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PROSPECTS FOR LATIN AMERICAN PULP AND PAPER EXPORTS TO OVERSEAS

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1. INTRODUCTORY NOTE and SUMMARY of FINDINGS

The following survey examines the prospects of pulp and paper exports from Latin America over the period to 1980.

The first six sections of the study review the prospective developments of the international markets of paper and pulp over the short run. These markets will be dominated by the balances of supply and demand in North America and Western Europe. The conclusion is reached that the confirmed expansion plans of the industries in these two regions will considerably outstrip the projected total demand, that is, for domestic consumption and for estimated net exports to the less developed regions. In the case of paper pulp, the over expansion will be considerable and large capacities will remain idle until the end of the present decade and possibly even in the early 'seventies. As yet unconfirmed expansions in North America together with a prospective large export availability of paper pulp in the Soviet Union by 1970, could make the short and medium-term balance of supply and demand even worse than is indicated by the survey.

Over the longer run, i.e. to 1980, the prospects of paper and pulp exports from Latin America will be determined mainly by the developments in Western Europe. Earlier studies have indicated that this region may become a net importer of large quantities of paper pulp, or of wood for its manufacture. The prospective future demand and supply of roundwood in Western Europe are reexamined in Section 7 where the conclusion is reached that the main deficit over the period to 1980 will be in the regional supply of sawnwood, plywood and veneers, or of roundwood for their manufacture. Provided more dymanic forest policies are adopted than are presently in use, the region will be able to cover most of her rising needs of small-sized industrial wood for pulping and for board manufacture. The prospective small deficit indicated by the study of some 5 million cu.m. of wood by 1980 will, if it materializes, no doubt be covered by increased imports from North America and from the Soviet Union.

Section 8 of the survey reviews the prospective developments to 1975 in Latin America. The conclusion is reached that this region will raise her net imports of forest products and will experience particular difficulties in covering her growing needs of coniferous wood for pulping. The conclusion

/is also

is also reached that exports of long-fibered pulp from Latin America must be compensated for by higher imports from other regions, and that the additional cost of these cross-shipments would have to be paid by the Latin American countries.

There is, however, one sector of the pulp industry which offers real prospects of development also for exports to the international market, that is of dissolving pulp produced from the very cheap wood available from the eucalypt plantations in the region, mainly in Brazil. The study recommends that serious investigations should be carried out to evaluate the prospects of establishing dissolving pulp mills in Latin America for export to the markets in Western Europe and in other regions of the world.

NOTE: Sections 1 - 7 of this survey is a summary of a study presently being carried out by the author at the Institute for International Economic Studies, Stockholm, Sweden.

2. PAPER and BOARD CONSUMPTION and TRADE - A SUMMARY of REGIONAL TRENDS

The estimates which are presented below of the future paper and board consumption levels in the different regions of the world were arrived at by using the method of projecting demand developed by FAO of the United Nations.[x] The projections are based on specific assumptions about the economic development rates, demographic trends and so-called "time trends", which reflect the influence of all other factors on the patterns of paper and board consumption.[xx] The assumptions which were adopted here about the future course of the three explanatory variables are recorded in the Annexes 1 - 3.

The demand estimates were worked out for two alternative assumptions of the economic development rates, intended to reflect likely upper and lower levels of potential developments. The following summary, however, shows only the averages of the two estimates of paper and board demand which correspond to the alternative assumptions of economic growth.

2.1 Projections of regional demand for paper and board

With the assumptions recorded in Annexes 1 - 3, one arrives at the following estimates of future demand for paper and board in the different regions of the world (Table 1).

According to the appraisal, the total world consumption of paper and board will grow from about 74 million tons in 1960 to some 126 million in 1970 and to nearly 205 million in 1980, corresponding to an average annual

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x) World Demand for Paper to 1975, FAO, Rome, 1960, and Pulp and Paper Prospects in Western Europe, BLV, Munich, 1963.

xx) Among those factors may be mentioned a) the return to "normal" consumption patterns after a period of restrictions (for instance, on imports), b) substitution trends (for instance, the replacement of corrugated boxes for wooden crates), c) the increasing rate of literacy in the less developed countries and d) the prospective changes in the price of paper and board relative to those of other commodities.

/growth rate

growth rate over the two decades of 5.2 per cent, as compared with a yearly rate of about 5.9 per cent over the 'fifties.

Table 1 Proyections of world paper and board demand levels 1950-1980

	1949-51	1959-61	1965	1970	1975	1980
	million metric tons					
WORLD TOTAL	41.66	73.92	96.70	125.90	161.00	204.80
North America	26.06	36.24	43.60	52.27	61.70	72.00
Latin America	1.32	2.64	3.44	4.82	6.72	9.35
Western Europe	8.89	18.59	24.90	32.60	40.35	49.60
Eastern Europe	1.40	2.67	3.81	5.30	7.30	9.75
Soviet Union	1.44	3.26	5.30	8.30	12.45	18.10
Middle East	0.07	0.21	0.32	0.47	0.69	1.02
Africa	0.34	0.82	1.18	1.72	2.45	3.55
Asia a)	0.50	1.28	1.79	2.49	3.50	4.80
Japan	0.87	4.41	6.63	9.60	13.50	18.50
Mainland China	0.25	2.77	4.42	6.80	10.50	16.00
Oceania	0.52	1.02	1.28	1.56	1.90	2.35

a) Excluding Japan and Mainland China.

Western Europe's and North America's combined share of the total world consumption, which in 1960 amounted to nearly three quarters, is likely to fall considerably as a result of the expected rapid increases in the consumptions of the Soviet Union and of Mainland China. Nevertheless, it appears that the two regions, i.e. Western Europe and North America, will account for almost 60 per cent of the world consumption by 1980. The prospective developments of the markets in those two regions will thus continue to dominate the world balance of demand and supply of paper, board and pulp for their manufacture.

As regards the demand estimates for the Soviet Union, Mainland China and the countries of Eastern Europe, it should be pointed out that the actual developments of consumption in those countries which have centrally-planned economies could, of course, become quite different from what is indicated above. It may, for instance, be mentioned that the latest published long-term plan for the paper industry in the Soviet Union indicates

/a production

a production target of 13 million tons of paper and board by 1970, all of which is intended for domestic consumption. If this plan is realized on schedule (which, however, seems doubtful), the consumption will thus become considerably higher than the level of 8.3 million indicated in the projection of Table 1.

A breakdown of the demand estimates for Western Europe and North America into projections for the main groups of paper and board is given in Annexes 4 and 5.

2.2 Trends in the inter-regional trade of paper and board

During the 'fifties and early 'sixties some very important changes took place in the pattern of inter-regional trade of paper and board, as is demonstrated by the summary of trade developments in Table 2.

Table 2 Historical development of the inter-regional net trade of paper and paperboard

Net export (+); net import (-)

	1949-51	1959-61	1962	1963	1964 prel.	Yearly change
	1000 metric tons					Percent
North America	+ 410	+ 1 440	+ 1 456	+ 1 760	+ 2 100	+ 12.4
Western Europe	+ 1 190	+ 870	+ 686	+ 676	+ 617	- 4.8
Total	+ 1 600	+ 2 310	+ 2 142	+ 2 436	+ 2 717	+ 3.9
Latin America	- 620	- 860	- 830	- 769		
Eastern Europe	+ 100	- 20	- 50	- 31		
Soviet Union	+ 20	+ 10	- 10	- 28		
Middle East	- 50	- 120	- 133	- 130		
Africa	- 310	- 440	- 438	- 420		
Asia [a]	- 320	- 540	- 617	- 620		
Japan	+ 23	+ 168	+ 190	+ 200	+ 100	
Mainland China	-	+ 30	+ 22	+ 18		
Oceania	- 280	- 340	- 305	- 275		
Stat. residual [b]	- 163	- 198	+ 29	- 381		
Total	- 1 600	- 2 3010	- 2 142	- 2 436	- 2 717	+ 3.9

a) Excluding Japan and Mainland China.

b) Includes import to countries which are not included in the statistics; residuals for individual years are affected by stock changes.

/Of special

Of special interest to note from the statistics in Table 2 are - a) the steady increase from 1950 to 1964 in North America's and Western Europe's combined net export of paper and board to the less developed deficit regions of the world, and b) the rapid increase over the same period in the net exports from North America, while those from Western Europe declined to only about one half of the level in 1950.

It is, of course, a very difficult, or almost impossible, task to forecast the future developments of the inter-regional trade of paper and board with any claim to accuracy, since the actual developments may be influenced by so many factors which cannot be predicted in advance. This is especially true as regards possible changes in the trade policies and custom tariffs which could have important effects on the volume and direction of trade.

There are, nevertheless, some main features of the past developments which appear could be projected also into the future. These trends may be briefly summed up as follows:

a) It seems likely that the less developed, deficit regions will continue, or even increase, their efforts to raise their domestic production in order to prevent rapidly mounting expenditures of foreign exchange on imports of paper and board (and of pulp).

b) In spite of these efforts, however, it appears from past experience that the rising production in those countries or regions will not keep pace with the increasing demand of paper and board. The availability of locally produced paper will have a "triggering effect" on demand, and consumption will rise at a faster rate than would be the case if the growing market has to rely primarily on imports. Net imports of paper and board to those countries are therefore likely to continue rising, but probably at a slower rate than during the 'fifties and early 'sixties.

c) The paper and board imports to the deficit regions will probably consist more and more of so-called bulk products such as newsprint, magazine paper and linerboards which are produced in very large mill units in the industrialized countries and are subject to important economies of scale in manufacturing.

/d) As

d) As a result of the increasing deficit of industrial wood in Western Europe, it is reasonable to assume that this region will change from being a net supplier of paper and board to the world market to become a net importer, probably sometime in the early 'seventies. The net import is, however, likely to be rather small and to consist mainly of shipments of newsprint (from Canada), kraft liners (from the United States) and perhaps minor quantities of paper which are produced without any admixture of wastepaper to the fiber stock.x)

Table 3 shows the estimates which were adopted here of Western Europe's and North America's future trade in paper and board with the rest of the world. It is again emphasized that these projections are of an expository nature and that actual developments of the trade patterns could become substantially different from those indicated, especially over the long run, as a result of possible changes in trade policies and customs tariffs. A breakdown of the estimates into main groups of paper and board is given in Annex 6.

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x) It is an often overlooked fact that wastepaper accounts for a large share of the fiber supply in the manufacture of paper and board. It may thus be mentioned that in Western Europe wastepaper makes up an average of some 35 percent of the fiber furnish in the production of all grades of paper and board, excluding newsprint and kraft paper. In North America the share is 1 - 2 points lower than in Europe. Since the price of wastepaper is considerably lower than that of virgin pulp, whereas the freight rates are usually higher, it follows that the production of paper and board qualities containing high percentages of wastepaper could always be produced cheaper in the markets where they are consumed.

/Table 3

Table 3 Expository estimates of world trade in paper and board to 1980

TOTAL:	WESTERN EUROPE'S net trade with: North America	Rest of world	Total	NORTH AMERICA'S net trade with: Western Europe	Rest of world	Total	Net import to Rest of world
	1000 metric tons						
1949-51	?	?	+1190	?	?	+ 410	1600
1954-56	- 260	+1287	+1027	+ 260	+ 617	+ 877	1904
1959-61	- 602	+1472	+ 870	+ 602	+ 838	+1440	2310
1963	- 766	+1442	+ 676	+ 766	+ 994	+1760	2436
1964	- 861	+1478	+ 617	+ 861	+1239	+2100	2717
1970	-1300	+1500	+ 200	+1300	+1600	+2900	3100
1980	-1800	+1300	- 500	+1800	+2100	+3900	3400

According to the appraisal in Table 3, Western Europe's trade surplus may decline from the 1960 level of about 870 thousand tons to some 200 thousand by 1970. In the beginning of the 'seventies the region is likely to change into becoming a net importer of paper and board with a deficit which is estimated will reach about 1/2 million tons by the end of the decade. The region's present trade surplus with the deficit regions of about 1.4 - 1.5 million tons will probably remain at approximately today's level throughout the 'sixties and then decline only slowly during the course of the following decade. The yearly deficit in the trade with North America is thus estimated will increase rapidly from a level of 600 thousand tons in 1960 (860 thousand in 1964) to 1.3 million tons by 1970 and to 1.8 million by 1980. The growing imports will consist mainly of kraft liners, net imports of which may account for nearly two thirds of the net trade with North America in 1980 (Annex 6).

As mentioned earlier, the deficit regions are likely to raise their net imports of paper and board, mainly of newsprint and kraft papers, from North America and Western Europe. Their combined annual deficit of some 2.3 million tons in 1960 may go up to 3.1 million by 1970 and to 3.4 million by 1980, but could, in fact, become substantially larger if the less developed countries fail to step up the rate at which production capacities were expanded in the past.

/The estimate

The estimate of the future trade patterns thus indicates that the only region having a net surplus of paper and board in the 'seventies would be North America, who may increase her net exports from the 1960 level of about 1.8 million tons to nearly 3 million tons by 1970 and to almost 4 million by 1980.

2.3 Expository estimates of future paper and board production levels in North America and Western Europe

Accepting the above projections of the paper and board consumption levels (Table 1, Annex 4) and the estimates of the future trade patterns (Table 3, Annex 5), one arrives at the following assessment of the paper and board production levels in North America and Western Europe (Table 4).

