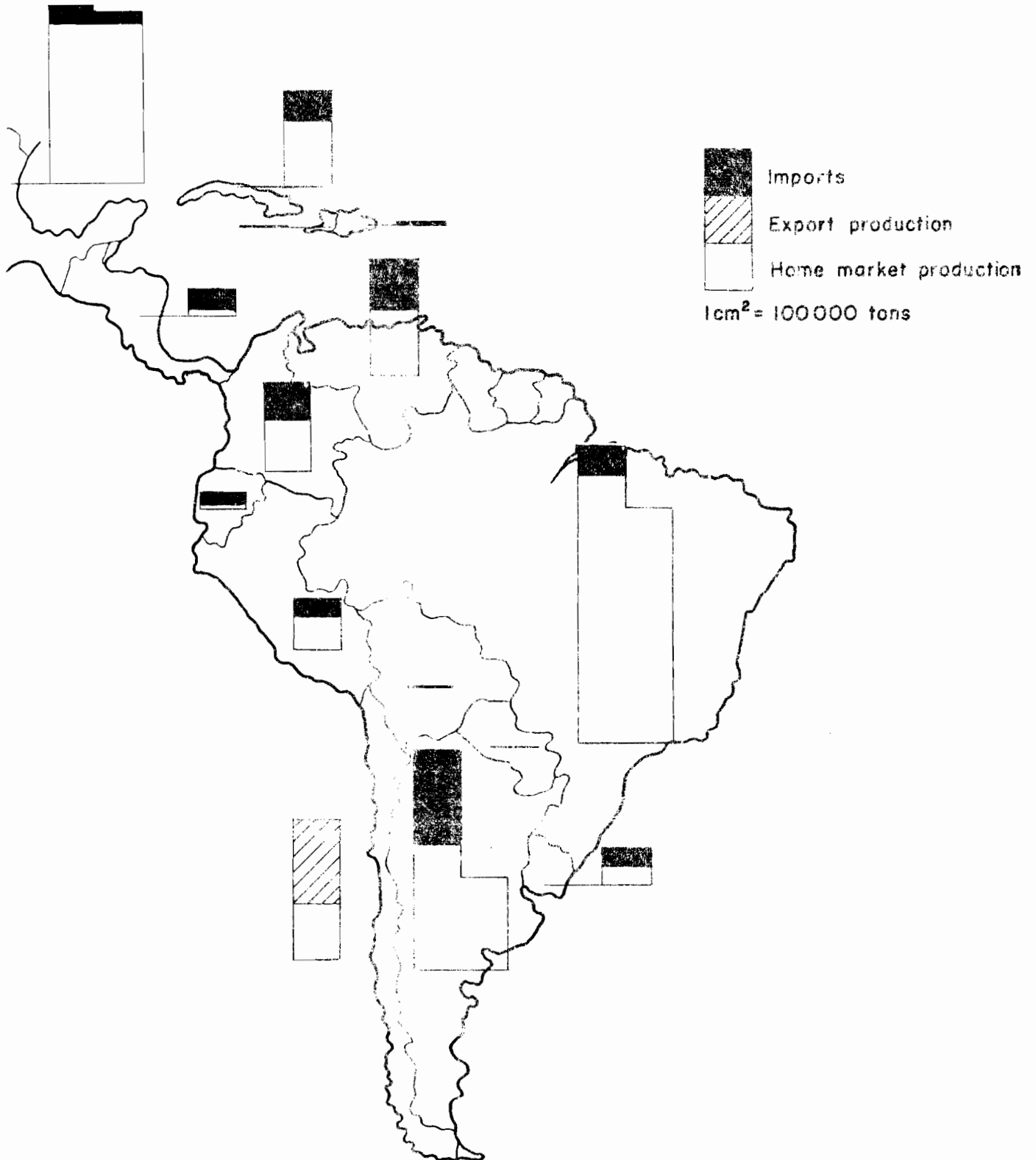


Table 21
LATIN AMERICA: BALANCE SHEET OF PROJECTED DEMAND AND ESTIMATED CAPACITY a/
(Thousands of tons)

	Long fibre pulp		Newsprint		Printing and writing				Other papers and board	
	1955/57	1965	1970	1955/57	1965	1970	1955/57	1965	1970b/	1970b/
Argentina	160a/	120a/	120	103	175	214	23	9	43	8
Brazil	106	10 (+50)	12	146	35	160	23	15	105	4
Chile	27	+55	+95	11	+170	+158	2a/	1	2	2
Uruguay	17	26	29	27	35	40	2	1	4	1
Total	310	156 (55+50)	161 (95)	287	245 (170)	414 (158)	48	26	154	15
Bolivia	-	-	-	1	2	3	1	3	3	1
Paraguay	-	-	-	1	1	1	*e/	*e/	1	1
Peru	8	17	20	17	30	42	5	4	2	5
Total	8	17	20	19	33	45	9	7	6	7
Ecuador	-	-	-	6	12	18	1	2	3	3
Colombia	24	11	14	25	44	60	25	27	43	21
Venezuela	8f/	80	85	19	44	64	19	49	60	47
Total	32	91	99	50	100	142	45	78	106	71
Central America	...	6	+93	11	20	27	5	78	13	16
Panama	-	-	-	2	4	5	1	2	2	8
	-	6	-	13	24	-	6	20	15	24
Mexico	49	36	112	68	40	90	7	10	66	19
Cuba	22	39	39	35	31	51	17	15	28	48
Dominican Republic	-	-	-	1	2	3	1	2	3	7
Haiti	-	-	-	0.3	1	1	e/	1	1	2
Grand total	421	345 (+55+50)	431 (95+93)	473	305	621	120	149	379	193
										108
										949

a/ See annex IV.

b/ Estimated demand in 1970 compared with capacity forecast for 1965. Although the expansion plans beyond 1965 are not known, it is to be hoped that most of the demand will be covered from local production.

c/ Including 31 000 tons of mechanical pulp.

d/ " 34 000 tons of mechanical pulp

e/ " imports of waste paper.

f/ " "other paper and board".

3. Prospects for intra-regional trade

The future balance between projected demand and estimated production capacity in the Latin American countries is given in table 21.

An analysis of the prospect of import requirements being met by Latin American countries with probable exportable surpluses is given below. It is obviously based on a number of assumptions and the pattern of future trade may well be affected by unexpected developments. It is nevertheless felt that a short, even superficial sub-regional study, might reveal interesting facts of some use in evaluating the future flow of trade.

(a) Southern region

According to the estimates in table 21, Argentina, Brazil, Chile and Uruguay will have to import about 160,000 tons of wood pulp in 1965 and approximately the same amount in 1970. If present plans materialize, Chile will have an exportable surplus of approximately 55,000 tons in 1965 and about 95,000 tons in 1970.

Newsprint import requirements will be approximately 250,000 tons in 1965 and 415,000 tons in 1970. The Chilean exportable surplus might be approximately 170,000 tons in 1965 and 160,000 tons in 1970.

In the case of other qualities, supply and demand can be expected to be roughly in balance if allowance is made for imports of some specialty papers. No significant export production of these qualities is foreseen by any of the countries of the region.

In 1965, Bolivia, Paraguay and Peru - the three other southern countries - will have to import approximately 17,000 tons of long fibre pulp, 33,000 tons of newsprint and some 12,000 tons of other qualities; by 1970 their requirements will have increased to 20,000 tons of long fibre pulp, 46,000 tons of newsprint and some 17,000 tons of other qualities.

The southern region thus constitutes a natural market for Chilean surplus production. However, when studying the possibilities of marketing this surplus, consideration should be given to such factors as the ability to compete, tariff protection and local traditions.

/The percentage

The percentage of newsprint exported in 1955-57 by the main supplier countries to the countries mentioned above is indicated in table 22.

Newsprint imports are exempt from customs duties in all countries except Peru, where the duties are approximately 13 per cent ad valorem. Brazil and Uruguay have even instituted a preferential rate of exchange for newsprint imports. A summary of present customs duties is given in Annex III.

Assuming that there will be an adequate supply of newsprint on the world market until the late 1960's,^{20/} Chile will have to compete with other suppliers. It might also be assumed that by 1965 Chile, being one of the countries of the region, can secure for itself a greater share of the market than that held by any country in 1955-57 and that the Chilean share may well increase after 1965. On this basis, Chilean newsprint exports to the southern countries might be estimated as in table 23.

Thus, if marketing factors are taken into account, it seems reasonable to estimate that Chile could supply approximately one-third of the newsprint imported by the countries of the southern zone in 1965 and about 40 per cent of their imports in 1970. This amounts to about 55 per cent of the estimated Chilean export capacity in 1965 and to well over 100 per cent of its estimated capacity in 1970. Chile's share in the middle 1960's might be even higher if some preferential procedures are applied to Chilean production within the economic integration schemes. This is doubtful, however, since newsprint is a commodity of a very special type.

Imports of long fibre pulp by the countries of the southern region are given in table 24. Here, the dominance of the Scandinavian countries is much clearer than in the case of newsprint.

Pulp imports are subject to duties: in Argentina the duty is 6 per cent ad valorem plus a foreign exchange surcharge of 20 per cent. Imports from countries benefiting from the most-favoured-nation clause are exempt from duty on the basis of the convention with Paraguay and the exchange surcharge is not applied to neighbouring countries.

^{20/} See Report of the World Consultation on Pulp and Paper Demand, Supply and Trade, FAO 59/9/6788.

Table 22

NEWSPRINT IMPORTS FROM THE MAIN SUPPLIER COUNTRIES, 1955-57

(Percentages)

Exporting country Im- port- ing country	Austria		Canada		Finland		Norway		Sweden		United States	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Argentina	9	13	17	16	28	25	8	9	10	12	23	20
Brazil	1	1	16	16	27	27	12	11	28	28	14	14
Peru	-	-	16	16	46	44	4	4	2	2	30	31
Uruguay	-	-	25	25	19	19	-	-	49	49	6	7
Total	3.7	5.0	16.7	16.8	27.4	26.5	9.1	9.0	22.1	23.0	17.5	16.4

Table 23

CHILE: POSSIBLE SHAPE OF NEWS-PRINT IMPORTS a/

Possible exporter country	1965		1970	
	Percentage	Thousands of tons	Percentage	Thousands of tons
Argentina	30	53	40	86
Brazil	30	10	35	56
Peru	30	9	50	21
Uruguay	50	17	55	22
Bolivia		1		2
Paraguay		<u>1</u>		<u>1</u>
		91		188

a/ These estimates are really guesses, because not much is known e.g. regarding the development plans of the Brazilian industry after 1965.

/Table 24

Table 24

PULP IMPORTS FROM THE MAIN SUPPLIER COUNTRIES, 1955 TO 1957
(Percentage)

Exporting countries	Importing countries	Argentina	Brazil	Peru	Uruguay	Total
Canada						
Volume		1	1	40	6	2.4
Value		1	1	34	6	1.8
Finland						
Volume		32	68	9	23	46.2
Value		27	62	7	20	38.6
Norway						
Volume		...	9		...	3.7
Value		...	9		...	3.3
Sweden						
Volume		50	19	26	65	38.8
Value		57	23	24	68	44.5
United States						
Volume		5	2	24	7	4.6
Value		3	4	34	5	3.7
U.S.S.R.						
Volume		5				2.7
Value		7	-	-	-	3.8

/Brazil imposes

Brazil imposes an 80 per cent import duty on mechanical and semi-mechanical pulp and in addition these imports are listed in a "special" category subject to a very high foreign exchange surcharge or agio. A 30 per cent import duty ad valorem is applied to chemical pulp which is included in the "general" category.

Import duties in Peru amount to approximately 16 per cent ad valorem. In Uruguay, the duty is 0.54 cents per gross kg, corresponding to 0.50 dollar per ton or approximately 0.3-0.4 per cent ad valorem.

