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**APPROPRIATE TECHNOLOGY
FOR THE MANUFACTURE OF
PULP AND PAPER PRODUCTS**

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FOREST INDUSTRY POLICY AND CHOICE OF APPROPRIATE TECHNOLOGY
Background Paper

FOREST INDUSTRY POLICY AND CHOICE OF
APPROPRIATE TECHNOLOGY

by

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SYNOPSIS

The purpose of this primarily methodological paper is to study the problem of how the government in a less developed country can influence the choice of appropriate technology in its forest products industry.^{1/}

To understand the nature of this problem we are first looking into the early experiences of Sweden and Canada. We study especially the formative years of the forest industry in these two countries, which might have some similarities with the development situations in LDC's.

By analyzing a number of success stories we will attempt to show that the key role of the government is the removal of constraints. Over time these constraints have changed and different government interventions have evolved to achieve this removal.

The second step in this paper is the study of the overall global structure of some subsectors of the forest products industry. For pedagogical reasons we have concentrated our analysis on one sector, namely kraftliner and corrugated boxes, and more briefly sketched two other subsegments, namely newsprint and fine paper. Here we show

- that each such subsector has its own logic consisting both of certain techno-economic

1/ The theoretical background to this paper is described in Appendix 1 "Elements of a Frame of Reference".

constraints and the way various actors in the industry have interpreted and embodied these constraints. Over time this overall logic goes through different stages of development.

- that this overall industry logic breeds an international set of actors with a variety of strategies (including choice of technologies) but always in consonance with the overall industry logic.

The analysis of these global sectors leads us to the conclusion that industries can be seen as systems of actors.

This model of industries as systems of actors having a variety of strategies reflecting an overall internal logic of the system is applied in the third part of the paper in a model of the situation of the government planner in LDC's. By analyzing a few ideal types of situations, we attempt to show that the model of the industry logic we arrived at in the second step, can be used as a tool by the government planner both to identify the development constraints of a particular situation and to select the international partner best suited to achieve the appropriate technological solutions.

PART I: EXPERIENCES OF FOREST INDUSTRY DEVELOPMENT

Our concern in this section is to analyze the relation between government policy and the development of the forest industry. The methodology we will apply is to analyze a number of success stories and failures in the development of the industry from this point of view, using the Swedish and Canadian industries as cases. The Development and key characteristics of the Swedish and Canadian forest industries are described in Appendices 2 and 3 to this paper. Some data about the development of the general economic development and government policies are also given in these Appendices.

CHAPTER 1. EXPERIENCES FROM THE SWEDISH FOREST INDUSTRY

The following success stories will be discussed

1. The establishment of the early sawmilling industry and the great expansion from the 1850s to the 1890s.
2. The creation of the Swedish pulp industry and its rapid expansion from the 1890s and the development of a world leading role as pulp supplier.
3. The development of the Swedish forest industry to become the leading supplier of forest products to the Western European market after World War II.

Rather than discussing failures - which are not very spectacular in the Swedish development - we are going to analyze some dilemmas in the present situation of the forest industry in the perspective of government policies.

1.1 The Establishment of the Early Sawmilling Industry

From the history in Appendix 2 we can identify the following factors as being of importance during this phase (Exhibit 1:1).

<u>Key Elements and Driving Forces</u>	<u>Swedish Government Policies</u>
<ul style="list-style-type: none">- Great demand in Europe, especially UK, for lumber.	<ul style="list-style-type: none">- Adoption of trade supporting policies.
<ul style="list-style-type: none">- Norwegian sources insufficient and already exploited.	<ul style="list-style-type: none">- Government initiation to clear rivers and organize floating.
<ul style="list-style-type: none">- Introduction of steam saws, made location to river mouths along the coast of Northern Sweden possible.	<ul style="list-style-type: none">- State forests transferred to private owners.
<ul style="list-style-type: none">- Availability of cheap high quality timber, easily accessible through river floating.	<ul style="list-style-type: none">- General laissez faire policies allowing foreigners and foreign capital to operate in Sweden.
<ul style="list-style-type: none">- Ruthless entrepreneurs, often connected to merchant houses that financed investments and had access to foreign markets.	<ul style="list-style-type: none">- Railways built to supply Northern Sweden with food-stuffs, etc.
<ul style="list-style-type: none">- Availability of skilled and unskilled labor from Norway and Southern Sweden.	

Exhibit 1:1. Early sawmilling period - driving forces and government actions.

The story of the sawmilling industry in the 19th century, the very start of the modern Swedish forest industry, is thus characterized by an abundance of driving forces - in the market as well as in the resource side (forest resources, labor, etc). Different types of government actions and policies had direct implications for the development - general policies such as the free trade and general "laissez faire" attitude, initiatives and actions to develop infrastructure (railways, floating systems) as well as land use and ownership policies.

Government policies thus functioned to remove some of the constraints that were blocking the development

of this industry. It became possible to organize and get access to foreign markets and capital since foreign entrepreneurs were allowed to come in, export tariffs from the old mercantilistic system were abolished. Improved infrastructure made it possible to sustain a labor force big enough, get access to large volumes of cheap timber, etc.

1.2 The Creation of the Swedish Pulp Industry and Its World Leading Role

In about twenty years - from the early 1890s till the Great War - Sweden became the world leading supplier of market pulp. From the history in Appendix 2 we can distinguish the following key factors in this development (Exhibit 1:2):

<u>Key Elements and Driving Forces</u>	<u>Swedish Government Policies</u>
- Rapidly increasing demand for paper in the late 19th and in early 20th centuries.	- Basically the free trade policy continues.
- Chemical pulping innovations introduced in the late 19th century.	- Training of chemical engineers at the Royal Institute of Technology started in 1876.
- Abundance of spruce and small timber apt for pulping in Central and Northern Sweden.	- The location and forest allotment policy vis-à-vis the iron works during the 17th and 18th centuries.
- Iron works, the "bruk" companies in Central Sweden and Southern Norrland become the early entrepreneurs, controlling forests and having a well-fitting management culture for capital intensive pulp production.	- Further development of infrastructure. Government heavy borrower of foreign capital.
- The big sawmilling companies in Central and Northern Sweden, especially after the turn of the century, also went into pulp making.	

Exhibit 1:2. The pulp era - driving forces and government actions.

The driving forces were remarkably strong during this period - both in the market side and as regards resources. Organizers of the new industry were available with steel mills and the old "bruk" companies as the pioneers of the industry. Their traditional business was declining, which left a surplus of forest resources from earlier charcoal use at the same time as it stimulated the interest of these companies for entering new ventures. It is interesting to observe in this context that forest policies implemented by the government long before the emergence of the pulp industry to secure long run wood supply for the steel mills, later payed off when the regenerated, man-made forests could be used for pulp.

During this period, however, government policies and actions were very little geared to have a direct effect upon the industry. General policies worked in favor of the industry though, e.g. the further development of the infrastructure (railroads, higher education, etc), foreign loans which left the domestic credit market free to be channeled via the commercial banks to the pulp sector and other industries. Thus important obstacles to the development were removed by the help of government action.

The policies specifically directed to the forest industry during this period, e.g. the enactment of the first forestry law and introduction of mandatory forest regeneration regulations, the ban on forest land acquisition by companies of forest land from the farmers, were more a reaction to the growth and some of the social dysfunctions of the industry development than having any direct implications for or contributing to the development of the industry. These policies and actions had more of a long term effect upon the industry.

1.3 Sweden Becomes a Leading Supplier of Forest Products to Western Europe

After a period of transition during World War II and up through the middle of the 1950s a new expansion phase started, which led to the development of Sweden as a leading supplier of bulk papers and forest products to the Western European market, reaching its peak in 1973/74 (Exhibit 1:3).

<u>Key Elements and Driving Forces</u>	<u>Swedish Government Policies</u>
<ul style="list-style-type: none">- Great demand for bulk packaging and printing papers and construction material in the rapid economic development of Western Europe from the 1950s onwards.	<ul style="list-style-type: none">- Joining EFTA and later association to EEC.
<ul style="list-style-type: none">- Large untapped man-made forests, especially in Southern Sweden, but also elsewhere.	<ul style="list-style-type: none">- Forestry law in 1904, amended in 1927 and 1947.
<ul style="list-style-type: none">- Closeness to European markets and exploitation of scale advantages through concentration of production to large, new pulp and paper (and sawmill) complexes give cost advantages to other producers.	<ul style="list-style-type: none">- Regular forest surveys carried out by the College of Forestry on behalf of the government.
<ul style="list-style-type: none">- Forest owners' cooperatives become a new and very significant type of actor, boosting the development of industry capacity directly through their own investments and indirectly by stimulating the existing industry to invest.	<ul style="list-style-type: none">- "Active" labor market policy helps reallocate people.- Investment funds give tax breaks for investment in machinery.- Government assigned Forest owners to organize fuel wood supply during the war.

Exhibit 1:3. Western European growth period - driving forces and government actions.

The expansion during this phase was more rapid than in any other period in terms of capacity additions and volume growth, e.g. doubling the pulp capacity from about 5 to about 10 million tons between 1960 and 1974. Government policy was not specifically directed to the forest industry, although paper and forest products were important negotiation items in EFTA and EEC agreements. Government policy can be characterized as selective - trying to achieve certain specific goals such as migration and reallocation of labor, support to consolidation and capital formation in going concerns - rather than general demand expansion and contraction policies. To level capacity utilization over the business cycle the Investment funds became an important instrument.

Once again a number of obstacles were removed by the economic policy - such as tariff restrictions, the difficulties of achieving high investments under heavy pressure from the labor force for wage increases, etc. As a matter of fact government actions tended not only to remove obstacles but to reinforce the "natural" driving forces and thus speed up the development.

A couple of forest industry related government actions before this period are worth mentioning. The first is the introduction of forestry laws at the beginning of the century and the successive implementation and enlargement of it. This helped create the abundance of forest resources. The other thing was the assignment of fuel wood supply during World War II to the newly formed Forest Owners' Association. That helped them get organizational stability and capacity to play a major role in the expansion of the forest industry in Southern Sweden.

1.4 A Comparison between the Three Success Periods

The driving forces have been strong in all periods, emanating especially from the export markets. For centuries export has been a characteristic feature of the Swedish economy at large. Incentives have been at hand in the market to stimulate entrepreneurial efforts. It has been possible to establish a good fit between type of actors to organize the business and the logic of the business in all three periods. Government policies have focused on removing constraints to the development by playing skilfully on the socio-political forces represented by popular movements such as the labor unions and the Forest Owners' Associations. We can thus distinguish three cornerstones in the development of the Swedish forest industry (Exhibit 1:4):

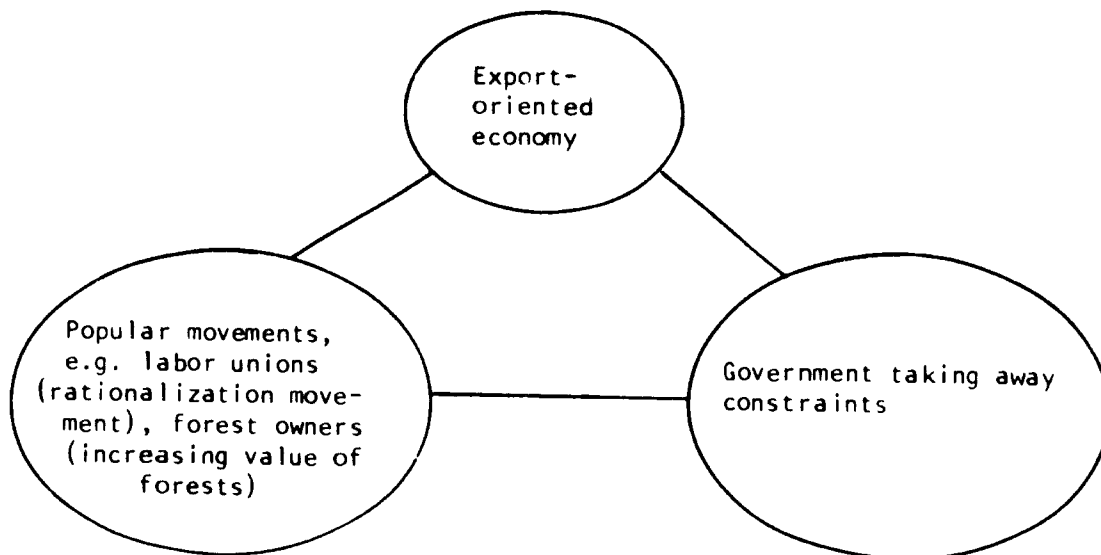


Exhibit 1:4. Three cornerstones in the development of the Swedish forest industry

It is important to observe, however, that business success has been based on logically different things in the three periods and that the development constraints have been different from one period to the other. The success achieved in the three periods is thus due to the fact that there has been a fit between the needs of the business and the government's ability to remove relevant constraints (Exhibit 1:5):

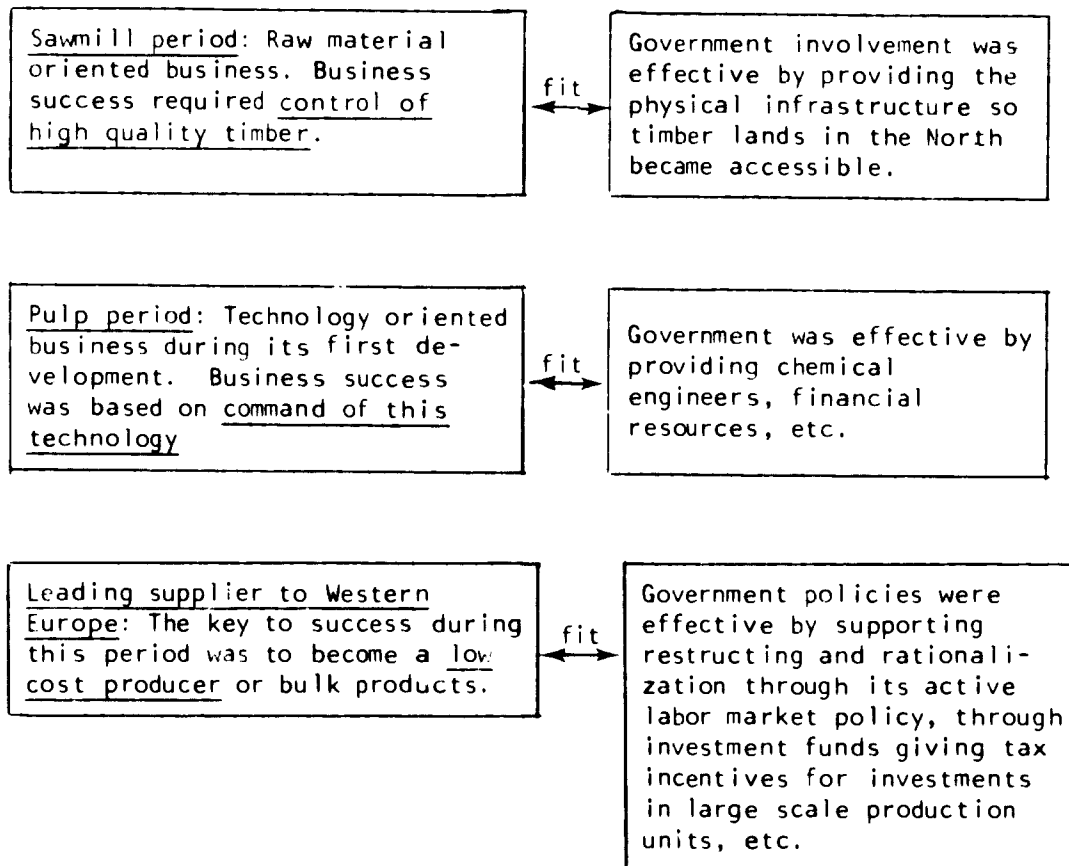


Exhibit 1:5. Consonance between government policy and business requirements in three different periods of Swedish forest industry development

The success of the government policies is thus a result both of its ability to remove relevant constraints and its ability to adapt from one period to the other. The character of the bottlenecks/constraints varies in relation to the nature of the business and the overall development stage and sophistication of the industry as well as the society at large.

1.5 Some Dilemmas in the Present Situation of the Swedish Forest Industry

After the boom in 1973/74 the Swedish forest industry is faced with a new situation that is not only due to an ordinary business recession. There are also some important structural changes in the present picture:

- Forest resources are now fully utilized in Sweden. Downstream capacity exceeds wood fiber production on a sustained yield basis.
- Due to high wood costs but also rapidly increasing labor costs, especially because of much slower improvement or even decline in productivity, the Swedish industry is no longer a low cost producer for some traditionally strong products in the European market.
- The decline in cost efficiency relative to overseas producers (especially in the US South) has been larger than transportation cost differences to the European market for several products.

- New actors have also entered the European market in several forest products - tropical hardwoods replacing Swedish softwoods, kraftliner from Portugal competing with Swedish liner, short fiber pulp is coming in from Portugal, Spain, Brazil, etc.
- Market growth has retarded in Western Europe, especially for the traditionally important products of the Swedish industry, such as sack paper, kraftliner and other packaging grades. This is more the case in Northern Europe than in the Southern parts of Europe, where transportation advantages compared to US producers are less.
- For printing and writing grades where demand is still growing, the Swedish export capacity is relatively small. However, the conditions for growth in this segment are very different from those prevailing when the big expansion of the packaging grades took place in the 1960s. Then the traditional industry in Western Europe was fragmented and insignificant and the market offered many alternatives. Now, in printing and writing papers, the industry is well developed in Europe and even dominating the market. Slower overall economic growth also makes restructuring more difficult than in packaging grades during the 1950s and 1960s.

From a government policy point of view the situation is very different from the earlier periods we have analyzed. The strong driving forces are not there or have shifted radically. There is no strong demand in the form of market pull for large bulk quantities. There is no cheap, unutilized wood available. Instead

of expanding demand in Western Europe, new market growth can be found in more remote areas and scattered over different places around the world. Instead of abundance of relatively cheap wood there is now an oversupply of technical capacity (engineers, know-how, etc) since expansion of production facilities is over.

The new situation of the industry thus implies that the requirements for success have changed. It also means that the requirements on government policy have changed. This paper is not the proper place to further develop the diagnosis of the present situation of the Swedish forest industry and recommend what the Swedish government should do. However, is the policy issue to try to do something about the lack of driving forces, is it a matter of mobilizing missing actors or is it a matter of trying to remove some kind of constraints?

CHAPTER 2. EXPERIENCES FROM THE CANADIAN FOREST INDUSTRY

We will concentrate our analysis of Canada to one success period - the development of the forest industry of the interior of British Columbia - and one example of failure - the case of Labrador Linerboard (see also Appendix 3 for background analysis).

2.1 The Development of the BC Interior Industry

The development of the BC interior came relatively late. From the history in Appendix 3 we can distinguish the following important factors during this development (Exhibit 2:1).

In only a short period of time, about seven years, pulp production capacity increased rapidly, from scratch to some 3 million tons per year. Several categories of actors were involved.

- backward integrating companies, Japanese, US and European
- international pulp producers such as Weyerhaeuser and International Paper
- local producers, mostly large sawmill operators

<u>Key Elements and Driving Forces</u>	<u>Canadian Government Policies</u>
<ul style="list-style-type: none">- Growing demand for softwood pulp in the US, Japan and Europe in the 1960s.- Abundance of softwood forests in BC interior.- Availability of basic infrastructure, e.g. rail-road to Vancouver seaport and to the Midwest markets.- Regional development ambitions of the government to<ul style="list-style-type: none">- support existing sawmill industry- increase employment- anticipate full utilization and depletion of coastal forests.	<ul style="list-style-type: none">- Granting of timber concessions against commitment by concession holder to build pulp mill within certain time limit.- Determination of stumpage charges on a value added basis (sales price - manufacturing costs).- Regulation of wood chips prices to protect independent sawmillers.

Exhibit 2:1. The BC interior development - driving forces and government actions

Strong driving forces in the market released this entrepreneurial energy and attracted actors, mostly from outside. But how come that the domestic companies and those established in the coastal region did not organize or involve themselves in this development?

Our interpretation is that the constraint was the dilemma of the marginal mill. A new mill in the BC interior would produce only at marginal costs higher than for existing mills. The government removed that barrier to some extent by making stumpage prices dependent on value added in the pulp mill. But this worked differently for the domestic pulp mills and the outsiders. The outsiders could use the BC mills as marginal mills and swing utilization rate in relation to the business cycle variations so that

their home base mills could be kept on a high and even operating rate. For the established BC pulp producers it was much more difficult to differentiate between their mills in the coastal region and those in the interior - for labor market reasons, etc.

2.2 The Failure of Labrador Linerboard

LLB (Labrador Linerboard) is one of several export oriented mills set up on the initiative of the government that has ended in failure during recent years. LLB came on stream in 1972 and closed down in 1975, after a little more than two years of operation. The main driving forces and key constraints behind this development are listed in Exhibit 2:2 as well as some government actions.

LLB illustrates the problem that Government is facing when driving forces are not strong enough or when the marginal costs of a new mill is too unfavorable compared to other mills (especially in the US South). The government managed to attract an entrepreneur but the problems of being a marginal mill in the market remained. LLB was the most vulnerable liner mill to variations in the liner market. This problem was better handled in British Columbia where backward integrating actors such as the Japanese companies were relatively independent in relation to the international business cycle.

<u>Driving Forces</u>	<u>Key Constraints</u>	<u>Government Actions</u>
<ul style="list-style-type: none">- Local employment problems after closing down of US army base in New Foundland.- Unexploited forests in Labrador.- Strong growth of liner market until 1974.- Strong local political powers.- Availability of regional development.	<ul style="list-style-type: none">- Established actors in New Foundland (newsprint companies) controlled timber rights.- No established local or kraftliner producers interested.- Inadequate infrastructure for wood procurement.- Marginal mill in US South more cost efficient.- Total problem separated in Government between Ministry of Lands and Forests and Ministry of Industry and Commerce.- Unions short term wage increase oriented.	<ul style="list-style-type: none">- Invited actors to invest with no connection in liner industry.- Financial support to cover investment costs and operating losses.

Exhibit 2:2. The failure of Labrador Linerboard

CHAPTER 3. CONCLUSIONS OF THE COUNTRY ANALYSES

The analyses of some success periods and dilemmas in the development of the Swedish and Canadian forest industries makes it possible to draw the following conclusions (see also section 1.4 "A Comparison between the Three Success Periods" in the Swedish development).

1. Government involvement seems most efficient when it is focused on removing development constraints.
2. The nature of these constraints varies from one subsegment to the other of the forest industry.
3. The nature of these constraints also varies over time in relation to the development of a particular country and in relation to a particular subsegment of the forest industry.
4. Government policies and involvement in successfully removing development constraints thus require adaptation both to different situations at a particular point in time and to their dynamic changes over time.

PART II: THE GLOBAL STRUCTURE OF SOME SUBSECTORS
OF THE FOREST PRODUCTS INDUSTRY

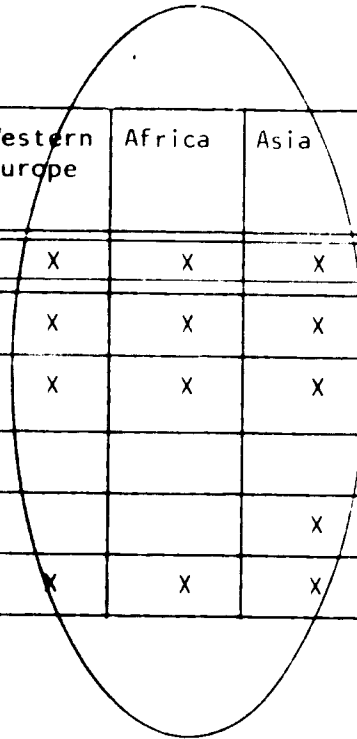
The forest products industry includes a wide variety of subsectors - all with its own characteristics, internal logic and degree of globalisation. We will concentrate our analysis to a selection of three such subsectors, namely:

- kraftliner and the corrugated container industry
- newsprint
- other printing and writing papers

For pedagogical reasons we will analyze the global structure of kraftliner and the corrugated container industry in depth. This makes it possible to cover the remaining two product groups more briefly. At the end of this part we will attempt to outline some summary conclusions.

CHAPTER 4. THE GLOBAL SITUATION OF KRAFTLINER

In the world market for kraftliner we find the following pattern of interdependencies between supplying industries and market regions.



Market regions Supplying industries	North America	Western Europe	Africa	Asia	Latin America	Australia
USA	X	X	X	X	X	X
Scandinavia		X	X	X		
Canada	X	X	X	X	X	
New Zealand						X
Japan				X		
Others		X	X	X	X	

Exhibit 4:1. Supply pattern of kraftliner (1976)

The supply pattern clearly shows the global character of the kraftliner industry - the North American and Scandinavian producers are suppliers to several continents. However, the only genuine world-wide actor is the US industry. How come that the US liner companies are dominating world-wide and what are the implications of this situation for the future industry structure?

Exhibit 4:1 also reveals that international competition is most pronounced in Western Europe, Africa and Asia - these areas are the "battle fields" for the global liner producers. What is the nature of this competition - what are the rules of this game? Who are the main actors/competitors?

The supply pattern gives a static picture of the present situation. How is the industry changing and what are the implications for new entries?