Table 4 Assessment of future paper and board production levels in North America and Western Europe

	1959-61	1965	1970	1975	1980	Yearly increase
	1000 metric tons					percent
North America						
Total paper and board	37680	45825	55170	64975	75925	3.6
of which:						
newsprint	7831	8790	9970	11175	12425	2.3
printing/writing	6188	7800	9800	11550	13700	4.1
other paper and board	23661	29235	35400	42250	49800	3.8
Western Europe						
Total paper and board	19455	25450	32800	40200	49100	4.7
of which:						
newsprint	3778	4550	5500	6400	7420	3.4
printing/writing	4438	6000	7400	8525	9760	4.0
other paper and board	11242	14900	19900	25275	31910	5.4

The assessment indicates that paper and board production in North America may roughly double over the two decades from 1960 to 1980, corresponding to an annual increase of about 3.6 per cent. In Western Europe the production is estimated will rise by about 150 per cent over the same period, corresponding to an annual growth rate of about 4.7 per cent. In both regions the yearly growth is likely to decline over time; in North America

/the annual

the annual increase during the 'sixties is thus estimated at close to 3.9 per cent, in Western Europe the rate is estimated at nearly 5.4 per cent during the same decade.

3. FIBER NEEDS for PAPER and BOARD PRODUCTION in NORTH AMERICA and WESTERN EUROPE

The historical patterns of fiber consumption for paper and board manufacture in North America and Western Europe are recorded in Table 5, which also shows the projected changes over the period from 1965 to 1980. The estimates are summarized from the more detailed breakdowns of the consumption patterns which are included in Annexes 7 and 8.

Table 5 Historical and estimated future fiber consumption patterns for paper and board manufacture in North America and Western Europe

	1954-1956	1959-1961	1964	1965	1968	1970	1980
	kg per metric ton of paper and board						
North America:							
Total all fibers	1031	1029	1017	1019	1010	1005	1000
Mechanical pulp	219	206	198	195	182	177	172
Semi-chemical pulp[a]	45	55	58	62	68	70	80
Chemical wood pulp	497	529	548	560	570	575	587
Other fiber pulp and rags	28	16	14	12	10	8	6
Wastepaper	243	225	199	190	180	175	155
Western Europe:							
Total all fibers	1034	1013	1009[b]	1600	999	995	989
Mechanical pulp	272	253	236	233	226	222	197
Semi-chemical pulp	4	11	27	30	37	41	60
Chemical wood pulp	406	421	438	442	452	459	493
Other fiber pulp and rags	109	80	59	53	42	34	17
Wastepaper	243	248	249	248	242	238	221

a) Including chemical and groundwood screenings.
b) Figures for Western Europe refer to 1963/1964 averages.

Note: Pulp quantities are given at 90% dry content (air dry).

/The historical

The historical series demonstrate some clearly discernible trends in the fiber consumption patterns, similar in both regions.

To begin with, it will be noted that the total consumption of all types of fibers per ton of paper and board declined. There were two main reasons for this trend: (a) the increasing use of efficient fiber recovery systems which became necessary because of stronger regulations against stream pollution and (b) the growing production of coated papers and of papers containing high percentages of fillers. There is every reason to believe that this trend will continue also in the future but at a declining yearly rate.

Secondly, it will be observed that the share of mechanical pulp in the fiber furnishes was substantially reduced over the period of observation. This is largely explained by the declining proportion of newsprint and mechanical printings in the production and consumption of paper and board in the two regions, a trend which is estimated will continue also in the future. This is exemplified by the following comparison of the historical and projected future shares of newsprint in the total production of paper and board (Table 6).

Table 6 Historical and estimated future share of newsprint in the total production of paper and board

	1954-1956	1959-1961	1964	1965	1970	1975	1980
	percent						
North America	21.3	20.8	19.3	19.3	18.3	17.4	16.6
Western Europe	19.8	19.4	18.1	17.9	16.8	16.0	15.1

Thirdly, it will be seen from Table 5 that the use of semi-chemical pulp in paper and board manufacture increased. Semi-chemical pulping of wood is a fairly recent development which, however, appears to have very good growth prospects. The potential use of this pulp grade will depend on further developments of processing techniques and product qualities. It must be presumed, however, that the growing deficit in wood supplies in Western Europe will create a strong incentive to carry out research in

/this direction

this direction and that the use of semi-chemical pulp in this region will continue to grow at a fairly rapid rate. The estimates in Table 5 are probably cautious appraisals of the potential future utilization of this grade of pulp in both North America and Western Europe.

Finally, the historical series demonstrate a rather rapid increase in the consumption of chemical wood pulp whereas the usage of other fiber pulp from bagasse, esparto, straw and the like, as well as of rags, declined in both regions. These trends will certainly continue in the future. It should be emphasized that the estimates in Annexes 7 and 8 of the use of different grades of chemical wood pulp are likely to be much less precise than that of the overall total. The different chemical pulp qualities are in many ways interchangeable and actual usage will be largely determined by market developments, and in particular by price changes.

As regards the use of wastepaper in the manufacture of paper and board it is interesting to note that the historical trends in Western Europe were different from those in North America. The consumption per ton of paper and board produced in Western Europe rose slowly whereas there was a marked downward trend in North America.

Since the estimates of the future use of wastepaper will greatly affect the assessment of wood pulp needs in the two regions, it is worthwhile to mention a few of the considerations underlying the projections in Table 5.

There are two main factors which will determine the future utilization of wastepaper: (a) the supply which, in turn, depends on the possibilities and cost of salvage and (b) the extent to which technical factors may limit the amount which could be included in the fiber furnishes for different grades of paper and board.

Over the decade from 1954 to 1964 the rates at which wastepaper was recovered in Western Europe remained remarkably stable at a level of about 26 per cent of the total paper consumption.[x] The rapidly rising

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x) The rates were: 26.1% in 1955, 26.2% in 1959-61 and 25.6% in 1962-64. See also: Pulp and Paper Prospects in Western Europe; op. cit., Table 3.3.

paper consumption together with the continuing shift of rural population to urban centers will greatly favor the possibilities of recovering wastepaper in the region and there are valid reasons to presume that the recovery rate could be maintained for a long time at approximately today's level, in spite of the rising labor wages.x)

The growing consumption of coated and wet-strength paper and board, which qualities are difficult to process into new fibers for papermaking, as well as the increasing use of short-fibered pulps in Western Europe could, however, limit the extent to which wastepaper may be used in the fiber furnishes.

The estimate given in Table 5 of a wastepaper utilization by 1980 in Western Europe of about 220 kilograms per ton of paper could be on the low side. Under the pressure of a growing deficit in fiber supplies for paper manufacture it may well be that the salvage rate in the region could be kept as high as 25 per cent which would reduce the estimated needs of wood pulp in 1970 by some 330 thousand tons and in 1980 by nearly 1 1/2 million tons.

Accepting the projections of fiber consumption per ton of paper and board indicated in Table 5, one arrives at the following estimates in Table 7 of the total tonnages of different grades of wood pulp needed to produce the quantities of paper and board given in Table 4.

According to the appraisal, North America's and Western Europe's combined needs of mechanical pulp (groundwood) will grow from about 12.7 million tons in 1960 to nearly 17 million tons by 1970 and to 22.7 million by 1980, corresponding to an annual growth rate of 3 per cent over the two decades.

The total requirements of semi-chemical pulp may go up from a little less than 2.3 millon tons in 1960 to about 5.2 million tons by 1970 and to over 9 million by 1980. The annual increase averages more than 7 per cent over the whole period.

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x) To support this statement, it may be mentioned that North America had a recovery rate of close to 27% in 1953-54, a paper consumption level of 165 kg/capita and a GNP/head of $2100 (1954 prices); the estimates for Western Europe indicate a consumption of 137 kg/capita by 1980 at an income level of only $1360.

Table 7 Estimates of future needs of wood paper pulp in North America and Western Europe

	1959-61	1965	1970	1975	1980	Yearly increase
	1000 metric tons					percent
North America						
Mechanical pulp	7750	8935	9765	11340	13060	2.6
Semi-chemical pulp	2056	2840	3860	4870	6070	5.6
Chemical pulp	19921	25650	31720	37750	44570	4.1
Western Europe						
Mechanical pulp	4929	5930	7280	8420	9670	3.4
Semi-chemical pulp	206	765	1350	2010	2950	14.2
Chemical pulp	8187	11250	15050	19140	24210	5.6
Both regions						
Mechanical pulp	12679	14860	17050	19760	22730	3.0
Semi-chemical pulp	2262	3600	5210	6880	9020	7.2
Chemical pulp	28108	36900	46770	56890	68780	4.6

The two regions' combined needs of chemical wood pulp, finally, may rise from 28.1 million tons in 1960 to 46.8 million by 1970 and to nearly 69 million by 1980, corresponding to an annual increment of 4.6 per cent.

4. CAPACITY DEVELOPMENTS in NORTH AMERICA and WESTERN EUROPE

The question of accurately defining the productive capacities of pulp, paper and board mills is a very complex one. Paper machines are flexible within limits and can usually manufacture a variety of grades, each of which will be produced at a different tonnage rate per day; pulp mills may also produce several qualities of pulp at different yields and hence with different output per day.

Much work has been done over the past five years by international organizations and by the industry associations with the view to determine and to define the productive capacities on a uniform basis. The estimates of the existing capacities and of the planned expansions of the industries in North America and Western Europe which are presented in the following are believed to be reasonably correct and comparable. They refer to capacities measured on so-called "maximum or all-out basis" and reflect the tonnages which can be theoretically produced in a year with allowance only for normal annual repair downtime and for present restrictions on working time imposed by labor union contracts and agreements.

Regarding the estimates of capacity expansions, it should be noted that these can only cover a rather limited period of time. For paper and board the presently known expansion plans extend over three years only, i.e. to 1968; for paper pulp the data also include preliminary assessments of the minimum expansions which are likely to be completed in the years from 1968 to 1970.

4.1 Paper and board capacity developments

Table 8 summarizes the estimates of paper and board productive capacities in North America and Western Europe in 1960 and 1964, as well as the presently known expansion plans and estimated future additions to capacities in the years 1965 - 1968.

The North American capacity for paper and board manufacture will, according to the appraisal, rise by nearly 14 million tons between 1960 and 1968, corresponding to an average annual increment of 3.5 per cent. The rate of expansion will, however, be considerably higher over the second half of the period when the capacity additions are estimated will read over 9 million tons as compared with about 4.8 million over the first four years.

/Table 8

Table 8 Estimates of paper and board productive capacities in North America and Western Europe (maximum or all-out basis)

	1960	1964	1965	1966	1967	1968	Yearly increase
	1000 metric tons						percent
North America							
Total paper and board	44100	48930	50710	53170	55710[a]	57890[b]	3.5
of which:							
newsprint	9044	9815	9860	10130	10580	11090	2.6
printing/writing	6853	8015	8415	9050	9495[a]	9930[b]	4.7
other paper and board	28200	31100	32435	33990	35635	36960	3.4
Western Europe							
Total paper and board	20450	26631	28190	29590	31030	32300	5.9
of which:							
newsprint	4033	5119	5290	5445	5590	5770	4.6
printing/writing	4698	6320	6580	6950	7360	7640	6.3
other paper and board	11719	15192	16320	17200	18080	18890	6.2

a) Includes an estimated 100 thousand tons over and above presently known plans.

b) Includes an estimated 470 thousand tons over and above presently known plans.

Sources: FAO Capacity surveys 1964, 1965, and Industry Associations.

In Western Europe it is estimated that the total productive capacity will go up by almost 12 million tons over the whole period, or by an average of 5.9 per cent per year. The expansion trend is, however, reversed from that in North America; during the first half of the period the capacity went up by about 6.2 million tons, as compared with the estimated additions of some 5.7 million over the four years from 1965 to 1968.

It is again emphasized that the above estimates of capacity expansions are likely to be on the low side. The time required to install a new paper or board machine is often less than two years from the time of decision, and the list of expansion plans is therefore probably incomplete.

/4.2 Expansion

4.2 Expansion of paper pulp capacities

Table 9 records the 1960 and 1964 productive capacities for wood paper pulp in North America and Western Europe and the presently known expansion plans for the period from 1965 to 1970. The plans include only so-called "confirmed effective expansions"; excluded are a number of projects, mainly in British Columbia, with a combined capacity of about 1 1/2 million tons and which may be postponed in view of the expected large over-supply of market pulps in the second half of the 'sixties (see Section 5).

Table 9 Estimates of wood paper pulp capacities in North America and Western Europe

	1960	1964	1965	1966	1967	1968	1970	Yearly increase
	1000 metric tons							percent
North America								
Total wood paper pulp	35520	40880	43540	45720	48540	50100	53600	4.2
of which:								
mechanical pulp	10246	10775	11250	11380	11505	11665	11950	1.6
semi-chemical pulp	3036	3120	3215	3310	3400	3480	3900	2.5
chemical pulp	22235	26985	29070	31030	33630	34950	37730	5.4
Western Europe								
Total wood paper pulp	14957	19575	20650	21510	22530	23150	24850	5.2
of which:								
mechanical pulp	6032	6790	6970	7220	7490	7650	8100	4.2
semi-chemical pulp	220	715	860	950	1120	1190	1450	20.7
chemical pulp	8705	12070	12820	13340	13920	14310	15300	5.8
Both regions								
Total wood paper pulp	50477	60455	64190	67230	71070	73250	78450	4.5
of which:								
mechanical pulp	16278	17565	18220	18600	18995	19315	20050	2.1
semi-chemical pulp	3256	3835	4075	4260	4520	4670	5350	5.0
chemical pulp	30940	39805	41890	44370	47550	49260	53030	5.5

Note: Mechanical pulp capacities in North America include also capacities in fiberboard mills.

