

1953

A study of world production and  
international trade in paper with  
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Canadian newsprint industry

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BOSTON UNIVERSITY

College of Business Administration

THESIS

A Study of World Production and International  
Trade in Paper with Emphasis on the Problems  
of the Canadian Newsprint Industry

by

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(B.Sc.Com. Sir George Williams College, 1948)

Submitted in partial fulfillment of  
the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

1953

5/28/53  
44761

TABLE OF CONTENTS

	Page
I INTRODUCTION . . . . .	5
Three Steps in Civilization . . . . .	5
From Stones to Silk . . . . .	6
A Scarcity Arises and Ts'ia Lun Invents Paper	7
Two Methods of Printing . . . . .	8
Social Consequences of Invention of Printing	9
Wood a Plentiful and Cheap Raw Material for	
Paper	10
The Taiga and Human Welfare . . . . .	12
Cultural Significance of Cheap Paper . . . . .	13
II EARLY HISTORY OF THE PAPER TRADE . . . . .	15
Paper at First Rare and Expensive . . . . .	15
Papermaking Comes to Europe . . . . .	16
Hand Methods of Papermaking . . . . .	19
Paper and the Industrial Revolution . . . . .	21
The Search for a Cheap and Plentiful Raw	22
Material	
Effects of the Use of Woodpulp on the	
Paper Industry . . . . .	26
III WORLD PRODUCTION OF PULP AND PAPER:	
THE PLACE OF NEWSPRINT IN THE INDUSTRY . . . . .	31
Introduction . . . . .	31
Primary Industries . . . . .	34
The United States of America . . . . .	34
Importance of the Industry in the U.S.	
and World Economy . . . . .	34
History . . . . .	35
Newsprint . . . . .	38
Canada . . . . .	42
Place of the Industry in the Canadian	
and World Economy . . . . .	42
History . . . . .	44
Newsprint . . . . .	47
The Scandanavian Countries . . . . .	50
General Conditions . . . . .	50
History . . . . .	51
Newsprint . . . . .	52
Sweden . . . . .	53
Finland . . . . .	55
Norway . . . . .	56

	Page	
III	WORLD PRODUCTION OF PULP AND PAPER: THE PLACE OF NEWSPRINT IN THE INDUSTRY (Cont.)	
	Russia . . . . .	57
	Importance in the Russian and World Economy . . . . .	57
	History . . . . .	58
	Possible Present Conditions . . . . .	61
	Japan . . . . .	63
	Importance in the Japanese and World Economy . . . . .	63
	Secondary Industries . . . . .	65
	Papermaking Widely Dispersed . . . . .	65
	The United Kingdom . . . . .	66
	Germany . . . . .	68
	Other Producing Areas . . . . .	69
IV	INTERNATIONAL TRADE IN PAPER . . . . .	74
	Papermaking a Large and Growing Industry . . . . .	74
	Inequalities in Consumption . . . . .	75
	Production of Other Papers Widely Dispersed but Newsprint Concentrated in a Few Countries . . . . .	75
	"Newsprint" Defined . . . . .	77
	Newsprint Must be Produced in the Regions of Lowest Cost . . . . .	79
	Results of the War . . . . .	80
V	POSTWAR PROBLEMS IN THE CANADIAN NEWSPRINT INDUSTRY . . . . .	84
	Measures Taken to Correct World Newsprint Shortage . . . . .	84
	International Competition . . . . .	85
	Canada's Relations with the United States as Chief Consumer . . . . .	86
	Supply of Factors of Production . . . . .	88
	Currency Difficulties . . . . .	89
	International Materials Conference . . . . .	92
	Government Controls . . . . .	93
	Investment and Research . . . . .	93
VI	THE FUTURE OF THE INDUSTRY IN CANADA . . . . .	96
	Europe's Diminishing Importance . . . . .	96
	Competition from Southern Pine and Alaskan Forests . . . . .	97
	Potential Russian Exports . . . . .	98
	Australia and New Zealand . . . . .	99
	Possible Use of Tropical Hardwoods . . . . .	100
	Scientific Forest Management . . . . .	101
	Conclusions . . . . .	102
	BIBLIOGRAPHY . . . . .	105

## LIST OF TABLES

	Page
I    PRODUCERS OF NEWSPRINT PAPER . . .	72
II   EXPORTERS OF NEWSPRINT PAPER . . .	73
III  WORLD NEWSPRINT PRODUCTION AND CONSUMPTION	83

## I INTRODUCTION

### Three Steps in Civilization

Man's ability to express his thoughts has progressed through three fundamental steps, each development extending over many centuries. These three stepping-stones are speaking, drawing and printing. The purpose of this study is to trace the history of paper, the most commonly used medium for preserving and transmitting the written word through printing, and to present some of the problems in the production and distribution of paper, especially newsprint, in quantities adequate to meet the growing needs of the world.

In the beginning, the spoken word was the only means by which thought could be communicated. The second stage - drawing - evolved a means of communication which required skill and ingenuity to guide a pointed stick to scratch simple outlines, to devise a tool to portray pictures on cave walls, and to evolve over long centuries a stylization of the pictures into hieroglyphics and characters. Stone, metal, wood, ceramics, leaves, barks, cloth, papyrus and animal skins were utilized as mediums for keeping records of

events and ideas as man, gradually emerging from savagery to civilization, began to realize that human knowledge must be preserved for future generations if the race were to advance.

### From Stones to Silk

Cleopatra's Needles are monuments recording the deeds of Thothmes and Rameses II. Inscriptions on the pyramids describe many things, including the manner of passing from life to death and what to do when stung by a scorpion. The Assyrians and Babylonians inscribed records of their doings on the bricks of their buildings and on clay tablets. The Persians inscribed their early records on rocks and later on metal coins. Moses wrote the ten commandments on slabs of stone.

By 3,500 B.C. the Egyptians had developed papyrus from a plant which grew along the banks of the Nile. Large quantities were used in Egypt for record keeping and wrapping and exchanged in trade among all the people of the Mediterranean Sea. Papyrus was known in Greece and Rome centuries before the birth of Christ and was actually used until the 10th century A.D., when other and better writing materials took its place.

As early as 1,500 B.C. Vellum and parchment, made from the skins of sheep and goats, were used by the Persians to keep records. These durable substances survived in common use in Europe until the 15th century A.D. and are in demand even today for printing documents and diplomas.

Table-books made of slabs of wood fastened together with leather thongs were much used in the monast<sup>er</sup>ies of Europe, and were reported by Chaucer to be in use in England in the 14th century.

In the South Sea Islands the inner bark of the mulberry tree was used to make a writing substance, and the Indians of Central America developed a ~~t~~ree-bark material at an early stage in their civilization which was commonly traded among the Incas at the time of Cortez' invasion in the 16th century.\*

The Chinese used a writing material of woven silk and linen, on which the characters were made with a pointed stick. In 250 B.C. Meng T'ian invented the camel's hair brush which was instrumental in the development of Chinese character writing and increased the use of cloth as a writing material. This, along with the papyrus of Egypt and the parchment of Asia Minor, made possible the manuscript roll, the first form of book in its true sense.

#### A Scarcity Arises and Ts'ia Lun Invents Paper

Chinese scholars adopted the camel's hair brush and soon invented a fluid writing pigment, and the subsequent development of the art of writing eventually created a need

\* 1

for a writing substance cheaper and more practical than woven textile. In answer to this, in A.D. 105, Ts'ia Lun announced his invention of paper - a thin, felted material formed on flat, porous moulds from macerated vegetable fibre, and gave to the world the substance which was to supersede all others for the preservation of written records.

### Two Methods of Printing

It was not until many centuries later that the third step - printing - occurred, and this took place in Japan. But the achievement was of Chinese conception and a result of Chinese influence. The Empress Shotoku's "Million Printed Dharini" (charms or prayers) of A.D. 770\* were the first known examples of block printing. The process consisted of spreading the incised surface of the block with pigment, placing a sheet of paper upon the inked relief, and rubbing the upper side of the paper with a cloth ball until the impression was clear.

This method of printing was not suited to the hard rag paper which developed in Europe primarily for writing with a quill pen and which required a stronger impression. This rag paper was made from linen and cotton, each sheet being dipped in a solution of gelatine and dried to form a hard, opaque and impervious surface. It was this unyielding

\*1

surface of European paper that made necessary the invention of the printing press.

Paper that had been fabricated purposely for writing with a quill pen determined the size and form of the books printed by Gutenberg and his followers, in addition to influencing the method of transferring an ink impression from type to paper. Unlike the thin, transparent Oriental paper, the thick, opaque paper of Europe lent itself readily to printing on both sides. For this reason we have two distinct schools of book printing - the Oriental with its delicate wood block impressions on one side of the sheet, and the European, using both sides of the paper for the comparatively heavy indentations of metal type set in a hand press.

### Social Consequences of the Invention of Printing

"The disappearance of papyrus from the Western world significantly coincided with the advent of the period which became known as the Dark Ages. The very limited supply of parchment retarded greatly the spread of knowledge. Transmission of ideas was confined to word of mouth and the closely kept illuminated manuscripts. This condition continued until rag paper made its way into the commerce of the time during the 13th century."\*

The invention of printing by Gutenberg about 1450 facilitated more effective communication of knowledge and its cumulative transmission by making possible the economic

\*8, p.73

multiplication of texts on a large scale and permitting an expansion of the range of influence of published works. It had the effect of, or was one factor in, a revolutionary ferment among the masses and disruption of the authoritarianism of the Middle Ages in Europe. Though at first books were prohibitively expensive for any but the wealthy, the times were propitious for a wider use of printing. Economic, social, political and religious changes were hastening the collapse of feudalism and printing played a significant role in the Reformation when leaders printed cheap books and pamphlets as a means of spreading their doctrines among people who previously had been apathetic to the abuses of the social and economic system.

#### Wood a Plentiful and Cheap Raw Material for Paper

After the impetus given to the diffusion of knowledge by the invention of the printing press there was a steady increase in interest in books and writing materials. By the early part of the 18th century increasing consumption of paper made it more and more difficult for papermakers to procure sufficient rags to cope with the fast-growing demand, for with the advance in literacy books were being printed for more general circulation. Periodicals and magazines began to appear, and by the beginning of the 19th century the search for a cheap and plentiful raw material for paper occupied the minds of many people.

The desire was not to find a superior material for the purpose, but for one that was cheaper than rags, more abundant, and easily converted into pulp - for speed and low cost. Quality was to be superseded by quantity. Asbestos, raw hemp, straw, moss, bark, leaves of various plants were all tried.

Then, at the turn of the 19th century, the paper machine was invented to replace hand labor in the making of paper. Its great productivity made even more apparent the shortage of cotton and linen rag as a raw material, and spurred the search for a substitute. One day it was noticed by a French naturalist that wasps made their nests of a paper-like substance from fibers of wood. This observation resulted in a machine being made to grind wood into pulp in imitation of the wasp, and the search for a cheap and plentiful raw material for paper was ended.

The transformation in the making of paper caused changes in social life infinitely more important and significant. The quantity production of cheap paper revolutionized literature, education and the reading habits of the entire world. Reading was no longer the prerogative of the rich but was within reach of the poor. The tremendous quantity of reading material that cheap "newsprint" made possible was to add much to the world's bulk of knowledge and contribute significantly to the raising of the standard of living of all the people of the globe.

### The Taiga and Human Welfare

The woods best suited for the making of paper are the coniferous<sup>#</sup> woods which form a belt through the northern temperate zone, extending in latitude from the south margin of the tundra until they meet the deciduous forests in the south temperate zone. This evergreen forest, or "taiga" covers Canada, Norway, Sweden, Finland and Russia, and extends through the mountains into Germany and Austria, and covers much of North America as far south as the Gulf of Mexico. There is only a comparatively very small area of taiga in the southern hemisphere because the continents do not extend far south into the temperate zone.

Man has always looked to the forests for many of his necessities and comforts - for fuel and housing, for paper and textiles, and now for other products resulting from chemistry. With the increase in world population and the evolution of economic activity much of the original forest cover has disappeared and that which remains has become a scarce and valuable resource controlled by a few political units. In our times few nations can provide for all their needs of wood, while the uses of wood are becoming increasingly numerous and essential to civilization. Wood, especially in the form of paper, has become an international commodity, crossing frontiers and oceans,

<sup>#</sup>Coniferous trees are the evergreen, cone-bearing species; and the deciduous species are those whose leaves fall each autumn.

because to meet their needs many countries must depend on others far removed.