When analyzing the possibilities of satisfying the demand for pulp in the countries of the southern region by imports from Chile, it must be borne in mind that the Chilean export surplus consists and will consist of sulphate pulp. In 1955-57 sulphate pulp represented 35 per cent of the average chemical pulp imports by Argentina, 42 per cent in the case of Brazil, 75 per cent for Peru and 35 per cent for Uruguay.

As a result of modern techniques sulphate pulp can in most cases be used instead of sulphite pulp. The majority of the paper mills, however, are still very reluctant to change their proven methods. There is, nevertheless, every reason to believe that sulphite pulp will in most cases be replaced by sulphate pulp if there is an ample supply of the latter.

It is estimated in this analysis that in the countries concerned sulphate pulp will in future not only retain its own share of imports but also replace half the volume of sulphite pulp imports. In the case of Brazil, however, the present distribution is expected to continue because of the very rapid rate at which domestic sulphate pulp production is developing.

Therefore, assuming that the same conditions exist as in the case of newsprint, and taking into consideration probable sulphate pulp imports while excluding the effects of the Free-Trade Area, the marketing outlook for Chilean export production might be as summarized in table 25.

If this estimate proves to be accurate, Chile will be able to supply about 60 per cent of the sulphate pulp imports in the southern zone in 1965 and approximately 65 per cent in 1970. This amounts to about 40 per cent of the estimated pulp import total.

Table 25

CHILE: POSSIBLE EXPORTS OF SULPHATE PULP IMPORTS AND SHARE IN THE
IMPORTS OF EACH COUNTRY

Importer country	1965		1970	
	Percent- age	Thousands of tons	Percent- age	Thousands of tons
Argentina	70	41	70	41
Brazil	40	2	50	2
Peru	50	8	60	11
Uruguay	50	9	60	
Total		60		66

/ These quantities

These quantities will correspond to approximately 110 per cent of Chile's export capacity in 1965 and to about 70 per cent of its planned capacity in 1970. Thus, there would appear to be a market in neighbouring States for Chile's entire export surplus in 1965. If present plans materialize before 1970, 75 per cent of the exportable quantities could be marketed in this area without difficulty. This figure might even be much higher if Chilean production enjoyed a measure of protection against international competition in the countries of the Free-Trade Area.

As already indicated, Brazil might have an exportable surplus of some 50,000 tons of short fibre pulp in the late 1960's. A considerable amount of this production could be consumed in Argentina and Uruguay if preferential treatment were granted within the Free-Trade Area.

(b) Greater Colombia region

Imports by the three countries - Colombia, Ecuador and Venezuela - in 1955/57 amounted to approximately 32,000 tons of pulp, 50,000 tons of newsprint, 45,000 tons of printing and writing papers, and about 71,000 tons of other paper qualities and board. Import requirements are estimated as follows: in 1965 approximately 91,000 tons of chemical pulp, 100,000 tons of newsprint, 78,000 tons of printing and writing papers, and 40,000 tons of other qualities and in 1970 about 100,000, 130,000, 105,000 and 175,000 tons respectively. Venezuela will be the chief importer of all qualities except perhaps newsprint of which Colombian imports will also be substantial.

None of the three countries mentioned will have an exportable surplus.

Chile and possibly Honduras and Brazil are the only Latin American countries which will have exportable surpluses of paper pulp and newsprint before 1970.

The main suppliers of pulp to this region and their share of the market in 1955-57 are shown in table 26.

The duties imposed on pulp imports are 0.04 bolívares per kg in Venezuela and 0.08-0.10 pesos per kg plus 15 per cent ad valorem in Colombia. In Venezuela, however, pulp imports are at present exempt from import duties.

Table 26

GREATER COLOMBIA AREA: PULP IMPORTS FROM THE LEADING SUPPLIER COUNTRIES a/
 1955-57
 (Percentage)

Importer country	Canada		Finland		Sweden		United States	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Colombia	30	24	2	4	1	1	62	70
Venezuela	10	11	6	7	47	54	34	25
Total	26	21	3	4	10	11	56	61

a/ Including waste paper imports.

/Assuming that

Assuming that Latin American export production, if any, could secure a 20 per cent share of these markets, the corresponding quantities in 1965 would be approximately 2,000 tons for Colombia and 16,000 tons for Venezuela. For 1970 the figures would be 3,000 tons for Colombia and 17,000 tons for Venezuela.

Chile's entire pulp exports in 1965 may very well be absorbed by the southern zone. If so, the only Latin American pulp available for this market would come from the very tentatively planned mill in Central America, although some short fibre pulp might be supplied by Brazil. If present plans are fully realised, Chile and Central America might have an exportable surplus of long-fibre pulp in 1970. Venezuela is not, for geographical reasons, a very likely market for Chilean production.

The import situation for newsprint in 1955-57 is given in table 27.

As in the case of pulp, the North American suppliers are also dominating the market in this respect.

Import duties amount to approximately 5 per cent of the c.i.f. value in Ecuador. Newsprint is exempt from duties in Colombia and in Venezuela, in spite of the fact that the latter has a nominal duty of 0.28 bolívars per kg (approximately 50 per cent of the c.i.f. value).

Assuming that a newsprint mill in Central America (not likely to materialize) could secure a 20 per cent share of the Colombian and Venezuelan markets and that Chilean production could supply 30 per cent of the Ecuadorian, 20 per cent of the Colombian and 10 per cent of the Venezuelan newsprint markets, the volume of this intra-regional trade in 1965 and 1970 would be as shown in table 28.

The amounts indicated for Chile will be available in 1965 if present plans to expand capacity can be carried out. In 1970 Chile's entire export surplus could probably be marketed in the southern countries.

(c) The Central American common market

In 1955-57 the five countries belonging to this area imported a few tons of pulp and approximately 11,000 tons of newsprint, 5,000 tons of printing and writing paper and 16,000 tons of other papers and board. The chief source of supply has been North America.

If present plans for a sulphate pulp and paper industry based on the area's coniferous forests are carried out, this area will be self-sufficient

Table 27
GREATER COLOMBIA AREA: NEWSPRINT IMPORTS FROM THE
LEADING SUPPLIER COUNTRIES, 1955-57

(Annual averages in percentages)

Importer Country	Canada		Finland		Norway		Sweden		United States	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Ecuador	16	15	2	2	6	6	32	34	37	37
Colombia	56	51	4	6	1	1	5	5	26	28
Venezuela	63	62	4	4	-	-	1	1	31	32

Table 28

POSSIBILITIES OF SELLING NEWSPRINT IN THE GREATER
COLOMBIA MARKET

(Tons)

Exporting country	<u>Colombia</u>		<u>Ecuador</u>		<u>Venezuela</u>		<u>Total</u>	
	1965	1970	1965	1970	1965	1970	1965	1970
Chile	9 000	12 000	3 000	5 000	4 000	6 000	16 000	23 000
Central America	9 000	12 000	-	-	9 000	13 000	16 000	25 000
Total	18 000	24 000	3 000	5 000	13 000	19 000	32 000	48 000

/in pulp,

in pulp, kraft paper and newsprint. It might even be in a position to export substantial quantities.^{21/} Colombia, Venezuela and Cuba are possible Latin American markets for sulphate pulp, with the first two countries and Mexico potential buyers of newsprint if production begins in Central America.

(d) Mexico

Mexico's import requirements in 1965 are estimated at 36,000 tons of pulp, 40,000 tons of newsprint and 30,000 tons of other papers. By 1970 these requirements might rise to 112,000 tons of pulp and 90,000 tons of newsprint, imports of other papers probably remaining at the previous level. Mexico, however, is in a position to increase its production considerably above the present target. Thus, its import requirements as given above, particularly with respect to pulp, may well have been over-estimated.

Mexico's imports are given in table 29.

Imports have usually been subject to restrictions, and import licenses, e.g. for sulphate pulp, have been most difficult to obtain. Customs duties amount to 20 centavos per kg plus 10 per cent ad valorem for pulp which is not produced in the country or cannot be substituted by locally produced pulp (in practice sulphite pulp, in which case duties are approximately 20 per cent ad valorem), 40 centavos per kg plus 20 per cent ad valorem for other types of chemical paper pulp (e.g. approximately 40 per cent for unbleached sulphate) and 3 centavos per kg and 30 per cent ad valorem, or approximately a total of 31 per cent ad valorem, for newsprint.

With respect to Mexico's future import requirements, newsprint seems to offer the best possibilities for intra-regional supply. Chile has already begun to export newsprint to Mexico and, within the framework of the Free-Trade Area, will probably be in an advantageous position in the future as well. A newsprint mill in Central America would also find an outlet in Mexico. Most of Mexico's pulp imports will probably be of

^{21/} See Proyecto para la fabricación de celulosa y papel en Centroamérica (FAO/LAIS/59/1; TAO/LAT/23).

Table 29
MEXICO: NEWSPRINT AND PULP IMPORTS, BY COUNTRY OF
ORIGIN, 1955-57
(Thousands of tons)

Imported product	Canada	Finland	Sweden	United States	Other	Total
Newsprint	47.6	2.5	0.1	16.5	0.7	67.5
Pulp	5.1	3.6	18.3	21.3	0.4	48.6

/Sulphite qualities,

sulphite qualities, and in this respect no intra-regional trade possibilities are foreseen.

(e) Caribbean area

The Caribbean countries have imported virtually all their pulp and paper from North America. Developments in Cuba point towards increasing self-sufficiency but this area will still have to import approximately 34,000 tons of newsprint, 80,000 tons of other papers and board, and approximately 39,000 tons of pulp in 1965. By 1970 the requirements might grow to 55,000 tons, 175,000 tons and 40,000 tons respectively, unless Cuban bagasse pulp and paper production can be stepped up.

The prospect of supplying these requirements from Latin American sources is very limited if the plans for building a mill in Central America are not carried out.

(f) Summary

The intra-regional possibilities for supplying the Latin American pulp and paper import requirements are summarized on the above basis in table 30.

Chile and the Central American countries have been omitted from the table, the former because it is already a potential exporter, and the Central American countries because of the reasons explained in point 3 of the present chapter: the Central American common market. Failure to carry out the project under consideration will raise Central American import requirements to approximately 20,000 tons of newsprint and 7,000 tons of pulp in 1965 and about 27,000 tons of newsprint and 10,000 tons of pulp in 1970.

Table 30 shows, however, that if Chile's plans can be fully carried out before 1965, its exports might cover approximately 25 per cent of the newsprint import requirements, this intra-regional trade representing about 20 million dollars.

In 1970 Chile's share will probably be somewhat smaller, approximately 20 per cent, although intra-regional trade is expected to increase to some 27 million dollars.

In the pulp trade, Chile's export potential in 1965 might meet about 15 per cent of the import requirements for a value of around 6 to 7 million

Table 30
LATIN AMERICA: POSSIBILITIES OF INTRA-REGIONAL TRADE
(Thousands of tons)

	Non-pulp								Pulp						
	1965				1970				1965				1970		
	Import requirements	Chilean market	Central American market	Import requirements	Chilean market	Central American market	Import requirements	Chilean market	Central American market	Import requirements	Chilean market	Central American market	Import requirements	Chilean market	Central American market
Argentina	175	53	-	214	86	-	-	120	41	-	-	120	41	-	-
Bolivia	2	1	-	3	2	-	-	-	-	-	-	-	-	-	-
Brazil	35	10	-	160	56	-	-	10	2	-	-	12	2	-	-
Colombia	44	9	8	60	12	11	11	11	2	2	2	14	3	3	3
Cuba	31	-	?	51	-	?	?	39	-	-	-	39	-	-	-
Dominican Republic	2	-	?	3	-	?	?	-	-	-	-	-	-	-	-
Ecuador	12	3	-	18	5	-	-	-	-	-	-	-	-	-	-
Haiti	1	-	?	1	-	?	?	-	-	-	-	-	-	-	-
Mexico	40	10	10	90	15	20	20	36	-	-	-	112	5	-	-
Panama	4	-	-	5	-	-	-	-	-	-	-	-	-	-	-
Paraguay	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Peru	30	9	-	42	21	-	-	17	8	-	-	20	12	-	-
Uruguay	35	17	-	40	22	-	-	26	9	-	-	29	11	-	-
Venezuela	44	4	9	64	6	15	15	80	-	-	16	85	3	17	17
Total	456	117a/		752	220b/			339	62c/			431	77d/		

a/ If all present plans are successful, Chile's near-term manufacturing capacity for export will reach 170 000 tons by 1965, the demand shown here represents 70 per cent of this capacity.

b/ Chile's export capacity in 1970 is estimated at 158 000 tons.

c/ Chile's export capacity in 1965 is estimated at 55 000 tons.

d/ Chile's export capacity in 1970 is estimated at 85 000 tons.

