THE FEASIBILITY STUDY REPORT

ON

THE ESTABLISHMENT OF A PAPER PULP PLANT

IN

THE ORIENTAL REPUBLIC OF URUGUAY

[illegible], 1975

JAPAN INTERNATIONAL COOPERATION AGENCY

TOKYO, JAPAN

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SEPTEMBER, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

TOKYO, JAPAN

P R E F A C E

It is with great pleasure that I present this Feasibility Study Report on the Establishment of a Paper Pulp Mill to the Government of the Oriental Republic of Uruguay.

This report embodies the result of the Field Survey which was carried out in Uruguay from November 27 to December 26, 1984 by a Japanese Survey Team commissioned by the Japan International Cooperation Agency following the request of the Government of the Oriental Republic of Uruguay to the Government of Japan.

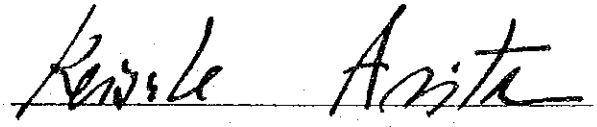
The survey team, headed by Mr. Yoshiyasu Mikami, held a series of close discussions on the project with the officials concerned of the Government of Uruguay and conducted a wide-ranging field survey and data analyses.

After the return of the team to Japan, further studies were made and the present report has been formulated.

I sincerely hope that this report will be useful as a basic reference for development of the project.

I wish to express my deep appreciation to the officials concerned of the Government of the Oriental Republic of Uruguay for their close cooperation extended to the servey team.

September, 1985



KEISUKE ARITA
President
Japan International Cooperation Agency

The Feasibility Study on the Establishment
of a Paper Pulp Plant
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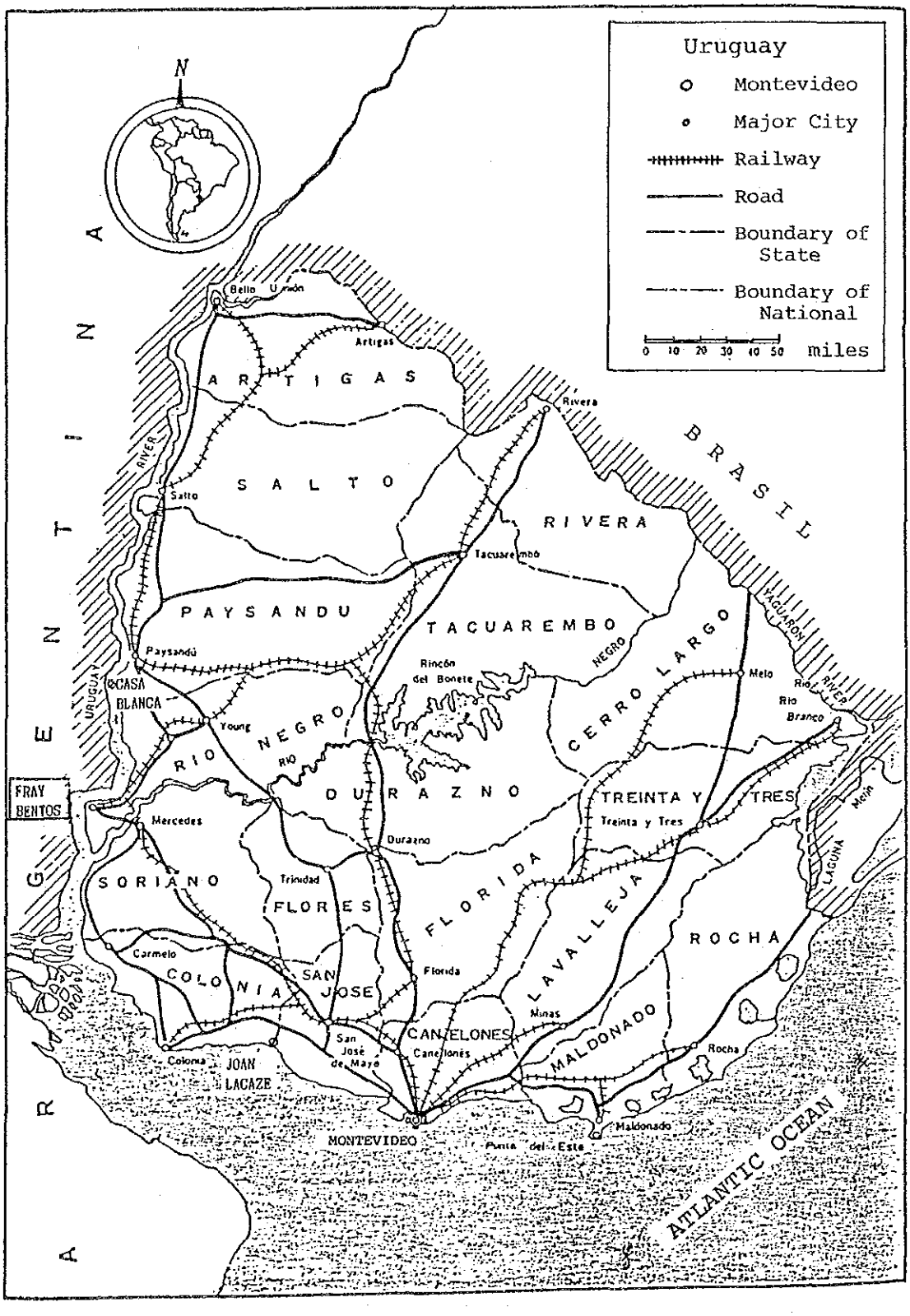

ABBREVIATIONS AND SYMBOLS

Unit and Conversion

mm	Millimeter
cm	Centimeter
m	Meter
km	Kilometer
in	Inch (1 in = 2.54 cm)
ft	Foot (pl. feet)(1 ft = 0.305 m)
cm^2	Square centimeter
m^2	Square meter
ha	Hectare (1 ha = 10,000 m^2 = 2.471 acres)
ft^2	Square foot (1 ft^2 = 0.0929 m^2)
m^3	Cubic meter
Nm^3	Normal cubic meter
MMm^3	Million cubic meters
ft^3, cu ft, cft	Cubic foot (1 ft^3 = 0.0283 m^3)
SCF	Standard cubic foot
MMSCF	Million standard cubic feet
ml	Milliliter
l	Liter
kl	Kiloliter
gal	Gallon (1 British gallon = 4.546 litters, 1 U.S. gallon = 3.785 litters)
g/m^2	Basis weight of paper, grams per square meter
g	Gram
kg	Kilogram
t, T, ton, Ton	Metric ton
lb(s)	Pound (1 lb = 0.454 kg)
sec	Second
min	Minute
h, hr, Hr	Hour
d, D	Day
m, M	Month
y, Y	Year
°C	Degree centigrade

°F	Degree fahrenheit
cal	Calorie
Kcal, K cal	Kilo calorie
BTU, Btu	British thermal unit (1 BTU = 0.252 Kcal)
MMBTU, MMBtu	Million British thermal units
LHV	Low heating value
HHV	High heating value
A	Ampere
V	Volt
W	Watt
kW	Kilowatt
MW, mW	Megawatt
kVA	Kilo-volt ampere
MVA, mVA	Mega-volt ampere
kWH, kWh	Kilowatt-hour
MWH, mWH, mWh	Megawatt-hour
HP	Horse power
%	Percent
ppm	Parts per million
ppb	Parts per billion
g/Nm^3	Gram per normal cubic meter
pH, PH	Hydrogen ion concentration
kg/cm^2	Kilogram per square centimeter
lb/in^2	pounds per square inch
mmAq	mm aqua (= water)
t/d, ton/day, T/D	Tons per day
t/y, ton/year, MT/Y T/Y	Tons per year
MMSCFD, MMscfd	Million standard cubic feet per day
t/m^3	Ton per cubic meter
BDt	Bone dry ton
BDg	Bone dry gram
BDU	Bone dry unit (2,400 pound = 1 BDU)
ADt	Air dry ton (90% dry content in pulp)
ϕ	Diameter
L	Length
W	Wide
K. value	Kappa number & permanganate number

freeness	drainage rate
AA%	Rate of active alkali
Wax No.	Wax pick test
C.E.K.	K. value after C.E. stage C = Cl_2, E = extract

Technical Terms

Hw, L.W	Hardwood
Sw, N.W	Softwood
BKP	Bleached kraft(sulfate) pulp
UKP	Unbleached kraft(sulfate) pulp
LBKP	Hardwood bleached kraft pulp
NBKP	Softwood bleached kraft pulp
CTMP	Chemi-thermo-mechanical pulp
DIP	Deinked pulp
GP	Groundwood pulp
MP	Mechanical pulp
SCP	Semi-chemical pulp
TMP	Thermo-mechanical pulp
CSF	Canadian Standard Freeness
G.E.	Brighteness code of America
JIS	Japan Industrial Standard
N-operation	Processing of softwood
L-operation	Processing of hardwood
C-E_1-H-D_1-E_2-D_2	C = Cl_2, E_1 = extract, H = Hypo, E_2 = extract, D_1 & D_2 = ClO_2
Hypo	Sodium hypochorite NaOCl
PFI	Beating degree
NaOH	Caustic soda
SOx	Sulfur Oxide
NaCl	Salt
Na_2SO_4	Salt cake
Cl_2	Chlorine
H_2	Hydrogen
SO_2	Sulfur Dioxide
ClO_2	Chlric Dioxide
$CaCO_3$	Lime stone

CaO	Calcium Oxide
s	Sulfur
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
ss	Suspended Solid
BMP	Barge Mounted Plant

Financial and Economic Terms

DCF	Discounted cash flow
IRR	Internal rate of return
ERR	Economic internal rate of return
FRR	Financial internal rate of return
ROI	Return on investment
NPV	Net present value
DSR	Debt Service Ratio
GDP	Gross domestic product
GNP	Gross national product
C & F	Cost and freight
CIF	Cost, insurance and freight
FOB	Free on board

Currency and Exchange Rate

N.$	New Pesos (Uruguay Currency)
US$,$	U.S. dollar
yen	Japanese yen

Organization and Company

SEPLACODI	The planning Coordination and Information Secretariate
MIE	Ministerio de Industria Y Energia
LATU	The Technological Laboratory of Uruguay
MAP	Ministerio de Agriculture Y Pesca
AFE	Administration of State Railway
MTOP	Ministry of Transport and Public

UTE	Administracion Nacional de Usinas Y Transmisiones Electiricas
OSE	*Obras Sanitarias del Estado*
ANTEL	Administracion Nacional de Telecomunicationes
CENCI	Centro de Estadisticas Nacionales Y Comercio Internacional del Uruguay
CNTPI	Centro Nacional de Tecnologia Y Productividad Industrial
JICA	Japan International Cooperation Agency
FAO	Food and Agriculture Organization of the United Nation

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TABLE OF CONTENTS

Page

Page

Page

Page

Page

Page

Page

Page

Page

Page

Page

Page

PART VII CONCLUSION AND RECOMMENDATION

LIST OF TABLES

Page

Page

Page

Page

LIST OF FIGURES

Page

LIST OF ANNEX

PART I

INTRODUCTION

Part I INTRODUCTION

Chapter 1 Background of the Project

In response to a request from the Government of Uruguay in August 1980, the Government of Japan dispatched an expert study team to Uruguay for the purpose of preparation of a master plan for development of that country's paper and pulp industry. As a consequence of this study, a master plan was presented to Uruguay in February 1981. This master plan incorporated research and analysis of problems which the Uruguayan paper and pulp industry confronts, with the major objectives of

(1) Expanding exports,
(2) Substituting domestic products for imports, and
(3) Realizing regional development which makes effective use of Uruguay's land,

and a Paper and Pulp Industry Development Plan (PPIDP). This plan was divided into the following three phases:

Phase I Improvement of existing mills, with the goal of increasing production by about 26,000 T/Y over a period of 5-6 years.

Phase II As a medium-term plan, construction of a newsprint mill having 72 T/D capacity and intended to supply the domestic market.

Phase III As a long-term plan, construction of a BKP mill having 750 T/D capacity for export purpose provided that suitable afforestation measures will be taken.

On the basis of the foregoing the Government of Uruguay requested the cooperation of the Government of Japan for conducting a feasibility study for construction of the export-oriented 750 T/D BKP mill, of Phase III. In compliance with this request, the Japan International Cooperation Agency (JICA) dispatched a preliminary study team to Uruguay in August 1984. September 6, 1984 an agreement of undertaking regarding the scope of the feasibility study was signed by a representatives of JICA and SEPLACODI, the competent agency of the Government of Uruguay. The feasibility study which has culminated in

the present report was carried out on the basis of that agreement. (For reference, a copy of that agreement is furnished as Annex I.)

Chapter 2 Purpose and Scope of the Study

2-1 Purpose of the Study

The greater part of Uruguay consists of relatively level grasslands, which has in some parts thick strata of exposed sand which are unsuitable for raising livestock. Wooded areas, including some livestock shelter areas, comprise a mere 5% of the national land area, resulting in frequent flood damage after major rainstorms. The Government of Uruguay is desirous of promoting the paper and pulp industry which would contribute to making improved use of the nation's land by creating greater demand for wood, and simultaneously promote the effective use of land and contribute to regional development by supporting afforestation efforts.

The purpose of the study is, on the basis of the agreement signed between JICA and SEPLACODI on September 6, 1984 regarding the objective of this study, to prepare the construction plan for an export-oriented 750 T/D BKP mill, as well as of the prospects for supplying pulp wood for the mill through afforestation. A comprehensive study also aims to select the site for the BKP mill, to investigate the investment conditions in Uruguay as well as the market environment for products of the mill, with the purpose of ascertaining the prospects for success in realizing the plan for construction of the paper pulp mill, from financial and economic viewpoints.

Practically, the followings are the purposes to be studied on the basis of the in-country research: selection of tree species on the basis of both tree growth rate and pulping tests; calculation of the required area for afforestation, relation between suitable area for afforestation and candidate plant site which must be studied with an eye to exporting products (pulp); technical problems and project economics talking into consideration of the management of mill operation, the maintenance shop requirements, required equipment for protecting the environment and safety assurance and productivity of existing mills (pulp wood costs, ancillary supplies cost, labor cost, utilization of capacity, etc.). The ultimate purpose of this work is to analyze the possibility of plant in combination with projections of demand in Uruguay and in EC countries with results as above stated.

