BC MOULDING AND ARCHITECTURAL MILLWORK:
AN ANALYSIS OF THE US MARKET AND EMERGING COMPETITORS

by

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ABSTRACT

A competitor analysis of the BC coastal moulding producers has been undertaken. This analysis was accomplished by performing extensive market research on the producing regions and the products active in the North American moulding market. The geographic regions analyzed through an extensive literature review were the British Columbian coastal producers, the US market, Chile, and New Zealand. The various products and substrates discussed were MDF (Medium Density Fibreboard), composites (plastics), and solid wood. It is hoped that the information obtained in this analysis will form the basis for understanding the dynamics of the North American mouldings market, and present opportunities where BC coastal moulding producers may succeed.

Results of this analysis clearly showed that in order to succeed in the attractive US mouldings market the BC coastal moulding industry must overcome a number of challenges. Production of mouldings in the US market is stagnant while the demand for moulded products is on the rise. The Chileans were the first to take advantage of the decreased amounts of Ponderosa pine available on the market in the late 80's, the species traditionally used for mouldings, and have continually been increasing the presence of clear, fast grown radiata pine (Pinus radiata) ever since. Other US domestic pines have also found the mouldings niche and are gaining market acceptance. MDF is also quickly gaining market share in paint grade mouldings. Composite mouldings are developing a small niche in outdoor applications and where mouldings must bend. All of these products, including BC softwood mouldings must compete in the developing US mouldings market.

BC coastal producers have high production costs, difficulties accessing suitable softwood fibre, and in general are running old machinery. The advantage of being next door to the desired market is hampered by the US/Canada Countervail Duty which affects many producers. Some recommendations for overcoming these barriers are offered here. These recommendations generally take on the form of increased investment in technology, training, finding secure niche markets, and producing market driven products.
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1. **INTRODUCTION**

As BC moves to more value-added wood processing, the moulding and architectural millwork sector holds much promise for growth. The BC industry is well positioned with ample raw materials, access to cutting edge technology, a skilled labour force, and supportive associations and government programs to promote this industry. As new opportunities in the moulding and millwork industry present themselves, BC industry seems well poised to play a dominant role.

The moulding and millwork industry in British Columbia is in its infancy stage and is comprised of firms primarily producing windows, window parts, doors, door parts, and wood mouldings. This project will focus on the **wood mouldings** component of the industry. Most of the products produced in Canada, British Columbia, and the US are consumed domestically, with only a small percentage being shipped over seas (Forintek Canada and McWilliams 1993). Thus, it seems that there is potential for growth in the industry and as a result there is a need to understand this market more comprehensively.

The definition of a “standard wood moulding” agreed upon between the Canadian and American governments in the “Harmonized Tariff Schedule of the United States” in 1996 was: “a wood moulding worked to a pattern and having the same profile in cross section throughout its length…”² The Wood Moulding and Millwork Producers Association has a somewhat more romantic definition: “...a detail of architectural design - a decorative strip of wood, milled with a plain or curved narrow surface which is continuous throughout its length. It has traditionally been called moulding because its uniform, continuous shape appears to have been mould casted.

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² This is more commonly referred to as the US Countervail Duty.
The precision quality of the finished product truly reflects the pride and tradition of old world craftsmen."

According to Gary Nikolai, an architectural wood products specialist, architectural wood working is the main selling feature of a house. He suggests that the electrical work in a home must be done properly and safely, but one cannot see it; doors, windows, railings, and mouldings are what potential buyers see and must be sold on.

Most companies focus on producing one product well, such as cabinets or wood mouldings, rather than producing a large variety of goods in one manufacturing facility. This happens for two main reasons:

- the companies involved in the value-added industry tend to be smaller companies;
- focusing on one type of product allows for a high degree of specialisation (Forintek Canada and McWilliams 1993).

There are a number of specific reasons that there is growing interest in the moulding industry:

- Producers are interested in getting more value out of the domestic wood supply. Rather than selling round wood or even kiln-dried dimension lumber, companies are taking the process one step further and producing finished products for local and export markets.
- A result of secondary and tertiary manufacturing is increased job opportunities for locally skilled labour.

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The provincial government is encouraging primary producers to expand up the value chain from primary lumber products into secondary processing.

Not only are producers focusing on retrieving higher value out of the domestic wood supply, but also as the threat of decreased fibre supply increases, the need for more efficient utilisation of wood fibre becomes urgent.

In order to ensure the success of BC producers of mouldings in the domestic and international market place we must address three key aspects, each of critical importance (refer to Figure 1). The first is competing products and producers which may impede the domestic and international success of BC products. The second is the opportunities in the US Market for solid wood moulding from BC. The third is the BC industry itself and the potential for expansion based on Dr. Michael Porter's model of Competitive Advantage (Porter 1991).

Figure 1: The Triangle for Success
This report will be structured according to the Triangle for Success\textsuperscript{4}. The report begins with a background look at the BC moulding industry. Information that could be collected through a short literature review is presented with regards to Dr. Porter's Model of Competitive Advantage (refer to Figure 3). This model will be described in detail below.

Following this, the competitive producers and products are discussed. Chile is described in detail through a comprehensive literature review both as a competitor and as a case study of a successful entrant into the US market. The US domestic producers and New Zealand are reviewed for their production capabilities and softwood mouldings market share within the US. Mexico is also briefly mentioned. MDF as an emerging international competitor to BC softwood mouldings is explored, as well as plastic composites and hardwoods. Substitute pines for Ponderosa pine both domestic and international are discussed as well.

The second stage of the triangle will focus on the US market demand for mouldings.

The third section is the primary data collection results of the BC moulding industry survey. The information was collected based on questions that could not be answered through the initial literature review presented in the background.

Once all three pieces of the Triangle for Success (refer to Figure 1) have been presented, the discussion section explains how the information from the three previous sections can benefit the BC moulding producers.

\textsuperscript{4} The Triangle for Success is currently under development by Dr. David Cohen at the University of British Columbia, Vancouver, BC.
1.1 Objectives

The objectives of this project are the following:

- To understand the current status of the BC coastal wood moulding industry based on Dr. Michael Porter’s Diamond of Competitive Advantage.

- To evaluate this industry for future success and expansion based on:
  1. A detailed analysis of:
     a) Chile as a competitor and as a model for entry in the U.S. market;
     b) MDF (Medium Density Fibreboard);
     c) other products.
  2. Competitive consideration of:
     a) New Zealand;
     b) Mexico (historically a large supplier of mouldings to the U.S.);
     c) hardwoods (aspen finger joints, etc.);
     d) non wood products (i.e., foam crown mouldings, etc.).
  3. An analysis of the US market for its supply and demand of mouldings.

- To make recommendations to the BC secondary manufacturing industry based on the above analysis.
1.2 LIMITATIONS

This thesis has a number of limitations that the reader should note. The value-added industry in BC is quite small but diverse which makes it difficult to comment on the entire industry. Producers manufacture a broad scope of products and because of that this project must cover, at least in some detail, many of the products. It is unlike the primary industry where the majority of producers manufacture variations of lumber. Instead, in the value-added sector, companies manufacture a variety of entirely different products. The project is then forced to be broad in scope and somewhat reduced in specific detail.

1.3 STRUCTURE OF PAPER

This thesis is divided into 7 chapters. Chapter 1 provides an introduction, some key definitions, background, and outlines the main objectives. Chapter 2 discusses the methodology used in this project.

Chapter 3 and 4 make use of the available literature to develop two of the major objectives of this paper. Chapter 3 focuses on a description of international competitors that are operating within the US moulding market. Chile is used not only as a competitor, but also as a case study as a successful entrant into the US arena. Chapter 4 concentrates on the demand side of the US moulding industry.

Chapter 5 provides details of the BC coastal moulding and millwork industry survey. This section covers information that could not be sourced from a comprehensive literature review. Chapter 6 discusses how the information discovered from the data analysis interrelates with the competitor analysis and US market information. This chapter also mentions some of the areas where BC producers could succeed in dominating the US moulding market.
Finally, in Chapter 7, the study’s conclusions are presented.

1.4 BACKGROUND

1.4.1 British Columbia and Porter’s Diamond

It is important to note at the outset that there is very little public information available from literature regarding the value-added manufacturing sector in British Columbia. The little information that could be collected is presented here as a background. The many questions that were left unanswered regarding the state of the BC moulding industry were the basis for the survey and analysis that follow (refer to Chapter 5 and Appendix I). Therefore, the predominant literature review will follow the background section and discuss the competing producers and products, as well as the production and demand for mouldings in the US market.

Although BC’s secondary manufacturing industry has been in existence for many decades, it is only in the last 10 years or so that the value-added industry has come into the limelight. The historical focus has been on the primary sawmilling industry, and as a result BC’s primary industry is world class in terms of technology and production (Binkley, Cohen, and Maness 1993). This new focus has not occurred in the secondary manufacturing sector to the same extent. Although it has slowly developed, it is years behind that of many European countries.

Secondary manufacturing in BC is faced with the challenge of living in the shadow of the primary sawmilling sector. Although there are some excellent examples of high tech, efficient value-added producers in the province, the proportion of these operators is surprisingly low (Taylor 1996). World class sawing machinery was developed as a spin off to the successful primary sector. This pattern has not followed suit for many reasons in the value-added arena.
Any technology that is purchased by local producers comes from the US or overseas, and only seems to add another variable of difficulty to the operations.

BC is blessed with a relatively young, well educated, and easily trainable work force. The downside to this situation is that these same people have a very high standard of living and wage rates are comparatively high as a result (Binkley, Cohen, and Maness 1993). In order to compete with nations such as Chile where they have demographically a very young work force that works for less, BC must balance out its high wage costs with increased capital expenditure in technology. Theoretically, with the technology upgrades production will increase, accuracy will increase, and fibre recovery will be at a maximum (Taylor 1996).

Access to affordable fibre is of course, one of the greater concerns of many of the moulding producers in the province. One of the most difficult challenges for many of the producers is securing long term fibre supply at a price they can afford.

The above concerns are some of the issues that need to be addressed, and in order to fully understand the competitive nature of British Columbia’s secondary wood products industry, it is useful to apply Porter’s Model of Competitive Advantage. By applying this model to the BC moulding industry it will allow us to understand where the industry is performing well and where improvement is needed in order to be a world competitor. Porter’s model will be discussed in detail and addresses the key aspects for a nation, province, or even a company to compete successfully in a domestic or international environment. Porter’s Competitive Analysis model is shown below and described briefly (refer to Figure 2).
1.4.1.1 **Factor Conditions:**

This incorporates the country’s position in basic factors of production such as labour, land, natural resources, and infrastructure. Also included are highly specialized and advanced pools of skills, technology, and infrastructure tailored to meet the needs of particular industries (Porter 1991).

British Columbia has an extensive pool of both experienced, educated middle aged people as well as a growing number of highly educated yet inexperienced younger workers. Many of the older employees in the industry have extensive knowledge gained through years of hands-on experience. Although this type of education is vital to the micro applications of mill production, many of the older generation lack the business and computer skills that are necessary to succeed...
in today's competitive industry. In BC there are a number of institutions that have started to have specialties that focus on the value-added sector. The two primary leaders in this type of education are the British Columbia Institute of Technology and The University of British Columbia.

The issue of land and natural resources will be briefly mentioned here but further discussed in detail in the section of government as they play such a intricate role in the management of the resource. Obviously, it is well known that BC has extensive supplies of first growth timber. The land that could potentially be harvested is owned 96% by the government and 4% is privately held (Canadian Forest Service 1995).

The millwork sector in British Columbia consumes primarily softwood and hardwood lumber and a variety of panel products. All of the companies that participated in a 1991 FRDA study reported that they did not purchase raw logs and process them, but instead purchased the components in primary cut form. The wood used tended to be high quality: clear grade 68%, select 9%, No. 2 shop 8%, standard and better 4%, etc. (Forintek Canada and McWilliams 1993). Composite wood products and other materials such as metals and plastics are becoming increasingly accepted.

In 1991, softwoods made up 74% of the raw wood used by millwork plants. The species that make up this component are:

- Hemlock 18%
- Douglas-fir 17%
- SPF\(^5\) 16%
- Other 18%

The FRDA market study of the BC millwork industry conducted in 1991 reported that the millwork sector in BC appeared to break even with revenues of $180 million. The largest cost to

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\(^5\) SPF: Spruce, Pine, Fir. These species are usually sold in lumber products together under the name SPF.
the industry is the rising wood costs which constitute roughly 34% of the companies’ operating costs (Forintek Canada and McWilliams 1993). Some of the results of the higher fibre cost are:

- More efficient use of the current fibre source through investments in higher technology. In 1991, 1.6% of sales was spent on capital expenditures. (Wood Industry Census 1994).

- A shift to the use of other wood and non-wood materials such as wood composites, plastics, and metals.

- Because smaller producers cannot take advantage of economies of scale, some may be forced out of the industry.

British Columbia has a very advanced and stable infrastructure. Road networks, both paved and dirt are extensive from the harvesting block to the mill and to other downstream distribution points. The province has a very competitive, well established, and successful trucking industry to complement its comprehensive road systems. The rail system in Canada is extensive and is well connected to the rest of North America. Loading docks and harbours in BC are some of the most efficient and advanced in the world. The infrastructure in BC certainly will not hamper the success of the millwork and moulding industry in this province.

The global potential for the British Columbia millwork and moulding industry is enormous. But there are a few hurdles that the province faces within the global village:

- Because of the high cost of materials, BC industry must use raw materials efficiently. BC’s advantage is that the machinery is generally technologically advanced and the work force is comparatively highly skilled and educated. Efficiently made high
quality products will be forced to compete with the cheaper commodities produced in many of the developing nations.

- The industry as a whole must become profitable. There are windows of opportunity that exist that should be explored. Currently, sales equal costs - not a very attractive market to be involved in which could lead to this industry’s demise (Forintek Canada and McWilliams 1993).

1.4.1.2 Demand Conditions:

Demand Conditions are defined as the nature of home market demand for the output of local industries. Particularly important is the presence of sophisticated and demanding local customers who pressure firms to innovate, and whose needs anticipate needs elsewhere. It also includes the structure and operation of established distribution channels and their potential to expand (Porter 1991).