/ dollars; by

dollars; by 1970 the percentage figure will remain at around 15 per cent of imports by other countries, but the value will rise to 9 million dollars.

While production by Central America might add a considerable amount to intra-regional trade, the main exporter will still be the United States. A rough estimate of the possible outlook for the long-fibre chemical pulp trade in 1975 is given in table 31.

4. Estimates of world supply

As stated previously the Latin American region will have to import considerable quantities of pulp and paper in the future. In 1965, in spite of ambitious expansion schemes, either carried out or projected, imports will amount to some 240,000 tons of pulp, 300,000 tons of newsprint and 340,000 tons of other paper qualities and board. The demand will continue to grow and every effort will have to be made to meet these requirements unless consumption is deliberately restricted, a measure which would impede economic, educational and cultural progress.

Future trends in the world pulp and paper supply were examined at a recent meeting held in Rome in September 1959.^{22/} The participants considered the situation that might arise in 1965 if demand in the various regions of the world continued to follow the trends indicated in the background papers prepared by the secretariat. Existing capacity and known plans to expand capacity were taken into account but no allowance was made for any additional expansion that might take place. The Consultation reached the conclusions presented in table 32 of this study. It considered that the estimated regional balances might lead to aggregate net import requirements in 1965 by developing regions (sub-group 2 in table 32) as follows:

^{22/} Report of the World Consultation on Pulp and Paper Demand, Supply and Trade, FAO 59/9/6788, subsequently published under the title World demand for paper to 1975.

Table 31

ESTIMATE OF THE POSSIBLE CHEMICAL LONG-FIBRE PULP TRADE
IN 1975

(Thousands of tons)

Country	I m p o r t s				Exports
	Total	From Chile	From Central America	From outside	
Argentina	155	100	-	55	
Brazil	260	180	-	80	
Chile	-	-	-	-	355
Colombia	55	20	25	10	
Cuba	75	-	25	50	
Mexico	-	-	-	-	
Peru	35	30	-	5	
Uruguay	25	20	-	5	
Venezuela	105	-	15	90	
Other	15	5	5	5	70
Total	725	355	70	300	425

Note: For details see Annex V.

Table 32

BALANCE BETWEEN PROJECTED NORMAL CAPACITY AND PROJECTED
DEMAND IN 1965

(Thousands of tons)

	Newsprint	Other paper and board	Total paper and board	Paper pulp
North America	+430	-1 400	-970	-700
Western Europe	-310	+80	-230	+1 660
Total	+120	-1 320	-1 200	+960
Latin America	-440 <u>a/</u>	-210 <u>a/</u>	-650 <u>a/</u>	-200 <u>a/</u>
Africa	-120	-360	-480	+140
Middle East	-	+130	+130	-260
Far East	-250	-130	-380	-800
Oceania	-230	-250	-480	-100
Total	-1 040	-820	-1 860	-1 220
Rest of world	+20	-100	-80	+80
Grand total	-900	-2 240	-3 140	-180

Note: (+)=surplus; (-)=deficit.

a/ These figures differ considerably from those presented in this study
(table 21, and at the beginning of chapter IV, page 65).

/ Newsprint

<u>Newsprint</u>	<u>Other papers and board</u>	<u>Total paper and board</u>	<u>Paper pulp</u>
1,040	790	1,830	1,130

If it is assumed that the import requirements are met by net exports from North America and Western Europe approximately in the proportions which have recently prevailed, exports from these two regions would be as follows in 1965:

	<u>(Thousand</u>			
	<u>Newsprint</u>	<u>Other papers and board</u>	<u>Total paper and board</u>	<u>Paper pulp</u>
North America	920	260	1,180	520
Western Europe	60	700	760	610

In order to satisfy their internal demand and to provide for the above-mentioned net exports, these two regions would by 1965 require a rated capacity (assuming an operating ratio of 95 per cent) as indicated in table 33.

Thus, if no further additional capacity were added by 1965, the North American and Western European paper industries would be operating at their maximum capacity. If a reserve capacity of 5 per cent were provided for, the North American needs would be 520,000 tons of additional newsprint capacity and 1.75 million tons in the other sectors. The Western European needs would be approximately 660,000 tons and 680,000 tons respectively. As far as paper pulp is concerned, the additional requirements shown are subject to a number of qualifications, in particular the possibility that in North America a substantial capacity for dissolving pulp may be devoted to the production of paper pulp.

The Consultation emphasized that undue importance should not be attached to the figures which had been arrived at, since these were largely hypothetical, resting on a series of successive assumptions and subject to explicit qualifications. **Nevertheless**, it had been clearly established that expansion plans already under way in the pulp and paper industry are sufficient to meet the major part of the increase in world demand which may be expected up to 1965.

Table 33

APPARENT CAPACITY REQUIREMENTS IN NORTH AMERICA AND
WESTERN EUROPE

(Rated capacity; millions of tons)

	Existing and planned	Required	Apparent additional requirements
<u>North America</u>			
Newsprint	9.20	9.72	0.52
Other paper and board	<u>35.77</u>	<u>37.52</u>	<u>1.75</u>
	44.97	47.24	2.27
Paper pulp	34.97	38.65	3.68
<u>Western Europe</u>			
Newsprint	4.52	4.91	0.39
Other paper and board	<u>17.72</u>	<u>18.37</u>	<u>0.65</u>
	22.24	23.28	1.04
Paper pulp	19.69	19.69	-

/Therefore, from

Therefore, from the point of view of satisfying the Latin American import needs, the traditional sources seem to be able to supply requirements at least up to the middle of this decade.

Of course nothing is known as yet regarding the trends in the capacity of the world paper industry beyond 1965. However, it might be pointed out that difficulties already exist, or might arise by 1975, in the raw material supply in Europe, in the Near and Middle East, and in some areas of the Far East. It is, therefore, imperative to develop industries in Latin America for which unused raw material resources still exist.

/V. EFFECTS

V. EFFECTS OF A FREE TRADE AREA OR COMMON MARKET

1. General considerations

The mere existence of a common market or Free-Trade Area does not in itself imply a larger demand in the area as a whole. The lowering and abolishing of customs duties, however, makes it possible for producers with surplus capacity in one country to try to capture markets for their production in another, previously protected country.

The combined market of many countries may prove to be large enough to provide for possibilities of specialization and for use of bigger production units, thereby reducing the cost of the product. Economic growth will thus be stimulated by free trade.

Dynamic and expansion-minded producers may therefore be able in the future to capture an increasing share of the markets, overshadowing the stagnating companies which have failed to advance with the times. The latter, however, are not doomed to extinction for the following reasons:

(a) While operational costs will be higher than those of new, efficient producers, their capital costs are in most cases considerably lower than the capital costs of the new factories;

(b) The old, small producers usually supply the local market, where they have well-established customer relations; their sales and transport costs might be lower than those of producers operating in a much larger area;

(c) The small producers might specialize in very few qualities, for which their machinery is most suitable, thus lowering their production costs to a competitive level.

The introduction of a common market or the Free-Trade Area will probably tend to lower the prices of those items which have had to carry import duties when entering the country, assuming naturally that in some other country in the area the same items are produced at lower cost and in sufficient quantity to allow for an exportable surplus. Cheaper products or a price trend which is lower than the general price level of other comparable goods may boost the demand growth beyond the increase resulting from the overall expansion of the economy.

/2. Special

2. Special aspects concerning pulp and paper

As shown previously in this study, all Latin American countries, except Chile and perhaps Honduras, will be deficit countries for a foreseeable future. In some other countries there might be some surplus in a few qualities. Brazil, for instance, might have an excess capacity of short fibre pulp in the latter part of the 1960's and Mexico seems to have an unduly large capacity for low-grade wrapping paper in the early 1960's. However, it might be difficult to sell these qualities abroad since no international market for them has developed as yet.

While it is possible that minor trade in some special qualities will develop between the countries of the Free-Trade Area if these products are included in the goods traded free of duties, especially if prices vary substantially from country to country, the only significant trade that can be expected is in pulp and newsprint, and perhaps in kraft paper.

Newsprint, however, is already exempt from import duties in most of the member countries, Mexico and Peru being exceptions. Thus, the effect of the treaty in respect of newsprint will probably be limited to easier marketing of Chilean newsprint in Mexico and Peru.

In the pulp trade the effect of the treaty may be felt more deeply. Argentina has had a 6 per cent ad valorem import duty, though imports from the "most-favoured-nation" clause countries have been free of duty. There has also been a 20 per cent exchange surcharge, from which the neighbouring countries and Peru have been exempted. Uruguayan import duties on pulp have been approximately 6.5 per cent. In the other countries, import duties for unbleached sulphate pulp for example have ranged from 16 per cent (Peru) to 38 per cent (Chile) ad valorem. It therefore seems very likely that the gradual lowering and subsequent abolition of import duties between member countries would greatly facilitate the placing of regionally produced pulp on these markets.

The main importance of the Free-Trade Area naturally lies in the possibilities for future expansion. As the manufacture of pulp and paper is mainly a mass producing industry requiring heavy capitalization, the large market area now established permits specialization and

/large-scale

large-scale use of modern techniques, thus contributing to lower production costs.

While there is no fixed minimum economic size for a paper mill (location, raw materials, energy etc. playing important roles in this connexion), it is generally considered that chemical pulp, newsprint and kraftpaper mills with a capacity of less than about 100 tons per day should not be built. For larger mills, the investment required per ton of daily capacity would decrease considerably: e.g. investment per daily ton in a mill with a daily capacity of 200 tons is only 80-85 per cent of the investment required in a mill with a daily capacity of 100 tons. For a mill with a daily capacity of 300 tons, the investment required per daily ton would be 70-80 per cent of the corresponding investment for a mill with a daily capacity of 100 tons.

There are, of course, limiting factors. Besides the marketing possibilities and availability of capital, in the case of pulp and integrated paper production the raw material supply very effectively regulates the maximum size of the mill: with increasing production, the raw material has to be transported over longer distances and the transportation costs set a limit for quantities obtained economically. The marketing costs also tend to mount with increasing production.

There are some locations within the Free-Trade Area where rather large-scale mills could be built and the new phase in the economic integration may very possibly prove a strong incentive to future expansion of the pulp industry, and at a later stage, of the paper, especially the kraft paper industry. As stated before, the creation of the Free-Trade Area will have a rather minor impact on the newsprint industry, newsprint trade having already been free to a great extent.

VI. OTHER REQUIREMENTS FOR ADDITIONAL CAPACITY

1. Manufacture of pulp and paper-making machinery in the region

The machinery requirements of the pulp and paper industry are, generally speaking, of three types: repairs, modernization and new machines and installations.

Normally the mills are equipped with their own machinery and electrical workshops able to effect the usual repairs; in some few cases, even a foundry is included in the mill facilities. In case of bigger repairs and modernizations, however, the mill facilities are not sufficient, and the work has to be done by the machinery suppliers.