In this chapter, we are analyzing the kraftliner business, emphasizing its character as a system of actors (companies) that take actions and develop strategies within a number of constraints (technical, economic and social). "Some Basic Characteristics of the Kraftliner and Corrugated Board Industry" gives a background picture (Appendix 4).

4.1 The Historical Development and the Dominance of the US Kraftliner Industry

Exhibit 4:2 shows one aspect of the historical development of kraftliner by comparing the accumulated kraftliner production in US and in Sweden, thus illustrating the massive dominance of the US industry.

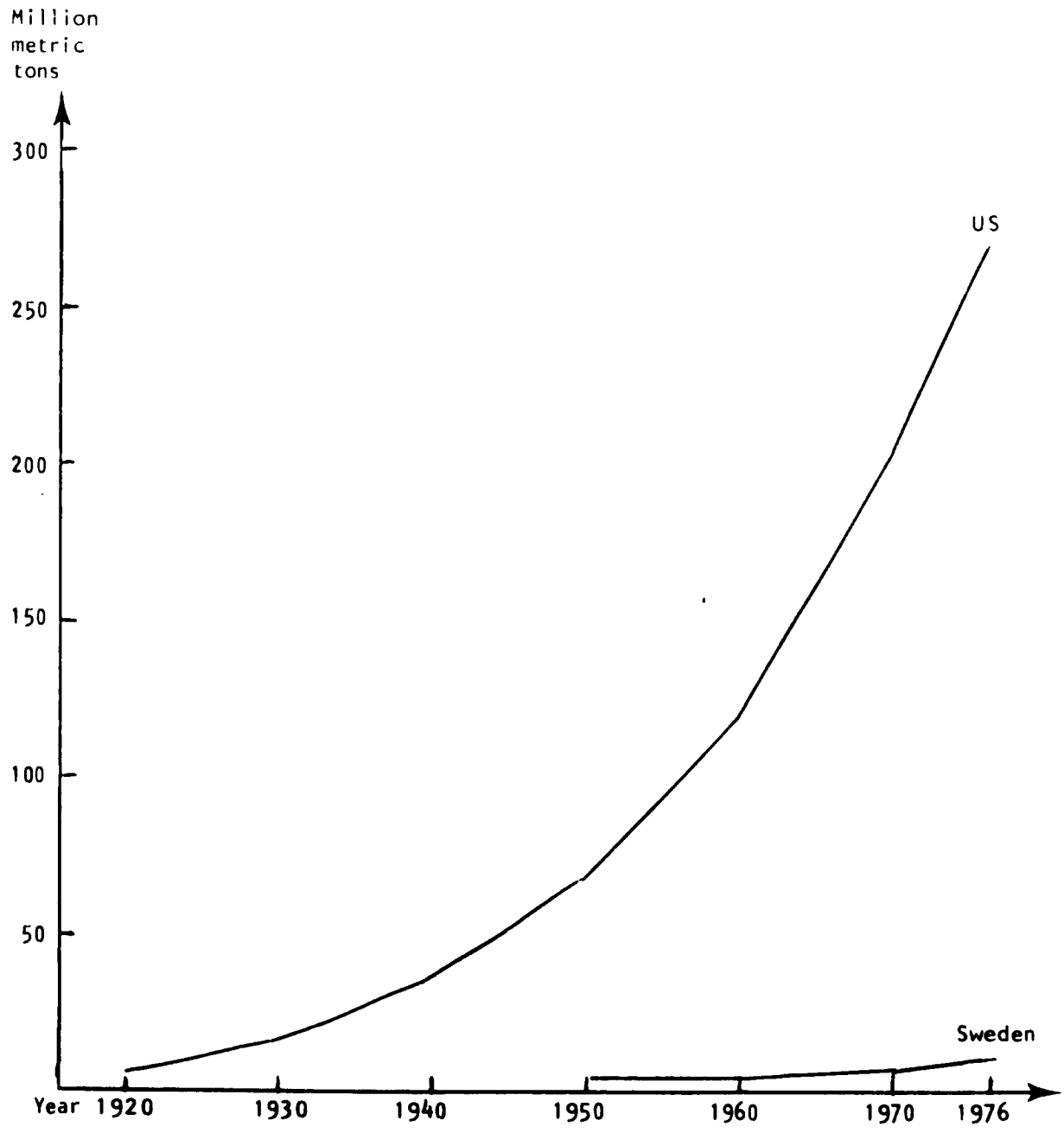


Exhibit 4:2. Accumulated kraftlinerboard production

The fact that the kraftliner industry originated in the US was very important for its development and present situation. Very strong driving forces were at hand in the US environment in the early 20th century:

- the US industry was leading in developing the packaging technology
- the exploitation of the rich US South fiber resources
- the emerging large US market for packaging materials

Development of Packaging Technology

While Europe has been the cradle for the modern paper technology, the US have dominated the paper board and packaging development.

Corrugated board (the principle of having one corrugated layer of paper combined with a ply of liner on one or both sides) was patented already in 1871. Before kraftliner was introduced something called jute liner was used. At first jute liner was produced from jute fiber but later from a combination of waste paper and virgin kraft pulp imported mainly from Sweden. Kraftliner technology then developed with the following key steps in the US:

- 1910 First kraft pulp mill established in the US.
- 1911 First kraft wrapping paper mill was set up in the US South utilizing young trees of southern pine which was found possible

to pulp (the high pitch content of the older trees had made it impossible to use southern pine with good results earlier).

- Ca 1920 A boxboard company in Chicago, The Auglaize Box Board Company, showed that it was possible to make liner out of 100 % kraft pulp by using imported Swedish pulp.
- 1923 First kraftliner mill started in Virginia.
- 1927 First kraftliner mill started which combined the kraft pulp process with the new Fourdrinier paper machine.

In the late 1920s, the corrugated box got its final breakthrough in the market when the US railway companies finally gave in (1927) and accepted it as a transportation material. The railway industry had strongly opposed the corrugated box, claiming that it was not strong enough to stand the abuses of railway transportation, but in fact the reason was to a large extent to protect their own side business of producing wooden crates. This breakthrough led to a rapid expansion for corrugated boxes and a mushrooming of kraftliner mills in the US South during the 1920s and 1930s.

The Availability of Fiber

The new pulping technologies had opened up forest resources in the US South which to a large extent was exploited for kraftliner production. The fiber production of the US South is still ongoing with a potential for increasing it in the years to come. The US South is also the most cost efficient wood fiber producer because of good natural conditions

and a well developed infrastructure. The physical properties of the fiber of the southern pine match the quality requirements of kraftliner, and are especially well fitted for the production of kraftliner.

The Size of the US Market

The consumption of corrugated boxes is of course closely related to the size of the total economy and its growth. In addition, one important factor has been the large degree of regionalization of the US industry. The distribution of various types of industries to different regions in the US has generated needs for long distance transportation and thus a demand for containers. This is one reason for the fact that per capita consumption of corrugated containers in the US is twice as large as in any European country.

The size of the US packaging market has also been a good breeding ground for the development of very large companies. Less than 20 US companies thus control more than 70 % of the world's kraftliner industry.

4.2 The Business Logic of the Kraftliner System

Although there are differences from company to company, some of the basic logic of a bulk commodity product like kraftliner is heavily influencing the marketing strategies.

For an undifferentiated product like kraftliner, the price is more or less given and cost efficiency therefore is the key to success. The relevant cost

here is the cost of the product when it is delivered to the customer. To achieve favorable production and distribution costs the following factors are important:

1. Low cost of production factors (raw material, labor and capital). By low cost of raw material it is important to observe that low stumpage value is not enough but the cost of the raw material when transformed into kraftliner. Thus, the efficiency by which it is logged and delivered to the mill, its yield in the production process and fitness of the fibers to the desirable liner properties are important factors. In the case of favorable capital costs, the availability of a well developed infrastructure which is shared by other industries is very important.
2. Economies of scale and a high and even capacity utilization are crucial success factors, since the production technology is capital intensive.
3. Efficient and low cost distribution through closeness to market and access to an efficient transportation infrastructure.

A Note on the Marketing Strategy of a Bulk Commodity Producer

The factors mentioned above are more or less equally important to any bulk commodity producer. They often lead to the following market pattern (Exhibit 4:3).

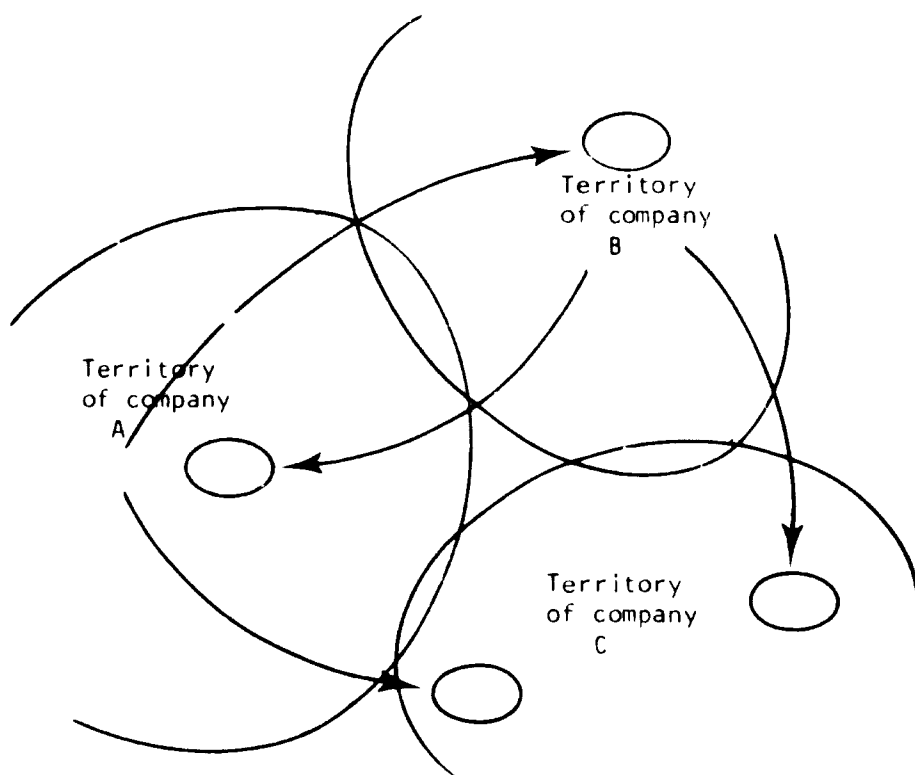


Exhibit 4:3. Market pattern of bulk commodity producers

Each company tries to establish its market territory where it is more cost efficient than the others. To keep other companies out and maintain stability over the business cycle and other disturbances, each company tries to deter invaders from coming into its territory, e.g. by the following measures:

1. Company A sells small portions of its production in the territories of company B and C to keep them reminded of the danger of doing stupid things in company A's territory, e.g. by trying to dump surplus quantities in a business recession situation. Company B is doing the same thing. Sometimes only the threat of coming

into the other company's territory, by keeping a sales office there for instance, is enough to maintain stability. In a bulk commodity type of market, marginal amounts at a lower price can reduce the price level in the whole market.

2. To keep invaders out in the long run - provided company A is able to maintain a favorable factor cost situation - the capacity enlargement strategy is very important. Once company A has increased its capacity it is difficult for the others to squeeze company A out of its territory. The timing of these investments is critical, since a too early enlargement would lead to low utilization and high capital cost per unit. Therefore, the strategy of announcing capacity enlargement, e.g. the forthcoming construction of a new kraftliner mill, becomes an important instrument to keep invaders off.
3. Integration forward by bulk commodity producers into the converting operations is another important means of stabilizing the territory. Since forward integration is very common among kraftliner producers, we should take a closer look at this strategy in the next section.
4. A global bulk commodity market often turns into an oligopolistic market, where some kind of organized stability is prevailing. This stability is determined by the cost efficiency situation of each company but also by the way the oligopolists learn to take on specific roles in relation to each other. Each company

seems to develop its role by learning what its strengths and weaknesses are in relation to the others but also by learning how it is perceived by the other companies. This learning process - with its elements of communication and negotiation - takes place when various measures are tried in the market place: acquisition of box plants in the case of liner producers, pricing strategies, capacity announcements and enlargements, etc. All these measures and activities function as signals,^{1/} as language of communication between the actors in the market.

The Strategy of Forward Integration

Integration forward by kraftliner producers is a very powerful instrument to enlarge and stabilize the market territory. The kraftliner producer gets a captive outlet for its production. Empirically its usefulness has turned out to have three important limitations, however:

1. The integration thrust spreads to other kraftliner producers. If one company integrates forward, the others must follow (the logic of the terror balance). This has happened in the US as well as in Europe. But the liner producers also meet resistance from box makers and packaging companies which are strong enough to resist take-over bids and which have grown themselves by acquiring additional box plants and in some cases even integrating backward into liner production.

1/ What we refer to here thus is different from sheer collusion between producers in a certain industry. Cartelization has been practiced among Scandinavian producers but in the US all attempts in that direction are strictly forbidden and closely controlled by FTC.

2. Forward integration into box making in some peripheral parts of the territory might bring a situation where the opportunity cost of kraftliner from in-house production is getting too high in relation to closer producers or in relation to testliner producers (the Finnish liner producers have experienced this in the Mediterranean area and have been forced to withdraw from the box plants in that area).

3. Box making is also a different type of business than kraftliner. The success factors are very different in these two types of businesses. For the kraftliner producers that have integrated forward, it has turned out to be difficult to manage the box plants, especially to organize a net work of box plants spread out over several countries and continents. But there are also successful exceptions, and the forward integrated company probably has a lot to learn from some of the backward integrated ones, which have built their success on being skilful in the box making business.

However, there are a large number of kraftliner producers (as well as semi-chemical producers) that have integrated forward into the corrugated board business. Exhibit 4:4 indicates that at least ten US, two Canadian and three Scandinavian liner companies have fully or partly owned foreign box plant subsidiaries.

Liner Producer	Box Plant Holdings: UK & Ireland	Denmark	Germany	Holland	Belgium	France	Switzerland	Austria	Italy	Spain	Greece	Latin America	Other countries
International Paper	X					X			X	X			Canada
Weyerhaeuser					X	X						Guatemala	South Africa
Container Corporation				X					X	X		Mexico Venezuela Colombia	
Continental Can			X										
Boise Cascade								X					
St Joe	Ireland												
St Regis	X	X				X					X	Nicarag. Equador Suriname	South Africa
Mead			X							X			Lebanon
Union Camp						X				X			Israel
Owens - Illinois			X									Mexico	
Consolidated Bathurst			X										
McMillan Bloedel	X			X									
ASSI	X	X					X						
SCA	X	X	X			X							Nigeria
ENSO													Morocco

Exhibit 4:4. Large liner producers with corrugated board subsidiaries abroad^{1/}

1/ Minority holdings are included as well. Since data are collected from various sources, the list of subsidiaries is to some extent incomplete.

It is possible to distinguish between at least two categories of integrated companies - the forward integrated (most of them) and backward integrated ones (Container Corporation, for instance). The strategy behind the forward integrated company is often a "liner-push-strategy" with box plant holdings in large (but mature) liner consuming countries (like Northern Europe). It is interesting to observe how a backward integrated company like Container Corporation is deviating by having its box plants also in other places than large kraftliner importing countries. The policy behind that is explained by the chairman of Container Corporation in the annual report a few years ago:

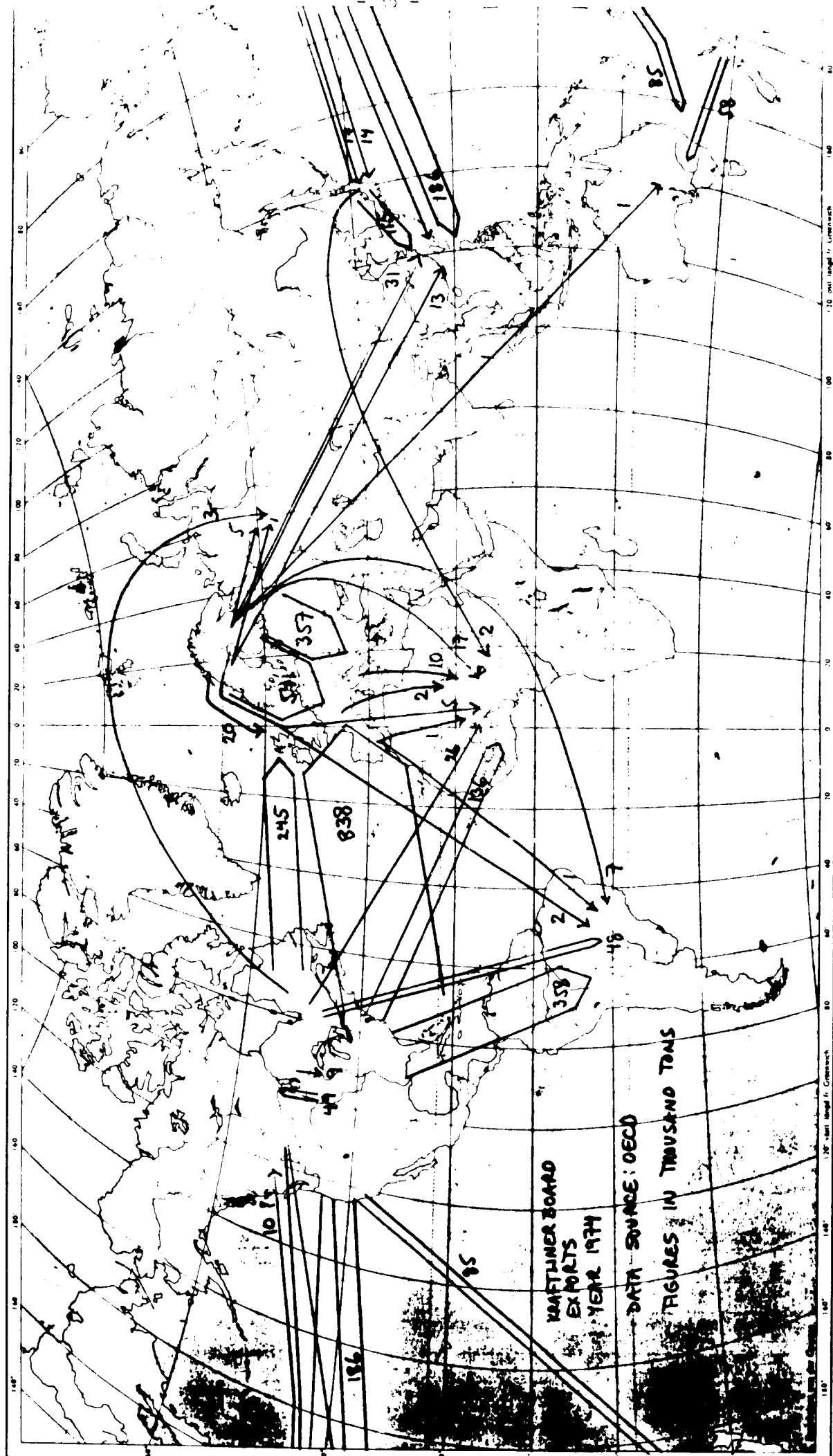
- As a matter of conscious policy, we have sought from the beginning of our international operations in 1944 to participate primarily in developing nations which offer us opportunities to contribute management ability, packaging technology, and marketing know-how not available from local sources. We have sought to share these talents with local nations and, with the development of indigenous raw material sources, share in the benefits of expanding economies.

A Note on the Nature of the Market - Stable vs Spot Markets

This basic logic of the liner producers' strategies applies very differently in various markets. Some markets are big and close and thus attractive for the companies to supply. Others are too small and too distant to get any producer to really bother. The first type of market will get its stable suppliers, while the other type of market will become a spot market - served on an ad hoc basis with extremely varying prices, delivery times, etc.

The differences in supply pattern of the big, stable markets and the smaller spot markets are illustrated by comparing the following two diagrams showing world flows of kraftliner exports in 1974 (business boom) and 1976 (recession) (Exhibits 4:5 and 4:6.) Several non-permanent suppliers (mainly Mediterranean middlemen) are active in 1974 but have disappeared in 1976.

As some markets are growing they become interesting enough for the kraftliner producers to serve on a more permanent basis and to organize to get a territory established. Such areas can be found, e.g. among fruit producing and exporting countries, such as the "Banana Republics", Israel and the Canary Islands (as can be seen in Exhibit 4:7). Several of the large US liner producers have also holdings in box plants in these areas to achieve stability.



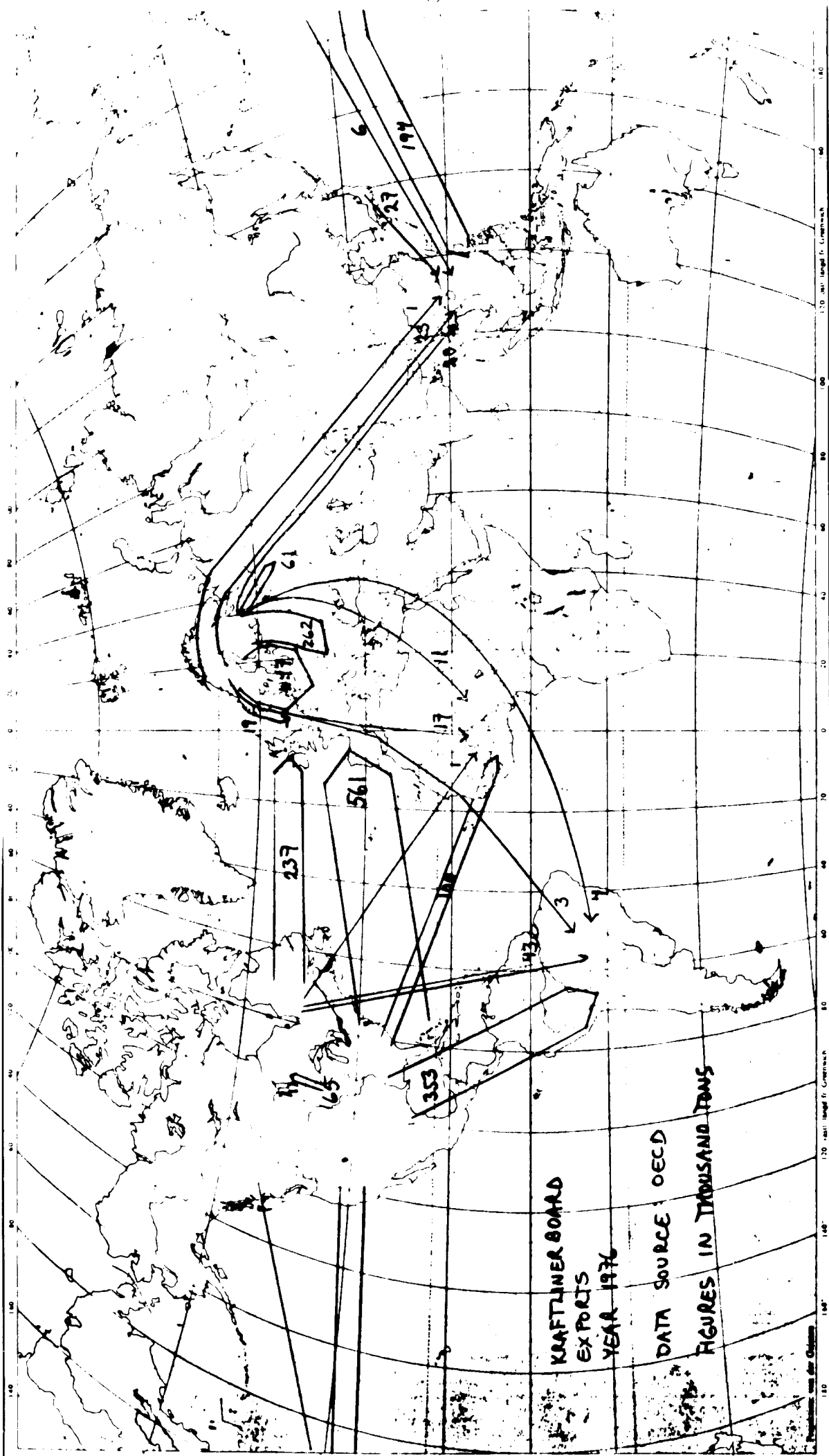
MARITIMER BOARD
 EXPORTS
 YEAR 1974

DATA SOURCE: OECD

FIGURES IN THOUSAND TONS

180° 160° 140° 120° 100° 80° 60° 40° 20° 0° 20° 40° 60° 80° 100° 120° 140° 160° 180°
 GENERALSTÄMENS LITOGRAFISKA ANSTALT KARTFÖRLAGET
 Adresserna förmedling AB
 GLA & KONTORERNA nr R 2630
 Artilleri nr 275 118

Exhibit 4:5.