/The confirmed

The confirmed effective expansions will raise the productive capacities of wood paper pulp in North America by over 18 million tons over the sixties and in Western Europe by nearly 10 million tons. The annual capacity growth rates in the two regions are estimated at 4.2 and 5.2 per cent, respectively. The developments of pulp capacities in the two regions follow the patterns of the planned expansions in the paper and board industries, i.e. the expansion rate in North America is accelerating, whereas in Western Europe there is a declining trend. Thus, the additions to pulping capacities in North America was about 8 million tons during the first five years of the decade but the expansion over the second five-year period is estimated will be over 10 million tons with the prospects of an additional 1 1/2 million tons of not yet confirmed projects coming into operation by the end of the decade. In Western Europe the pulp capacity rose by some 5.7 million tons from 1960 to 1965, whereas the additions from 1965 to 1970 are estimated will amount to about 4.2 million.

/5. SHORT-TERM

5. SHORT-TERM BALANCES of DEMAND and SUPPLY of PAPER and PULP in NORTH AMERICA and WESTERN EUROPE

The future production levels of paper and board in North America and Western Europe were estimated in Section 2 and the derived demand of paper pulp was calculated in Section 3. Section 4 recorded the presently known plans for expanding the industrial capacities; of paper and board to 1968 and of paper pulp to 1970.

The object of the present section is to establish the balances of demand and supply of paper and pulp in the two regions by comparing the estimated production levels with the industrial capacities.

Before establishing the demand/supply balances which will indicate whether the two regions' exportable surpluses of pulp and paper will grow or decline in the short term, it will be necessary, however, to say a few words about the operating ratios in the two industries.

5.1 "Normal" operating ratios in the paper and pulp industries

It will be recalled that the capacity data in the preceding section were given in terms of so-called "maximum or all-out capacity" and reflect the tonnages which can be theoretically produced in a year.

Historical records show, however, that the actual production over a whole year rarely reached the theoretically calculated output, especially in mills having a mixed production program, even in times when the demand was in excess of the supply. The following Table 10 shows the estimated "normal" operating ratios in the industries, i.e. the maximum output which could be maintained over a longer period of time without changing the labor union contracts or postponing the normal repair and maintenance.

Table 10 Estimates of "normal" operating ratios in the paper and pulp industries of North America and Western Europe

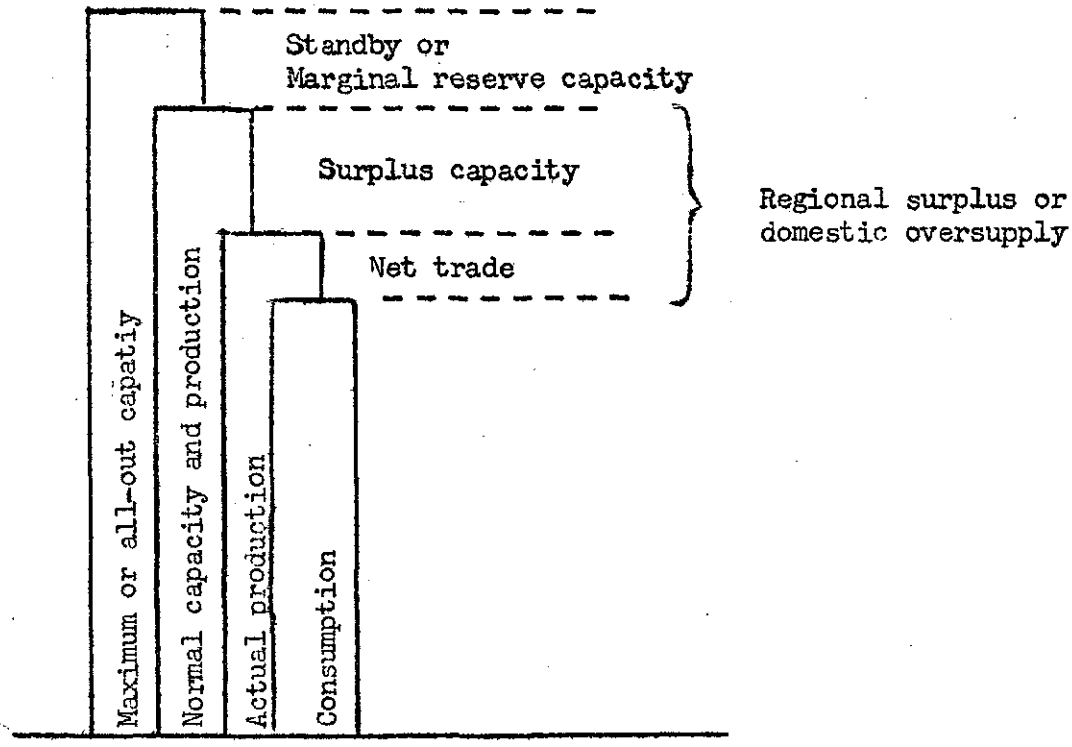
	North America	Western Europe
	percent	
Newsprint	100	96
Printing, writing paper	94	94
Other paper and board	92	96
Mechanical pulp	87	85
Semi-chemical and chemical pulp	95	95

/In the

In the following discussions of the demand/supply balances for paper and pulp, the difference between the maximum or all-out capacities (sometimes referred to as "rated capacities") and the output at the normal operating ratios indicated above will be referred to as "standby" or "marginal reserve" capacities. The difference between "normal" capacity, i.e. output at the normal operating ratios, and actual production will be called surplus capacity.

The definitions are illustrated by the following Fig. 1.

Fig. 1



5.2 Demand/supply balances for paper and board

The estimated short-term market developments to 1968 for paper and board in North America and Western Europe are recorded in Table 11 which compares the normal supply with the estimated actual production levels of all grades of paper and board. The normal production levels were obtained from the capacity data in Table 8 and the operating ratios indicated in Table 10; the estimated actual production levels for the individual years were calculated from the data in Table 4, assuming constant annual growth rates over the period from 1965 to 1970.

/Table 11

Table 11 also shows the developments of surplus and standby capacities and the calculated changes in the operating ratios in the industry. Annexes 9 - 11 give the estimates of market developments for the major grades of paper and board.

Table 11 Estimates of short term market developments for paper and board in North America and Western Europe

	1960	1964	1965	1966	1967	1968
	1000 metric tons					
North America						
Maximum or all-out capacity	44100	48930	50710	53170	55710	57980
Normal capacity/production	41435	45960	47610	49900	52290	54425
Estim. actual production	37680	44375	45825	47560	49360	51225
Surplus capacity	3755	1585	1785	2340	2930	3200
Standby capacity	2665	2970	3100	3270	3420	3555
Western Europe						
Maximum or all-out capacity	20450	26630	28190	29590	31030	32300
Normal capacity/production	19535	25435	26935	28270	29650	30850
Estim. actual production	19460	24560	25450	26770	28170	29625
Surplus capacity	75	875	1485	1500	1480	1225
Standby capacity	915	1195	1255	1320	1380	1450
Both regions						
Maximum or all-out capacity	64550	75560	78900	82760	86740	90280
Normal capacity/production	60970	71400	74550	78170	81940	85275
Estim. actual production	57140	68935	71275	74330	77530	80850
Surplus capacity	3830	2465	3275	3840	4410	4425
Standby capacity	3580	4160	4350	4590	4800	5000
	percent					
Operating ratios						
North America	85.4	90.7	90.4	89.4	88.6	88.3
Western Europe	95.2	92.2	90.3	90.5	90.8	91.7
Both regions	88.5	91.2	90.3	89.8	89.4	89.6

Note: Detail figures may not add up to totals because of rounding.

/When interpreting

When interpreting the data in Table 11 we are only concerned with the overall trends in the development; data for individual years are of less interest since the markets are not likely to grow at the constant annual rates assumed here.

It appears from the analysis that the capacity developments for paper and board in North America and Western Europe over the period from 1964 to 1968 will be somewhat in excess of the estimated increase in the total regional needs, i.e. for domestic consumption and for export. The combined surplus capacity of a little less than 2 1/2 million tons in 1964 will rise by almost 2 million tons to a level of somewhat over 4.4 million by 1968. As a result, the operating ratios in the industry will decline. The fall will, however, be rather small; in North America from 90.7 per cent in 1964 to 88.3 in 1968 and in Western Europe from 92.2 to 91.7 per cent.

On the whole, it may be said that capacity expansion plans, as they are presently known, are reasonably well in line with the expected market growth. It should be warned, however, against the likelihood that the list of projects is incomplete towards the end of the projection period and that the actual market developments may thus become less favorable than are indicated by the rather small decline in the operating ratios shown in Table 11.

5.3 Market developments for wood paper pulp

For technical as well as for economic reasons the inter-regional trade in mechanical and semi-chemical pulp is very small, and it appears unlikely that this situation will change in the future. The prospective balances of demand and supply of these pulp grades need therefore not be discussed in the present survey of the international pulp market.

When analyzing the market developments for chemical paper pulp we shall start by comparing the normal capacities, or production levels (derived from data in Tables 9 and 10), with the estimated requirements for domestic manufacture of paper and board in North America and Western Europe. The difference between supply and demand indicates the overall regional surplus of integrated and market pulp, all or part of which may become available for export to the deficit regions.

/Next will

Next will be discussed the possible future exports of pulp from North America and Western Europe to the other regions of the world. The net exports will then be subtracted from the earlier estimated regional surplus quantities of pulp. This gives us the surplus capacities which will then be compared with the estimated total capacities to establish the average operating ratios in the pulp sector.

Table 12 compares the normal capacities of chemical pulp with the estimated domestic needs for paper and board manufacture in North America and Western Europe over the period from 1960 to 1970.

Table 12 Regional oversupply of chemical paper pulp in North America and Western Europe

	1959-61	1964	1965	1966	1967	1968	1970
	1000 metric tons						
North America							
Maximum or all-out capacity	22235	26985	29070	31030	33630	34950	37730
Normal capacity/production	21125	25635	27620	29480	31950	33200	35850
Estim. domestic needs	19921	24469	25650	26790	27970	29200	31720
Regional surplus	1204	1166	1970	2690	3980	4000	4130
Western Europe							
Maximum or all-out capacity	8705	12070	12820	13340	13920	14310	15300
Normal capacity/production	8270	11470	12180	12670	13220	13600	14540
Estim. domestic needs	8187	11100	11250	11920	12640	13400	15050
Regional surplus	83	370	930	750	580	200	-510
Both regions							
Maximum or all-out capacity	30940	39055	41890	44370	47550	49260	53030
Normal capacity/production	29395	37105	39800	42150	45170	46800	50390
Estim. domestic needs	28108	35570	36900	38710	40610	42600	46770
Total regional surplus	1287	1535	2900	3440	4560	4200	3620

From the comparison it will be seen that the two regions' combined surplus of chemical paper pulp will grow rapidly from about 1 1/2 million tons in 1964 to a little over 4 1/2 million tons by 1967, and then slowly decline to about 3.6 million tons by 1970.

/In North America

In North America the domestic oversupply is estimated will increase from some 1.2 million tons in 1964 to about 4 million by 1967 and then slowly rise to a level of a little over 4.1 million tons by 1970; in Western Europe the regional surplus will rise to over 900 thousand tons in 1965 and then fall to some 200 thousand by 1968. In the last two years of the decade the Western European domestic oversupply will change into a net deficit of about 1/2 million tons by 1970.

The reader is again reminded that the above recorded capacity expansion plans in North America do not include a number of still unconfirmed projects with a total additional capacity in the order of 1 1/2 million tons. The decline in the regional surplus of pulp towards the end of the decade may therefore be only illusionary; should the unconfirmed projects come into operation within the present decade, the domestic oversupply will continue to rise to a level of about 5.1 million tons by 1970.

5.31 Net trade of chemical paper pulp:

The question now arises of whether or not the regions of North America and Western Europe will be called upon to continue being net suppliers of paper pulp to the deficit regions of the world and to what extent the net export may reduce the above projected regional surpluses.

Over the 'fifties the two regions of North America and Western Europe raised their combined net export of chemical paper pulp from 340 thousand tons in 1950 to 525 thousand in 1960; in the first three years of the 'sixties net exports almost doubled to a little over one million tons in 1963, and preliminary data for 1964 indicate a further rise of almost 150 thousand tons to a level of nearly 1.2 million tons (Table 13).

From 1950 to 1960 there was a very marked shift in the individual trade balances of Western Europe and North America. Western Europe, which in 1950 was a net exporter of over 800 thousand tons of chemical paper pulp, changed into becoming a net importer of 300 thousand tons by 1960; North America which was a net importer of nearly 1/2 million tons in 1950 had a net export of over 800 thousand tons at the end of the

/decade. Over

decade. Over the first four years of the 'sixties Western Europe's trade deficit remained at a level of some 250 thousand tons, whereas North America's trade surplus continued to rise (except for a temporary setback in 1962) to reach a level of nearly 1.4 million tons in 1964.

Table 13 Historical development of net trade in chemical wood paper pulp

	Western Europe	North America	Net export of both regions		
			Total	to Japan	to others
	1000 metric tons				
1950	821	-482	339	34	305
1955	133	367	500	17	483
1960	-300	824	524	9	515
1961	-345	957	612	20	592
1962	-106	815	709	67	642
1963	-242	1262	1020	289	731
1964 prel.	-232	1387	1155	262	893

Sources: OECD; Pulp and Paper Statistics.
FAO; Yearbooks of Forest Products Statistics.
American Pulp Producers Association; World Pulp Statistics.

The assessment of trade developments over the next five years, i.e. to 1970, includes two very important factors of uncertainty, namely, the possible changes in the trade balances of Japan and of the Soviet Union.