Machinery suppliers can be divided into four categories:

- (i) Producers of complete installations.
- (ii) Producers of special machinery, parts and appliances (refiners, digesters, cutters, filters, etc.).
- (iii) Producers of equipment of a general character (pumps, valves, steam boilers, conveyors, motors, etc.).
- (iv) Producers of auxiliary materials (belts, felts, wires, rubber coatings, etc.).

In addition to the limitations set forth by the size of the machinery or parts the industry can manufacture, production costs should also be taken into consideration. While most of the machinery producers can certainly produce a given machine or part within the limit of their capacity if the drawings are furnished, only those specializing in pulp and paper machinery or in the machinery of a related process industry can do so at reasonable cost.

In the following summary, however, the cost factor is disregarded and attention is focused only on the technical possibilities of known manufacturers in the major pulp and paper countries.

(a) Argentina

Approximately 10 establishments produce machinery and parts for the pulp and paper industry. Only one of them is a specialized establishment and can produce an almost complete line of machinery, although rather limited in size. The largest Argentine produced paper machine has a width of 2.20 m. and a maximum speed of 150 m/min., with a daily capacity of 30 tons.

/The local

The local industry is able to produce most of the usual machinery parts, auxiliaries, etc., such as steam boilers up to 50 kg/cm², 100 tons per hour. The major items not produced in the country are, in addition to large paper machines, centrifugally casted cylinders, steam valves, suction rolls, etc..

(b) Brazil

The manufacture of machinery has developed considerably during the last decade and practically all types of machinery and equipment can be manufactured in the country, excepting the largest paper machines, control and some other special equipment. The industry can build paper machines up to 4m.'s width and cast cylinders up to 25 tons.

Five companies are producing complete installations, some of them working in co-operation with foreign manufacturers such as: The Black-Clawson Co., Millspaugh Ltd., J. M. Voith G.m.b.H., Escher Wyss A.G., Kamyr and Beloit Iron Works Ltd.. One of the leading manufacturers has produced over 70 paper machines since 1935, the largest of which have an annual capacity of approximately 20,000 tons.

In addition to the enterprises capable of producing complete installations there are about 10 other firms producing machines and equipment for the pulp and paper industry. Felts and metal wires are also produced in the country.

In spite of the considerable expansion in the production of machinery Brazil has imported a significant part of the new machinery installed. However, there have also been some exports (e.g. screens to Peru).

(c) Chile

The capacity of the Chilean machine industry is very limited as yet, and apart from some repair work and minor items, such as certain types of pumps etc., the pulp and paper industry has to depend on imported machinery and parts.

(d) Mexico

The Mexican industry seems to have the capacity and potential to produce all the machinery necessary for the pulp and paper industry, excepting the largest units. Castings can be made up to 25 tons, boilers constructed up to 60 kg/cm² and electrical motors up to 100 HP. However,

/the industry

the industry is not in any way equipped to satisfy its requirements. Existing capacity is not inventoried and there are no agencies which supervise and distribute orders to subcontractors. As a result, all equipment for the pulp and paper industry has been imported, with one or two notable exceptions. In these cases the mills have either produced in their own workshops or have subcontracted for many essential parts of the machinery. This does not apply to paper machines, however.

It should be mentioned that the production of felts and metal wires will be started in Mexico in the near future.

The anticipated increase in the capacity of the pulp and paper industries, most of which will take part in the countries of the Free-Trade Area, is expected to act as a stimulus to machinery production as well. The estimated magnitude of the investment proves that there will be a market of more than 100 million dollars per year for machinery and equipment. Further efforts should be made to study the possibilities of producing a greater volume and variety of machinery in Latin America.

2. Educational, training and research aspects

(a) Education and training

The Latin American pulp and paper industry is composed in general of rather small units, as can be seen from tables 10 and 12. The machinery is very often old and outdated. The region does not offer any possibilities for specialized technical training or education in these industries. It is not surprising therefore that in the circumstances it has been very difficult to develop higher technical skills and, as a result, the existing machinery is often not fully used.

With the accelerating pace of industrialization, increasing investments and growing consumption demands, the inadequacy of technical training may become an impediment to production possibilities and the rational use of natural resources. The problem has been acute for a long time, and in 1954 the Latin American Meeting of Experts on the Pulp and Paper Industry drew the attention of the Governments to this question. There has not, however, been any improvement in the situation. It has, on the contrary, grown worse, as several new investments have been made in more complicated machinery and equipment, and the contracting of foreign technicians has become increasingly difficult.

/It is

It is evident that some measures must be taken and the sooner this is done the better. If no action is taken, there will be no prospect either of producing the increasing quantities of pulp and paper needed or of improving the quality of production, even if large-scale investments are made.

(i) Senior technical staff. In many cases the present senior technical staff received their technical education in mechanical, chemical, electrical or even civil engineering. This formal education, varying widely because of the considerable differences in the level of educational institutes attended, is then complemented by practical work in the industry. In the smaller enterprises, however, it is quite common for the technical supervisor to have no formal technical education.

In order to improve the present situation it might be suggested that steps be taken to encourage and assist the industrial organizations or technical associations of the industry in starting a voluntary technical training programme for their members. The programme could consist of panel discussions, lectures and field trips. If this kind of activity is started in the major paper producing countries of the region, it could later be developed into biannual regional seminars or symposiums.

This co-operation might take the form of a Latin American Pulp and Paper Council, which could also handle other common problems of the industry.

Facilities for educating and training new technicians for the industry should be improved. It is evident that the industry both in Brazil and Mexico needs at least 20 to 30 new engineers per year each, which is equivalent to one university class, and that an equal number is required in Argentina, Chile and Uruguay combined. Specialized courses, supplemented by periods of practical work in the industry, could easily be provided by the chemical or mechanical faculties of the existing technical universities or institutes of technology.

(ii) Foremen. Formal technical training for the lower levels of supervisory personnel is in general even scarcer than the "academic" facilities. It is non-existent as regards the pulp and paper industry.

The foremen are the immediate supervisors of the mill crew. The smooth running of the machines, the quality and homogeneity of the

/production, the

production, the frequency of repairs and accidents depend to a great extent on the ability and knowledge of foremen. The training of these key men, most of whom have been promoted from the ranks, is still mainly based on the principle of trial and error.

This is a major problem and it can be assumed that it will be several decades before any country of the region provides sufficient formal training facilities for first line supervisors in industry.

The possibilities for training within the pulp and paper industry should not, however, be overlooked. While these activities will, of course, depend on the initiative of individual enterprises, the industrial organizations could point out the needs, encourage their members and, perhaps, prepare clear and simple technical explanations and short courses, in the language of the country, to be used in training within the industry.

(iii) Operators. The training of skilled workers and mechanics is generally connected with the educational level of the country. The expansion of primary education, the importance given to technical trades and many other factors play a decisive role in the forming of skilled "cadres" of workers.

Naturally, industry itself can do much to improve its workers' skills, if interest is shown and trainers are available. Apart from the purely technical aspects, attention should be drawn to the prevention of accidents and the avoidance of all forms of waste.

(b) Research

Though there are many famous research laboratories in the world, equipped with modern machinery and staffed with the highest-quality personnel, which are studying a wide range of problems related to the pulp and paper industry, there is still room for research centres concentrating on the study of the most suitable use of local raw materials and the techniques required.

Latin America does not, by any means, have an abundance of coniferous trees - the traditional source of raw material for pulp production. On the other hand, the region is the world's largest producer of sugar cane, has immense tropical broadleaf forests and grows a wide variety of

/agricultural plants

agricultural plants which could yield fibre suitable for the manufacture of paper.

Considerable research work, particularly during the past twenty years, has been focussed on the utilization of sugar cane bagasse and tropical hardwoods for paper-making purposes, and many beneficial results have been achieved. The region already produces large quantities of chemical pulp from bagasse and the first step has been taken to use tropical forests for pulping.

In spite of these advances, many problems still remain to be solved and require further research. As an example, the following can be mentioned:

- (a) Economic aspects of mechanical pulp production from bagasse for newsprint manufacture;
- (b) Cheap long fibres from non-coniferous trees, for the production of strong papers (bamboo, sisal, etc.);
- (c) Economic, small-scale units (up to 50 tons per day) for chemical pulping of tropical woods and agricultural residues.

Research work on pulping problems has been, or is being, conducted to some extent in the Mexican Technological Institute, the Universidad de los Andes, Mérida, Venezuela, the Universidad de Concepción, Chile, the Technological Institute of São Paulo, Brazil (Instituto de Pesquisas Tecnológicas da Universidade de São Paulo), and the Instituto de Investigaciones Tecnológicas, Havana, Cuba.

Recently a Latin American Technological Institute has been proposed. If this institute is established, pulp and paper problems should be included in its programme. This Institute could also play a leading role in the "post-graduate" training discussed in section 1(a)(i) of this chapter.

Annex I

PAPER AND PULP TRENDS

(Thousands of tons)

	Average 1955-57			Capacity 1961-62	Estimates for 1965			Projected increase in consump- tion 1965-75
	Produc- tion	Con- sump- tion	Im- ports (balance)		Produc- tion	Con- sump- tion	Im- ports (balance)	
<u>Argentina</u>								
Pulp: mechanical	15	46	31	24	30	64	34	
chemical softwood	12	142	129	30	30	115	85	
miscellaneous	33	33	-	104	130	130	-	
Newsprint	17	120	103	-	-	175	175	88
Printing and writing paper	65	88	23 }	460	125	134	9	87
Other paper and board	216	224	8 }		335	339	4	106
<u>Bolivia</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	1	1	-	-	2	2	2
Printing and writing paper	-	2	2	-	-	3	3	1
Other paper and board	1	2	1	1	1	3	2	2
<u>Brazil</u>								
Pulp: mechanical	91	91	-	117	290	290	-	
chemical softwood	95	202	106	185	230	240	10	
miscellaneous	20	20	-	309	350	350	-	
Newsprint	43	189	147	125	300	334	34	302
Printing and writing paper	108	132	23	550	220	235	15	116
Other paper and board	309	313	4		550	571	21	554
<u>Chile</u>								
Pulp: mechanical	19	19	-	73	200	200	-	
chemical softwood	-	28	28	70	135	80	55	
miscellaneous	3	3	-	3	-	-	-	
Newsprint	14	25	10	60	210	40	170	27
Printing and writing paper	17	17	-	53	27	28	1	20
Other paper and board	37	39	1		64	64	-	47
<u>Colombia</u>								
Pulp	2	26	24	55	95	106	11	
Newsprint	-	25	25	-	-	44	44	33
Printing and writing paper	-	25	25	104	19	46	27	35
Other paper and board	35	56	21		93	102	9	84
<u>Costa Rica</u>								
Pulp	-	-	-	-	-	1	1	
Newsprint	-	3	3	-	-	5	5	5
Printing and writing paper	-	1	1	-	-	2	2	1
Other paper and board	...	4	4	3	3	8	5	7
<u>Cuba</u>								
Pulp	-	22	22	60	70	109	39	
Newsprint	-	35	35	30	28	59	31	47
Printing and writing paper	2	19	17	113	19	34	15	31
Other paper and board	44	92	48		117	166	49	150
<u>Dominican Republic</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	1	1	-	-	2	2	3
Printing and writing paper	-	1	1	-	-	2	2	1
Other paper and board	-	7	7	-	-	12	12	13

/ Annex I (continued 2)

Annex I (continued 2)