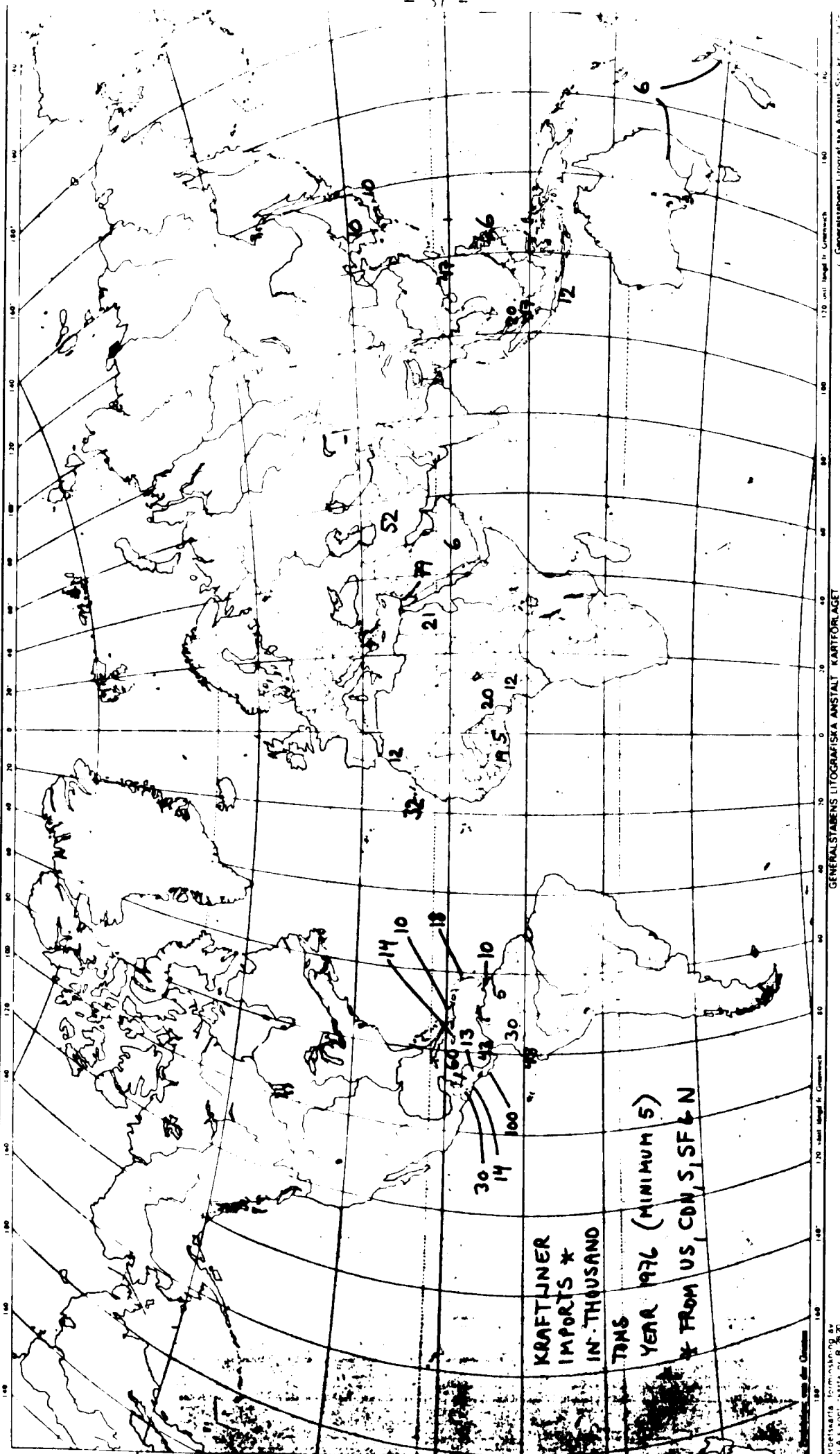


KRAFTLINER BORD
 EXPORTS
 YEAR 1976

DATA SOURCE: OECD
 FIGURES IN THOUSAND TONS

180 140 100 60 20 0 20 40 60 80 100 120 140 180
 GENERALSTABENS LITOGRAFISKA ANSTALT KARITÖRÄGET
 GENERALSTABENS LITOGRAFISKA ANSTALT STOCKHOLM 1976

Exhibit 4:6.



KRAFTLINER
 IMPORTS *
 IN THOUSAND
 TONS
 YEAR 1976 (MINIMUM 5)
 * FROM US, CAN, S, SF & N

Exhibit 4:7.

The Kraftliner Industry - a System of Actors and Constraints

In this chapter, we have tried to analyze some of the factors that determine the organization of the kraftliner industry - its origin and historical development, the importance of easy access to raw material, the bulk and scale oriented production process, etc. In addition to these technical or economic constraints, the industry is also characterized by the position of its companies - the actors within the system. Some important groups of actors with different roles are depicted in Exhibit 4:8.

4.3 A Note on the Dynamics of the Present Situation

A number of structural changes can be observed which will work as driving forces to upset and change the present order and character of the kraftliner industry.

Raw Material and Cost Efficiency

The Scandinavian and the Japanese industries are facing limits of raw material supply. This is increasing the costs and changing the cost efficiency unfavorably in relation to the US industry especially. The US industry will have a potential for future growth thus maintaining a cost efficiency superior to most other kraftliner producers in the world.

Also, some countries are entering kraftliner production and others are increasing their capacity, e.g. Brazil. These capacities will mainly be for domestic use.

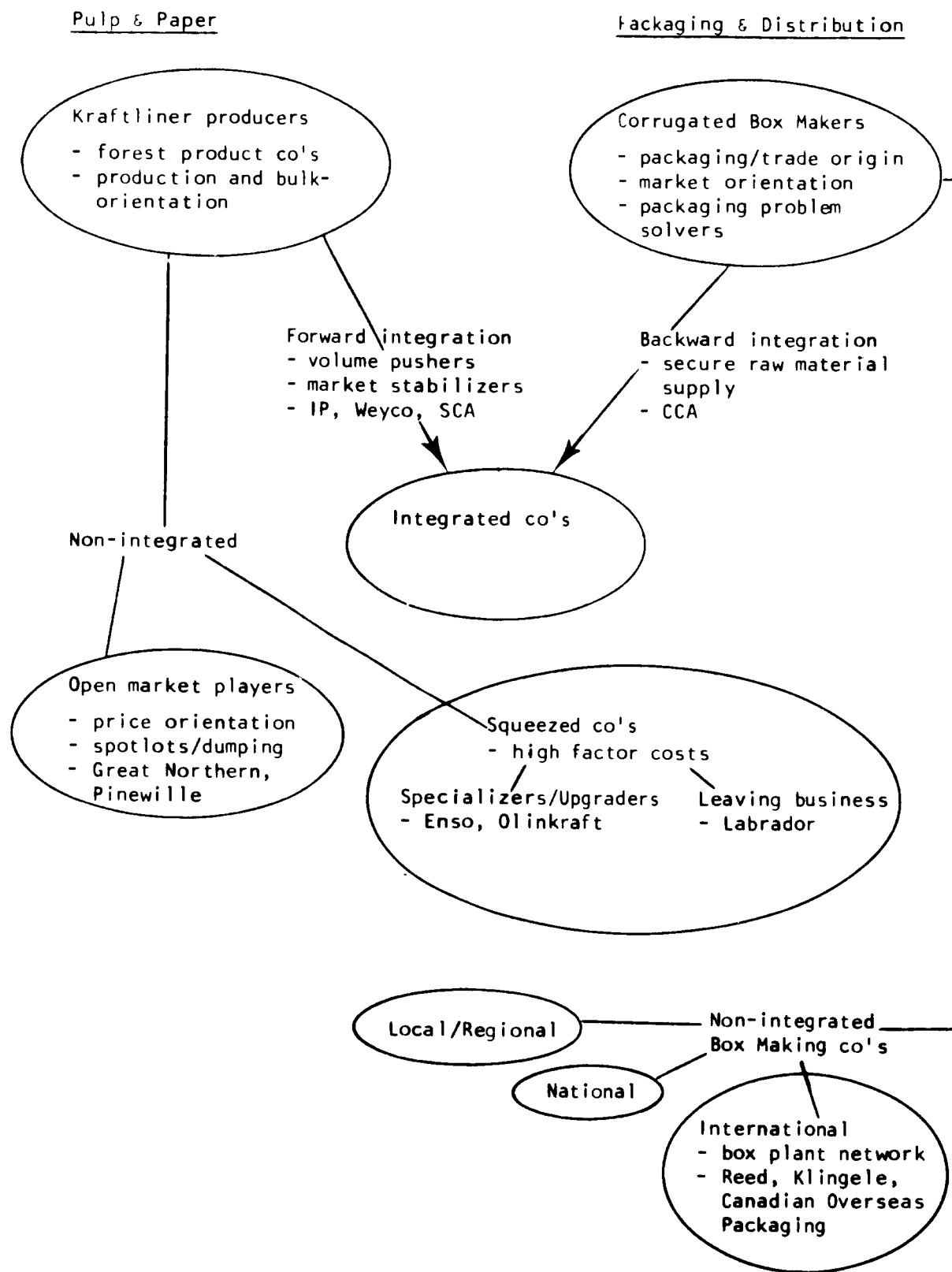


Exhibit 4:8. Examples of actors in the kraftliner and corrugated board system

Changes in the Market Situation

As a consequence of the limits to further growth among Scandinavian producers, a reorganization of liner supply to Europe has to take place. Market growth in Europe is also stagnating and changing from northern to southern Europe.

There is still potential for increased integration between case making material producers, especially kraftliner producers, and box makers both in Europe and in North America. The companies will grow larger and become still more complex.

As a number of developing countries are growing into a more industrialized situation, demand for corrugated containers will rapidly increase. As a first stage, these markets will become interesting for corrugated box producers (utilizing local raw materials, if possible). Later, as packaging needs become more sophisticated, these markets will also become interesting for producers of case making materials based on virgin fiber, e.g. kraftliner.

The Industry Will Become More Characterized by its Integrated Nature

The control of the box making is becoming more and more important in a mature situation, where competition puts a pressure on improved efficiency in every part of the production chain and the ability to integrate them efficiently. The importance of the box making business is then further emphasized as a potentially strong instrument in penetration of new markets with a "backward integration logic". A handful of the

large integrated US companies are coming into a situation, where they could take on the role as global organizers of the industry.

Technology Issues - Some Observations

- a) Capacity additions are now relatively few. The hesistance to invest is due to several factors, such as overcapacity, low profitability and the fact that economies of scale seem to be fully exploited - new and larger machines are not significantly more efficient than the older and smaller ones.
- b) Discussions have been going on in the industry for some time about the best type of machine choice and investment strategy, e.g. whether to invest in one big machine or two smaller to get the same capacity. The eventual disadvantages of scale of having two machines are being offset by the advantages of flexibility and less opportunity cost in case of machine breakdowns, etc.

The possibility of selecting a liner machine that can be used for alternative production ("swing machines") e.g. sack paper, is as actual as ever and also implemented in many cases, not the least in developing countries.

- c) Companies in a cost and profitability squeeze will have difficulties to continue as bulk producers of standard kraftliner qualities. They will either have to use their liner machines for more upgraded products (special liner qualities, etc) or shut down. In the latter case

there will be second hand machinery available in the market which technically is fit for continued production, where the factor costs are more favorable.

- d) The use of testliner (recycled based) increased rapidly after the oil crisis and the price inflation on forest products, but is now stagnating in several European countries. Also here second hand machinery could be available.

CHAPTER 5. SOME NOTES ON THE BUSINESS LOGICS OF THE
PRINTING AND WRITING PAPERS

5.1 Newsprint

Newsprint is a very pronounced bulk commodity. It is a standardized, anonymous and global commodity with few producers and few consumers.

Some 20 - 22 million tons of newsprint are produced annually. This volume can be separated into two different and approximately equally large subgroups, namely the export business and the domestic supply business. The export pattern is stable and very simple - the only significant exporters are Canada and Scandinavia and the only significant trade flows are the Canadian export to the US and to the UK, the Finnish export to the UK and the Swedish and Norwegian exports to continental Europe. The other half, newsprint production for domestic use, is distributed among a large number of countries with varying degrees of self-sufficiency. These two parts of the newsprint industry have different origins:

1. The mechanical pulping technology was developed in the mid-19th century as a response to the emerging demand for newspapers in the industrialized Europe. Newsprint is to a large extent based upon mechanical pulp and high wood content, thus being a paper grade suitable for countries with scarce forest resources such as continental Europe.

2. The mechanical pulping technology was for a long time demanding long fiber wood, especially spruce. This was one reason for the large investments in Canadian newsprint production to meet the increasing demand in US, which was lacking suitable forest resources at that time.
3. After World War II, the advantages of technical integration between pulp and paper and large scale production were so pronounced that the expansion of the industry was concentrated to mainly three raw material rich countries: Canada, Finland and Sweden.

In recent years, new technologies for newsprint production, such as thermal mechanical pulping, utilization of pine, etc, have increased the forest resource base for newsprint production, thus making it possible for new countries to enter the newsprint industry. However, large scale advantages are still very pronounced and an efficient newsprint mill demands a large market.

Very particular for the newsprint business is the way sellers and buyers behave and are dependent upon each other. Both parties are very concentrated, not only in production but also in trade and distribution. In Sweden, e.g. production has been dominated by three companies - Holmen, Stora Kopparberg and SCA since the 1930s. Scandinavian export is organized through one single organization, Scannews.

The customers are also very large - from large British newspaper publishers to central purchasing organizations for all printing papers like the one in

France.^{1/} The Newspaper publishers have a great influence on the business logic: very low tariffs are set on newsprint and the buyers have in general succeeded in achieving low prices, often with the government's support, as newsprint is considered as a strategic commodity of national interest.

Demand for newsprint is fairly easy to estimate since fluctuations have proved to be less pronounced than in packaging papers, e.g. In addition, central selling and buying organizations are forming a system where all the actors are easy to identify and with stable relationships - sales and marketing costs can therefore be kept at a minimum level.

The global newsprint system can be regarded as a very efficient one for several reasons: Newsprint is the best wood utilizer among paper grades, today's production units are extremely efficient and there is still potential in scale advantages, low tariffs and large buying organizations keep the consumer prices down, the administrative and sales costs are low, etc.

The domestic newsprint business is heavily dependent upon good "contracts" with the government and the central price setting authorities (a certain volume is often guaranteed on the domestic market but with prices hardly exceeding costs). The export oriented newsprint business, on the other hand, is extremely dependent upon competitive factor costs. Presently, the traditional Canadian supply to the US market

1/ The Swedish newspapers have also centralized their purchasing of newsprint through Tidningsutgivareföreningen (The Association of Newspaper Publishers).

is declining - in addition to high labor costs and strike problems in the Canadian newsprint industry, newsprint production technology has also developed so that newsprint can now be manufactured from a variety of fiber resources, even waste paper and US Southern pine. The US company Garden State Paper, producer of newsprint based on 100 % waste, can be mentioned as one example of such a non-traditional actor in the newsprint business. Thus, the US newsprint industry is one of the few industries that are investing in newsprint capacity for the moment.

Since the newsprint supplying and consuming organizations usually are very large companies, they are mutually dependent upon each other. There are many examples of real ownership integration between publishing companies and newsprint producers as well as non-visible relationships, one example in Sweden being Dagens Nyheter's minority share of Holmens bruk. The large British company, Reeds, controls newsprint production in Canada as well as publishing houses in London. There are also several examples of integration between US publishers and Canadian newsprint mills.

5.2 Other Printing and Writing Papers

The business logic of "other printing and writing papers" is quite different from the one of newsprint. While newsprint is perhaps the most bulkified of the forest products, the fragmented group of other "printing and writing papers" has quite other characteristics, even if a bulkification process also in fine paper seems to have started a few years ago.

"Other printing and writing" is a highly diversified group of paper grades: from magazine print (with many similarities to newsprint) to several small specialized grades of fine papers.

The fine paper industry is mainly a domestic industry with Finland being the only substantial exporter (Canada and Sweden have some exports of a few hundred thousands tons as well). The common trade pattern for forest products, with exports from the raw material rich countries into large consuming areas, is not at all significant for fine papers. On the other hand, there is a rather substantial trade of fine paper within Western Europe, mainly dependent upon some specialization but above all movements of paper rolls across the borders in consonance with the currency fluctuations.

The reasons for fine paper production being a mainly domestic industry are several:

1. Modern paper making technology is basically a European technology: coating methods, the "art" of mixing various pulp qualities and chemicals, etc, are in principle Western European developments. Thus, in production of fine paper the Western European industry has a tradition.
2. The fragmented market structure and the variety of end use sectors, such as books, posters, catalogues, duplication paper, offset papers and envelopes have required a local market oriented industry. A low degree of standardization among fine paper qualities has also made it difficult to adapt large scale production technologies.

3. For a long time, technical integration between pulp and paper was not possible for production of high quality fine papers. This contributed to an interesting role differentiation between the Scandinavian bleached market pulp suppliers and the Western European fine paper industry after World War II. Since about 1970, however, both the market development (more standardized qualities and larger end use sectors) and technical innovations have led to the creation of some large integrated fine paper mills, especially in Sweden (Nymölla and McDo are examples) and in Finland.

The fragmented market structure is now to some extent developing into larger and more distinguishable segments: new web-offset printing machines have rapidly increased the size of the printing shops and new end use industries (the school system, the data system, etc) have created homogeneous demands for printing papers. The A4 paper size is also gradually becoming a standard size in Europe, thus encouraging a more scale oriented production.

Utilizing large scale economies has just started in the fine paper sector, in which you can find the last paper grades not yet bulkified by the Scandinavian or North American producers. This is of course a tempting growth direction for the Scandinavian industry now looking for new opportunities in the Western European market since the demand for packaging paper grades and newsprint have stagnated. However, such strategies from the Scandinavian companies (especially the market pulp suppliers that would like to integrate forward) will meet counteractions taken by the Western European industry. The wood containing fine paper

grades have also increased their share, making it possible for countries with scarce forest resources to further develop its own printing and writing paper industry.

As mentioned earlier, Finland, being the only substantial exporter so far, is an interesting actor in the fine paper industry. Since Finland was first in Scandinavia to invest in newsprint production in the early 1950s, the Finnish industry was also the first to look for other paper grades to export when the large Swedish newsprint investments took place in the 1960s and to some extent outcompeted Finland with larger machines. Among Finnish companies that then took an interest in the fine paper industry, Kymmene is the most interesting one. Kymmene has acquired subsidiaries in the Western Europe market (UK, France, West Germany) both for local fine paper production, and for control of distribution systems.

Kymmene's strategy in the fine paper business is thus somewhat different from the more export oriented Swedish companies. One emerging conflict in the present struggle between the Swedish fine paper producers and the established European production and distribution system - how could standard qualities delivered as paper rolls be fitted into the local networks of distribution in Europe?

CHAPTER 6. SUMMARY CONCLUSIONS

From the analysis of the global structure of the kraftliner and corrugated container industry, newsprint and other printing and writing papers we would like to draw the following general conclusions:

- Each subsector has its own logic consisting both of certain techno-economic constraints (factor costs, market size, technologies, etc) and the way the various actors in the industry have interpreted and embodied these constraints. Over time this overall logic goes through different stages of development.
- This overall industry logic breeds an international set of actors with a variety of strategies that always, however, are in consonance with the overall industry logic.
- The analysis of these sectors makes it possible to define industries as systems of actors.
- In these systems of actors we find a variety of actors. These are sub-categories of actors but each actor is at the same time unique, each actor representing a unique way of handling the overall logic and the particulars of its situation.
- The different strategies of actors are thus a reflection of the different situations and

that actors have gone through different learning processes as the industry has developed.

PART III: THE SITUATION OF THE GOVERNMENT PLANNER
IN LESS DEVELOPED COUNTRIES

We will base our analysis on a discussion of some ideal types of development situations rather than actual cases, which have not been within the scope of this study.^{1/} In the last chapter, we will summarize the analysis of the development situations and arrive at an overall model for handling development planning problems.

1/ A number of paper mill projects in LDC's are listed in Appendix 5, though, and described by their key characteristics.

CHAPTER 7. THREE IDEAL TYPES

7.1 Ideal Type 1

The Setting

This could be a country in Latin America with rapid growth, increasing literacy among adults and increasing standard of living, especially for the middle classes. The government is continuously struggling with balance of payment problems. The country has a sizable production of cane sugar which generates a surplus of bagasse, now poorly used. Hardly any softwood forests exists.

Driving Forces/Development Opportunities

It is obvious that in a country like this there is demand in the market for several paper products that could be supplied by domestic production, using surplus raw material such as bagasse.

Understanding the industry logic of newsprint, however, it is no surprise to find that this product accounts for the largest drain on the balance of payments. The demand for newsprint is relatively high in a country at this stage of development. There is an increasing need to advertise consumer products. Increasing literacy makes newspapers an efficient means for information. Newsprint, a homogeneous product,

has to be all imported and among newsprint exporters, Canadian producers are likely to be the most cost efficient for a Latin American importer. The demand for other paper products of any volume are much less homogeneous and there has been opportunities to produce waste based packaging papers and simple tissue products on a small scale close to population centers.

What Are the Development Constraints?

Why has not any production of newsprint in a country like this been organized? The driving forces are obviously there in terms of market as well as raw material.

An analysis of the newsprint industry as a system of actors can help us come to the conclusion that there are two important constraints, namely

1. Lack of technology that can produce a sufficient quality of newsprint based on bagasse. This is due to the fact that the traditional newsprint producers, especially the Canadians are so dominant that they control the technology of making newsprint out of spruce. Should other technologies develop it would be a threat to the established newsprint industry and to the value of spruce and softwood forests. A strong tie thus exists between the established newsprint producers and the dominant equipment manufacturers.
2. The domestic newspaper publishers. They do not want to be dependent on a domestic newsprint producer, which probably will have to

be protected by import duties against foreign competition. In periods of business recession the newspaper publishers can take advantage of the fact that a country of this type is a spot market for newsprint suppliers. It is not a large enough market to have a well organized supply from the newsprint producers. In times of business recession spot lots are therefore offered at very low prices which, still if they do not cover full costs, help keep up capacity utilization and give a positive contribution above variable costs for the large scale newsprint producers. An unprotected domestic producer will have difficulties in responding.

How Can the Development Constraints Be Removed?

It is obvious from the preceding analysis that we must look in other directions in the system of actors that is called the newsprint industry to find actors that could help the government to overcome these development constraints. Two subsystems of actors then seem to be of interest:

1. The US newsprint industry. The largeness of the US market for newsprint makes it likely to breed a broad variety of actors developing alternative technologies. The system has been large enough to generate driving forces to develop alternatives to and avoid dependence on the dominant Canadian industry, especially since the Scandinavian suppliers withdrew from the US market. Examples of alternative strategies and technologies in the US are Garden State

Paper which has developed a waste based technology to produce newsprint. Another is the Kimberley-Clark process.

2. Equipment manufacturers, especially the peripheral ones. In the maturing newsprint industry, competition among equipment manufacturers has led to a shakeout where some dominant companies have emerged. The other companies have been forced to withdraw more or less and one way of surviving would be to develop alternative technologies.

7.2 Ideal Type 2

The Setting

This could be a country in Southern Africa with strong development ambitions, starting from a relatively low level. Strong emphasis is given to the schooling of children and to raise literacy among the broad masses of people. This requires a lot of printing and writing papers which are not available from domestic sources. The country has no softwood forests with the exception of some small quite recently developed pine plantations. Mixed hardwoods on the other hand are in relatively abundant supply and there are also opportunities to grow or use other types of fibers, e.g. sisal, bagasse, etc.

Driving Forces/Development Opportunities

There are obviously no lack of development opportunities. There is a market need, as well as hard-

woods and other fibers to produce considerable volumes of relatively simple qualities of printing and writing papers. Domestic production of printing and writing papers would also be beneficial to the balance of payment problem.

What Are the Development Constraints?

Why has not this development already taken place?
Why are there no external interest in industrializing a country like this in printing and writing papers?

To European and also American actors these countries seem too small as markets to justify efforts in that direction. Their technology does not fit to the lower quality requirements of the end uses and the kind of raw material available. Their choices of technology and strategies are reflecting the fact that the printing and writing sector started in Europe and matured there in its traditional use. The driving forces for renewal have come from technological innovations in certain end using sectors, e.g. copying papers, computer printing papers, NCR and OTC-papers, etc. This development was later followed by simplification of these qualities for cost rationalization and competition reasons.

How Should the Development Constraints Be Removed?

Rather than trying to integrate into the European tradition and find partners to provide adequate technology and know-how we should look into subsystems that have broken with that tradition. Examples of these are,

1. Japan. Raw material scarcity has forced Japanese producers to use a variety of raw materials - tropical hardwoods, waste and recycled wood, etc.
2. China. Ambitions to inform and educate its enormous masses of people have called for development and production of simple qualities of paper in large volumes.
3. India. Here we may find the actors with the most appropriate strategy rather than just technologies in a limited sense. The market environment in India seems likely to breed a number of companies that are skilfull in developing and managing a variety of technologies as well as producing a wide product mix in the same mill.

7.3 Ideal Type 3

The Setting

This type of country has taken the first step of development and achieved some industrialization. Products are produced in several regions, exchanged within the country and also exported to some extent. Demand for transportation packaging is thus increasing as for the basic packaging materials. Mixed hardwoods are available as are other fibers, e.g. bagasse and wastepaper.

Driving Forces and Development Opportunities

Demand for transportation packaging is thus strong and there is probably an increasing need for high quality packaging, e.g. for export purposes. Availability of wood and other fibers is another driving force which can be used both for the production of wooden crates and for packaging papers, e.g. fluting and liner for corrugated containers. These two packaging technologies do not exclude each other, but more is likely to be gained by the country, especially considering long term prospects, if the corrugated container industry is developed and supplied to an increasing amount from domestic liner/fluting suppliers.

What Are the Development Constraints?