Most sales of British Columbian millwork products in 1991 were within the province.

*Figure 3: Millwork in British Columbia: Sales By Market*

(Wilson, Ennis, Fisher 1991)
From Figure 3, one can see that 93% of the millwork produced in BC was sold in-province in 1991. This situation suggests a number of possible scenarios:

- The BC millwork and moulding industry is still very young and domestic sales support the current levels of production. Competition has not yet forced companies to look elsewhere for markets.

- The relatively poor financial results of the industry may be due to the fact that BC firms are not looking for more lucrative export markets.

- The fact that only 7% of the current production is exported suggests that there is potential for expansion within the industry with a focus on export.

- The industry is only starting to become technological sophisticated and stable since in the past it has largely been supported by fly-by-nighter manufacturers who are not in the business for long term.

With Japan, as the world's largest net importer of solid wood products on one side of the Pacific Ocean, and Canada, the world's largest exporter of manufactured wood products on the other side, it is not surprising that a substantial trade in wood products has developed between the two countries. The share of Japan's imported fibre has been increasing steadily from 55% in 1970 to 76% in 1994 (Cartwright 1995). It is important to note that during this period of time, there has been an important shift from importing logs to importing manufactured wood products. These trends have been favourable to the millwork industry of BC. Although it only makes up 1% of British Columbia's exports of millwork, future trends should see its sales to the Pacific Rim increase.

Other windows of opportunity also exist for the BC market. The spotted owl problems that have been occurring in the Pacific North West have led to a large amount of Ponderosa pine
being removed from the market place. Ponderosa pine was the number one species used in the Pacific North West for millwork and mouldings products. There are two immediate ways that British Columbia could fill this void:

- Supply these states with cut stock if they are unable to access materials. Chilean radiata pine is currently the main competitor that has taken advantage of their raw material shortages.
- Fill in the gap left by the reduction in production to the end user.

Although the outline of the section, “Demand Conditions” specifically states that it relates to, “the nature of the home market demand . . .,” the author will argue that as far as BC wood products are concerned, North America is the home market. In his research titled, “In International Competitiveness of the West Coast Forest Products Cluster: A Framework for Analysis,” Alan Rugman (1990) argues very strongly that this is the case for the forest products industry on the west coast of Canada.

1.4.1.3 Related and Supporting Industries:

This topic includes the presence (or absence) in a country of supplier industries and other related industries that are internationally competitive. This determinant includes local suppliers of specialized inputs (e.g., machinery, components, and services) that are integral to innovation in the industry, as well as innovative local companies in industries related by technology, skills or customers (Porter 1991).

If we refer back to the primary processing industry there is a strong network of suppliers for components, machinery, and trouble shooting. But the value-added sector is not quite as developed and in general companies have to go out of province, and in some instances, out of
country. Because the industry is in its infant stage, the industry has not yet matured enough, nor become technologically advanced enough to create its own support industry.

1.4.1.4 Firm Strategy, Structure, and Rivalry:

This section covers the conditions in the country affecting how companies are created, organized and managed, as well as the nature of domestic rivalry (Porter 1991).

In general the companies operating in the value-added sector in BC are small (less than 50 employees), private companies that operate on little capital. There are also a minority of manufacturers who have joined forces with large primary producers in order to ensure future log supply and capital. These companies usually boast a larger work force and export markets.

In the past, secondary manufacturing companies have been on their own cooperating little with other manufacturers. Recently, however, with money made available through Forest Renewal BC (FRBC) manufacturing associations have been emerging. These associations are helping producers communicate and share ideas with one another, as well as disseminating outside information that could prove valuable to the membership. These groups are also responsible for putting on an increased number of workshops and conferences.

Because there is so little public information regarding the secondary manufacturing industry in BC, this section will be expanded due to primary data collection and analysis (refer to Chapter 5: Results).

1.4.1.5 Government Policy

Government policy affects all four components of the diamond in different ways and it is important to understand these relationships. It plays a role as a buyer of goods and services as well as establishing its influence on the competitive environment through competition policies,
regulation, and government ownership of enterprises. In the forest industry, government is the body that grants companies operating areas, or tenure. This practice can be detrimental to the existence of the industry.

One characteristic that is common in Porter’s Model of Competitive Advantage and the Triangle for Success is the presence of “government.” Government policy drastically affects the forest products industry and plays a major role at all levels from fibre allocation, forestry practices, and industry start up funding to tariff structures for competing products. This report will not focus on the provincial government’s involvement in the industry, but only briefly mention some of the general topics. Perhaps future research should be undertaken specifically to understand the real affects that the government has on the health of the industry. Due to the scope of the involvement of the provincial government in the forest industry, this topic warrants its own research.

Both the provincial and national government are very involved at all levels of the forest industry in BC. The value-added sector seems to be the buzz word of the nineties as government and industry try to promote the production of more finished goods within BC. The purpose is to create more jobs and improve the economy through direct and indirect spin-offs of this new industry.

The government owns roughly 94% of the forest land in the province and allows companies to manage them through various different style of tenure systems based either on volume or area based management agreements. Almost all of the fibre supply in the province is handled through the government, so understanding exactly how the system of timber procurement legislation operates is essential to all businesses involved in the forest industry.
Extensive policy has been implemented in the last few years that will drastically affect the industry. Forest Renewal BC is a fund created by further taxing the primary forest products producing industries. The resulting money is supposed to be allocated to projects within the industry from watershed restoration and management, research and technology improvements, to value-added business creation. The funding for these various projects is given as grants.

Also, the BC Forest Practices Code affects raw material costs for any producer who is harvesting their own timber. The extremely high cost of getting fibre to the mill site affects the competitiveness of local operators.

1.4.1.6 Chance

These are developments outside the control of the country’s government and its firms, but which affect the competitive environment. Some examples include breakthroughs in basic technologies, external political, legal and economic developments, and international war and conflict.  

The main event that has occurred in the last few years that would be classified as “chance” that has affected the millwork and moulding industry is the problems in the Pacific North West due to the Spotted Owl. Because the owl lives in the same areas where Ponderosa pine grows, the result was an abrupt decrease in the amounts of Ponderosa pine available to the market place. Chile was very quick to promote its Radiata pine as a substitute and quickly gained market share. This was one of the areas where BC industry was caught sleeping.

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1.4.2 Products and Producers

Since World War II, the dominant species being used in the production of mouldings has been Ponderosa pine. Recently, for various reasons that will later be discussed in detail, there has been a general shift away from this to substitute softwoods. Also, within the softwood arena, fingerjoint materials are making strong inroads. These softwoods are both domestic and imported.

One of the newest and most aggressive competitors within the North American moulding sector is medium density fibreboard. Although it has been produced for well over twenty years, it is only in the past decade that world production been increasing in leaps and bounds. Technology has changed the production of MDF from a commodity, not much more useful than particle board, to a high quality, paintable, and even bendable product (Borretti 1994).

Non-wood products used in moulding applications has been a consistently growing concern in the last ten years. As wood costs increase, previously more expensive plastic and metal products become a viable option. Numerous polyurethane combinations are being used to produce plastic moulding with variable characteristics. Although the polyurethane mouldings are more expensive, they are beneficial in situations where the moulding needs to bend, or be exposed to the elements. These mouldings tend to weather better than solid wood and many varieties can be bent to fit arcs such as circular windows (Anonymous 1997).

One of the newest and fastest growing players in the softwood millwork and moulding market is the rapidly grown Chilean radiata pine. Currently it is not a dangerous threat within the Canada market, but it is becoming a major force in the American moulding industry. Radiata pine has filled the gap left by the decline in Ponderosa pine harvesting due to the spotted owl debate as increased US timber areas becoming protected from industrial use. Chilean
industrialists were ready to fill the void and in a very short period of time, radiata pine has taken over 10% of the entire US mouldings and millwork industry (Blackman, Hillman, and Sowle 1995). This is an area where Canadian producers are left to follow the pioneering market work of Chilean producers.

New Zealand is the world’s second largest producer of radiata pine, and radiata pine products. Although it is not as serious a threat to the Canadian success in the North American market as Chile, it is worth mentioning. Its participation with U.S. sawmills and remanufacturers makes New Zealand an important segment of the industrial lumber market in the US, serving the market with radiata pine logs and lumber. Their intensive forest management system has resulted in plantations of radiata pine capable of offering materials that can be used in both clear mouldings and finger jointed products. The pruned forests are in some cases over a hundred years old, and these forests now compete in the world markets for their niche. However, there are a number of adverse factors that will be discussed that must be overcome if this country is to retain its position in the U.S. market and, more importantly, to expand that share.

The US market is a large producer of mouldings but more importantly is even a larger consumer of these products. While domestic US production of mouldings is stagnant, the demand for the products is expanding yearly. It is the promised land for many international producers of moulding and moulding stock, the BC industry being one of the international suppliers interested in successfully penetrating and holding onto that market. It is not the threat of Chile dominating the Canadian moulding market that is the big concern for BC producers. It is very likely that the Chileans will aggressively market themselves into dominating the US moulding market, and they are well on course to doing this. It is for this reason that we must understand the domestic production, fibre supply and demand for mouldings. Once the opportunities are understood, the BC industry can position itself to take advantage of its positive
manufacturing attributes and exploit the opportunities that exist in the growing US mouldings market.
2. METHODOLOGY

2.1 INTRODUCTION

The primary objective of this project is to explore options for the wood mouldings industry in BC that would be practical, profitable and applicable. In order to obtain a sufficient understanding of the moulding industry it is useful to apply the “Triangle for Success” model (refer to Figure 4). The success of the softwood moulding industry in BC is affected by international competitors such as Chile and New Zealand, and from substitute wood products like MDF (the first leg of the “Triangle for Success,”). All of these products compete with BC softwood moulding products in the potentially lucrative US mouldings market (the second leg of the “Triangle for Success”).

Figure 4: The Triangle for Success
2.2 COMPETITOR ANALYSIS: MARKETS AND PRODUCTS

The competitor analysis is two-fold: geographic competitors to the BC moulding industry are first discussed followed by a comprehensive analysis of the main competing products to softwood mouldings.

A literature review and secondary information including purchased publications are used to gather enough data in regards to the Chilean strength in the moulding industry. Chile will not only be explored in-depth as a competitor, but as a potential model for successful penetration of the US mouldings market. Although only a limited number of publications are available regarding Chile, they are extensive in their scope. The US domestic producers are covered extensively through an exhaustive literature review. New Zealand, a future competitor, will be briefly researched through a short literature review. Mexico, although currently the most important supplier of mouldings to the US will not be discussed. It is not seen as a long term competitor. It is also not an emerging competitor as the title of this thesis suggests.

In-depth secondary data collection will also be used to determine MDF’s position domestically and internationally, and to understand the position of non-wood products in the moulding sector.

2.3 THE US MARKET

A comprehensive literature review and secondary information including purchased publications will be used to gather enough data to sufficiently analyze the current status of the US moulding market. This literature review will focus on the demand for mouldings within the market. Secondary sources will also provide enough information to identify possible opportunities for BC moulding producers.
2.4 BC INDUSTRY ANALYSIS

In order to get a proper understanding of the BC moulding industry Porter’s Competitive Advantage Model will be applied (refer to Figure 5). Dr. Michael Porter’s Model of Competitive Advantage is a well accepted model used by industry, government and academia for strategic planning and competitive analysis. Some of this information can be readily obtained through secondary sources and purchased publications, but a structured survey was necessary for the section, “Firm Strategy, Structure, and Rivalry.” The survey also included data on “Factor Conditions” and “Demand Conditions” where secondary sources were insufficient. Initial literature review had determined that there are many questions left unanswered.

Figure 5: Porter's Model of Competitive Advantage

(Porter 1991)
Two populations of producers were surveyed:

1. Those that are currently producing moulding.
2. Companies that are involved in related areas in the wood processing industry who could easily shift to produce mouldings with minimal effort.

This involved site visits in order to do one on one interviews for both populations. Once the primary data was collected, descriptive statistics were used to draw practical and useful conclusions concerning the moulding industry in British Columbia.

"Any scientifically valid research project must begin with rigid attention to issues of sampling and data collection." (Kozak 1995) It is especially important in a project such as this one where there is a small sample population, strict methods of sampling, and a very high cost of re-sampling in the event of a design error. The sampling and subsequent analyses of the moulding producers in British Columbia was carried out in accordance with accepted scientific methods. The sample frame, sample size, sampling procedure and design, and sampling instrument are presented here in detail. Primary data collection, entry, and analyses are also discussed.

2.4.1 Sample Frame

British Columbia can geographically be split into two main forest sectors, the coastal area and the interior. The tree species and wood characteristics differ between the two areas, as do their wood products processing industries. This particular survey focused on the coastal producers. Future research could be directed towards better understanding the interior producers and how they compare to the coastal producers using the exact same sampling methods and design.
The population under study consists of all "value-added" producers in coastal British Columbia, Canada that produce architectural or commodity mouldings as a proportion of their production. Less than a handful of value-added producers in BC produce only architectural mouldings, therefore, it was necessary to incorporate all firms who produced moulded products as a proportion of their annual production.

The sample frame came from a variety of sources. The main two were the Directory to Secondary Manufacturing of Wood Products in British Columbia, produced by Natural Resources Canada and the Canadian Forest Service in 1996, and the membership directory of the BC Wood Products Specialties Group. Another invaluable source of information was word-of-mouth from value-added interviewees. During one-on-one interviews, inquiries were made regarding other companies that could be contacted.

It should be noted that random sampling was not used in this survey, rather a purposive sampling method approaching a census was used to ensure the capture of a substantial proportion of coastal BC production with a focus on the larger producers. This size based sampling procedure has support in the literature.