2-2 Scope of the Study

The scope of the study as proposed and realized is as follows.

(1) Industrial policy in Uruguay regarding the paper and pulp industry

a) Political affairs
b) Economical affairs
c) Industrial policy
d) Policy for paper and pulp industry

(2) Market study (primarily of the international market as a source of demand for exports)

a) Supply and demand conditions

b) Market prices

c) Future demand projections (Analysis was primarily made using pre-existing statistics and other materials particularly regarding the EC countries.)

(3) Forest resources study

a) Field study (stock, method of transportation, etc.)

b) Pulping tests (six species)

c) Selection of species suitable for making pulp (Made on the basis of past results with six species, through discussions with the Uruguay counterparts)

(4) Evaluation of afforestation planning

(5) Pulp wood study

a) Suppliable pulp wood volume, price

b) Ancillary supplies: required volumes, prices; procurements from domestic or foreign sources

Since afforestation for this project is not existing at present, the plan of pulp wood supply shall be prepared on the base of existing afforestation scheme of Government, paper and pulp manufacturing company and civilian landlords etc. And shall recommend kind of species of tree to be planted and required land space etc. in order to insure the wood for this plant.

(6) Mill site survey

a) Natural conditions (physiography, soil, climate)

b) Social conditions (labor, wages, population, related industry)

c) Infrastructure (ports, roads, railroads, other)

d) Utilities (power, water, fuel, chemicals, other)

e) Site selection (The foregoing were considered in connection with three sites proposed by Uruguay, Juan Lacaze, Fray Bentos, and Casa Blanca, in order to determine the optimum site.)

(7) Determination of production scale

The optimum scale was determined through study of several conditions such as supply and demand conditions of pulp, wood availability and the mill site.

(8) Conceptual design of the mill

a) Design basis
b) Process selection
c) Layout

(9) Environmental impact study

(10) Organization and manpower planning

(11) Construction and operation planning

(12) Total project cost and expenses

(13) Financial analysis and evaluation

(14) Economic analysis and evaluation

(15) Conclusions and recommendation

Chapter 3 Study Implementation Items and Outline

3-1 Study Method and Schedule

For the implementation of the study, a team of eight experts led by Y. Mikami was organized. The names and major responsibilities of each member of the team are as follows.

Y. Mikami	Team leader; pulp and paper industry policy; financial analysis
J. Morokuma	Forestry resources afforestation planning
F. Sakabe	Pulp wood study and tests of pulp wood
K. Matsubara	Plant site survey (including infrastructure)
M. Onozuka	Conceptual design; technical matters
N. Sato	Integration of plant cost and environmental survey
T. Sentoku	Overall construction planning; civil engineering (including barges)
T. Ushijima	Market study; mill site

The team were divided into three groups for in-country research, and conducted the research from November 27, 1984 to December 26, 1984. The schedule for major activities is provided as Table I-1, and results of the in-country work were previously given in the Interim Report. After returning to Japan the team conducted detailed studies and analysis in order to make the present report.

The team expresses its gratitude for the best cooperation by officials and employees of SEPLACODI, the counterpart organization, the Ministries of Industry and Energy, Agriculture and Fisheries, and The Technological Laboratory of Uruguay (LATU), as well as all others and officials of the Japanese Embassy, whereby the team was provided with the necessary data needed for the study.

3-2 Outline of the Study

The major components of the study, based on the scope as described above in Chapter 2, are as follows.

(1) Market study
(2) Forestry resources and pulp wood supply study

(3) Study of technical aspects of establishing the mill

(4) Financial and economic analysis

The outline of the in-country study is as follows in the classification of the above.

(1) Market study

As the result of consultation with the Uruguayan counterpart, the study of the domestic market shall be limited on the statistics and data only because Uruguayan BKP market is too small and instead, it was strongly asked to make world wide study of following items including BKP. The team recognized their circumstances and agreed to execute the study in accordance with their request. The items to be executed the world wide study are as follows.

a) Unbleached kraft pulp
b) Paper
c) Paperboard
d) Chips

(2) Forestry resources and pulp wood supply study

The wooded areas in Uruguay is only 5% of the national land areas, among of this 5% rate of afforestation which has higher productivity is 20% of it. Quantity of pulp wood shall be consumed by this project is estimated as 700,000 - 1,000,000 m^3 per annum. In order to supply such quantity for this project constantly and steadily large scale of afforestation is absolutely necessary. The study team related to forestation had implemented study of existing condition of forestation, suitable species of tree to the regional conditions and afforestation cost.

On the other hand, they have gathered samples to be used for pulp test for selection of the most suitable species of tree for the production of BKP by this project.

Species of tree and gathered location are as under.

Sample No.	Species	Collected location
No. 1	Eucalyptus maidenii	FNP
No. 2	Eucalyptus globulus	FNP
No. 3	Pinus taeda	CAJA BANCARIA
No. 4	Populus	CAJA BANCARIA
No. 5	Pinus elliottii	CAJA BANCARIA
No. 6	Eucalyptus grandis	CAJA BANCARIA

The above samples were sent to Japan and pulp testing were done at Hokuetsu Paper Mills Ltd.

(3) Study of technical aspects of establishing the BKP mill

As specified previously 3 places were proposed for the selection of plant site but after that Nueva Palmira was added as the result, the site survey had been done at the following 4 places.

a) Juan Lacaze
b) Fray Bentos.
c) Casa Blanca
d) Nueva Palmira

Since this project is export oriented type the following factors are considered as important elements for the site selection.

a) Habor facilities can be provided near to the site.

b) The depth of sea water to access to such harbor and that of the harbor itself should have enough depth to accept ships of 20,000 dead weight tonnage or more.

In additions to the above, the following factors are required.

a) The area shall have ample extent for the plant.
b) Convenient for plant construction.

c) Afforestation zone is available near to the site.

d) Ample industrial water supply is available.

As the result "Fray Bentos" was assumed as the most desirable place, however the final decision shall be left in Japan with prudent study.

(4) Financial and Economical Evaluation of this project

The repeated discussion were made between JICA and Uruguayan counterpart, concerning to following matters of this project for financial and economic evaluation.

a) Credit condition

b) Taxation

c) Inflation rate

d) Criterion currency

e) Wages

In conclusion the following major items were settled.

a) Long term loan:
- interest rate, Libor+2 or 2.5%(12%) per annum.
- Repayment, grace period 3 years
  10 years installment plan
  (14 semi annual installments during 7 years)

b) Short term loan:
- Interest rate, Libor+3 or 3.5%(13%) per annum.
- Repayment, within 12 months

c) Exchange rate:
- New Uruguayan Peso vs U.S. Dollars shall be based on the rate of Dec. 20, 1984 (N. Pesos 75.0 = US$1.0)

d) Escalation rates:

- Domestic escalation rate in Uruguay shall be converted into dollar base and apply escalation rate in U.S.A.

- Escalation rate for imported items shall be decided referring the escalation of industrial products in Japan and U.S.A. and fluctuate in the extent of 4 - 6%/Y.

Concerning to the other details please refer to Part V, Chapter 1 and 2 of this report.

Table I-1 SITE SURVEY SCHEDULE (1)

1984, November	
27 (Tue.)	Lv. Tokyo (1st Group; Mikami, Matsubara, Onozuka)
28 (Wed.)	Movement
29 (Thu.)	Ar. Montevideo Complimentary visit to the Japanese Embassy
30 (Fri.)	Complimentary visits to Secretary of the Planning, Coordination and Information Secretariat (SEPLACODI) the Ministry of Industry and Energy (MIE) the Technological Laboratory of Uruguay (LATU)
1984, December	
1 (Sat.)	Complimentary visit to the Association of Paper Industry Data collection and study
2 (Sun.)	Survey on Inception Report Data study Adjustment of schedule
3 (Mon.)	Discussion with SEPLACODI and LATU Adjustment of schedule
4 (Tue.)	Discussion with SEPLACODI and LATU Visit to MIE
5 (Wed.)	Visit to MIE and SEPLACODI Complimentary vist to the National Land Agency Data collection and study
6 (Thu.)	Complimentary visits to the Statistic Agency and MIE Data collection and study
7 (Fri.)	Lv. Tokyo (2nd Group; Sakabe, Ushizima, Morokuma, Sentoku, Sato)
8 (Sat.)	Ar. Montevideo
9 (Sun.)	Adjustment of schedule Data collection and study Visit to the agency of harbar (Matsubara)
10 (Mon.)	Discussion with the counterparts Visit to the Japanese Embassy

Table I-1 SITE SURVEY SCHEDULE (2)

11 (Tue.)	(A Group)	Visit to FNP
	(B Group)	Visit to FNP and Hydropower Station
	(C Group)	Visit ot FNP
12 (Wed.)	(A Group)	Survey on the mill of PAMER
	(B Group)	Visit to the PALMIRA Power Station Survey on PAMER Paper mill
	(C Group)	Survey on the plantation of PAMER
13 (Thu.)	(A Group)	Survey on the Caja Bancaria plantation
	(B Group)	Visit to the Rio Negro Prefectural office Survey on Fray Bentos city
	(C Group)	Survey on the Caja Bancaria plantation
14 (Fri.)	(A Group)	Survey on proposed project site at Fray Bentos port area
	(B Group)	Complimentary visit to Maritime Safety Agency Survey on Angro Factory
	(C Group)	Movement
15 (Sat.)	(A Group)	Survey on the site from Rio Uruguay
	(B Group)	Survey on the site from Rio Uruguay Complimentary visit to prefectural governor
	(C Group)	Survey on the F.Y.M.N.S.A plantation
16 (Sun.)	(A Group)	Arrangement of data
	(B Group)	Survey on Nueva Palumina port area
	(C Group)	Movement
17 (Mon.)	(A Group)	Arrangement for sample woods packing
	(B Group)	Complimentary visit to Paysandu Prefectural Office Survey on Casabranca
	(C Group)	Survey on the plantation of the Republic University of Uruguay
18 (Tue.)	(A Group)	Discussion at LATU
	(B Group)	Survey on the root No.3 and root No.1
	(C Group)	Movement
19 (Wed.)	(A Group)	Visit to the Harbor Board
	(B Group)	Visit to SEPLACODI and LATU
	(C Group)	Visit to the plantation of Owner's

Table I-1 SITE SURVEY SCHEDULE (3)

20 (Thu.)	(A Group)	Visit to LATU
	(B Group)	Visit to SEPLACODI, LATU and MIE
	(C Group)	Visit to SEPLACODI, LATU and Ministry of Agriculture and Fisheries
21 (Fri.)	(A Group)	Final checking of sample woods packings for air freighting to Japan
	(B Group)	Visit to the Construction Company
22 (Sat.)	(B Group)	Final discussion at SEPLACODI and LATU

Notes: A Group is the Group to survey mainly of Raw materials
(Sample woods)
(Sakabe)

B Group is the group to survey the recommendable factory sites
(Mikami, Onozuka, Matubara, Sato, Sentoku)

C Group is the group to survey the present plantation area
(Morokuma, Ushizima)

PART II

MARKET STUDY

Part II MARKET STUDY

Chapter 1 Objective

To determine whether a plan to produce BKP in Uruguay for export is both suitable and economic is the objective of this study. Since Uruguay does not now possess sufficient forest resources to supply the pulp wood needed by such a BKP mill, the plan must call for a tree planting program can start 8 to 11 years before pulp production.

Because almost none of the BKP would be shipped to the domestic market, the market study necessarily is concerned mostly with the world market for this product, and the domestic market is considered to be minor in nature. Particular mention must be made of the point that on the occasion of the in-country research in November and December 1984, Uruguayan officials requested that the world market study not be confined to BKP but also cover paper, pulp other than BKP, and pulp wood. What must be given attention in connection with the world market study is that the best judgements possible at this time with regard to major factors which will influence the future structure of the market are made, and adequate data for judging whether the project is realizable is presented on the basis of those judgements.

That is, in order to judge whether the project can be realized, it is necessary both to attain a suitable understanding of major movements in world production of paper and pulp, and to establish an outlook regarding the geographic scope of the market for the products of the proposed mill, and the market price for it.

1-1 International Market Study

This is a feasibility study for construction of a mill which, as the third phase of a master plan presented to the Government of Uruguay in 1981 by JICA, would produce 750 T/D of BKP for exportation, and hence the international market study is concerned with the market for 255,000 T/Y of BKP (750 T/D x 340 days). Therefore, detailed analysis, including price analysis, was undertaken for BKP in addition to the market analysis for paper, pulp, and pulp wood.

Since it is considered that the EC is the most promising market for the BKP, analysis was made of each EC country. Information is supplied, in addition, for Latin American countries in order to aid in consideration of the possibility of international cooperation for paper and pulp production.

1-2 Uruguay's Domestic Market Study

A domestic demand would be covered by the domestic supply, if demand increases at the annual rate of 2%, after 10 years from the base year 1985, and because it is desirable to avoid disturbing the other existing the domestic industries, in compliance with the request of Uruguay a field study of the domestic market was not made, so the analysis and projection of domestic demand were made based on statistics.

Chapter 2 International Market for Paper, Pulp and Pulp Wood

2-1 World Economic Trends, and the Paper and Pulp Industry

2-1-1 Basic Ways

In order to project future levels of demand for paper and pulp, and to project the future structure of demand according to principal components as well as the corresponding prices, it is necessary to analyze the past trends and factors underlying the directions and changes of those trends.

Change of factors effected in past demand, supply and prices of paper and pulp are given in Figure II-1. The factors behind change in paper demand Figure II-1(6) are, primary economic growth and change in economic structure (popularization of substitutes and the trend toward smaller and lighter products, etc.). Demand for pulp (13), in addition to being dependent on demand for paper, is influenced by recycling of paper (15) as well as change in unit consumption of pulp in papermaking (14). The supply and demand balance for paper and pulp (5) is related to demand (6) and supply (4).