The recent experience of war has underscored the link between the forests and human welfare. The destruction caused by the war, shifts in economic power from Europe to North America, the disorganization of established trade channels and fluctuations in currency exchange rates have intensified the already great disparities in supplies of paper, particularly newsprint grades, obtainable by the nations of the world. Requirements are far in excess of supplies in most countries, especially the "under-developed" areas where modern educational methods are only now taking root.\* The world's demand for paper - cheap paper - has materially expanded with the post-war drive of many governments to wipe out illiteracy and raise standards of living. Meanwhile, countries like India lack the paper to print the school books upon which their educational programs depend.\*\* Yet those countries which lack paper also are short of foreign currencies with which to buy it from others.

#### Cultural Significance of Cheap Paper

Paper for printing books, magazines and newspapers is a material essential to the development of education,

\* 13 pp.34-35

\*\*13 p.35

science and culture, and to the effective enjoyment of freedom of information within and between countries. The forests of the world can, or can be made to, yield sufficient paper to meet the needs of all people if sufficient understanding between nations can be created to encourage the correction of inequalities in the distribution of this product which is so essential to the intellectual and social progress of humanity.

One of the greatest obstacles to equitable distribution is the difference between the distribution of the world's forests and the distribution of populations. The greatest increases in consumption of paper, particularly cheap paper, will probably occur in South America, Asia and Africa, while the supply for the foreseeable future must continue to come from Europe and North America. An equitable distribution depends on the free flow of international trade, which at present is impeded by currency difficulties and tariff barriers. Shortages in supply and unequal distribution impede the progress of human welfare and the understanding between peoples that are essential to peace and progress.

## II EARLY HISTORY OF THE PAPER TRADE

### Paper at First Rare and Expensive

From the time of its invention in A.D. 105 the Chinese kept the method of making paper a secret and reserved a monopoly in its fabrication. It was rare and expensive, and many other materials remained in more common use as writing substances. The Greeks used papyrus, vellum, parchment and paper. Ts'ai Lun made his first paper from discarded cloth and hemp, but soon the bark of trees, bamboo, mulberry and grass were used as papermaking materials. Paper became highly priced and highly prized among the Chinese, as the art of writing was one of the highest forms of Chinese art and the earliest paper was used chiefly for inscribing the sayings of Confucius and other writings concerned with the religious life of the East.\*

From China, paper found its way into Central Asia and Persia, carried by traders over the caravan route, and in A.D. 751 during a battle on the banks of the Tharaz river the Turks took prisoner a number of Chinese skilled in papermaking and set them to work making paper in Samarkand. Up to

\*1, pp.12-38

this time paper making had been a Chinese monopoly and a closely guarded secret. From Samarkand the craft spread to Baghdad and Damascus, and finally to Egypt and Morocco. It required almost 500 years to find its way from Samarkand to Europe. First records of its manufacture in Europe were in Spain and Italy in the 12th century - a thousand years from its inception in China.

#### Papermaking comes to Europe

Early paper was regarded with disfavor in Europe, not only because it was higher in price and more fragile than parchment, then in common use for bookmaking, but because it was introduced by the Jews and Arabs, and Christendom was fanatically opposed to anything that suggested the Moslem civilization.\*

It is not definitely known where paper was first made in Europe, but it is probable that it was in Spain, brought by the Moors from Africa. In 1085 A.D. the Christians took over Moorish paper mills in Valencia and Toledo which produced "parchment cloth" from raw cotton, and a mill producing paper from cotton pulp was in operation in Sicily as early as 1102,

\*5

and paper was traded through southern Europe in competition with papyrus and parchment. Paper was not the favored writing material, as it became yellow and brittle, but was in common use, being both made in Europe and brought in by vessels from Arabian sources. Books and legal documents were written on parchment and vellum of sheep, goat and calf skin. It was about this time that papyrus was making its last struggle for survival and Eustathius wrote in 1170 that papyrus had disappeared.

The use of paper made from raw flax, hemp, cotton and linen as well as rags spread gradually into northern Europe, but for about 300 years its manufacture remained the secret of the Jews of Spain and Italy. Efforts were made, as early as 1348, to set up paper mills in France but costs of labor and materials were so high the product could not compete with paper from Spain and the Orient. By 1382 the Italian papermakers were selling a dozen sheets of paper for the same price as one parchment skin, which effectively eliminated parchment as a competitor, and mills were being established in Austria, France and Flanders. The fall of Constantinople in 1453 drove skilled Greek papermakers to Switzerland, England and the north of Europe.

Already shortages of raw materials were developing and in each paper making center government concessions were

made to dealers for the exclusive privilege of collecting refuse cordage, hemp and rags and it was forbidden to sell used rags to anyone else for resale. The papermakers objected to this monopoly, stealing was very common, and the struggle for raw materials created many problems even then.

During the 17th century France was easily the leading producer of paper, in both quantity and quality, and exported large quantities all over Europe - to Spain, England, Switzerland, Denmark, Holland, Russia and Sweden. However, the political uncertainties of the time drove many French, particularly the Huguenots, to other countries and they were in a high degree responsible for the excellent competing industries which rapidly grew up in Holland, Germany and England. The effects of the Renaissance and Reformation were at the same time resulting in a tremendous increase in demand for paper, particularly cheap paper. A new market was being brought into existence by increased popular interest in education, the invention of printing, the many new discoveries, and the general intellectual awakening.

It was during this time, in 1690, that a refugee from Germany, Wilhelm Rittershausen (William Rittenhouse),\*

\*4

sailed from Broich in Holland to the English colonies in America and in the same year started construction of the first paper mill in America on Wissahickon Creek near the Schuylkill river and Philadelphia.

In 1712 Peter the Great of Russia visited Germany and was so impressed with the efficiency of paper production at Dresden that he hired a group of Germans to go to Russia and make paper at Moscow.\* This was evidently the first attempt at production in Russia, in spite of their long acquaintance with the Chinese and Arabic industry on their eastern and southern borders.

#### Hand Methods of Papermaking

During all these centuries the methods used to make paper had changed very little. The process was essentially the same as that employed by the earliest papermakers in China. Very little is known of the subject because the technical details of manufacture were a closely guarded secret of the industry and each man probably had his own methods as there was considerable variation in the papers produced by these hand operated mills.

\*5

The four essential utensils used were a vat, moulds, felts and a press. The vat was a wooden tub filled with the mixture of cotton or linen fibres and water. Into this was dipped the mould, a woven wire screen with a "deckle" around the edge to keep the fibre from running off. These moulds were the size of the sheet of paper to be made and the woven wire permitted the water to escape easily, and it was on the mould that the "watermark", the trademark of each paper-maker, was stitched.

When the sheet of paper was dry enough to hold together it was laid on a piece of felt, which absorbed more water. These felts and papers were stacked on top of each other until there were 144. This was called a "post". The post was placed in the press and the screw turned down to squeeze out more water. This required great pressure and the whole mill crew was called to help turn down the screw to reduce the post from a thickness of about two feet to six inches. The sheets were then dry enough to be piled together until completely dry. In this way, by long hours and diligent work, three men could make about five reams of paper in a day.

If a smooth finish was desired in the paper it was put into a light press for a time, taken out and the sheets rearranged and pressed again, until the desired finish was acquired; and this is the secret of the beautiful texture and finish of hand-made paper.\*

Sizing to make the paper impermeable to ink was accomplished by dipping the finished sheets into an animal size made from the parings of hides. This process resulted in many sheets being torn and bruised beyond use, which resulted in the sizing room in the early mills being known as the "slaughter house". \* There was no uniformity in sizing methods so early printers had much difficulty.

The present methods of making hand-made paper differ very little from the ones described here. A few innovations have been introduced, but each appliance can still be traced to its Medieval and Oriental origin.

### Paper and the Industrial Revolution

Until the beginning of the 19th century, when the paper machine was first invented, all paper was made by hand and the dimensions of each sheet were limited by the ability of the papermaker to handle the mould. The increase in the diffusion of knowledge by printing caused a shortage of paper and papermaking materials, and this urgent need of more and cheaper paper turned scientists toward a solution of the problem. In 1798 Nicholas-Louis Robert, while in the employ of a French paper manufacturer, contrived a machine to

"form the paper upon an endless wire-woven cloth which retained the matted fibres and at the same time suffered the superfluous water to drain through the meshes of the woven wire... The paper is formed in an endless length, the width being limited only by the width of the machine."\*\*

\* 1

\*\*1 p.412

This paper machine with its continuous web of paper later suggested and made possible the invention of the rotary press. Robert patented this machine in France but, because of the unsettled political conditions, could find no interested persons to make it, so he went to England and Henry and Sealy Fourdrinier, London stationers, built and sold the machines. For this reason Robert's invention became known as the "fourdrinier machine". The development of the paper machine was rapid and many improvements increased the width of the sheet. Improved drying and finishing methods were introduced, and this growing efficiency and productive capacity made more apparent the ever-increasing shortage of rag.

#### The Search for a Plentiful and Cheap Raw Material

The ever-present problem of rag spurred the manufacturers in their search for a substitute and many fibres were tried out. Straw and esparto grass proved quite acceptable and are still used to some extent. Cornstalks, the bark of many trees, jute and hemp were all experimented with.\* The desire was not to find a superior material for the purpose, but for one that was cheaper, more abundant and easily converted into pulp - for speed and low cost. Quality was superseded by the necessity for quantity.

The use of wood was first suggested in 1719 by Rene Antoine Ferchault de Reaumur, a French naturalist, who had observed that wasps' nests made of wood filaments were very like paper.

In England Mathias Koops made many experiments and

\*1, p.13

in 1801 received a patent to make paper from "straw, hay, waste and different kinds of wood and bark". Mr. Koops in 1800 published a treatise declaring that wood could be used not only for making a "practical paper" but that it could be converted into a substance of great strength and if treated to become impenetrable and incombustible might replace tile and slate as a building material. But his firm went into bankruptcy soon after and the experiments were not followed up.

The first commercial attempt to use wood as a raw material was in Germany. In 1840 Friedrich Gottlob Keller secured a patent for a wood-grinding machine which defibred wood by pressure against a revolving wet grindstone. This machine was destined to give the world cheap groundwood papers, chiefly newsprint as we know it today, and made possible the high-speed rotary printing press and the modern newspaper with its almost unlimited dissemination of the news. By 1852 groundwood pulp was being commercially produced in Germany and was mixed with 40% rag fibre to give it strength. About the same time Charles Fenerty, working independently in Nova Scotia, Canada, made the first American paper from groundwood. He began his experiments in 1839 and produced a satisfactory groundwood sheet in Halifax in 1841, but the Canadian paper-makers lacked faith in groundwood and the discovery was not utilized at the time.

The use of groundwood gave the paper industry cheap paper in huge quantities, but there still remained the problem of durability. In the early papers 30% to 50% of rag pulp had to be mixed with the groundwood in order to make a durable product. Paper made from 100% groundwood was very weak, brittle and discolored (yellowed) quickly. The answer was found in chemistry. The earliest successful process was developed by Hugh Burgess and Charles Watt in England in 1851 to eliminate the lignin and resin from the fibre and leave only pure cellulose. The process consisted of boiling wood chips under high pressure in caustic alkali, and became known as the soda process. After experimenting with straw, cornstalks, bamboo and cane, wood was found to be the most suitable raw material for this process.

Soon after this, in France, Benjamin C. Tilghman and his brother Richard developed another process to accomplish much the same result by the use of sulphurous acid. This was taken up by Carl D. Ekman and George Fry in a mill in Sweden in 1872, and later in England where sulphite pulp was being produced on a commercial scale by 1880. In the meantime a German, Professor Alexander Mitscherlich, secured a patent on a method of cooking wood with sulphuric acid about the same time, first used in 1887 in Germany, and it was this process that was first introduced into the United States and

Canada when International Paper & Fibre Co. purchased the North American rights to the method. By these processes a satisfactory paper can be made from wood alone without the addition of any rag pulp. This solved the problem of durability and enabled paper production to expand rapidly.

In 1884 C.H. Dahl in Danzig, in seeking to reduce the cost of the soda process, used salt cake or sodium sulphate instead of the costlier soda ash, and got not only a cheaper pulp but one that has long, strong fibres. It was a better process than the older soda method. There were enormous quantities of sawmill waste in Sweden, Norway and Finland suitable for use with this process and it was rapidly put to use. This process utilizes woods which do not produce satisfactory results in the sulphite process and has fulfilled Mathias Koops' prediction of 1801 that paper "could be converted into a substance of great strength and if treated to become impenetrable and incombustible might replace tile and slate as a building material"\* for it is now the basis of the huge and rapidly growing kraft paper industry. The method attracted a great deal of attention and the Scandanavian mills were soon visited by paper manufacturers from America. Brompton Pulp & Paper Co. built the first North American sulphate mill at

\*4

East Angus, Quebec, in 1907 and the first United States mill was constructed in 1908 at Muskegon, Michigan by the Central Paper Company, although sulphate pulp had been produced experimentally by Smith & Thomas at Pensacola, Florida in 1903.