2.4.2 Sample Size

According to the 1996 Directory to Secondary Manufacturing of Wood Products in British Columbia, there were 31 producers of mouldings in British Columbia. Since the directory was published at least one of these firms has gone into receivership. There were also eight producers found through the BC Wood Specialties Membership Directory and by word-of-mouth who were not listed in either directory mentioned above. Although it is difficult to be absolutely positive, it is believed that there are 40 producers of architectural mouldings and moulded wood products in
BC as of April 1997. Twenty-seven producers were located in the coastal region with 22 of these located on the lower mainland and five on Vancouver Island.

Sampling was carried out on a one on one interview basis, a technique that is costly. Time and budgetary constraints led to the objective of sampling 50% of the producers in coastal BC.
Results, while not inferable to the general population do provide an understanding of the situation for a substantial proportion of BC moulding producers.

For the entire coastal area, this survey reached 16 of a possible 27 producers, giving a response rate of 59.3%. Eleven producers of mouldings out of a possible 22 were surveyed in the lower mainland producing a response rate of 50%. All five possible samples were surveyed on Vancouver Island creating a response rate of 100%.

2.4.3 Sampling Method and Design

The personal interview method of data collection was used in this survey. Because of the close proximity of the Vancouver Island producers to one another, it was decided that 100% of the possible respondents would be surveyed if they were to willingly participate. Potential respondents were then contacted by phone to set up an interview date and time. During the initial phone call, the potential interviewee was:

- informed of the interest and goals of the survey,
- made to understand that the results of the survey would be kept confidential,
- asked if he/she required a letter of confidentiality if they would willingly participate,
- requested to participate in the survey.

At the specified date and time the interviewer would visit the site. Before the interview started, the interviewer clearly defined the intentions of the survey and that the results would be kept confidential.

During the interview, the interviewee was given a copy of the survey and was asked to comment on each question based on 1996 data. He/she had the option to complete the survey for their own use while the interviewer completed the one used for further analysis.

2.4.4 Sampling Instrument

Although the personal interview method of data collection is costly and time consuming, it is a very effective method of collecting reliable research data. With such a small population to sample, it is imperative to personally contact a high proportion of the potential interviewees since non-response bias can become a serious problem. If a mail survey was used for such a small population, the chances of receiving an acceptable number of responses is low. By taking the time to go to the plant site and meet with the general manager or president, the respondent is more inclined to participate in the survey (Fowler 1993). A reproduction of the survey can be viewed in Appendix I.

Questions were logically ordered without bias. The broader, more general questions were placed at the front of the survey, with the more specific, sensitive questions being at the end (Dillman 1978). The purpose was to establish a positive relationship with the person in a short period of time so that they would be more inclined to answer questions relating to sensitive information.
The survey was divided into the following sections:

1. The General Company Information section dealt with primarily employee issues such as number of employees, union or non-union, and average hourly salary. The length of time that the company had been in business was also asked in this section.

2. The Fibre Supply section asked producers about their species breakdown, sources of raw materials, suppliers of raw materials, products produced from the raw material, finger jointing activity, fibre supply security, and fibre expansion opportunities.

3. The Level of Technology section collected data on the manufacturing equipment used in the plant. Information regarding the three most important pieces of machinery was requested in the areas of book value, age, replacement schedule, percent capacity operating, and how the machines were controlled. Also, questions were asked about the country of origin of the machines and how that affected product support, technical support, and maintenance of the machinery. Finally, respondents were asked if they knew of any Canadian machinery that was produced and if it was price competitive and if they would use or have used it in their mill.

4. The Marketing section dealt with the markets serviced by the respondents' production, how the Canada/U.S. Countervail Duty has affected their business, distribution channels, potentially competing products, total production in dollars as well as lineal feet, and how their geographical location has affected their access to markets, ability to attract skilled employees, and machinery.

The questions were asked in a variety of styles. These included simple-dichotomy questions, determinant choice questions, checklist questions, rank order questions, subjective
continuum scales, and numerical scales. For analysis purposes, most of the question consisted of closed questions with only a few open ended qualitative questions being asked. By using closed questions with the “other” category, it allowed the respondent to create their own response if sufficient answers were not provided. Generally, the scales and order type questions were used to measure attitudes and beliefs; where attitudes measure what people say they want and beliefs are what people think is true (Dillman 1978). Standard questions were used simply to ascertain facts, company and personnel attributes, and accumulate statistics (with counts and proportions). The questions were designed in such a way that systematic error was minimized. This means that complexity and ambiguity were avoided, leading and loaded questions were not asked, no assumptions of the respondents were made, and there were no double-barreled questions. For further information on the survey, the reader is asked to refer to the actual questionnaire in Appendix I.

Due to time constraints, a limited pre-test was completed. Peers, colleagues, academics, and knowledgeable industry personnel were asked to test the survey, comment on the clarity of the questions, note the time it took to complete the survey, and add any questions that they thought may be relevant to the industry. As a result, the questionnaire seen in Appendix I is a product of countless revisions and is accurate, lucid, and readable. It is however, far from concise.

2.4.5 Notes on Data Analyses

A discussion of data analyses must begin with a restatement of what exactly is to be measured in this study. In this short project it is not a difficult task, although it is easy to get lost

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8 Types of questions were found in three sources: Dillman 1978, Fowler 1993, Kozak 1996.
9 "Attributes" is defined by Dillman as, “what people are.” This definition can also be applied to the company itself.
10 Dr. Robert Kozak’s Ph.D. Thesis titled, “An Analysis of the North American Specifiers of Structural Materials in Non Residential Construction” was used as a guide in these sections.
amongst the many variables being analyzed. The section on primary data collection is focused on filling in gaps not covered by previous research and existing secondary information into the moulding sector of British Columbia. The majority of the information collected focused on primary operating information of the firms (technology, raw material supply, markets, and products). As well, a small proportion of the questions were concerned with attitudes and beliefs of the operators within the industry. As a result, the information collected reflects the status and health of a proportion of the moulding industry in BC.

The statistics used in this project were strictly descriptive statistics. Due to the small population and the non-random sampling method the study was limited to reporting general trends from the respondents rather than being able to infer results to the larger population. Finally, it should be noted that one software package was used to analyze the data presented in these analyses: *Excel for Windows V. 7.0*. 
3. COMPETITOR ANALYSIS: MARKETS AND PRODUCTS

3.1 INTRODUCTION

As BC moves to more value-added wood processing, the moulding and architectural millwork sector holds much promise for growth. The BC industry is well positioned with ample raw materials, access to cutting edge technology, a skilled labour force, and supportive associations and government programs to promote this industry. However, the success of BC's moulding initiative depends not only on BC's ability to produce, but also on market potential and competing products. This section focuses on the first leg of the Triangle for Success (refer to Figure 6), which examines the competing products which will challenge the success of BC products in the US market.

Figure 6: The Triangle for Success

The focus of this chapter will be on existing and future competitors. It will not discuss competitors such as Mexico. Mexico currently dominates the moulding market in the US but
seems to be losing market share to the other rising competitors. Therefore, this chapter will be broken up into six sub sections all covered through an exhaustive literature review:

1. US Domestic Production
2. Chile
3. New Zealand
4. MDF
5. Composite Mouldings
6. Competitor Analysis Conclusion

The three most rapidly growing competitive products for BC softwood mouldings are radiata pine, currently imported from Chile but with potential supply from New Zealand, medium density fibreboard (MDF), and vinyl composite products. US domestic production still has a strong presence, but production levels are stagnant. In order to properly understand current threats and opportunities in the moulding industry in BC, Canada, and North America it is helpful to analyse the sources of these competing products, as well as their quality, quantity and availability.

One of the newest and fastest growing players in the North American moulding market is Chilean production sourced from rapidly grown radiata pine plantations. Currently this product has not captured much market share in Canada, although it is capturing substantial market share in the US moulding market by filling the gap left by the dramatic decline in Ponderosa pine harvests from the western states. Chilean industrialists were well positioned to fill this void and in a very short period of time, radiata pine has captured over 10% of the US moulding market (Blackman, Hillman, and Sowle 1995). The pioneering market work of Chilean industry may provide a window of opportunity for Canadian producers. This chapter will examine the Chilean
forest industry with an emphasis on moulding exports into the North American market. Additional information is provided on the Chilean forest sector in the Appendices.

The other serious competitor to BC softwood moulding is MDF (medium density fibreboard). Whereas radiata pine is currently limited to being commercially harvested in Chile, Australia, South Africa, Spain and New Zealand, new MDF mills are coming on line almost monthly all over the world. There is already a glut of product in certain markets such as Europe (Botting 1996). As MDF capacity increases, producers are being faced with the challenge of inventing new and practical uses as they attempt to move up the value chain into specialty markets. MDF is very attractive as blanks for the moulding industry because: it can be cut into intricate curved and complex shapes with little surface deformation, it accepts paint and other finishes with little telegraphing of surface characteristics, it is inexpensive compared to solid wood products, and it does not split when nailed.

The newest but least significant threat in the solid wood moulding industry is that posed by composite mouldings. In the last five years, polyurethane mouldings have been slowly making a mark within the moulding sector. Because they are about 20% higher in cost than solid wood mouldings, their success in the market generally reflects the price level of the solid wood products. However, there are certain instances where the vinyl mouldings are having some success. As mentioned earlier in this report, polyurethane mouldings can be beneficial in instances where mouldings are exposed to the elements of nature, and where there is a use for bendable mouldings. For this reason, composite moulding will be briefly discussed as one of the new, non-wood competitors in the moulding market (Anonymous 1997).
3.2 US DOMESTIC PRODUCTION

3.2.1 Introduction

Since WWII, the Pacific North West assumed leadership of the forest products industry in supplying wood products to the US market place. A partnership existed between the forest products companies and the US Forest Service. The Forest Service adhered to the philosophy promoted by Gifford Pinchot, the first Chief Forester of the US Forest Service, who said that the forests of the nation were to supply the wood needs of the people and were thus intended for the greatest good to the greatest number (USDA 1994).

Since the 1960s, the growing environmental movement has questioned what comprised the “greatest good,” resulting in large tracts of forest land in western US being set aside as protected areas. This has led to a steady decline in harvest levels in the west. The moulding and millwork industries, who had relied on Ponderosa pine as their major source of fibre, lost much of that supply. The last decade has been an adventure in global sourcing for alternative fiber supply or finished products for this industry. From the stable, domestic arrangement in which all the major players were known, the industry has shifted dramatically to a market place for global competitors. In addition, the domestic scene has grown more complex. These changes in traditional supply created a vacuum which attracted global suppliers of wood suitable for moulding as well as new wood composites and non wood. Although Ponderosa pine is still the indicator species for the market, other species from other regions of the country are making inroads. Southern pine is re-emerging as a competitive species, as well as Eastern White Pine. Imported pines are also competing to fill the void left by the decrease of Ponderosa pine. In addition, MDF is a rapidly emerging competitor to solid wood in the moulding sector, as well as plastics and foam to a lesser extent.
Supplies of Ponderosa pine are not expected to increase as the US Forest Service is in the process of building a new identity. It is still unclear what that will be. But as strongly stated in Crow’s Forest Industry Journal (July 1996), “One fact is certain: national forests will produce much less timber for commercial use than in the past. Private timberlands will assume a much more pronounced role in the wood fibre supply, and Ponderosa pine will remain high on the list of preferred species.”

In the absence of traditional volumes of moulding and shop lumber, the industry will continue to broaden raw material types and sources compared to previous decades.

### 3.2.2 Background: The Millwork Industry

The US millwork and moulding industry (SIC 2431) developed in much the same pattern as that of Canada. The millwork industry is composed of companies producing product such as windows, doors, architectural wood work (architectural mouldings are included here), and turned stock. Since the Second World War mouldings have been produced with Ponderosa pine, while most other millwork during this time used various hardwoods. Because the moulding sector is classified as a sub group of the millwork industry, it is of great interest to understand how the millwork sector evolved in the US market. The general trends that occurred historically in the millwork sector reflect what has occurred in the specific moulding sector.

Hardwood millwork in housing jumped from 235 board feet per unit in 1950 to 340 board feet per unit in 1976. Towards the end of the 80’s, hardwood millwork demand continued to climb due to the growing do-it-yourself and professional remodeling markets (Sinclair 1992). Much of this market was sparked from rising land and housing costs and as a result people shifted towards remodeling the old rather than buying the new.
Although the employment rates in the US millwork sector (SIC 2431) in 1992 were down 3% from 1987 to 86,300, this negative employment trend was not reflected in the production and shipment of products in the industry. Industry shipped a total value of $9.64 billion in 1992 as compared to $9.33 billion in 1987. The number of companies operating in this sector has steadily increased since 1982 (Census of Manufacturers 1994).

The leading millwork producers over the past decade were concentrated in four states: Wisconsin, California, Minnesota, and Oregon. Today, California and Wisconsin alone produce 22% of the US millwork products. Companies operating within the millwork arena in the US tend to be smaller, similar to the Canadian structure. Almost 90% of the companies in the US have under 50 employees. Seventy-five percent of firms have less than 20 employees, and 20% of the firms have between 20 to 100 employees (Census of Manufactures 1994). This is a shift away from the larger primary lumber and pulp producing companies. This is due to the fact that the markets for many of the products are high end niche markets specializing in many different species, sizes, and end uses.

But unlike the much of the Canadian secondary industry, the US manufacturers are profitable. Because companies are reluctant to release financial information, actual industry wide statistics for industry profits are not available. But the following table should give a general indication of gross profits (refer to Table 1).
Table 1: US Potential Profits

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost of Materials and Payroll as a Percent of the Value of Shipments</th>
<th>Remaining Costs and Gross Profit as a Percent of the Value of Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>79%</td>
<td>21%</td>
</tr>
<tr>
<td>1991</td>
<td>79%</td>
<td>21%</td>
</tr>
<tr>
<td>1990</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>1989</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>1988</td>
<td>81%</td>
<td>19%</td>
</tr>
</tbody>
</table>

(Census of Manufactures 1994)

In fact, profits made by the small manufacturers is attracting attention from the larger firms in related industries.