From Table 13 it will be seen that there was a rapid increase from 1962 to 1963 in Japan's net import of chemical paper pulp, from 65 thousand to 290 thousand tons, and that the preliminary statistics for 1964 indicate that net imports in that year remained at approximately the 1963 level.

There is conflicting evidence and considerable difference of opinions about the potential removals from Japan's forest resources, but there are reasons to believe that the forests have been, and are still, subject to considerable overcutting. Even so, the country is today a heavy importer

/of roundwood

of roundwood and of forest products. For instance, in 1963 Japan had a net import of about 13 million solid cubic meters of roundwood (mainly from the Philippines, from the Soviet Union and from North America), one million cubic meters of sawnwood and about 470 thousand tons of chemical pulp (including dissolving pulp).

In 1963 Japan's consumption of paper and board reached 6.2 million tons and demand as estimated will reach 9.6 million by 1970 (Table 1), an increase by 3.4 million tons over a period of seven years.[x] To produce this quantity of paper and board within the country, an additional amount of about 1.7 million tons of chemical and semi-chemical paper pulp will be needed. Unless the domestic pulp capacity is expanded the country may thus have to raise her imports of paper pulp (or paper and board) from the present 1963 level of some 300 thousand tons to about 2 million tons by 1970. Great efforts will, no doubt, be made to prevent this rapid rise in the import requirements by increasing the domestic pulp production facilities. Such expansion will probably to a large extent be contingent upon the possibility of raising the imports of roundwood over the present level, the prospects for which, however, appear less favorable than in the past. The overall conclusion is, therefore, that Japan will have to increase considerably her net imports of paper pulp and/or paper and board over the next five years. In view of the dynamic attitude of the Japanese paper industry, the high technical skill and the rather low labor wages in the country, it appears likely that the imports will be mainly in terms of paper pulp and not of finished paper and board products.

The second factor of great uncertainty in assessing the combined future net exports of paper pulp from North America and Western Europe is the prospective balance of supply and demand in the Soviet Union.

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x) Consumption was 7.2 million tons in 1964, i.e. 600 thousand tons higher than the estimated level of 6.6 million in 1965. This gives reason to believe that the projection in Table 1 is underestimated, probably as a result of a too conservative estimate of the economic growth rate in the country.

/According to

According to the latest announced development plans, the Soviet Union shall expand her production of paper and board to 13 million tons by 1970 and her output of chemical and semi-chemical paper pulp to a level of 10.4 million tons in the same year.[x] A preliminary assessment indicates that the production of 13 million tons of paper and board in the Soviet Union will require the input of chemical and semi-chemical paper pulp in the order of 8.8 million tons. This means that if the development plans are implemented in full, the Soviet Union may have a quantity of some 1.6 million tons of paper pulp available for export by 1970.

That the Soviet Union is planning for a considerable net export of chemical paper pulp is beyond doubt. Considerable doubts must, however, be expressed that the ambitious development plans to 1970 will be implemented in full within the short period of five years, and there are reasons to believe that the actual production levels in 1970 of both paper and pulp will fall short of the announced targets. This does not mean, however, that the above indicated surplus of 1.6 million tons of chemical paper pulp may not become available for export by 1970 since the delay in the execution of the expansion program may become just as large in the paper and board as in the pulp sector.

A large share of the planned exports of chemical paper pulp from the Soviet Union is, no doubt, aimed at satisfying the growing requirements of the countries in Eastern Europe. It has thus been estimated that this region, which in 1963 had a net import of only some 30 thousand tons, will have a deficit of 700 thousand tons of paper pulp by 1970.[xx]

In the following appraisal (Table 14) of the future net exports of paper pulp from North America and Western Europe to the deficit regions

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x) "Exhibition of Soviet Economic Achievements" (BDAX) and Bumashnaja Promishlennost 6/64, as reported by FAO in "Pulp and Paper Trends in the USSR and Eastern Europe", April 1965.

xx) FAO: "Pulp and Paper Trends in the USSR and Eastern Europe", April 1965.

of the world, it is presumed that the growing import needs of Eastern Europe will be met primarily by exports from the Soviet Union who would raise her total net exports of paper pulp from about 160 thousand tons in 1963 to some 600 thousand tons by 1970.

Table 14 Expository estimates of net exports of chemical paper pulp from North America and Western Europe

net export (+); net import (-)

	1960	1963	1964 prel.	1965	1970
	1000 metric tons				
North America	+ 824	+ 1262	+ 1387	?	?
Western Europe	- 300	- 242	- 232	?	?
Total net export	+ 524	+ 1020	+ 1155	1200	+ 1900
of which: to Japan	9	289	262	300	700
to others	515	731	893	900	1200

The estimate indicates that North America's and Western Europe's combined net exports of chemical paper pulp to the deficit regions of the world may grow from a little over one million tons in 1963 to 1.2 million in 1965 and to 1.9 million tons by 1970.

5.32 Total surplus capacities for chemical paper pulp:

Accepting the above assessment of the two regions' trade balance with the rest of the world, one arrives at the following appraisal of the combined surplus capacities (integrated and non-integrated) in the years from 1965 to 1970 (Table 15).

/Table 15

Table 15 Estimates of total surplus capacities for chemical paper pulp in North America and Western Europe

	1959-1961	1964	1965	1966	1967	1968	1970
	1000 metric tons						
Regional oversupply[a]	1287	1535	2900	3440	4560	4200	3620
Estimated net exports	524	1155	1200	1340	1480	1620	1900
Surplus capacity	763	380	1700	2100	3080	2580	1720
	percent						
Estim. average operating ratio	92.5	94.0	91.0	90.3	88.5	89.8	91.8

a) From Table 12.

The calculations indicate that the two regions' combined total surplus capacity for chemical paper pulp will increase rapidly from only some 400 thousand tons in 1964 to 1.7 million in 1965. In the following years the surplus will continue to grow to a little over 3 million tons by 1967 and then decline to some 1.7 million by 1970. Should the still unconfirmed expansions of about 1 1/2 million tons come into operation within the present decade, the total surplus capacity is likely to remain at the level of 3.0 - 3.2 million tons throughout the period from 1967 to 1970.

As a result of the considerable overexpansion of the market pulp sector, the operating ratios in the pulp sector will fall rapidly from an average in the two regions of 94 per cent in 1964 to 91 per cent in 1965 and to a low of 88 1/2 per cent in 1967. Should the above mentioned unconfirmed expansions not be realized in the 'sixties, there will be an improvement towards the end of the decade with an average operating ratio of close to 92 per cent by 1970; should, however, the potential expansions of 1 1/2 million tons of market pulp capacity come into operation, the operating ratio will still be as low as about 89 per cent in 1970.

/5.33 Surplus

5.33 Surplus capacities for market pulp:

It should be noted that the above calculated operating ratios refer to the average which will be realized in the industry, i.e.in integrated as well as non-integrated production. The oversupply and surplus capacities will, however, develop mainly in the market pulp sectors of the net exporting countries.

A recently completed study by the industry associations in North America and the Nordic countries indicates that the consumption of market pulp from those regions will increase by some 3.4 million tons from 1964 to 1970, as indicated in Table 16 which also shows the estimated maximum and surplus market pulp capacities as well as the derived operating ratios.

Table 16 Estimates of capacities and operating ratios in the market pulp sector

	1960	1964	1965	1966	1967	1968	1970
	1000 metric tons						
Capacities:							
North America	3490	4300	4930	5870	6750	7500	8115
Nordic countries	4206	5983	6473	6672	6880	7185	7625
Total rated capacity	7696	10283	11403	12542	13630	14685	15740
Estim. normal capacity	7310	9770	10835	11915	12950	13950	14950
Estim. demand:							
North America	n.a.	3005	3390	3590	3490	3490	3790
Western Europe	n.a.	5120	5010	5365	5685	6025	6795
Other regions	n.a.	1260	1220	1370	1540	1740	2190
	7056	9385	9620	10325	10715	11255	12775
Surplus market pulp capacity	254	385	1215	1590	2235	2695	2175
	percent						
Operating ratio	91.7	91.3	84.4	82.3	78.6	76.6	81.2

Sources: Rated capacities 1960-1970: Industry Associations
Demand 1964 - 70: Study by Industry Association referred to in the text above.

/According to

According to the appraisal the combined surplus capacity for chemical market pulp in North America and the Nordic countries may grow by as much as 2.3 million tons from 1964 to 1968, as a result of which the operating ratio will fall from about 91 1/2 to 76 1/2 per cent. In the following two years the surplus capacity may decline by about 1/2 million tons, as a result of which the operating ratio will increase to a little over 81 per cent. Although there are reasons to believe that the regional demand for chemical market pulp given in Table 16 is underestimated for the end of the period (as indicated by the higher surplus of market pulp than of total surplus capacities arrived at in Table 15), the overall conclusion is still valid that there will be a rapid increase in the oversupply of chemical market pulp and that this surplus will be substantial throughout the remaining years of the present decade and probably even beyond.

6. A SUMMARY of the MEDIUM TERM PROSPECTS

At this stage it may be worthwhile to sum up the findings of the earlier sections of this survey which deal with the prospective development of the international market for paper pulp in the period until the early 'seventies, and to draw the conclusions from these findings.

Section 2 of the survey contains an evaluation of the regional trends in the consumption and trade of paper and paperboard on the basis of which are estimated the future paper and board production levels in North America and Western Europe. The conclusion is reached that the development of those two markets will continue to dominate the world balance of demand and supply of paper and board and, therefore, also of pulp for the manufacture of these products.

Section 3 includes an estimate of the future needs of different types of papermaking fibers which correspond to the projected production levels of paper and board in North America and Western Europe.

Section 4 records the presently known and estimated further additions to the productive capacities of paper and board and of paper pulp in the two regions. The development plans, which cover the period to 1968 for paper and board and to 1970 for paper pulp, indicate that considerable expansions are under way, particularly in North America. Attention is drawn to the probability that the actual additions to capacities may become larger than the recorded plans, especially in the case of paper pulp in North America, where still unconfirmed projects may add an additional capacity of some 1 1/2 million tons before the end of the decade.

Section 5 includes an assessment of the short-term balances of demand and supply of paper and pulp in North America and Western Europe.

It appears from the analysis that the combined surplus capacity for paper and board (i.e. the difference between "normal" and estimated actual output) will grow by almost 2 million tons over the four years from 1964 to 1968, to a level of somewhat over 4.4 million tons. Because of the large expansion of capacities the fall in operating ratios will, however, be rather small and, on the whole, it may be said that the capacity increase is reasonably well in line with the expected market growth.

/The regional

The regional oversupply of chemical paper pulp from integrated and non-integrated production (i.e. the difference between "normal" production and regional demand) will, according to the appraisal, grow rapidly from about 1 1/2 million tons in 1964 to over 4 1/2 million by 1967, and then slowly decline to about 3.6 million tons by 1970. Should the still unconfirmed expansions of some 1 1/2 million tons of pulp in British Columbia come into operation before the end of this decade, then the oversupply may reach a level of over 5 million tons by 1970.

An estimate is made of the import needs of the deficit regions which indicates that they may rise by some 700 thousand tons during the second half of the present decade to a level of 1.9 million tons by 1970. The review of the international pulp market points out that the Soviet Union is planning for export of chemical paper pulp. The latest published plans of the USSR indicate an exportable surplus by 1970 of over 1 1/2 million tons, of which some 600 thousand may be needed to cover the rising deficit of the countries in Eastern Europe. This leaves a net exportable surplus of about one million tons which may be offered for sale on the international market.

The combined surplus capacity of chemical paper pulp from integrated and non-integrated mills in North America and Western Europe is estimated will rise to a maximum of about 3 million tons by 1967, and then gradually fall off to 1.7 million in 1970. Should the unconfirmed expansions of British Columbia come into operation, the surplus capacity will remain at the level of 3.0 - 3.2 million tons throughout the period from 1967 to 1970.

The oversupply and surplus capacities will develop primarily in the market pulp sector of the net exporting countries. As a result, the average operating ratio in the market pulp mills of North America and the Nordic countries is estimated will fall rapidly from 91 1/2 per cent in 1964 to a low of 76 1/2 per cent in 1968. A slight improvement is foreseen which may take place towards the end of the decade with an indicated operating ratio of 81 per cent by 1970, provided that there will be no additions to capacities over and above the presently known, confirmed expansions.

/Conclusions:

Conclusions:

The picture of the international market developments to 1970 for chemical paper pulp, as it emerges from the present survey, is of a period with capacity expansions in North America and Western Europe which are considerably in excess of the sum of estimated regional demands and potential net exports to the deficit regions of the world. This will, no doubt, lead to increased competition for the available outlets and prices are likely to remain at the prevailing unsatisfactory levels, or possibly even go down.

The potential further additions of 1 1/2 million tons to the productive capacity of paper pulp in British Columbia, together with a possible surplus in the Soviet Union of one million tons for sale on the international pulp market by 1970, make the picture of the medium-term market prospects even more gloomy than it appears from the demand/supply balances drawn up in the survey.

In the light of the above findings it must be considered a very hazardous venture to plan for the installation in the near or medium-term future of paper pulp capacities in the less developed regions, aiming at exports to the international market.

7. DEMAND and SUPPLY of WOOD in WESTERN EUROPE - An OUTLOOK to 1980

The present section estimates the growing needs and prospective future supply of wood in Western Europe. From these estimates is derived a balance of demand and supply by 1980, which serves as a background against which will be judged the region's long-term import needs of roundwood and/or different forest products.