#### Effect of the Use of Wood on the Paper Industry

Experiments have proved that there are at least 2,000 plants known to yield fibres that can be felted into paper, but there are comparatively few that will yield cellulose economically for quantity production.\* Wood serves not so much as a substitute for rags as at first intended but as a supplementary material for increasing the scope and variety of papers to meet the constantly growing demand and development of new uses.

The development of the different processes for purifying cellulose has tremendously increased the versatility of paper, which has been further supplemented by the use of many different kinds of wood with their varying qualities.

Spruce is generally considered to be the most preferable wood because of its light color, strong fibre

\*4

and comparative lack of resin. Hemlock comes next, with poplar in third place, although its fibres are short and lacking in strength. In the United States a method has recently been perfected for making newsprint from southern yellow pine which will compete in quality and cost with that made from the northern woods. Two mills are now in operation and two more under construction. These may be the forerunners of a great new source of newsprint supply.

Research to develop cheaper methods and utilize poorer grades of wood and to improve and diversify the product are carried on by governmental, educational and industrial institutions. The paper industry must compete for its raw material against the lumber industry and the demand for cellulose of the rayon, cellophane, synthetic fibre, and plastics industries. These products may be able to outbid the paper industry for the use of high-grade wood as their products command much higher prices than paper.

A very significant effect of the use of wood as a raw material is the change in the geographical distribution of the industry.

While rags were the only raw material available, the location as well as the volume of the industry was limited

by the availability of rags. The costs of transportation of the raw material and product compelled the industry to locate in or near centers of population. The mills utilizing waste paper and rags as a raw material still remain in those centers. But with the change to wood as a raw material and the application of machinery and electrical power to the industry, the basic requirements of close wood supply, cheap power and pure water have determined the location of the paper industry.

Around the turn of the century the migration to the forests began. The European industry moved to Sweden, Norway and Finland. The United States industry moved to the Lake States, then to Eastern Canada, the Pacific Northwest, and the most recent development - the kraft process - has taken it to the southern yellow pine area. A pulp mill was built in 1951 in the Alaskan Panhandle and construction of at least one more is being planned.

A third result of the use of wood in the industry is a marked trend toward integration. This is less apparent in the writing and book paper branches of the industry than the others. Mills making rag and rag-content papers have remained small, with many family-size firms and mills producing a variety of different grades of paper. Many of these buy their sulphite and groundwood pulp from other producers. In

the newsprint and kraft sections of the industry, however, corporations of tremendous size have grown up, since the economies of scale and integration are great, and most of the producers in the industry are corporations owning many miles of standing timber, power developments, mills with great capacity, transportation facilities, plants for converting their paper into consumer products, lumber companies and chemical plants for utilizing waste products. There are even instances of newspapers owning newsprint mills and forests to supply their needs.

Warren B. Bullock, in "The Romance of Paper", comments on the social effects of these far-reaching changes as follows:

"With this transformation in the material phases of the industry came changes in social life infinitely more important and significant. It is no exaggeration to say that the quantity production of a cheaper paper revolutionized literature, education, in fact the reading habits of the entire world."

"This rapid sequence of developments in the utilization of wood marked a two-fold revolution. The entire scope of the paper industry was altered. Mills were built to take advantage of the recent discoveries. Their erection demanded large capital investment."

"The use of wood made paper a cheap commodity. Newspapers of huge size, books innumerable, magazines, became available within the reach of everyone. Reading no longer became the prerogative of the plutocrat, but a privilege of the poor. Possibly the quality of the world's literature is not what it was in the days when only the worthwhile books could

be published, but the quantity of reading material now available has certainly added to the world's bulk of knowledge, and to the raising of standards of all the peoples of the globe."\*

\*9, pp.107

### III WORLD PRODUCTION OF PULP AND PAPER: THE PLACE OF NEWSPRINT IN THE INDUSTRY

#### Introduction

Although the manufacture of woodpulp, the semi-manufactured raw material of paper, depends directly on local resources of suitable wood and clean water, large paper industries may, and do, exist in localities where neither of these resources exists; the availability of skilled labor, fuel, industrial technique and a large market determining the location of the mills. Papermaking occurs in virtually every country in the world and is geographically much more widespread than pulp production.

Most of the world's woodpulp production takes place within the area of the major coniferous<sup>#</sup> forests - in the United States and Alaska, Canada and Newfoundland, Northern and Central Europe, Russia and Siberia, and the northern islands of Japan. There are no significant coniferous forests in the tropics or in the Southern Hemisphere, although Chile, Brazil, New Zealand and Tasmania can support small paper industries to partially supply local consumption.

<sup>#</sup>Coniferous forests are those composed of "evergreen" species with soft, easily worked fibres. Deciduous forests are those composed of trees which drop their leaves each year and whose fibres are harder and more compact.

Deciduous woods are at present used in making only limited quantities of pulp. The firmness of the wood requires so much power to reduce it to fiber that its use is at present uneconomic. Although use of the hardwoods may expand, in the light of present technology the taiga will continue to supply the raw material for the world's paper for the foreseeable future.

In areas where woodpulp is very expensive other fibers are used in pulp-making. These include esparto grass, straw, bamboo and bagasse. Rags are used to a considerable extent in the making of fine and expensive papers.

Some of the world's largest paper industries rely in large measure on imported raw materials. The United States imports substantial amounts of pulp and the British paper industry is almost entirely dependent on imported pulp, as are the industries in France, Belgium and the Netherlands. Paper mills exist in every European country and in most countries where there is any significant amount of industrialization. Many of these mills are small. Large scale methods are not essential in the manufacture of paper other than industrial paper and newsprint, and mills range in size from small, family-size establishments employing less than fifty workers to large concerns using Fourdrinier<sup>#</sup> machines.

<sup>#</sup>The modern, automatic paper machine invented by Nicholas-Louis Robert in 1798 and developed and first used by Fourdrinier Brothers in England.

However, even in the manufacture of book and writing paper there is a perceptible trend towards concentration and integration to increase productivity and lower costs; and pulp-producing countries are becoming also manufacturers and converters of paper as they attempt to increase their export trade in finished or semi-finished goods rather than export only the raw materials.

The structure, organization and geographical location of the newsprint industry have been affected to a much higher degree by the advantages of mass production than has the rest of the paper making industry. Newsprint is made for a specific use which requires less variety of weight, grade, quality and size than most kinds of paper. Newspapers have a very short life, and, to achieve as wide circulation as possible, must be printed as economically as possible. Newsprint machinery is extremely costly and is economic only for large and continuous production. This huge production necessitates a large supply of wood as the average time required to produce a pulpwood tree is forty years.

These requirements of large wood supply, high initial investment and the need to program production many years in advance have had four major results: (1) the smaller unit has tended to be eliminated or absorbed by the larger one, and the long-term trend is definitely towards greater

concentration of production in a diminishing number of growing concerns. (2) The processes of production have become increasingly integrated. (3) Mills have moved toward the sources of their raw materials. Several British mills have a stake in pulp production in Scandinavia and Canada and own or control paper mills in those countries. (4) A system of long-term contracts (ten to twenty-five years) has evolved as the form of marketing in an effort to avoid the hazards of an open market.\*

### Primary Industries

#### THE UNITED STATES OF AMERICA

#### Importance of the Industry in U.S. and World Economy

The United States is the largest producer of pulp and paper in the world, making about 40% of the total output of woodpulp and 60% of the world's paper, and is in addition the leading importer of pulpwood and newsprint. The paper industry is the sixth largest industry in the United States in value of product, using 20 million cords of wood each year and employing about half a million people. It operates in 37 of the 48 states and in Alaska. \*\* Present production amounts to over 24 million tons a year and is valued at \$5 billion. Writing and printing papers comprise about 25% of the total tonnage (6,500,000 tons), kraft papers 42% (9,200,000 tons), specialties and building papers 25%, and newsprint 8%

\* 13 pp.27-29.

\*\*12 pp.77-79.

(2,000,000 tons). Notwithstanding this tremendous domestic production, the United States is by far the largest importer of paper in the world. In addition, much pulpwood and wood-pulp are imported from Canada and the Scandanavian countries as raw material.

Annual consumption is 343 pounds per capita, as compared with about 210 pounds in Canada, 88 in the United Kingdom, 12 in Soviet Russia, and 3 in China.\*

The United States has very extensive resources of both coniferous and deciduous woods. The chief areas of coniferous forests are (1) along the border of Canada from Maine to the Great Lakes, (2) in the South from the Carolinas across the states bordering the Gulf of Mexico to Eastern Texas, (3) the Northwest, in Washington, Oregon and the Rocky Mountains.

### History

Production of paper began in the United States during colonial days when William Rittenhouse\*\* built a mill to make paper by hand on the outskirts of Philadelphia in 1690. The industry grew with population and, after the discovery of woodpulp as a raw material, production increased rapidly.

\* 13 pp.27-29

\*\* 4 pp.3-8

During the 19th century the industry was concentrated in the Northeast, near consuming centers and within the coniferous belt. Firms and mills continued to be small, family affairs until around the turn of the century when the economic unit of production in newsprint and kraft products became very large and a period of concentration in those two branches of the industry began. Mills producing book and writing paper continued to be small in size. Around the turn of the century the scarcity and rising price of pulpwood compelled the migration of the larger units requiring great wood reserves - newsprint and kraft - to the Lake States and Canada. The smaller mills which produce writing, book and specialty papers and use substantial amounts of rag and waste paper as raw material still remain in this area, but they no longer contribute as great an amount of paper as they formerly did.\*

In the Lake States production for a time formed a substantial part of the total but forest utilization methods were so wasteful that the wood supply became depleted and the industry moved on, leaving behind, as in the Northeast, mills producing the higher grades of paper for local consumption. In this area the industry now uses about 40% waste paper, rags and straw, and about 60% woodpulp in production. Some of the woodpulp is imported from Canada.\*\*

The most recent migration of the industry, which is still in process, is to the South and the Pacific Northwest, where there are huge resources of coniferous wood. In these areas of mild climate and heavy rainfall tree growth is much more rapid than in the Northeast, and the prospects of a perpetual supply of wood are extremely good.

An added advantage in the Pacific Northwest is the cleanliness of the water supply and the availability of large amounts of hydroelectric power. Mills in the area are all integrated, producing their own pulp and paper, and in many cases converting the paper into containers and many other consumer products. Woodpulp is the only raw material used. Much high-grade dissolving sulphite pulp is produced for the rayon, plastics and explosives industries. Production is almost entirely for consumption on the West coast and west of the Rocky Mountains, as transportation costs to the Northeast are prohibitive.\*

The most spectacular recent development in the industry has been in the kraft division, making strong, heavy papers for wrapping and containers, and industrial and construction purposes. This has taken place almost entirely in the pine belt of the South where the wood is admirably suited for cheap production of these products. Mills are all comparatively large and many are highly integrated. Recently

the pulp and paper industry has become very conscious of the danger of forest depletion and many of the Southern firms are experimenting with the growth of wood on "tree farms" to insure future supply. Since 1930 the number of paper mills in the southern pine belt has increased rapidly. Since the beginning of World War II the first two mills for the production of newsprint have commenced operations in the belt to supply local demand. If these prove successful it is possible that this branch of the industry may move to the South.

To sum up the location of the pulp and paper industry in the United States, the East leads in making fine papers, the South in kraft and the Northwest in high-grade sulphite pulps and their products.

### Newsprint

The United States is the second largest producer of newsprint in the world. Previous to World War I it was the largest, but from 1915 to 1929 demand expanded rapidly while production declined, and the Canadian newsprint industry expanded to fill the gap.

Since 1925 the United States newsprint capacity has declined steadily because of the competition of other paper and wood using industry for the available raw material.

The newsprint mills in the Northeast and Lake States shifted to other grades which could pay the rising wood, power and labor costs. Several American producers built mills in Canada, and much United States capital and management was supplied to the Canadian industry. In 1950 United States production was approximately 1 million tons against Canadian tonnage of 5.3 million.\*

Within the last decade the trend has been slightly reversed. In 1933 Dr. Charles H. Herty discovered that several varieties of southern pines were suitable for newsprint pulp until they were about 20 years of age. With the rapid growing conditions in the South pines are large enough for pulpwood at from 10 to 15 years of growth, compared with 25 to 50 years in the Northeast and Canada. This opens the possibility of newsprint production based on "tree farm" raw material, and in 1940 the first southern newsprint mill began production to supply newspapers in Texas. Recently a second started production, and construction of several more are contemplated, encouraged by the scarcity and high prices of newsprint during the last ten years.