Supply is determined by production capacity (4) and rate of operation (11), but production capacity which will be newly constructed is based not only on projections of future supply and demand balance (5), but also on international competitiveness (2) and matters such as developing countries' industrialization plans, which act on mill construction planning decisions. As factors which determine international competitiveness, other than selection of raw materials, regional differences in production cost, level of development of production technology, and expansion of mill scale (1), the cost of transporting products to markets may be cited, besides which it is necessary to take into account factors which can change costs (9) notably change in exchange rates for the currencies of major producer countries and in the costs including crude oil price. The price of paper and pulp is determined by basis prices (16) according to production cost in the country which is the price leader (8) but in actuality the price fluctuates around the basic price (17), reflecting change in the supply and demand balance (5) and change in inventory level (12) which results from that.

The analysis of historical conditions and projection of future conditions, are based on the foregoing and are described in sequence below.

2-1-2 World Economic Trend

Following the end of World War II the world economy has followed a path of expansion, led by the United States. But after the start of the Sixties, there has been a relative decline in the power of the United States, due to the resurgence of Japan and Europe, as well as the setback in the Vietnam war. Nevertheless, the world economy continued to expand during this decade, with assistance from low oil prices. The contradiction encompassed by the coexistence of low oil prices and high growth of the industrialized economies during the Sixties, however, became more readily apparent after the start of Seventies. The world economy underwent a major transformation in 1971-72, with the change from fixed to floating exchange rates. The value of the dollar fell as one consequence. Then, in 1973, the first oil crisis took place. The following increase in the oil price caused prices to rise and economic conditions to sag, and in 1974 the paper and pulp industry was obliged to mark up its prices by a wide margin to cover the higher cost of the oil.

After two years of zero growth in 1974 and 1975 the world economy entered an adjustment phase in 1976 (5% growth rate) after which there was an interim period of stable growth in 1977-79 (3% growth rate), until the second oil crisis brought about another adjustment phase, in 1980-82. And at the time of the second oil crisis there was an increase again in paper and pulp production due to false demand, as well as an increase in prices.

The gross national product in the United States after the second oil shock (Table II-1) contracted in real terms in 1980-82 but began to recover in 1983 and showed a strong performance in 1984. In the process, however, the rapid growth of the nation's fiscal deficit and deficits in both international trade and current accounts (in 1985 it is expected that the United States will become a debtor nation to the extent of $70 billion) appeared, leading to expectations of policy changes in the United States.

For purposes of forecasting demand for paper, it is assumed that peaceful coexistence of the United States and Soviet Union will enable the world economy to grow at the same rate as in the past (Table II-2) even though there may be short-term change such as noted above.

Projections were made also on the assumption that there will not be another oil shock.

2-1-3 Demand for Paper and Pulp

Change in total world production of paper, pulp and pulp wood is shown in Table II-3 to II-5.

In the case of each of the three, reflecting world economic conditions, there was steady growth up to 1973, an increase in production in 1974, a decline in 1975 and then low-level growth up to 1978 after which production rose in accordance with the second oil shock.

Unit consumption of pulp for the paper production for the world as a whole is declining, and due to the increase of utilization of waste paper it is projected that this trend will continue. The unit consumption of pulp wood for pulp production varies according to the type of pulp produced, the type of wood used, and the pulp production process. As shown by Table II-8, the trend may not be viewed as changing, despite some year-to-year fluctuation. Soft wood trees grow more rapidly than hard wood trees, and are less costly, so their share was increased.

2-1-4 Paper and Pulp Price Trends

Paper and pulp prices, in terms of the base price determined by change in production cost, have been extremely volatile, reflecting fluctuation in inventory in response to change in the supply and demand balance.

Change of United States paper and pulp price index from 1946 to 1980, as reported in "Pulp and Paper Week" (January 1980 issue), were as shown in Figure II-4. This chart shows the price index based on in 1972 price. Change in real price index, by using the Production Price Index as a deflator, were reported in the June 1982 issue of this trade publication and is shown in Figure II-5. Moreover, Figure II-6 depicts change in newsprint price in the United States during 1980 to 1984. From the information provided by these charts the following will be observed.

(1) Although there have been cyclic changes in the price of paper, when the price is evaluated in real terms, there has been almost no change since 1960.

(2) The pulp price, however, have fluctuated over a wider range than the paper price, and since the Sixties the price declined (in terms of the real

price), and then stabilized at that lower level. This is believed to reflect the combined effects of use of the Kamyer continuous digester, increase in the share of low-cost logs from Canada, the United States and elsewhere, and reduction of fixed costs due to expansion of mill scale (details are given below).

With regard to the trend of the pulp wood price in the United States, an almost steady movement can be seen in the real price, as shown in Figure II-7 (source: Pulp and Paper Week, June 1981). The same publication has showned a comparison of several countries' prices of wood for pulp production during the Seventies, in its September 1981 issue (Figure II-8). This is showned for soft wood, in the case of hard wood the advantageous position of Brazil becomes even more enhanced. It is expected that hereafter prices of United States pulp wood will rise somewhat percentage. The increase in the exchange rate for the dollar during recent years period had the effect of reducing the dollar-denominated price of pulp wood for pulp from countries other than the United States by nearly 30%. Despite the reason above, the price of United States pulp wood remained lower than those of Scandinavian wood.

It may be judged from the foregoing that real prices for paper, pulp and pulp wood have fluctuated within certain ranges. As noted above, change in price has been influenced by change in inventory level, which reflects the operation of supply and demand functions. This is readily evident, for example, in the case of market pulp, when comparison is made between change in its inventory (Figure II-2) level and change in its price (Figure II-4).

As shown in Figure II-2, from 1975 on, inventory in Scandinavia in particular has been high. This is because financial and other government supports was provided in 1975 to help maintain pulp prices at desired levels.

Cost has been cited as the central factor determining price, but paper and pulp production cost varies from region to region in the world. Table II-9 compares cost as of 1st half of 1981 and 1982 in Canada, Sweden, the United States and Brazil. From this it can be seen that for soft wood pulp whereas the cost in Sweden was US$453 - 483, the United States and Canada had a cost advantage exceeding US$100. Even when the cost of maritime transport to Europe of US$50 is taken into account, it is evident that United States pulp has an advantage in the European market. It is also obvious that Brazil has superiority over the United States regarding hardwood pulp. In comparing prices of different nations, however, it is necessary to take exchange rates into account.

Change in the exchange rates of the US dollar, Scandinavian and European Community currencies is shown in Table II-10. As an example, the Swedish Krona fell 33% against the dollar from 1981 to 1983. If the Swedish cost of US$483 in 1983 is revised in accordance with this exchange rate charge, it becomes about the same as the United States cost, US$363. Under such a condition, the United States product loses its competitive advantage in European markets because of the need to also consider the freight cost. The pertinent question of the difference between softwood pulp price and hardwood pulp price as shown by Table II-9 is such that the latter is cheaper. In 1982 whereas the price of the former in the southern United States was US$362, the price of the latter was US$343, and the price of Brazil hardwood pulp was US$327.

Of the above factors the one which has the greatest influence is the price of wood for pulp but in the case of Brazil fixed costs are higher than in any other countries. Figure II-9 compares the cost of constructing a pulp mill in each country. Not only is the cost of construction highest in Brazil but, in addition, the necessary investment in improvement of infrastructure is highest. This indicates the importance of obtaining the lowest possible interest rate in project financing and to minimize construction cost.

The trend of papermaking equipment costs is shown in Figure II-10, from which a sharp increase following the first oil crisis may be seen. That is, costs rose after both oil crises, indicating the increased need for caution in making investment decisions.

When the prices of paper and pulp fall, the prices of competitive countries will lead to pull downward, and hardwood prices will lead to pull down more than by softwood prices. Because the fluctuation of prices takes place above and below a base price, economic calculations, is made based on projection base price and after which break even analysis is performed for price fluctuation effect.

2-1-5 Trend of Equipment Investment

The trend from 1969 to 1984 for paper and pulp production capacity is shown by Table II-11, and Table II-12 shows projections of capacity through 1988. Pulp capacity increased from 101 x 10^6 MT in 1969 to 137 x 10^6 MT in 1979. Paper capacity increased from 132.9 x 10^6 MT to 192.2 x 10^6 MT during the same period. This is equivalent to average annual growth of 3.1% and 3.7% respectively. After 1979, the annual growth rates moved in approximately the

same way (Tables II-11-2). Regional annual growth rates for pulp and paper capacity are shown for 1978-1983 and 1983-1988 in Table II-12, but great differences are evident from region to region. The growth rates for both pulp and paper investment were great in the developing countries, but low in North America, Europe and Japan and in the case of pulp there was a contraction rather than growth in Europe during 1978 and 1983. To the extent that absolute amounts are compared, however, the increase in the developed countries is by far greater.

The number of paper and pulp mills, and production capacity, are shown in Tables II-13 and II-14. (China is excluded from these tables.) Regions where strong increase in production capacity of paper took place in 1978-1983 were North Europe, North America, Asia, Oceania and Latin America, while capacity declined in the EC and East Europe. In the EC, a considerable number of mills were closed in and after 1978. Despite a decrease in the number of mills in Scandinavia and North America, there were increases in capacity, indicating increased concentration. Regions which showed large increases for pulp are North America, Oceania and Latin America; capacity fell in the EC, Scandinavia and East Europe. These changes reflect differences and changes in regional competitiveness. That is, these changes reflect a movement toward constructing pulp mills in regions where pulp wood are low in cost, as well as a shift in Scandinavia comprising producing less pulp but more paper.

Rates of operation of the mills in North America and Scandinavia are shown in Table II-15. Fluctuation is greater for pulp than for paper which is what may be expected in view of fluctuation of inventory levels, and in 1980 whereas the rate for pulp in Scandinavia was 0.69 it was higher, at 0.93, in North America, indicating that the United States' competitiveness was high by the exchange rates at that time.

2-1-6 Regional Trend of Supply and Demand, and of Trade, in Paper, Pulp and Pulp Wood

Tables II-16, 17 and 18 show, for paper, pulp and pulp wood, each region's production, exports, imports, apparent consumption and self-sufficiency (production divided by consumption). Self-sufficiency rates for paper and pulp in the EC are about 75% and about 40% reflecting high dependency on imports and it is particularly characteristic that dependency is high in the case of pulp. Further, regarding pulp wood, recently almost complete self-sufficiency has been

attained in the EC, in part reflecting the high level of dependency for pulp. In North America although exports of paper and pulp are high there also are considerable imports. In net terms, of course, this region is an exporter. In the case of exporting paper and pulp from Uruguay, the EC would be the largest market; at present it imports more than 10 million tons of paper and about 8 million tons of pulp a year. Moreover, North American imports of paper are greater than 7 million tons, and imports of pulp exceed 3 million tons, making this region an attractive market. Exports of pulp by Brazil are made to the United States in addition to Japan and West Europe. It is judged desirable from the viewpoint of safety that as the basis for economic calculations (given elsewhere in this report) to use prices for the EC. Regarding pulp wood as may be seen in Table II-18, there has been a gradual decline in Scandinavian self-sufficiency, to 85%. The region having the lowest selfsufficiency of pulp wood is Asia, with about 60%. To compensate for the shortfall, imports are made from East Europe, North America, and Oceania. Regarding pulp production in Scandinavia where equipment investment has become stagnant it is apparent that the limit has been virtually reached due to the pulp wood situation.

Production, exports and imports of each major type of paper are shown in Table II-19 from which it is evident that the volume of trade is highest for newsprint and paperboard. From Table II-20 it may be seen that the volume of trade in chemical wood pulp is high. Within that chemical wood pulp trade the greatest share by far is that accounted for by BKP. This is because BKP is the most suitable pulp among the pulp produced for export purposes (sale) in the world as a whole and in Europe in particular.

The foregoing explanation is summarized in the table, Table II-21. This table indicates the following.

(1) Regarding the influence of world economic growth, the production quantities of paper and pulp fell following the economic growth rate decline by the oil shocks.

(2) Pulp inventory level changed in accordance with that reason.

(3) There were wide-margin price increases by the two oil shocks, but declines followed as a result of false demand. In general when inventory rose past the 2-3 million tons level a decline in real price resulted, but efforts were made to keep prices steady prior to the decline. After price fell prices rose as a result of inventory draw down and economic recovery.

(4) From 1972 value of U.S. dollar was drop and stayed low until 1980 but recovered from 1982, in dollar terms. That is, American production had a strong cost advantage up to 1980.

2-1-7 The Project Suitable for Study as Investment in Uruguay

The object of this feasibility study has been determined to be a 750 T/D BKP mill. This had been recommended in the 1980 master plan and was confirmed at the site survey of the present study. The reasons this was confirmed using the perspective of the world market are as follows.

(1) There is a clear advantage in pulp cost for those regions where it is possible to obtain inexpensive pulp wood, as is indicated by the paper and pulp price trends. Scandinavia had been a supply center of logs in the past, but is importing logs now.

(2) As noted in the discussion on plant investment, pulp production capacity was increased in North America, Oceania and South America, and pulp production capacity declined in Scandinavia even which is now a supply center of pulp. Declines in pulp production capacity were also evident in West Europe and East Europe beside of Scandinavia. It is thought, therefore, that just as has been true in the past pulp demand, and in the future expansion demand, countries capable of utilizing inexpensive pulp wood will take on the role of supplying pulp.

(3) The world market for paper has conditions differing somewhat from those for pulp. That is, because there is little difference in the cost of marine freight for pulp and that for paper, it is advantageous to produce paper using imported pulp at a point close to consumption centers. Further, the cost of papermaking equipment as shown by Figure II-10 has risen and because it is more expensive to construct a mill in a developing country than in a developed country, it is difficult to attain competitiveness in the former.

(4) It is clear from trade statistics that BKP is the preferred form of pulp in international trade.

(5) Exportation of pulp wood deserves to be studied as raw material of pulp. As a matter of fact, Scandinavia is increasing its imports of pulp wood and

logs. But the cost of marine freight is very high in the case of pulp wood, and because the distance factor is important this cost is strongly influenced by oil prices and demand for ships. By increasing freight charges, due to an increase in the price of oil has the effect of reduction of competitiveness of producers distant from their markets.