Several circumstances can explain why not more development has taken place so far. This country has been too small for large international liner and fluting actors to serve on a regular basis. It has been used as "dumping ground". Obviously this country is also of little interest for the establishment of ordinary kraftliner units by these actors even if appropriate wood fiber would be available. The output would exceed domestic need and they would have to export. For such an actor this country does not represent the most favorable marginal investment. Furthermore, for integrated actors there have not been interesting acquisition targets among the small box making companies in the country. The domestic corrugated box making actors are small and very local. They do not have the growth ambitions and the management capability of developing larger units with more sophisticated

packaging technologies. They do not either have the ability to manage a network of box plants.

How Could the Constraints Be Removed?

If the domestic market of this country is starting to take off, especially with demand for export packaging, several international actors of different categories may appear.

To remove the constraints and make use of domestic raw materials, the most suitable technology partners are likely to be found among independent multiplant box making companies or among backward integrated packaging companies. The forward integrated companies would tend to try to peddle their own raw material, i.e. liner and fluting produced outside this country. It is more in line with the overall strategies of the independent and backward integrated actors on the other hand to develop the most favorable and locally adapted procurement strategy for case making materials. Potential candidates in these categories are likely to be found in the US because of the largeness and variety of that system, and in West Germany where there are several independent, multiplant companies.

CHAPTER 8. TOWARDS A METHODOLOGY FOR CHOICE OF TECHNOLOGY AND THE ROLE OF GOVERNMENT

We have discussed three ideal types of situations for the government planner in less developed countries. Here, we have followed a certain line of analysis based on the concepts developed earlier in this report, namely:

- The concept of the role of government to remove constraints.
- The concept of industries as system of actors and actor strategies reflecting an overall internal logic of the industry.

In the ideal type situations that we have analyzed, the problem has not been lack of driving forces. They were all domestic market oriented with strong market forces. The nature of the market forces were both substitution of earlier imported products and catering to new needs developing. Some kind of raw material has also been at hand that could have found a better use in paper making.

We have not discussed export situations, with a minor exception for the ideal type situation on developing the packaging sector. In export situations the driving forces may be lacking or require much more of creative search and learning to be found.

Two principally different situations can be distinguished when LDC's are involved in export oriented activities:

1. Trying to make use of a unique raw material to produce a new type of product. This is the market development situation where it is necessary to successively learn where there could be driving forces/market demand, e.g. in very special applications/market segments. It could also be a matter of creating driving forces by teaching the market how to use the new product.
2. Trying to make use of raw material, get some development effect and cash in foreign currency by producing some standard product for the world export market. This is the case of the marginal mill. Even if there are driving forces in the export market, these fluctuate over the international business cycle and it will be the marginal mill that fluctuates most.

Our analysis have shown that the critical problems of the government planner is:

1. To identify the development constraints as an answer to the question of what is hindering the development to take place by itself.
2. To identify the type of actor that has a strategy that fits with the development situation and is able to overcome the constraints.

In our analysis we have shown that a common denominator for both these problems are an in-depth understanding

of the industry logic and the systems of actors, these relations can be illustrated as in the following model (Exhibit 8:1).

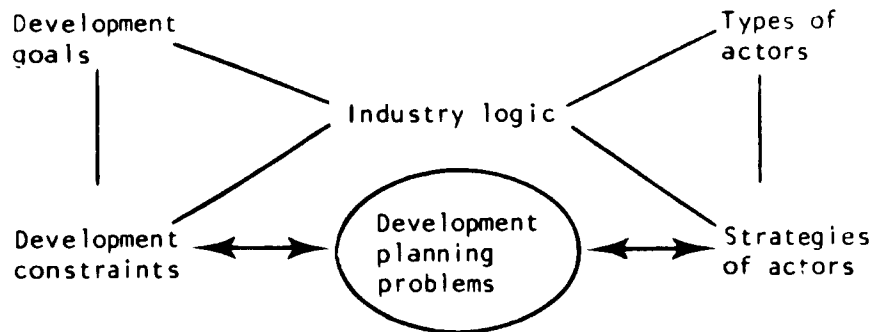


Exhibit 8:1. Problem solving in development planning requires in-depth understanding of the development constraints, the industry logic and the system of actors

The model underlines the industry logic as a determining factor both for the goals and development constraints of the developing country on one hand and for the types of actors and the strategies of these actors that can be found in this particular industry. The key task of development planning, thus, becomes how to fit development constraints with strategies of the actors so that the positive energy of certain actors is used to overcome certain development constraints.

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APPENDIX 1

ELEMENTS OF A FRAME OF REFERENCE

The purpose of our paper on Appropriate Technology is to take the first steps in developing a methodology for forest industry policy making and choice of forest industry technology in developing countries. We will thus try to discuss the problem of choice of forest industry technology in the perspective of national policy making in the less developed countries. This means that we will discuss the choice of technology at the industry level as a matter of influence for forest industry policy making at the national level. Such a discussion includes at least three important elements:

1. Choice of technology at the industry and company level.
2. National forest industry policy making.
3. The relation between choice of technology and national policy making.

Building up a Frame of Reference for Choice of Technology

The Concept of "Appropriate Technology"

UNIDO discusses this concept in a report recently (ID/B/188) emphasizing the following characteristics:

- Appropriate technology is not a specific technology but a concept that draws... "attention to the importance of adopting criteria for selection. The importance of involving such criteria, at the national level, cannot be overemphasized, since technological options do exist and the choice of an appropriate technology is possible".
- The concept is broadly defined as "technology that contributes the most to the economic and social objectives of development". Thus it is not seen as merely a technical concept. "The appropriateness of technology depends on development policy objectives, and those objectives are often political in nature." In the paper a number of development goals are also listed which are assumed to be generally applicable, namely acceleration of growth in both qualitative and quantitative terms, meeting the basic needs of the whole population, raising the standard of living (particularly among the poorest), reducing income disparities, creating more productive employment and fostering self-reliance.
- Three sets of factors are important to consider "in determining whether a technology is appropriate, namely, development goals, resource endowments and conditions of application... It may not be possible to meet all these criteria fully; available technologies would have to be filtered through these criteria with the relative priority assigned to each in any given situation born in mind".

- Government has a critical role in the selection process of technology although technology ultimately is selected by enterprises which may have selection criteria differing from those of the government.
- The appropriate technology concept is a dynamic concept. "With changing conditions, which may be the result of the development process itself, the appropriate technology will also change." It can be both labor intensive and capital intensive. That is a function of the situation at each point in time.
- "The choice of appropriate technology is not a problem relevant only for developing countries. Such a choice is equally important for the industrialized countries. However, nearly all the existing technologies have been developed in and for the industrialized countries."

Choice of Technology in Neo-Classical Economics

The appropriate technology concept could be seen as a reaction to existing theory as well as frustration and re-interpretation of actual choices and development so far. Let us start this discussion by looking at how choice of technology is viewed in basic economic theory, how that has been criticized and what alternative approaches could be taken.

Choice of technology is a central theme in the production theory of neo-classical economics.^{1/} The

1/ Salter is regarded as a leading authority in this field. See Salter, W.G., 1960, Productivity and technical change. Cambridge.

focus of production theory is productivity and the choice of technology issue thus becomes to get the technology that minimizes output costs per unit.

It is assumed that an infinite number of technologies are available so that in every situation it is a matter of selecting the technology that match prices of production factors with the size of the market to achieve minimum unit output costs as illustrated in Exhibit A1:1 below.

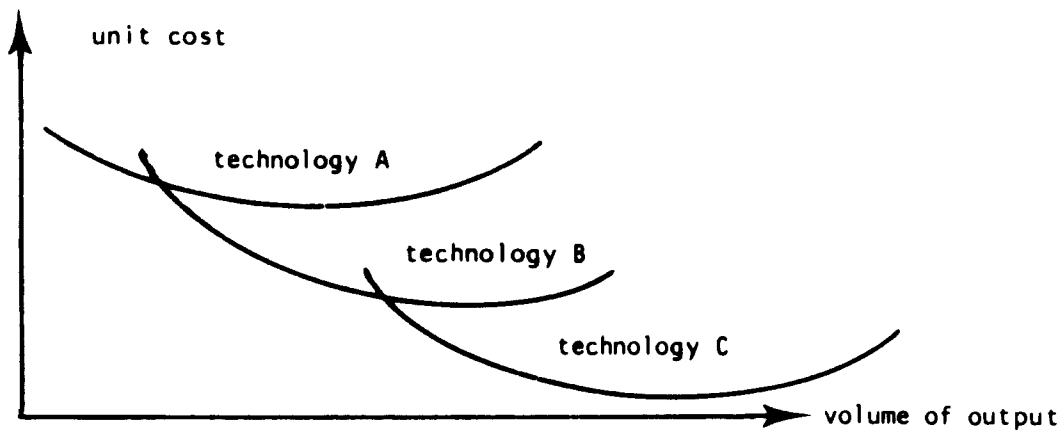


Exhibit A1:1. Choice of technology and minimum cost at different volumes of output

As technology develops over time there is at every point in time an optimal technology to be applied. This situation can be illustrated as in Exhibit Al:2 below.

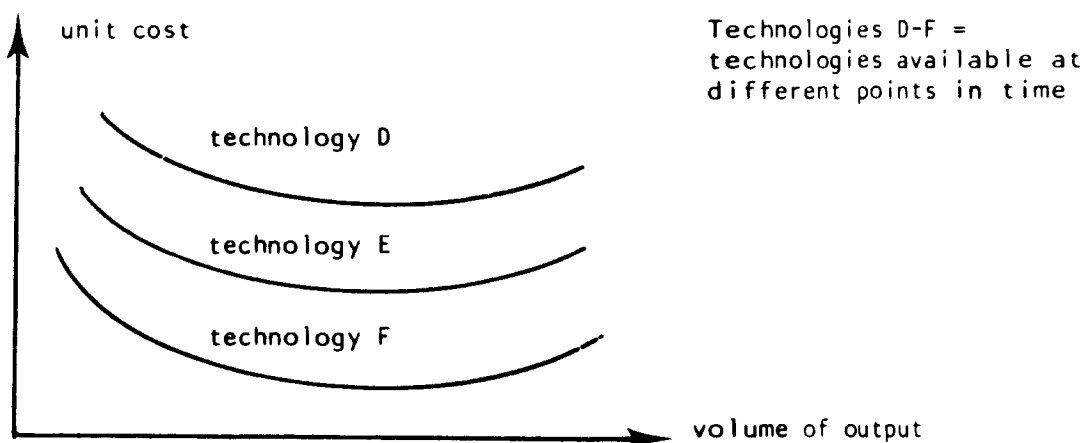


Exhibit Al:2. Optimal choice of technology at various points in time for a certain volume

It is worthwhile mentioning that similar effects on cost performance can be a result of changing external economies, e.g. by changes in infrastructure which can reduce the costs to be carried by a particular company.

The productivity orientation of the neo-classical production theory has made it focus on two of the production factors, namely capital and labor.

1. The focus on capital is because of the assumption that technological improvement is embodied in the capital goods - machinery, equipment, etc. Productivity gains are possible with the same capital equipment due to better adminis-

tration but the more capital intensive a certain industry is (like chemical process industries or pulp production), the more is technology improvement embodied in the capital equipment.

2. Labor productivity development has two driving forces, namely improvements of technology that increase productivity of all production factors and wage increases that runs faster than prices of capital goods.

A Critique of Neo-Classical Theory

The analysis and critique of neo-classical theory can be done along two dimensions:

- The rationality or applicability of the cost optimization model. How well does it fit into and map different situations?
- How does the neo-classical theory work as a decision making tool in various decision making contexts and how well does it explain actual development?

Several researchers have criticized the neo-classical model and here follow a few examples:

Wohlin^{1/} has pointed out that this model makes a lot of simplifying assumptions necessary when applying it to various branches of industry. Cost of input goods are not included in the model. These costs

1/ Wohlin, L., 1970, Skogsindustrins strukturomvandling och expansionsmöjligheter. Industrins Utredningsinstitut. With a summary in English: Forest based industries: Structural change and growth potentials.

differs between companies and are also influenced by the technology development.

Amsalem^{1/} criticizes the traditional theory and the methodology derived from it of studying just capital-labor or labor-output ratios. The assumption of the existence of an infinite number of technologies has no correspondence in reality. Amsalem finds in his study of some cases of choice of technology in textile and pulp that "... the number of such alternatives was limited and for some processing steps very small".

Hirschman^{2/} makes the observation that a certain technology, e.g. of a process type, is not uniformly capital intensive. There is very often a central unit in a processing industry which is capital intensive but that other parts of the production process such as material handling of various types can leave more freedom of choice as regards technology and capital-labor ratios.

A Broader Frame of Reference is Needed

The critique of the classical theory thus calls for a broader frame of reference that allows for much more of situational orientation and adaptation.

-
- 1/ Amsalem, M.A., 1978, Technology choice in developing countries: The impact of differences in factor costs. Cambridge, Mass.: Harvard Business School Doctoral Thesis.
- 2/ Hirschman, A.O., 1958, The strategy of economic development.

SIAR^{1/} has in various contexts worked on the problems of choice of technology. Neo-classical theory through its limiting assumptions and focus on production gives productivity a too narrow meaning, where productivity or efficiency of the production process becomes the most important factor. But real efficiency has wider implications. It is only in special cases, that a company can be successful and profitable merely on efficiency in production. It is helpful in this context to define total efficiency as a product of both internal and external efficiency as the formula in Exhibit A1:3 shows.

$$\frac{\text{Volume of output}}{\text{Volume of input factors}} \quad (\text{internal efficiency}) \quad \times \quad \frac{\text{Price of output}}{\text{Price of input factors}} \quad (\text{external efficiency})$$

= Total efficiency

Exhibit A1:3. The composition of total efficiency

1/ For a comprehensive presentation of SIAR concepts see Normann, R., 1977, Management for growth. London: Wiley.

The choice of technology should be put into this broader frame work, where total efficiency requires both an effective way of relating to the environment and an efficient way of transforming inputs to outputs by the help of the resources available and the most appropriate technology. One could say that a system of fit between technology and other elements are necessary as illustrated in Exhibit A1:4 below.

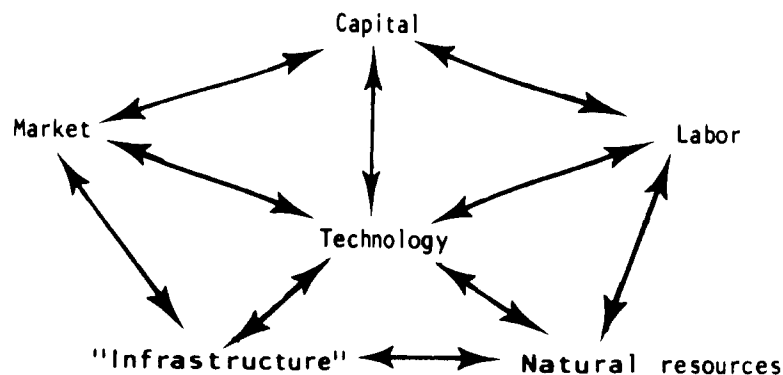


Exhibit A1:4. A system of fit between technology and other elements

Efficiency exists only when these elements are in consonance (are fitted together) and thus support each other. This fit has to be created by someone since the elements of efficiency has to be organized to fit together.

When analyzing the situation from a company's point of view, it has proven meaningful to apply the following two concepts, namely the concept of the business idea and the concept of various stages of development in a business idea.

The Concept of the Business Idea

For every situation of market and production factor conditions, different combinations to organize a business are possible. A successful combination corresponds to some problems in the environment that are difficult to solve. A business idea is thus a successful way of combining markets, resources, technology and organization. In the wide variety of situations - different markets, industries, technologies, etc - each situation is unique but it is possible to identify some broader categories of business ideas, which have different implications for choice of technology. Four basic categories of business ideas are:

1. Raw material oriented business ideas. In some situations, the business logic is characterized by the importance of having access to a certain raw material, e.g. valuable wood, oil, minerals, etc. The successful business idea in this case must solve the problem of how to get access to this raw material and control this access over time, e.g. by being efficient enough to pay better prices than the competitors.
2. Production oriented business ideas. In some situations, the critical factor is to be the superior producer by having the lowest costs of production. This is the case in many bulk product industries. The business idea in this case must solve the problem of achieving low production cost through favorable production factor costs, high productivity, economies of scale, location in relation to markets, etc.

3. Technology oriented business ideas. In some situations a certain technology is unique and much demanded. It could be a unique innovation of a certain process or product. The business idea in this case is thus to control such a unique technology, but in a more dynamic sense also how to generate such unique technologies and how to exploit them over time.

4. Market oriented business ideas. In some situations the critical success factor is to know the market needs and deliver the appropriate service or product. This is the case of many consumer goods but also for application of various basic technologies to different industries. The critical thing in the business idea is thus to know these market problems and demands and understand how to come up with the appropriate solutions and products.

The Development Stages of the Business Idea

During the development of a business idea it goes through different stages, where the critical and important factors vary from stage to stage.

In the early stages it is important to learn what the problems of the customers are and the means available to solve them.

As the business idea matures - when the ways to solve the problems are established - it is a matter of improving the efficiency by exploiting economies of scale at all levels in the production process through simplification, rationalization, etc. Internal

efficiency thus becomes more important. This is boosted by the fact that the initial business idea developer successively gets competition in the form of followers and substitutes.

An indication of maturity of an industry is how encompassing the driving forces of efficiency are. In the very mature situations, typically, both production and marketing efficiency are very important. For example, one finds vertically integrated companies which compete by trying to achieve overall system efficiency between basic production, converting and distribution.

Choice of Technology Implications

Analyzing a choice of technology situation by the help of these concepts thus gives an understanding of the logic of the situation and what functions various types of technologies fulfil or could fulfil. It is only by achieving a fit between the technology chosen and the other elements in the total business idea as well as with the development stage that overall efficiency is possible to obtain.

The forest industry provides many examples of different business ideas and situations in this context. The most successful sawmilling companies in Sweden are those that have succeeded in their market orientation rather than those concentrating on excellence of equipment and productivity in processing the wood. The internal efficiency on the other hand has been more important for the pulp producers, where production efficiency in terms of production unit costs has been a key to success.

The Context of Decision Making

It is not possible to explain the actual choice of technology in a company, an industry or a country by a "rational" model, a model that maps the business or techno-economic logics of a particular situation.

We found in the preceding analysis that the neo-classical model for choice of technology had limitations as a rational model. But it is also used as a diagnostic tool, and when deviations between reality and the model are found they are classified as due to factors like distortions in market prices, incomplete information for the decision makers, etc. The model thus cannot explain why a certain development takes place.

There is a fundamental assumption, however, behind the applicability of rational models for decisions, namely that goals are first set and plans, actions and selection of means follow as a derivation of the goal-setting. This can be criticized both from a logical point of view and from how it applies to the decision making situation of a particular actor/decision maker.

The normative decision theory (based on mathematical statistics and systematically applied in operations analysis) has very little to say about the formulation of goals, although it builds plans as an hierarchy of goals and means to achieve these goals.^{1/} Several researchers have analyzed and criticized this, e.g. Simon^{2/} and Vickers^{3/}.

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- 1/ For an elaborate discussion of this, see Normann, R. & Rhenman, E., Formulation of goals and measurement of effectiveness in the public administration. Stockholm: SIAR Dokumentation AB. (SIAR-E-29)
 - 2/ Simon, H., 1947, Administrative behavior. New York: Macmillan.
 - 3/ Vickers, Sir Geoffrey, 1965, The art of judgment. A study of policy making. London: Chapman & Hall.

From a logical point of view, certain situations are genuinely uncertain, e.g. regarding development of new technologies or new business ideas. The rational planning model, however, requires the future to be predictable so that goals for some kind of final end to be achieved could be set. In these genuinely uncertain situations another approach is necessary, namely to see the formulation of goals as a successive learning process. Possible goals are successively explored by experiments instead of goals set in advance. However, this has far reaching administrative and organizational implications. Decision making in situations of certainty, where a planning approach is possible, and in situations of uncertainty, where a learning approach is appropriate, are different and require different organization structures.^{1/}

When it comes to the situation of the decision maker he is also using "models" for his decision making but these are his own, often unconscious models.^{2/} These models or decision rules reflect the "subjective rationality" of the individual. They are applied to make the decision to the best understanding of the individual how goals and means are related. In the subjective rationality the knowledge about available means, e.g. different technologies, influence what goals are actually considered.

1/ Several authors have discussed this, e.g. Burns, T. & Stalker, G.M., 1961, Management of innovation. London: Tavistock. Normann, R., 1969, Organizational innovativeness: Product variation and reorientation. Stockholm: SIAR Dokumentation AB (SIAR-E-15) Also publ. in Adm. Sci. Quarterly, June 1971, p. 203-215. Rhenman, E., 1973, Organization theory for long-range planning. London: Wiley. (SIAR-E-18)

2/ Boulding uses the term "image" to denote the kind of knowledge and frame of reference that an individual applies in situations of choice and problem solving. Boulding, K.E., 1956, The image. Ann Arbor, Mich: The Univ. of Michigan.

Several researchers interested in the relation between the setting of goals and means to achieve them have studied the impact of the organization structure.^{1/} They have found that the organization cannot be seen as a mapping of the goal means hierarchy only, but that the organization structure also influences what goals are set in the organization.

Organizations as Systems of Rationality

In understanding the rationality and development of a particular organization/company, Normann^{2/} suggests the following model

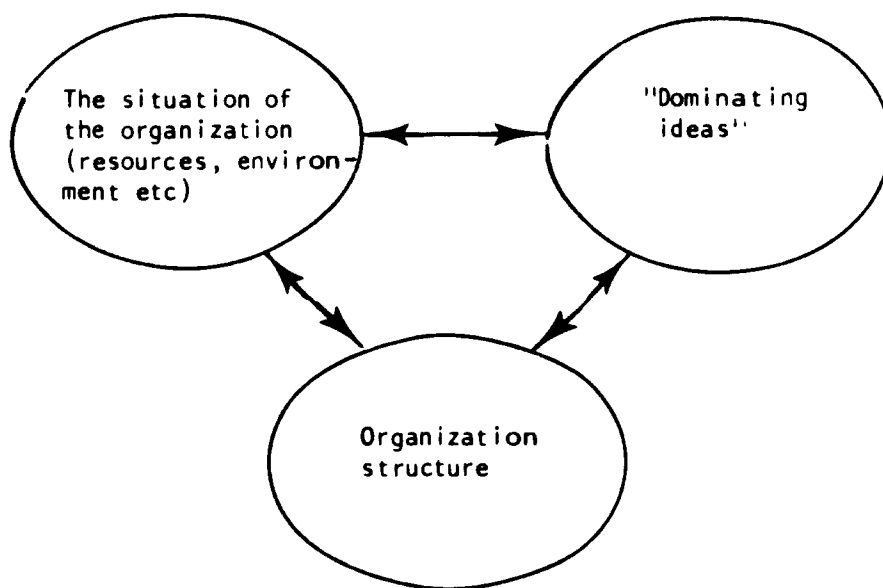


Exhibit A1:5.

1/ See note 1, p. 14

2/ Normann, R., 1976, Management for growth. London: Wiley. (SIAR-E-33)

Three interdependent elements are important. Compared to alternative theories of organizations, Normann has added the concept of dominating ideas. The assumption is that a certain organization always acts rationally - from its own perception of the situation and what is rational in that situation. The "dominating ideas" thus represent the way the organization actually perceives a situation and acts in relation to it.

The Role of Government in Influencing Choice of Technology

Several aspects are important to discuss in this context:

1. Efficiency criteria
2. Policy paradigms
3. Typologies of government actions
4. Models of exercising government control

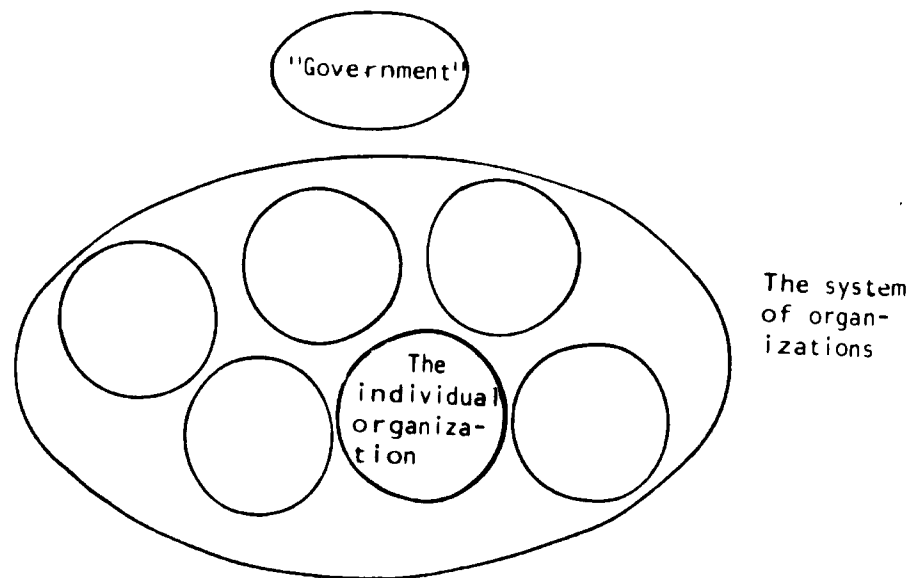
1. Efficiency criteria

Normann and Rhenman analyze the difference in efficiency criteria between an organization controlled by market forces and systems of organizations controlled by government.^{1/}

- The chief focus of interest in a system controlled by market forces is generally the efficiency of the individual organizations; in the public administration, on the other hand, we must distinguish expressly between problems of three levels. The problem of effectiveness in the administration is broken down into the three fold problems of creating effectiveness

1/ Normann, R. & Rhenman, E., 1975, Formulation of goals and measurement of effectiveness in the public administration. Stockholm: SIAR Dokumentation AB. (SIAR-E-29)

- (1) in the individual organization, (2) in the system of individual organizations, and
- (3) in the "government".