For the last hundred years there has been an almost constant rise in the consumption of newsprint in the United States\*\* and the increase in demand since the end of World

\* 21

\*\*24 p.31

War II has been very great. However, this is expected to taper off in the very near future. During the war available supplies of newsprint in Canada and the United States were rationed among consumers, with the result that new demand created by and during the war experienced an acute shortage which has not yet been entirely eliminated. The gap between supply and demand has been closing since 1949 and presently the shortage is not serious.\*

A factor which may affect future supply is the possibility of using Alaskan timber for newsprint. Recently two mills to produce dissolving pulp for textiles have been built in Alaska and there is active interest in utilizing this resource for newsprint. Distance from the large markets in the Northeast would place mills in this locality at a distinct cost disadvantage.

In addition to being the world's second greatest producer of newsprint, the United States is by a great margin the world's biggest consumer and importer of the product.

Until about 1900 the United States could supply her own domestic requirements, but since that time population growth and increase in per capita consumption from 15 pounds annually in 1900 to 56.5 pounds in 1940, coupled with the decline in production, had by that date placed the country in

the position of having to import approximately 75% of total requirements. In the five years immediately preceding World War II the United States accounted for 44% of total world consumption and it has been the principal factor in the increase in world demand from 1946 to 1950, consuming 60% of the expanding world supply since the end of the war. It is estimated that demand will continue to increase, though at a decreasing rate, during the next few years.\*

In the years following the war the United States has been in a most fortunate position with regard to imports, in that consumption has been unrestricted by difficulties of foreign exchange or government controls on quantity, as has every other newsprint importing country in the world. In fact, newsprint is the only manufactured product admitted free of duty into the United States, and her imports of the product are a vital factor in the balance of payments position of the supplying countries, Canada and the Scandanavian countries.\*\*

In spite of its very large production, the United States has exported extremely little newsprint. Small amounts are produced for delivery to the West Indies under direct contract, notably Puerto Rico. At present these are estimated to total about 40,000 tons annually.\*\*\* This amount has almost no significance in world commerce.

\* 21 pp.12-15

\*\* 13 pp.50-63

\*\*\*21 p.14

## CANADA

Place of the Industry in the Canadian and World Economy

Canada, with a forested area of 1,300,000 square miles, is the second largest producer of paper and makes more than 20% of the total world supply. As a producer of newsprint, its output is five times that of any other country. As a producer of pulp, it is the second largest manufacturer and the greatest exporter, furnishing more than one-third of the world's exports. There is also a large production of fine, book, kraft and specialty papers, of paperboard, building board and building papers.

More than 77% of the industry's output of 9.5 million tons is exported, and the remainder constitutes one of the leading commodities in Canada's domestic commerce. It is largely owing to this industry that Canada has attained a first-rank position in the trading world, and it constitutes Canada's greatest single industry - first in capital invested, in wages paid, in value of production and in export value.

The economic bases of the industry are (1) large resources of coniferous wood, of which a high percentage is spruce and balsam, the best pulping species; (2) abundance of clean water for manufacturing and low-cost hydro-electric power production<sup>#</sup>; (3) cheap water transportation; (4) good

<sup>#</sup>Cheap power is the chief competitive advantage and, in turn, the pulp and paper industry is the main reason for the large development of waterpower in Canada.

quality labor, as the industry requires a high percentage of skilled labor.\*

The taiga, the great northern coniferous forest, covers all of Eastern Canada from Newfoundland# and the Maritime provinces to the western end of Lake Superior, and from the Rocky Mountains to the west coast. The Canadian forest of 1.3 million square miles comprises the greatest pulpwood resource possessed by any country except Russia, which has approximately 4 million square miles, some of which is very high-grade coniferous forest. The provincial governments own approximately 90% of the forest land and lease it to the pulp and paper companies on a long-term basis. As a result of this land policy the various provincial governments are enabled to regulate to a high degree the activities of the privately owned pulp and paper firms. The major part of the industry lies in a string of mills on the southern edge of the taiga stretching from the lower St.Lawrence river to Lake Winnipeg. The greatest concentration is in the Province of Quebec along the north shore of the St.Lawrence. Three Rivers, at the junction of the St.Maurice and St.Lawrence rivers, is sometimes called the "newsprint capital" of the world.\*\*

\* 17 pp.1-3;47

\*\*12

#Newfoundland became a province of Canada in 1949, and for purposes of this study will be considered as part of Canada.

Recently there has been more expansion of the industry on the west coast than in the east. This area has advantages of wood and water similar to those of the United States Pacific Northwest for the production of high-grade dissolving pulps for the textile industry.

### History

The first Canadian paper mill was established at St. Andrews, P.Q. in 1804, and several mills for making paper by hand, and using rags for raw material, were operated in various centers of population in the early part of the 19th century. When woodpulp was developed as raw material and machines were invented for large-scale operation the improved methods were introduced into Canada almost immediately, and considerable amounts of mechanical pulp and sulphite pulp were exported to England and the United States during the latter part of the 19th century. Small amounts were also exported to France, Belgium, Mexico, Germany and Japan. Up to 1900 virtually all the paper produced in Canada was for domestic consumption.\*

By 1900 the Northeastern United States paper industry was to some extent dependent on imported pulp, and small amounts of newsprint were also being imported to supplement domestic production. In the United States the pulp and paper industries had been protected by tariffs as early as

1789, but as wood resources became scarce and expensive agitation began in the 1890's to have them lowered.\* The 1911 Canadian Reciprocity Act admitted Canadian pulpwood, woodpulp and newsprint free of duty. Other grades of paper are still protected by tariffs. Canada encouraged the home production and export of newsprint by placing embargoes on pulpwood cut from Crown lands. This was much resented by the United States newsprint manufacturers, whose pulpwood costs were rising rapidly and who claimed that without a tariff their industry would be destroyed. The newspaper publishers, however, wanted cheap newsprint and it remained on the free list. Immediately a migration of the newsprint industry to Canada began, led by International Paper Company, the largest producer in the United States. It has been claimed that the Canadian newsprint industry owes its existence to the removal of the tariff, but Mr. John A. Guthrie in "The Newsprint Paper Industry; An Economic Analysis" states:

"The removal of the tariff and the restrictions on pulpwood exports accelerated the shift of the newsprint industry to Canada; but the shift was inevitable. Diminished pulpwood resources and higher costs would have eventually forced the mills to move where wood and water were cheaper. The abandonment of the tariff was not the most important cause as close proximity to the principle raw materials is of such importance in newsprint manufacture that even if Canadian pulpwood had been allowed unlimited export, most United States mills would have remained little, if any, longer at their original locations if they had had the assistance of a tariff."\*\*

\* 4 pp.16-53.  
\*\*6 p.47

Newsprint production, which had been almost non-existent at the beginning of the century, began a rapid growth, reaching a total of over half a million tons by the beginning of World War I, as compared with 1.2 million tons produced in the United States in the same year. The tremendous increase in demand at the end of the war brought about a 100% increase in price which caused a further expansion of production, and by 1933 productive capacity was approximately triple that of 1914.

Expansion in the other grades of paper has kept pace with domestic demand but these enter into Canada's export trade only in very small volume. Neither is much imported, since the industry supplies domestic demand in all branches. A significant current trend is toward greater diversification of products. During the early years of the 20th century production of newsprint grew to comprise 65% of total paper production by 1915; by 1930 85% of total paper production consisted of newsprint; in 1939 it was 80%. Increased domestic demand for other paper products, particularly kraft, caused an expansion of those products which pushed newsprint back to 75% of total production by 1944, 61% in 1946, 59% in 1950.\* Estimated 1951 production is at the rate of 56% newsprint and 44% other grades of paper. This reflects the growing industrialization and rising national income in Canada. It also indicates that investment in facilities for the production of other

grades of paper than newsprint has become increasingly attractive.\*

### Newsprint

About 3 out of every 5 newspaper pages in the world are printed on Canadian newsprint, and the recent tremendous increase in the newspaper circulation throughout the world has been made possible by expansion of the Canadian industry. Canada produces more than five times as much newsprint as the United States, the next largest producer, and accounts for about 85% of North American, and almost 60% of world production, which totalled about 9 million tons in 1950.

Only 6% is consumed in Canada and the rest is exported. In 1950 89.4% of production went to the United States, 3.9% to all other countries, and 6.7% was used in Canada.\* Of the total of Canadian exports, newsprint has accounted for roughly 10% between 1913 and the beginning of World War II. As early as 1913 Canada led the world with exports of 256,661 tons of newsprint, and the total has increased steadily. The chief market has always been the United States, which has steadily absorbed at least 80% of the peace-time exports. (Please note tables at the end of this section.)

During the war years other nations exporting pulp

\*17 pp.3-4;27-28

and paper - chiefly Scandanavia - were cut off from their market and it was necessary for Canadian production to meet the needs of the United Nations. Canadian capacity did not increase during the war years; in fact, production declined considerably (see tables) owing to labor and power shortages. However, production and exports declined drastically in the major European producing countries and Canada's production relative to the rest of the world increased. Before the war she accounted for three out of every eight newspaper pages printed throughout the world, and at the end of the war she accounted for three out of every five. The following figures give some indication of the change in Canada's relative position as a producer and exporter.

Newsprint Production

(Short Tons)

<u>Year</u>	<u>World Total</u>	<u>Canada</u>	<u>Canada's Percentage of World Total</u>
1937	8,971,000	3,645,000	40.6 %
1938	7,555,000	2,625,000	34.7
1939	7,679,000	2,869,000	37.4
1949	9,178,000	5,176,000	56 (est.)*
1950	9,767,000	5,279,000	54 "

\*Allowance made in world totals for U.S.S.R. and satellite production of 623,000 tons 1949, 692,000 1950.

Sources: Newsprint Data, 1951  
Pulp and Paper Facts and Figures.

United States and Canada hold dominant positions in the world newsprint industry, as Canada produces at least 55%

of world supply and the United States uses 60% of world consumption. The Canadian industry has grown in direct response to United States demand, and the relationship has always been very close. In the postwar years it has become still closer.

Until the beginning of World War II most of Canada's exports outside the United States were to the United Kingdom, Australia, New Zealand and other Empire countries, and when the European exporters became cut off from their markets during the war Canada supplied the United Nations with their imports of newsprint as part of the war effort.

Since 1946 purchasing power in these countries has steadily declined, with a resulting reduction in Canada's exports until in 1950 exports to countries outside North America amounted to only 3.9% of total production. Shortages of newsprint have developed in several countries, which, although amounting to only about 3% of total world demand, cause considerable distress in the economies concerned. These shortages result from a lack of Canadian and United States dollars and do not reflect a physical shortage of newsprint.

## THE SCANDANAVIAN COUNTRIES

### General Conditions

The Scandanavian peninsula has one of the best stands of high grade coniferous forest in the world. Climate and rainfall are favorable to tree growth, the wood fibers have the comparatively great length and strength necessary for high grade sulphite and dissolving pulps which are in great demand, and location close to ocean trade routes and consuming countries gives it a competitive advantage in world trade. In addition, the area has for many years had efficient forest management to keep growth at a high rate and assure efficient utilization.

Outside of Canada, this area is the biggest exporter of newsprint, although its total production is only about one-eighth that of Canada and is below that of the United States and Britain. As in Canada, the newsprint industry is an important sector of the economy and newsprint exports form a significant factor in the countries' balance of payments position, particularly vis-a-vis the United States which, since 1920, has been one of their best customers.

With the elimination since 1939 of their two biggest European competitors - Britain and Germany - the Scandanavian countries during the war supplied 45% of the total exports to

the rest of the world except North America, compared with Canada's contribution of 29%.\* Since 1945 the Scandanavian countries have supplied an even larger proportion on account of the currency difficulties of many consuming countries which have prevented them from taking paper from Canada. The figures vary from year to year and often represent dollar shortages rather than changes in potential demand.

### History

Papermaking is one of the oldest industries of Europe and it is known that a paper mill was operating in Sweden as early as 1550, but production in all of Scandanavia was very small and only for local consumption.

Keller's invention in 1841 of a machine to grind woodpulp and the development of the groundwood process revolutionized the paper industry and gave a great competitive advantage to the countries with large supplies of suitable wood. The Scandanavian countries, with the best wood resources of Europe, quickly became the leading manufacturers and exporters of pulpwood and woodpulp. The development of the sulphite process in the 1850's further increased their advantageous position and the area became a leading producer and exporter of newsprint. When the sulphate process came along and the tremendous demand for kraft paper began after World War I, this area was the only one in Europe which could provide the natural resources to supply requirements.

Scandinavia is now believed to have reached the limit of its productive capacity. Output of the sawmills, the competitors of the pulp and paper industry for available wood, has been declining since 1929, and pulp production has for many years been as great as annual growth in the forests would permit. #

Production, Consumption, Exports and Imports  
of WOODPULP from the Scandinavian Countries  
(Average for Years 1934-38 in 000's Short Tons)

<u>Country</u>	<u>Production</u>	<u>Consumption</u>	<u>Exports</u>	<u>Imports</u>
Sweden	3,441	1,042	2,407	7
Finland	2,134	736	1,398	...
Norway	<u>1,065</u>	<u>449</u>	<u>636</u>	<u>20</u>
Total	6,640	2,227	4,441	27

Source: Pulp and Paper Facts and Figures.