(6) As indicated in the calculation of pulp cost, in Brazil the fixed cost component (effected by construction cost, interest and operation rate) of pulp production is high. As a means of reducing construction cost of capital, intensive industry such as pulp plant is to build larger capacity plants at the international wise scale. Because at present the scale of plants being constructed or planned in various countries is on the order of 1,000 T/D (varying according to the type of pulp wood to be used), it is necessary to consider building on the same scale as Brazil, i.e., at least 750 T/D. Brazil's mill, although built for production of 750 T/D, now is producing about 900 T/D. It has been stated that in a short time it will produce 1,000 T/D. It is thought that this would have great impact on the economy. In order to maintain a high-level of operational rate it is necessary for certain conditions to be satisfied regarding equipment and its operation.

The Condition used for economic calculations for 750 T/D of BKP are given elsewhere, but a problem would be encountered depending on whether hardwood or softwood is to be used. In the case of softwood, pulp wood would be more expensive, but products would be higher in price. In the event that the target market is not defined as the world but only as the domestic Uruguayan market, or the Latin American region, the thinking in the selection product would be different. In the subsequent analysis of the paper and pulp industries, information on Latin American countries is provided.

2-2 Paper Industry

2-2-1 Paper Demand

Overall demand for paper, as noted in 1-1-3 of Chapter 2, bears a relationship to the country's economic level. As shown by Table II-16, the annual growth rates for paper, for the world, in 1972-1977 and 1977-1982 respectively, were 1.9% and 1.8%, but there were low rates in West Europe (0.9% and 1.5%) and North America (0.6%, 0.7%). Elsewhere, on the other hand rates were high, they were above 3.5% in Asia, Oceania and Africa. But the shares accounted for by West Europe and North America in the world total in 1982 were 24.3% and 38.1%, so that together their share was higher than 60%, and they served to pull down the world's overall growth. Projection of future economic growth are used as the basis projection of future paper demand. Calculations made on the basis of the economic projections given in Table II-2 are presented in Table II-22. Some organizations have made projection of future paper demand, and that by PPI (May 1983) is provided in Table II-23, as representative of these record. Our forecasts show the annual growth rate for paper, for the world, in 1982-2000 was 1.73%, which is somewhat higher than that of the lowest projection.

Although it is stated in 1-1-3 of Chapter 2 that growth in total demand for paper bears little relation to change in industrial structure, have ever demand of specific types of paper has relationships with industrial structure and should be expected to be evident in the future.

As may be seen in Table II-19, whereas total paper demand increased 1.8% a year from 1972 to 1982, demand increased 2% for newsprint, 3.6% for printing and writing paper, and 2.5% for household paper. In contrast to these high growth rates, demand for paper and paperboard declined 1.9%. Some comments on the implications of this situation for future paper demand are as follows.

(1) Development of new media, and paper demand

The two major aspects of paper demand which development of new media would influence are paper as a material for recording information, and paper for conveying information. It is likely that a part of the demand like telephone directories will be eliminated by use of magnetic recording media, which also will be widely used in other ways to record information.

Nevertheless, it is believed that the write-anytime, read-anytime quality of conventional written recording will continue to be of inestimably great importance, and the quantity of paper demand for information-related devices will increase in proportion.

(2) Paper as a flexible wrapping material

Increased use of plastic as a wrapping material, in the form of film or net, etc., has made inroads in the traditional market for paper as a wrapping material. But increases in the price of oil have caused the prices of plastic products to rise, and it is thought that in the future demand both for paper and plastic for wrapping will increase in keeping with economic growth. Moreover, technological advances which have made coating of paper with plastic, or bonding of the two materials, are causing utilization of these hybrid materials to increase.

(3) Demand for cardboard

It is projected that demand for cardboard will increase, in keeping with trends for product differentiation, need for improved strength of protective materials for goods being shipped, change in industrial structure, and other factors, but it is also expected that demand for corrugated paper board will be restrained due to development of hybrid materials and other developments.

(4) Special paper

Because of the foregoing considerations, it is expected that demand will grow for coated paper and papers to be used computer systems and in copying machines etc. (within the classification of miscellaneous paper), while demand growth will slow for wrapping paper, newsprint and cardboard for paper products.

Information on past trends of regional production, imports and exports of the each types of paper is provided in the Annex.

Country-by-country supply and demand trends of paper in the EC and Latin America countries, which are considered to be a suitable export market, are

shown in Table II-24. Major importers are West Germany, England, France, Italy and Holland, in that order. But as net import, England is the biggest and in 1982 about 3.6 million tons were imported, and the self-sufficiency rate was only 47%. France, West Germany, however, the self-sufficiency ratio was more than 80%. For the EC as a whole in 1982 imports totalled 14 million tons and exports totalled 5.6 million tons, so net imports came to 8.4 million tons, making this a large market for exports.

Productions, imports and exports and consumption statistics in Latin America, for each paper type are shown in Table II-25. Latin America's paper demand, in aggregate terms, came to only about 830,000 tons in 1982, and because imports were high the self-sufficiency rate was 89%. The type of paper for which import dependency was highest was newsprint, for which the self-sufficiency rate was 65%, and imports came to about 50,000 tons. Statistics for the Latin American region by type of paper, for country-by-country production, imports and exports, and consumption are provided in the Annex. This will be useful in considering the potential for constructing new paper mills in the region.

2-2-2 Paper Trade

As shown in Table II-19, total trade volume for all types of paper in 1982 amounted to about 33 million tons, or about 20% of both production and consumption. The most important components are newsprint and paperboard which accounted for about 14 million and 12 million tons respectively. For each type of paper, and for major exporters (United States, West Europe, South America, Japan) and for major importers statistics for the 1971-1982 period are provided in the Annex, together with export and import figures. The largest importer of newsprint is the United States (about 6 million tons in 1982), followed by England (1.3 million tons), major exporters are Canada (about 7 million tons), Finland (1.3 million tons) and Sweden (1 million tons).

Regarding printing and writing paper, major importers are West Germany (1.10 million tons) and the United Kingdom (1 million tons). Major exporters are Finland (1.9 million tons), West Germany (960,000 tons), Canada (660,000 tons), Sweden (520,000 tons) and France (520,000 tons). For both West Germany and France imports slightly exceed exports. Therefore, net exporters are Finland, Canada, Sweden and other countries.

Regarding paperboard, importers are West Germany (1.9 million tons), England (1.6 million tons) and France (1.2 million tons), while exporters include Sweden

(2.9 million tons), United States (2.8 million tons), Finland (1.7 million tons), West Germany (1.2 million tons) and Canada (910,000 tons). Even so, West Germany is a net importer.

2-2-3 Investment in Papermaking Facilities

Investment in papermaking facilities of all kinds is discussed in Chapter 2, section 1-1-5. The following discussion is devoted to investment according to type of paper. Trends of world production capacity, by paper type, is shown in Table II-12. The total for 1983 is 200 million tons, of which paperboard accounts for 120 million tons (60%), printing paper accounts for 50 million tons (25%) and newsprint accounts for 31 million tons (15%). Average annual rates of increase in capacity for the 1973-1983 period are 3.7% for printing paper, 2.2% for newsprint, and 2.1% for paperboard. From the May 17, 1982 edition of "Pulp and Paper Week", the investment potential of in each country for each kind, is provided (see Table II-26). Because demand for paper is high in West Europe and America (62.4%), investment for paper making facilities is at higher rate of 61.4% in EC and U.S.A. In Latin American countries, decisions have already been made to add there are paper and pulp making facilities of 2,000,000 tons and another 370,000 tons is now being planned.

2-3 Pulp Industry

2-3-1 Pulp Demand

The quantity of pulp demand, and its change as stated in Chapter 2, 1-1-3, is analyzed in terms of change in unit pulp consumption corresponding to change in the quantity of paper demand, taking into account the ratio of waste paper. If, as noted in Chapter 2, 1-2-1, there is a continuation of waste paper recycling and decline in unit pulp consumption, the world demand for pulp would be as shown in Table II-27. Regional demand for each type of pulp is determined by regional production of paper (Table II-16) and unit pulp consumption (Table II-7). Change in the demand for each type of pulp is determined by change in the structure of paper demand (demand for each type of paper), and change in papermaking technology (including any change in favor of greater use of cheap pulp), as well as the development of waste paper technology. The consumption quantities of chemical and wood pulp during 1972-1982, as shown in Table II-20, shows an increase from 71 million to 83 million tons, for a gain in share of

65.7% to 68.8% (average annual growth, 1.5%). Within this category, the share of sulphate pulp in total pulp increased from 52.6% to 58.1%. Within wood pulp, BKP showed an average annual increase of 3.4%, the highest growth rate of all. Consumption of mechanical pulp increased but at a rate lower than that of BKP. Production forecasts for each type of pulp, from PPI (August 1980 issue), are given in Figure II-11.

Regional production, imports and exports, and consumption of each type of pulp are analyzed in the Annex. The trend of demand for each type for each country in the EC market, which is deemed attractive for the present project, is shown in Table II-28. The EC as a whole imports about 8 million tons a year; major importers in order of decreasing scale are West Germany (2.4 million tons in 1982), France (1.5 million tons), Italy (1.4 million tons) and England (1.4 million tons). Although it appears that British imports are declining year to year, this is also because of an increase in paper imports due to reduction in papermaking capacity. With the exception of Belgium and Luxembourg, pulp exports are negligible and may be ignored. Table II-29 shows production, imports and exports, and consumption of each type of pulp in Latin America. Production of BKP made a sharp increase from 90,000 tons in 1972 to 120,000 tons in 1982, and production of UKP 65,000 tons in 1972 to 101,000 tons in 1982 but mechanical pulp production is not increased as 390,000 tons in 1972 and 410,000 tons in 1982. Production, imports and exports, and consumption statistics for each type of pulp in the Latin America region are shown in the Annex. This would be relevant for a consideration of the possibility of a joint regional project.

2-3-2 Pulp Trade

As may be seen in Table II-20, the level of total pulp trade, at 18 million tons, is about 15% of both production and consumption (about 120 million tons). The most important type of pulp in trade is BKP, for which the quantity is about 12 million tons or about 65% of total pulp trade. It is followed by bleached sulphite pulp and unbleached sulphate pulp, for which the trade quantity is about 2 million tons.

Statistics for import and exports of each type of pulp, for major importers (the United States, West Europe and Japan) and major exporters for 1971-1982 are shown in the Annex. Countries which are important importers of BKP are the United States (the largest 2.6 million tons in 1982) followed by West Germany

(2 million tons), France and Japan (1.1 million tons each), and Italy and England (900,000 tons each). Because in the United States consumption of BKP is high, the ratio of imports to consumption is 14%. In comparison to that, the ratio is nearly 100% for all West European countries. Consumption is also high in Japan where the ratio is only 21%. Among BKP exporter countries, Canada is foremost (5 million tons in 1982), followed by the United States (2 million tons), Sweden (1.6 million tons), Finland (1 million tons), Brazil (700,000 tons) and Norway (200,000 tons). Because the Unites States imports 2.6 million tons it is a net importer of 600,000 tons. Among the BKP exporters, Canada, the United States and Scandinavia have maintained dominant shares, and although its share may grow in the future that of Brazil is small. It is thought that the cost in Canada, the United States and Scandinavia for some time will continue to be the leading factor in determining the price of pulp. Further, because of its cost advantage, as long as Brazil does not reduce its operation ratio that country is expected to benefit considerably.

2-3-3 Investment in Pulpmaking Equipment

The situation regarding overall investment in pulpmaking equipment is discussed in Chapter 2, 1-1-5, of this section of the report. The following is concerned with investment for the different types of pulp. World production capacity is shown in Table II-12, for each type of pulp. As of 1983 this capacity was 140 billion tons, including 110 billion tons for chemical pulp and 36 million tons for mechanical pulp. Capacity for both grew at almost 2% a year from 1973 to 1983. Expansion programs for pulp mills, for the period 1982-1985, are as shown in Table II-26. With specific regard to confirmed projects, investment for BKP would add 4.5 million tons of capacity (40% of the total), followed by that for TMP, 2.1 million tons (19%), and mechanical and UKP, but much of the TMP increment is in the United States (1.43 million tons), and of the BKP increment, 750,000 tons, biggest is in South America. The same general situation holds true for the unconfirmed projects.

2-4 Pulp Wood

The level of demand for pulp wood varies in accordance with the levels of demand for the different types of pulp. Because hardwood trees grow faster than softwoods, the use of the former for pulp is increasing faster than use of the latter. Technological progress is being made in accordance with this, and can be expected to further advance in the future.

Supply and demand in the world's regions of pulp wood are shown in Table II-18, from which it is evident that self-sufficiency in Asia is low (about 60%), and that Scandinavia is gradually increasing its dependency on foreign wood, large supply sources are the Soviet Union, East Europe, Oceania and elsewhere. In 1982, FAO issued a report entitled "World Forest Products Demand and Supply 1990 and 2000", in which is included a forecast of demand for industrial wood. The subclassification of industrial wood is shown in Table II-30. The figures given as forecasts of demand for wood for pulp are as follows, and these growth rate may be thought to be somewhat high relative to growth of demand quantities for paper and pulp.

(Units 10^6 m^3; year to year growth in percent)

	1960	1970	1980	1990	2000
N.W	39.8	91.7(8.7%)	132.0(3.7%)	187.1(3.5%)	263.6(3.49%)
L.W	187.6	314.0(5.3%)	379.5(1.9%)	477.3(2.3%)	631.0(2.8%)

Table II-31 uses data from the FAO report to give past records and projections of regional production, imports and exports, and consumption of industrial wood. Imports and export data for pulp woods for major importers or from major exporters for each year from 1972 to 1982 are given in Tables II-32 and II-33. Import data indicate that the foremost importer is Japan (13 million tons, in 1982), followed by Finland (4.7 million tons), Sweden (4.4 million tons), Belgium and Luxembourg (3.3 million tons) and the United States (1.4 million tons). Whereas Japan and Finland have consistently been importers since 1973 Sweden imported only 500,000 tons in 1973, and swiftly increased imports since then. Among the exporters, the foremost countries are Australia (5.7 million tons), the United States (4.4 million tons), France (2.5 million tons), Canada (2.2 million tons) and Sweden (1.1 million tons). The United States is a net

exporter. In Sweden, whereas imports have increased, exports have decreased from 3 million tons in 1973 to 1 million tons in 1982, changing the country's position to that of a net importer. Elsewhere in Scandinavia, Finland's exports were lower than in 1973, but Norway has increased exports.