The cost of materials makes up a large percent of the finished millwork product. In 1992, the cost of materials to producers was $5.6 billion dollars. Most of this cost is made up of buying high quality primary and secondary cut softwood and hardwood lumber. The breakdown of wood materials that went into the millwork industry is as follows (refer to Table 2):
Table 2: Material Cost

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Cost ($ Millions)</th>
<th>Percent of Total Material Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rough Lumber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardwood</td>
<td>248.9</td>
<td>4.8 %</td>
</tr>
<tr>
<td>Softwood</td>
<td>679.1</td>
<td>13.2 %</td>
</tr>
<tr>
<td>Dressed Lumber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardwood</td>
<td>125.2</td>
<td>2.4 %</td>
</tr>
<tr>
<td>Softwood</td>
<td>503.4</td>
<td>9.8 %</td>
</tr>
<tr>
<td>Softwood Cut Stock</td>
<td>533.7</td>
<td>10.3 %</td>
</tr>
<tr>
<td>Hardwood Dimension and Parts</td>
<td>48.4</td>
<td>0.9 %</td>
</tr>
<tr>
<td>Hardwood Veneer</td>
<td>101.3</td>
<td>2.0 %</td>
</tr>
<tr>
<td>Plywood</td>
<td>98.6</td>
<td>1.9 %</td>
</tr>
<tr>
<td>Particleboard</td>
<td>52.9</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Wood Fibreboard (Hardboard)</td>
<td>61.7</td>
<td>1.2 %</td>
</tr>
<tr>
<td>MDF</td>
<td>26.1</td>
<td>0.5 %</td>
</tr>
</tbody>
</table>

(Census of Manufactures 1994)

Softwood lumber (rough, dressed, and cut stock) makes up 34% of the total material cost as compared to 8% hardwood. This illustrates the shift in the last decade from predominantly hardwoods to softwoods. It is also interesting to note, although not shown in the above table, that the use of composite wood products and engineered wood products is increasing with market acceptance (Census of Manufactures 1994).

The production side of the market is dominated by wood windows (33%), wood doors (interior and exterior) (16%), and wood mouldings (12%). Capital expenditures are focused in these three areas respectively.\(^\text{12}\)

As one can see from Figure 7, the total value of shipments of millwork products has been moving on a general trend upwards, much the same as the Canadian industry. The total value of shipments of millwork products in 1992 was $9.639 billion. This is an increase of over 7% from 1991, and up almost 20% from 1986. As mentioned above, the negative trend of the late eighties

\(^{11}\) These numbers represent the entire millwork industry, the moulding sector is only a component of this. If production is representative of material costs, then the moulding industry would represent 12% of these costs.
was consistent with that of the economy at the time. The construction industry felt the effects of a
down turn in the economy and these effects were carried over into the millwork industry.

*Figure 7: Value of Shipments in the US Millwork Industry*

(Census of Manufacturers 1994)

### 3.2.3 Domestic US Lumber Production and Grade Trends

The moulding and millwork sector is the primary user of industrial pine in North America. Up to 2 billion board feet of industrial pine lumber and other softwoods are consumed annually. About half of that went into the production of softwood mouldings, jambs and frames in 1995, while doors and window parts comprised the remainder (Taylor 1996).

Ponderosa pine has traditionally represented 75% of the western US product of shop & better lumber used in the moulding and millwork industry. Output in all grades of Ponderosa pine has plummeted 55% since 1987 due to the timber harvest reductions on federal lands from the Spotted Owl Issue (refer to Figures 8 and 9).

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12 It is important to note that cabinetry is a separate SIC code, but that millwork supplies it with many of its components. (Census of Manufactures 1994).
Logically, any decrease in lumber supply while demand increases would lead to higher prices (refer to Figure 10). However this has not been the case due to increased competition from alternative supplies (refer to Figure 11). In fact, prices have declined since 1993 as a result of imported pines, alternative species, or other substitutes entering the market due to higher prices of Ponderosa pine in 1991-93.
Not only have the western US harvest volumes decreased, so has the average yield per log. Smaller logs harvested at younger ages from private lands have yielded lower volume and grade recoveries. As an example, yields of shop & better grades from Ponderosa pine logs sawn between 1988 and 1994 have changed dramatically both for high and low quality lumber:

- #2 shop & better (including moulding and selects) grade out-turns have dropped from 58.6% to 45.9%.
- #3 shop & lower, (including stained, short, and reject shop) has increased from 41.4% to 54.1% of output (Taylor 1996).

As a result, other domestic species have started to fill the void created by the depleting Ponderosa pine resource. The most commonly used domestic species as substitutes for Ponderosa pine are:

- Sugar Pine (*Pinus lambertiana*)
- White fir (*Abies concolor*) and Western Hemlock (*Tsuga heterophylla*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Southern yellow pine (*Pinus spp.*)
- Eastern white pine (*Pinus strobus*)
- Eastern poplars and aspens (*Populus spp.*)
- Oaks (*Quercus spp.*) (Lincoln 1986)

Figure 11 shows the species dominant in the solid wood portion of the US moulding market, both domestic and imported. It should be noted that while the use of substitute domestic species for Ponderosa pine is growing, imported pines far exceed this growth. From 1994 to 1995 all species exhibited either growth or stability in use except for Ponderosa pine and Mexican pines, the two most traditional species for moulding use in the US (refer to Figure 11).

**Figure 11: US Mouldings Market - Solid Wood**

(Taylor 1996)

Figure 12 shows the actual and projected production volume of the WMMPA (Western Millwork and Moulding Association) from 1989 to the year 2000. From 1991 to 1994 WMMPA member production increased from 276,386 Mbf to 356,257 Mbf. Since the peak in 1994,
production volumes have been slowly declining, and R.E. Taylor & Associates have predicted that production will slowly level out and begin to climb again by the year 2000.

It is important to note that moulding production and its success in the market place is very sensitive to the health of the economy and consumers’ confidence. During down turns in the economy, moulding production generally decreases, not so much due to reductions in supply, but because of decreased demand (refer to Figure 12). For example, during the economic slow down in 1991, new housing and R&R decreased, causing domestic production to taper downwards (refer to Figures 8 and 9). In the late 90’s the industry is predicted to slowly increase its production (Cohen 1996).

*Figure 12: US WMMPA Moulding Production*

(Taylor 1996)
3.2.4 US Benchmarking Study

In 1996, R.E. Taylor & Associates was commissioned by Forest Renewal BC to do a benchmarking study of US North West Value-added producers. It had the following objectives:

1. To further quantify the magnitude of CLS volumes of "industrial grade" lumber shipped from BC sawmills to remanufacturing plants or destination in the northern US border states.
2. To determine how BC lumber is utilized at the US remanufacturing plants.
3. To determine possible opportunities for further value-added processing in BC.
4. To outline success factors and barriers to entry for value-added processing.
5. To determine why there is more remanufacturing of CLS lumber in the US border states than is currently taking place in the BC southern Interior and Kootenay regions.

The research was done in two phases, a formal survey component and a number of field visits to US remanufacturing facilities with a group of BC industry and government people. There were thirty-one respondents for the formal survey from varying areas of the secondary manufacturing industry.

Although the report focused on the Southern Interior of BC, many of the results seem to be transferable to the lower mainland and Vancouver Island producers also. As well, many of the suggestions of the site visits regarding opportunities for BC producers could be valuable for future manufacturing expansion. It is strongly recommended to the reader that he/she order the full report from FRBC for a more detailed analysis of the sector as this summary only touches on some of the key elements.
3.2.4.1 General

Remanufacturing facilities in the US had been operating for an average of 15 years with current annual sales of $US5.4 million. The average hourly rate paid was $US10.45, with benefits averaging $US3.08. On a scale of 1(low) to 5(high), the average level of technology was 2.9. Of the 16 mills that were visited only 3 were set up for export markets. The rest were evenly split between western US and the overall US market.

3.2.4.2 Raw Material Costs

Only a few remanufacturers claimed that they could control in part their lumber costs or supplies. These producers were usually subsidiaries of larger firms or had direct access to a primary sawmill. Most other companies bought raw materials on the open market. It is interesting to note that the respondents indicated that they had “little to no” trouble sourcing raw materials in desired volumes, species, sizes, grades or quality from primary sawmills.

3.2.4.3 Labour Costs

Wage rates are a major competitive advantage for most US producers according to the Taylor study. As discussed briefly above, the average loaded wage paid was about $US14.00 per hour, but many of the facilities pay between $US6.00 and $US9.00 per hour before benefits. At some plants, “imported” labour from Mexico represented more than half the work force. As a result of a low level of motivation and training, some companies had high accident rates, resulting in very high Workmen’s Compensation rates (as high as $US 0.15 on the dollar). Also, some companies offered very poor benefit packages.
3.2.4.4 Access to Capital/Financing

Most of the companies visited on the US benchmarking tour were smaller and it would be expected that they faced challenges in acquiring new capital. Not surprisingly, any producers that were divisions of larger companies were in the best financial position.

3.2.4.5 Relative Position in the Value Chain/Distribution Channels

Sixty-eight point eight percent of the producers visited during the mill were ranked as “well positioned” in the value chain. They had taken a more proactive approach with either their product line, marketing, or customer base by sending marketing personnel regularly into the market to promote and research the distribution of product to customers. As a result, firms could locate market niches, enhance product development, secure customers, and avoid competition. The final result was either higher overall revenue or higher net margins with less competition.

3.2.4.6 Competitive Advantage

The main competitive advantage held by the firms visited during the benchmarking study organized by R.E. Taylor and Associates were the following in order of rank:

1. Good access to end markets and a strong position with its core customers.
2. Low operating overhead and depreciation costs.
3. Moderate to strong marketing focus, avoid commodities or have niche programs.
4. Simple or focused business plan, well established production process.
5. Moderate to good access to capital, financial strength.
6. Favourable access to lumber supplies.
7. High level of technology.
Overall, R.E. Taylor and Associates felt that the US remanufacturing industry has been able to grow steadily as a result of a number of perceived strengths or competitive advantages:

- Lower wage rates.
- A more established remanufacturing infrastructure based on greater experience.
- A reduced focus on primary products.
- A strong market presence.
- A strong entrepreneurial drive by owners/managers.

3.2.4.7 Level of Technology

Some of the most interesting and useful results of the US benchmarking study were reported in the area of technology. The report suggested that a strategy of developing a flexible plant so as not to be tied down to one product, species or market is critical. Many companies followed the KIS (Keep it Simple) principle.

The average plants visited were low to moderate technically. But compared to BC they were considered highly technical plants, as few operations in BC utilize technology such as optimized chops saws, veneer slicing equipment or veneer and paper overlays.

3.2.5 Conclusion

It is plain to see that opportunities exist in the US moulding industry. For various reasons the production volumes of species and grades necessary to supply the expanding US market are decreasing. The decreased levels of Ponderosa pine have created a dynamic situation where international producers can compete and succeed.
3.3 CHILE

Chile is a very dynamic country and is often called Latin America’s “forestry dynamo.” It is a country of “highs and lows.” Geographically, it starts at sea level from its semi-tropical beaches and rises 6,000 metres to the snow capped Andes mountains. The climate ranges from hot and sunny in the north-west to sub zero temperatures in the south at the Antarctic. This same analogy also reflects the rapidly growing forest industry of Chile. It is a country of extremes. Most of the country’s sawmills are tiny, portable, inefficient, and generally family-run. But the dominance of large corporations investing substantial funds to build state-of-the-art wood processing facilities is growing at an unprecedented rate. These investments are focused on sawmills, wood composite mills, and pulp mills (Blackman, Hillman, and Sowle 1995). This section examines the country from a historical, economical, and political point of view, and then focuses on the forest sector.

A word of caution is necessary concerning data contained in many of the reports available on Chile. Many articles casually quote numbers with no references, causing some concern over the validity and accuracy of information. Different sources claim different statistics for the same topic and in general, much of the information contained in this report is exactly that - general. The trends are present, but the numbers may not be precise. "One industry estimate states, -analysts predict, -researchers say: " these are all examples of some of the poor referencing that is used. It is important that the reader understand this limitation. That said, it does provide useful insight into the factors that contribute to the emergence of the Chilean forest industry.
3.3.1 General Description

The Republic of Chile is a country of unique characteristics. Making up the left-hand side of South America's tapering tail, Chile's lean strip of country has been described by the Chilean author Benjamin Subercaseauz as a "geographical extravaganza of crazy geography." It is a prominent member of the southern cone region. This region consists of Argentina, Brazil, and Chile: otherwise known as the ABC countries. The country extends almost 4,300 km from the desert north to the glacier-filled south, and is bordered by the Pacific Ocean on the west and the Andes in the east. Width from west to east averages less than 200 km, but elevation climbs rapidly from sea level to 6,000 metres. The 13.5 million people that populate Chile are spread through out three main climatic zones: the desert north (approximately 1,300 km long), the mid-section (about 800 km), and the cool southern half of this long segment of Pacific coastline (2,200 km long) (Anonymous 1996). This length is equivalent to the stretch of land from Guadalajara, Mexico to Prince Rupert, BC. Chile is a narrow strip of arable land between the Andes foothills and the Pacific Ocean. In the arid north the mountains meet the Pacific and scatter into a group of islands. The largest island contains significant timber stands. Chile shares most of its eastern border with Argentina, and borders with Peru and Bolivia in the north.

3.3.2 Economic Indicators

Chile has a prosperous, essentially free market system, with a degree of government intervention varying according to current government philosophy. More recently it has been called the exception to the rule of economic troubles in Latin America. Under the centre-left government of President Aylwin, who took power in 1990, spending on social welfare rose

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steadily. At the same time, business investment, exports and consumer spending have also grown substantially. Economic growth from 1991 to 1993 averaged 8% annually, with an estimated one million Chileans moving out of poverty from 1989 to 1994. When President Frei of the PDC (Christian Democrat Party) took office in 1994, social spending increased even further (Anonymous 1996).

Because Chile is the world’s largest producer and exporter of copper, this industry is vital to the economic prosperity of the country. Other primary industries important to Chile’s economy include timber production, iron ore, nitrates, precious metals, and molybdenum. Chile is also the world’s second largest producer of farm fed salmon, ranking ahead of Canada. Agriculture, which includes forestry and fishing, accounts for 7% of the country’s GDP (Anonymous 1996).