2. Policy paradigms

Some kind of basic paradigm is embodied in the national policies of various countries. These paradigms differ from one country to the other and often reflect the power structure of a particular country. Examples of such paradigms are:

- Economic development by increasing the use and value of natural resources (e.g. Canada)
- Secure stable supply of resources for critical industries (e.g. Finland)
- Economic development through ongoing rationalization (e.g. Sweden)
- Self-sufficiency paradigms (e.g. France, Brazil)
- Global versus national paradigms
- Colonial/imperialistic paradigms

3. Typologies of Government Actions

- Government actions and the industry life cycle. Problems are different during initiation, expansion, maturity, and decline.
- Imbalance creating policies versus actions that take away constraints.
- Forest oriented policies versus general policies versus special policies with specific consequences (e.g. land use policies).
- Genuinely creative policy solutions (e.g. the Yugoslavian model of participative management) versus imitative policies.
- Negative versus positive policies. It is easier to use the stick than develop the appetizing carrots.
- Holistic versus compartmentalized policies.
- Different land use conflict resolution models.

4. Models of Exercizing Government Control

Different models of exercising government control or decisions at the industry or company level are possible. Here we would like to draw attention to the concept of meta-management.

The concept of meta-management has three characteristic features:^{1/}

1. Control is exercised by means of influence on the organization structure.

1/ For an elaboration of this concept see Normann, R. & Rhenman, E., 1975, Formulation of goals and measurement of effectiveness in the public administration. Stockholm: SIAR Dokumentation AB. (SIAR-E-29)

2. Control is based on an overall picture of the total system.
3. A high degree of learning ability in the "government" function.

THE DEVELOPMENT OF THE SWEDISH FOREST INDUSTRY

Introduction

The development of the modern Swedish forest industry which started in the 1850s into its present situation is a remarkable achievement. The Swedish industry is the largest market pulp and softwood lumber exporter in the world after Canada. The export of certain paper grades is also considerable in a worldwide comparison as can be seen in Exhibit A2:1.

From the start of the modern Swedish forest industry in the middle of the 19th century the increase in wood consumption has developed rapidly but there has also been considerable changes in the pattern of wood utilization as can be seen in Exhibit A2:2.

First came the sawmilling boom in the second part of the 19th century. Then followed a period of introduction and rapid growth of pulp production with its corollary in pulp wood consumption. Over the last 20 years finally, Sweden has been the leading supplier of pulp, softwood lumber and bulk grades of paper to the Western European market. Thus demand for both sawn timber and pulp wood has grown rapidly into maximum forest utilization.

Before this development is described and analyzed in more detail we will briefly touch upon some of the early prerequisites of the modern Swedish forest

	Sawn wood (softwood) 000 m ³ %	Sawn wood (hardwood) 000 m ³ %	Wood-based panels 000 m ³ %	Wood pulp 000 tons %	Newsprint 000 tons %	Other print & writing tons %	Kraftliner 000 tons %	Fluting 000 tons %	Sack kraft 000 tons %	Folding boxboard tons
Total export	56329 100	10887 100	14009 100	16960 100	10203 100	5156 100	2665 100	850 100	1184 100	1524 100
Supplied from										
Sweden	6610 11	69 -	866 6	3287 19	862 8	314 6	542 20	168 19	601 50	263 17
Finland	3824 6	36 -	652 4	1084 6	867 8	1325 25	356 13	161 18	103 8	410 26
USSR	8550 15	771 7	865 6	632 3	290 2	-	63 2	-	-	-
Canada	3715 6	491 4	1093 7	2283 13	115 1	336 6	1287 48	50 5	57 4	364 23
	22613 40	218 2	473 3	6132 36	6997 68	325 6	288 10	81 9	202 17	-
Austria	3815 6	-	-	-	-	506 10	-	-	114 9	-
Belgium-Lux	-	-	1338 9	-	-	-	-	-	-	-
West Germany	-	-	-	-	-	476 9	-	-	-	110 7
Mal. penin-sula	-	2715 24	-	-	-	-	-	-	-	-
Singapore	-	1116 10	-	-	-	-	-	-	-	-
South Korea	-	-	1656 11	-	-	-	-	-	-	-
Japan	-	-	-	-	-	-	-	106 12	-	119 7
Others	7202 16	5471 53	7056 54	3542 23	1072 13	821 38	87 7	276 37	105 12	239 19

Exhibit A2:1. Leading world market suppliers of significant forest industry products (1976)

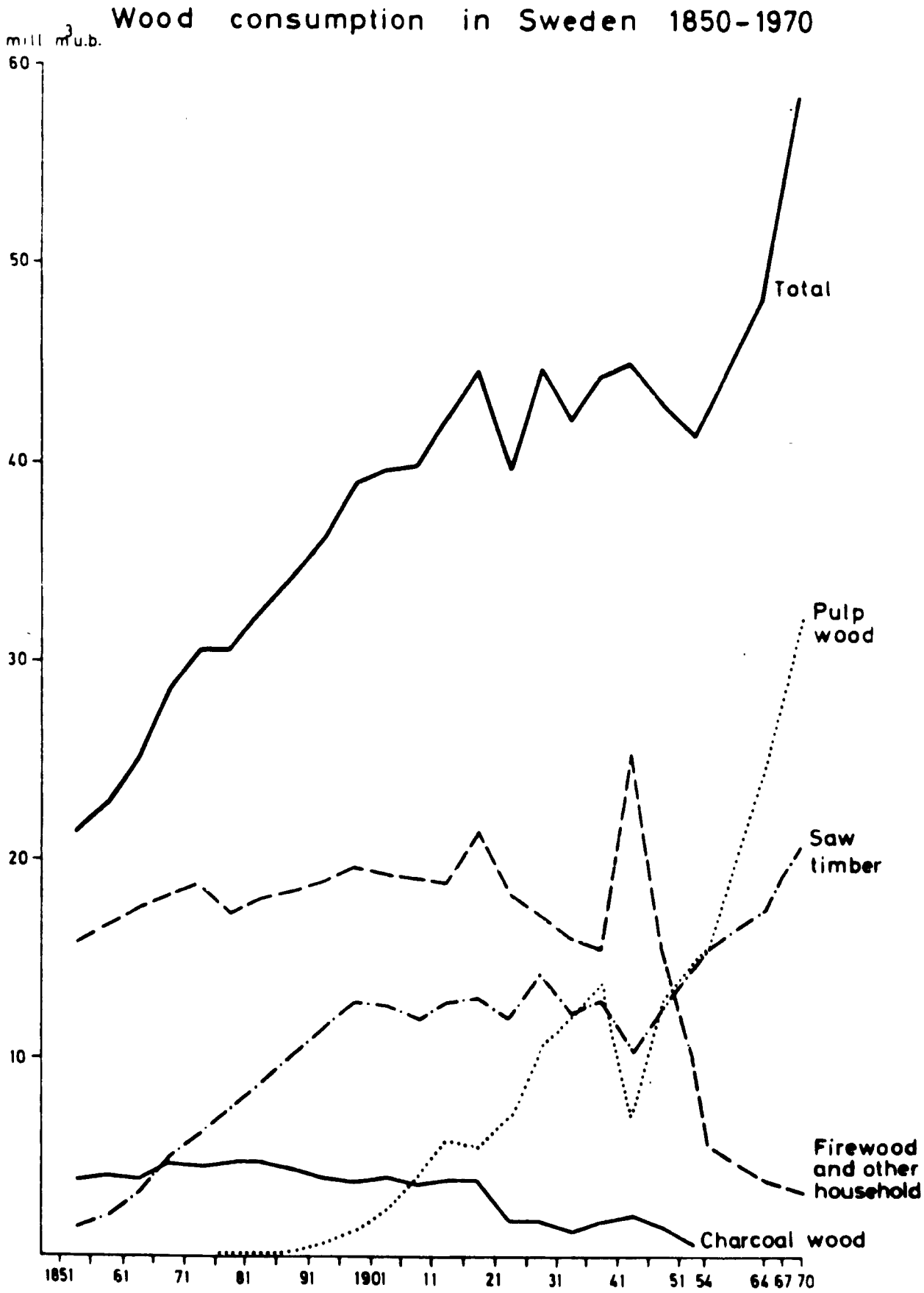


Exhibit A2:2.

industry, namely the situation and character of the forests and the industrial environment and infrastructure at that time.

Three Different Regions - Three Different Stories

It is important to distinguish between three parts of Sweden in understanding the development of the forest industry. These different regions are Northern Sweden, Central Sweden and Southern Sweden. Erland von Hofsten makes the following observations about the character of the forests in these regions:^{1/}

- The three regions obviously varied considerably with regard to their forest resources 100 years ago, when the development of the forest industries began to gain momentum:
 - Northern Sweden - large, almost untouched forests awaiting exploitation,
 - Central Sweden - many promising but mostly still young, man-made forests,
 - Southern Sweden - many depleted forests, also heath land, but with excellent potential.

Thus, in no case was the early development of the forest industries based on forestry production planned for the purpose. Northern Sweden availed itself of semi-virgin forests, and Central Sweden of forests established for the purpose of another industry, while Southern Sweden (and, in part, Central Sweden as well) saw forests established basically as a result of a switch in the methods of animal husbandry.

1/ SIAR-T-22:1 The Story of Domänverket. Forest History. Erland von Hofsten. Stockholm 1977.

Northern Sweden

Northern Sweden was for centuries very sparsely populated (and of course still is compared to other parts of the country). The inhabitants were nomades (the Lapps) in the highlands and in the interior, while farmers and semi-nomades occupied the lower river valleys and the coast line. The land produced for hunting and grazing including collection of fodder for the long winter time. At that time the forests, especially the dominating pine forests, were not an integrated part of everyday economic life. Carl von Linné reports from his journey to Lappland in 1732:

- The forests full of big pine trees were completely useless, for no-one makes houses from him and he is eaten by nobody.

The capacity of the vast lands and forests in Northern Sweden were only marginally used up to the middle of the 19th century when the sawmilling boom started.

Central Sweden

It is the copper and iron industries that have given a specific twist to the forest history of Central Sweden. The iron industry in the old time (from the 17th century and through the 19th century) required enormous amounts of wood - fuel wood in the mines to heat the rock (before efficient explosives were invented) and charcoal into the metallurgic processes that followed. The existence of mines and forests in the same region was a prerequisite for the iron industry of those days. Sweden's iron industry got

a leading position which could never have been provided by the mines only - in the 18th century roughly a third of all the iron produced in the world came from this central region of Sweden, and practically a monopoly was maintained for centuries on the important English market.

Due to primitive transportation technologies, wood could not be transported over vast land areas at that time. A Swedish government agency, known as the Bergskollegium (approximately The Mines Authority) granted privileges to start mining and iron making industries. In doing that the location of new mills and iron works was determined with regard to the necessary forest areas. This situation stimulated an early interest in forest regeneration to safeguard supply of wood in the long term. These efforts were further enhanced when the rapid growth of the iron and steel industry led to a depletion of forests during the 18th and early 19th centuries. Around 1900 the forest improvement measures were yielding beautiful returns in the form of productive forests. In the meantime, however, the demand for wood from the iron industry had almost vanished as a result of new technologies in steel making and a concentration to larger production units.

Southern Sweden

The population in Sweden has been mainly concentrated to the southern parts of the country. The land had to be used for agricultural purposes and during the 19th century signs of over-strain became more and more frequent. Overgrazing led to the development of the large heath lands in the south-western part of Sweden. A century ago, Sweden was still an ex-

tremely poor nation and had difficulties in feeding a growing population. A large rural proletariat lived under the poorest circumstances. In the decades around 1900 some 1.2 million people, about 25 % of the whole population of Sweden at that time, emigrated, most of them to the United States. The emigration together with changes in agricultural methods and land reforms made it possible to afforest large parts of Southern Sweden, e.g. by turning the heath lands into fast growing spruce forests.

The Government and the Forest Resources

Liberalism succeeded mercantilism in the early 19th century and thus the old government interferences - as in the case of the mines and the steel works - were abandoned. State owned forests were sold out during the first decades of the 19th century.

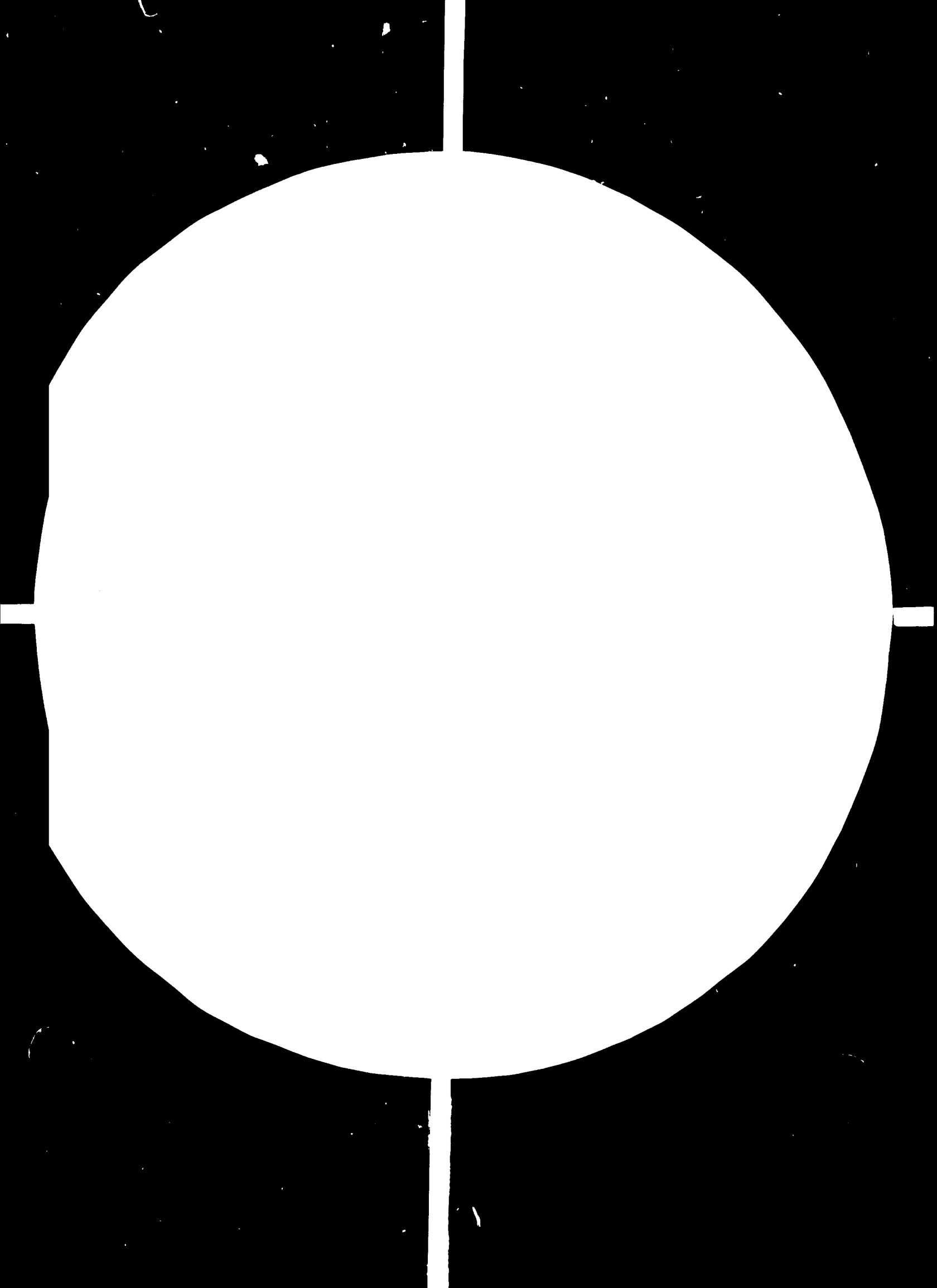
Numerous reports about the depletion of Swedish forests, especially in Southern Sweden, during the 19th century were ignored. However, the Head of the Royal College of Forestry (founded in 1828), Israel af Ström, managed through a series of reports on the ongoing destruction of the forests to convince the government and parliament to establish a state forest service and stop the selling out of forest lands.

The Swedish Forest Service was thus founded in 1859. It took until 1903 before a forest legislation, requiring regeneration after felling on private forest land, was implemented, however.

B - 10

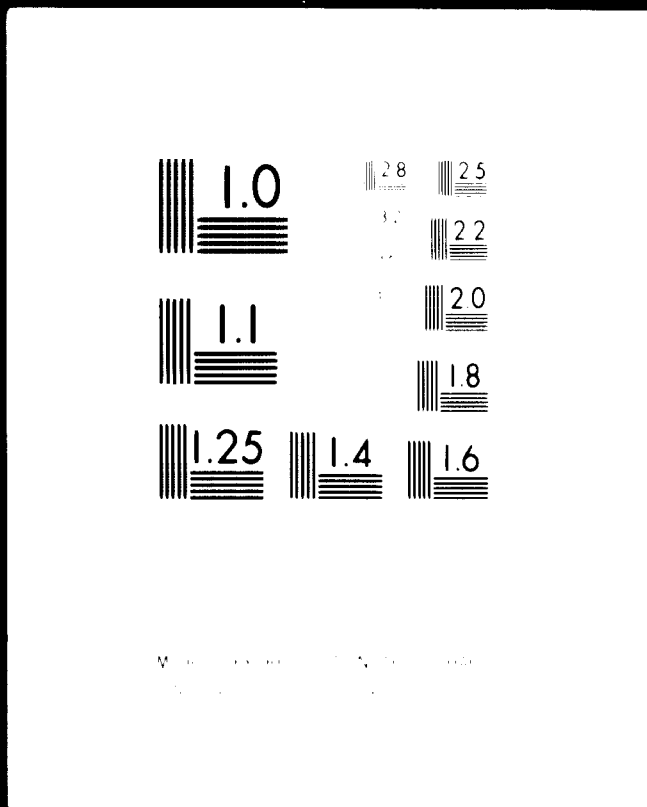


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The Development of the Export Role of the Swedish Forest Industry

The export character has been a dominating feature of the Swedish forest industry, throughout its development. However, the export role has shifted over time and three or four different periods are clearly distinguishable as shown in Exhibit A2:3 below.

1850-1900	Sawmill period. Export of sawn wood.
1900-1940	Pulp mill period. Export of pulp to various countries. US big customer.
1940-1960	Development of special pulp qualities for export. Home market orientation. Forward integration.
1960-	Export grows and concentrates to Western Europe. Heavy investment in bulk production facilities.

Exhibit A2:3. Stages in Swedish supply role evolution

The Sawmilling Period

During the 19th century Sweden became the dominating world exporter of sawn wood. About 90 % of the Swedish sawmill production went abroad in the last decades of the century. The Swedish sawmill industry gradually replaced the stagnating Norwegian industry as major supplier to the industrialized England, and also took use of skilled Norwegian sawmilling labor.

Swedish export duties on sawn wood were gradually lowered and Great Britain - the most important market - abolished its import duties. The introduction of steam boilers had carried with it the establishment of sawmills on the Norrland coast, while the rivers were used for log floating. The advent of the steamship lowered transportation costs between Sweden and Western Europe.

The Pulp Era

After the turn of the century, a shortage of timber with adequate dimensions for the sawmill industry led to a stagnation in production and a shift towards pulp production. The main factors behind the shift from sawn wood to pulp production were:

- Maturity of the sawmill business as a result of shortage of suitable wood and the emergence of Finland and Russia as competitors.
- New pulp production technology.
- Availability of waste wood and timber which could not be used for other purposes than pulp production.
- Western European paper industry demand for raw material.

Naturally, the Swedish paper industry too was experiencing a shortage of fiber as demand increased. Paper production had been going on in Sweden for several decades based on other kinds of fiber than wood fiber. The paper machine had been introduced in Sweden in 1832. The very early Swedish paper industry was located in areas where the supply of textile

fiber and water was sufficient, examples of such places being Lessebo, Klippan, Tumba och Grycksbo. These places were also fairly close to the domestic market - concentrated to Southern and Central Sweden.

Paper pulp production became interesting to the Swedish forest companies which previously mainly had grown through sawmill business. Wood pulp production enabled use of timber qualities not utilized in the sawmills, and forest thinning and other silvicultural measures were encouraged by demand for smaller dimensioned wood. While the sawmills mainly had used pine, the new pulp production methods enabled industry to process spruce.

The early decades of the 20th century could be called the Swedish "pulp era". The maximum number of mechanical pulp mills (105) was reached in 1900 and the number of sulphite pulp mills (70) was maximized in 1920. Sweden was an important pulp exporter (the market pulp share of total pulp production was much higher than today), with deliveries to North America and South America as well as to Europe. We illustrate this below with figures from 1937 and 1974.

	1937		1974	
	Production	Export	Production	Export
Sulphate pulp	1.2	0.9	5.5	2.9
Sulphite pulp	1.4	1.1	1.7	0.9
Mechanical pulp	0.7	0.4	1.9	0.5
Semi-chem. pulp	-	-	0.4	-
Dissolving pulp	<u>0.2</u>	<u>0.2</u>	<u>0.3</u>	<u>0.3</u>
Total	3.5	2.6	9.8	4.6
Export share		74 %		47 %

Exhibit A2:4. Swedish pulp production and export (1937, 1974, million tons)

World War II and the Early Postwar Period

Naturally, the Swedish export of pulp and paper decreased sharply during World War II. But the following years were also characterized by a rather pessimistic attitude towards the Swedish forest industry. Forest resources were considered as being more or less used up until a new forest survey indicated this belief was incorrect. Available forest resources were, however, located in non-traditional areas, e.g. in Southern Sweden, where there were no mills. The pessimistic view was also supported by such factors as export restrictions on certain products, as e.g. sawn wood, and capital shortage hindering new investments.

The Swedish forest industry thus tried to increase value added rather than production volume. Bleached qualities of pulp and paper and special pulp qualities for other purposes than paper production were emphasized. The industry became home market oriented and lost export opportunities and market shares to Finland and North America in the 1950s.

The Western Europe Export Growth Period

Sweden's present supply role has developed since the late 1950s. During the last two decades, Sweden's export of pulp and paper has grown considerably and concentrated on the Western European market.

The present role is a result of structural changes in the Western European market as well as the strategies developed by the Swedish industry itself.

a) Market Structural Changes Supporting the Swedish Supply Role

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The structural changes have been caused primarily by three factors:

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- 1. Increase in gross national product linked growth in demand for paper and paper products in Western Europe.

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Consumption of paper products is linked to GNP growth. Starting in the 1950s, the demand for packaging paper grew very quickly in Western Europe. This was a result of increasing trade within Western Europe. Goods being carried around more, there was a need for packaging. Consumption of paper for writing and other printing purposes than newspapers has also increased rapidly during the last two decades.

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The growing Western European market with decreasing degree of self-sufficiency offers an interesting opportunity for the Swedish industry. While in 1953 slightly over half the Swedish pulp and paper exported went to Western Europe, the share had risen to 82% in 1974.

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- 2. Diminishing protectionism in Western Europe

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Western Europe's expanding demand for paper products could not be met by domestic supply. In 1956 West Germany lowered its tariffs on paper and paper products independently from the other Western European countries. The other countries, not being able to satisfy demand within the area, in 1960 followed the German

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action by a general agreement between the EEC and Scandinavia on a successive tariff reduction.

3. Increase in demand for new paper qualities suitable for Scandinavian fiber and bulk technology.

The evolution of the Western European systems for packaging and distribution have contributed to an increasing demand for qualities like sack kraft, kraftliner as well as fluting for corrugated board and food board. The strength required for kraftliner and sack kraft could be achieved by use of long-fiber Scandinavian raw material. Efficient production of kraft paper pulp also required large volume sulphate mills, as those which were put up in Scandinavia. The development of new bulk paper qualities has resulted in a subsequent supply role differentiation between the Scandinavian and the Western European industries.

b) Large Scale Economies

The Western European market still being protected by tariff barriers and long delivery times due to transportation reasons, the Swedish industry sought competitiveness by exploiting economies of scale and producing standard products.

The larger production units necessary for achieving economies of scale also implied that integration forward from pulp into paper became advantageous. This scaling-up process was well suited in an environment characterized by adequate raw material supply

sources and a growing market demand in Western Europe. The last 20 years have very much been a "plus sum game", with Sweden's export growing without anyone else losing.

The Swedish production increase was achieved by heavy capital investments rather than increased employment, leading to a situation in which capacity utilization became decisive. This factor again supported concentration on standard bulk products.

The rough course of the events affecting the Swedish forest industry during the 1950s and 1960s is illustrated in Exhibit A2:5 below.