The estimates of prospective future total removals of roundwood are essentially projections of the forecasts to 1975 presented in a recent study of European timber trends and prospects, carried out jointly by the Economic Commission for Europe and FAO.[x] For reasons which are explained in the text, some rather minor upward revisions of the prospective total removals were made. A more important difference, however, between the present estimates and those of the above mentioned study concerns the probable distribution of the available wood supplies to different end uses. The ECE/FAO study (in the following referred to as RETTS) foresees that the potential deficit will develop mainly in the supplies of small-sized wood to the pulp and board industries; the present survey, which summarizes the findings of a study currently being carried out by the author at the Institute for International Economic Studies in Stockholm, indicates that the deficit will be primarily in terms of sawlogs and veneer logs.

7.1 The demand of wood for pulping

The following estimates of Western Europe's future needs of wood for pulping are derived from the projections of future requirements of wood paper pulp given in Table 7. To these are added the wood equivalents of the region's estimated future consumption of dissolving pulp for domestic use. It should be borne in mind that the requirements of wood paper pulp shown in Table 7 were, in turn, derived from the estimated paper and board production levels (Table 4) which were based on the assumption that the

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x) European Timber Trends and Prospects - A New Appraisal to 1975; UN Publication, Sales No: 64.II.E.4, New York 1964.

/region will

region will have a net import of about 1/2 million tons of paper and board by 1980.

To begin with, no account will be taken of the form in which the wood will be supplied, that is, as roundwood or from industrial residues. All quantities will be given in terms of roundwood, solid measure without bark. Later, when drawing up the overall balance of roundwood demand and supply, an adjustment will be made for the prospective supplies of sawmill and other industrial residues to the pulp and board industries.

Available statistics show that the volume of wood needed to produce one ton of pulp has fallen considerably over time (Annex 12). There are several reasons which explain this development; for instance, (a) the increasing share of broadleaved species in the total supply of pulpwood, (b) less waste in the transport, handling, barking and chipping of the wood, and (c) increasing process yields.

There are reasons to believe that a further decrease in the wood consumption per ton of pulp will be achieved in the future, as a result of the growing intake of broadleaved species but mainly because of rising process yields, particularly in chemical pulping. A probably very conservative estimate indicates a reduction of wood requirements in the order of 5 - 6 per cent over the two decades from 1960 to 1980. Should the recent developments in the high-yield pulping of wood be introduced at a faster rate than is assumed here, then the decline in wood consumption per ton of chemical pulp may well be in the order of 10 per cent, or even more. Table 17 shows the estimates of wood input per ton of different grades of wood pulp which were used in the present survey, as well as the total needs of wood as derived from the estimates of pulp demand levels in Table 7. The estimates of wood requirements for dissolving pulp production included in Table 17 were arrived at from the projections of dissolving pulp needs given in Annex 13.

/Table 17

Table 17 Derived needs of wood for pulping in Western Europe

	1959-1961	1965	1970	1975	1980
	solid cu.m. without bark per ton pulp				
For the production of:					
Mechanical pulp	2.52	2.50	2.45	2.40	2.40
Semi-chemical pulp	3.30	3.25	3.20	3.15	3.10
Chemical paper pulp	4.74	4.71	4.63	4.59	4.52
unbleached qualities	4.55	4.50	4.40	4.35	4.25
bleached qualities	5.05	4.95	4.85	4.80	4.75
Dissolving pulp	5.60	5.55	5.50	5.45	5.35
	million solid cu. m. without bark				
Mechanical pulp	12.4	14.8	17.8	20.2	23.2
Semi-chemical pulp	0.7	2.5	4.3	6.3	9.1
Chemical paper pulp	38.8	53.0	69.7	87.9	109.4
Dissolving pulp	6.5	7.1	7.0	6.8	6.7
Total wood equivalent	58.3	77.5	99.0	121.0	148.5

Note: Detail figures may not add up to totals because of rounding.

It is again reminded that the above estimates of wood requirements refer to the projected paper and board production levels in the region. They do not include the wood equivalents of Western Europe's estimated net imports of paper and board which amount to approximately 3.3 million cu. m. by 1980.

According to the appraisal, Western Europe's demand for pulpwood (including mill residues) will rise by about 90 million cubic meters over the two decades from 1960 to 1980, corresponding to an average annual increase of about 4.8 percent. For comparison it may be mentioned that actual pulpwood removals in the region rose by about 6.6 per cent annually over the 'fifties, from 27 1/2 to 52 1/2 million cubic meters.

7.a The needs of small-sized industrial wood for products other than pulp

Small-sized roundwood is used not only for pulping but also in the manufacture of other products and for miscellaneous end-uses mainly by

/the rural

the rural population. The different uses may be divided in the following four groups:

a) for the production of fiber building boards
b) " " " " particle board
c) " " " " pitprops
d) " miscellaneous end-uses

Annex 14 shows the estimates of future demand of fiberboards and particle board and the projected needs of wood for their manufacture. Table 18 summarizes the estimated wood requirements for these two products, as well as the projected needs of small-sized roundwood for pitprops and for miscellaneous products.

Table 18 Estimated needs of small-sized industrial wood for products other than pulp

	1959-1961	1965	1970	1975	1980
	million solid cu.m. without bark				
For the production of:					
Fiberboards	3.2	4.4	5.4	6.6	7.8
Particle boards	2.5	5.0	7.2	9.5	11.5
Pitprops	7.9	6.5	5.2	3.8	2.5
Miscellaneous products	15.2	13.8	12.4	10.8	9.2
TOTAL	28.8	29.7	30.2	30.7	31.1

Sources: For fiberboard and particle board: see Annex 14.
For others: projections derived from 1975 estimates of RETTS.

The appraisal indicates that the needs of small-sized wood for products other than pulp may remain almost stationary over the projected period. A considerable shift in the consumption pattern is, however, likely to take place with a rapid rise in the wood requirements for fiberboard and, especially, for particle board which is almost counterbalanced by the declining needs of pitprops and of wood for miscellaneous end-uses.

7.3 Log requirements for sawnwood, plywood and veneers

Western Europe's consumption of sawnwood, plywood and veneers are estimated will rise as indicated in Table 19, which also shows the log

/volumes needed

volumes needed to manufacture these products. Trade is not taken into account in these estimates, which thus show the roundwood equivalents of the regional consumption.

Table 19 Estimated roundwood equivalents of Western Europe's consumption of sawnwood, plywood and veneers

	1959-1961	1965	1970	1975	1980
	million cubic meters				
Projections of demand					
Sawnwood	52.9	55.8	58.6	61.5	64.2
Plywood	2.3	3.2	4.1	4.9	5.7
Veneers	0.9	1.4	1.8	2.2	2.6
Roundwood equivalents	million solid cu.m. without bark				
Sawnwood	89.6	94.3	99.2	103.5	107.8
Plywood and veneers	7.2	10.0	12.8	15.5	18.2
TOTAL	96.8	104.3	112.0	119.0	126.0

Source: Demand projections derived from 1975 forecasts in RETTS.

Note: The following conversion factors of roundwood to finished products were used in the projections:

	Sawnwood	Plywood/veneer
EFTA	1.75	2.25
EEC	1.65	2.15
Rest of W. Europe	1.65	2.25

The estimates show that if Western Europe were to produce all of her demand of sawnwood, plywood and veneers, then the consumption of large-sized logs will rise by a little over 29 million m^3 over the two decades from 1960 to 1980, corresponding to an average annual increment of only about 1.3 per cent. For comparison it may be mentioned that the removals of large-sized logs in the region increased by about 2.1 per cent annually over the 'fifties.

7.4 The 1960 balance of wood demand and supply

Before looking into de possibilities of raising the removals from Western Europe's forests to meet the growing demand for wood, it is of interest to make up a balance showing to what extent the region is presently able to cover her needs of industrial wood from domestic resources.

This balance, drawn up as the average for the years 1959-61, is given in Table 20, where all data for production and trade of different products were translated into roundwood equivalents.

Table 20 Estimated balance of annual demand and supply of industrial wood in Western Europe in 1959-61

	Consumption	Net trade: Products	Net trade: Roundwood	Production from own resources: Roundwood	Production from own resources: Mill waste
	million cu. m. without bark				
Roundwood equivalents of:					
sawnwood, plywood, veneers	96.8	- 11.1	- 5.1	80.6	-
Paper and pulp	57.6	+ 1.0	- 2.5	59.2	10.5
Fiberboard, particleboard and pitprops	13.6				
Miscellaneous products	15.2	-	-	15.2	
TOTAL	183.2	- 10.1	- 7.6	155.0	10.5

The balance indicates that in 1960 Western Europe was a net importer of forest products and roundwood for their manufacture amounting to the equivalent of a little over 17 1/2 million cubic meters, corresponding to about 9 1/2 per cent of the total regional needs.

Practically the whole of this deficit, or over 16 million cubic meters, was of large-sized wood for the production of sawnwood, plywood and veneers. The region was thus practically self-supplying in terms of

wood of smaller dimensions, with a deficit of only 1 1/2 million cubic meters,[x] corresponding to less than 2 per cent of the total regional needs.

7.5 Prospective future removals of roundwood

The removal forecasts which are presented below were derived from the data for 1975 recently published by ECE/FAO,[xx] assuming constant annual growth rates from 1960 to 1980. The 1975 forecasts are based essentially on official communications from the individual countries.

Earlier experience demonstrates that the official forecasts of removals have considerably underrated the potential removals from the forests in Western Europe and practically every new inventory which has been carried out has resulted in upward revisions of the earlier forecasts. One of the reasons for this appears to be that the foresters have underestimated the effects of the various measures they have recommended and put into practice in the management of the forests. This is in no way a criticism of the cautious policies which were adopted in the past. When it comes to the long-term planning for the utilization of the forest resources, an underestimate of the potential removals may, however, be nearly as dangerous as an overrating of the available supplies.

There are valid reasons to believe that the latest "official" forecasts again underestimate the potential removals from Western Europe's forests. This is also clearly recognized in the EEC/FAO study quoted above, where reference is made to the possibility that the prospective gap in 1975 between demand and supply of industrial wood of 70 million cubic meters (in Europe as a whole), "may be materially narrowed by some 20 million to 40 million cu.m. by application of (the) various measures (outlined above) and by a further potential transfer of fuelwood to industrial usage, up to about 19 million cu.m."[xxx]

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x) Recorded net imports of small-sized industrial roundwood in 1959-61 were about 2 1/2 million cubic meters.

xx) European Timber Trends and Prospects - A New Appraisal to 1975 op.cit. New York 1964.

xxx) Op.cit. Chapter 18, p.161.

In the following appraisal of the prospective woundwood removals in Western Europe, the author has made some upward revisions of the official removal forecasts based on specific assumptions about the various measures through which the additional supplies would be forthcoming. They are briefly summarized as follows:[x)]

Roundwood prices in Wextern Europe are likely to rise as a result of the growing competition for the available supplies, but the price increment will probably be rather small because of a growing competition from North American forest products on the European market. The additional removals of small-sized industrial wood (mainly thinnings) which could be achieved from rising wood prices in the region will, therefore, be very small and are estimated at only one million cubic meters by 1980.

Practical results from large-scale fertilizing of forests with urea in the Nordic countries demonstrate considerable increments in growth and attractive economic returns on the investments. A very cautious appraisal indicates that the prospective removals in Western Europe as a whole may be increased by at least 6 million cubic meters annually by 1980, assuming a rather modest program of fertilizing will be adopted.

Drainage of forest areas, mainly in the Nordic countries, as well as various silvicultural measures such as genetic improvements will raise the growth considerably over the long run.

More important, however, for the long-term supplies of wood is the potential increase of the forest area by plantations, not only on the presently non-productive lands of the Mediterranean countries. The growing productivity in European farming combined with the very slow increase of population will result in a substantial agricultural overproduction in Westerm Europe, which will result in a considerable transfer of land from agriculture to other uses. A large part of these areas will, no doubt, be replanted with forests of rapid growth and high yield per unit of area.

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x) This is a very brief summary of the findings in a study currently being carried out at the Institute for International Economic Studies, Stockholm.

/These measures

These measures having effect only over the long run will, however, permit a rather important over-cutting of the existing stands. A probably very conservative estimate assumes that this over-cutting may be raised successively to a level of some 10 million cubic meters annually by 1980.x)

The "official" removal forecasts and the author's appraisal of the additional quantities of roundwood which may be taken out by introducing more dynamic forest policies than are presently practiced in many of the Western European countries are shown in Table 21. It is again emphasized that the estimates are cautious and do not represent the maximum of removals which could be achieved in the region.

Table 21 Prospective removals of roundwood from Western Europe's forests 1960 - 1980

	1959-61	1970	1975	1980
	million cu.m. without bark			
"Official" forecasts of removals[a]	230	243	253	264
Estim. additional removals from:				
price increase	-	1/2	3/4	1
forest fertilization program	-	3	4	6
temporary over-cutting	-	5	8	10
TOTAL REMOVALS	230	251 1/2	266	281
of which:				
large-sized roundwood[b]	80	97	106 1/2	115
small-sized roundwood	71 1/2	90	101	114
fuelwood[a]	78 1/2	64 1/2	58 1/2	52

a) Derived from 1975 forecasts in RETTS.

b) Approx. lower size limits: for spruce - 8" top diam.
for pine - 6" " "

The estimate of prospective total removals of roundwood indicates an increase of 51 million cubic meters over the two decades from 1960 to

x) Over-cutting of present mature stands, particularly in Central Europe, will also be desirable as a means to improve the age structure of the forests and to shorten the rotation cycles.