Chapter 3 The International Market for BKP

3-1 Present Situation of and Future Outlook for BKP Production

3-1-1 Present Situation of BKP Production

The world's production of BKP, as shown in Table II-34, increased from 28.11 million tons in 1972 to a peak of 40.86 million tons in 1981, after which there was a slight decline, to 40.08 million tons in 1982. The average annual growth rate for this 10-year period was 3.6%, which is the highest rate among those for all types of paper pulp.

Of the increase in production during that period the region which had the largest increase was North America with 6.30 million tons, followed by Scandinavian 1.73 million tons, by Asia 1.30 million tons, and South America 1.25 million tons. During this period, North America also demonstrated its superior competitiveness.

However, review of production statistics indicates that the share in the world total accounted for by North America and Scandinavia combined decreased 3.7 percentage points from 79.7% in 1972 to 76.0% in 1982, but this continued to dominate world production. The United States, Canada, Sweden, Finland and Norway, the so called NOSCAN group, are the world leaders in BKP production, Table II-35 gives information for the ten top national producers of BKP.

Latin American production is increasing. The increase there is largely due to increased LBKP production by Brazil, and during the past 10 years this has enabled Latin America to increase its share of the world total by 2.5 percentage points, to 4.6%.

Regarding regional average annual growth rates, the highest rate seen during the past 10 years is that of Latin America (11.9%), followed by East Europe (10.9%). These are followed by "other Western Europe" (Western Europe exclusive of the EC and Scandinavia), Oceania, Africa, Scandinavia, Asia, North America and the EC in that order.

The world's production statistics for BKP broken down by species are extremely limited. As a first effort to undertake such an analysis, FAO in its 1977 publication, "World Pulp and Paper Demand, Supply and Trade", split BKP into LBKP and NBKP components and used estimates for production, trade and demand in 1973 as a basis for projections for 1980 and 1990. FAO also surveyed world paper and pulp production capacity in 1984 and undertook to forecast capacity in 1988 and studyed the present situation and forecast regarding total BKP, LBKP and NBKP production capacity.

Information on the production of LBKP in 1983 released in FAO information and PPI Annual Review data released in 1983 were used to estimate production of both LBKP and NBKP in 1973 and 1983. The result is shown in Table II-36.

As is clear from Table II-36, the average annual growth rate is higher for LBKP than for NBKP, and the share of LBKP in total BKP increased from 40.1% in 1973 to 41.4% in 1983, a gain of 1.3 percentage points. The increase in LBKP output primarily comprised 2.6 million tons in North America, 1.48 million tons in "Other Western Europe," and 1.46 million tons in Latin America. The highest growth rates were those of the Latin America, Africa and "Other Western Europe" regions; the combined share of the these three regions in total world LBKP production rose from 7.6% in 1972 to 20.9% in 1983.

Whereas the increase in NBKP production in North America was high as 5 million tons, the increases in the "Other Western Europe" and Latin America regions were low at 50,000 tons and 60,000 tons respectively. Thus, a distinct pattern among regions is evident.

It is estimated that market pulp production capacity, within the larger category of world BKP production capacity, is 24.81 million tons in scale. This corresponds to 42% of BKP prodution capacity and it is assumed that the remaining 58% is destined for own uses.

As shown by Table II-37, in 1983, regarding BKP market pulp, production was 22.11 million tons, of which 13.7 million tons is NBKP and 8.94 million tons in LBKP. The breakdown by type of wood of BKP pulp production in major regions shows a very large share of 74.5% for NBKP in North America, while in Western Europe NBKP has a share of 54% LBKP 46%) and in Latin America LBKP has big share (72%). Thus, here too regional differences can be clearly seen.

3-1-2 Outlook for BKP Production

Using FAO and PPI statistics, world production capacity for BKP in 1988 has been projected as 55.48 million tons, meaning an average annual increase of 2.5% from 1983.

The average annual growth rates of production capacity for each type of pulp are 3.0% for LBKP and 2.1% for NBKP. Therefore the share of LBKP in the total is expected to increase from 41.3% in 1983 to 42.3% in 1988, a gain of one percentage point.

The outlook for increase in BKP production capacity, by region, as indicated in Table II-38, is that there will be an increase of 2.5 million tons in North America, accounting for 39.0% of the total increase, followed by increases of 1.29 million tons in the three Scandinavia countries (20.0%), 710,000 tons in Africa (11.1%), 650,000 tons in "Other Western Europe" (10.1%), and 600,000 tons in Latin America (9.4%).

Regarding increase in production capacity beyond 1988, it is thought that a strong increase cannot be expected in Scandinavia because of difficulty in obtaining inexpensive wood. The United States is very sensitive to charge of currency exchange rates and given the presently overvalued dollar it will be difficult for significant new investment to be made. From this it is concluded that the region which can possess the best investment potential is Latin America, where it will be possible to obtain pulp wood at relatively low cost.

3-2 BKP Demand and the Supply-and-Demand Outlook

3-2-1 BKP Demand

World BKP demand grew at 3.4% a year from the 1972 level of 27.90 million tons to 39.15 million tons in 1982. This is the highest rate among those for all forms of paper pulp, and BKP is an extremely important type.

The major regions consuming BKP, as shown by Table II-39, are North America, Western Europe and Asia. Although the share of these three regions in total world demand was 93% in 1982, the portion accounted for by North America is by far the largest, and at 51.5% of itself it exceeds half of the world total.

As shown in Table II-40, the country which is the foremost BKP consumer in the world is the United States (46%), followed in order by Japan, West Germany, Canada, France, Finland, Sweden, Italy, Brazil, England, Spain and Holland. Eight of the 12 top countries are in West Europe, and their total consumption, 9.56 million tons, is equal to 24.4% of the world total.

BKP production, trade and demand in West European countries, the United States, Canada, the three Scandinavian countries and Brazil are shown in Table II-41.

A classification of consumer and producer countries may be made according to a three-way split: (1) self-sufficient countries, (2) import-dependent countries, and (3) export-oriented countries. The United States and Japan belong to the self-sufficient classification, West Germany, France, Italy, England and Holland are dependent on imports, and Canada, Sweden, Finland and Brazil are export-oriented countries.

Because the BKP mill which is the objective of the present study is defined as being export-oriented, it may be thought that the markets it would supply would be import-dependent countries such as identified above.

Regarding the demand for each type of BKP, although there is almost no statistics which could be used for the essential task of ascertaining conditions for the world as a whole, FAO has announced information on a regional basis for LBKP and NBKP as of 1973 (including a breakdown for major countires). FAO worked on the basis of the assumption that world exports are equal to world imports and took the world BKP demand quantity as equal to the world production quantity, and allocated this quantity to each region. Table II-42 gives the FAO regional estimates of demand for LBKP and NBKP in 1973.

BKP demand conditions in Latin American countries have been indicated in Table II-43. BKP producers in Latin America are Brazil, Chile, Mexico, Uruguay, and Colombia. Regarding the level of production, in 1982 the leader was Brazil with 1.6 million tons, followed by Chile with 320,000 tons and Mexico with 210,000 tons; Argentine with 50,000 tons, Uruguay with 16,000 tons, and Colombia with 1,000 tons. Brazil and Chile export BKP; their exports in 1982 were 740,000 tons and 230,000 tons respectively.

3-2-2 BKP Supply-and-Demand Outlook

World BKP demand in 1988, 1990, 1995 and 2000 was forecast based on the forecast of the world total and North America, Latin America and EC regional totals, demand of paper and paperboard and wood pulp demand based on that.

Demand projections for paper and paperboard were made by a mathematical model using correlation analysis of demand and GDP, and a growth curve model was then used to forecast world total demand and demand in the above three regions.

Demand projections for wood pulp were made as follows. As the world total, the projected demand quantities for paper and paperboard as cited above were taken as equal to the projected production quantities, and the world average unit pulp consumption figure was applied to them in order to forecast demand of pulp. Unit pulp consumption was used in the form of figures for each projection year and taking into account anticipated improvement in recycling rates. The outlook for total world paper, paperboard and paper pulp demand is shown in Table II-44.

Regarding North America, Latin America and the EC, on the basis of analysis of the self-sufficiency ratios and production growth rates over the past ten years for paper and paperboard, the above-mentioned demand forecast quantities were multipled by the self-sufficiency rates to obtain production forecasts and forecasts of growth rates. From these production forecasts were made and regional production quantities of paper and paperboard were made. Projections of paper pulp demand were made by applying regional unit pulp consumption figures to paper and paperboard demand forecast quantities.

The projection of BKP demand was made as follows. On the basis of the growth rates over the past ten years for paper pulp demand in the entire world as well as the above-mentioned three regions, and comparative analysis of BKP demand growth rates, as well as demand, was projected from two approaches, namely growth rates and demand components. Total world BKP demand forecasts are shown in Table II-45, and those for North America, Latin America and the EC are shown in Table II-46. Total world demand for BKP from 1982 to 1990 is forecast to grow 2.3% a year, and to be 47.12 million tons in 1990, grow as 1.6% a year during the Nineties, and reach 55.31 million tons in 2000.

Regarding the outlook for BKP supply and demand, the scale of possible production capacity was obtained by multiplying projected 1988 production capacity by 0.9 and the projected demand quantity obtained as described above are used to make the outlook for world BKP demand and supply balance (Table II-47).

In the case that total world demand is less than the scale of possible production capacity, demand is taken as equalling production, and in the case that total world demand exceeded the scale of possible production capacity, the shortfall is to be divided by 0.9 to determine the additional capacity required, which must be constructed in the future.

The World's supply and demand outlook for BKP is shown in Table II-47, and the scale of additional BKP capacity required is 3.15 million tons in 1995 and 7.38 million tons in 2000.

3-3 BKP Trade

3-3-1 World Trade in BKP

World exports of BKP, as shown in Table II-48, after rising from 8.32 million tons in 1972 to a peak of 13.42 million tons in 1980, declined to 12.06 million tons in 1982. The average annual rate of growth of BKP exports during the past ten years, 3.8%, is approximately the same as the growth rate of production.

If we examine the growth of exports during the ten years from 1972 on, it is seen that North America's increase in exports, 20.5 million tons, accounts for 54.8% of the total, and is followed by Latin America's 960,000 tons (25.6%) and Scandinavia's 930,000 tons (24.8%). Thus, during this period North America increased its competitive strength in the export market. The increase in exports by Latin America, however, was formidable; exports were a mere 6,000 tons in 1972, but rose to 960,000 tons in 1982.

In terms of shares of export quantities, North America and Scandinavia combined had a share of 84.8% of the world total in 1972, and it declined 1.6 points to 83.2% in 1982, but continued to constitute a large majority. Meanwhile, Latin America emerged as the third most important exporter region and during the ten

year period its share rose 7.9 points, to 8.0% in 1982. Exports quantities and net export quantities of the world's top seven BKP exporters in 1982 are shown in Table II-49. In net terms, Canada is by far the largest exporter with 4.96 million tons, followed in order by Sweden with 1.58 million tons, Finland with 1.0 million tons, Brazil with 730,000 tons, Chile with 230,000 tons and Norway with 140,000 tons.

As is shown by the world import quantities of BKP, in Table II-48, after an increase from 8.11 million tons in 1972 to a peak of 13.42 million tons in 1980 there was a decline to 11.13 million tons in 1982.

Examining the increases in imports from 1972 onward, it is found that the regions which had the greatest increases were the EC and Asia. The increase in EC imports was 1.29 million tons, 42.9% of the world's increase in imports, while the increase for Asia, 900,000 tons, was equal to 30% of the total increase.

In terms of import quantities, each region's share in the world total in 1982 was: EC, 49.9%; North America, 23.9%; Asia 14.1%. The EC is the largest importer region.

Table II-50 provides import quantities and net import quantities for the top seven BKP importer countries in 1982. Five of those countries are in the EC. In terms of net imports, West Germany is first with 1.94 million tons, followed in order by France with 1.05 million tons, Japan with 1.04 million tons, Italy with 910,000 tons, England with 860,00 tons, and Holland with 410,000 tons. Thus, the majority of import demand is attributable to the EC countries, and the net imports of these five countries comes to 5.17 million tons.

3-3-2 Trends Among Major BKP Exporters

The past trend of export quantities and export ratios of major BKP exporter countries of the world is shown in Table II-51, from which it may be seen that there has been considerable fluctuation in their export shares.

The combined share of Canada and Sweden, which accounted for 64% of world BKP exports in 1972 (Canada, 49.8%, Sweden, 14.2%) declined by the substantial margin of 8.8 points to 55.2% in 1982 (Canada, 41.8%. Sweden, 13.4%). In contrast to this, the share of the United States increased 7.2 points from 11.0% in 1972 to 18.2% in 1982, as United States' competitiveness

improved. Brazil and Chile had a share of zero percent in 1972 but ten years later Brazil and Chile were exporting 6.1% and 1.9% of total world exports, respectively.

If the trend of major BKP exporters' export ratios is reviewed it is seen that Canada consistently has had a high ratio, it having been 75% in 1972 and 74% in 1982, but Sweden's export ratio has been declining since the peak of 76% in 1973, and in 1982 it was 55%. In the Latin America region Brazil and Chile have emerged as exporters. Brazil, from a 2% export ratio in 1972, experienced an increase to 46% in 1982. Chile had no exports in 1972 but in 1982 its export ratio was 69% after a period of extremely rapid growth of exports.

It is anticipated that countries which the present project would compete with are Canada, the United States and Brazil. Export destinations and export quantities of these three countries in 1983 are shown in Table II-52.