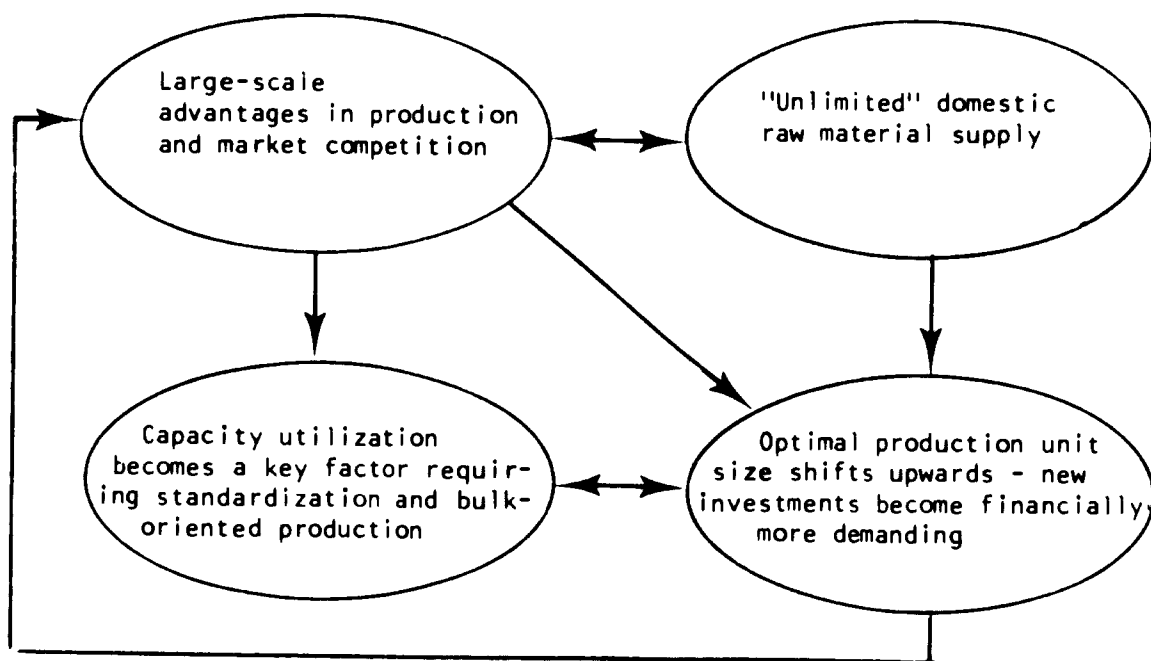


Exhibit A2:5. Some of the reinforcing mechanisms in Swedish forest industry's evolution towards standard quality and bulk products

The combination of "market pull" (growing demand for forest products in Western Europe) and "volume push" (bulk oriented growth mechanisms) has given the Swedish forest industry a structure which is perhaps best illustrated by the production and distribution pattern of 1974 (the latest business boom year) - see Exhibit A2:6.

A Note on the Leading Actors in the Various Phases

In the first phase of the development, the sawmilling period, foreign capitalists and wholesalers in wood were the entrepreneurs. British, Dutch and German traders established export agencies and organized sawmilling in the small river mouth villages along the coast in Northern Sweden.

To some extent the steel works companies also took part in the sawmilling boom but rather became the leading actors during the pulp era. Some of the steel plants were very well located, had the administrative capability of making large investments and of exporting abroad. An important driving force was also the decline of the steel business as well as the sawmilling business at that time.

During the last 20 years a lot of expansion of the industry took place in Southern Sweden. Here the Forest Owners' associations, especially the Southern Forest Owners (Södra Skogsägarna), have been leading actors. The expansion of the forest industry in Southern Sweden is parallel to the emergence of the Southern Forest Owners' Association which, directly through their own investments and indirectly by

Products	Production (000's ton or m ³)	Export (share of production)	EEC	E x p o r t t o					Others
				Austria Switzer- land	Portugal Spain Greece Turkey	Eastern Europe	Share of export		
Sawn wood (softwood)	13.274	7.393 56 %	6.215 84 %	79 1 %	564 ^{1/} 8 %	7		528 7 %	
Chemical Pulp	9.479	4.376 46 %	3.150 72 %	249 6 %	199 4 %	128 3 %		650 15 %	
Newsprint	1.210	944 78 %	713 75 %	5 1 %	42 4 %	14 1 %		170 18 %	
Other printing writing	833	445 53 %	336 76 %	37 8 %	16 4 %	46 10 %		10 2 %	
Sack kraft	822	750 91 %	511 ^{1/} 68 %	13 ^{1/} 2 %	1 -	19 3 %		206 27 %	
Folding l/ box board ^{1/}	429	282 66 %	82 29 %	3 1 %	-	1		196 70 %	
Kraftliner	706	562 79 %	433 ^{1/} 77 %	1 ^{1/}	15 3 %	1		113 20 %	
Fluting	331	221 67 %	91 86 %	13 ^{1/} 6 %	-	-		17 8 %	

Year 1974

Sources: FAO and OECD

1/ All countries are not included in the export figures

Exhibit A2:6. Sweden's supply pattern 1974

stimulating other to invest, contributed significantly to the development in Southern Sweden.

Some of Today's Dilemmas of the Swedish Forest Industry

The Swedish forest industry is facing a number of critical problems today. After the extra-ordinary good results in 1974 and partly in 1975, most of the companies have been in a profitability squeeze with some of the companies making big losses. Exhibit A2:7 illustrates the profitability development during 1972 - 1977. However, there are large differences between the companies - while SCA, Stora and Korsnäs had a total profit of some 650 million Swedish kronor in 1977, the losses of the forest owners' industries (Södra, NCB, Vänerskog) and the state-owned ASSI amounted to more than 1,100 million Swedish kronor.

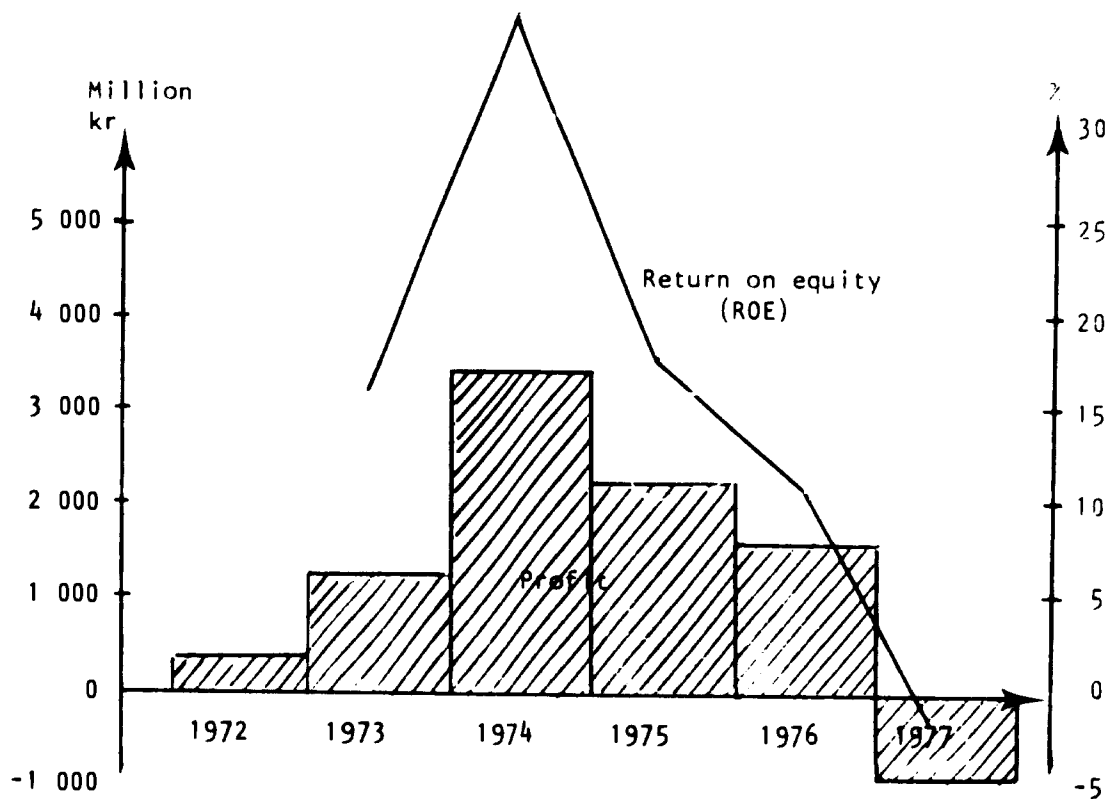
This situation is interpreted by actors and experts in different ways, two of the opposite ones being:

- It is basically a business cycle phenomenon. It is only to wait to see the good times come along again.
- We are witnessing the results of structural changes. "1974" will never return. It was a peak-year in the period of the Swedish industry as the leading supplier of bulk products to the Western European market.

Observations Supporting the "Structural Change Interpretation"

1. The forest resource situation has changed

The downstream processing capacity of the Swedish forest industry is now exceeding the production



Source: Affärsvärlden 21/1978

Profit:= Pretax result after allowed depreciation and net interest

Return on equity (ROE) = After-tax profit as percentage of corporate equity

Exhibit A2:7. The Swedish Forest Industry 1972 - 1977:
Profit and return on equity

capacity of the forests on a sustained yield basis. This problem is further enhanced by an unfavorable age distribution in the forests. Too little "middle-aged" trees due to mismanagement and application of wrong silvicultural methods 30 - 40 years ago will force an actual reduction in annual cuts compared to the peak-years in 1973 and 1974. Successively the average size of the trees in the annual cuts will be reduced as the old stands of mature trees are replaced by younger stands and thus decreasing the most valuable base for the sawmilling industry.

As a consequence of the shortage of forest resources in relation to processing capacity, the prices of wood have increased rapidly since 1973. In addition, increasing labor costs and stagnation in the productivity development have also contributed to the considerable deterioration of the cost efficiency of the Swedish forest industry over the last 2 - 3 years, especially in relation to the US competitors.

2. An emerging new supply pattern in Europe

The new resource situation of the Scandinavian forest industry is one of the driving forces for a restructuring of the market in Western Europe. Signs of a new supply pattern have already appeared:

- The North American forest industry have gained market shares in Europe in several product areas and is also a potentially more important supplier to the Western European market.
- New suppliers are entering the European market, sometimes on a large scale. Brazilian pulp

exporters, Portuguese kraftliner producers and South East Asean tropical hardwood exporters are a few examples where the market shares of the Swedish industry will be encroached upon.

3. Integration forward by Swedish producers

Among the new strategies tried by the Swedish industry to cope with the new situation are various forms of integration forward. Producers of packaging papers, such as sack paper, kraftliner and fluting, are consolidating and increasing their involvement in the converting end by acquiring captive outlets to secure a stable market (c.f. the chapter on the global kraftliner situation).

Other companies are trying a production oriented strategy by integrating their bleached pulp capacity into various bleached products, e.g. paperboard and fine papers. The idea is to achieve a more cost efficient production through economies of scale and energy savings and by that taking over markets from less efficient, market pulp based paper mills in continental Europe.

This is a growth pattern similar to the one that took place in the late 1950s and in the 1960s when the Swedish industry integrated its unbleached pulp capacity into various packaging grades. But there are also important differences in the present situation compared to the earlier integration wave. At that time the European economies were growing rapidly and demanded a lot of additional volumes of packaging

papers. The necessary restructuring of the European industry was also facilitated by the possibilities to transfer redundant resources to other, fast growing sectors of the economy. Now the growth has slowed down in most North European countries and today's integration forward wave into traditional continental territories seems to develop into a "zero-sum game" and an employment battle between Sweden and the EEC countries.

4. Need for a more active reorganization involvement?

A much more active involvement in the European market and in the restructuring of the continental industry by the Swedish forest industry companies is perhaps needed. Control of marketing and distribution channels, converting operations, etc become more important in a mature market situation, as the one now facing Western Europe. Such control will remove some obstacles to an optimization of production between Sweden and the continent. It will also give opportunities to channel the increasing amounts of products coming from other suppliers (and which will come into the market anyway). Finally, much more of market orientation and contacts with end users^{es} are necessary to provide a good environment for product development and growth in new directions.

These imperatives for the Swedish forest industry, which can be derived by analytical work and by learning from other industries, may encounter difficult blockages in the Swedish industry, however. The structure of the industry is mainly reflecting the requirements for production efficiency in a situation of relative abundance of wood resources. The management and the

culture of the forest industry companies are production and technical oriented rather than market oriented, and export oriented rather than international in a more genuine way.

Enclosure 1
(to Appendix 2)

MAIN EVENTS OF ECONOMIC DEVELOPMENT IN SWEDEN AND
GOVERNMENT AND NATIONAL POLICY DURING VARIOUS PERIODS

- | | |
|------------------------------|--|
| Before early
19th century | Mercantilistic ideas are dominating economic policy - export tariffs, prohibition of imports, etc. Iron production is leading industry. Government regulates the location of iron works with certain allotment of forests to secure the supply of wood needed for the iron making. |
| 1823 | Parliament decision to transfer state forests to private hands. Sold in the South, given to the farmers in the North in the process of clearing property rights. |
| 1827 | Royal Institute of Technology was founded. |
| 1829 | College of Forestry and training of professional foresters started. |
| 1831 | First private banks started based on note issuing. |
| 1834 | Swedish currency is made redeemable based on a silver standard. |
| 1846 | Mandatory primary school system. Abolition of craft guilds. |

- 1854 State Railroad Act passed.
- 1856 First railroads.
- 1859 The Swedish Forest Service founded.
- 1850s - 1860s Abolition of protectionistic regulations in Sweden such as prohibition of imports and exports, export duties. Reduced import tariffs for manufactured goods and free trade in agricultural products.
- 1873 Sweden adopts the gold standard.
- 1879 First major strike in Sweden, in sawmills in Sundsvall.
- 1892 Import tariffs on industrial goods increased.
- 1895 Joint Stock Company Act.
- 1897 The Riksbank (The National Bank) is given the exclusive rights of a no-issuing bank.
- 1898 LO, the National Labor Organization is formed.
- 1902 SAF, Swedish Confederation of Employers created.
- 1903 Forestry law enacted: Regeneration after felling on private lands. County Forestry Boards to enforce the law and promote "proper forest management properties".
- 1905 The Union with Norway is dissolved.

- 1906 Prohibition against companies to acquire forests from the farmers in the North enacted.
- 1900 - 1910 Sweden joins the German protectionist treaty system. Swedish industry protected by tariffs. The idea was that all branches of the industry should be treated the same way.
- 1910 Sweden ends being a net international borrower; borrowing has taken place mainly through government bonds.
- WWI period Gold standard is abandoned.
Unemployment policy: public works organized for parts of the unemployed at lower wages than the market level.
- 1920s 1920s in general characterized by free trade policy in Sweden.
Deflationistic economic policy initiated to bring back Swedish currency to gold parity.
Law of 48-hour week enacted with wages income to compensate.
Strong "rationalization movement" and increased productivity.
Sawmill closing-down period.
- 1924 Swedish currency returns to gold standard.
- 1927 New Forestry Law: protection of young forests.

- 1930 First major departure from "laissez faire". Protectionistic policies introduced in agricultures.
- 1931 Sweden abandons gold standard, a requisite for a more free economic policy as regards internal goals. Forest Owners' Association start to develop.
- 1932 Social democrats take over government.
- 1933 New financial and unemployment policy introduced with the purpose to counteract the business recession and boost economic growth.
- WWII Wartime economy
- 1940 The government gives the Forest Owners' Associations the assignment to organize fuel wood supply to the towns and cities.
- After the WWII years Successive abolition of wartime regulations. Stimulating economic policy to avoid "after war depression": low interest, trade agreements and credits to USSR, etc. But stabilization of prices and currency still strong ambitions as before the war.
- 1946 Appreciation of Swedish currency (17 %).
- 1948 Depreciation of Swedish currency.

- 1948 Paper tax is introduced.
- 1950 Paper tax is abolished.
- 1950s During the 1950s and onwards "the full employment policy" has been a strong element in overall government policy. To achieve this an "active" labor market policy was developed that helped reallocate labor between industries and between regions in Sweden. Taxation and financial policy was designed to stimulate consolidation of companies and to allocate investments to recession periods, etc.
- 1951 - 1952 The Korea Boom.
- 1960 Sweden enters EFTA.
- 1969 Government financial support for pollution abatement investments.
- 1970 The National Forest Survey strikes to alarm: cutting will soon exceed growth.
- 1972 Association agreement with EEC.
- 1974 Capacity enlargement control for the pulp industry introduced.
- 1975 Government support to inventory investments.
- 1977 Depreciation of Swedish currency.

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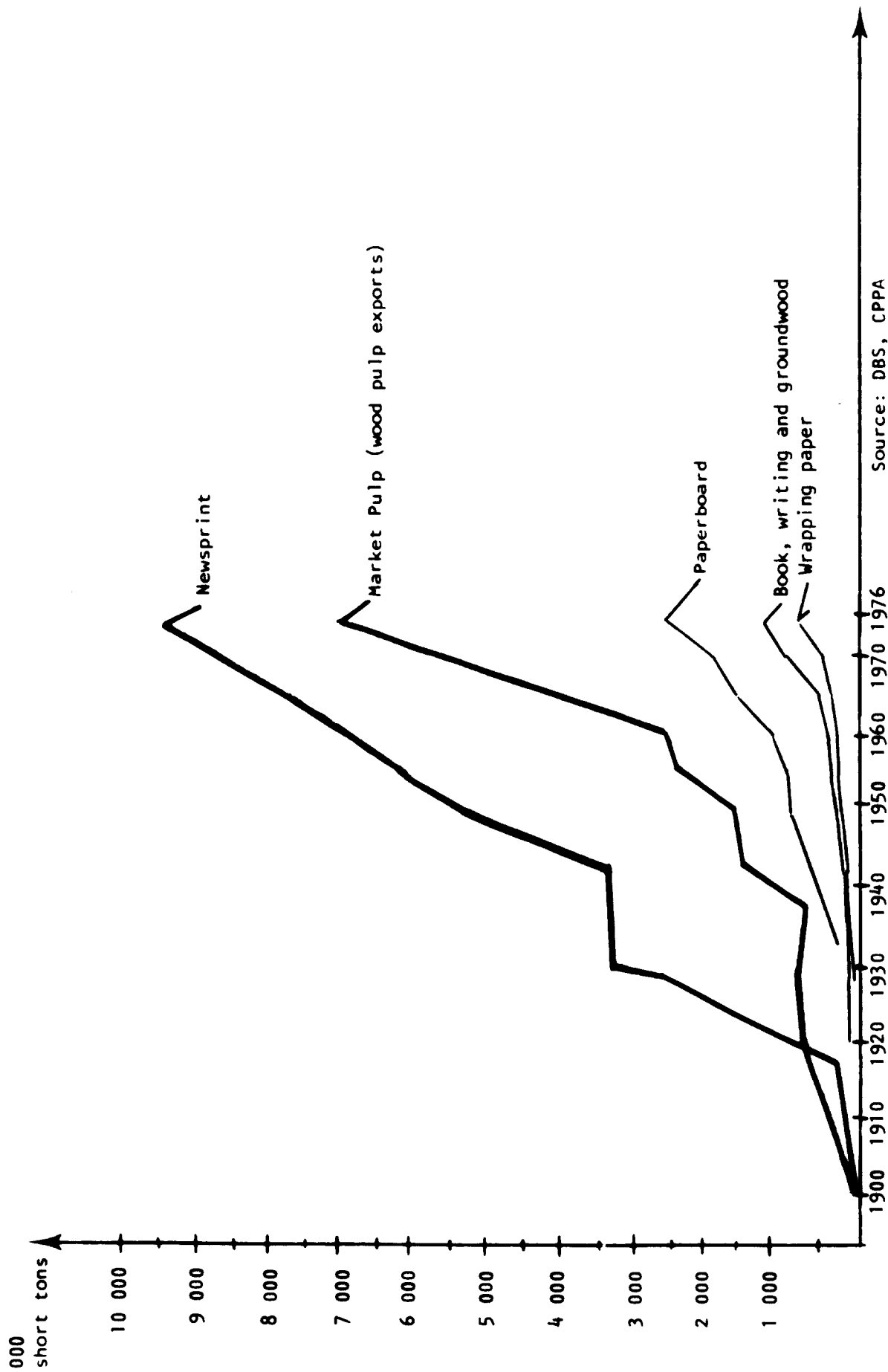
THE DEVELOPMENT OF THE CANADIAN FOREST INDUSTRY

Introduction

During the last sixty years, the Canadian forest product industry has experienced an extremely strong development, which has made Canada one of the key suppliers of newsprint, market pulp and lumber to the world market. This development, which we have tried to illustrate in the accompanying graph (see Exhibit A3:1), has, however, not proceeded uniformly and in the following paragraphs, we will attempt to chart some of the key factors and forces, which have shaped the development of the industry over time. Through this analysis we will try to describe the influence of the market, technological, social and political forces, which in one way or another have given the Canadian forest industry its present physiomy. Finally in a concluding paragraph we will attempt to delineate some of the key dilemmas, resulting from this particular development process, which the industry has to face presently.

1. The Evolution of Three Key Products Dominating the Canadian Forest Industry

Given the overriding importance represented by three key products (lumber, newsprint and pulp) we will first briefly analyze the development of these three commodities in the Canadian context, before turning to the other products constituting the remaining of the forest product industry.



Source: DBS, CPPA

Exhibit A3:1. Canada's production of main forest products

Lumber: The Canadian lumber industry origins can be traced back to the particular needs of the two colonial powers (France and the United Kingdom) that controlled the development of this part of North America.

The French and the British saw mostly in Canada's forests a source of supply for the materials they needed for their naval expansion plans. The French first organized a trade of oak planks and pine masts to supply the needs created by their shipbuilding programs.

This policy was later continued by the British authorities, who after the conquest of Canada established a system for both the reservation of pine trees suitable for the making of masts (these trees were marked with the broad arrow of the admiralty) and the preservation of adequate forest reserves to supply future needs.

Up to 1800, this was the only forest product trade entertained by Eastern Canada with Europe; this selective exploitation of the forest resources did not lead to the development of a significant sawmilling industry, which remained confined to the production of sawn goods for local needs.

The development of the Napoleonic wars, however, changed this situation dramatically. Cut from their traditional sources of supplies, the British authorities attempted to increase their supplies from other sources. Through the development of a preferential tariff, they ensured a privileged access to North American lumber to the United Kingdom market.

This opening rapidly led to the development of a growing "square timber" industry, which proceeded to exploit available forest resources along the major water ways (trees were felled, squared, assembled into rafts and floated to various shipping points). This in turn resulted in a shift of the industry away from the maritime provinces towards the interior of the country.

This growing industry in turn created a need to organize the cutting of timber, which the various local authorities tried to regulate through different mechanisms. The most populated areas, such as Nova Scotia and New Brunswick, chose to alienate some of their so called "waste lands", while Ontario and Qubec established license cutting policies, which still form the backbone of their present timber disposal methods.

As the square timber trade continued to grow and stimulated the development of a local shipbuilding industry, a small sawn deals trade progressively evolved mostly in the direction of the United Kingdom. This development in turn was further reinforced by the various improvements (improved sawmilling machines, growing use of steam) which affected the sawmilling industry.

As a free trade current developed in the UK, however, after 1840 the basis of the industry was progressively weakened and its competitiveness in comparison to other sources of lumber suffered noticeable from lowered tariffs. Fortunately the development of the US Atlantic Coast market around 1850 came to compensate for the decline experienced on the UK market.

The accessibility of this new market was further enhanced by the development or improvement of water ways in New York State and along the St. Lawrence river. This shift in the markets served by Eastern Canada in turn, led to a further development of the sawmills at the expense of the old square timber trade.

A further impetus to the development of the industry was given by the building of the transcontinental railroads, which both enabled the industry to reach forest reserves previously unattainable by water and opened the Prairies to population settlements. This resource and market push benefitted mostly to the sawmills located in the western part of the forested area of Central Canada. As the railways progressed westward, however, this movement started to revert and Western lumber began to find its way first in the Prairies and later in Central Canada around the turn of the century.

Up to that date, the Western Forests had been mostly exploited locally or for specific purposes (masts or exports to the Pacific rim); the arrival of the railroad, however, changed these conditions and provided for a rapid growth of the industry.

Back in the East, however, some difficulties started to emerge. Pushed by declining log supplies, US sawmills started sourcing logs in Canada (particularly in the Great Lake region). After a while, however, the Ontarian government became concerned by this problem and initiated a ban upon log exports. This ban, which was implemented in 1900, in turn led to a series of reactions. First most of the other provinces took similar measures between 1900 and 1913

and second the US for a while established a tariff against Canadian lumber imports.

These skirmishes, however, tended to dissimulate the real issue, namely the growing competitiveness of West Coast lumber. Over time the Eastern Canadian industry had started showing various signs of strain (declining qualities, increased prices), which the availability of West Coast lumber made the more visible. A decisive blow was handed to the Eastern industry by the opening of the Panama Canal in 1915. By facilitating the access of the US East Coast to West Coast lumber, the Panama Canal severely impacted the Eastern Canadian producers' position on the US Atlantic coast market. After a few years the Eastern Canadian industry started to decline and the relatively large sawmills to give way to much more modest operations.