1980, corresponding to an average annual increment of less than 1.2 per cent. This may be compared with the estimated rise in the actual removals of some 18 1/2 million cu.m. over the 'fifties.[x)]

The rise in industrial wood removals were estimated will be some 77 1/2 million cu.m., whereas the removals of wood for use as fuel may decline by 26 1/2 million to a level of 52 million cu.m. by 1975.

7.6 Additional transfer of fuelwood to industrial usage and prospective supplies of mill residues

In view of the prospective rising deficit of poundwood supplies in Western Europe it has been estimated that a larger transfer of wood from the fuelwood sector to industrial use may take place, than is foreseen in Table 21. In the ECE/FAO study the prospective additional transfer by 1975 is estimated at 19 1/2 million cu.m. for Europe as a whole, of which about 16 1/2 million in Western Europe.[xx)] The present survey foresees a potential transfer by 1980 of 13 million cu.m. bringing the fuelwood consumption down to a level of 39 million cubic meters. It appears likely that practically the whole quantity - i.e. 13 million cu.m. - of fuelwood transferred to industrial use will be consumed in the fiberboard and particle industries, thereby raising the potential supplies of small-sized industrial roundwood to 127 million cu.m. by 1980 and the total of industrial wood to 242 million cu.m.

In 1960 the equivalent of some 10 1/2 million cu.m. of mill residues (mainly from sawmills) were supplied to the pulp, fiberboard and particle board industries in Western Europe.[xxx)] Considerable efforts will undoubtedly be made in most countries of the region to raise the

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x) The increase from 1950 to 1960 in recorded removals was 33 1/2 million, of which some 15 million were estimated representing improvements in the statistical coverage.

xx) Op. cit. Appendix III.

xxx) This quantity includes also the supply of other fibrous raw materials such as flax shives, straw and bagasse to fiberboard and particle board mills.

/salvage rates

salvage rates in the sawmills and plywood mills, as well as in other wood consuming industries. In the present survey it is assumed that the amount of mill residues which will be salvaged for industrial use will double over the two decades between 1960 and 1980 to reach a volume of 21 million cubic meters.[x)]

7.7 Summary of wood supplies by 1980

The estimates in the preceding paragraphs of the prospective total wood supplies by 1980 in Western Europe may be summed up as follows:

Projections of the "official" forecasts of roundwood removals to 1975 indicate a total supply of 264 million cubic meters by 1980, of which 212 million of industrial wood and 52 million of fuelwood.

Provided that dynamic forest policies are adopted the prospective removals may be raised by some 17 million cubic meters over and above the level indicated by the "official" forecasts, i.e. to a total of 281 million cubic meters by 1980.

The increasing demand for industrial wood, a rapid shift from rural to urban populations and rising living standards will bring about a substantial reduction in the use of fuelwood which may decline to one half of the 1960 level over the two decades to 1980, i.e. to 39 million cubic meters.

Over the same period the salvage of mill waste for industrial use will double from 10 1/2 to 21 million cubic meters.

As a result, Western Europe's total supplies (from own resources) of wood for industrial use (roundwood plus residues) will rise from 162 million cubic meters in 1960[xx)] to 263 million by 1980.[xxx)]

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x) This estimate is somewhat more cautious than the projection of the ECE/FAO study of a total supply of mill waste in Europe as a whole of 25 million cu.m. by 1975.

xx) 151 1/2 million cu.m. of roundwood plus 10 1/2 million of mill waste.

xxx) 229 million cu.m. of roundwood plus 21 million of mill waste plus 13 million of fuelwood transferred to industrial use.

7.8 Distribution of wood supplies to different industry sectors

A direct comparison of the estimated demand for large-size industrial wood of 126 million cubic meters (Table 19) with the projected removals of 115 million (Table 21) indicates a prospective deficit in the supplies of sawnwood, plywood and veneers, or roundwood for the manufacture of these products of 11 million cubic meters by 1980.

The problem is, however, more complicated since the distribution of the available roundwood supplies to different end-uses will be determined by a number of factors of which the most important are:

a) The different industries' ability to pay higher prices for the roundwood,

b) the possibilities to import roundwood and/or finished products from other regions, and

c) possible changes in the trade policies of the Western European countries.

It goes without saying that the problem of estimating the future distribution of the domestic supplies of roundwood to different industry sectors is very complicated. Some likely trends in the future developments may, however, be discerned from the changes which occurred in the past.

To begin with, it will be recalled that Western Europe in 1960 had a net import of sawnwood, plywood, veneers and roundwood for their manufacture corresponding to the equivalent of over 16 million cu.m. of wood, i.e. 5 million cu.m. more than the apparent deficit by 1980 indicated by the removal forecast.

Secondly, out of a total increase from 1960 to 1980 in the demand for large-sized industrial wood of 29 million cu.m. about 11 million will be for veneer logs (Table 19). Western Europe's possibilities to raise her annual removal of veneer logs are, however, very limited and may be estimated at some 2 - 3 million cu.m. by 1980. This means that the net imports of plywood and veneers, or logs for their manufacture will go up by at least 8 million cu.m. from 1960 to 1980.

Finally, Western Europe raised her consumption of sawnwood by about 10 1/2 million cu.m. over the 'fifties, of which total about 40 per cent or a little over 4 million cu.m. were covered by increased imports, mainly from the Soviet Union and from Canada. There are a number of valid reasons

/to believe

to believe that the net imports of sawnwood will continue to rise in the future, and it is here presumed that it will account for approximately the same share - i.e. 40 per cent - of the rising consumption in the region which is estimated at about 11 1/2 million cu.m. from 1960 to 1980. This corresponds to a rounwood equivalent of a little over 18 million cu.m. of which total some 7 1/2 million are thus estimated will be imported.

The net imports of sawnwood, plywood, veneers and/or roundwood for their manufacture are thus estimated will rise by the equivalent of about 15 1/2 million cu.m. of roundwood (8 + 7 1/2) to a total level of 31 1/2 million by 1980.[x] This means that the production from regional resources will rise from the equivalent of about 80 1/2 million cu.m. in 1960 (Table 20) to 94 1/2 million by 1980, leaving a surplus of sawlogs of smaller dimensions of 20 1/2 million[xx] which may be transferred to the pulp, fiberboard and particle board industries.

The total availability of small-sized wood and industrial residues would then rise from about 82 million cu.m. in 1960 to 168 1/2 million by 1980.

7.9 Western Europe's balance of wood supply and demand by 1980

The prospective balance of supply and demand of wood for different end-uses in Western Europe by 1980 may now be summed up as shown in Table 22.

The balance suggests that Western Europe's total deficit of wood supplies for industrial use may rise from about 17 1/2 million cu.m. in 1960 (Table 20) to 42 1/2 million cu.m. by 1980, excluding an estimated 3 million cu.m. corresponding to the assumed net import of paper and board from North America.

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x) Net imports in 1960: 16.2 million m^3 (Table 20).

xx) Estim. removal of 115 million cu.m. minus 94 1/2 million used by the sawmills and plywood mills.

/Table 22

Table 22 Prospective balance of wood supply and demand in Western Europe by 1980

	Fuel-wood	Industrial wood: large-sized	Industrial wood: small-sized	Industrial wood: Total	TOTAL
	million cu.m. without bark				
Prospective removals:	52	115	114	229	281
Transfer from:					
Fuel substitution	-13	-	+13	+13	-
Quality sorting of sawlogs	-	-20 1/2	+20 1/2	-	-
Total supply of roundwood	39	94 1/2	147 1/2	242	281
Supply of mill residues	-	-	21	21	21
TOTAL WOOD SUPPLY	39	94 1/2	168 1/2	263	302
ESTIMATED NEEDS	39	126	179 1/2	305 1/2	344 1/2
NET IMPORT REQUIREMENTS	-	31 1/2	11[a]	42 1/2[a]	42 1/2[a]
Of which: roundwood		11 1/2	6	17 1/2	17 1/2
finished products		20	5[a]	25[a]	25[a]

a) Excluding the roundwood equivalent of paper and board net imports, estimated at about 3 million cu.m.

The deficit of sawnwood, plywood, veneers and/or roundwood for their manufacture is estimated will about double from the 1960 level of 16 million cu.m. to 31 1/2 million by 1980 (roundwood equivalents). Table 22 suggests that this deficit will be covered by the imports of some 11 1/2 cu.m. of roundwood (about 5 million cu.m. in 1960), mainly as veneer logs, while the balance will be imported in terms of finished products, i.e. sawnwood (mainly from Canada and the Soviet Union) and plywood/veneers (partly from North America but also in increasing quantities from the undeveloped regions.

The deficit in small-sized wood supplies - about 1 1/2 million cu.m. in 1960 - may rise to 11 million cu.m. by 1980. This figure does not include the estimated roundwood equivalent of 1/2 million tons of paper and board net import to the region. It is presumed that the region's present (1964) net import of small-sized roundwood (pulpwood) may be kept at the

/same level

same level in 1980, leaving a deficit of 5 million cu.m. which must be imported as finished products. These imports will, no doubt, mainly consist of pulp, in which case the imports will amount to about one million tons. This compares with the region's current (1964) net imports of about 325 thousand tons of all pulp grades, including dissolving pulp.

7.10 Conclusions

The picture as it emerges from the above analysis of the trends to 1980 in Western Europe's demand and supply of industrial wood is of a period with a rising deficit of supplies.

The indications of the present survey are - contrary to the findings of earlier studies[x] - that the wood supply deficit will be mainly in terms of larger-sized roundwood for the manufacture of sawnwood, plywood and veneers, which is in line with the historical developments over the 'fifties. The net imports of these products, or of roundwood for their manufacture, are therefore estimated will double from 1960 to a level equivalent to 31 1/2 million cu.m. of roundwood by 1980.

The deficit in supplies of industrial wood for the production of pulp, fiberboards and particle boards which was rather small in 1960 may rise to the equivalent of about 14 million cu.m. by 1980. Of this total some 9 million cu.m. will probably be covered by (a) the net imports of some 1/2 million tons of paper and board, and (b) an estimated net import of 6 million cu.m. of pulpwood from other regions.

The above conclusions presuppose (a) that more dynamic forest policies will be adopted in the countries of Western Europe than are presently practised in order to raise the removals over and above the present plans and, (b) that specific measures will be undertaken to reduce the consumption of fuelwood in the region.

Whether, or rather to what extent the region will raise her efforts to reduce the mounting deficit in wood supplies will depend on a great many factors of which the most important are: (a) the cost of marginal production within the region in relation to the cost of importing roundwood

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x) Pulp and Paper Prospects in Western Europe; op. cit. and European Timber Trends and Prospects; op. cit.

or forest products from other regions, (b) long-term policies of the individual countries as regards the utilization of land resources and (c) possible changes in trade policies. These factors may change the above estimated overall deficit in wood supplies by 1980 - upwards or downwards. On the whole, the present survey is probably conservative in its projections of the available wood supplies whereas the estimates of requirements, which are based on the assumption of unchanged product prices, may be on the high side. The probability is thus that the overall deficit in wood supplies will become smaller than is indicated by the analysis.

As mentioned above, there are considerable differences of opinion as regards the prospective distribution of the available wood supplies between the different industry sectors. The ECE/FAO study (RETTS) holds that the increasing deficit will develop almost entirely in the supply of wood to the pulp and board industries; the present survey finds that the increase may be slightly higher for sawlogs/veneer logs than for small-sized wood.[x)]

The overall conclusion from the survey of prospective trends to 1980 in Western Europe is that the region is unlikely to become a net importer of more than marginal quantities, if any, of pulp from the less developed regions. The rather small deficit of pulp and/or paper which may develop in Western Europe will, no doubt, be covered mainly by imports from North America and the Soviet Union, which regions have very large, still untapped resources of coniferous forests.

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x) Estim. increase 1961-1980 in the deficit of:

sawlogs/veneer logs	15 1/2 million cu.m.
small-sized wood	12 1/2 " "

8. PROSPECTIVE DEVELOPMENTS in LATIN AMERICA to 1975

The following very brief summary of the prospective developments in Latin America to 1975 is based on some of the findings of a study recently published by the Economic Commission for Latin America.[x)]

The study estimates that the total consumption of paper and board in Latin America will reach a level of a little over 7 million tons by 1975, i.e. somewhat higher than the estimate of 6.7 million indicated in the present survey (Table 1). Production is assumed will rise considerably over the 'sixties but, nevertheless, net imports will grow by some 56 per cent over the same period to a level of about 1.3 million tons by 1970. In drawing up the prospective balance of supply and demand by 1975, the study presumes that net imports may be maintained at the 1970 level of 1.3 million tons, which means that regional production would rise to 5.8 million tons by 1975.

The consumption of paper pulp (all grades) is estimated will rise by about 4 million tons from a little over 1.4 million in 1962-63 to about 4.4 million tons by 1975. Net imports which rose very slowly over the 'fifties and early 'sixties are assumed will be reduced to about one half, or 150 thousand tons, by 1970, and then increase to only 180 thousand by 1975.[xx)] The regional production of paper pulp (all grades) will thus, according to these estimates, rise by over 3 million tons from about 1.1 million in 1962-63 to over 4.2 million by 1975.

The study arrives at the prospective balance of demand and supply of different grades of paper pulp in 1975 shown in Table 23.

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x) "El Papel y la Celulosa en América Latina: Situación actual y tendencias futuras de su demanda, producción e intercambio"; Doc. N° E/CN.12/570/Rev.2.

xx) The 1970 imports of long-fibered chemical pulp and of mechanical pulp are assumed will remain unchanged, while the net exports of some 30 thousand tons of short-fibered pulp will disappear.