Regions to which a large share of United States exports are made are Western Europe, Asia, and Latin America, but Western Europe dominates, with a share of over 50% of United States exports. It is followed by Asia, 25.3%, and Latin America 9.2%. Of total Canadian exports, 49.3% are destined to the United States; Western Europe takes 25.2% and Asia takes 17.8%. Brazil export shares by destination are 46.5% to Western Europe, 24.5% to Asia, and 15.5% to the United States.

The trend of export quantities of the United States, Canada and Brazil, by destination, is shown in information included in Annex.

3-3-3 Trends Among Major BKP Importers

From examination of the trend of import quantities and import ratios of the major BKP importers, as shown in Table II-53, it is evident that the share has declined in the United States but has risen in West Germany, France, Italy and Japan.

The import share of the united States declined 4.8 points from 28.0% in 1972 to 23.2% in 1982. Share of for Western Europe, France, Italy and Japan in 1972 were 14.4%, 9.4%, 7.8% and 4.8%, but rose to 17.5%, 10.2%, 8.2% and 9.9% in 1982. As a result, the total ratio of these countries in all world imports rose 9.4 points from 36.4% in 1972 to 45.8% in 1982. In England the import share was 11.7% in 1972 and declined to 7.8% in 1982, but as explained in

Chapter 2, 2-3-1 this is seen as a result of a decline in papermaking capacity combined with an increase in imports of paper.

Regarding import share of major importers, the share are very high in West European countries. There has been a sharp increase in the ratios for South Africa and Japan. The ratio for the United States has been relatively steady at about 15%. Among of the West European countries, five countries have in port ratios of 100%: West Germany, Italy, Holland, England and Denmark. Austria's ratio is 97%, and that of France in 67%.

The trends of import quantities of LBKP for the EC nations, which are considered as the likely primary objective for exports from the present project, are shown in Table II-54, and those for NBKP are shown in Table II-55. The average annual growth rate of EC imports of LBPK has been 31.9%, which is higher than the rate for NBPK which has been 18.3%. As a result, the LBKP share in total BKP rose 22 points from 16.3% in 1972 to 39.2% in 1982, indicating that demand for LBKP in the EC countries has been increasing rapidly.

Table II-56 shows import quantities and sources for BKP imports by major importers in the EC, for 1983, and in all cases most imports are obtained from the United States, Canada, Sweden, Finland and Brazil.

Information on the trend of EC imports of LBKP and NBKP, classified by source, are provided as part of the Annex.

3-4 Analysis and Projection of the Price for BKP

3-4-1 Analysis of Market Pulp Price

(1) Trend of the BKP market pulp price

The fluctuation of pulp prices and its background have been analyzed in 2-1-4.

The trends of EC import prices for NBKP and LBKP from 1972 to 1983 are given by Table II-57, and the United States domestic price and Western Europe (northern part) C&F Rotterdam price, both for NBKP from the southern part of the United States, are given in Table II-58, these prices are graphically shown by Figures II-12 and II-13.

Considerable fluctuation in the prices of market pulp are evident from these tables and figures but the major reasons behind changes in price, as noted in 2-1-4, are false demand attributed to the first and second oil crises, and fluctuation in inventory levels due to unbalances in supply and demand during the periods of recovery subsequent to those crises.

At the same time, these tables show the following.

a) Up to about 1975 the LBKP price was about the same as the NBKP price, but LBKP became cheaper than NBKP thereafter. Then, when there was a phase of upward movement of prices, the gap between the two increased, and when prices moved downward the gap became narrower. Thus, it seems that when prices fall the NBKP price is pulled down by the LBKP price (Table II-57 and Figure II-12).

b) Whereas during 1980 and 1981 domestic-origin NBKP price in the Unitd States market was less expensive than NBKP price in the West European market, after 1982 it has been higher in price. This is ascribed, as mentioned in 2-4-4, by the extremely rising of the United States dollar against other currencies (Table II-58 and Figure II-13).

From a longer perspective, excluding the effects of inflation, the trend of the real price for market pulp has been as shown in Table II-14. This shows prices in terms of the 1972 prices taken as equal to 100.

As may be seen from this figure, fluctuation in the real price of market pulp is of considerable magnitude, and fluctuation has been particularly marked since 1973.

Nevertheless, the following characteristics may be discerned.

a) From the Fifties through the first half of the Sixties the price index was relatively stable slightly above the 115 level.

b) Since the start of the Sixties the level of the average index fell to below 105 and thereafter some fluctuation was seen, but mostly around that 105 level.

This indicates that the price of market pulp, in real terms, fluctuates around a certain level which becomes the base (this level for the most part being the sum of production cost and costs for transportation to market).

With the aforementioned price of the BKP market pulp group fundamentally based on production cost plus transportation cost, and with fluctuation of that price due to change in inventory level arising from imbalance in supply and demand, the following are taken to be the causes of this.

(2) Factors behind change in production cost

Table II-59 shows production cost for softwood pulp in the southern region of the United States in 1976 and 1982.

In 1976 a recovery phase subsequent to the first oil crisis began, and pulp makers maintained steady prices (while building up inventory), but in 1982 it proved difficult to escape from the recession which followed the second oil crisis, and the high level of inventory worked to depress prices, so although it is not possible to make a simple comparison of them, it is thought useful to undertake analysis from the viewpoint of production cost.

First of all, it may be seen that in comparison to increase in the consumer price index (9.2%), total cost increase of wood labor, chemicals and interest which comprises 84% of production cost rose at lower rates. It may be thought that this was due to the recession. On the other hand, the cost of energy rose by a wider margin than the consumer price index due to the immediate effects of the second oil crisis. Depreciation cost became very high but it is thought that base for depreciation must be different. Change in plant cost is discussed elsewhere, below. Assuming that in the future there is no third oil crisis, that there is no great change in pulp production technology, and that economic conditions remain stable, it is thought that the above components of production cost will rise at a rate close to that of consumer prices.

Next, regarding the composition of production cost, despite an increase in depreciation cost in 1982, the fixed cost remained below 30% and variable cost were in excess of 70%. In the variable cost component, the cost of wood accounts for 23-27% of total cost and thus is of obvious high importance. Efforts were made to reduce the effect of increase in the cost of energy, through energy conservation as well as use of substitute energy (wood and coal).

The factors effected on the production cost are explained below.

a) The influence of inflation

In Figure II-14, the trend of market pulp prices, in real price terms, is shown.

Real price and current prices are indicated in Figures II-15 and II-16. These are taken from the January 1980 issue of Pulp and Paper.

b) Pulp wood price and change in the structure of supply

Any consideration of wood for making pulp must deal with the question of regional differences and wood species. Between regions not only is there a difference in growth rates but in addition the cost of felling trees and transporting logs differs.

Figure II-17 shows the trend of prices for softwood for pulp during the Seventies. As this figure shows, the price rose in all countries following the first oil shock, but the increase was especially great in Sweden and Finland. Because of the decline in the value of the dollar by approximatery 10% after 1972, the advantageous situation of the United States and Brazil becomes evident. From 1980 the dollar appreciated against other currencies and by 1982 had risen 44%, meaning a decline in the competitiveness of American wood. (Although the price of wood remained lower than the price of wood in Scandinavia, it became difficult to recover the cost added by transportation.)

Table II-60 shows examples of costs for each year in the United States, Canada and Scandinavia; the advantageous position of the United States in 1981 was lost by 1984.

Figure II-18 gives the trend of softwood prices in Louisiana, the United States, and from it may be seen that in constant prices the price is almost perfectly steady. The price for a standing tree in Canada is much less than that in the United States but the cost of cutting and transporting it is higher so that it is estimated that the cost delivered to a mill is somewhat higher in Canada, but this too is influenced by exchange rates.

Regarding differences between species, hardwood is higher growth rate and is cheaper than softwood and also because it has a higher specific gravity, it provides greater production than softwood by identical facilities. Nevertheless, there is a limit to its usefulness for papermaking because the staple length is shorter and the vascular bundles present a problem.

Therefore, there has been an increase in the ratio of hardwood pulp because attention has been given to improving the technology for its use for papermaking.

A comparison of production cost in Canada, Sweden, the United States and Brazil in 1981 and 1982 is given in Table II-61.

In the case of the southern United States the fiber cost of soft pulp and hard pulp respectively is $116 and $101, meaning a per ton cost advantage of $15 in favor of LBK. If the fiber cost of LBK from the United Satates is compared to that for LBK from Brazil while that of the former is $101 a ton, in the case of the latter it is $60, and thus Brazil has a distinct cost advantage.

From the abovementioned regional change in the price for pulp wood and the outlook for future availability of pulp wood, it is expected that Sweden will increase her imports (see Chapter 2, 2-4). However, because the cost of transporting pulp wood is greater than the cost of transporting either pulp or paper, there have been changes in terms of

where pulp production centers are. That is, there has been a trend away from Scandinavia and towards the United States, Latin America and other regions. This is discussed in Part II, Chapter 2. The same process is evident within the United States.

Figure II-19 shows how consumption of pulp wood has increasingly become concentrated in the southern part of the United States.

c) The influence of advances in pulp production technology

As is shown by Figure II-14, the price index in the Sixties declined about 20% from the level of the Fifties.

The following may be cited as factors responsible for this decline in price. First, there was a rapid buildup of production capacity in the western seaboard and southern region in U.S.A. Second, production efficiency was improved by adoption of the Kamyr continuous digesting kiln and other labor-conserving technology. Third, by means of increases to 1,000 tons/day mill production capacity, increasing scale merit were achieved. That is, the main reason for the decline in the price of pulp during the Sixties was the improvement in productivity made possible by larger production scale and use of improved processes in new mills. Increase in the scales of production in United States mills has been as shown in Table II-62.

The scale merits of the larger mill capacities, in terms of the price of a digesting kiln are estimated as follows, using the cost at 1,000 T/D as equal to 100; as 200 T/D it is 200 or more; as 400 T/D it is 150, as 700 T/D it is 120 or less; and as 1,000 T/D, as noted, it is 100. The same situation is true with regard to other equipment for pulp production than the digesting kiln. Thus, mills for market pulp, which are being built with the objective of supplying export markets, are all of 800-1,000 T/D capacity.

It is reported that unless there is further development of the technology needed, it will not be possible to attain lower construction costs by putting up a mill with more than 1,000 T/D capacity (PPI, Sept. 1981).

Although it is apparent that there will be further improvement in the future in pulp production technology, it is thought that there will be no fundamental change in that technology.

d) Change in mill construction cost

The cost of constructing a pulp mill will vary according to the year it is built and the duration of the construction period (mostly due to the effects of cost increases and largely influenced by the demand and supply conditions of plant also). Further, the cost will also be influenced by the construction site (its features), the scope of the project, as well as the type and scale of the process.

Estimates of the cost of pulp in major countries are shown in Figure II-20; in the case of Brazil it should be noted that the cost of the mill is higher than it is in the other countries, and the investment in required infrastructure is great.

In order to consider the cost of a mill, taking into account the process plant only in the same country, the pulp cost index of the Jaakko Poyry company may be used.

This cost index includes will cost of civil works, carbon steel and stainless steel, electrical equipment and labor costs and the weight factor for each item is based on the average cost composition in the investment for construction of a pulp mill and paper mill. Figure II-21 shows the trend of construction cost of NBKP mills in Sweden, expressed in terms of this index.

As can be seen from Figure II-21 the difference between the plant cost index and construction investments for a new mill widens according to time. This is largely a reflection of increases in the complexity of pulp mills, making them more expensive; more demanding requirements for processing of waste; improvement of the energy balance; and need for improvement of process control.

The plant cost index in 1980 is 50 points above the consumer price index, at about 370.

It is vital to either reduce the cost of the mill, and lower fixed cost components through attaining a higher operation ratio of the mill to obtain the competitiveness of a pulp mill in a developing country.

e) Influence of fluctuation in exchange rates against the US dollar

A discussion of the influence of fluctuation in the rate of exchange for currencies against the US dollar is given in 2-1-4, and that influence is graphically shown in Figure II-22.

From 1960 to 1972 each country's pulp price follows the same trend, the prices were not much different from country to country, and the relationships between countries were stable.

In August 1971, at the same time that President Nixon imposed a 10% surcharge on imports, the dollar's convertability into gold was brought to an end as a new economic policy, and the effects of this "Nixon shock" were widely felt throughout the world. Subsequently, there was a multilateral revision of the relationship between the dollar and other currencies, according to the Smithsonian Agreement, and fixed exchange rates were adopted.

The Smithsonian Agreement lost its power when the dollar was again devalued in February 1973, and other currencies were permitted to float against the dollar. The gold standard was abandoned, as the dollar continued to be unconvertible into gold. In consequence the U.S. dollar itself took the position of the standard of currency instead of gold.

These fluctuation in exchange rates were among the factors which have caused substantial change in the relationship of pulp prices in North America and North European countries since 1972, such change being much more advantageous to North America (Figure II-23).

Thereafter, however, the appreciation of the US dollar which began in 1980 has had the opposite effect (Figure II-24). Take the case of Sweden, the sales price of Swedish pulp had risen 30% in krona terms as of the end of 1981, due to the higher value of the dollar. That the dollar continued to appreciate after that time is mentioned in 2-1-4. The result, namely that the price of United States pulp became higher than that of North European pulp, as shown in Figure II-13.

f) Relation between sales cost and sales price

The United States, as the same time that it is a large-scale exporter of BKP, also is a large-scale importer of BKP and because of the scale of paper consumption in that country it is the world's largest consumer of BKP, and BKP price leader in the world market.

The position of the United States as price leader, at the same time that it enabled the United States to have hegemony in international markets as a major producer, consumer, exporter and importer, enabled it to maintain a dominant position in the international markets through the Sixties and Seventies, because of its advantage in terms of production cost made possible by having inexpensive wood for pulp.

Figure II-23 shows, by means of the difference between sales price in Rotterdam and the production cost, how United States BKP consistently maintained an advantage over Scandinavian BKP from 1965 to 1980.

Whereas in 1975 and 1980 sales were being made in Scandinavia with less than 20% ROI (return on investment), the United States was able to obtain profits even after a 20% ROI was added on.