The depressions of 1920 and 1930, finally contributed to further disorganize the Eastern industry. After World War II, the leadership role in Canada was definitely assumed by the West Coast industry, particularly as the decline of accessible reserves on the US West Coast opened new opportunities to the British Columbian Coastal producers to penetrate the US Eastern Seaboard market. The dominance of the BC producers was finally enhanced by the growth of the BC interior lumber industry, whose output progressively came to supersede that of the more established coastal industry.

In the late 1960s and early 1970s, some attempts were made to stimulate lumber production in Eastern Canada, particularly through the financing of some relatively large scale sawmill operations. The success of these efforts, however, which were initiated by

local operators or existing pulp and paper companies desirous to control their supplies of chips, still appear uncertain. On one hand, on the US East Coast market, the Eastern Canadian producers have to confront both the Western Canadian producers and the US South producers, whereas on the other hand they do not appear to have been able to achieve a level of efficiency comparable to their Western counterparts on the overseas export markets.

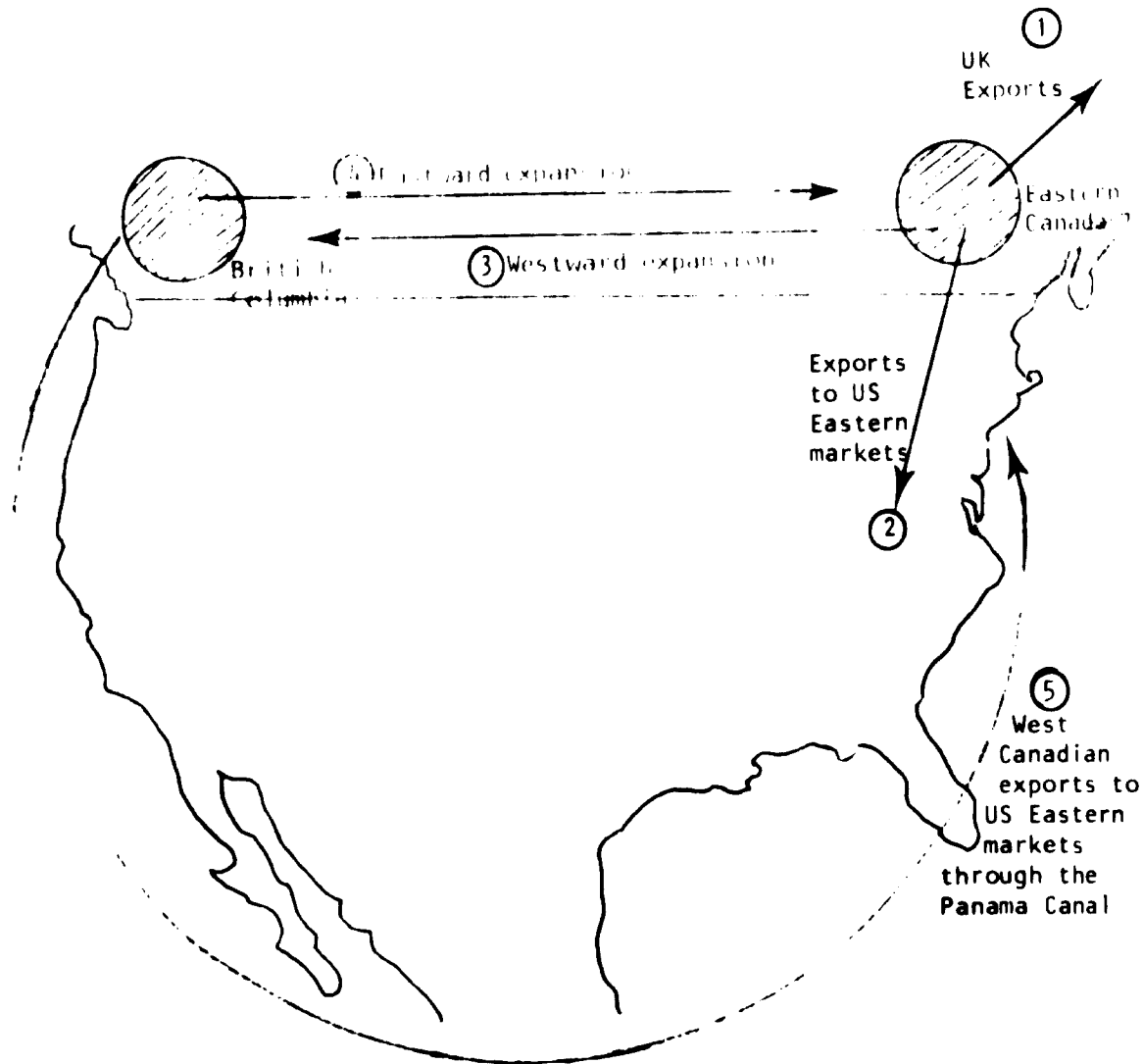


Exhibit A3:2. Various stages in Canadian lumber production development

Newsprint: At the turn of the 20th century the growing demand for newsprint in the US, which was mostly concentrated in the North-Eastern and Mid-Western part of the country, progressively strained the capacity of most existing US mills. These difficulties were the more acutely perceived as the natural wood reserves of a significant number of North-Eastern and Mid-Western mills had progressively been exhausted, and that very few possible sites for additional green-field mills remained available (because of the constraints imposed by the then available technology, which did not permit the use of other species than spruce in the manufacture of newsprint). To some extent, some US mills had attempted to alleviate these problems by acquiring land, or by securing Crown land concessions in Canada and importing the roundwood they needed for their operations.

The bans imposed by Ontario (1900) and Quebec (1913) on the export of logs harvested on Crown lands, which were apparently motivated more by the situation of the sawmill industry than by a desire to increase pulp and paper production in Canada, severely constrained these arrangements and probably incited several producers to consider relocating their manufacturing facilities (even if these producers could still import roundwood secured from other sources than Crown lands).

A further driving force was added in 1913 when US publishers, who had been increasingly concerned by rising newsprint prices and had never hidden their desire to gain access to a second source of supplies, successfully fought the domestic newsprint producers and secured the duty-free entry of newsprint (defined as ground wood paper above a certain weight) into the United States.

These successive events in turn, led to a rapid development of the Canadian newsprint industry in Eastern and Central Canada. By and large this development was enhanced by some of the physical, social and political characteristics of the Eastern Canadian environment.

First Eastern Canada had ample supplies of spruce, which constituted at the time the only raw materials considered suitable for the production of the two types of pulp (groundwood and sulphite) used in the manufacture of newsprint. Moreover, the fact that this technology entailed relatively little economies of scale (particularly as far as sulphite pulping facilities were concerned), offered good possibilities of "spacing out" the mills, and hence locating them relatively close to available forest resources.

Second, these wood supplies had little alternative value at the time, since both the opening of the Panama Canal, which had just opened the US East Coast market to the West Coast lumber producers, and the relative exhaustion of the Eastern forests had strongly undermined the competitiveness of Eastern Canadian sawmills.

Third, because of its high birth rate and traditional agricultural system, Eastern Canada and particularly Quebec had ample labor reserves, upon which the new mills could draw. This factor was particularly important in the light of the fact that most of the roundwood being floated to the mills, harvesting operations had to take place during the winter. The highly seasonal pattern of employment, created by these practices in turn, was supported in turn by the existence of a traditional farming system to which the forest workers could return during the

summer months. Additionally the relatively low wages paid in Eastern Canada fitted relatively well a product such as newsprint, for which labor costs still represent approximately half of the total manufacturing cost (wood costs included).

Fourth, Eastern Canada had ample water resources, which helped the establishment of the industry in three different ways. First the extensive network of rivers (most of them flowing south) and lakes made log transportation relatively inexpensive. Second, these same rivers and lakes supplied the large quantities of water required by the pulp and paper mills. Third, by offering numerous sites for harnessing, they provided the electric power (the transportation of which was quite problematic at the time) needed to action the grinding stones used in groundwood pulping (which is one of the most energy intensive pulping processes).

Finally the closeness of numerous mill sites to key US markets, such as Chicago or New York, as well as the availability of transportation (by boat on the Great Lakes or through the Saint Lawrence seaway and by train between most destinations), provided additional incentives for the location of newsprint mills in Eastern Canada.

This relatively easy and gradual transition of manufacturing facilities between the US and Canada, was further enhanced by the rather well established character of the newsprint technology, which had been gradually perfected in the later part of the 19th century. In turn this rather "smooth" transition got reflected into the type of firms, which Canada attracted:

- First, some of the dominant newsprint producers in the US started moving northward and in at least one case located close to the timber limits from which they had drawn their roundwood supplies.
- Second, some large publishers seized the opportunity to backward integrate into the production of newsprint. As newsprint costs tend to increase more than proportionately with circulation, this alternative proved particularly attractive to large metropolitan papers' publishers, who consequently attempted to set up wholly or partly owned mills in Canada.
- Finally, a small number of local entrepreneurs, with a good knowledge of possible sites, managed to secure both the timber limits and the financing they needed to start their own newsprint mills. In several cases, they set up joint sales subsidiaries with US publishing paper producers to handle the sale of their newsprint into the US.

As a whole then, because of the strength of these evolutionary forces favoring Canada, government interventions appear to have been kept at a minimum during this first period (1917 - 1928). In fact the only interventions, which have been recorded, dealt mainly with two issues:

1. Some attempts to prevent publishers to backward integrate, largely under the pressures of the commercial or "open market producers" (one publisher was first refused access to Crown lands in Ontario around 1920, even if later

the Quebec government authorized the company to set up a mill in Northern Quebec).

2. Attempts to have the companies locate their mills in "socially desirable areas", through the granting of attractive timber concessions or favorable stumpage rates.

This early period of prosperity, however, came rapidly to a halt in 1928, when for the first time the Canadian industry's capacity started to outstrip available demand. By and large this overcapacity appears to have been the result of two main causes:

1. The lack of coordination between some of the key host Provinces policies regarding capacity developments (each Province apparently chose to promote the development of its mills independently of the others, even if those mills were ultimately to serve the same markets).
2. The restructuration of the industry, which accompanied the development of newsprint production in Canada (by granting long-term timber concessions, and hence eliminating land ownership requirements, the Provincial government policies artificially lowered the barriers to entry into the industry; this in turn had the effect of enabling relatively undercapitalized firms to enter the industry).

As this overcapacity became manifest and as prices began to sag, the governments' concerns shifted from their earlier economic development goals to a desire to preserve the economic base of the industry (i.e. to maintain as many mills in operation as possible). To achieve these goals several measures were taken:

- First, some of the two key provinces involved started improving their coordination, through direct contacts at the highest political level.

- Second, with the support of the public authorities, some attempts were made to concentrate existing sales organizations and to allocate orders on a capacity basis among the various mills involved. These efforts, however, met some resistance from various sources. First integrated mills fought their de facto inclusion in the "order pool" on the basis that they had nothing to do with the industry overcapacity problems (they were only selling to their affiliated publishers). Second some mills (particularly the most efficient ones) refused to join the association (or Institute as it was called at the time). Third some mills, officially belonging to the association, continued to discount prices and jeopardized the rationale of the whole scheme.

- Third, as prices continued to decline (down to \$ 35 in 1933) at least one provincial government threatened to implement a dual stumpage price system (a first price for those mills following the official prices and a higher price for the "discounting mills").

- Fourth, as these measures were only moderately effective, the various governments involved allowed or even encouraged the industry to concentrate (largely as a way to implement the pooling of orders, which voluntary agreements had failed to achieve). Between 1928 and 1930, in addition to the industry's established leader, two new groups of large dimensions were formed.

Real stabilization of prices, however, did not emerge until 1935, when under the influence of the NRA legislation passed by the Roosevelt Administration in the US, newsprint producers in both the US and Canada, were finally pressed to establish and maintain minimum or floorprices.

The outbreak of World War II had some further impact upon the industry. During wartime regulations both newsprint prices and production volumes became the subject of government controls. Additionally, production volumes were allocated among the various mills, so as to minimize demands upon critical resources such as labor and electric power. These restrictions, altogether, created growing difficulties for several US newsprint mills which became unable to contain their costs below the level of the administered newsprint prices.

The end of World War II, found the Canadian newsprint industry in a rather paradoxal situation. On one hand its main source of competition had severely been reduced, but on the other during the twenty years or so of its existence it had practically never been able to generate any significant profit (with the exception of a few years in the early 1920s).

In contrast, the late 1940s and 1950s were some kind of a "golden era". A growing demand for newsprint in the US first and in the rest of the world later, boosted the Canadian producers operating rates. As demand continued to increase, the Canadian producers expanded their capacity marginally (in fact practically no newsprint mills were added between 1945 and 1960).

The rising prices which accompanied these policies, however, started to generate their own corrective mechanisms. The southern publishers in the US, who were the further away from Canadian mills, in particular became increasingly restless. They first supported various congressional investigations around the issue of alleged price fixing by the Canadian producers, but ultimately chose to stimulate local newsprint production. In doing so they benefitted from the pioneering work done by a publisher sponsored firm, who had already established a newsprint mill in Texas in the late 1930s.

A first wave of capacity increases in the US South in the late 1950s had little noticeable effects upon the Canadian producers. A similar set of increases, however, in the late 1960s impacted the Canadian industry more severely.

This increased impact in turn appear to have been caused by several factors. First, the economics of newsprint (cheap wood and labor) as well as the growing Southern market started to favor the US producers, particularly as Canadian costs (specially wood harvesting costs), inflated rapidly. Second, the fluctuations of the Canadian dollar, took away the exchange advantage the Canadian producers had enjoyed in the early 1960s. Finally some ill timed capacity additions made simultaneously in Canada, further depressed the operating rates of the Canadian producers.

These conditions in turn severely depressed the profitability of the industry, and some companies attempted to close or dispose of their most marginal mills. The 1973 - 1974 boom briefly restored a high level of prosperity, but as the 1975 worldwide slump

developed, the industry continued to face the same dilemmas. These difficulties in turn prompted several government levels to undertake reviews of the situation of the industry and early 1978, the Quebec government publicly announced the broad lines of an investment plan aimed at modernizing its own newsprint industry.

Market Pulp: In comparison to lumber and newsprint, market pulp, appears as a relatively new comer upon the Canadian scene.

Prior to the development of the newsprint industry, some initial developments had taken place (Canadian pulp exporters shipped 1.8 million tons of pulp in 1900) mainly in Eastern Canada. The development of the industry, however, largely stagnated until the beginning of World War II (with exports remaining in the vicinity of 700,000 to 800,000 tons a year, with the US as the main market).

Apparently, Canadian producers were experiencing some difficulties in competing with the more established Scandinavian producers, who during that period exported close to 1.4 million tons a year to the US market. In the absence of discriminatory tariffs between the two countries (pulp entering into the US duty free, whatever the origin), the preeminence enjoyed by Scandinavian suppliers during that period appears difficult to explain at this point.

A first impetus for the development of the Canadian market pulp industry, emerged during World War II as US customers got cut off from their traditional Scandinavian suppliers. Additionally as less wartime restrictions were placed upon pulp than upon newsprint,

some companies were able to take advantage of this opportunity and market pulp exports more than doubled during the war years. By and large most of these additional supplies appear to have come from Eastern Canada.

The next major development took place in the early 1950s as following the technological progresses made in pulping of Western species by the kraft process. West Coast producers entered the market pulp industry (which enabled them to use the wood wastes generated by sawmilling and plywood operations).

This brought the industry to approximately 180 % above its end of World War II level in 1960. The main driving forces supporting this development, appear to have originated mainly from the continuous decline of Scandinavian pulps upon the US market and from the rapid growth of US paper consumption.

The real "take off" of the Canadian market pulp industry, however, did not materialize until the early 1960s. The forces behind this development appear to have been both complex and numerous.

First, some increased demand came from the established US paper manufacturers located in the Midwest and particularly in Wisconsin. Apparently this increased demand was triggered by both the increase in output experienced by these producers and by their attempts to close their existing sulphite mills, largely because of pollution related concerns. This substitution of sulphite pulp by bleached kraft pulp, in turn was made possible by the progresses made in bleaching technology, which enabled the use of the more efficient kraft process.

Second, some increased demand came from specific end users' segments, such as tissue paper for example, for which Canadian softwood pulp (which dominates Canadian exports) had unique properties (tissue paper manufacturers are in general loath to utilize southern pine kraft pulp which they consider to be too bristly). This coupled to a growing demand for disposable paper products, led most tissue producers to set up pulping facilities in Canada during the early and late 1960s.

Third the continuous development of the European market, led to an increased demand for market pulp which benefitted mostly the Canadian producers, whose market share in the European bleached kraft pulp market doubled between 1965 and 1970 (from an initial level of 13 % according to the OECD).

These strong driving forces, were exploited by the authorities in British Columbia, who made low cost timber supplies available in the interior of British Columbia for a relatively large number of new mills during the mid and late 1960s. Due to the rapid character of this development, a large number of relatively diverse firms established operations in British Columbia.

First, some mills got established because of the desire of their parent companies to secure stable sources of kraft pulp supplies. Several Japanese and European firms for example, opened pulp mills in British Columbia often on a joint venture basis.

Second, some local sawmill operators, with the support of the local authorities entered the pulp field, mostly with the perspective of making better use of their waste products.

Third, some international companies already established in the pulp trade, set up mills in British Columbia, to support their existing pulp businesses. In some instances, particularly in the case of some US companies, a conscious decision was made to use these mills as "an export platform" independent from their domestic operations.

These development in turn resulted in an extremely fragmented industry pattern, with 26 producers involved and a relatively low level of industry concentration (the five largest firms in the industry are reported to control approximately 30 % of the industry total capacity).

Since this rapid development of the BC industry, only a relatively small number of new mills has been added mostly in Eastern and Central Canada. In at least one case the development of a new pulp mill had to be supported by public funds and there have been some worries in industry circles about the effect of its coming on line upon the rest of the industry (due to their large size new pulp mills usually represent a significant share of the industry existing capacity).

Other products. While the development of the Canadian lumber, newsprint and market pulp industries, was predominantly triggered by the needs of a few key export markets, the development of some other segments of the Canadian forest product industry, was mainly influenced by the needs of the Canadian domestic market.

The fine paper industry, for its part, developed mainly under the impulse of local paper merchants, who took advantage of the protective tariff structure, to initiate their own domestic manufacturing operations. This in turn, led to the creation of a relatively large number of small, often non-integrated, fine paper mills, mostly in areas close to the major metropolitan markets. The depression of the 1930s, brought some form of concentration to the industry, but changed apparatenly little in the way individual mills were operated; as a result at the end of World War II, the industry remained characterized by a small number of extremely "broad lined" producers.

As long as market growth remained relatively high and input costs low in relation to the US (which had evolved a more specialized and hence more competitive industry), this pattern remained stable. When Canadian authorities, however, in line with the GATT agreements started to significantly lower the tariffs, things started to deteriorate.

In prevision of the tariff changes, the Canadian producers had started to acquire more efficient paper machines, so as to improve their cost competitiveness. The existing pattern of competition, under which most firms attempted to compete with each other on the basis of extremely broad product lines, as well as the difficulties experienced by some of the firms in entering the US market with specific products, however, severely hampered these efforts. A second cut in tariffs, motivated by domestic anti-inflation policies, as well as rising wood and labor costs, further precipitated the issue and resulted in a steady increase in fine paper imports.

The industry's situation continued to deteriorate in 1975, when both a strike in all Canadian paper mills and a depressed US fine paper market, enabled imports to conquer close to 25 % of the Canadian market. Since that date, thanks to a lowered Canadian dollar and serious efforts aimed at controlling prices, the Canadian producers have been able to regain most of their market share, but the future orientation of the industry, particularly in the light of the new GATT negotiations, still remains unsettled.

This evolution, which characterized the fine paper industry, has raised numerous comments. The industry itself, for example, has long maintained that the tariffs have been needed for the industry to prosper. Other sources, on the other hand, have underlined the fact that the industry could have been competitive on a world wide basis, if it had organized differently and achieved earlier the specialization required by modern production techniques. As evidenced, by the present controversies regarding the future of the industry, these issues, however, still remain actual.

By and large the packaging paper and paper board segment of the industry experienced a similar development to that of fine paper segment. With the exception of a few export oriented mills and of its container board segment, the Canadian packaging paper and paper board industry, presents various characteristics, such as small, and less than technologically efficient mills, which make it quite similar to the fine paper industry.

In both cases the underlying causes appear to be similar, namely the existence of both a protective

tariff and of a geographically fragmented market, to which firms have attempted to adapt in various ways (scaled down or multi-purposes mills) at the cost of some efficiency.

In contrast with the fine paper industry, however, some segments appear to have "rationalized" much earlier. This phenomenon is particularly evident in the case of containerboard, where in spite of the tariff the high efficiency of US South producers and the inadequacy of available raw materials forced the industry both to take advantage of available economies of scale and to attempt to protect itself through forward integration into domestic converting operations. This relative efficiency, which was achieved by the early 1960s, however, led a few producers and some Provincial authorities to promote capacity increases aimed at the export market. These various ventures initially met some success as markets for these products became tense in 1973 and 1974. As more normal conditions prevailed, however, their unfavorable raw material situation, due to the low density of wood fibers available in Canada particularly in the East, and higher input costs rapidly placed them in rather difficult positions. Most affected were those mills such as Mantor or Labrador Linerboard which had to depend upon the open market to fill their capacities. After several years of losses, the Labrador Linerboard mill, which had been partly financed by public funds, was finally closed in 1977, while some others are reported to be in various degrees of difficulty.

2. The Regional Development of the Canadian Forest Industry

As can be inferred from the preceeding paragraphs the development of the Canadian forest product industry has been characterized by a significant Westward shift in the course of its development.

This shift was particularly obvious in the case of both the lumber and pulp industries, which from an established base in Eastern and Central Canada moved to British Columbia (gradually, for lumber and in a quantum fashion for pulp) and increasingly concentrated in this province. In the case of pulp this move was reinforced by the increasing economies of scale which emerged over time and which created strong incentives to establish larger and larger mills and to relocate to advantage of cheaper raw material sources.

The newsprint industry in contrast, has experienced a remarkable stability since its inception in the early 1920s. The persisting concentration of this industry to Eastern Canada (particularly in Quebec) can largely be related to the facts that

- The newsprint industry did not experience the same technological development that the pulp industry did. Up to the diffusion of the TMP process, most progresses were apparently made at the paper machine end. This in a large measure encouraged the newsprint producers to attempt to speed up their machines rather than attempt to build new greenfield mills.
- The newsprint producers, whose equipment was already depreciated in 1945, but who had made

little profits during the last twenty years apparently tried to improve their returns and marginally increase their production capacity, rather than engage in costly new ventures. The development of US South, both as a market and as newsprint producing region (following the technological progresses made in the manufacture of newsprint out of Southern pine in the late 1930s and 1940s) finally, virtually eliminated the incentives of developing greenfield mills in Eastern Canada in the late 1950s and early 1960s. This change in the economics of production, was in turn reflected in the decisions made by various Canadian producers to set up newsprint mills in the late 1950s and 1960s in the US South.

The dominance of the newsprint industry in Eastern Canada, the type of firms established in the industry as well as the timber disposal methods in use, in turn created little incentives to divert fibers to other uses than pulp and paper. As the growth of the newsprint market started to slacken in the 1960s, Eastern Canadian firms started investing in pulp or other paper grades (mostly for the domestic market). The few attempts that were made by established companies to enter the sawmilling business were reported to be relatively unsuccessful. These difficulties in turn, led public authorities to stimulate the growth of independent sawmills, which in turn generated conflicts with the established paper companies over the issue of timber disposal methods (particularly the concession system). In spite of these developments, however, Eastern Canada still predominantly remains a "pulp and paper committed" rather than a "forest products committed" region.

3. The Role of Government Intervention

On the basis of this broad historical review, the role of public authorities appear to have been guided by a limited number of principles, which we have tried to list and document in the following paragraphs:

- The preservation and control of forest resources:
This set of policies originated from the need to preserve a strategic raw material (ship-building grade timber) and gave birth to the practice of reserving forest areas for this explicit purpose. Once this initial control was achieved, public authorities undertook to farm out to various users of the raw material, the forest resources which were under their control. In this process, however, they persistently insisted upon local conversion of the raw materials extracted from Crown land, as evidenced by the ban imposed on round wood exports by the various provinces at the turn of the century, or the persisting opposition of the British Columbian government to allow the export of chips or logs to foreign markets (particularly Japan).

- The use of this control over the resource to attract manufacturing operations: This mode of intervention is exemplified by the development of both the newsprint and the market pulp industries, where during short period of times one can see the various provincial governments allocating timber limits to practically all interested parties. In many cases, this rather liberal allocation policy, was accompanied by the provision of incentives in the form of reduced stumpage rates to encourage firms

to locate in socially desirable areas (like for example the Quebec North Shore or the Maritime provinces). The rather diverse nature of the firms involved, for example in the BC pulp expansion or the initial newsprint boom, appear to indicate that little explicit attention was paid to the particular strategic situation and long term plans of the firms involved.

- The use of government funds and influence to preserve established manufacturing facilities:
This strong emphasis upon the preservation of manufacturing operations in Canada, has been repeatedly emphasized over the whole history of the forest product industry. First the provincial governments actively intervened to maintain the newly established newsprint mills and to prevent the various newsprint companies from engaging into destructive price competition. Second the same propensity to intervene was later displayed in the case of faltering mills: the BC government for example took over a newsprint mill which its parent planned to close in Northern BC, the Quebec provincial government in a similar way financially supported three mills faced with a similar fate and in two cases other provincial governments stepped in to take over mills "abandoned" by their original promoters. More recently the plan announced by the Quebec government to financially support its newsprint industry, appear to be clearly based upon the same logic.