/Table 23

Table 23 Prospective 1975 balance of demand and supply of fibers for paper and board manufacture in Latin America

	Consumption	Regional supply	Net import
	1000 metric tons		
Paper and board:	7049	5771	1278
Total fiber consumption	6113	5930	183
Wood pulp: total	3348	3165	183
Mechanical	959	881	78
Chemical: long-fibered	1489	1384	105
short-fibered	900	900	-
Other fiber pulp: total	1074	1074	-
of which: long-fibered	50	50	-
short-fibered	1024	1024	-
Waste paper	1691	1691	-

Source: E/CN.12/570/Rev.2: Table 23.

The estimated regional supply by 1975 of groundwood and long-fibered chemical pulp will, according to the study, require the input of nearly 8.7 million cubic meters (solid without bark) of coniferous species.[x] This means an increase of about 6 million cubic meters over the estimated supply in 1962-63 of 2.7 million cu.m. of coniferous wood.

As regards the prospects of satisfying the region's growing needs of papermaking fibers, in general, and of coniferous wood, in particular, the report concludes:

"Las pruebas de que América Latina podrá satisfacer su demanda de materias fibrosas durante 1975 no son convincentes. Además, se duda si será posible obtener fibras largas en suficiente cantidad."[xx]

To this may be added that the conclusion, no doubt, refers to the economic possibilities of supplying the necessary quantities.

x) Op. cit. Appendix V.

xx) Op. cit. point f), page 9.

/The following

The following observations may be made as regards the proposed pattern of fiber supplies to the paper industry in 1975.

It will be noted from the data in Table 23 that the suggested share of long-fibered pulp amounts to only one quarter of the overall consumption of fibers by 1975. This compares with the input of a little over 36 per cent in 1962-63. Although the share of short-fibered pulp in the overall supply of fibers will become very high by 1975, this by itself should not give rise to any concern. What matters is the overall content of long-fibered pulp in the papers and boards consumed in the region and which may be taken as a measure of the paper and board quality standards. From the data in the above mentioned study, it may be estimated that the average content of long-fibered pulp in all grades of paper and board consumed in Latin America will fall from 36 1/2 per cent in 1962-63 to only about 27 1/2 per cent by 1975.[x] There are reasons to believe that the rapid substitution of short-fibered for long-fibered pulps and the high level of 82 1/2 per cent of short-fibered pulp by 1975 represent ambitious targets which may be difficult to reach. The needs of long-fibered pulp and, in turn, of conifers for their manufacture may thus become higher and lead to higher imports of coniferous paper pulp than are foreseen in the study.

The overall picture of the developments to 1975, as it emerges from the study, is that Latin America will increase substantially her net imports of paper and board, presumably from the industrialized regions of North America and Western Europe. Within the same period of time the region may be able to reduce her net imports of paper pulp to about one half of the present quantity, that is, to a level of some 180 thousand tons. Difficulties may, however, be encountered in supplying the rapidly rising requirements of coniferous pulpwood at a reasonable cost. Therefore, it appears almost certain that the region's overall deficit in the supply of pulp, paper and board will rise in the next fifteen years, particularly

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x) Assumed long-fiber content of paper and board imports are:

Newsprint	20%
Printing, writing	50%
Other grades	80%

/as regards

as regards the supply of long-fibered pulp and of coniferous wood for its manufacture.

With these prospects in view, it would be inconsistent with a sound economic planning in the region if exports of long-fibered pulp to the world market were to be encouraged. Should such exports develop they must be compensated for by imports from other regions, and the additional costs arising from these cross-shipments would ultimately have to be paid by the Latin American countries.

The prospective large deficit in Western Europe's supply of wood for pulping, indicated in earlier studies, raised the hopes of some countries that this region might become a net importer of large quantities of short-fibered paper pulp. The present survey, however, arrives at the conclusion that Western Europe's supply deficit of pulp, or wood for its manufacture, will become only marginal within the course of the next fifteen years. Furthermore, the future additional wood supplies for pulping in Western Europe will include a high percentage of broadleaved species, which means that whatever deficit may develop would be mainly in terms of long-fibered paper pulp.

There is, however, one sector of the pulp industry which does offer good prospects of development in Latin America, also for exports to the world market, and that is mills for the production of dissolving pulp.

Research and technical developments over the last fifteen years have demonstrated that most grades of dissolving pulp and, in particular, of pulps suitable for the production of rayon and staple fibers, may be produced from a great many broadleaved species and, especially, from eucalypts. Latin America has large plantations of eucalypts, mainly in Brazil, with potentially very high yields of low-cost wood. Western Europe, on the other hand, produces today about one million tons of dissolving pulp from coniferous wood which commands a high price in all countries of the region.[x] Indications are that over the long run the production

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x) The price of coniferous wood, delivered at mill in Western Europe, is today in the order of $ 13 - 15 per solid cu.m. without bark. For comparison, it may be mentioned that the cost of eucalypt wood in Brazil (State of Sao Paulo) is around $3.50 per cu.m. (solid, without bark).

/in Western

in Western Europe of dissolving pulp from coniferous wood will decline in favor of paper pulp production from the limited wood resources.

The conslusion is, therefore, that the countries of Latin America having cheap resources of broadleaved woods and, in particular, of eucalypts, should seriously investigate the possibilities of building dissolving pulp mills for export to the international market and, in particular, to Western Europe. It should be warned, however, that no such projects are likely to become successful ventures unless they are carried out in close cooperation with the prospective consumers of the pulp.

Annex 1. Estimates of demographic trends by regions 1950-80

	1950	1960	1970	1980	1951-60	1961-70	1971-80
	-million inhabitants				- yearly growth: %		
North America	166.0	198.6	237.1	278.6	1.80	1.88	1.63
Latin America	156.1	203.9	273.8	359.0	2.71	3.00	2.75
Western Europe	284.9	307.3	335.4	362.7	0.76	0.87	0.78
Eastern Europe	104.9	115.3	125.8	137.2	0.95	0.78	0.78
Soviet Union	181.0	214.4	249.0	289.0	1.71	1.50	1.50
Near and M. East	34.9	46.3	60.8	79.7	2.87	2.76	2.75
Africa	203.7	254.4	322.2	418.0	2.33	2.40	2.63
Asia, excl. P.R. of China	726.6	883.8	1111.2	1403.6	1.97	2.31	2.36
Peoples Rep. of China	546.8	686.4	857.0	1077.0	2.30	2.25	2.20
Oceonia	10.1	12.7	14.8	17.3	2.31	1.54	1.57
World	2415.0	2923.0	3587.1	4422.1	1.93	2.07	2.12

Note: Estimates do not include some countries which have no statistics of paper consumption. The combined populations of these countries were about 65 millions in 1960.

/Annex 2.

Annex 2. Historical and estimated long-term economic development rates 1961-80

	1951-60	1961-80 Alt. A	1961-80 Alt. B
	- % annual growth in GNP/capita -		
North America	1.50	1.73	2.21
Latin America	2.00	1.54	2.54
Western Europe	3.76	2.58	3.24
Eastern Europe	(7.07)	4.50	5.50
Soviet Union	(8.45)	4.50	5.50
Near and Middle East	2.70	1.68	2.56
Africa . . .	1.90[a]	1.50[d]	2.50[d]
Asia, excl. P.R. of China	1.70[b]	1.60	2.10
Peoples' Rep. of China	(2.5-3.5)[c]	3.50	4.50
Oceonia	1.60	2.00	2.50

Sources for historical series: UN; World Economic Survey, 1963.

ECLA; Economic Survey of Latin America, 1963.

ECAFE; Economic Surveys of Asia and Far East, 1962, 1963.

OECD; General Statistics Bulletin; November 1962.

ECE; various publications.

UN Yearbook of National Accounts Statistics, 1962.

Notes: Figures in parenthesis refer to Net Material Product (see text).
a) Excluding Rep. of South Africa with a growth rate of 1.7%.
b) Excluding Japan with a growth of 8.7%. Period is 1953-54 to 1960-61.
c) Period 1953-61. See Economic Survey of Asia and Far East, 1961, p. 92.
d) Excluding UAR with estimated growth rates of 2.50 and 3.50 per year.

/Annex 3.

Annex 3. Estimates of "residual time trends" 1951-60 and 1961-80

	Cultural paper Total		Newsprint		Industrial paper and board	
	1951-1961	1961-1980	1951-1960	1961-1980	1951-1960	1961-1980
	Percent per year					
North America	0.20	0.15	-0.40	-0.40	-0.30	0.25
Latin America	0.40	0.40	0.40	-0.20	0.70	0.50
Western Europe	1.40	0.40	1.60	nil	1.30	0.70
Near and Middle East	1.00	0.80	-1.70	0.50	2.50	1.25
Africa	1.60[a]	1.00	1.60	1.00	1.00[a]	1.25
Asia[b]	1.50	0.25	0.20	0.25	2.70	0.50
Japan	1.60	-	2.60	-	2.90	0.60
Oceonia	2.80	0.25	3.50	-	2.10	0.50
Eastern Europe	-7.40	nil	-9.60	nil	-5.00	nil
Soviet Union	-9.40	nil	-11.50	nil	-6.90	nil
Mainland China	n.a.	nil	n.a.	nil	n.a.	nil

a) Excl. Repub. of South Africa.

b) Excl. Japan and Mainland China.

Note: Future time trends were estimated for smaller groupings of countries -or individual countries - than are shown in this regional breakdown. Indicated values are, therefore, approx. averages.

/Annex 4.

Annex 4. Final Assessment of Paper and Board Requirements to 1980 in Western Europe

	1959-61	1965	1970	1975	1980
	1000 metric tons				
TOTAL W. EUROPE:					
TOTAL PAPER AND BOARD	18585	24900	32600	40350	49600
Cultural paper	7636	10020	12435	14625	17030
Industrial paper	10952	14900	20145	25745	32560
Newsprint	3564	4350	5340	6300	7370
Kraft paper	2443	3700	5300	7280	9750
EFTA:					
TOTAL PAPER AND BOARD	8030	10250	12970	15440	18310
Cultural paper	3386	4225	5055	5725	6420
Industrial paper	4643	6025	7910	9720	11890
Newsprint	1854	2150	2520	2845	3180
Kraft paper	1166	1690	2290	3020	3940
EEC:					
TOTAL PAPER AND BOARD	9950	13750	18360	23250	29100
Cultural paper	3932	5340	6820	8185	9710
Industrial paper	6020	8405	11540	15075	19380
Newsprint	1573	1990	2540	3100	3730
Kraft paper	1240	1885	2830	4000	5440
REST OF W. EUROPE:					
TOTAL PAPER AND BOARD	605	920	1250	1660	2190
Cultural paper	318	455	560	715	895
Industrial paper	289	470	695	950	1290
Newsprint	139	200	275	360	455
Kraft paper	72	120	180	260	370

ANNUAL GROWTH RATES 1961-80:	EFTA	EEC	rest of W. Europe	Total
	Percent per year			
TOTAL PAPER AND BOARD	4.21	5.51	6.64	5.03
Cultural paper	3.25	4.62	5.31	4.09
Industrial paper	4.81	6.02	7.77	5.60
Newsprint	2.73	4.41	6.11	3.70
Kraft paper	6.28	7.83	8.53	7.16

/Annex 5.

Annex 5. Final Assessments of Paper and Board Demand in North America

	1959-61	1965	1970	1975	1980
	1000 metric tons				
NORTH AMERICA:					
TOTAL PAPER AND BOARD	36240	43590	52270	61720	72050
Cultural paper	13083	15610	18460	21300	24340
Industrial paper	23157	27980	33810	40420	47700
Newsprint	6981	7890	8870	9900	10925
Canada:					
TOTAL PAPER AND BOARD	2201	2750	3440	4255	5200
Cultural paper	743	915	1125	1365	1640
Industrial paper	1458	1830	2310	2890	3570
Newsprint	425	500	590	695	815
United States:					
TOTAL PAPER AND BOARD	34039	40840	48830	37460	66840
Cultural paper	12340	14690	17340	19930	22700
Industrial paper	21699	26150	31490	37530	44140
Newsprint	6556	7390	8280	9200	10110

ANNUAL GROWTH RATES 1961-80:	Canada	United States	North America
	percent per year		
TOTAL PAPER AND BOARD	4.39	3.43	3.50
Cultural paper	4.04	3.10	3.15
Industrial paper	4.58	3.61	3.68
Newsprint	3.37	2.19	2.26

/Annex 6.