	Average 1955-57			Capacity 1961-62	Estimates for 1965			Projected increase in consumption 1965-75
	Produce- tion	Con- sump- tion	Im- ports (balance)		Produce- tion	Con- sump- tion	Im- ports (balance)	
<u>Ecuador</u>								
Pulp	-	-	-	3	3	3	-	
Newsprint	-	6	6	-	-	12	12	13
Printing and writing paper	-	1	1	-	1	3	2	2
Other paper and board	1	6	5	4	2	11	9	13
<u>El Salvador</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	4	4	-	-	6	6	5
Printing and writing paper	-	1	1	-	-	1	1	1
Other paper and board	...	5	5	-	-	9	9	7
<u>Guatemala</u>								
Pulp	-	-	-	1	1	6	5	
Newsprint	-	3	3	-	-	5	5	4
Printing and writing paper	-	3	3	-	2	5	3	4
<u>Haiti</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	...	...	-	-	1	1	...
Printing and writing paper	-	...	...	-	-	1	1	...
Other paper and board	-	2	2	-	-	3	3	3
<u>Honduras</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	1	1	-	-	2	2	1
Printing and writing paper	-	1	1	-	-	1	1	1
Other paper and board	-	2	2	-	-	3	3	3
<u>Mexico</u>								
Pulp: mechanical	29	30	1	73	115	121	6	
chemical softwood	83	131	48	126	177	207	30	
miscellaneous	18	18	-	55	104	104	-	
Newsprint	-	67	67	40	95	135	40	140
Printing and writing paper	58	65	7	545	122	132	10	142
Other paper and board	206	225	19		448	468	20	527
<u>Nicaragua</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	1	1	-	-	2	2	2
Printing and writing paper	-	...	...	-	-	1	1	...
Other paper and board	-	2	2	-	-	4	4	4
<u>Panama</u>								
Pulp	-	-	-	-	-	-	-	
Newsprint	-	2	2	-	-	4	4	2
Printing and writing paper	-	1	1	-	-	2	2	1
Other paper and board	-	8	8	-	-	13	13	11

Annex I (cont'd 3)

	Average 1955-57					Estimates for 1965			Projected increase in consumption 1965-75
	Production	Consumption	Imports (balance)	Capacity 1961-62		Production	Consumption	Imports (balance)	
<u>Paraguay</u>									
Pulp	-	-	-	1	...	...	-
Newsprint	-	1	1	-	-	1	1		1
Printing and writing paper	-	...	...	-	-	...	...		1
Other paper and board	...	1	1	1	...	2	2		1
<u>Peru</u>									
Pulp	16	23	7	43	45	62	17		
Newsprint	-	17	17	-	-	30	30		27
Printing and writing paper	3	8	5	47	10	14	4		12
Other paper and board	29	34	5		62	62	-		55
<u>Uruguay</u>									
Pulp: mechanical	2	3	1	2	2	2	-		
chemical	4	22	18	6	6	32	26		
Newsprint	-	25	26	-	-	35	35		10
Printing and writing paper	10	11	2	47	14	15	1		5
Other paper and board	22	24	1		31	32	1		10
<u>Venezuela</u>									
Pulp	-	8	8	20	20	100	80		
Newsprint	-	19	19	-	-	44	44		51
Printing and writing paper	-	19	19	75	-	49	49		81
Other paper and board	15	63	48		140	162	22		257
<u>Latin America</u>									
Pulp: mechanical	155	188	32	249	637	677	402a/		
chemical softwood	190	582	391	428	572	820	248a/		
miscellaneous	95	95	-	683	825	825	-		
Newsprint	74	548	474	255	633	938	305a/		763
Printing and writing paper	263	395	132	2 013	559	710	151a/		632
Other paper and board	916	1 111	195		1 852	2 040	188a/		1 945

^{a/} From outside the region.

Annex II

LATIN AMERICA: LIST OF PULP AND PAPER MILLS

Name	Address	Capacity in 1958					Board
		Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper	
Argentina							
Adamas	C. Correo 17, S. Justo, B. Aires					4 000	2 000
Alsina, Rosich & Cia., S.R.L.	Corrientes 485, B. Aires					2 500	
Amorosi, Hector & Cia., S.A.	Gral. Paz 170, G. Cruz, Mendoza					1 400	
Berti, José Suc. de	J. Salguero 3361, B. Aires					2 400	
Brandolini, Alberto J.	Arroyo 1075, B. Aires						3 300
Brandolini, Carlos F.	Mendoza 478, Córdoba						
Canicoba & Cia. Soc. en Com.	C. Correo 439, Córdoba						
Carpel S.R.L.	Cuenca 1-73, B. Aires						
Cartonera Villa Adelina S.R.L.	Molina Arrotea 1775, L. Zamora						
Celcor S.R.L.	M. Pedraza y R. Obligado, V. Adelina						
Celulosa Argentina S.A.	Laprida 4602, V. Martelli	24 000		60 000	20 000	85 000	
Celulosa Río Segundo S.A.	Av. Pte. R. S. Peña 938, B. Aires			4 500		6 000	
Cia. Gral. Papelera de B. Aires S.A.	Tucumán 439, B. Aires					9 000	
Cia. Papelera del Norte de Sta. Fe S.A.	Guevara 1597, B. Aires						
Cifive S.R.L.	Mitre 575, Rosario, Sta. Fe		6 200			5 800	3 600
Copaca	25 de Mayo 2701, Santa Fe						3 800
Correa Hnos. & Cia.	Cent, Uruguayo 56, V. Domínico					3 600	3 600
Chalate-Dalio de Paola S.R.L.	Juan B. Alberti 15, B. Aires					2 000	
Denti Ltda. S.A.	Bolívar y Rondeau, Salto, B. Aires						
El Cacique S.A.	Directorio 5972, B. Aires					5 000	2 000
Ernesto Segal e Hijos y Cia. S.R.L.	Juan B. Alberdi 163, B. Aires						6 000
Fca. Arg. de Cartones y Papeles S.A.	Vieytes 1164, B. Aires					3 600	
Fabricarton S.R.L.	Cañada de Gómez, Sta. Fe		1 000	1 200		3 000	
Fabriloma - José S. Gianelli	Oncativo, Córdoba						600
Fibroquímica Argentina S.R.L.	R. Darío 380, Temperlay						3 000
Fonolita S.R.L.	Boulevard Mitre 690, S. Lorenzo		4 000			5 000	
Gregorio Passianoff S.A.	Santa Fe						
Ind. Argentinas del Papel S.A.	C. Correo 20, Avellaneda					12 000	
Ind. Celulósicas Regionales S.A.	Corrientes 550, B. Aires					2 400	3 000
Industrial Riocuartense S.R.L.	Reconquista 319, B. Aires						
Ipasa S.A.	Sarmiento 945, Rosario, Sta. Fe						3 600
La Papelera Argentina S.A.	Av. Italia 2552, Río IV, Córdoba					2 400	
La Papelera del Plata S.A.	Rivadavia 21522, Ituzaingó					37 000	22 000
Marietta, Data y Rivolta S.R.L.	Av. Pte. R. S. Peña 938, B. Aires	10 500				4 500	
Papel Victoria S.A.	Gral. Cadorna 545, Wilde, B. Aires						
Papelcint S.A.	Ayacucho 3810, Rosario, Sta. Fe					4 800	
Papelera Berazategui, S.A.	Diagonal J. A. Roca 530, B. Aires						
Papelera Bernal S.R.L.	Paysandú 1278, B. Aires					4 500	
Papelera Dock Sud S.R.L.	Charcas 2042, B. Aires						2 500
Papelera Don Torcuato S.A.	Charcas 2042, B. Aires					1 000	1 000
Papelera E. Rodríguez Canedo, S.A.	Irala 1563, Avellaneda, B. Aires						
Papelera Hispano Argentina S.A.	Burgos y Av. D. T. Alvear, D. Torcuato						
Papelera Hurlingham S.A.	Cnel. Sayos 2730, V. Alsina					9 000	
Papelera Marchegiani S.R.L.	Larrazabal 752, B. Aires					700	250
Papelera Mitre S.A.	Av. Sáenz 822, B. Aires					10 500	
Papelera Pedotti S.A.	Gral. Cadorna 602, Wilde	1 000				4 000	
Papelera Raffaele S.A.	Moreno 876, B. Aires					5 600	
Papelera Río Paraná S.A.	Florida 671, B. Aires					6 000	4 000
Papelera San Isidro S.A.	Echeverría 466, Wilde					10 000	
Papelera San Justo S.A.	Córdoba 890, B. Aires			6 000		13 000	1 500
Papelera San Pedro S.R.L.	Corrientes 456, B. Aires			1 500		1 600	
Papelera Teitelman S.A.	Jujuy 1263, B. Aires					6 000	
Papelera Urquiza S.R.L.	L. Valentinas 2453, V. Alsina					2 400	
Papeltex Argentina S.R.L.	Gral. Madariaga 1952, Avellaneda					12 000	
Pedreira Hnos.	Boedo 27, B. Aires					1 800	
	Córdoba 890, B. Aires						
	Gibraltar 1738, Avellaneda					1 800	1 200

Name	Address	Capacity in 1958				
		Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper
Schoolnik S.A.	Av. Emilio Castro 7598, B. Aires		6 000			9 000
Sein & Cia. S.A.	Humb. Saboya 323, Avellaneda					4 500
Suárez Asin S.A.	José Bonifacio 750, B. Aires					
Zucamor S.A.	Av. V. Sársfield 1088, B. Aires					3 000
<u>Bolivia</u>						
Fábrica y Manufactura de Cartones y Talleres Litográficos	Purapura, La Paz					800
<u>Brasil</u>						
<u>I. Distrito Federal</u>						
Cia. Industria Papeis e Cartonagem	Rua Mayrink Veiga 28 Rio					11 000
Cia. Inháuma de Papeis, Papelo e Artefaos	Rua Debrat 23, Rio					1 400
Cia. Nacional de Papel	Est. De Furnas 675, Tijuca					5 500
Cia. Franco Brasileira de Papel	Rua Debrat 23, Rio					2 400
Fábrica de Papelo Sao Geraldo Ltda.	Av. G. Aranha 182, S.L.					3 300
Fábrica de Papel Tijuca S.A.	Frei Caneca 68, Rio					3 500
Tannuri & Cia.	Inháuma					2 200
<u>II. Estado do Rio</u>						
Celubagaço Industria e Comercio S.A.	Campos					
Celulosa e Papel Fluminense	Campos					
Cia. Fábrica de Papel Petrópolis	R. V. Inháuma, Rio					9 000
Cia. Industrial de Papel Pirahy, S.A.	Av. Mal Camara, 350 Rio			1 500		12 000
Cia. Industrial de Papeis Alcantara Ltda	Rua da Alfandega 295, Rio					7 500
Fábrica de Papel Iguassu	Rua da Alfandega 11, Rio					1 200
José Luis Eirinhas da Sieva	Rua Senador Pompeu 3, Rio					
Cia. Industrial de Papeis Sta. Rita	Nova Iguassu, Rio					
Sotex, S.A.						1 200
<u>III. Estado do Sao Paulo</u>						
Adamas do Brasil S.A.						
Brasital S.A.	Av. Rio Branco 10, Rio		1 000			4 000
Brasil Viscose Ltda. Ind. Prod. Celulosicos				8 000		
Cartonificio Valinhos S.A.	Rua 12 de Outubro, Valinhos					3 00
Cia. Agrícola e Industrial "Cicero Prado"	Rua Gen. Ogario 354, Sao Paulo		1 300			8 000
Cia. Celulose Brasileira S.A.			3 000			
Cia. Fabricadora de Papel (Klabin)	Rua Florencio de Abreu 54, Sao Paulo	2 400				20 000
Cia. Industrial Paulista de Papeis e Papelo	Rua Cavour 156, Vila Prudente, S.P.					4 000
Cia. Industrial Polpa de Madeira "Cipolma"	Av. Thomas Edison, 1737, S.A.					7 500
Cia. Melhoramentos de Sao Paulo, Industrias de Papel	Rua Liibero Badaro 443, S.P.			10 000		20 000
Cia. Nitro-Química Brasileira	Rua 15 de Novembro 244, S.P.			7 000		
Cia. Papeis e Celulosa				600		
Cia. Química Rodia Brasileira				5 000		
Cia. Santista de Papel	Rua Boa Vista 65 S.P.	1 700				10 000
Cia. Suzano de Papel e Celulose	Av. Pres. Wilson 4100 S. Paulo					6 000
Dianda & Cia. Ltda	Rua Francisco Monteiro 41 S.P.			1 000		5 000
Dini & Mazzarini	Rua Guaporé 234, Porte Grande S.P.					