The successful program developed by the Chilean government to reduce its external debt and attract foreign capital has been a strong positive influence in forest sector development. The relatively high production costs and growing environmental restraints on industrial resource extraction in competing areas have encouraged global interest in direct investment in the Chilean mining and forest sectors (Nagle 1995).

Chile is a country dependent on exports, which account for 27% of the country's Gross National Product (GNP). A total of $US2.37 billion of forestry exports, representing approximately 15% of total 1995 Chilean exports of $US16 billion. Forestry accounts for 12% of Chile’s net trade, with exports more than seven times larger than imports. Each year Chile relies more heavily on its booming export oriented economy, with exports having doubled its relative share from 1992 to 1995 (Blackman, Hillman, and Sowle 1995).
3.3.3 Infrastructure

The bottleneck Chile must overcome, if it is to continue to increase exports of forest products, is the inadequate highway, railroad and port infrastructure. Private truck fleets, which carry most products to ports, are growing along with exports. This will place even more pressure on the mostly inadequate two-lane highway network. In 1990, Chile had 80,000 km of highways but only 14% of them were paved with the vast majority consisting of unpaved gravel or earth. The state-owned railroad will most likely be unable to accept additional freight, since its growth depends on government budgets, currently focused on social programs. In addition, railroads are made up of five different gauges of track, causing logistical difficulties.

There are also 392 airports, but only 12% of these have permanent-surface runways. The result of these are surface transportation difficulties and a high cost of logistics (Anonymous 1996).

Three ports handle most forest products shipments from Chile: Lirquén, San Bivente and Talcahuano. All are near Concepción in Region VIII (see Figure 16). Overcrowding has led shippers to use smaller facilities, despite their disadvantages in terms of logistical efficiencies. Currently the Chilean government is spending $US 130 million to improve ports which includes work and repairs on ports to facilitate the export of wood products (Solis 1996).

In contrast to much of the transportation industry, the private telecommunications industry in Chile is very modern. Fibre optics and cellular networks are common throughout much of the country.
3.3.4 Wood Supply

3.3.4.1 Natural Forests: Location and Accessibility

Chile is only starting to approach its potential in producing wood products from both native forests and plantations. The energetic and thriving forest industry has proved itself worthy of its designation as South America’s “Forestry Dynamo.” In less than three decades the country has developed from a very small forest sector to a fast rising world competitor.

Chile has a land mass of 800,000 km$^2$ and 45% of that area has forest potential (refer to Figure 13). Of this area 18.9 million hectares are classified as protected forests and 14.9 million hectares are productive forest lands. Within that productive area, 7.6 million hectares are covered by native forests and 1.6 million are man-made plantations, consisting mostly of radiata pine. It should be noted that sources do not account for the remaining 5.7 million ha. that are not discussed under the title “Productive Forest Lands” (Solis 1994). To put this in context, BC has a total area of 95.2 million hectares and 51.2 million hectares of productive forest land (Forestry Facts 1990).
Commercial utilization of forests began in Chile with logging of native forests in the last century. Plantations were unheard of until the late 1950's. Industrial wood went mainly to the production of sawnwood. Some key commercial species were: roble (*Tabebuia donnell-smithii*), laurel (*Ocotea bulllata*), lingue (*Afzelia spp.*), and larch (*Larix decidua*) (Lincoln 1986). Once radiata pine plantations were successfully introduced in the early 1960’s, industrial pressure on the native forests greatly diminished. Thus, industrial forest activity in Chile has shifted from native forests to plantations.

To better understand the differences between the forests in BC and Chile, refer to Figure 14.
3.3.5 Native Forests: Forest Management Philosophy and Criteria

From the 1960's through to the late 80's, native forests contributed only 9% of Chile’s industrial wood supply. Timber from these forests was used mostly for home fuel, as it still is today. Only the highest quality trees were harvested and made into lumber and plywood. In 1988, exports of chips from native wood for pulp commenced. This activity resulted in a large area of native forest being reclassified and placed under forest management regimes due to increasing economic value (refer to Figure 15).
Native forests’ participation to supply the industrial sector jumped to about 15% and continues to climb. There is confusion over future industrial use of native forests. Lignum Magazine (April 1996) reports that the native harvest will drastically increase over the next few years. They expect native species to be used primarily as pulp, composite materials, and furniture stock. The quality of the native woods ensures that the millwork, panel, veneer and furniture industries will obtain products with greater added-value, especially from lenga (a hardwood species grown in the jungle region of Chile). Conversely, Wood Technology magazine (Vol. 100, No. 14 1996) is more sceptical. The deciding factor will be the current bill, The Law for the Recovery and Promotion of Native Forests under review since 1992.

The goal of this bill is to achieve a delicate balance between environmental concerns and industrial production for Chile’s natural forests. Included in this new law are the incentives for activities that tend to improve the forest. The proposed new law would add 7.6 million hectares of now unmanaged native forest to Chile’s commercial timber base. Although, once economic realities are analysed and the definition of “potentially productive” is scrutinised, the realistic amount of land base that would be profitable is about 3.5 million hectares, which would double
the current native forest land classified as available for commercial use. Three years after the introduction of the law, no decision has been made, but the benefits to industry could be significant (Blackman, Hillman, and Sowle 1995).

3.3.6 Plantations: Location and Accessibility

Native forests represent 83% of the productive forest area and constitute a growing stock six times that of the plantations, yet contribute only 15% of the industry’s raw material supply. As the new millennium approaches, Chile’s wood processing industries still rely mainly on timber grown on 1.7 million hectares of tree farms (Campino 1996).

Chile’s prime plantation timber is actually a California native, Monterey pine, (Pinus radiata). Although not considered a commercial species in its native homeland, both Chile and New Zealand have adopted it as their own and the commercial results are impressive. Chile is using the fast growing species in lumber, wood-based panels, and pulp and paper (refer to Table 3).

Table 3: Total Area of Chilean Forest Plantations

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Radiata Pine</strong></td>
<td>1,243,293</td>
<td>1,305,325</td>
<td>1,312,812</td>
<td>1,360,918</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>101,700</td>
<td>130,915</td>
<td>171,520</td>
<td>206,711</td>
</tr>
<tr>
<td>Atriplex</td>
<td>37,878</td>
<td>40,663</td>
<td>46,003</td>
<td>45,193</td>
</tr>
<tr>
<td>Tamarugo</td>
<td>20,600</td>
<td>20,600</td>
<td>20,600</td>
<td>20,603</td>
</tr>
<tr>
<td>Oregon Pine (Douglas-fir)</td>
<td>11,343</td>
<td>11,731</td>
<td>12,135</td>
<td>12,090</td>
</tr>
<tr>
<td>Alamo</td>
<td>3,526</td>
<td>3,660</td>
<td>3,718</td>
<td>3,798</td>
</tr>
<tr>
<td>Algarrobo</td>
<td>3,201</td>
<td>3,201</td>
<td>3,201</td>
<td>3,211</td>
</tr>
<tr>
<td>Other Species</td>
<td>38,989</td>
<td>39,160</td>
<td>39,306</td>
<td>41,580</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,460,530</strong></td>
<td><strong>1,555,255</strong></td>
<td><strong>1,609,295</strong></td>
<td><strong>1,694,104</strong></td>
</tr>
</tbody>
</table>

(INFOR - CORFU, CONAF, y EMPRESAS 1996)
Currently there are 3.55 million ha. of Radiata Pine forests worldwide, with 36% of these in Chile representing the largest proportion of this resource in the world. New Zealand is a close second with 34%, then Australia with 21%. These three countries, located in similar latitudes in the Southern Hemisphere, have 90% of the planet's Radiata Pine resource (Campino 1996).

In Chile, most of the plantation stock is located relatively close to the nation's largest cities and ports, where it is available to both domestic and export markets, despite transportation problems discussed previously. They are primarily in three administered regions: VIII ( Concepcion), VII (Talca), and IX (Temuco) (refer to Figure 16). Region VIII has more than half of the country's radiata pine stands.

Chile is one of a handful of nations on Earth that can boast that they grow more trees today than it did 50 years ago. From the state of the country's timberlands now, it is very likely that they will be able to state the same comment again in another fifty years. Blackman, Hillman, and Sowle comment in their publication, “The Forestry and Wood Processing Industries of the ABC Countries: Argentina, Brazil, Chile” that the plantation forestry that is being done in Chile is one of the few examples in the world where "green" forestry is practised.
However, one must be careful when using this term. According to the Forest Stewardship Council\textsuperscript{14} definition, a “green” forest does not have single species plantations, use chemical fertiliser, or herbicides and pesticides. The plantations of Chile would not meet these criteria.

\textsuperscript{14} The Forest Stewardship Council is an independent body backed by the World Wildlife Fund that has designed a set of standards to promote forest certification as a means towards reaching “sustainable” forest practices.
Because of the move towards plantations in the past 20 years, the country now boasts over 1.6 million hectares of tree farms, most of them located in south-central Chile. Currently, there are 200 million cum of radiata pine and eucalyptus (44 billion board feet) growing in plantations. In 1993, the output of Chile’s forest sector hit a record 27.5 million cum and there was an additional 125,000 hectares of new plantations. Production increased to 30.5 million cum in 1994. Today, more than 85% of Chile’s plantation pine stands are less than 15 years old, roughly a decade away from maturity (refer to Figure 17). By the year 2000, annual harvest is expected to reach 35 million cum (Blackman, Hillman, and Sowle 1995). However, a study done by Instituto Forestal, a Chilean government forest agency, predicts that an annual harvest of close to 35 million cum will not be reached until the year 2020. While this volume will not have a major impact on global timber supply, it will have a major impact on Chile’s economy and specific markets; including the North American market for mouldings.

\textit{Figure 17: Distribution of Chile’s Pine Plantations by Age}

(Solis 1996)
Growth rates for radiata pine are impressive averaging 21 cum per hectare per year. This is slightly higher than that of New Zealand, three times greater than pine in the southern US and a dozen times faster than the average Canadian conifer (refer to Figure 18).

*Figure 18: Comparison of Selected Average Growth Rates*

![Graph showing average growth rates for different countries.]


In Chile there are also plantations of even faster growing hardwood eucalyptus (*Eucalyptus globulus*) which complements the radiata pine in developing an integrated forest industry. This species has established an international popularity among pulp producers. The Instituto Forestal (INFOR) predicts that eucalyptus plantations will triple from 100,000 hectares in 1990 to 300,000 hectares in 2000, and reach 500,000 hectares by 2010. These fast growing trees can be harvested every ten years for use in the pulping process. By 2000, Chile is expected to harvest 7.1 million cum per year of eucalyptus - enough to support the country's entire pulp industry (Blackman, Hillman, and Sowle 1995).

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15 Breeding efforts are producing significant reductions to this short rotation period.
3.3.7 Current Industry Operations

The current industry operations in Chile range from some of the world's most primitive to some of the most technologically modern. The vast majority of sawmills are small and mobile with small outputs of inefficiently sawn lumber. One industry estimate considers only 317 of Chile's 1,600 sawmills as "permanent." A directory of sawmills published by the Instituto Forestal listed more than 1,300 companies that each produced less than 5,000 cum of lumber per year. Fewer than 100 companies own all of the rest of the country's sawmills; those with annual output of more than 5,000 cum. These latter companies account for all of Chile's lumber exports. The same concentration is found in the other segments of the forest products industry, including wood-based panels and pulp and paper.

By 2002, annual lumber output is forecast to average 5.5 million cum with the largest change occurring not in terms of volume but in terms of value-added products such as kiln dried lumber, flitches and clears\(^\text{16}\). Mills are predicted to produce 3.6 million cum of value-added products and remanufactured goods, a fourfold increase in just a decade. Fundación Chile predicts that shipments of value-added products will increase from US$ 134 million in 1993 to US$ 500 million by 2004.

To achieve the predicted 36% increase in production of basic lumber, the industry will require US$160 million of investment. It will require another US$270 million for mills and machinery to quadruple the production of finished lumber. This level of investment implies major shifts toward large, modern mills with recovery rates far higher than achieved in the country's older and smaller mills.

\(^{16}\) Blackman, Hillman, and Sowle (1995) define the term “value-added” as incremental increases in net value of a product obtained through further processing. They suggest that flitches, kiln-dried lumber, and clears are all value-added products. These products are generally considered part of the primary process in British Columbia.
Between 1987 and 1994, companies announced 66 new wood processing plants in Chile totalling a value of US$3.9 billion. Other sources put that figure at only US$ 3 billion with half already committed to existing projects. Large pulp mill projects account for most of this money. The largest projects on the solid-wood side include a Medium Density Fibreboard plant in Concepcion, and an OSB plant in Valdivia (refer to Figure 16). Both of these projects belong to MASISA (Maderas y Sintéticas SA), which expects to be the largest producer of wood-based panels in Latin America when these mills come on line.

Aruaco y Constitucion SA, owns over 400,000 hectares of predominantly Radiata Pine plantations and plans to build six large sawmills and associated dry kilns within the next few years. Once these plants become active, consumption of wood in their mills will jump from 300,000 cum a year to 1 million cum per year by the year 2000. For additional information on industry structure see Appendix VI.

In the first half of 1995, Chile exported US$ 1.15 billion worth of forest products, and despite the major share attributable to pulp, Chile sells an increasing volume of value-added products over-seas. Rough green lumber accounted for more than 15% of the value of Chile's forest products exports (Blackman, Hillman Sowle 1995).

3.3.8 Consumption

3.3.8.1 Domestic

Today, Chile's domestic demand for forest products is the equivalent to 5 million cum of logs annually. This volume is predicted to rise to 7 million cum by the turn of the century. But timber harvests are growing much faster, creating an ever-growing volume of wood for export. The current surplus is equal to 5 million cum (log volume) per year but is predicted to double in the next five years.
Although many people do not feel confident about the quality of fast grown species such as radiata pine, the timber has proven to be dense and strong enough to qualify as structural timber in the UK under European Standards. In the past, strength was improperly assessed by the closeness of growth rings, and although Northern Hemisphere species have closer rings they are not necessarily stronger than the fast growing radiata pine (New Zealand Ministry of Forests 1995). Appendix II describes in detail a comparative test of radiata pine to common Pacific North West species done by the New Zealand Ministry of Forests.