The above figures represent approximately the normal capacity of Scandinavian woodpulp production which can be sustained over a long period of time. It can be seen that a large proportion of woodpulp production is exported to other countries of Europe, whose paper industries are dependent on this area for raw material.

### Newsprint

Newsprint is the most important grade of paper made in the Scandinavian countries and comprises the greatest

# During the years 1900-1939 careful forest conservation methods greatly increased the growth and yield of the Scandinavian forests, and great efforts are being made by both government and industry to further increase production.

tonnage of exports. Figures for prewar production and exports are given below.

Production and Exports of Newsprint  
(Thousands of Short Tons)

<u>Country</u>	Average for Years 1935-39	
	<u>Production</u>	<u>Exports</u>
Sweden	299,015	204,758
Finland	436,125	380,530
Norway	<u>205,500</u>	<u>179,737</u>
Total	940,640	765,025
Canada	3,336,786	3,122,588
The United States	907,804	14,647

Source: Pulp and Paper Facts and Figures.

Sweden

Sweden has the largest and most diversified pulp and paper industry in the Scandanavian peninsula. All grades are manufactured, but not enough of the finer grades to supply the home market.<sup>#</sup> Some writing, bond and specialty papers are imported. Newsprint comprises about one-third of total production, with packing paper coming second in volume.

The great period of expansion in Sweden came from around 1900 until World War I. By that time there were about 200 pulp and paper mills in operation, some of them the most

<sup>#</sup>Great difficulty has been encountered in securing data on developments in the European pulp and paper industry since World War I. By that time the industry had become quite stabilized, most of the expansion taking place in North America, and figures may be considered to be reasonably accurate up to the beginning of World War II.

efficient in the world. Sweden's great competitive advantage is the location of the mills on tidewater with excellent river transportation of pulp to the mills and ocean transportation of paper to markets. Whereas in most countries transportation costs are about 75% of the value of pulp, in Sweden the cost is about 25%.\*

Over two-thirds of pulp production and about two-thirds of paper production are exported, the two together forming Sweden's most valuable export. Pulp goes to the United Kingdom, the United States, France, Germany, Argentina and Mexico; and paper, chiefly newsprint, to the United Kingdom, the United States, Germany, Australia, France, China, Brazil and Argentina.

The Swedish pulp and paper industry has for many years been protected by tariffs on the import of paper; and the industry is highly organized, as are the pulp and paper industries in all European countries.

Damage to the industry during World War II was negligible and since 1945 production has increased considerably over 1939. During the war Sweden was cut off from her markets and began the post-war period with large stocks of paper and pulp which were quickly available to supply the urgent needs of the European countries. Recently Sweden has been increasing

her output of dissolving sulphite pulp for the textile industry. In 1949 and 1950 60% of woodpulp exports were of this grade.

### Finland

Finland has the greatest forest resources of any European country except Russia. The forest forms the principle economic base of the country's standard of living, and three-fourths of the total exports are wood products. The pulp and paper industry developed early and rapidly because of the excellent wood supply, high quality labor and cheap waterpower. However, further expansion is hampered by lack of hydro-electric power sites.

In 1913 a customs union was formed between Finland and Russia which allowed paper into Russia at a very low rate of duty, and that country absorbed the bulk of production. This was discontinued after World War I and exports began moving to other European countries and to the United States.\*

During World War II many of the mills were bombed and about 20% of Finland's paper production capacity passed into Russian hands. After the end of the war, until 1949, Finland was forced to pay a considerable portion of her pulp and paper production to Russia as reparations. This has now

been discontinued and Finland's exports to the Free World are above prewar.

There were in Finland, previous to World War II, approximately 70 pulp and paper mills producing pulp for export, newsprint, paperboard and wallpapers.\* About 65% of paper production is newsprint, most of which is exported.

### Norway

Although Norway's production of pulp and paper is greatly outranked by that of Sweden and Finland, nevertheless the industry is of vital importance in Norway's economy and exports are an important factor in her balance of payments position.

Mills were built between 1865 and 1885 to produce all three types of woodpulp, almost all of which was exported to other European countries. As production began to exceed foreign demand, paper mills were added. The period of greatest expansion was, as in the other Scandanavian countries, from the turn of the century to the beginning of World War I, when about 125 mills were in operation, mostly owned by Norwegian capital, and producing about 50% newsprint, 35% kraft and 15% fine and specialty papers.\*\*

Norway is plentifully supplied with waterpower but

\*38

\*\*12

her wood supply is limited. By 1939 Norway had reached her maximum peak of forest utilization. During World War II the forests were badly depleted and for many years to come Norway will be unable to reach her prewar volume of production. Damage to paper mills was also considerable, but this has to a great extent been repaired.

## RUSSIA

### Importance in the Russian and World Economy

Russia has the best and most extensive coniferous forests in the world. Of the 11,580,000 square miles of timberland in the world, Russia possesses 4,250,000 square miles, approximately one-third, and could supply all Europe with paper. However, costs of production and transportation are at present so high that as long as the supply of more accessible wood continues to be sufficient for the world's needs much of Russia's forests will be uneconomic. Most of the wood produced in Russia now must be rail-hauled, which makes costs so high it is difficult to compete with cheap Scandanavian wood.\*

The best and most accessible of Russia's forests are those bordering on the Baltic Sea, and that area has been extensively exploited. The taiga covers all the interior of

Russia and Siberia where rainfall is sufficient to support tree growth. This whole area is badly handicapped by lack of water transportation. The rivers are sluggish and frozen a great part of the year, and most of them flow into the Arctic Ocean so they are of little value for commerce.

### History

Papermaking was introduced into Russia by Peter the Great about 1712\*, who imported machinery and skilled workers from Germany, and encouraged the building of mills and the use of paper.

From this time until the 19th century there was very little further development. Output was small, quality poor, most of the finer grades were imported, and consumption was very limited. With the discovery of woodpulp as a raw material and the development of the Fourdrinier machine production began slowly to increase and price dropped considerably. The industry concentrated in the populated area on the southwestern edge of the taiga near the Baltic Sea. Mechanical pulp was exported to other European countries and chemical pulp imported.\*\*

The 1913 customs union between Russia and Finland admitted Finnish paper into Russia at a very low duty, and Russia absorbed almost all Finland's production of paper until

\* 5 p.21

\*\*34

the end of World War I when the union was ended and Finland sold her pulp in other markets. Duties on paper coming from other countries than Finland were extremely high to protect the Russian industry which was very inefficient and unable to compete with the superior product from Finland and the rest of Europe in any grade of paper except newsprint. In the early years of the 20th century there was a very rapid increase in paper consumption, with which the industry did not keep pace, and in spite of the tariff imports increased substantially each year.\*

In 1915 Siberia's first paper mill began production at Tomsk to make newsprint, wrapping and cardboard for local consumption and export to Russia.\*

After the Revolution the government became actively interested in expanding the pulp and paper industries, not only to increase the supply of paper, but as a source of explosives, pyroxylin, turpentine and wood alcohol which had been formerly imported. Very little has been published regarding these industries, and production has all been for home consumption. During the 1920's and 1930's Russia exported considerable quantities of pulpwood and some wood-pulp in order to get badly needed foreign exchange. Expansion of the pulp and paper industry has been a major objective of each of the "Five-Year Plans", much papermaking machinery was

imported from Germany and England, and by 1937 Russia ranked eighth among the pulp and paper producing nations, with a production of 772,000 tons that year.

World War II greatly expanded Russia's papermaking capacity. 53.5% of the pulp and paper mills of Germany, in 1937 the fourth largest manufacturer, are located in the Russian Zone. It has been reported that some of these mills have been dismantled and moved to Russian locations. Russia also acquired at the end of the war a considerable amount of Japanese papermaking capacity located on the mainland of Asia. As reported by the Food and Agriculture Organization of the United Nations in their forest products publication "Unasyilva"\*, paper production in Russia amounted to 812,000 tons in 1940, and in 1947 production was back to that level. According to the new Five-Year Plan, 1950 production was expected to reach 1,340,000 tons, 65% above that of 1940. However, in the past paper production has often lagged behind the estimates of the Five-Year Plans, as woods labor is very poorly paid and living conditions are undesirable. Exile to the lumber camps of Siberia has always been a favorite punishment for crime in Russia. A large percentage of the pulp used in the Russian paper industry has always been imported from Finland and Central Europe. This applies chiefly to chemical pulp, the necessary groundwood pulp being made domestically. Since World War II

these countries have been satellites of Russia and the problem of obtaining sufficient chemical pulp may have been solved.

Possible Present Conditions

Pulp and paper are produced on a small scale in several of Russia's satellite countries. Figures published by the United Nations Economic, Social and Cultural Organization publication "The Problem of Newsprint and Other Printing Paper"\* include the following figures for production of chemical and mechanical woodpulp in 1948:

Finland	1,440,000 metric tons
Czechoslovakia	315,000
Austria	215,000

Figures for Poland and Soviet Russia were not made available to them.

There is little doubt that Russia has today an important cellulose and paper industry. The drive to increase literacy during the interwar years more than doubled Russian consumption of pulp products, of which the great bulk was probably of newsprint grade. Total production is consumed domestically and none enters into international trade.

It is almost impossible to obtain reliable information or figures on Russian industry, including the pulp and

paper industry<sup>#</sup>. However, the American Paper and Pulp Association in New York, in their "News Summary" dated August 14, 1951, gave some information on the progress of the Russian paper industry.\* This news bulletin commented that the most recent public report issued by the State Planning Committee and the Central Statistical Administration of the U.S.S.R. regarding the first Post-War Five Year Plan reported that the Russian paper and board production had increased 47% over 1940, increasing from 810,000 metric tons in 1940 to 1,190,700 tons in 1950. The Plan had called for a production of 1,224,000 metric tons for 1950, of which Russia proper was to supply 81.4%, Finnish Karelia 11.6%, Estonia and Latvia each 2.8%, and Lithuania 1.4%. This report stated that Russian production surpassed Sweden's, whose 1950 production was about 1,170,000 tons; that Russian production was equal to about 76% of West Germany's; and that per capita consumption in the Soviet Union in 1950 was 6 kilograms (13.2 pounds) using as a base a countable population of 200,000,000. They gave the following figures for total Russian pulp and paper production:

1913	197,000 tons
1929	385,000
1937	832,000
1940	810,000
1945	333,000
1946	536,130
1950	1,190,700 tons.

<sup>#</sup>In preparing this study the writer contacted the Embassy of the Union of Soviet Socialist Republics in Washington, D.C. asking for information on paper production and consumption in Russia and its satellites. The reply was that no information relative to the pulp and paper industry was available.

## JAPAN

Importance in the Japanese and World Economy

Papermaking is an ancient art in Japan, as it is in China. When Marco Polo (1254-1323) visited China he was amazed at the great use of paper for purposes entirely unknown in Europe. It was then, and still is, used in great abundance in ceremonies, and for purposes such as window-coverings, umbrellas and containers (oiled to make it water-proof), purposes for which cloth, metal, glass and leather have always been used in the Occident.\*

Paper is still made in innumerable, small, family establishments in Japan, although the industrial revolution about the turn of the 20th century brought the most modern machine methods of production to Japan. The first newsprint mill was erected in 1899. In 1932 the value of paper made by hand in Japan was 14 million yen and that made by machine was 43 million yen - this in the most highly industrialized country in Asia. For hand production, rice straw, bamboo and mulberry bark supply much of the raw material, but in the mechanized mills the extensive coniferous forests of northern Japan have been utilized. The record production was that of 1940, amounting to 1,250,000 short tons of woodpulp and 1,700,000 short tons of paper and board.\*\* However, the best

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and most modern mill was located at Sakhalin on the Asiatic mainland and was lost to Russia at the end of World War II. On the islands the fundamental problem is limited wood resources. Japan has a very extensive rayon industry which competes with the paper industry for available pulp and can afford to pay a higher price, so there will probably be little expansion in the Japanese pulp and paper industry in the foreseeable future.

The Japanese pulp and paper industry is efficient and diversified and in 1940 was the fifth largest in the world.\* Newsprint accounted for about 20% of total paper and board and about 35% of "foreign-style" paper products excluding board and Japanese-style paper. In addition, Japan was one of the biggest importers of newsprint. In the five years previous to the war imports averaged 33,635 tons annually.\*\* This market has been lost for the foreseeable future, chiefly because of lack of foreign exchange, and constitutes the most extensive change in the consumption pattern of paper to occur as a result of the war.