Annex II (continued 3)

Name	Address	Capacity in 1958					Board
		Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper	
Euclides Damiani & Cia. Ltda.	Rua Caetes 11						
Fábrica de Papel Carioca	Rua Curuçá 1242, Vila Maria S.P.					4 000	
Fábrica de Papel N.S. Aparecida S.A.	Rua Joaquín Carlos 419, S.P.	9 000				15 000	
Fábrica de Papel Santa Tereseinha S.A.	Rua Guayaúna 740, Penha, S.P.		4 000			6 000	
Fábrica de Papéis e Papelão "Campinas"	Rua Helvetia 957, S.P.						
Fábrica "Mogy" de Papéis e Papelão Ltda.	Rua Hipódromo 720, S.P.						
Indústria Americana de Papel Ltda.	Av. Celso Garcia 3045 S.P.					4 000	
Indústria de Papel Leon Feffer Ltda.	Av. Presid. Wilson 4070 S.P.		600	8 000		9 000	
Indústria de Papel Santo Amaro S/A	Rua Santa Maria 55, Santo Amaro, S.P.						
Indústria de Papel São Roberto	Vila Maria, S.P.					2 500	
Indústrias de Papel Simão S/A	Rua Manifesto 931, (Ipinanga) S.P.					18 000	
Indústria de Papel Sul Americana S/A "IPSA"	Rua Conselheiro Crispiniano 20, S.P.			1 500		10 000	
Indústria de Papelão Limeira	Limeira, S. P.					2 500	
Indústria e Artefatos de Papéis "IAP" Ltda.	Alameda Cleveland 520 S.P.					1 400	
Panamericana Textil S/A	Mogi Guacu, S.P.						
Refinadora Paulista S/A				15 000		5 000	
Ribeiro Parada S/A	Rua Helvetia 957, São Paulo					7 000	
Rigesa S.A.				8 000		12 000	
S/A Gordinho Braune	Rua 15 de novembro 244 S.P.			700		2 200	
S/A Industrias Reunidas F. Matarazzo	Praça do Patriarcas, S.P.			30 000		10 000	
S/A Papel e Cartolina "SAAD"	Rua São Bento 28, S.P.						
J. Segnario & Cia.	Itapeva						
IV. Paraná							
Fábrica Paranaense de Papel	L. General Ozorio 171, São Paulo		1 400			2 000	
Indústrias Brasileiras de Papel Inc.	Rua 15 de novembro 244, S. Paulo			4 500		5 000	
Indústrias Klabin do Paraná de Celulose	Rua F. de Abreu 54, São Paulo	15 000		33 000	50 000	20 000	
Indústria Teófilo Cunha S/A	Rua 15 de novembro 52, S.P.						
V. Santa Catarina							
Celulose Irani Ltda.	Praça Senador Florencio, 22 Porto Alegre	10 000		2 000		3 000	
Cia. Fábrica de Papel Itajahy S.A.	Rua Benetidinós 21, Rio			4 500		14 000	
Olinkraft S.A.	Canoas						
VI. Bahia							
Fábrica de Papel da Bahia S/A	Rua Marques de Monte Santo 50, San Salvador			1 200		1 200	
Maracajá & Cia.	Rua C. Dantas 2, San Salvador						

		Capacity in 1958					
Name	Address	Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper	Board
VII. Rio Grande do Sul							
Celulose Cambará Ltda.				13 000			
Cia. de Industrias Gerais, Obras e Terras S/A	Rua Vigarrio José Inacio 30, P. Alegre					1 500	
Cia. Fabrica de Papel e Papelao	Rua Uruguay 35, Porto Alegre		1 600			1 500	
Cia. Industrial de Celulose e Papel Guaiba	Av. Julio de Castilhos 299, P. Alegre			4 000		5 000	
Companhia Industrial Linheiras S/A	Rua Uruguay 764, Pelotas			1 500		3 000	
Fábrica de Celulose e Papel Ltda.	Canela, Municipio de Taquara			2 000		2 000	
Fabrica de Papel e Papelao Justo S/A	Rua Bela 1200, Sao Leopoldo			2 000		2 000	
VIII. Minas Gerais							
Cia. Mineira de Papeis	Cataguases					4 000	
Fábrica de Papel Cruzeiro S/A	Rua Rio de Janeiro 651, Belo Horizonte					2 500	
Fábrica de Papel Sta. Cruz	Rua Conselheiro Saraiva 21, Rio					2 500	
Fábrica de Papel Sta. Maria S/A	Av. 13 de Maio 23, Rio					6 000	
Fábrica de Papel Uniao Industria	Av. Dos Andradas 1146, Mariano Procópio-Juiz de Fora					1 500	
Fabrica de Papel e Papelao Mariano Procópio	Rua Mariano Procópio 1406, Juiz de Fora					2 500	
IX. Pernambuco							
Cia. Industrias Brasileiras Portela S/A	Rua Buenos Aires 41, Rio					6 000	
Chile							
Compañia Manufacturera de Papeles y Cartones	Oficina Central: Casilla 297, Santiago						
	Fábricas: Puente Alto	15 000		3 000	12 000	28 000	
	San Pedro	34 000			40 000		
	Laja			70 000		20 000	
	Valdivia	2 000				7 000	
Leandro Pons B.	Casilla 20 Viña del Mar					2 000	
Schorr y Concha, S.A.	Casilla 185, Talca					5 000	
Colombia							
Cartón de Colombia	Apartado Aéreo 219, Cali		3 000			30 000	15 000
Grace y Cía.	Cali						
Empresa Papelera S. A.	Soacha					1 000	
Industrias Bond S.A.	Soacha					3 000	
Fca. Nacional de Cartón	Bogotá						2 000
Fca. de Cartón, Carbonari Hnos.	Cali						2 000
Industria de Cartón, Villa Hnos	Medellín						1 000
Costa Rica							
La Papelera Nacional	Apartado 2000, San José					3 000	
Cuba							
Bohon Trading Co.	La Habana					2 000	
Industrias de Papel, Cartón y Envases S.A.	Real Número 68						
Papelera Damuji	Puertas Grandes, Habana					25 000	14 000
Papelera Moderna S.A.	Cienfuegos						
Papelera Rio Verde S.A.	Box 549, Habana					15 000	
Papelera Pulpa-Cuba S.A.	Mercaderes 263, Habana					3 000	
Técnica Cubana S.A.	Trinidad			20 000		30 000	
	Cárdenas			30 000	30 000		

Annex II (cont'd 5)

Name	Address	Capacity in 1958					
		Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper	Board
<u>Ecuador</u>							
Industria Papelera Ecuatoriana C/A "IPECA"	Latacunga			3 000		3 000	
<u>Guatemala</u>							
Industria Papelera Guatemalteca	7a. Avenida 0-24 Zona 4, Guatemala			1 000		1 400	
<u>México</u>							
Adamas S.A.	San Bartolo Naucalpan, E.de México					3 000	
Cartonajes Estrella S.A.	Calz. Vallejo 1090, México, 8 D.F.					15 000	
Cartonera Covadonga S.A.	Apartado Postal 23010, México, 9 D.F.					3 000	
Cartonera Industrial S.A.						2 500	
Cartonera Moderna S.A.	Calz. Tacuba, Naucalpan N° 1 Naucalpan, E. de México					12 000	
Cartonera de Occidente S.A.	Guadalajara, Jal.					1 000	
Cartonera Sago S.A.	Atizapan de Zaragoza, E. de México				4 000		
Cartón y Papel de México, S.A.	Tlalnepantla, E. de México			1 000			
Celanese Mexicana S.A.	Rio Bravo, Tamps			10 000			
Celulosa de Chihuahua S.A.	Apartado Postal 530, Chihuahua			40 000			
Cia. de las Fábricas de Papel, San Rafael y Anexas S.A.	Manuel Ma. Contreras, 133, México 5, D.F.	18 000	2 000	21 000		55 000	10 000
Cia. Industrial de Atenquique S.A.	Av. Juárez 117, México 1, D.F.			33 000		15 000	18 000
Cia. Industrial San Cristóbal S.A.	Lieja 8, México D.F.			20 000		10 000	
Cia. Industrial Papelera Poblana S.A.	Av. 11 Sur 3102, Puebla, Pue.					1 000	2 000
Cia. Papelera El Fénix S.A.	Rio del Consulado 375, México 15, D.F.	500				7 000	2 000
Cia. Veracruzana de Papel, S.A.	Orizaba, Ver.					1 000	
Empaques de Cartón Titán S.A.	16 de Septiembre 38, México 2, D.F.			20 000			50 000
El Pilar S.A.	Ayotla, E. de México			10 000			
Empaques de Cartón United S.A.	Calle del Cobre 185, México 2, D.F.					10 000	14 000
Fábrica de Papel Coxcacán S.A.	Fernández Leal 62, Coxcacán 21, D.F.	2 000				13 000	2 000
Fábrica de Papel La Soledad S.A.	Texcoco, E. de México						3 000
Fábrica de Papel Madruño S.A.							2 000
Fábrica de Papel Maldonado S.A.	Monte Morales, N.L.						9 000
Fábrica de Papel México S.A.	Ayotla, E. de México						10 000
Fábrica de Papel Monterrey, S.A.	Monterrey, N.L.						5 000
Fábrica de Papel San José, S.A.	Texcoco, E. de México						3 000
Fábrica de Papel Sta. Clara, S.A.	Santa Clara, E. de México						10 000
Fábricas de Papel Loreto y Peña Pobre S.A.	Altamirano 46, Villa Obregón 20, D.F.	9 000		12 000		18 000	17 000
Fábricas de Papel Tuxtepec	Tuxtepec, Oax.	28 000			35 000		
Impulsora de Papel S.A.	9a. Pte. N° 5035, Col. Panamericana, México 15, D.F.					1 000	
Industrial Telaya S.A.	José M. Rico 135, Col. del Valle, México 12, D.F.			3 000		4 000	
Kraft S.A.	Filomena Mata 13, México 1, D.F.					7 000	
La Aurora S.A. de C.V.	F. Alba Ixlioxóchitl 44, México 8, D.F.	500				7 000	
Manufacturera de Papel Bidasoa, S.A.	Av. Hidalgo 122, Barrio de Sta. Catarina, Azcapotzalco 16, D.F.					2 000	3 000
Negociación Papelera Mexicana	Laguna de Mayrán 197, México 1, D.F.	2 000				12 000	4 000

Annex II (cont'd 6)

Name	Address	Capacity in 1958				
		Mechanical pulp	Semi-chemical pulp	Chemical pulp	Newsprint	Other paper
Papelera Chabacano S.A.	Calzada de Chabacano, 11, México 8					2 000
Papelera de Chihuahua S.A.	Ciprés 248, México D.F.					2 000
Papelera Iruña S.A.	Uruguay 44, México D.F.					5 000
Papelera Veracruzana S.A.	Orizaba, Ver.					5 000
Papeles Faciales y Kraft S.A.	Justo Sierra 26, México 1, D.F.					10 000
Productora de Papel S.A.	Apartado Postal 867, Monterrey, N.L.					9 000
Sonoco de México S.A.	Km. 15½ Carretera México-Laredo, Sta. Clara, E. de México					9 000
<u>Perú</u>						
Cia. Papelera y Celulósica del Norte	Casilla 2, Lima					3 500
La Papelera Peruana S.A.	Virreyna 489, Lima					5 000
W.R. Grace y Cia.	Paramonga (Lampa 560, Lima)			40 000		19 000
<u>Uruguay</u>						
Cia. Industrial y Comercial del Sur S.A.	Rincón 487, Montevideo	2 000				10 000
Fábrica Nacional de Papel, S.A.	Av. Gral. Rondeau 1799, Montevideo			6 000		18 000
Industria Papelera Uruguaya S.A.	Calle Paraguay 1902, Montevideo					8 000
Papelera Mercedes S.A.	A. García Morales 1319, Montevideo					10 000
Cia. Primus del Uruguay	Rondeau 1739, Montevideo					1 000
<u>Venezuela</u>						
Cartón de Venezuela C.A. (Petare)	Edificio Roemen, Santa Capilla a Mijares, Caracas					7 000
C.A. Venezolana de Pulpa y Papel VENEPA	Edificio "Las Fundaciones", Av. Andrés Bello, Caracas					35 000
Fábrica de Papel de Maracay	Apartado 301, Maracay					6 000
Papeles Venezolanos C.A. (Guacara)	Apartado 4317 del Este, Caracas					5 000