Some native trees are sawn into lumber or pressed into panels, but over 90% of Chile’s forest products are manufactured from plantation wood. The major use of native timber in the country is firewood; at least half of Chile’s people burn wood for heat and cooking. This use is increasing as the high cost of oil and gas prevents people from changing fuels (Solis 1996). In 1990, the National Energy Commission estimated that harvests totalled five million cum of native timber for firewood. This volume accounted for two thirds of all native wood harvested (Blackman, Hillman, and Sowle 1995).

3.3.8.2 International

Unlike its North American neighbours, Chile faces the problem of what to do with all the wood, rather than where to find enough fibre to keep mills running. Two thirds of Chile’s forest products (by value) are currently exported. Larger companies are staffed by well-educated people who are used to competing in international markets.

Companies such as CMPC, one of the biggest companies in the Chilean forest industry, are committed to develop value-added products made up of radiata pine lumber. The company has had excellent success in introducing and certifying kiln dried structural lumber into the UK, and
now into Japan. In the United States, moulding, windows and door components made of radiata pine have been very successful competing with North American species.

This is a major change for the radiata pine species which only a few years ago was considered as a marginal lumber product suitable only for pallets and crates. Now radiata has won important, though small, markets for higher valued products such as moulding. In the US, radiata pine from Chile and New Zealand has come to be a practical and less expensive substitute for Ponderosa pine. According to Guillermo Guell, general manager of Forestal Copihue, Chilean producers of radiata pine moulding and door frames have earned 10% of the US market for these products (Blackman, Hillman, and Sowle 1995). This is a substantial increase since 1991 when it was stated, "...of significant interest to Chile, and potentially to Canada, is a small but growing trade in quality wood products, and wood-based manufacturers into the USA. With a total value of less than US$25 million in 1991, it should not be assessed as a major threat at present. However vertical marketing chains\textsuperscript{17} may be involved into particular US markets which could expand the trade quickly.\textsuperscript{18} In only five years Chile has grown from a minor threat to a worthy competitor in the US market (refer to Figure 19). This same type of vertical marketing chain is currently being established in the Canadian market. The ability of radiata pine from Chile to penetrate North American markets will fluctuate as the price of lumber increases.

The recent Canada/US Softwood Lumber Agreement (SLA) will not help the situation for Canadian producers. One expected result of the SLA is an increase in overall lumber prices. But as the lumber prices climb it also makes it worthwhile for American secondary manufacturers to

\textsuperscript{17} Vertical Marketing Chain: networks that are professionally managed, centrally programmed, and pre-engineered to attain operating economies and maximum impact on the market channel. They are often linked with relationship marketing. Definition taken from - Beckman, Kurtz, and Boone. 1982. Foundations of Marketing. Third Edition. Holt, Rinehart and Winston of Canada, Ltd. 459-464.

import radiata pine from Chile rather than buying lumber for remanufacturing from Canada (refer to Figure 19).

*Figure 19: USA Imports from Chile*

![Bar chart showing USA imports from Chile from 1989 to 1995 for Siding, Moulding, Millwork, Lumber, and Solid Wood Products.]

*Note: solid wood products includes logs, cants and non-dimension lumber*  
(BC Statistics Web Site 1996)

In Tierra del Fuego, at the southern tip of the country, Trillium Corp., based in Bellingham Washington, wants to invest US$200 million to develop a complete forest industry on the island, which Chile shares with Argentina. The company has hired 100 Chilean scientists to produce a US$ 9 million environmental impact report on its proposed logging and manufacturing operation. Trillium intends to harvest the timber in an "environmentally sensitive" manner. If the government approves this project, Trillium will produce finished products such as door and window frames and furniture. Most of these "environmentally correct" products will be exported to North America, Europe, and Asia.

Currently, the country's forest product exports consist mainly of raw materials and semi-finished products such as logs, green lumber and market pulp; Asian countries buy nearly half of
them. With the current positive investment climate in Chile, along with relatively low wage levels and the growing abundance of plantation wood, additional processing capacity would enable Chile to export additional kiln-dried planed lumber, or value-added products such as moulding, millwork, doors, windows, furniture parts, cabinets or ready-to-assemble furniture. Although North America is currently the fourth largest export market (13% of forest products exports), it is expected to grow substantially as it is becoming the focus for finished products (refer to Figure 20).

![Figure 20: Chilean Forest Products Exports](image)

(Fundacion Chile 1995)

In 1994, Chilean mills produced 30.5 million cubic metres of solid-wood products, up 11% from 1993. Forestry has become Chile's third largest export sector after mining and manufacturing. In 1994, the country exported US$ 1.65 billion in forest products accounting for

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19 Solid wood products are all wood products that are not pulp, paper or packaging.
13% of the nation's export earnings. In 1995, the value of the forest sectors exports was forecast to jump to US$ 2.2 billion including pulp (Blackman, Hillman, and Sowle 1995).

It is clear that Chile is poised to be a world competitor in not only the supply of raw logs and pulp, but also finished value-added goods. Chile welcomes foreign investment and has one of the healthiest and most stable economies in South America. Secondary manufacturing has become a focus of the Chilean forest products industry and in recent years has gone from almost a negligible amount of moulding exports to capturing 10% of the US market. These are opportunities that should be examined by many BC producers. The large amounts of radiata pine coming on-line in the next few years combined with expected capital investments and aggressive marketing will make Chilean wood products fierce competition in certain markets.

Figure 21: Chile Forest Products Exports by Product

In late 1996, the US Moulding and Millwork Producers Association organised trips to Chile to review its potential wood supply and production capacity. Participants were surprised when they found out that within a few years, one large company in Chile alone will produce enough moulding & better lumber as consumed in the US annually (Brauner 1997). Not only will
there be a greater supply of radiata pine on the open market, but the quality of the wood is consistently increasing. One of the factors is the aggressive pruning programs that began a few years ago. Pruning the lower limbs from the tree allows the tree to grow knot-free clear wood, which makes these trees ideal for higher-value products, where appearance is more important than strength. To complement this, fast grown radiata pine is proving to be as strong as its slow grown competitors. It is also favourable to work with as it takes paint well, doesn’t split when nailed, has a grain which is suitable for furniture, and can be sanded to a very smooth finish. There is the possibility that Chilean mills could produce a great deal more product, with an increasing proportion of high quality goods.

20 Chile has adapted the management regime developed in New Zealand and as increased plantation forests are converted to high quality sawlog regimes, the volume of timber suitable for clear and appearance grade applications will increase sharply.
21 This claim is disputed by several producers of wood products from boreal forests.
3.4 NEW ZEALAND

3.4.1 Introduction

Another potential force in the North American mouldings market is New Zealand. The established investment linkages with US producers makes New Zealand an important segment of the industrial lumber market, providing both radiata pine logs and lumber mostly for remanufacture. New Zealand has used the intensive forest management system on radiata pine plantations to produce materials that can be used in both clear mouldings and finger jointed products. Pruned forests are now maturing and the resultant products now compete in high value niches in world markets (Wilson 1995). However, there are a number of adverse factors that must be overcome if New Zealand is to sustain or expand its position in the US market.

3.4.2 Forest Resources

New Zealand began planting their less productive farmland with Radiata pine about the same time as Chile. The planted area totals 1.478 million hectares, 90.5% of which is radiata pine (refer to Figure 22). Four point five percent of the planted area is Douglas-fir, and the rest is other exotic hardwoods and softwoods (New Zealand Land Owners Association 1996).
New Zealand planted forests make up almost 100% of the harvested areas. In 1961 the harvest level of natural forests was ~1.5 million cubic metres, today it is next to nothing. Most radiata pine is harvested at about 25 years of age, the current level of harvest is ~17.0 million cubic metres of plantation wood and will increase steadily over the next 20 years (refer to Figure 23).
As one can see from Figure 24, the volume of wood coming on stream in the next twenty years will drastically increase the quantity of clear fast grown timber on the market. New Zealand will soon be faced with the same problem that the Chilean producers have - what to do with all the clear lumber?
3.4.3 Production

Lumber, pulp & paper, and panel production have all been increasing in the last 40 years. From a low of ~1.85 million cubic metres in 1988, lumber production reached a high of almost 2.9 million cubic metres in 1995. Since 1985 the production of fibreboards22 has almost quadrupled with the production of plywood and particleboard reaching production levels of 680,000 cubic metres in 1995. Slight decreases in both lumber and fibreboard production occurred in 1996.

Figure 25 shows the recent investments in the forest industry. In the late 1980’s, a large percentage of investment dollars was being put towards pulp and paper mills. This trend has changed in the 90’s as the shift has been toward solid wood processing (rather than shipping most logs off shore), and processing production residue.

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22 Fibreboard includes hardboard, softboard, MDF and triboard.
It is interesting to note, however, that the value of mouldings produced increased dramatically from 1994 to 1995 but were reduced by almost 3 fold in 1996 (refer to Figure 26).

Figure 26: Value of Domestic Moulding Production

(New Zealand Forest Owners Association Inc. 1996)
Although log exports are increasing so is the amount of solid wood and panels being processed. This is of course possible because of the increased amount of available timber coming on line. 23

3.4.4 Markets

Most New Zealand participants in the US market struggled to maintain their presence during 1995, resulting in reduced volumes of exports to the US for both logs and lumber. Their biggest markets for logs are Japan and Korea. In 1996, New Zealand shipped ~1.6 million cubic metres of logs to Japan, and ~2.9 million cubic metres to Korea. China is the third most important market for New Zealand logs with the US only being a minor market at the moment (New Zealand Forest Owners Association 1996).

One of the major factors in New Zealand’s reduced exports to the US was the serious decline in the price of US Ponderosa pine. Through much of 1995, the price of 5/4 Ponderosa pine Moulding & Better was soft by historical standards, and in early 1996, it reached a level of U.S.$1,100 (see Figure 27). These low prices led some US producers to temporarily withdraw from the market. Exporters from New Zealand faced the difficult decision of maintaining market commitments at a loss, or reassessing and withdrawing at least a portion of their commitment from the US. Many New Zealand producers shifted their focus from developing the US market to increasing their presence in the Japanese market (McEwan 1997). The major difficulty is that there is far more clear material (mostly radiata pine) coming from New Zealand’s plantation forests than the world needs or wants to pay for at present.

23 The above information was extracted from: New Zealand Forest Owner's Association Inc 1996.
The US is the major consumer of clear material for mouldings, and the trend in mouldings has been toward finger-jointed products. During the price deviation many New Zealand firms completely reallocated their production that had been designated for the US causing US buyers to find alternative sources of supply. This lack of commitment to the US market may make it very difficult for New Zealand mills to regain lost market share. In the fourth quarter of 1996, Ponderosa pine rough Mldng & Btr was once again above U.S.$1,425 and New Zealand producers are now looking at getting back in the market. But even this price is unstable as 5/4 Ponderosa pine rough Mldng & Btr is predicted to dive again in the first two quarters of 1997 (see Figure 27).

*Figure 27: Lumber Prices - 5/4 Moulding & Better*

If the price decrease forecast is correct, New Zealand will not only have a difficult time regaining market share, but will have even more of a challenge to do so at a profit. Figure 28 suggests that New Zealand's decision to pull out of the moulding and better market when the price began to fluctuate was a damaging one. Not only were the holes left by New Zealand filled by countries like Chile and Canada; but through aggressive marketing and holding market share
even when prices were low, Chile drastically increased its penetration and hold on the US market. Although New Zealand seems to be recovering from the loss of market share, Canada’s real competition in this growth industry seems to come from Chile due to their long term commitment to capturing market share.

Other important economic factors that are currently leading to a decline in imports from New Zealand to the US include: a strong NZ dollar in world exchange rates, the escalating cost of New Zealand logs, and the increasing presence in the US market of other wood products from Scandinavia, Canada and Chile. According to a spokesman from the New Zealand Timber Industry Federation (NZTIF), the production of radiata pine in 1996 is off between 10 - 15% from the year before. In addition, export sales are down 20 - 25% from their peak in 1994. In addition, domestic demand is falling off, and activity in the market is flat. In the words of the speaker, “The bad economic news is just starting” (Sherrill 1996).

*Figure 28: US Imports of Softwood Mouldings*²⁴

(US Foreign Agricultural Service 1997)

²⁴ A detailed examination of the US market for mouldings will follow in the next chapter.
In other words, in order for New Zealand to regain and grow its market share in the US moulding market, log costs for New Zealand mills must decrease, a more favourable exchange rate is required, higher prices for Ponderosa pine would be essential, and the New Zealand manufacturers would have to shift some of their focus from the Asian markets to North America. Like Chile, New Zealand will be forced to move up the value chain to producing higher value products and find new markets for its clear wood. With all the extra volume of wood both their domestic market and current off shore markets will be adequately served. They may then decide to have a more serious look once again at the attractive US mouldings market.
3.5 MDF: A WORLD COMPETITOR

New competitors in the North American moulding market not only include the aggressive campaign for Chilean radiata but also moulding made from Medium Density Fibreboard (MDF). Although it has been produced for well over twenty years, in the past decade world production has been increasing sharply. Technology has changed the production of MDF from a commodity with few advantages over particleboard, to a high quality, easy-to-finish, and even bendable product (Boretti 1994). It has become an attractive alternative for solid wood moulding for a variety of reasons:

- It can be sanded to a very smooth finish.
- It accepts paint readily.
- It can be wrapped with overlays without telegraphing any base defects.
- It accepts nails and screws well.
- It will not split.
- It can be sculpted into many elaborate shapes and still maintain structural integrity.
- It can be made to any length.
- It has no knots.

Production capacity for MDF is expanding at a dramatic pace, both in Europe, Asia, Oceana and North America. Many large scale new mills have already come on stream, adding a significant volume of product to the already sizeable global capacity. Not only is existing global production high but another group of new mills, under the “project phase” banner are being completed during the past six months. Recent and expected capacity increases will dramatically
increase quantities of MDF available and will write a completely new chapter in MDF history (Botting 1996).