The war has left Japan with greatly reduced resources of wood. Before the war Japan possessed the forest of Karafuto on the mainland which supplied about 50% of pulp-wood requirements. This has been lost to Russia, and the

\* 33

\*\*21 p.25

timber stands on the islands were so badly overcut during the war that newsprint and other paper production will have to be greatly reduced for many years to come. Since most of the newsprint capacity is located on the far northern islands near the wood supply<sup>#</sup> war damage was not great, but competition for the limited sulphite supply is very keen and the rayon industry can afford to pay a higher price.

## SECONDARY INDUSTRIES

### Papermaking Widely Dispersed

Paper is made in almost every country in the world, regardless of the level of culture. In the "under-developed" countries of Asia and Africa a small amount is made for local consumption by crude hand methods and using such local raw materials as bamboo, sabai grass, jute and straw. In these areas the per capita consumption of paper is very small and all fine papers and newsprint, 30% to 40% of total consumption, are imported.

It was in Western Europe that the machine production of paper first developed. Several European countries, because of their technical superiority, colonial markets, resources of

<sup>#</sup>The largest one is at Tomakomai on the island of Hokkaido, which has large stands of spruce and much hydro-electric power.

wood and/or resources of chemicals, early established themselves as leaders in the manufacture and export of paper, and are still significant factors in the world paper industry. The most important of these are the United Kingdom, Germany, France and Austria.

### The United Kingdom

Although France was the pioneer in the modern industry and produced paper of excellent quality, England became the first large producer and exporter, chiefly because of her cost superiority in the production of chemicals and machinery and her policy of free trade which enabled manufacturers to obtain cheap imported raw materials. Wood and woodpulp were imported from the Scandanavian countries, Russia, Germany and Canada, and rags from France. When wood became scarce in Europe in the last decade of the 19th century the English manufacturers developed areas of esparto grass in Spain and North Africa.\* Later they built mills in Canada, Newfoundland and Scandanavia. England produces every grade of paper and exports to practically every country in the world. Her world position as a net importer stems from her status as the second largest consumer of paper and the fact that she is a sizable net importer of certain types.

At the beginning of World War II the United Kingdom

\*11 p.73

had the largest newsprint industry in Europe, with a capacity of about 900,000 tons annually. At the present time, although she produces only about 600,000 tons a year, she still ranks as the largest in Europe. There are several reasons for this decline in production. The most important and difficult is the acute balance of payments difficulties of Britain. Imports of woodpulp for consumption in papermaking have had to be cut back to two-thirds of the pre-war level, and newsprint production has declined accordingly. In 1947 production sank to 282,000 tons but has been improving steadily since that year.

Reduced productive capacity resulted from war damage in addition to obsolescence of machinery which had been allowed to deteriorate during the 1930's. During the first year of the European Recovery Program Britain received 31 million U.S. dollars to finance the purchase of pulpwood, pulp, newsprint and other paper. This has been a substantial factor in the recovery of the industry.

Since the end of the war there has been a great effort to increase exports of newsprint from Britain. Pre-war (1935-1939) exports averaged 67,000 tons. In 1949 they were 68,000 tons, and in 1950 115,000 tons. This, combined with the decline in production, has resulted in a very acute shortage of newsprint for domestic consumption.\*

## Germany

German technology was responsible for much of the world's progress in the mechanization of the pulp and paper industry, and for many years German paper machinery was the best in the world. From the middle of the 19th century until World War I Germany was a leader in pulp and paper production. In 1914 Germany was the second largest paper producer, exceeded only by the United States; and 50% of the world's paper was produced in Germany, Great Britain, France, Belgium and Austria. Since that time most of the expansion has taken place in North America and the share produced by Europe has declined steadily.

Germany has considerable coniferous forest resources. They are mostly privately owned but are subject to close government regulation, with cutting strictly supervised to avoid waste because wood resources are very scarce relative to requirements. The pulp and paper industry is heavily dependent upon imported raw material.\*

At the beginning of World War II Germany was the fourth largest producer of woodpulp and paper in the world, and the second largest in Europe, and the fourth largest consumer of paper. The industry was very diversified and the product entered extensively into international trade. A considerable amount of wood and pulp were imported from German owned forests in Russia, the Scandanavian countries and Austria. Also small

amounts of high-grade sulphite pulp were exported. Large quantities of paper were exported and small amounts imported, although the German industry was able to supply most of the domestic market and was one of the biggest industries in the country.

At the end of the war, in 1945, the forests were badly overcut, the mills had been allowed to deteriorate and had suffered considerable damage from bombing, and 53% of the paper-making capacity was in the Russian Zone and in the hands of the Russians. Capacity remaining in the Western Zone is far below that necessary to supply normal needs of the domestic market. This destruction of the German paper industry is one of the major factors in the acute balance of payments problem of Germany at the present time and also in the present world shortage of newsprint. With a decrease in productive capacity of about 300,000 tons annually, German newsprint production is now in fourth place among European producers.\*

#### Other Producing Areas

France, the Netherlands, Italy and Austria have for many years had a considerable paper industry, which has been maintained at approximately pre-war (1939) level. Of these countries only Austria exports any appreciable amount, and all depend to some extent on imports to supplement domestic production

and on imports of wood and woodpulp to supplement available raw materials.

Poland is the only country in Europe to significantly increase production over the 1939 level. This is the result of obtaining territory from Germany and of a speed-up in operations.\*

Newsprint production outside Europe and North America is negligible except in the Soviet Union and Japan. Productive capacity has changed considerably since 1939 in both countries. Russian capacity has increased from below 200,000 tons annually in 1939 to about 300,000 tons. Japanese capacity has decreased by about the same amount, from 300,000 tons in 1939 to 200,000 tons at the present time. Part of this change is explained by the cession to the Soviet Union of the Japanese half of Sakhalin where newsprint is manufactured.

India produces kraft paper, using local raw materials such as jute, sabai grass and straw, and since 1945 several new mills have been established which use imported woodpulp. Plans have been made to develop the coniferous forests of the Himalaya Mountains to supply these mills. However, the great bulk of paper, including 100% of newsprint requirements, are imported. In 1949 domestic production was 110,000 tons and imports were 116,304 tons.

Small amounts of paper are made by machine methods

in Australia, New Zealand, the Union of South Africa, most of the South American republics and all the European countries. None of them produces sufficient to supply domestic demand and none has large enough resources of wood to permit the production of newsprint even for local consumption.

Because of the wide dispersion of the papermaking industry in small firms and the paucity of statistics in many countries, it is difficult to accurately determine the total world production of all types and grades of paper. However, the American Institute for Economic Research, in their study "A Report on the Future of the Paper Industry in the Southern United States and the Effect on Stumpage Values"\* estimates total world production and consumption of paper products to be as follows:

Year	World Consumption	U.S.A. Consumption
1900	5 Million Tons	2 Million Tons
1910	10	4
1920	20	7
1925	22	10
1930	23	12
1935	30	10
1939	40	16

\*20 pp.3-10

TABLE I

P R O D U C E R S  
 NEWSPRINT PAPER: CHIEF SOURCES OF SUPPLY  
 ANNUAL PRODUCTION (in thousands of tons)

<u>Year</u>	<u>Canada</u>	<u>U.S.A.</u>	<u>Scandinavia</u>	<u>Britain</u>	<u>France</u>	<u>Japan</u>	<u>German Republic</u>	<u>All Others</u>
Prewar	3,337	908	941	962	361	406	166	1,023
1946	4,506	771	674	330	108	83	55	629
1947	4,820	826	721	282	203	100	72	770
1948	4,983	867	840	336	305	112	99	985
1949	5,176	900	939	529	292	120	140	1,082
1950	5,279	1,015	993	609	336	145	187	1,204
1951*	5,525	1,095	989	595	355	200	187	1,248
1952*	5,690	1,120	986	645	355	204	215	1,336

\*Estimated

Sources: Newsprint Association of Canada  
 Governments of the Countries Concerned  
 The United Nations (UNESCO)

TABLE II

E X P O R T E R S  
NEWSPRINT PAPER: ANNUAL EXPORTS  
(in thousands of tons)

Year	<u>Canada - to</u>		<u>Finland</u>	<u>Sweden</u>	<u>Norway</u>	<u>Britain</u>	<u>Austria</u>	<u>U.S.A.</u>	<u>All Others</u>
	<u>U.S.A.</u>	<u>Others</u>							
Prewar	2,388	735	380	205	180	67	41	15	142
1946	3,563	685	236	138	96	17	4	28	45
1947	3,897	701	273	167	100	3	18	28	68
1948	4,128	533	318	196	128	22	39	28	118
1949	4,380	449	391	233	158	68	43	39	139
1950	4,748	208	416	226	148	115	49	44	149
1951*	4,790	375	415	228	144	105	53	50	122
1952*	4,930	385	415	220	137	110	70	50	105

\*Estimated

Sources: Newsprint Association of Canada  
Governments of the Countries Concerned  
The United Nations (UNESCO)

#### IV INTERNATIONAL TRADE IN PAPER

##### Papermaking a Large and Growing Industry

The making of paper is one of the major enterprises of the industrialized nations of the world. It is the leading industry in Canada, Sweden, Norway and Finland; it is among the ten leading industries in the United States, England, Germany, Japan and Russia; it is an important economic factor in every country with suitable wood resources; and 60% of the product enters into international trade.

This industry has grown in leaps and bounds during the 20th century as new uses for paper have developed and standards of living have risen. It is probable that it will continue to grow for a considerable length of time, for if a nation's standard of living may be taken as a rough measure of its use of paper the world will need enormously increased volumes of paper as general living standards improve.\*

A recent study made by the United Nations Economic, Social and Cultural Organization\*\* has found that world consumption of paper has doubled in the last 20 years, and in addition there is a large unsatisfied demand in many countries

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due to lack of foreign exchange for imports and lack of raw materials, fuel and labor for domestic production. Because of the recent drive to increase literacy in many countries it is estimated that during the next 20 years the rate of increase will be even more rapid.\*

### Inequalities in Consumption

There is a great disparity between the distribution of world population and world consumption of paper. In North America and Europe the per capita consumption of newsprint is 32.4 kilograms for the United States of America, 21.3 kilograms for Canada, and in England normal consumption is 26 kilograms per person annually. But in the rest of the world, with over 75% of the world's population, per capita consumption is normally 6 kilograms per capita in Japan, 0.8 in India and 0.1 in China. Table III at the end of this section shows the tremendous differences in per capita use in different areas of the world. This to a great extent reflects the fact that North America and Europe possess the resources for a large and efficient paper industry which are lacking in the other areas.

### Production of Other Papers Widely Dispersed but Newsprint concentrated in a Few Countries.

Every industrialized country maintains some production

of paper for domestic consumption - book and writing papers, wrapping paper and specialty papers are common products and are protected by tariffs against foreign competition. Where raw materials are insufficient pulps are imported.<sup>#</sup> For printing and writing papers there is a degree of self-sufficiency in many countries. For example, India imports all its newsprint but produces at least 50% of all the other grades used. Argentina has a considerable output of printing paper but imports almost all its newsprint. The principle reasons for this self-sufficiency are (a) rag forms a considerable percentage of the raw material and is available in every population center; (b) most grades of paper are subject to import barriers of tariff, quotas and exchange control, often to protect industries which were established before wood became the chief raw material. Newsprint is also liable to customs duties, but to a far lesser degree because in many countries it cannot be economically produced by domestic manufacturers and, because it is such an essential commodity, it is admitted duty free. Even in countries where industrialization is backward paper is produced by hand methods for local consumption. This is true of China, Japan and India. But of all the countries of the world, only Canada, the United States, Norway, Finland, Sweden and Russia have sufficient coniferous wood of suitable quality to support economically the production of newsprint and kraft paper. Of these, the United States is such a large

<sup>#</sup>Usually duty free or under a small duty.

consumer that she is unable to produce all her requirements and imports about one-third of total consumption of pulp and paper, chiefly from Canada. Russia also consumes her total production. This leaves Canada and the Scandanavian countries with sufficient resources to produce an exportable surplus. Since 1913 Canada has led the world in exports of pulp and paper products.

The United States, by a wide margin the largest consumer of kraft paper, can supply all her own requirements, and the large users of kraft in Europe have developed industries of their own protected by tariffs and using sulphate pulp imported from the Scandanavian countries.

This leaves newsprint as the remaining category to be considered, and it is this product that enters in huge volume into international trade. To some extent, every kind and grade of paper is traded between countries but the volume and value are inconsequential in comparison with newsprint.

Of world production of all grades of paper, newsprint accounts for about 40%, wrapping, industrial paper and cardboard each account for about 20%, printing paper about 15%, and writing paper 5%.\*

#### "Newsprint" Defined

Perhaps it might be well at this point to define

"newsprint" and explain exactly how it differs from other grades of paper. This study does not deal with the technical qualities or methods of production of different kinds of paper, therefore it will be sufficient to state that it is the cheapest and least durable type of paper and is usually consumed in initial use, though this is not always true.