(3) Change in freight cost

Ocean freight is an influence on the price competitiveness of market pulp from major producer countries in the international pulp market.

A comparison of list prices for market pulp from the United States, Canada, Sweden and Brazil in the northern part of the West European market, with ocean freight, is shown in Table II-63. The contribution of ocean freight to the pulp price is 12.3% for the United States, 11.0% for Canada, 8.3% for Sweden and 13.7% for Brazil. Because of Sweden's geographic advantage the freight cost per ton for that country is $15-20 cheaper than in the case of United States pulp, giving that country a strong advantage. The recent decline in oil prices has not had a major effect on freight rates, so Scandinavia continues to possess an advantage in this regard.

The trend for BKP ocean freight, as shown by Figure II-25, fundamentally has risen in tandem with the rate of inflation of the US dollar.

(4) Change in the balance of supply and demand

a) Change in the world economy and influence on pulp demand and inventory

The influence of the first and second oil crisis was to elicit false demand but at the same time led to a serious world recession. The subsequent combination of false demand and recession was expressed in the form of a buildup of inventory, and the pressure it created caused a drop in pulp prices.

Reduced production by pulp makers, and recovery of the economy, led to reduction of inventory and a recovery of pulp prices.

Figure II-26 and Figure II-27 show the trends of inventory and pulp prices.

The fact that inventory was particularly high in Scandinavia following the first oil shock led the governments there to provide financial support in order to prevent a collapse of pulp prices.

b) Increase in pulp production capacity and influence on the supply-and-demand balance

World production capacity of wood pulp has increased during the past ten years at a rate greater than the growth of demand and with the exception of 1980 it was possible to satisfy demand every year. On the other hand, the surplus supply resulting from the buildup of production capacity led each maker to increase production whenever prices rose in the pulp market, and the over production which resulted caused the supply and demand balance to become unbalanced. This process was repeated several times. For the most part, the increase in the world's pulp production capacity was due to increases in capacity attained by construction of new facilities in regions where competitiveness was based on inexpensive wood for pulp.

During the Sixties and Seventies, in the United States and Canada, production capacity was increased through construction of new mills, and thereafter from about the middle of the Seventies there was a rapid buildup of capacity in Latin America (especially in Brazil) where hardwood resources were abundant, and in Africa.

However, after world production capacity reached its peak in 1981, from 1982 as shown in Table II-64, there was a decline as old plants were shut down in response to deterioration of market conditions. On a regional basis, it was only Latin America and Oceania that continued to have increases in capacity after 1981.

The point which must be noted is the nature of the trend in major producer regions. Whereas capacity in North America declined from 1981 onward, in Scandinavia there was an increase, although it was slight.

c) The influence of qualitative change in paper demand and technological advances in pulpmaking processer.

Change has taken place in the composition of pulp demand as a result of qualitative change in paper demand (for example, there have been rapid increases in demand for paper for copying machines, paper for computer printouts, and paper for offset printing) as well as improvement in hardwood pulp utilization technology following improvement in pulpmaking technology.

Demand for wood pulp increased at the average annual rate of about 1.5% during the Seventies but within the growth of demand for paper pulp, it was the increase in demand for BKP which was foremost; it grew 3.6% a year.

Further, formidable change took place in the demand for different varieties of BKP. Demand for LBKP grew at a higher rate than that of BKP as a whole, because of quality improvement due to advances in production technology and a price lower than that of NBKP. Table II-65 indicates the trend of LBKP and NBKP imports by the EC. Imports of LBKP grew at the average rate of 31.9% while imports of NBKP grew as the much lower rate of 18.3%.

3-4-2 Projection of the Price of Market BKP Pulp

(1) Assumptions for making projections

On the basis of the above analysis of the past trends of pulp prices, projections of the price of market BKP pulp to be exported from Uruguay have been projected.

The following assumptions were made in order to obtain the projections.

a) While the United States is an importer, and acquires large quantities of pulp from Brazil, it is also an exporter, and totally it is net export country. Therefore Western Europe is assumed as the Market.

b) Therefore, the FOB Price in Uruguay is calculated by forecasting the import (C&F) price of BKP (both NBKP and LBKP) in Western Europe, and deducting the cost of ocean freight.

c) In consideration of the duration of time required from afforestation to felling of trees (hardwood, 7.2 years) the time for price projections was set for after 1990.

d) In performing the projection work it is to be assumed that there will be no runaway escalation of the oil price nor major disturbance in the world economy, and that there will be steady progress in economic development and inflation of about 5%.

e) As has already been determined through analysis, technological developments have resulted in a decline in the price of BKP (real terms) from the Fifties into the Sixties after which even though there was some volatility the real price fluctuated around a certain level. Therefore the appropriate real price level for the Sixties onward was determined, the 1984 price was determined on that basis, and the anticipated inflation rate was applied to obtain the future BKP price in Western Europe.

f) Ocean freight had also risen at the same tendency with the inflation, it is also assumped to escalate at the same rate of assumpted inflation after 1984.

(2) Determination of the level of BKP real price

As shown in Figure II-14, the real price of pulp from 1972 to 1984 went through rising phases in 1974/75, 1980 and 1984, and decreasing phases in 1977/78, 1982/83 and early in 1985, but the movement of prices tended to be above and below the level of 104 in terms of the index as shown in Figure II-14. Therefore, 104 was selected as being the central level for prices. Because the second quarter of 1982 was the time when prices were closest to 104, this was selected as the starting point for price projection.

The price for NBKP market pulp during the second quarter of 1982 for product form the southern part of the United States, as shown by Figure II-13, was the same price in the domestic United States market as in the Scandinavian market.

Because of the relationship between LBKP price and NBKP price is as shown in Table II-66, the LBKP price in the second quarter of 1982 is taken to be 93.7% of the NBKP price at the same time. As the result, the NBKP price in that quarter was US$475 a ton, and that of LBKP was $445 a ton.

By multiplying the 1982 second quarter prices by the inflation coefficient of 1.0328 the prices for 1984, the base year, were obtained: US$490 a ton for NBKP and $460 a ton for LBKP.

(3) Ocean freight from Uruguay to the northern part of Western Europe in the base year (1984)

The ocean freight charge for pulp (New Orleans to Rotterdam) changes by about the same amounts as does the inflation rate, as shown in Figure II-25, and in 1983/84 declined.

For this reason the ocean freight charge between the United States or Brazil and Rotterdam was sought by use of the 1982 second quarter price, with adjustment made for the decline in 1983/84.

Actual freight charges for BKP during the second quarter of 1982 were as shown in Table II-63.

From this table it can be understood that the per mile charge was US$0.0155 and because of the 85.9% decline in the second quarter of 1982, the charge in 1984 was taken to be US$0.01332/mile-ton.

This latter figure then can be multiplied by 5,410 miles, the distance between Montevideo and Rotterdam, and US$72 a ton was obtained as the ocean freight charge for the second quarter of 1984.

(4) Projection of the NBKP market pulp FOB price in Uruguay

The NBKP and LBKP market pulp shipment prices in Uruguay were determined by use of the following equations.

NBKP Market pulp

With the NBKP market pulp shipment price (FOB) as YNt years after 1984,

$$YNt = (490 - 72) \times 1.05^{t} \text{ US\$/ton}$$

Where 490 : Import price of NBKP market pulp in the northern part of Western Europe in 1984 (US$/ton),

72 : Ocean freight between Uruguay and the northern part of Western Europe in 1984 (US$/ton), and

1.05 : Average increase in price with the rate of inflation of the US dollar as 5% per annum.

LBKP Market pulp

With the LBKP market pulp shipment price (FOB) as YLt t years after 1984,

$$YLt = (460 - 72) \times 1.05^{t} \text{ US/ton}$$

Where 460 : Import price of LBKP market pulp in the northern part of Western Europe in 1984 (US$/ton),

72 : Ocean freight between Uruguay and the northern part of Western Europe in 1984 (US$/ton), and

1.05 : Average increased in price with the rate of inflation of the US dollar as 5% per annum.

The FOB prices for NBKP market pulp, and LBKP market pulp, derived as shown above, are shown in Table II-67.

Chapter 4 Uruguay's Politics and Economics

4-1 Uruguay's Politics

Uruguay, having gained its independence in 1825, had promoted the welfare for its people as its political policy. After independence, the presidential and parliamentary systems were overturned, but since 1970 the power of the military was increasingly becoming strong and in 1973 the parliament was dismissed and a new National Assembly waf founded. Elections were then held and General ALVAREZ was appointed as president by the National High Assembly which was composed of the General and the National Assembly. But, due to the results of the elections held in November, 1984, the Colorado party was elected into power and from March, 1985 civilian rule again came to Uruguay. Under the new civilian administration the kind of new political structure as well as economic policy is gradually being revealed.

Uruguay's industrial policy is expected to be different from the policy which was adopted up till now. However, due to Uruguay's economic circumstances no change is expected regarding promotion of export industries, attraction of foreign investment, liberalization of currency exchanges as well as the subsidies for afforestation all of them have the relation with the export paper pulp mill project which are under study and futher activation can be expected.

4-2 Uruguay's Economics

Uruguay is composed of 176,000 km^2 of flat land with less ups and downs, so that land area which can be used effectively is very great. It is blessed with a climate suitable for the development of agriculture and stock rising have been developed. It is also blessed with a highly educated people thanks to a good education system. The population in 1984 was estimated at roughly 2,990,000 people therefore land per head is very wide nation. Table II-68 shows income according to industrial sector in 1981, '82, '83, at 1978 New Pesos price. The most important industries are agriculture and stock rising, which contributes about 12% of the GDP (in 1983), manufacturing, with a 20% share, with wool, hide and leather products being the most important products of this sector.

Most important products in the agriculture and stock rising industry are cattle (beef), wool, wheat, rice, linseed, sunflower seed and sugar. As shown in Table II-69, the proportion of agricultural and livestock products and related industrial products is approximatery 88% of total exports (1983). Marine resources are also abundant and the government plans to increase their development.

As for industry, development of foodstuffs, beverages, chemicals, and machinery industries is progressing. Important export industries are wool products, cement, tires, and shoes. But export of paper and pulp are negligible. As for imports, Table II-70 shows us that petroleum is the most major item followed by chemicals and machinery as main items.

Uruguay's economy began stagnating from the middle of the 1950's. Especially since 1973, the oil crisis and the EC nation regulations on food imports dealt a serious blow to Uruguay's economy. Illustration of the GDP from 1973 to 1983 can be seen in Table II-71. Immediately after 1974 thanks to the government's policy to increase exports the economic situation improved. The growth rate for GDP from 1978 to 1980 rose favorably but, from 1981, the worldwide recession and the state of economic affairs (debt crisis) of neighboring Brazil and Argentina had an unfavorable influence and in Uruguay the economic conditions deteriorated.

With regard to 1982, the worldwide recession deepened and the Peso became overvalued causing exports to plummet. Domestic interest rates jumped and industrial output fell. The growth rate for the same year decreased 10%.

The government wanted to stimulate domestic economic activity and so the announced exchange system which had been adopted in 1978 was stopped, and the Peso was permitted to float. The recession which had infiltrated the economy from 1981 hit bottom from the middle of 1983 but then gradually showed signs of recovery.

According to the Central Bank, in 1983 the GDP contracted 4.7%, but compared to the previous year's contraction of 10%, this was considered good. Compared to the 4th Qtr. of 1983, the 1st Qtr. of 1984 showed growth of +0.7% (Table II-72).

Since 1979 inflation has steadily lessened (1979: 83.14%, 1980: 40.82%, 1981: 29.36%, 1982: 20.53%). But, after changing over to the floating rate system the Peso fell and inflation grew 51.53% in 1983, and 32.6% in the 1st, Qtr. of 1984 (Table II-73).

Through the announced exchange system and floating system, the exchange market rate was changed widely. One U.S.$ being worth 2.26 Pesos in 1975 is changed to 6.06 Pesos in 1978. Because the announced exchange rate system was introduced in the same year, the rate of increase of currency exchange showed down even the inflation rate rose and one U.S.$ was 13.12 Peso in Sep. 1982. But in November 1982 the announced system was stopped and the floating rate system was adapted. In December of the same year the Peso sank to 28.51. Soon after, due to the effect of the nation's inflation and the high U.S.$ the Peso climbed to 58 per $1.00, in September of 1984.

With the GDP's decline, as shown in Table II-75, real wages in 1983 were only 53% of that in 1968. Here, GDP and real wages are on a Peso Base. In U.S. Dollar, it is a greater decline (Table II-76).

From the viewpoint of foreign trade, as seen in Table II-77, in 1973 there was a balance but, at the end of 1973 due to crude oil price rise trade turned to a deficit and, due to the 2nd oil shock in 1979/80, trade balance changed to an excess of imports. The total amount of imports of combustibles and lubricants in 1973 was 19.2% of total import, but rose to 33% in 1974. And, after that the import share level remained the same. Because in 1982/83 total amount imported decreased a little, imports of "Products Minerals" exceeded 40%. Because in 1982 and 1983 due to the economic stagnation imports increased a little, in 1982 the total balance was balanced and in 1983 aprox. $300 million in excess of export was recorded.

Uruguay's foreign debt as shown in Table II-78 March 1984, currently is approx. $4.7 bil. and of that number public debt was approx. $3.2 bil. Figure II-30 shows the above changes of economy. Figure II-31 shows the ratio between inflation rate and exchange rate. From 1978 change of inflation and change in exchange rates become separate as the announced exchange system was introduced. But as this system was stopped in 1982 after which it returned to the 1978 base a parallel situation was containing.

4-3 Uruguay's Industrial Policy

For the XXV Annual Meeting of the Governors of the Interamerican Development Bank, in March, 1984, Secretation de Planeamient, Coordnacion y Difusion and Ministry of Industry and Energy have prepared the following on 'Investing in Uruguay'.