Annex III

BASIC SERIES AND FACTORS USED TO PROJECT PAPER AND BOARD DEMAND

1. Population

Table I

LATIN AMERICA: PROJECTION OF POPULATION, BY COUNTRIES,
1965, 1970 AND 1975

(Estimates as at 30 June 1960, in thousands)

Country	1965	1970	1975
Argentina	22 959	24 991	27 120
Bolivia	4 152	4 677	5 299
Brazil	74 572	84 442	95 788
Chile	8 581	9 662	10 800
Colombia	16 985	19 589	22 702
Costa Rica	1 335	1 558	1 827
Cuba	7 553	8 341	9 183
Dominican Republic	3 319	3 897	4 605
Ecuador	4 912	5 629	6 446
El Salvador	2 730	3 113	3 571
Guatemala	4 340	5 049	5 902
Haiti	4 133	4 621	5 209
Honduras	2 179	2 469	2 819
Mexico	40 635	46 552	53 561
Nicaragua	1 692	1 954	2 269
Panama	1 206	1 383	1 587
Paraguay	1 779	1 973	2 214
Peru	12 420	14 305	16 382
Uruguay	2 896	3 022	3 143
Venezuela	8 081	9 351	10 779
Total	226 459	256 578	291 206

2. Gross

2. Gross national product

Table II

LATIN AMERICA: TOTAL GROSS NATIONAL PRODUCT

(Thousands of dollars at 1950 prices)

	Total gross national product				Population in 1960 (Thousands)	Per capita gross national product 1955-57
	1955	1956	1957	1955-57		
Argentina	10 936	10 916	11 351	11 068	19 512	567
Bolivia	263	263	260	262	3 240	81
Brazil	13 276	13 676	14 296	13 749	59 905	230
Chile	2 185	2 198	2 274	2 219	6 909	321
Colombia	3 181	3 274	3 312	3 256	12 961	251
Costa Rica	237	235	253	242	983	246
Cuba	2 339	2 555	2 923	2 606	6 242	417
Dominican Republic	495	539	577	537	2 593	207
Ecuador	512	531	568	534	3 796	141
El Salvador	351	381	406	379	2 264	167
Guatemala	474	534	568	525	3 358	156
Haiti	270	281	291	281	3 351	84
Honduras	248	266	279	264	1 711	154
Mexico	7 364	7 695	8 039	7 699	30 526	252
Nicaragua	221	223	253	232	1 286	180
Panama	252	272	275	266	934	285
Paraguay	176	175	187	179	1 601	112
Peru	1 521	1 560	1 607	1 563	9 599	163
Uruguay	1 010	1 020	980	1 003	2 657	391
Venezuela	4 802	5 309	6 140	5 417	5 953	910
Total						
Latin America	50 114	51 903	54 839	52 281	179 381	291

Source: ECLA, on the basis of official statistics.

Table III

LATIN AMERICA: ESTIMATED GROWTH OF GROSS PRODUCT

(Annual per capita growth rate)

Country	Historic rate	Estimated rate
Argentina	1.10	2.00
Bolivia	0.35	1.50
Brazil	2.70	2.50
Central America	2.90	2.00
Chile	0.70	2.00
Colombia	2.40	2.20
Cuba	2.80	3.00
Ecuador	2.60	2.50
Mexico	3.10	3.00
Paraguay	1.10	1.50
Peru	2.60	2.00
Uruguay	1.10	1.50
Venezuela	5.00	3.00

Note: The historic rate was calculated on the basis of 1945-47 for Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru and Venezuela, whereas the years 1945-55 were used for the remaining countries. Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama were considered together, for the basic calculations as well as for the growth of the product.

As no information was available for the Dominican Republic and Haiti, it was decided to adopt the Central American projection base of 2 per cent for their projections as well.

3. Elasticity coefficients

As indicated in the body of the text, the elasticity coefficients (first demand of the function) were calculated for the levels of income corresponding to the years at either end of the projection period (1955-57 and 1975), the average of the coefficients thereafter being used in the projections, as may be seen from table IV.

/Table IV

Table IV

LATIN AMERICA: AVERAGE INCOME-ELASTICITY COEFFICIENTS (1955-57/1975) USED
TO PROJECT DEMAND FOR VARIOUS TYPES OF PAPER AND BOARD

Country	Newsprint	Printing and writing paper	Other papers and board
Argentina	1.21	1.44	1.42
Bolivia	2.11	1.85	2.11
Brazil	1.58	1.62	1.72
Chile	1.45	1.56	1.62
Colombia	1.55	1.60	1.70
Costa Rica	1.57	1.61	1.71
Cuba	1.31	1.49	1.51
Dominican Republic	1.65	1.65	1.77
Ecuador	1.81	1.68	1.89
El Salvador	1.75	1.69	1.84
Guatemala	1.73	1.71	1.87
Haiti	2.07	1.83	2.08
Honduras	1.79	1.71	1.87
Mexico	1.52	1.59	1.67
Nicaragua	1.72	1.68	1.82
Panama	1.50	1.58	1.66
Paraguay	1.91	1.78	2.00
Peru	1.76	1.70	1.85
Uruguay	1.38	1.53	1.57
Venezuela	1.64	2.30	2.23

Note: As explained in chapter III on demand projections the elasticity coefficients used in the case of Venezuela were those calculated during the preparation of the report on La industria del papel y la celulosa en Venezuela. (E/CN.12/536; FAO/ETAP/IN5; TAO/VEN/12)

4. Correlation functions and indices.

The functions that relate the consumption of each type of paper and board with the product are as follows ("Y" representing per capita paper consumption and "X" the per capita gross national product):

(a) Newsprint

$$Y = 4.70726 + 4.21919 \log X - 0.53512 (\log x)^2$$

P (correlation index)=0.91

(b) Printing and writing paper

$$Y_2 = 3.24203 + 2.77368 \log X - 0.23490 (\log x)^2$$

P=0.91

(c) Other paper and board

$$Y_3 = 3.90946 + 3.67876 \log X - 0.39801 (\log x)^2$$

P=0.96

Annex IV

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

1. ARGENTINA

Number		Item	Unit value of imports in 1959 (dollar per kilogramme) <u>a/</u>	Ad valorem duty (percentage of c.i.f. value)	Exchange surcharge on c.i.f. and f.o.b. values (percentage)
Statistical	Tariff				
1021-1	4572	Wood pulp for paper	0.12	6	20b/
925	3899	Newsprint	0.16	free	free
926-1	3901 and 3901 (a)	Printing and writing paper	0.26	45	20b/
924-1	3895196	Wrapping paper	0.22	40	100

a/ 83 Argentine pesos per dollar.

b/ The exchange surcharge of 20 per cent is not applicable to neighbouring countries and Peru.

/CUSTOMS DUTIES

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

2. Brazil

Tariff and statistical number	Item	Unit value of imports in 1955-59 (dollars per ton)	Ad valorem duty	Customs	Total	Exchange category
				clearance fee Percentage of c.i.f. value		
47.01.005	Bleached sulphite pulp	170	20	5	25	general <u>a/</u>
47.01.002	Non-bleached non- sulphite pulp	140	20	5	25	"
48.02.006	Newsprint	190	free	-	free	- <u>b/</u>
48.02.007	Printing and writing paper	300	free	-	free	special <u>c/</u>

a/ 230 cruzeiros per dollar during the first half of 1960.

b/ Subsidized foreign exchange, sold outside the auction system at 100 cruzeiros per dollar in the first half of 1960.

c/ 508 cruzeiros per dollar in the first half of 1960; imports by publishers or printers for their own purposes were purchased with foreign exchange bought outside the auction system.

/CUSTOMS DUTIES

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

3. COLOMBIA

Tariff and statistical number	Item	Unit value of imports in 1957-58 (colombian pesos per kilogramme) a/	Customs duties				Prior deposit (percentage)	Incidence (financial cost) of prior deposit (percentage of o.i.f. value)	Consular fees (percentage of f.o.b. value)	Total estimated charges (percentage of o.i.f. value)
			Specific duty (colombian pesos per kilogram- me)	Ad valorem duty	Ad valorem equi- valent of specific duty	Total ad valorem				
416.b.1	Mechanical pulp	0.75	0.08	15	10.7	25.7	130	4.5	1	31
416.b.2	Chemical pulp	1.32	0.10	15	7.6	22.6	130	4.5	1	28
419.e	Newsprint	1.23	1	1	-	-	20	0.7	1	2
419.f.2	Paper for books and periodicals	1.54	1	1			20	0.7	1	2
419.f.3	Writing paper	1.95	0.20	20	10.3	30.3	130	4.5	1	36
419.f.1	Kraft (wrapping) paper	1.37	0.20	30	14.6	44.6	20	0.7	1	46

a/ 6.40 colombian pesos per dollar.

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

4. ECUADOR

Tariff and statistical number	Item	F.o.b. unit value of imports a/ in 1957-58 (sucres per kilogramme)	Customs duties				Additional charges				Total customs duties and charges (estimated percentage of c.i.f. value)
			Specific duty (sucres per kilogramme)	Ad valorem duty	Ad equivalent of specific duty	Total ad valorem	Incidence on c.i.f. value (percentage)	On f.o.b. value (per- centage)	Approximate incidence of f.o.b. value on c.i.f. value (percentage)	On c.i.f. value (per- centage)	
			Percentage of f.o.b. value								
419.e.4	Newsprint	2.28	0.01	3	0.4	3.4	2.7	11.1	9	6	18
419.f.1	Kraft paper	3.39	0.80	10	23.6	33.6	28.0	11.1	9	6	43
419.f.2	Other papers including bleached Kraft	4.17	1.20	10	28.8	38.8	33.02	11.1	9	6	48
417.e	Board	1.74	1.30	10	74.7	84.7	63.9	11.1	8	11	83

a/ 15.15 sucres per dollar.

**CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD**

5. Mexico

Tariff and statistical number	Item	Unit value of imports in 1958-59	Specific duty	Ad valorem duty	Ad valorem equivalent of specific duty	Total ad valorem
		Pesos per kilogramme <u>a/</u>		Percentage of c.i.f. value		
241.00.03	Bleached pulp	1.80	0.20	10	11.1	21.1 <u>b/</u>
630.00.00	Newsprint	2.04	0.03	30	1.5	31.5 <u>b/</u>
630.02.98	White paper (up to 120 gr)	2.27	0.70	55	12.7	67.7 <u>b/</u>

a/ 12.50 Mexican pesos = 1 dollar.

b/ Imports subject to prior authorization by the Ministry of Industry and Trade (Secretaria de Industria y Comercio), mainly in the case of pulps not produced domestically in sufficient quantity. Those that compete with domestically-produced pulps are subject to a duty of 30 to 35 per cent.