Current volumes of MDF moulding remain minor compared to wood and barely register in terms of market share. However, this product is passing rapidly through its introductory stage and can be expected to commence dynamic growth especially given its strong consideration as a substitutable material for moulding by the US construction industry (Eastin 1997). Currently, this competitive threat cannot be measured nor ignored.

3.5.1 Global Growth

In Europe, Germany is the leading producer, but Belgium, Spain, Italy, Poland, and even Luxembourg are all producing, or will be producing, formidable amounts of MDF. Germany is now the second largest producer in the world following the US (refer to Table 4).

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Production m^3/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>2,883,000</td>
</tr>
<tr>
<td>Germany</td>
<td>1,830,000</td>
</tr>
<tr>
<td>Italy</td>
<td>1,210,000</td>
</tr>
<tr>
<td>Canada</td>
<td>1,060,000</td>
</tr>
<tr>
<td>Spain</td>
<td>472,000</td>
</tr>
<tr>
<td>France</td>
<td>454,000</td>
</tr>
<tr>
<td>UK</td>
<td>430,000</td>
</tr>
<tr>
<td>Total Europe and North America</td>
<td>10,432,000</td>
</tr>
</tbody>
</table>

(Botting 1996)

A good example of the impact of MDF mouldings in the marketplace is what has occurred in the New Zealand domestic market during the past few years. MDF per capita consumption in New Zealand has been steadily increasing. In a country, where there are abundant supplies of radiata pine products, MDF mouldings and exterior facings are becoming well accepted and
currently substitute for locally produced solid wood products often due to the reasons previously mentioned (paintability, workability, etc.). Per capita consumption of MDF in 1993 was 30m$^3$/1000 people, a far higher figure than other countries.

It is also expected that there will be additional growth in MDF consumption as two new modifications of MDF become accepted by consumers: exterior MDF and fire retardant MDF. It is only in the latter part of 1996 and early 1997, that Medite, a large European panel manufacturer, is actively promoting exterior grade MDF in Europe after 5 years of proprietary testing. Much of the new MDF capacity is expected to be absorbed by the market place through inroads into existing markets for solid wood products and other wood-based panels (Wood-based Panels International 1995).

With double digit annual percent production expansion throughout the late 80's and early 90's, over capacity is becoming a real challenge for world MDF producers. The president of the European Association of Medium Density Fibreboard Manufacturers (EMB), Jeff Rhodes, warned producers as plainly as he could when he said, "...the MDF industry must channel its energies into diversification and seeking new market openings for its products, rather than into new capacity, if it is to rise above the present over capacity conundrum."\(^{25}\) He expressed these views at the EMB general assembly in June, 1996. He also felt that pressure on margins would spawn more efficient utilization of plant capacities and increased diversification of MDF panels. This will mean more specialty boards and custom products such as cut-to-size, application-oriented densities, special surface treatments, new laminations, and components. Real demand has always fallen short of industry’s optimistic estimates. Surveys have resulted in excessively optimistic figures on actual market size which contributed to new capacity investments. These

\[^{25}\text{Wood-based Panels International. October 1995, pg. 8.}\]
have led to an artificial inflation of MDF sales expectations, a situation EMB had already warned about (Botting 1996).

Asia/Oceana (the region encompassing both Asia and Oceana, i.e. the Australia and New Zealand locale) is engaged in a close race with Europe for the global lead in terms of MDF production. Both regions will soon produce approximately 7 million m\(^3\) per year. Asia/Oceana has doubled its capacity from 1993 to 1995, from ~2.5 million m\(^3\) to ~5 million m\(^3\). With an additional increase of 2 million m\(^3\) coming on line in 1996 and 1997, Asia/Oceana's capacity will total 7.4 million m\(^3\)/year. The largest producers are Japan, Korea, Australia, New Zealand, and the South East Asian countries of Indonesia, Thailand, and Malaysia. While China has the most MDF mills, the small size of the mills results in an annual production of under 1 million m\(^3\) per year. Wood-based Panels International Magazine warns though, that capacity is not production: many of the new mills are barely in or out of the commissioning phase. Production, particularly in Asia, is expected to increase dramatically through 1997 and 1998 as shown in Table 5.

Table 5: World MDF Production

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Plants</th>
<th>Capacity (m(^3)/Year)</th>
<th>Projected Capacity (m(^3)/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1996</td>
<td>1995</td>
<td>1994</td>
</tr>
<tr>
<td>Africa</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Asia/Oceana</td>
<td>66</td>
<td>53</td>
<td>46</td>
</tr>
<tr>
<td>Europe</td>
<td>43</td>
<td>41</td>
<td>34</td>
</tr>
<tr>
<td>Latin America</td>
<td>7</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Middle East</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>North America</td>
<td>24</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>Ex-USSR</td>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>World Total</td>
<td>155</td>
<td>135</td>
<td>114</td>
</tr>
</tbody>
</table>

World Capacity: Existing Plants + Projected New Capacity = 21,066,000 m\(^3\)/Year

(Botting 1996)
Figure 29 clearly illustrates the enormous growth of world MDF capacity in just a few years.

\[\text{Figure 29: MDF World Capacity}\]

3.5.2 Domestic Production

Canada is number four in terms of European and North American production capacity, after the US, Germany, and Italy (refer to Table 4). Production in Canada almost doubled in the past year growing from a 1995 volume of 550,000 m\(^3\) to 1,060,000 m\(^3\) a year later. By 1998, capacity is expected to increase another 594,000 m\(^3\), to bring the Canadian total to 1,654,000 m\(^3\) (refer to Table 6). Producing locations are spread out evenly across the country.

Canada's domestic market is small compared with that for US producers, resulting in a heavy reliance on export markets for MDF sales. The US imported a total of 89,000 m\(^3\) in 1995, and 16,600 m\(^3\) for the first quarter of 1996. Although the Pacific Rim imports high volumes of MDF every year, it will be interesting to see where the massive increase in Canadian production
is sold, especially given the increases in capacity for relatively low cost MDF production both in Asia and the US (Botting 1996).

Wood-based Panels International Magazine considers MacMillan Bloedel as North America’s rising star in the North American sector. It claims that the firm was so deeply involved in perfecting its engineered wood products, lumber and pulp and paper that, until recently, it watched its wood products competitors grab the MDF ball and run with it. But MacMillan Bloedel has entered into the MDF market with investments to bring on stream two new MDF projects, one in Canada (Pembroke, Ontario) and one in the US.

West Fraser Timber has also become a major player in the North American MDF market in a very short time. West Fraser purchased Blue Ridge Lumber in White Court, Alberta in 1995 and completed a mill expansion to boost production to 190,000 m$^3$ per year. The company also owns Westpine, a newly constructed MDF mill in Quesnel, BC where it can produce an additional 175,000 m$^3$ per year.

Several other mill projects are in various stages of planning or discussion. Gerard Crete & Fils Ltd. has been carrying out feasibility studies for a new mill in Shawinigan, Quebec, but it is believed to have been put on hold. Uniboard Canada’s green field mill in Ville la Baie is also rumoured to have been put on hold. Other mills under consideration are Grant Forest Products in Engleheart, Ontario with a 300,000 m$^3$ per year mill out put. Also, Canfor/Sinclair Enterprises are trying to establish an MDF mill in Prince George, BC (Botting 1996).
Table 6: Canadian MDF Production, Present and Future

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Province</th>
<th>Total Production m³/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flakeboard</td>
<td>St. Stephen</td>
<td>New Brunswick</td>
<td>103,000</td>
</tr>
<tr>
<td>G-P Flakeboard</td>
<td>Sault Ste. Marie</td>
<td>Ontario</td>
<td>212,000</td>
</tr>
<tr>
<td>MacMillan Bloedel Fidev</td>
<td>Pembroke</td>
<td>Ontario</td>
<td>256,000</td>
</tr>
<tr>
<td>Ranger Board Ltd. (West Fraser Mills)</td>
<td>Whitecourt</td>
<td>Alberta</td>
<td>190,000</td>
</tr>
<tr>
<td>Panfibre (Kunz Germany)</td>
<td>Mont Laurier</td>
<td>Quebec</td>
<td>124,000</td>
</tr>
<tr>
<td>Westpine MDF (West Fraser Mills)</td>
<td>Quesnel</td>
<td>British Columbia</td>
<td>175,000</td>
</tr>
<tr>
<td><strong>Total 1996 Production</strong></td>
<td></td>
<td></td>
<td><strong>1,060,000</strong></td>
</tr>
<tr>
<td>Canfor/Sinclair (1998)</td>
<td>Prince George</td>
<td>British Columbia</td>
<td>249,000</td>
</tr>
<tr>
<td>Gerard Crete &amp; Fils (1999)</td>
<td>Shawinigan</td>
<td>Quebec</td>
<td>124,000</td>
</tr>
<tr>
<td>Uniboard(Kunz) (1998)</td>
<td>Ville la Baie</td>
<td>Quebec</td>
<td>221,000</td>
</tr>
<tr>
<td><strong>Estimated 1999 Production</strong></td>
<td></td>
<td></td>
<td><strong>1,654,000</strong></td>
</tr>
</tbody>
</table>

(Botting 1996)

3.5.3 MDF and Moulding

The rapid expansion in global MDF production will necessitate the development of a wider range of value-added products to capture market share from existing products. While current uses for particleboard will be the primary target, solid wood products will not remain isolated from substitution by MDF products (refer to Figure 30).

The moulding sector is one targeted by many MDF producers. MDF mouldings make sense in any application where the product will be painted because not only does it have the long list of attributes noted above but it is also half the price of solid wood mouldings (Wood Markets Quarterly 1996). MDF is expected to capture the low-cost market not only from paint grade wood mouldings, but also from vinyl, aluminum, foam and other non-wood, low cost mouldings.

MDF mouldings will also capture market share for higher end products by using high quality photographed or vinyl overlays which mimic the look of natural wood. These products
are ideal for crown mouldings where they will capture substantial market share but still only account for a small proportion of the new MDF capacity coming on stream.

![Figure 30: North American MDF End Uses](image)

(Szucs 1996)

### 3.6 COMPOSITE MOULDING

No report on the moulding sector would be complete without mentioning the composite moulding sector. This project will not delve into great detail on these products, but will briefly discuss it.

Composite moulding was invented about 20 years ago, and has experienced moderate gains in acceptance and application in the past four to five years. These products consist mainly of rigid polyurethane blends and, to a lesser extent, flexible resins, as a viable alternative to traditional wood profiles.
Some manufacturers believe that they have found a niche with the builders and heavy-end remodelers who have taken to the product because it is easier to install than wood. It consists of a one-block piece rather than a few that need to be glued together or nailed together. For example, Custom Decorative Mouldings in Greenwood, Del, USA, a national vendor of composite mouldings and millwork, receives 3/4 of their business from home builders. They do a little business to DIY’ers through Home Depot, but are not pursuing that market.

Consumption has also increased since products were made available in wood like, stainable finishes. In many cases, the only deterrent was the price. Depending on the style and detail of the moulding, polyurethane can cost about 10 to 15 percent more than wood profiles. However, as the moulding becomes more intricate, the price difference diminishes, as it is easier to create complex mouldings with polyurethane. Victorian and colonial style homes generally tend to have elaborate moulding patterns and polyurethane is having greater success where these types of homes are prevalent. These mouldings are also growing in popularity for encasing round windows and doorways because of the ease of bending composite mouldings.

Many builders prefer polyurethane over wood for outdoor applications because it stands up better in many weather conditions. It also does not warp, shrink, crack or chip, and can be bent to almost any shape.

Three separate vendors estimate the size of the US polyurethane market at $75 million to $100 million. According to the Molding and Millwork Producers Association wood still makes up 95% of the moulding produced in the US.  

26 The above information was adapted from Home Centre News. February 3, 1997.26-27.
3.7 CONCLUSION

It is critical that the BC softwood moulding industry pay close attention to international developments in both MDF and radiata pine. However it seems that Chile will be the main solid wood competitor in the North American market. Chile must be monitored for its fast grown plantation wood that works very favourably for uses in both structural and non-structural situations and their stated target of increased penetration of the US and Canadian moulding market. MDF must be monitored due to existing and increasing over-capacity and the products’ positive characteristics in terms of painting, laminating and workability.

Chile’s potential is vast. Although they are not a major threat to the Canadian industry as a whole, they are a growing competitor. For British Columbia, it offers a little more of a hazard due to their focus on exporting to trading regions we depend on such as the Pacific North West and the Pacific Rim. The ability of Chilean radiata pine to maintain and expand market share in North America will depend on the availability and pricing of competing products in the major US markets. The recent Canada/US Softwood Lumber Agreement will not help the situation for the Canadian and American producers since it already has led to an increase in overall lumber prices which results in making the slightly higher import costs of radiata pine much more price competitive. Slowly, the Chileans are chipping away at the “big boys” market share in certain regions, and although they are not major competitors as of yet, they deserve the respect and attention given to a rapidly growing, modern, well educated economy.

Although currently not a huge threat on the North American Continent, New Zealand should be monitored in the future for its increasing presence. In the past it was forced to pull out of the US in order to increase its presence in the Pacific Rim, but as increased volumes of clear radiata pine mature new markets must be found.
It is not difficult to see that the amount of MDF production coming on stream is formidable. Current markets can only sustain reasonable levels of volumes, and as a result the MDF producers are going to have to live with lower margins and become creative in the applications of MDF. Because of its composition, MDF is very suitable for moulding; it accepts paint well, doesn’t split when nailed, and can even be bent. These are all characteristics that will promote the use of MDF products in the millwork and moulding industry but with a focus on low cost moulding and those that are viewed from a distance.

Polyurethane and polyvinyl mouldings are slowly making a presence in the market place. Some building contractors are shifting to using polyurethane mouldings is that they are generally easier to install than their wood-based competitors (Anonymous 1997). But composite mouldings will remain a niche market player unless the price of solid wood and other wood composites becomes exceedingly high.
4. THE US WOOD MOULDING MARKET

4.1 INTRODUCTION

The second leg of the Triangle for Success (refer to Figure 31) is the US moulding market. This chapter will examine the demand for mouldings in the expanding US moulding market.