Uruguay's development strategy is gradually opened up. Moreover, while there is a shift taking place to a competitive market economy, private firms are optimistically participating. This policy, was introduced from 1973 to 1977 in the National Development Plan. Even after 1977 this policy has been retained. In order to overcome the industrial stagnation emphasis was placed on export industries. At the same time as part of industrial policy the initiative of all leaders of private industry was sought, with the requirement that there must be international competitive pricing of their products, and guarantees of quality. Also foreign investment was allowed in practically all industrial sectors. For the purpose of making trading, interest, EPS, royalties, etc. more convenient, rules concerning the foreign exchange market were relaxed. At the sometime import duty rate was going reduced for reduction protection trade. Also, foreign capital is to be treated as the same way as domestic capital and the need for special licenses for export, import and credit receipts have been eliminated. If desired, application for protection under the foreign investment law is possible. Under this act which was established in March, 1974, interest event from capital and remittance are guaranteed.

The purpose of establishment and development of industry the Industrial Promotion law was enacted in March, 1974.

According to this law it was decided that in order to advance the national interest tax-exempt financing would be made available. The following was decided as relief measures according to the Decree of National Interest of September, 1977.

a) Surcharges, import tax, consular fees, port rates, custom duties on imports and other taxes on imports of equipment for the projects, which do not compete with the national industry;

b) Surcharges, import tax, consular fees, custom duties on imports, and other taxes on imports of equipment declared competitive for the national industry.

c) Benefit of savings channelling that consists in the exoneration of taxes on income of industry and commerce, up to an amount equivalent to the contribution deemed necessary to finance the approved projects.

Currently IL&T (Investing Licensing and Trading Conditions Abroad) of November 1983, states the role of government but, in order to increase the productivity of government-owned enterprises, need for a change to private management is expressed. Govt. investment is basically limited to services, utilities, banks and others which can compete with private enterprise to help raise the quality of the products of the manufacturing sector and make them more competitive. At present the following state-owned corporations exist.

Administracion Nacional de Puertos (ANP)
Administracion de Ferrscarriles del Estado (AFE)
Primeras Lineas Uruguayas de Navegacion Aerea (PLUNA)
Usinas y Transmissiones Electricas (UTE)
Administracion Nacional de Telecomunicaciones (ANTEL)
Administracion Nacional de Combustibles, Alcohol y Portland (ANCAP)
Industria Lobera y Pequera del Estado (ILPE)
Banco de Seguros del Estado

ANCAP is by far the most important of the govt. related industrial firm, refinery itself is monopolized by them. Sales of its petroleum products are handled by Shell, Exxon and Texaco.

4-4 Uruguay's Paper and Pulp Industrial Policy

In Uruguay, no basic investment policy for any specific industrial exists. Therefore, comment on JICA's 'Master Plan' in 1980 by the committes of the paper and pulp industry is referred. The committee are composed of the following members.

LATU	:	Dr. Alfrede Dovat Ing. Fernando Stotz
MAP (Ministry of Agriculture Foresty and Fishry)	:	Ing. Atilio Lygrone Ing. Tabare Larre Borges

CNTP (Productivity Research Center)	:	Ing. Mario Armando Ugon
Agricultural Division	:	Ing. Pedro Senyszyn
MIE (Ministry of Industry and Energy)	:	Ing. Rosario Pou Dr. Albaro Barreta EC. Ernesto Medina
UTU (Technical College)	:	Ing. Gilberto Sierra Medina
SEPLACODI (Planning Information Coordination Agency)	:	Ing. Ana Cazzadori Ctder. Juan Pirotto

From paper manufacturing Ind. co-operative, representatives of FNP, PAMER, IPUSA, CICSSA, Papelera y Cartonera PANDO were attended to the meeting.

The Master Plan calls for (1) the expansion and modernization of existing mills (2) Medium term plan for newsprint (3) Long-term plan for construction of a mill for pulp for exports.

Concerning (1), the modernization of existing plants, the Master Plan was supported and these plants are under expansion and modernization paper makers' capacity is being expanded with LATU's technological cooperation.

Concerning (2), the newspaper print plant is judged as difficult as not only are imports of newsprint tax exempt, recently good quality co-operations from newspaper companies who are now using good quality paper is not obtainable. As recycled paper is used as material for producing newsprint, there is no connection with the nation's natural resources (i.e., forests are not utilized). Also, entering the market for newsprint is difficult as competition is severe and large firms already hold most of the market (if not all).

Concerning (3), the plan for pulp export, since the afforestation is under promotion on the Governmental level, this pulp plant for export purpose is judged as a project worthy of study, because it is good enough for effective utilization of the afforestation and it was decided to ask for execution of a feasibility study to JICA and at the same time to ask to pay their attention to the following matters.

(1) It is necessary to perform detailed analysis of long term potential purchasing power taking consideration of utilization of mechanical pulp as well as waste pulp. And, as the opinion of FAO, if the project plant is added to existing plant capacity there is good possibility of satisfying all of the nation's demand for a considerable period (The above opinion was written as reference).

(2) Concerning reforestation, productivity of the woodland in the Master Plan, is estimated as low. Moreover, 150 km as distance from the woodland area to the plant site must be within 150 km seems too near. It is also desirable, due to the variety of trees existing, to start a viable lumber activities in a short period of time. It is hoped that these are no dangerous types of trees.

(3) Regarding the site of the plant, there must be a deep port (important for consideration of a plant site).

(4) The FAO has noted that, when establishing a plant in a developing country it is necessary to get the co-operator and also factory-related industries and pollution must be considered.

4-5 Uruguay's Economic and Policy and its Relationship to this Project

Method points for the performance of the feabilitiey study for the export-oriented pulp mill are as follows. These points were discussed with Uruguayan counterparts at the time of the field survey and recorded in the Interim report.

(1) The objective of this project is on of project in the industrialization policy, for development of export-oriented industry, and also is included in the items of utilization of afforestation promoted by the Government of Uruguay. Therefore it shall be considered as a national interest project, accordingly, various considerations such as provision of tax incentives should be made.

(2) In order to assure efficient operation of the mill, the core investor should be a private corporation, even if, investment from the country is seeked such investment shall be minimized. Provided, participation of existing paper and pulp enterprise is desirable but there is limitation considering from their financial ability. There is necessity to study domestic sources of investment such as ANCAP. There also is necessity to consider investment by such partners who would be large-scale stable purchasers of pulp, or who possess pulp making technology, or by international institutions.

(3) The management of the exchange rate will have great influence on the project's ability to compete in world export markets. Uruguay must make sure that, in order to promote exports, the Peso rate should not be higher than it is now (at the time of meeting in Nov. 1984). (It shouldn't go the way of the announced exchange rate).

(4) Since the Master Plan was prepared, Uruguay's economic environment has been changing: (1) as the exchange rate decreases, land and labor costs expressed in U.S. dollars will decrease greatly; (2) after the Master Plan, there was stagnation in the economy and in consequence the paper/pulp industries also suffured.

Chapter 5 Uruguayan Market for Paper and Pulp

Demand for paper in Uruguay was 58,420 T/Y in 1974, however, it fell to 44,500 T/Y in 1975 due to the first oil shock (Table II-80). After that the demand steadily increased, to 48,200 T/Y in 1976, 51,600 T/Y in 1977 and 63,300 T/Y in 1979 which is the third highest level during the seventies. The rate of growth of demand was at the high level of 6-16% per year, as analysed in the Master Plan.

But on account of the worldwide recession followed the second oil shock, the Uruguayan economy stagnated and in addition to severe inflation, real national income has sistently shown defrats, thus the Uruguayan economy is still remain at unfavorable situation. Because of this reason, the demand for paper and cardboard in Uruguay was reduced from 73,900 T/Y in 1979 to 58,700 t/Y in 1980; such tendency continued in 1981, 1982 and in 1983 when demand was 46,900 T/Y which is lower even than that of 1975. If compared with the figure for 1979, before the second oil shock, the rate of contraction is 27%. (Table II-79, using PPI statistics. The figure for 1983 is better than that of 1982 for 4.5%). The statistics for the paper and pulp industry in 1984 are not available yet; therefore the most recent trend can not be known but it is expected that the demand of paper and pulp has improved to some extent, becuase the general economic situation has improved.

Paper consumption per capita decreased from 26 kg in 1981 to 17 kg in 1982, a decline of about 40%, and still was 17 kg in 1983 (Table II-80).

The population of Uruguay in 1974 was 2.84 million. It slightly increased to 2.97 million in 1983. National income per capita, in U.S. dollars, reached its peak in 1981 then fell in 1982 and 1983 (Table II-80).

The effect of economic policy of the new civilian government which took office in March 1985 and receiving economical support for this new civil Government from abroad, etc. There are expectations that vitality will return to economic activities in Uruguay.

To forecast demand, it is common practice to utilize the coefficient of elasticity against GDP. But in case both actual GDP and demand for paper are gradually decreasing (since 1980), as in case of Uruguay, there is difficulty in using this method and there is almost no effect of domestic demand for the products of this

project in the domestic market of Uruguay. It therefore was decided to not utilize such a procedure for demand forecasting.

5-1 Present Production and Demand Forecast of Paper, Cardboard and Pulp

5-1-1 Production Situations and Forecast of Paper and Cardboard

The production capacity of four major paper mills (FNP, PAMER, IPSA and CICSSA) in Uruguay was expanded at two mills (FNP and PAMER) subsequent to the site investigation in 1979 for preparation of the Master Plan (Table II-81).

In 1979, total production capacity of the four major paper mills (FNP, PAMER, IPSA and CICSSA) was 273 - 303 T/D but in 1984 it was increased to 303 - 333 T/D (including facilities then being installated). However during such period demand was depressed and the utilization of capacity of all four mills was less than 50% in both 1982 and 1983 (Table II-82).

However, study of the production trend of newsprint and paperboard indicates that they are going to recover. The reason of increasing the production of newsprint might be cuased by the influence of the election in 1984. In the field of the packaging cardboard, production of carton boxes and corrugated paper board boxes are increasing rapidly (Table II-83 & 84).

Production records per item of 5 major paper mills in 1982 and 1983 are shown in Table II-85.

The carton boxes were produced 4,156 T/Y in 1982 and 7,055 T/Y in 1983, and the rate increased shows approximately 70%. The reason of such rapid increase was based on export of foodstuffs (such as meat and fruits, etc.). Increased and consequently demand for packaging materials was also increased, in addition, imported items were replaced with domestic products and packaging materials for inland transportation of light weight items were converted from wood to paper. Accordingly if economic movement was recovered and export is also increased, the demand for packaging paper cardboard would be increased. The export quantity of citrus fruit is expected to increase as shown in Table II-84.

5-1-2 Production Situation and Demand Forecast of Pulp

Uruguay is now importing pulp. The imported quantity of each year of the last decade were minimum 4,500 T/Y in 1975, just after the 1st oil shock and 11,000 T/Y each in 1977-1979. But after the 2nd oil shock imported quantity were again reduced to 5,200 T/Y in 1982, it was just 47.3% of that in 1979 but in 1983 increased to 6,700 T/Y i.e. plus 28.8% in comparison with the quantity in the last year.

On the other hand, export of pulp was 1,600 T/Y in 1975, 600 T/Y in 1976, 200 T/Y in 1977 and no export record was available for 5 years upto 1983. (Table II-87)

The main pulp exporting countries to Uruguay are Brazil, Chile and Canada (Table II-86). The biggest quantity of pulp imported was BKP. Uruguay purchased it at the peak of 7,500 T/Y in 1979 during period of 1975-1983 (Table II-87). If the demand of BKP is recovered 18,260 T/Y in 1984 and increased at the rate of 2% per annum, then demand of BKP in Uruguay after 10 years would be 18,260 T/Y x 1.22 = 22,280 T/Y, even so, if their present production capacity (75 T/D x 340 days = 25,500 T/Y) works at the rate of 100%, it may cover whole domestic demand of Uruguay. Accordingly we understood that the domestic market of Uruguay itself will not effect to the result of this project.

Chapter 6 Present Situation of Pulp Makers in Brazil

Through the field survey during Nov. to Dec. of 1984, as we have received request from the Government of Uruguay to study the present situation in Brazil for a typical case of marketing study, we wish to explain herewith the situation of Pulp Makers in Brazil, including their production facility.

The production capacity of big 4 enterprises in Brazil are as follows:

Name	Production Capacity at Operation	Output in 1984	Technical Partner
ARCRUZ	400,000 t/y	450,000 t/y	Sweden, Finland
CENIBRA	255,000 t/y	270,000 t/y	Japan
JARI	255,000 t/y	255,000 t/y	Finland
RIOCELL	200,000 t/y	220,000 t/y	Norway
Total	1,110,000 t/y	1,195,000 t/y	

All Brazilian pulp makers are technically supported by Northern Europe countries and Japan.

As you may find in Table II-88, the destinations of pulp exported from Brazil was changed due to the international relations with Brazil. But so far as Japan is concerned, they have constantly imported from CENIBRA.

Norway imported 100% of UKP Product of RIOCEL (Original name at the establishment in 1972 was Industria de Celulose Borregaard) and manufactured BKP by themselves, which is sold to whole Europe. Brazil would like to sell their products at higher value added in order to get more money but it was not accepted by Norway. As the result their export to Norway became zero in 1983. Now instead of export to Norway, their export to USA is increasing its quantity.

6-1 CENIBRA (Celulose Nipo - Brazilian S.A.)

6-1-1 Background of Establishment and Their History

1966 - 69: A special act of taxation for forestation project was enacted in Brazil and an interest to invest for forestation was accelerated.

1970 : The feasibility study on the export of forestation products and woodchips to Japan was carried out.

1970 : Japanese paper and pulp makers have established as Japan-Brazil Pulp Resources Investigation Corp.

1973 : The above Japan-Brazil Pulp Resources Investigation Corp. was re-organized as Japan Brazil Paper Pulp Resources Development Co., Ltd. (JBP) and established joint venture company between Brazil CVRD, of CENIBRA and agreed to set up enterprise of pulp project at Minas Gerais Brazil.

1974 : Started the construction of CENIBRA factory

1977 : CENIBRA factory has started its production. (It took 36 months after the start of the construction.)

6-1-2 CENIBRA S.A. and Location of Factory

(1) Head office : Belo Horizonte City Minas Gerais State

(2) Factory : Belo Horizonte City Minas Gerais State
(Approx. 250 km southwest direction from Head Office)
(ref. Figure II-32)