The broad trade classification "newsprint" is divided into two subdivisions - newsprint and hanging - and newsprint itself is divided into six groups, of which "standard newsprint" used in the production of newspapers is only one. The basic requirements of newsprint are availability in huge quantities, cheapness to allow newspapers to sell for a few pennies, high absorbency to permit printing on high-speed presses, and strength to prevent the paper from tearing in the rollers of the press.

The other five types of newsprint have special characteristics depending upon the requirements of the users. "Catalogue news" is lighter in weight for catalogues and directories. "Poster" paper is highly calendared<sup>#</sup> to make it less absorbent, as is "Halftone" news for pictorial newspapers. "Novel news" for lower priced books and magazines is thicker and rougher than standard newsprint. "Tablet" news for school pencil paper is much like standard newsprint and is made in many weights. "Hanging paper" for wall decoration is much the same product but contains more "sizing" to prevent the paste with which it is fixed to the wall from penetrating the surface <sup>#</sup> by means of greater pressure in the manufacturing process.

of the sheet.

From this description it will be realized that "newsprint" has many purposes in addition to the obvious one of use in newspapers. It is an article of daily use by the average person, and it is difficult to envision the American standard of living deprived of this product which provides a cheap and plentiful medium for the dissemination of information.

#### Newsprint Must be Produced in the Regions of Lowest Cost

Newsprint is the largest and most important branch of the paper industry and its biggest problem is that the product commands an extremely low price in comparison with other grades of paper, and therefore the industry cannot compete with higher priced papers for raw materials and labor and must go to the regions of lowest cost and mechanize to the utmost possible degree. So we find huge newsprint mills on Lake St. John in Quebec, at the head of Lake Superior, and near the Arctic Circle in Finland, all seeking markets for a product which cannot possibly be consumed in the locality.

Since international trade in newsprint resumed after the war (1945) it has faced the barriers of limited availability of currencies, quotas and exchange controls. Many governments have commodity agreements with suppliers affecting the import of newsprint. This has had the result,

in some cases, of creating an artificial scarcity in consuming countries and an artificial surplus in producing countries.

Newsprint enjoys a unique distinction on this continent in that it is the only important manufactured commodity which is not subject to tariff regulations on entering the United States. An important factor in the volume of international trade in the product is the fact that the chief users are newspapers and in most countries it is contrary to government policy to work hardship on such an important public service. Therefore no country imposes a prohibitive tariff, and usually the duty is quite nominal.

### Results of the War

The war years 1939-1945 saw tremendous changes in world newsprint production and trade, the most dramatic being the elimination of Germany as a leading producer and of Japan as a leading importer.

In 1938 England, Germany and Japan were among the largest producers of the world. Today, production has declined by at least one-third in all three countries. During the same time Canada's production and exports have increased by about one-third.\* The decrease in production in England is because

of lack of pulp, fuel, labor and other factors, and may be only temporary; but both Germany and Japan have lost considerable production facilities to Russia, forests have been greatly over-cut, and it will probably be many years before they are again important factors in international trade in newsprint.\*

This great shift of production from Europe and the soft currency countries to the hard currency area of North America and behind the Iron Curtain greatly increases the already great inequalities of newsprint distribution. "Fair shares" has never been the principle governing the distribution of the world's riches, but the inequalities in newsprint consumption are greater than for any other commodity of like importance.\*\* The United States with 6% of the world's people consumes nearly two-thirds of the world's newsprint, while Asia, Africa and Latin America, with 67% of the population, now receive barely 10% of the newsprint.

These great regional disparities cannot be blamed on the destruction and dislocation caused by the war. The war did not appreciably worsen the position of the ill-provided nations, but it has accentuated and attracted much attention to deficiencies which already existed. Latin America is slightly better off than in 1939. But in Europe consumption was reduced in eleven years from 2.5 million tons to about a million. The

\*29

\*\*13 p.53

increase in Canadian production has already out-paced the increase in United States consumption and in 1949 there was a small surplus; but although Canada has paper to sell to the rest of the world, the world cannot pay for it. The newsprint market, like other commodity markets, reproduces the split of the world into two trading areas caused by external payments deficits. Unification - and the free flow of newsprint from those who can produce it to those who need it - depends on the elimination of the currency problem.

TABLE III

WORLD NEWSPRINT PRODUCTION AND CONSUMPTION:  
PER CAPITA CONSUMPTION and INTERNATIONAL TRADING POSITION  
(for Areas and Selected Countries; in thousands of Metric Tons)

AREA	PRODUCTION		CONSUMPTION	CONSUMPTION		Surplus / Deficit -
	Average 1935-39	1948	Total 1948	Per Capita (Kilograms) 1935-39 1948		
World Total	7,411	7,482				650*
North America	3,849	5,265	5,023			242 /
Europe	2,960	1,809	1,450			359 /
Latin America	7	35	400			365 -
Asia	407	113	247			134 -
Africa	-	-	48			48 -
Near East	-	5	29			24 -
Oceania	-	30	172			142 -
Canada (incl.Nfld.)	3,026	4,515	275	17.5	21.3	4,249 /
U.S. of America	823	750	4,745	24.6	32.4	3,995 -
United Kingdom	872	299	406	26.2	8.0	107 -
Germany	464	181	168	6.0	2.5	13 /
Finland	395	300	29	6.5	7.2	271 /
France	327	203	220	8.8	6.4	17 -
Sweden	271	280	125	12.8	18.2	155 /
Norway	199	140	24	8.3	7.6	116 /
Italy	67	65	58	1.7	1.3	7 /
Poland	31	44	36	1.0	1.6	8 /
Russia	188	275	200	1.1	1.3	75 /
Brazil	3	25	77	1.6	1.6	52 -
Argentina	n.a.	4	150	9.4	9.7	146 -
Japan	360	100	88	5.7	1.0	12 /
China	6	5	60	0.1	0.1	55 -
Australia	-	30	139	23.1	18.2	109 -
Philippines	-	-	10	0.7	0.9	10 -
India	-	-	45	0.1	0.8	45 -

Sources: Newsprint Association of Canada and  
United Nations Economic, Social and Cultural Organization.

\*Approximate inter-regional trade.

## V POSTWAR PROBLEMS IN THE CANADIAN NEWSPRINT INDUSTRY

### Measures Taken to Correct World Newsprint Shortage

During and since World War II there has been a world shortage of newsprint, caused chiefly by the decline of production in the United Kingdom, the Scandanavian countries, Germany and Japan. War destruction, and shortages of wood, labor, chemicals and fuel were responsible for these declines. Only in North America did conditions permit expansion of production, and the Canadian industry grew accordingly to supply most of the newsprint requirements of the United Nations.

By 1950 most of the war destruction was repaired, most shortages corrected, and trade channels returned to normal. Production was equal to or above the prewar level except in Germany and Japan.

Since the end of the war there has been considerable construction of newsprint plant either planned or started in many countries which were previously entirely or mainly dependent on imports. These include the Union of South Africa, Egypt, Turkey, Argentina, India, Australia and New Zealand. During

the war their requirements were filled by Canadian exports, but since 1945 exports to these areas have steadily declined because of currency difficulties and government restrictions on consumption.

From 1939 to 1950 Canadian production rose from 3,316,000 tons of newsprint each year to 5,311,000 tons. This is an average increase of about 200,000 tons a year; and productive facilities under construction for 1951 and 1952 are 150,000 and 205,000 tons respectively. This has been accomplished without building any new mills - by improving and adding newsprint machines, streamlining of production and increasing the speed of machines. Very little new capital has been attracted to the industry, and established producers have been cautious about building new plant. The experience of the expansion after World War I, which came into full production after the world shortage had been overcome and demand had slackened in the 1930's, has probably had an influence on post-war planning.

### International Competition

The war period 1939-1945 considerably improved the competitive position of the Canadian newsprint industry in world trade.

The Scandanavian countries, Canada's chief competitors,

suffered war damage to plant and considerable overcutting of forests, which will limit newsprint production for some years to come. Finland lost about half its newsprint capacity to Russia.

Germany, the fourth largest newsprint exporter prior to 1939, also lost over half its newsprint capacity to Russia. Forests are badly overcut and the remaining mills have suffered from deterioration and bombing.

The United Kingdom is exporting considerably more newsprint than during the interwar years, but this is because of the necessity to earn foreign exchange, and there is large unsatisfied demand for newsprint at home, evidenced by the present rationing and allocation system.

#### Canada's Relations with the United States as Chief Consumer

Newsprint consumption in the United States amounted to about 44% of the world total during 1935-1939. In the period immediately following World War I the United States consumed about 55% of the world total, but during the years following 1925 consumption in the United States declined and that in the rest of the world, particularly Europe, rose steadily until the beginning of World War II.\*

Following World War II consumption in the United

\*21 p.11

States has again risen rapidly, unimpeded by government controls or foreign exchange difficulties, and has been the principle factor in the increase of total world demand. During the years 1946-1950 the United States has received about 60% of the expanding total world supply. Demand has recently levelled off to some extent and depleted publishers' inventories have been rebuilt; therefore indications are that, although demand may increase slightly in the future, the United States probably will consume a declining percentage of the world total if demand continues to rise outside North America.

The Canadian newsprint industry has grown up in response to the demand of the United States, and exports to that consumer have always been about 75% of total production. Since World War II shipments have increased steadily (by amounts ranging from 250,000 to 370,000 tons a year) until in 1950 they reached about 90% of production.\* Shipments overseas have declined from 22.2% in the years immediately preceding the war to 3.9% in 1950, as the purchasing ability of overseas customers declined while buyers in the United States were able and willing to take larger amounts.

In 1951 there was a partial recovery of overseas countries' purchasing power and shipments increased. In the future there is a possibility that overseas shipments may

absorb an increasing share of Canadian production. However, for the near future the United States will continue to be Canada's best customer and future expansion in the industry will probably depend on the American market.

### Supply of Factors of Production

During the war the industry suffered severe shortages of labor, power, wood, steel and many other essentials. However, this situation has to a great extent been corrected, although future expansion will depend on the extent of the Canadian defence program, particularly with regard to steel. Steel is difficult to obtain for construction purposes and many expansion programs have been slowed down. Present indications are that steel will remain in short supply while the expansion phase of the defence program continues.

Recently a world sulphur shortage has developed and a need has arisen for development of new sources of supply. Sulphur is used in large quantities in the production of sulphite pulp, which forms about 8% to 15% of newsprint pulp. Canada has traditionally received this material from Texas and Louisiana, and these sources have recently been compelled to limit shipments and place quotas on supplies to customers, with a result that the Canadian pulp and paper industry has received about 7% less than requirements.\* A committee has been appointed by

the Canadian pulp and paper industry to study the possibilities of obtaining sulphur domestically from iron pyrites.

For the foreseeable future, wood supply will not become a problem. On the whole, annual harvestings plus loss from fire, insects, etc. are less than annual growth on woodlands operated by the pulp and paper industries, and overcutting is not prevalent. The forests can provide in perpetuity the present harvest and measures are under way to increase their productivity. During recent years the industry has intensified forest research, increased silvicultural activities and expenditures for protection against fire and insects, and improved logging techniques.

The supply of hydro-electric power and labor, the two remaining significant factors of production, are at present adequate and need not be considered in this study.

#### Currency Difficulties

Newsprint ranks prominently among the world's export commodities, and its distribution is subject to direct impact of the level of international trade in general and the balance of payments position of importing countries in particular. Trade in newsprint thus depends for its normal functioning on a smooth, high-level flow of international commerce, and is very sensitive to any interferences arising from currency shortages and import restrictions.\*

\*13 p.104

It is believed that much of the blame for low levels of output as well as for the inequitable distribution of supplies must fall on the scarcity of currency to pay for imports. The scarcity has dislocated all sections of the pulp and paper trade at every stage of manufacture and exchange. The physical limitations to higher production seem to be few and do not themselves offer an explanation of why one-seventh of world newsprint capacity is unused at a time when requirements are unsatisfied.\*

Most of the World War II damage has been repaired and worn-out machinery replaced and, while world demand for newsprint is about a million tons above world supplies at current prices, world newsprint capacity to the extent of about a million tons is idle. The chief cause for this situation is the dollar shortage and the necessity of balancing payments in other currency areas. Stated in other words, governments with exchange difficulties tend to put paper in the non-essential category when it comes to allocating foreign exchange.