Annex 6. Expository Estimates of World Trade in Paper and Board to 1980

	WESTERN EUROPE'S net trade with:			NORTH AMERICA'S net trade with:			Net import to Rest of world
	North America	Rest of world	Total	Western Europe	Rest of world	Total	
	1000 metric tons						
TOTAL:							
1949-51	?	?	+1190	?	?	+ 410	1600
1954-56	- 260	+1287	+1027	+ 260	+ 617	+ 877	1904
1959-61	- 602	+1472	+ 870	+ 602	+ 838	+1440	2310
1963	- 766	+1442	+ 676	+ 766	+ 994	+1760	2436
1964	- 861	+1478	+ 617	+ 861	+1239	+2100	2717
1970	-1300	+1500	+ 200	+1300	+1600	+2900	3100
1980	-1800	+1300	- 500	+1800	+2100	+3900	3400
Newsprint:							
1949-51	+ 90	+ 455	+ 545	- 90	+ 262	+ 172	717
1954-56	- 198	+ 459	+ 261	+ 198	+ 444	+ 642	903
1959-61	- 302	+ 485	+ 183	+ 302	+ 548	+ 850	1033
1963	- 277	+ 472	+ 195	+ 277	+ 554	+ 832	1026
1964	- 228	+ 449	+ 221	+ 228	+ 619	+ 847	1068
1970	- 300	+ 450	+ 150	+ 300	+ 800	+1100	1250
1980	- 350	+ 400	+ 50	+ 350	+1150	+1500	1550
Kraft paper:							
1949-51	?	?	+ 139	?	?	+ 50	189
1954-56	- 70	+ 100	+ 30	+ 70	+ 119	+ 189	219
1959-61	- 263	+ 168	- 95	+ 263	+ 137	+ 400	305
1963	- 395	+ 181	- 214	+ 395	+ 139	+ 534	320
1964	- 510	+ 171	- 339	+ 510	+ 199	+ 709	370
1970	- 750	+ 150	- 600	+ 750	+ 250	+1000	400
1980	-1150	+ 150	- 1000	+1150	+ 450	+1600	600
Other grades:							
1949-51	?	?	+ 506	?	?	+ 188	694
1954-56	+ 8	+ 728	+ 736	- 8	+ 54	+ 46	782
1959-61	- 37	+ 819	+ 782	+ 37	+ 153	+ 190	972
1963	- 94	+ 789	+ 695	+ 94	+ 301	+ 395	1090
1964	- 123	+ 858	+ 735	+ 123	+ 421	+ 544	1279
1970	- 250	+ 900	+ 650	+ 250	+ 550	+ 800	1450
1980	- 300	+ 750	+ 450	+ 300	+ 500	+ 800	1250
of which:							
Printing, writing:							
1949-51	?	?	+ 212	?	?	+ 52	264
1955	?	?	+ 305	?	?	+ 65	370
1959-61	+ 1	+ 365	+ 366	- 1	+ 87	+ 86	452
1963	- 31	+ 353	+ 322	+ 31	+ 46	+ 77	399
1964	- 45	+ 386	+ 341	+ 45	+ 29	+ 74	415
1970	- 150	+ 400	+ 300	+ 100	+ 100	+ 200	500
1980	- 150	+ 250	+ 100	+ 150	+ 150	+ 300	400

Annex 7. Estimates of Fiber Consumption Patterns for Paper and Board Manufactured in North America

	1954-1956	1959-1961	1964	1965	1970	1975	1980
	1000 metric tons						
Paper and board production	32619	37680	44659	45825	55170	64975	75925
Fiber consumption: total	33639	38787	45439	46700	55450	65100	75925
Wood pulp: total	24799	29727	35917	37440	45350	54000	63700
Mechanical	7130	7750	8845	8935	9765	11340	13060
Semi-chemical	1457	2056	2603	2840	3860	4870	6070
Chemical: total	16212	19921	24469	25660	31720	37750	44750
Sulphate—unbl.	7428	8708	10566	11230	13850	16570	19740
Sulphate—bl.	3832	6170	8673	9260	12740	15920	19590
Sulphite-unbl.	2180	2050	2034	1790	1655	1560	1290
Sulphite—bl.	2214	2400	2623	2750	2980	3250	3490
Soda and others	558	593	573	595	495	450	450
Other fiber pulp x)	905	600	620	550	440	390	450
Waste paper	7935	8460	8902	8710	9650	10720	11770
	kilogram per metric ton of paper and board						
Fiber consumption: total	1031	1029	1017	1019	1005	1002	1000
Wood pulp: total	760	789	804	817	822	831	839
Mechanical	219	206	198	195	177	175	172
Semi-chemical	45	55	58	62	70	75	80
Chemical: total	497	529	548	560	575	581	587
Sulphate—unbl.	228	231	237	245	251	255	260
Sulphate—bl.	117	164	194	202	231	245	258
Sulphite—unbl.	67	54	46	39	30	24	17
Sulphite—bl.	68	64	59	60	54	50	46
Soda and others	17	16	13	13	9	7	6
Other fiber pulp x)	28	16	14	12	8	6	6
Waste paper	243	225	199	190	175	165	155

x) Including pulps from rags, ropes, etc.

Notes: Detail figures may not add up to totals because of rounding.
Pulp quantities refer to 90% dry content.

/Annex 8.

Annex 8. Estimates of Fiber Consumption Patterns for Paper and Board Manufacture in Western Europe

	1954-1956	1959-1961	1963-1964	1965	1970	1975	1980
	1000 metric tons						
Paper and board production	12322	19455	23718	25450	32800	40200	49100
Fiber consumption: total	12790	19700	23922	25600	32650	39880	48560
Wood pulp: total	8425	13322	16660	17950	23680	29570	36830
Mechanical	3435	4929	5603	5930	7280	8420	9670
Semi-mechanical	41	206	639	765	1350	2010	2950
Chemical: total	4950	8187	10378	11250	15050	19140	24210
Sulphate—unbl.	1550	2800	3402	3615	5120	6710	8740
Sulphate—bl.	375	1206	2351	2925	5020	7115	9920
Sulphite—unbl.	1864	2315	2145	2160	2300	2290	2110
Sulphite—bl.	1137	1865	2480	2545	2590	3015	3440
Others—not spec.	22	—	—	—	—	—	—
Other fiber pulp	1424	1560	1398	1350	1120	1045	835
Waste paper	2944	4820	5905	6310	7800	9250	10850
	kilogram per metric ton of paper and board						
Fiber consumption: total	1038	1013	1009	1006	995	992	989
Wood pulp: total	684	685	701	705	722	736	751
Mechanical	279	253	236	233	222	210	197
Semi-chemical	3	11	27	30	41	50	60
Chemical: total	402	421	438	442	459	476	493
Sulphate—unbl.	126	145	143	142	156	167	178
Sulphate—bl.	30	62	99	115	153	177	202
Sulphite—unbl.	151	119	90	85	70	57	43
Sulphite—bl.	92	96	105	100	79	75	70
Others—not spec.	2	—	—	--	—	--	--
Other fiber pulp	115	80	59	53	34	26	17
Waste paper	239	248	249	248	238	230	221

x) Including pulp from rags, ropes, etc.

Notes: Detail figures may not add up to totals because of rounding.
Pulp quantities refer to 90% dry content.

/Annex 9.

Annex 9. Estimates of short-term market developments for newsprint in North America and Western Europe

	1960	1964	1965	1966	1967	1968
	1000 metric tons					
North America						
Maximum or all-out capacity	9044	9815	9860	10130	10580	11090
Normal capacity/production	9044	9815	9860	10130	10580	11090
Estim. actual production	7831	8561	8790	9015	9245	9480
Surplus capacity	1213	1254	1070	1115	1335	1610
Standby capacity	—	—	—	—	—	—
Western Europe						
Maximum or all-out capacity	4033	5119	5290	5445	5590	5770
Normal capacity/production	3870	4915	5080	5225	5365	5540
Estim. actual production	3778	4451	4550	4725	4910	5100
Surplus capacity	92	464	530	500	455	440
Standby capacity	163	204	210	220	225	230
Both regions						
Surplus capacity	1305	1718	1600	1615	1790	2050
Standby capacity	163	204	210	220	225	230
	percent					
Operating ratios						
North America	86.6	87.2	89.1	89.0	87.4	85.5
Western Europe	93.7	87.0	86.0	86.8	87.8	88.4

Note: Detail figures may not add up to totals because of rounding.

/Annex 10.

Annex 10. Estimates of short-term market developments for printing and writing paper in North America and Western Europe

	1960	1964	1965	1966	1967	1968
	1000 metric tons					
North America						
Maximum or all-out capacity	6853	8015	8415	9050	9495	9930
Normal capacity/production	6442	7534	7910	8505	8925	9335
Estim. actual production	6188	7645	7800	8165	8550	8955
Surplus capacity	254	- 111	90	340	375	380
Standby capacity	411	481	505	545	570	595
Western Europe						
Maximum or all-out capacity	4698	6320	6580	6950	7360	7640
Normal capacity/production	4416	5940	6185	6535	6920	7180
Estim. actual production	4438	5584	6000	6255	6525	6805
Surplus capacity	- 22	356	185	280	395	375
Standby capacity	282	380	395	415	440	460
Both regions						
Surplus capacity	232	245	275	620	770	755
Standby capacity	693	861	900	960	1010	1055
	percent					
Operating ratios						
North America	90.3	95.4	92.7	90.2	90.0	90.2
Western Europe	94.5	88.4	91.2	90.0	88.7	89.1

Note: Detail figures may not add up to totals because of rounding.

/Annex 11.

Annex 11. Estimates of short-term market developments for industrial paper and board in North America and Western Europe

	1960	1964	1965	1966	1967	1968
	1000 metric tons					
North America						
Maximum or all-out capacity	28200	31100	32435	33990	35635	36960
Normal capacity/production	25950	28610	29840	31270	32780	34000
Estim. actual production	23661	28168	29235	30380	31560	32790
Surplus capacity	2289	442	605	890	1220	1210
Standby capacity	2250	2490	2595	2720	2855	2960
Western Europe						
Maximum or all-out capacity	11719	15192	16320	17200	18080	18890
Normal capacity/production	11250	14580	15670	16510	17360	18130
Estim. actual production	11242	14523	14900	15790	16730	17720
Surplus capacity	8	57	770	720	630	410
Standby capacity	469	612	650	690	720	760
Both regions						
Surplus capacity	2297	499	1375	1610	1850	1620
Standby capacity	2719	3102	3245	3410	3575	3720
Operating ratios	percent					
North America	83.9	90.6	90.1	89.4	88.6	88.7
Western Europe	95.9	95.6	91.3	91.8	92.5	93.8

Note: Detail figures may not add up to totals because of rounding.

/Annex 12.

Annex 12. Estimates of wood consumption per ton of pulp

		Mech. pulp	Sulphate		Sulphite		Dissolving pulp
			Unbl.	Bl.	Unbl.	Bl_2	
		cubic meter (solid) without bark per ton of pulp					
Sweden:	1926-31	2.90	5.65	—	5.85	6.70	n.a.
	1946-49	2.60	5.00	—	4.90	5.40	n.a.
	1957	2.50	4.80	5.20	4.00	5.20	5.70
	1961	2.50	4.70	5.10	4.50	5.10	5.70
Finland:	1947-49	2.49	5.10		4.80	5.30	6.10
	1956-58	2.46	4.75	5.15	4.55	5.05	5.80
	1959-61	2.45	4.50	4.90	4.45	4.95	5.70
Norway:	1950	2.72	6.05	—	4.90	5.40	6.10
	1955	2.64	5.15	—	4.85	5.35	6.05
	1960	2.55	5.05	—	4.65	5.15	5.85
F.R. of Germany:	1956-58	2.49	—	—	4.10	4.60	5.30
	1959-61	2.45	—	—	3.95	4.45	5.15
	1962-64	2.45	—	—	3.95	4.45	5.15
Other countries est. av.	1960	2.50	4.10	4.50	4.20	4.70	5.30

Sources:

Sweden:	1926-31 and 1946-49	Statens Offentliga Utredningar 1952:15
	1957	Skogsindustriens Virkesutredning 1958
	1961	Private communications from Kungl. Skogsstyrelsen
Finland and Norway:		Official statistics of wood consumption for mechanical pulp, sulphite and sulphate grades. Breakdown into individual grades estimated assuming bleaching and yield losses indicated by figures in table.
F.R. of Germany:		Statistics of wood consumption for mechanical and chemical pulping given by Treuhandstelle für Zellstoff und Papier. Breakdown into individual grades as for Finland and Norway.
Other countries:		Estimates based on scattered information.

/Annex 13.

Annex 13. Estimates of future needs of dissolving pulp in Western Europe

Y	1960	1965	1970	1975	1980
	- - - - - - - 1000 metric tons - - - - - - -				
TOTAL DISSOLVING PULP	1235	1360	1355	1355	1360
of which:					
for domestic needs	933	1030	1135	1245	1360
for net export[a/]	302	330	220	110	—
wood pulp	1165	1280	1265	1245	1250
linter pulp	70	80	90	100	110

a/ Refers to exports of finished products.

/Annex 14.

Annex 14. Projections of fiberboard and particle board demand and wood needs for their manufacture in Western Europe

	1959-61	1965	1970	1975	1980
	1000 metric tons				
FIBERBOARD[x]					
EFTA	708	860	1000	1160	1300
Nordic countries	312	340	375	400	430
EEC	535	805	1050	1340	1600
Rest of W. Europe	37	75	100	150	190
TOTAL W. EUROPE	1280	1740	2150	2650	3100
PARTICLE BOARD[x]					
EFTA	266	755	1250	1740	2230
Nordic countries	90	170	250	325	400
EEC	822	1450	2075	2700	3325
Rest of W. Europe	6	25	45	60	80
TOTAL W. EUROPE	1094	2230	3370	4500	5600
	cu. m. per ton of product				
Roundwood equivalent for the production of:					
Fiberboard	2.50	2.50	2.50	2.50	2.50
Particle board[xx]	2.20	2.22	2.15	2.10	2.05
	million solid cubic meters				
Fiberboard	3.2	4.4	5.4	6.6	7.8
Particle board	2.5	5.0	7.7	10.3	12.8
Total roundwood equivalents	5.7	9.4	13	17	20½

x) The projections to 1975 are those contained in: Pulp and Paper Prospects in Western Europe; loc.cit. Table 7.4 and European Timber Trends and Prospects; loc.cit. Table 2, p. 70. Projections for 1970 and 1980 were made assuming a constant annual increment from 1960 to 1975 (arithmetical projection).

xx) Here the possibilities of reducing the wood consumption in particle board production are viewed more optimistically than in the study of European Timber Trends and Prospects (Appendix II, Table 1) where the consumption is estimated will fall to 2.20 cubic meters in 1975.