/CUSTOMS DUTIES

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

6. PERU

Tariff and statistical number	Item	Unit value of imports in 1957-58 (dollars per kilogramme) <u>a/</u>	Specific duty (dollars per kilogramme) <u>b/</u>	<u>Ad</u> <u>valorem</u> duty	<u>Ad valorem</u> equivalent of specific duty	Total ad valorem
				Percentage of c.i.f. value		
1250	Chemical wood pulp	0.12	0.003	13.5	2.4	15.9
1261	Newsprint	0.18	free	11.5	-	11.5
1270	White paper <u>c/</u>	0.29	0.143	16.0	49.1	65.1
1255	Liner board	0.21	0.18	16.0	87.0	103.0

a/ 19.07 soles = 1 dollar, imports 1957; 23.40 soles = 1 dollar, imports 1958.

b/ 27.43 soles = 1 dollar, for specific duties.

c/ Bond, ledger type.

/CUSTOMS DUTIES

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

7. URUGUAY

Statistical and tariff number	Item	Unit of volume (gross kilo- grammes)	Unit value of imports in 1957 (dol- lars) s/	Offi- cial base value (pesos)	A percentage of										Charges of equal effect			Surcharge (percentage)
					Ad valo- rem duty (percent age of of- ficial base value)	Spe- cific equi- valent of ad valo- rem duty (pesos)	Total spe- cific duty (pesos)	Total column (7) dollars	Ad valo- rem duty as offi- cial base value	Ad valo- rem equiv- alent as a percent age of spe- cific duty	Total		Prior deposit (per- centage)	Transfer tax (per- centage)				
											Spe- cific duty (pesos)	Total spe- cific duty (pesos)			ad	va- lo- rem		
X-2954	Bleached sulphite pulp	100	17.86	15.60	4	0.62	-	0.62	0.06	-	0.3	0.3	-	6.1	-			
X-2955	Unbleached sulphate pulp	100	13.78	15.60	4	0.62	-	0.62	0.06	-	0.4	0.4	-	6.1	-			
X-2977	Newsprint	1 000	186.50	546	-	-	40.40	40.40	3.64	-	2.0	2.0	-	6.1	-			
X-2993	Art paper	100	42.43	54.60	16.2	8.85	-	8.85	0.80	2.3	1.9	4.2	-	6.1	40			

s/ 11.10 uruguayen pesos per dollar.

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

8. VENEZUELA

Tariff and statistical number	Item	Unit value of imports in 1959 (bolivares per kilo- gramme)	Customs duties				Consular fees (percentage of f.o.b. value)
			Specific duty (bolivares per kilo- gramme)	Ad valorem		Total <u>ad</u> <u>valorem</u>	
				Ad <u>valorem</u> duty	rem equivalent of specific duty		
251.02.00	Chemical and mechanical pulp	0.30	0.04	-	13.3	13.3 <u>a</u> /	3.5
641.01.02.1	Newsprint up to 60 grammes	0.48	0.28	-	58.3	58.3 <u>b</u> /	-
641.02.01.1	Glossy, satin-finished printing paper	0.89	0.30	-	33.7	33.7 <u>c</u> /	-
641.02.03	Unlined writing paper <u>d</u> /	1.14	1.20	-	105.3	105.3 <u>d</u> /	-
641.03.02	Kraft and wrapping paper	0.71	2.60	-	371.4	371.4 <u>e</u> /	-

a/ Pulp for gray board, kraft paper or corrugated board has 100 per cent exemption from specific duties.

b/ Total exemption, when intended for newspapers, periodicals and books.

c/ Total exemption, when intended for newspapers, books and periodicals.

d/ Exemption granted in specific cases, generally in the case of raw material for another industry.

e/ For envelopes or gummed paper, exemption of about 80 per cent of all duties is granted.

/Summary table

Summary table

CUSTOMS DUTIES AND OTHER CHARGES OF EQUIVALENT EFFECT LEVIED ON IMPORTS
OF PAPER PULP, PAPER AND BOARD

(Percentage of c.i.f. value)

Item	Argentina	Brazil	Colombia	Ecuador	Mexico	Peru	Uruguay	Venezuela
Chemical pulp	26 _a /	25 _b /	28	-	21 _g /	16	6.5	16 _d /
Mechanical pulp	26 _a /	80 _e /	31	-	-	-	-	-
Newsprint	free	free _f /	2	18	31.5	12	6	58 _g /
Printing and writing paper	65 _a /	free _h /	printing writing 36	-	68	65	46 _i /	105 _j /
Wrapping paper (Kraft)	140 _k /	-	46	43	-	-	-	371 _l /
Other papers, including white Kraft	-	-	-	48	-	-	-	-
Board	-	-	-	83	-	103 _m /	-	-

Note: A dash indicates that information is lacking; in most cases it refers to items imported in small quantities or not at all.

a/ Including an exchange surcharge of 20 per cent not applicable to neighbouring countries or Peru.

b/ General exchange category.

c/ Applicable to chemical pulps (principally sulphite) not produced domestically in sufficient quantity; for imported pulps that compete with the domestic product the duties are 30 to 35 per cent.

d/ Exempt from duty when intended for grey board, kraft paper or corrugated board.

e/ Special exchange category.

f/ Subsidized exchange sold outside the auction system, at 100 cruzeiros per dollar.

g/ Free, when intended for newspapers, periodicals and books.

h/ Special exchange category, except in the case of paper imported by publishers or printers, which is paid for by subsidized exchange as newsprint.

i/ Art paper; includes a 40-per-cent surcharge.

j/ Exemptions are granted in specific cases, mainly when the paper is a raw material for another industry.

k/ Including an exchange surcharge of 100 per cent, not applicable to neighbouring countries or Peru.

l/ Paper for envelopes or gummed paper has 80 per cent exemption from duty.

m/ Gray board.

Annex V

FIBRE CONSUMPTION EN 1975

(Thousands of tons)

1. Summary

Country	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
Argentina	185	300	165	245	895
Brazil	435	690	550	515	2 190
Chile	175	15	300	70	560
Colombia	55	115	10	85	265
Cuba	75	195	-	130	400
Mexico	345	525	260	450	1 580
Peru	35	55	10	50	150
Uruguay	15	25	5	20	65
Venezuela	105	200	-	170	475
Others	20	20	5	40	85
Total	1 445	2 140	1 305	1 775	6 665

/2. Argentina

2. Argentina

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Newsprint</u>					
Tons/ton paper	0.15	0.15	0.75		1.05
Total (estimated pro- duction 150 000)	22 000	20 000	120 000		162 000
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.55	0.10	0.15	1.00
Total (estimated pro- duction 200 000)	40 000	110 000	20 000	30 000	200 000
<u>Other papers and board</u>					
Tons/ton paper	0.25	0.35	0.05	0.43	1.08
Total (estimated pro- duction 500 000)	125 000	175 000	25 000	215 000	540 000
Total	187 000	305 000	165 000	245 000	901 000

Note: Local production 30 000 tons of chemical long-fibre pulp = 165 000 c.m.
Imports 157 000 tons, mostly from Chile.

3. Brazil

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Newsprint</u>					
Tons/ton paper	0.15	0.15	0.75		1.05
Total (estimated pro- duction 600 000)	90 000	95 000	450 000		635 000
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.55	0.10	0.15	1.00
Total (estimated pro- duction 415 000)	83 000	228 000	42 000	64 000	417 000
<u>Other paper and board</u>					
Tons/ton paper	0.25	0.35	0.05	0.43	1.08
Total (estimated pro- duction 1 050 000)	263 000	368 000	55 000	451 000	1 137 000
Total	436 000	691 000	547 000	515 000	2 189 000

Note: Assuming imports of 260 000 tons of chemical long-fibre pulp and that 30 per cent of the groundwood type pulp is made from other raw materials than coniferous trees, the requirements of coniferous trees will be $176\ 000 \times 5.5 = 0.97$ million c.m. + $381\ 000 \times 2.8 = 1.07$ million c.m. = 2.04 million c.m.

4. Colombia

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Printing and writing</u>					
Tons/ton paper	0.15	0.60	0.10	0.15	1.00
Total (estimated pro- duction 75 000)	11 000	45 000	8 000	11 000	75 000
<u>Other papers and board</u>					
Tons/ton paper	0.25	0.40		0.43	1.08
Total (estimated pro- duction 170 000)	42 000	68 000		73 000	183 000
Total	53 000	113 000	8 000	84 000	258 000

Note: Imports from Chile and Central America.

5. Cuba

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Newsprint</u>					
tons/ton paper		1.05			1.05
Total (estimated production 36 000)		38 000			38 000
<u>Printing and writing</u>					
tons/ton paper	0.10	0.75		0.15	1.00
Total (estimated production 60 000)	6 000	45 000		9 000	60 000
<u>Other paper and board</u>					
tons/ton paper	0.25	0.40		0.43	1.08
Total (estimated production 280 000)	70 000	112 000		120 000	302 000
	76 000	195 000		129 000	400 000

Note: Imports mostly from outside the region or from Central America.

6. Chile

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Newsprint</u>					
tons/ton paper	0.20		0.85		1.05
Total (estimated production 340 000)	68 000		289 000		357 000
<u>Printing and writing</u>					
tons/ton paper	0.40	0.35	0.10	0.15	1.00
Total (estimated production 48 000)	19 000	17 000	5 000	7 000	48 000
<u>Other papers and board</u>					
tons/ton paper	0.60		0.05	0.43	1.08
Total (estimated production 150 000)	90 000		7 000	65 000	162 000
	177 000	17 000	301 000	72 000	567 000

Note: Chemical long-fibre pulp and groundwood pulp for local paper production require 1.8 million c.m. of coniferous wood. Thus approximately 2.0 million c.m. remain for export pulp production, corresponding to approximately 360 000 tons of chemical pulp. Kraft paper exports are approximately 40 000 tons.

7. Mexico

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Newsprint</u>					
Tons/ton paper	0.20		0.85		1.05
Total (estimated pro- duction 275 000)	55 000		234 000		289 000
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.55	0.10	0.15	1.00
Total (estimated pro- duction 270 000)	54 000	148 000	27 000	40 000	269 000
<u>Other papers and board</u>					
Tons/ton paper	0.25	0.40		0.43	1.08
Total (estimated pro- duction 950 000)	237 000	380 000		409 000	1 026 000
Total	346 000	528 000	261 000	449 000	1 584 000

Note: Wood requirements for chemical long-fibre pulp are 346 000 x 5.5 = 1.90 mil-
lion c.m. and for groundwood 261 000 x 2.8 = 0.73 million c.m., in all
2.6 million c.m.

8. Peru

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.55	0.10	0.15	1.00
Total (estimated production 25 000)	5 000	14 000	3 000	4 000	26 000
<u>Other paper and board</u>					
Tons/ton paper	0.25	0.35	0.05	0.43	1.08
Total (estimated production 110 000)	28 000	<u>39 000</u>	<u>6 000</u>	<u>47 000</u>	<u>120 000</u>
Total	33 000	53 000	9 000	51 000	146 000

Note: Imports from Chile.

9. Uruguay

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Printing and writing</u>					
Tons/ton paper	0.20	0.55	0.10	0.15	1.00
Total (estimated pro- duction 20 000)	4 000	11 000	2 000	3 000	20 000
<u>Other papers and board</u>					
Tons/ton paper	0.25	0.35	0.05	0.43	1.08
Total (estimated pro- duction 40 000)	10 000	14 000	2 000	17 000	43 000
Total	14 000	25 000	4 000	20 000	63 000

Note: Imports from Chile: 14 000 for minimum long-fibre demands and 10 000 for additional demand that cannot be met by domestic production.

10. Venezuela

	Chemical long fibre	Chemical short fibre and semi- chemical	Groundwood type	Waste paper	Total
<u>Printing and writing</u>					
tons/ ton paper	0.20	0.60		0.20	1.00
Total (estimated production 100 000)	20 000	60 000		20 000	100 000
<u>Other papers and board</u>					
tons/ ton paper	0.25	0.40		0.43	1.08
Total (estimated production 350 000)	87 000	140 000		150 000	377 000
	107 000	200 000		170 000	477 000

Note: Imports of long-fibre pulp, mostly from outside the region or from Central America.