- The preservation of a protected sector: In addition to those policies aimed at supporting large export oriented commodities, such as

newsprint, pulp and lumber, the Canadian public authorities have maintained relatively protective policies aimed at other segments of the industry. The printing and writing paper or the packaging paper and paperboard segment of the industry, which were built under a relatively high protective tariff appear to be clear examples of this type of intervention.

As in the case of the export oriented segments, the rationale for these policies appear to have consisted mainly in the desire to establish domestic manufacturing facilities and hence to increase employment opportunities in Canada.

As a whole these policies, which were pursued by the Canadian public authorities, over time, appear to exhibit a certain degree of consistency in their orientation, even if as noted earlier their implementation has sometimes led to some difficulties. By and large they appear to reflect the philosophy of a capital and albeit to a lesser extent technology short country, which attempts to make the best use of its raw material in order to promote local employment. This philosophy which seems to have permitted government actions, finally appears to be highly consistent with the heavy emphasis placed upon resource management and allocation at the Provincial levels (where most forest industry issues are handled by natural resources or land and forest departments).

4. The Dilemmas of the Canadian Forest Industry

From this brief overview of the industry development a few key dilemmas can be identified:

- The fate of declining industry segments: Because of the particular nature of the firms which both the Canadian environment and government policies have nurtured, Canadian firms appear to have difficulties in handling mature or declining products. Because of the limited number of large volume commodities supplied by Canadian firms, and of the protected nature of the domestic market, attempts by firms to exit from maturing or declining product lines are usually problematic. In many cases, the only available alternative consists in the closing of the facilities involved, which is often difficult to achieve because of local social demands. This in turn has resulted in various forms of compensatory government interventions. For example in one case a failing newsprint mill had to be taken over by provincial authorities, while in other cases heavy pressures have been placed upon public authorities to finance the perpetuation of a few declining mills. The dilemmas generated by these developments are the more acute that the various levels of government do not appear to have evolved specific intervention strategies to deal with this particular type of problems.

- The conflicts between development and industrial goals: The large autonomy enjoyed by the provinces in issues regarding the utilization of forest resources, contributed positively to the early development of the industry's export oriented segment. As market growth started to slacken over time, however, these arrangements started to prove more problematic. Given the crucial role played by capacity management in capital intensive industries, uncoordinated additions

to capacity, if they create local benefits, can result in rather debilitating consequences for the industry as a whole. In a system where market growth is rapid, these imbalances are rapidly corrected, but as growth slackens they become increasingly costly. This dilemma which was already experienced throughout the development of the newsprint industry, was recently reviewed by the criticisms aimed at the funding of various mills by public authorities.

- The difficulties experienced by the protected segments of the industry: The tariff protection granted to some segments of the industry, if it enabled the development of domestic manufacturing has also generated some unexpected constraints in the long term.

In most cases the firms, in these segments, have adapted to the specific characteristics of the Canadian market. In doing so, however, they have tended to rely on relatively inefficient production processes, which have undermined their ability to compete in the long run. As demands placed upon them by public authorities, in terms of lowered tariffs or improved pollution control, have increased they have found their freedom of action severely constrained. In many cases, they have found it difficult to export or to openly discuss rationalization plans at the industry level, because of existing anti-trust policies. Additionally, rationalization plans have been looked at with some uneasiness by the two key provinces involved, because of their expected impact on employment. These difficulties in turn have resulted in a certain

disarray regarding both the future of the industry and the government policies aimed at supporting it.

- The conflict between the logics of export and domestic oriented industries. For the last ten years, Canadian pulp and paper manufacturers have bitterly complained against the wage increases demanded by the Unions, particularly in the light of those granted by their mediate competitors (specially the US South producers). The Unions on the other hand, have claimed that these wage increases were necessary to keep the salaries in the industry in line with both the rate of inflation and the salary increases granted to Public service workers. This debate which is still going on, illustrates the problems experienced by export oriented industries, such as forest products in the predominantly protected context of the Canadian economy. In the absence of mechanisms specially designed to handle these conflicts, these are bound to escalate and to result into non-constructive industrial relation patterns. By and large, this structural imbalance appears to have been one of the prime reasons behind the difficulties experienced during the 1973 and 1975 - 1976 contract negotiations.

Historical Chart of the Canadian Forest Industry's
Development

Prior to 1763
Reservations of oak and
timber for French naval
requirements

1763 - 1800
Reservation of pine trees
for the British navy and
establishment of forest
reserves for the produc-
tion of timber suitable
for masts. Development
of a locally oriented saw-
milling industry.

1800
Napoleonic wars and de-
velopment of the con-
tinental system; British
government fosters
British North American
wood trade by imposing
high duties on foreign
timber supplies.

1805 - 1819
Creation of first paper
mills in Eastern Canada
(rag based).

1810
Development of the square
timber trade with the
United Kingdom in Eastern
Canada (Quebec, New
Brunswick).

1825
Introduction of the con-
cession method enabling
licensed cutting on
"waste lands" not granted
or reserved for naval or
military purpose.

1830
Development of sawn deals
trade with the United
Kingdom (in addition to
the previous square timber
trade).

1850

Development of the US Atlantic coast market favorized by rapid population growth and the construction of waterways.

1860

Development of UK free trade movement; decline and lifting of preferential tariff for North American lumber on the UK market.

1860

Building of railroads in Canada leads to a westward movement of the Canadian sawmilling industry away from the major waterways (St. Lawrence, Great Lakes).

1880

Colonization of the Praries increases demand for lumber; supplies predominantly come from Eastern Canada. Arrival of railroads to the Pacific Coast starts reversing the trend: lumber begins flowing eastward.

1880 - 1900

Tariff struggle between Canada and the US over the issue of the lumber industry in the Great Lakes area (US impose a tariff on lumber. Ontario bans export of logs).

1910

Peak of production in Eastern Canada largely spurred by the US Eastern market demand; Eastern Canada, however, starts showing increasing signs of strains (increasing costs, declining quality).

1851

Ten paper mills (rags) in Eastern Canada.

1864

First soda pulp mill built in Canada.

1869

First groundwood mill built in Canada.

1880

First sulphite mill.

1900

Development of pulp trade with US mills.

1907

First sulphate mill.

1911

United States grant free access to Canadian newsprint.

1913

Free access to US extended to wood pulp and newsprint from all sources.

1915

Opening of the Panama Canal. Rapid growth of Western Canadian industry stimulated by both easy water shipments to the US East Coast and easy rail shipments to Central Canada.

1920

Depression creates growing difficulties for Canadian sawmills; growing competition from Western lumber (directly in Canada, and indirectly on the US East Coast market) felt by Eastern Canadian sawmills.

1930

Depression in the US reduces Canadian exports; large sawmills in Eastern Canada progressively replaced by small portable mills.

1932 - 1935

Revival of export trade to the UK (particularly from British Columbia).

Quebec ban on exports of pulp woods cut upon crown lands.

1920

Under the protection of Canadian tariff, paper merchants develop the manufacturing of fine papers in Canada.

1917 - 1928

Rapid development of newsprint production in Eastern Canada stimulated by rapid growth in US newsprint demand
ments grant timber concessions to newsprint producers.

1928

First signs of overcapacity in the newsprint sector, prices start to decline (between 1917 and 1928 the industry's capacity had grown from 250,000 to 2,612,000 ts).

1928 - 1932

More than half of the newsprint companies in Canada enter into receivership.
Financial concentration results in the formation of a few large groups.
Large number of companies change their management.

1929 - 1938

Various attempts by Ontario and Quebec governments to encourage price stabilization schemes (order sharing, direct pressures on price discounting companies).

1935

Passation of National Recovery Act in the US, which permits the fixation of minimum prices and enables prices to recover.

1940

With the outbreak of World War II imposition of controls upon the newsprint industry: stagnation of production.

1941

Decline of Swedish pulp shipments to the United States, doubling of Canadian market pulp exports between 1940 and 1945. Growth of the packaging and printing industries stimulated by war needs.

1945 - 1950

Development of the West Coast plywood industry.

1945 - 1960

Rapid recovery of newsprint markets. Canadian producers' profits increase; rapid brownfield capacity additions.

1950 - 1960

Canadian West Coast producers increase their share of the US East Coast lumber market.

1950

Following technological innovations in the field of pulping technology (kraft pulping of Douglas Fir), West Coast lumber producers start integrating backward into pulp and paper production.

1965 - 1970

Attempts by Eastern Canadian provincial governments (Quebec) to stimulate lumber production.

1957 - 1960

First wave of newsprint capacity expansion in the US South easily absorbed by rapid market growth.

1963

In line with GATT negotiations, Canadian government lower tariffs protecting fine paper and packaging industries.

1965 - 1970

Newsprint producers attempt to diversify into other lines.

1964 - 1972

Rapid expansion of bleached kraft pulp capacity in British Columbia stimulated by growing US and European demand.

Influx of new companies to British Columbia.

1967 - 1971

Second wave of newsprint capacity expansion in the US South; and limited market growth result in declining profit rates for the Canadian producers.

1965 - 1973

Partly on the basis of government funds attempts to develop exportoriented packaging paper and board mills.

1969 - 1972

Growing US imports of fine papers.

1972 - 1974

Demand outburst leads to high profits for all Canadian pulp and paper producers.

1975

Recession and strikes increase difficulties for newsprint, fine paper and packaging paper and paperboard producers.

1977

Closure of a linerboard export mill, a newsprint mill. Attempts to close some of the oldest fine paper or packaging paper mills.

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SOME BASIC CHARACTERISTICS OF THE KRAFTLINER AND
THE CORRUGATED BOARD INDUSTRY

1. Kraftliner is one of the most significant products in terms of volume in the global wood fiber based industry. Annual world production amounts to some 19 - 20 million tons with North America, Scandinavia and Japan as the dominating producing areas.

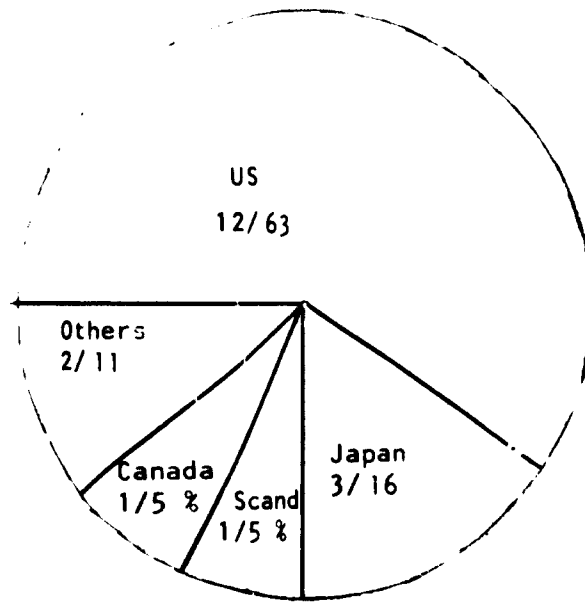


Exhibit A4:1. Distribution of kraftliner production
(1974, million tons and share of production)

Kraftliner production has its origin in the US industry, which is also dominating in a worldwide comparison.

Outside the US, the Japanese, Canadian and Scandinavian producers are the largest. The Japanese companies are mainly focused on the domestic market, while the Swedish and Finnish liner industry are exporting most of their production to Western Europe.

In Western Europe, there are also single producers in some countries - Cellulose de Pin in France, Nettingsdorf in Austria, Celnorte in Portugal - as well as some non-permanent production in Italy and Spain.

There is also some kraftliner production in Eastern Europe, New Zealand, South Africa and Brazil.

2. The basic technology for producing kraftliner was established already before 1930. Today, the technology is in a very mature stage and well developed. Efforts are concentrated to rationalize production and make economies of scale possible. This has resulted in a capital-intensive technology which is available from large paper machine manufacturers to anyone willing to invest.
3. Although there are varieties in the liner qualities, kraftliner is on the whole a very standardized product with the character of a bulk commodity. Large volumes of standardized products make it possible to get cost advantages by exploiting large scale technologies.

4. Raw material is an important cost factor. In addition to taking advantage of economies of scale it is important that production units are located where it can have access to cheap fiber. In the case of kraftliner, the wood fiber used must for strength requirements be softwood (long fiber) to a large extent. That explains why we find production of kraftliner in the countries mentioned above with feasible softwood resources.

5. Kraftliner is almost exclusively used for production of corrugated boxes.

Corrugated board consists of liner board (facing paper board) and fluting paper (medium). To produce corrugated board, the medium is corrugated between two layers of liner.

There are two principal kinds of liner board: kraftliner and other liner (testliner etc) Kraftliner is produced with kraft pulp (mostly sulphate pulp) as raw material, but it is allowed to use up to 20 - 30 % of other raw material as input. Testliner and other liner are processed from raw materials with less strength, e.g. reprocessed waste paper.

There are two principal kinds of fluting paper too. Semi-chemical fluting is processed from semi-chemical wood pulp and thus mainly based on hardwood (birch etc). The other fluting varieties (e.g. bogus), are based on other raw material (straw pulp, waste paper etc).

An average Western European corrugated box has the following approximate composition:

Kraftliner	33 %	} 57 %
Other liner	24 %	
Semi-chemical fluting	26 %	} 43 %
Other fluting	17 %	

In the US, a corrugated box has more of virgin fibers (kraftliner and semi-chemical fluting) and less of other liner and fluting.

6. Corrugated board is mainly utilized as transportation packaging. It is the cheapest paper packaging material existing. The different qualities of corrugated boards are due to the following factors, among others:
 - o The strength of the liner and fluted sheets. The long fiber softwood is superior to any other materials.
 - o The height and frequency of flutes per meter. Frequent and high flutes guarantee high quality of packaging corrugated board.
 - o The number of liners (walls). Two or more liners give normally the corrugated board strength enough to resist high strains.

7. The corrugated industry is part of a processing chain with the following appearance:

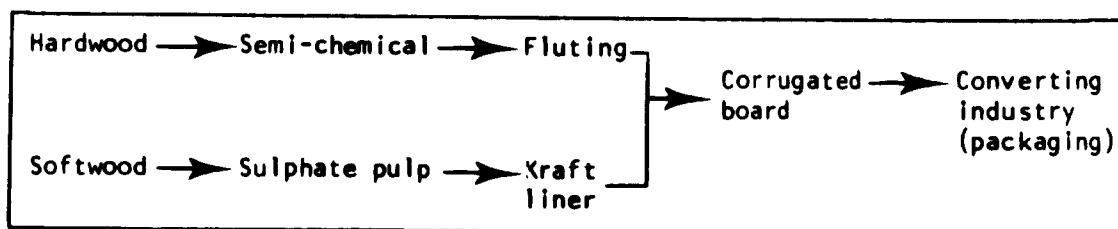


Exhibit A4:2. Basic product flow in the corrugated board industry

In contrast to kraftliner production, corrugated board and box making is a local/regional industry. Necessary local market contacts and high transportation costs often limit the territory of a box plant to a circle with a radius of a few hundred kilometers.

8. To a large extent there is an integration between producers of kraftliner and box makers. This is especially true in the US where 85 % of the box making capacity is controlled by liner producers.

Although many companies are integrated producers of both liner and boxes they have different character. Two important categories to distinguish between are

- a) Forward integrated companies. These are companies which have started out with liner production and later acquired box plants as "captive" outlets for liner. Examples of companies in this category are International Paper in the US and SCA in Sweden.
- b) Box making companies which have integrated backward into liner production. A typical company in this category is CCA (Container Corporation of America).

The degree of integration between kraftliner (and semi-chemical medium) producers and box maker is much lower in Europe than in the US. This has various explanations:

- a) The corrugated industry had its take-off in Europe only in the 1950s. The integration was initiated by the Americans in the late 1950s (IP and CCA), and during the early 1960s a wave of box plant acquisitions by the Americans took place, then followed by the Swedish liner producers. The Finnish liner producers made their acquisitions mainly in the peripheral part of the European market - the Mediterranean, North Africa and the Middle East which they later had to give up to a large extent.

- b) The paper material used in corrugated boxes in Europe is much more varied than in the US where kraftliner and semi-chemical medium is dominating. In Europe, recycled papers are used to a much larger extent and many box plants have their own small paper machines producing waste based paper.

This means that it "pays better" for a liner producer to integrate forward in US than in Europe - the amount of kraftliner that could be pushed through the box plant is almost twice as high in a US box plant than in an average European one.

SOME PULP AND PAPER MILLS IN DEVELOPING COUNTRIES

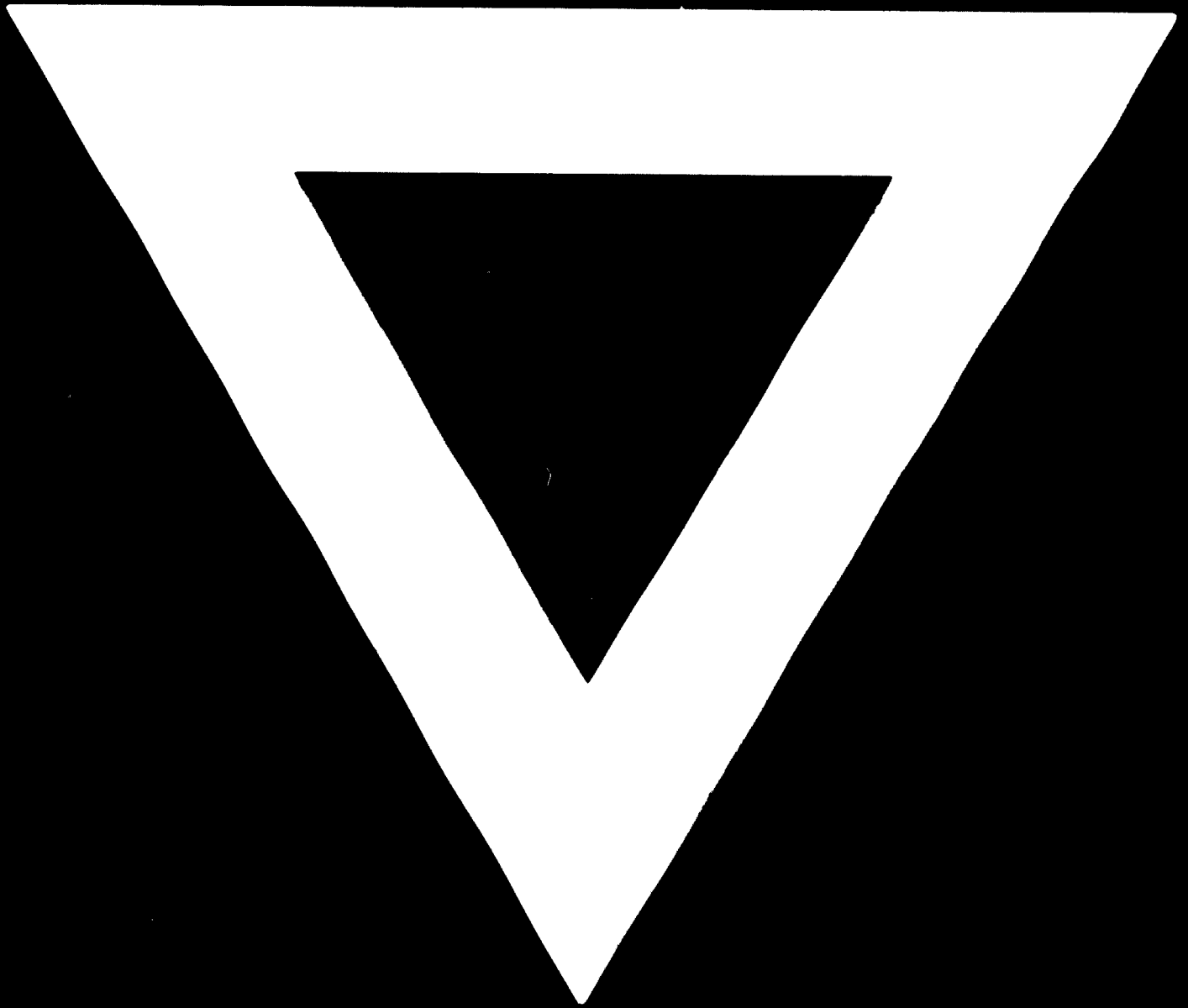
Mill	Local sponsor	Gvt agency	Size	Products	Financial	Export	Domestic	Cost	Foreign sponsor	Others
Stanger (RSA)	C.G. Smith (sugar bus.) See bagasse sold to Reed in 77.	(erase) (Ex problem mill sold to Reed for 10 M Rds), Reed original ownership)	150 tpd	Coated printing paper	Parents?		X	60M Rands.	Reed Paper (100)	Integrated bagasse
Jebba (Nigeria)	Nigerian Paper Mill (wholly owned Gvt cy) old mill Investment =	modernized Pulping (sulphate + semichemical)	60.000 t/y	Pulping (60% of needs) - sulphate - semichemical KLB, kraft paper printing & writing	95% NPM 5% Birla imported pulp + recycled paper. + 2 PM (1 KLB & fluting, other kraft + sack)		X (100%)		Birla (India)	Mixed hardwood Gmelina Eucalyptus Pine
Iwopin (Nigeria)	Nigerian Paper Man. cy (wholly owned by Gvt)		100.000 t/y pulp 70.000 t/y paper	Fine papers Fully bleached sulphate		X pulp	X (paper)		Echer Wyss (CH)	planted gmelina
Calabar			100.000 t	Newsprint Chemimechanical pulp + bleached sulphate (imported)	95% Gvt		X		Parsons & Whittemore	planted gmelina
Pan.Afric. Paper Mill Kenya	Kenyan Gvt		150 t/d (pulp) 2 paper machines	1st P & P mill in Kenya. Bleached + unbleached paper; tissue	IFC	30% Uganda, Zambia, Tanzania, Sudan, Iran, Pakistan	70% X		Indian Orient Paper Mills	1974 Profitable Kenyan F. Opt will plant Pine close to the mill (sawlogs also)

Mill	Local sponsor	Gvt agency	Size	Products	Financial	Export	Domestic	Cost	Foreign sponsor	Others
Mozambique (early phase)									SIDA (project evaluation) MoDo JPI	Old Portuguese plantations of eucalyptus & pine (1950) sawmilling particle board
Kabo (Tanzania)	National Dvmt Corp.		3.000 t/y	KLB & fluting			X	US 3 M		recycled (?)
Mufindi valley	National Dvmt Corp.		40.000 t/y 20.000 t/y	unbleached kraft paper P & M	Bank (\$7 M) for eucalyptus + pine plantation) Sw. Gvt K.A.f.V. Finland + Koweit Arab		X ?	US 100 to 200 M	SIDA ASSI JPI	12.000 to 60.000 ha man made forests
Katui (Zambia)			40.000	sulphate pulp kraft paper & paperboard						Planted 30.000 ha 22 pine } eucal.
Sogacel Gabon	59% Gvt		250.000 t/y largest African pulp exporter (paper in future)	Bleached kraft pulp		X		US 280 M	ELF + Stora	Mixed hardwood
Cellucam	65% Gvt		50.000 sulphate 23.000 secondary pulp 7.000 Nssc Fluting	125.000 t bleached sulphate		X (2)	X (1)	US 205 M	Vöist Alpine (Aus)	oil con- nection; mixed hardwood eucalyptus

Mill	Local sponsor	Gvt agency	Size	Products	Financial	Export	Domestic	Cost	Foreign sponsor	Others
Indu Peru	Peruvian Gvt		110.000 t/y	Newsprint based on Bagasse + some wood pulp and long fiber chemical pulp (Mexican process)		Some	Predomin.		Valmet 8.7 meters	Bagasse
Papel del Tucuman	Argentine gvt (self suff. goal) 26% + private funds		100.000 t/y \$350	Newsprint (most important imported) 90% bagasse 10% chem pulp (Cusi process)	US 116 to 150 M		X		Mexican (Cusi) company	
CCB Brazil		- market development problem	64.000 t	pulp	US \$56 M	X (large extent)	Technological barrier Market problem Long fiber paper (special uses)		Elof Hanson	Sisal large agri system to produce sisal.
Jari Florestal			750 t/d	bleached sulphate	500 M	X			Ludwig (sole financier) Kymmene Kaukas P & P	
Athens Paper Mill	Family owned		90.000 t P&M mag	Pulp mill (wood fiber) + paper + fiberboard	TMP Grwood sawmill + Part. b.	Plan to increase to 40.000 t coated paper				Raw mat. originally Greek gvt imported wood ...

Mill	Local sponsor	Gvt agency	Size	Products	Financial	Export	Domestic	Cost	Foreign sponsor	Others
K - C Mexico			115.000 t → 87.000 → 60.000 →	bleached bagasse pulp P&M pulp for sanitary products						Planting poplars
Pars (look at Stanger)	Entrepreneur owned		30.000 t 2 additional PM's 45 x 2 = 90,000 t Long fiber pulp imported	Bagasse (P&M papers) forced enlargement PM's 45 x 2 = 90,000 t Long fiber pulp imported	400 500 KR \$100 M				Reed (lowest offer) 10% ownership	
Argentina II				Newsprint						Salix ¹⁵⁸
Ivory Coast										Mixed hardwoods

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