Governments have sought to circumvent the worst effects of currency shortages on the trade in newsprint by providing for its exchange through bilateral trade agreements which specify the goods to be exchanged and the volume. These agreements are presently important instruments in directing the flow of newsprint trade, and have helped to restore a larger

\*13 p.104

volume of trade. However, the lack of foreign exchange has interfered considerably with the consumption of newsprint. Outside North America newsprint is one of the most rigidly controlled commodities, and current available supply is quite insufficient to satisfy demand at current prices. In many countries it is far below prewar consumption.

The present newsprint shortage, insofar as it is due to restrictions arising from currency shortages, is estimated at over a million tons for the world as a whole, compared with a current world consumption of 8 million tons. Since there is no shortage in North America, this shortage is felt exclusively by the rest of the world, which consumes at present about 3 million tons. The restrictions fall with particular severity on countries which import the whole or the bulk of requirements. Currency difficulties serve to widen the extreme inequalities which have always been an outstanding feature of the distribution of newsprint.\*

The currency shortages are a result of the disruption of trade since the war. The tremendously increased claims on the resources of North America and the reduced export potential of Europe have resulted in an appreciation in value of the dollar. Although the 1949 European currency devaluations helped correct differences in the cost and price structure between hard and soft currencies, for some time in the future it will be

\*13 pp.104-108

necessary for the rest of the world to curtail demand for North American products, including newsprint, by means of exchange controls. Exports of North American newsprint to soft currency areas may even be reduced below the current level.

### International Materials Conference

One of the problems encountered during the war was the need to relieve critical newsprint shortages in allied and friendly countries. This problem has continued into the post-war years and in 1951 the International Materials Conference, an international body operating in Washington, D.C., was set up to study this and other material shortages in the free world and make recommendations designed to alleviate critical situations. Its pulp and paper committee have made recommendations for allocations of North American newsprint totalling 30,000 tons to be made available for 15 countries with urgent shortages. These recommendations were accepted by the Canadian and United States governments and newsprint will be provided by the Canadian and United States mills in the ratio of 5:1.\*

At the time of writing these arrangements were still in the planning stage, but it is to be hoped that they will aid materially in ameliorating the present difficulties with which many countries have to cope as a result of their balance of payments positions.

### Government Controls

The Canadian Government has declared newsprint an essential commodity and subject to control under the Defence Production Act.\* Up to the present no detailed controls have been placed on the industry as there has been close cooperation of industry management with the government to make industrial objectives coincide with national needs.

Such minor forms of control as have been imposed are only those necessary to enable Canada to fulfill her international obligations and to place some brake on inflationary forces. The decision of the government to send newsprint to overseas countries on the recommendation of the International Materials Conference has been implemented by the Pulp and Paper Division of the Department of Defence, and a reporting system covering pulp supplies and future programs has enabled the Division to conduct negotiations with the United States government agencies.

### Investment and Research

During and since World War II Canada has had one of the fastest expanding economies in the world. Spectacular developments have taken place in manufacturing, oil and iron ore development; increase in population of 22% (compared with 16% in the United States); gross national product has increased by 81% in 1950 over that of 1939. The pulp and paper industry

has shared in this expansion, and in fact exceeds any of the other major developments. In 1945 the pulp and paper industry was capitalized at \$750 million; investment in pulp and paper mills between 1946 and 1950 were over \$360 millions for construction and machinery; plans for investment in 1951 totalled \$245 million. Total new investment planned for the industry between 1951 and 1955 is about \$600 million. This constitutes expansion from a capitalization of \$750 million to \$1,850 million in a period of ten years, and makes it the fastest-growing industry in Canada. 90% of this expansion has been financed by retained earnings. The rate of earnings on invested capital in the industry since 1940 has been high, but very little new capital has been attracted to newsprint productive facilities.

The above figures cover expansion in the pulp and paper industry, of which newsprint constitutes only a part. A characteristic of this industry is that over a period of twenty-five years the proportion of newsprint capacity to total paper capacity has steadily declined.\* During the 1920's newsprint capacity expanded very rapidly to meet strong demand in the United States, encouraged by very high world prices. After 1929, while the Canadian industry was still expanding rapidly, demand dropped and prices went down below average costs of production. Until 1940 production never exceeded 70% of rated capacity and no new installations were built. There was, however, some

\*23 pp.11-14

increase in production of kraft paper to meet an expanding domestic demand. This expansion decreased the percentage of newsprint production to total production.

The pulp and paper industry, in cooperation with the Canadian Government and McGill University, maintains the Pulp and Paper Research Institute at McGill University to conduct scientific research in all branches of the industry and to train personnel. Much emphasis has been placed on this phase of development since the end of the war, expenditures of the Institute in 1951 being more than six times the amount spent in 1947. In addition, many newsprint producers finance research projects in their own laboratories which contribute substantially to the general store of scientific knowledge in the industry.\*

## VI THE FUTURE OF THE INDUSTRY IN CANADA

### Europe's Diminishing Importance

The Canadian newsprint industry faces the future with much optimism. The world-wide shortage of wood which developed during the war curtailed not only the expansion but the continued production at previous capacity levels in Canada's foremost competitors - the Scandanavian countries, Germany and the United Kingdom. Although production of pulp-wood and woodpulp has increased considerably since 1945, the Preparatory Conference on World Pulp Problems held in 1949\* estimated that by 1955 European production of woodpulp would be able to supply only about 90% of the requirements of Europe's paper mills, and that in the near future northern Europe would become a net importer of pulp and paper. The most serious problem facing the pulp and paper industry all over the world is the increasing cost of wood\*\* as low-cost wood is becoming scarce. This is particularly true of Europe, where even in Western Russia the low-cost wood has been heavily cut.

In contrast, it is believed that the forests of

\* 13 p.91

\*\* 7 p.382

Canada could support a substantially larger production of pulp. This makes the Canadian newsprint industry less vulnerable to increasing costs than its competitors in northern Europe and the United States. Also, in the latter areas the newsprint industry must compete for wood with industries producing higher grades of paper and other cellulose products whose selling prices permit higher costs for raw materials.

#### Competition from Southern Pine and Alaskan Forests

The greatest immediate threat to Canadian dominance of the newsprint industry is the recent development of an economic process for converting United States Southern Yellow Pine into newsprint. This species reaches pulpwood size in ten to fifteen years, whereas the growing time of a pulpwood log in Canada is about forty years, and forms a huge potential source of wood. Two mills producing newsprint for consumption in the Southwest have recently begun operations and are believed to be economically successful. However, competition from the lumber, kraft and other wood-using industries may effectively limit the amount available for newsprint.\*

In Alaska the United States possesses another potential source of wood which could curtail demand for imports of newsprint from Canada. However, for the foreseeable future the remoteness of Alaska from the large consuming areas

\*13 p.110

of the East, and consequent high transportation costs, effectively limit its ability to compete. It is worthy of note that in 1950 a mill was built in Alaska to produce dissolving pulp for the rayon industry and the government of the United States is presently attempting to interest private enterprise in producing newsprint in the area.

### Potential Russian Exports

In the long run, the vast Russian taiga forms the greatest threat to the Canadian newsprint industry as it is the only larger source of raw material.\* Should the Russian government, with its controlled economy and almost unlimited reservoir of cheap labor, desire to expand newsprint production and enter the world market, it would be a very formidable competitor. However, for the foreseeable future Russia hardly constitutes a threat. No reliable statistics for Russia and its satellites have been available for ten years, but it seems safe to conclude that war destruction and dislocation, new military requirements, construction and other more essential activities, and the drive for literacy and higher living standards which will absorb increases in production, will place limitations on Russia's participation in international trade in newsprint for many years to come.

Exploitation of the vast wood resources and expansion

of the pulp and paper industry has been one of the major objectives of each of the Five-Year Plans, but never with any degree of success. Results usually fall far below stated objectives. It is likely that, for some time to come, the entire paper production of the U.S.S.R. will be absorbed at home. Offerings for export may be expected only in case of an emergency shortage of foreign exchange.

#### Australia and New Zealand

Australia and New Zealand have in the past been good customers of the Canadian newsprint industry. However, both these countries possess coniferous wood resources which could support a newsprint industry sufficient to supply domestic demand.

The forests in the mountains of Southeastern Australia and Tasmania support an efficient industry which produces newsprint, wrapping paper, fine papers and paper-board. This supplies the bulk of total paper requirements, but only about 15% to 20% of the demand for newsprint, a considerable part of the remainder usually being supplied by Canada.\*

New Zealand supports forests comparable to those of Oregon and British Columbia, with extremely rapid growth. Most of the land is government-owned and recently there has

has been very active interest in extending the forests by scientific planting and in establishing a pulp and paper industry, which in the future could compare favorably with that of the Scandanavian countries. However, production is at present limited to kraft and supplies only about 30% of total paper consumption.\*

#### Possible Use of Tropical Hardwoods

World hardwood supplies exceed those of softwood and constitute a tremendous potential source of raw material for the newsprint and other cellulose industries. As yet no economically and technically satisfactory method has been developed for making pulp from tropical hardwoods, although some temperate hardwoods have been utilized satisfactorily. The great diversity of forest types, poor transportation facilities, the enervating climate, unsatisfactory labor supply, and lack of industrialization and nearby markets appear to rule out the tropics for the near future at least.\*

However, poplar and beech are presently being pulped successfully in North America and Europe and Australia produces 30,000 tons of newsprint annually from eucalyptus and is increasing capacity rapidly.\*\* It is safe to assume that methods of processing hardwoods will continue to improve and may eventually produce a significant material.

\* 12

\*\*13 p.100

Many of the countries in Latin America and Africa which now are unable to import sufficient newsprint to satisfy their wants because of dollar shortages would greatly benefit by gaining access to non-dollar sources of raw materials,\* made available by economic pulping of tropical hardwoods.

### Scientific Forest Management

Another factor that could change the picture is the great increase in reforestation. For many years forests have been regarded as a crop in Europe, with harvesting restricted to the annual growth. Annual yields of the forests of Scandinavia and Germany have been increased appreciably by this method. The wood shortages which occurred during the war have greatly increased the interest of Canadian and United States producers of newsprint and other grades of paper in scientific forest management. It is believed that scientific protection and management could greatly increase the yield of Canadian forests and permit an increase in newsprint production.

At the present time the annual increment of the forests owned and leased by the Canadian newsprint industry can easily support present harvests. There is therefore little prospect of a curtailment in paper production because of a shortage of raw material.\*

\*20 pp.73-39

## Conclusions

The long-term growth of world demand for newsprint seems to be assured. It is difficult to foretell the rate of expansion or demand levels likely to be established in ten or twenty years, but it has been estimated by the United Nations Economic, Social and Cultural Organization that world demand may be at least 10 million tons by 1955, distributed as follows -

North America	5 million tons	
Europe	3 "	"
Latin America	600,000	"
Asia	750,000	"
Russia	300,000	"
Oceania	250,000	"
Africa and Near East	<u>150,000</u>	"
Total	10,050,000	" *

Existing world capacity is now about 9 million tons, and such projects for increasing production as are under way at present do not appear to be sufficient to meet estimated increasing demand. Most of the increases in production will probably be absorbed locally, and little account has been taken of increases in demand in the "under-developed" areas.

The long-term trend of consumption is decidedly upwards, and even without the war of 1939-1945 newsprint might have become a scarce commodity during that period. Productive resources are concentrated in a few countries. Expansion requires long-term planning and large capital investment.

Both production and distribution depend on the free flow of international trade which is at present impeded by currency shortages, and for this reason a decline in United States consumption would not automatically release supplies for soft currency countries. If this decline were brought about by a United States business slump the currency problem would be further aggravated and the newsprint shortage increased still further. In the short run the world newsprint shortage is inseparable from the currency problem, of which it is a part.\* The dollar shortage is now an effective curb on world demand for Canadian newsprint.

During the interwar period there was a steady increase in world demand for newsprint and paper products in general as literacy and standards of living rose. Since World War II the increased interest of many governments and the United Nations in increasing literacy and raising world standards of living will provide a broadening base of world demand. The long-term trend of demand in the United States is undoubtedly upward, but probably at a much slower rate than that of 1940-1950, when demand increased at an average rate of about 10% each year. World demand as a whole increased at a more rapid rate than that of the United States during the 1930's and presumably will again if the currency difficulties are removed. In the future the greatest increases in demand will probably come

\*13 p.110

from countries which at present have a low per capita consumption. Paper is one of the principle mediums through which ideas may be expressed and is the chief medium of teaching and learning. Consequently, as literacy spreads, as industrialization increases and as the growth of political consciousness stimulates the desire to exchange ideas, the demand for paper - defining demand as the full amount which should be available for education and information, representing the real desires of the community - may exceed present world production and capacity. But with productive resources and facilities concentrated in a few countries, distribution - and the expansion of production - depends on the free flow of international trade which is now impeded by shortages of the currencies of the producing countries.

While social needs play no direct part in an economic survey, it is essential to remember their existence and that they are the real requirements of social progress and world peace.

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