Figure 31: The Triangle for Success

The US mouldings market has developed from an industry dominated by Ponderosa pine since World War II, to one that has been flooded with substitutes varying from different pine species to polyurethane mouldings. When the Endangered Species Act was introduced in the late 1980's the face of the industry changed. The Spotted Owl controversy removed a large portion of Ponderosa pine from potential harvest. These changes in the traditional wood supply created a vacuum which attracted global suppliers of wood suitable for moulding as well as new wood composite and non-wood mouldings (refer to Chapter 3: Competitor Analysis).
4.2 SOFTWOOD

The market for solid wood has always been dominant throughout the US. As the competing products become more accepted the solid wood products must find their niche areas and hold them.

In 1996, The Centre for International Forestry Research (Cintrafor) produced a paper assessing market opportunities of second-growth clearwood lumber by identifying industry segments that currently utilize clearwood lumber and determining whether alternative markets will continue to exist for clearwood lumber produced from intensively-managed forests in the Pacific Northwest. Sections of it focused on the moulding and millwork sector. The report found that negative concerns regarding the ability of plantation grown timber or natural second growth timber to substitute for old-growth lumber products may be exaggerated. Results showed that the two most important lumber attributes were moisture content and reliability of supply. The least important attributes were identified as being mechanical strength and vertical grain (refer to Figure 32).
The study suggested that manufacturers could easily adapt to drying and machining the faster grown second growth timber. This bodes well for most of the Pacific North West as there is a decreasing supply of old-growth timber. It also helps areas that are growing Eastern White pine and radiata pine.

4.3 IMPORTED PINES

In 1992, the opportunity for imported pines in the US moulding market began to grow. Secondary manufacturers were caught in the crossfire of increasing prices and scarcity of supply for Ponderosa pine. Secondary producers, especially the moulding manufacturers, began to search for alternative raw material which would have both price and supply stability. Radiata pine lumber and finger joint blocks were initially supplied in small, steady volumes. When prices
rapidly escalated in late 1992, exporters from Chile, New Zealand, and more recently Brazil,
increased their offerings of shop and better lumber as well as finished mouldings, doors, and
furniture. Although Mexico is still by far the US mouldings market biggest external supplier, it is
no longer growing but decreasing it’s hold on the market (refer to Figure 33). New Zealand,
Chile, and even countries like Honduras are making the strategic and operational investments to
develop and increase their market share in the US moulding market.

*Figure 33: Value of US Imports of Mouldings ($000's)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
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<td>Mexico</td>
<td>116,958</td>
<td>141,089</td>
<td>118,938</td>
<td>84,853</td>
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<tr>
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<td>27,445</td>
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<tr>
<td>Canada</td>
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<td>11,560</td>
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<td>Brazil</td>
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<td>1,448</td>
<td>1,653</td>
<td>4,497</td>
<td>15,916</td>
</tr>
<tr>
<td>New Zealand</td>
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<td>6,632</td>
<td>6,926</td>
<td>7,483</td>
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<tr>
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<td>2,530</td>
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<td>4,847</td>
<td>6,678</td>
</tr>
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<td>0</td>
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<tr>
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<td>494</td>
<td>334</td>
<td>1,208</td>
<td>3,466</td>
<td>1,880</td>
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<tr>
<td>Taiwan</td>
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<td>3,416</td>
<td>5,241</td>
<td>2,813</td>
<td>1,551</td>
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<tr>
<td>Malaysia</td>
<td>412</td>
<td>494</td>
<td>1,417</td>
<td>1,150</td>
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<td>568</td>
<td>854</td>
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<td>United Kingdom</td>
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<td>201</td>
<td>277</td>
<td>392</td>
<td>502</td>
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<tr>
<td>Latvia</td>
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<td>0</td>
<td>0</td>
<td>325</td>
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<td>Estoria</td>
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<td>16</td>
<td>25</td>
<td>0</td>
<td>213</td>
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<td>Thailand</td>
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<td>Ecuador</td>
<td>85</td>
<td>175</td>
<td>122</td>
<td>112</td>
<td>173</td>
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<td>France</td>
<td>18</td>
<td>18</td>
<td>14</td>
<td>63</td>
<td>167</td>
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<tr>
<td>China</td>
<td>0</td>
<td>0</td>
<td>436</td>
<td>101</td>
<td>102</td>
</tr>
<tr>
<td>Singapore</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>86</td>
</tr>
<tr>
<td>Others</td>
<td>437</td>
<td>406</td>
<td>469</td>
<td>3,142</td>
<td>268</td>
</tr>
<tr>
<td>Grand Total</td>
<td>140,515</td>
<td>187,595</td>
<td>186,346</td>
<td>166,312</td>
<td>239,489</td>
</tr>
</tbody>
</table>

(Wood Products Trade and Foreign Markets 1997)

Canada, while steadily increasing it’s export of mouldings to the US market, is not making
as auspicious market share gains compared to some of the other countries. The other note of
interest is that the total imports of mouldings into the US is expanding each year (refer to Figure
34).
Figure 34: Market Share of Moulding Imports by Country of Origin (total for each year = 100% of imports)

(Wood Products International Trade and Foreign Markets 1994)

4.4 SUMMARY

Three years ago, Ponderosa pine was the undisputed king of the moulding and millwork industry. It was expensive, but had few substitutes. Although it is still requested today, more so in solid wood products, a completely different market for mouldings is evolving. Many other imported pine species are being considered acceptable alternatives for any finger-joint applications. The use of finger jointing allows species without some of the mechanical characteristics of Ponderosa pine to compete in terms of stability and machinability. In fact, many producer and distributors now market finger-joint products as a mixed pine, where the moulding may contain any of four of five different pine species. A growing number of moulding plants are using imported pine in their finger-joint mouldings. Their reasoning is not just due to the fact that imported prices are 5 - 10% lower than that of Ponderosa pine, but it is based on acceptable even preferred product quality and performance. Some customers even ask for finished products specifically produced from imported pines based on perceived superior attributes in finishing, nailing, or appearance.
4.5 SUBSTITUTES FOR SOLID WOOD

4.5.1 Wood-based Substitutes

Although solid wood and finger-joint are still the dominant products in the market place, there are an increasing number of other substitute products available on the market today. There is some confusion as to the exact proportion of MDF, solid wood, metals, and plastics being used in the US mouldings market. Various sources seemed to disagree as to the percentages actually used in the market.

R.E. Taylor and Associates, a consulting firm with expertise in the mouldings market estimates that MDF (medium density fibreboard) holds about 8.8% of the market, while solid wood still controls the moulding market (refer to Figure 35). This is a very conservative estimate, as other sources claim the MDF portion of the mouldings market to be as high as 41%, and the solid wood contribution to be as low as 38% (Eastin et al. 1996). All discrepancies aside, the demand for solid wood mouldings is decreasing and being replaced with substitutes, mainly MDF. As discussed earlier, MDF has many positive features and will continue to grow at an aggressive rate as market acceptance increases.
The top three reasons that moulding producers interviewed by Cintrafor (Centre for International Trade in Forest Products) gave for substituting clearwood softwood lumber were the price of the substitute, product availability, and reliability of supply. Reduced environmental impact was reported to be the least influential attribute (Eastin et al. 1996).

Those manufacturers who did use substitute products in their manufacturing process tended to be the larger producers with higher sales revenue and employment levels at twice the level of firms that did not use substitute products. Approximately 60% of moulding manufacturers indicated that they used a raw material substitute for softwood lumber (refer to Figure 36). The study found that 65% of the respondents used hardwood lumber some of the time as a substitute to softwood. The substitute products are mostly wood-based products: MDF and finger-jointed lumber. The benefits of MDF have been described earlier. The benefits of finger-joint lumber include:

- It has uniform strength properties.
• It is dimensionally stable.
• It is less tendency to warp.
• It contains virtually no rejects.

Figure 36: Percent of Wood-based Raw Material Substitution

Clearwood lumber also faces competition within the moulding industry from a number of non-wood substitutes. The two most common being polystyrene and polyvinyl chloride foams. The benefits of foam products are:

• It can be manufactured in long lengths.
• It can be machined with current technology.
• It can be painted or overlaid with wood veneer.
• It can be bent to form curved walls and windows.
• It weathers well.
While solid wood, (mainly Ponderosa pine) is still the indicator species for the health of the moulding industry, substitutes such as finger-jointed lumber, MDF, and to some extent plastics are making continuous inroads into the market.

4.6 US MARKET INDICATORS

4.6.1 Housing Starts

The market focus for many producers of mouldings world wide is the US. It is therefore important to understand which market indicators are useful in predicting future trends in the mouldings market. Historically, housing starts have been the main indicator as to the current and future health of the wood products industry. But in the last 15 years there has been an increasing number of people remodeling their existing home instead of buying new. Most of the products used in the do-it-yourself (DIY) and remodeling market are purchased in either home centres or lumber yards. Information from these sectors are increasingly valuable for understanding current and future market trends.

Housing starts for the 1996 totaled 1.475 million units, up 8.9% from 1.354 million units in 1995. This resulted in the best year for home building since 1988. The expected slowdown in the second half of 1996 did not happen, although starts did slow down slightly in the fourth quarter (WWPA 1997). The entire economy benefited from the recent downward trend in mortgage rates, and increased employment has made housing more affordable. Consumers and builders are becoming more optimistic about the economy and they believe that housing starts for the next quarter of 1997 will be strong. The total number of housing starts is predicted to decrease slightly from an average of 1.46 million in 1996 to 1.39 million in 1998 (RISI 1996) (refer to Figure 37).
Nineteen ninety-seven is predicted to be a strong year, although not quite as strong as 1996. Most indicators are very positive: attractive mortgage rates, high consumer confidence, low unemployment, real income and job growth. But demographic studies have concluded that age group population trends will not support the continuing rate of new housing starts experienced this past year (WWPA 1997).

The Federal Reserve recently stated that interest rates will not be increased and this is welcome news to building materials retailers. Stability in mortgage rates, at a time when incomes are increasing, will keep new housing starts strong and home improvements on the rise.

The two main areas mouldings are used in the US market are in new housing construction and R&R. Although the short term outlook for new housing starts will soften in the short term, the remodeling and renovation side of the industry is looking strong and should absorb any slack created in the market.
4.6.2 Home Improvement and Building Materials

The renovation and remodeling sector, indicators are strong for 1997. Home Centre News states that, "the average Joe or Jane Homeowner plans to spend about $2,660 on a renovation or remodeling project that will take at least two months to complete." A report done by American Express Retail Index found that homeowners are shopping increasingly at home centres over other retail stores. For their first choice in home improvement needs, people went to the following:

- Home centres: 55%
- Hardware Stores: 18%
- Lumberyards: 16%
- Other: 11%

The remodeling sector is also strong and growing. A national report done by the Home Improvement Research Institute (HIRI) in 1995 stated that lumber and building materials, and the dealers who sell them, are becoming increasingly important to the remodeler's business. Fifty-four percent of respondents said that they bought at least the same volume of lumber and building products as last year, and 36% stated that they bought more over the previous year. This is also confirmed by Dale Pond, Senior Vice President Marketing for Lowe's Companies Inc. who predicted continued growth for the R&R sector in North America at a recent wood products conference.

HIRI predicts that the home improvement market will average 4.4% annual growth from $US135 billion in 1996 to $US161 billion by the turn of the century. The DIY segment is

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28 Lowe's is one of the largest home centres in the US.
expected to grow the fastest, while the professional refurbishment and remodeling share will
decrease its relative share from 30% to 29% of the total.

General trends are very positive. In late 1997, the new home start up is predicted to soften,
but the trends to DIY and remodeling are increasingly strong. This is good news not only for the
moulding sector but for the lumber and building supply market in general.

In a study recently published in National Home Centre News (May 26, 1997), information
regarding the top 500 US home improvement retailers was collected and analyzed. Nineteen
ninety-six was a growth year for all of the top 500 home improvement retailers as the consumer
confidence had been at its highest since 1989, and the strong activity in home building and
remodeling.

Home centres and the DIY remodelers are purchasing items by the piece and not by the
carload or thousand lineal feet. The shift towards sales from large home builders to individuals
DIYers or BIYers (buy it yourself and then have professional install the materials) impacts the
importance of non-traditional attributes. This means that attributes such as appearance of
individual pieces of mouldings, packaging, point of purchase displays, recommendations of sales
assistance, etc. become more and more important. This trend also increases the need for
moulding suppliers to deal with the very large, and very powerful big box home centre stores
who often dictate terms for suppliers and squeeze producer profit margins regardless of final
selling prices (Anonymous 1997).

If one refers to Figure 38 he can see that the R&R sector has grown steadily since 1976
with the cyclical nature of the economy taken into consideration. Overall, people have shifted to
repairing and remodeling instead of buying new homes in the last 20 years.
It is also interesting to note that the dollars invested in the R&R sector does not follow the same pattern as the residential sector. This can be attributed to the fact the people who may have wanted to buy new are repairing and renovating instead.

Figure 38: Value of Industry (Millions of $US)

(Cohen 1996)

4.6.3 Summary

All in all the outlook for the building materials market looks very strong for 1997. This trend should reflect on the mouldings market. The predicted expansion through steady domestic production, and an increased volume of imported finished goods should continue.

While new housing starts has always been the strongest indicator of market trends. In the past few years the remodeling and DIY sectors have become increasingly strong. As a result, softer housing starts could be offset by increased remodeling.
The moulding industry in the US is very dynamic, and has a direct relationship with the developments that are occurring in housing starts and the R&R sectors. Although the general forecast for new housing starts is not optimistic, the DIY and R&R sectors are expanding rapidly. Increased demand in the moulding sector cannot be met by increased production of Ponderosa pine mouldings, the traditional substrate used in the industry. As a result, substitute species, fingerjoint products, wood composites, as well as plastic and metal are filling the void. Because of the increased market potential of substitute species (domestic and international) and products, it is important to understand each of them.
5. RESULTS

Results will be presented in the following order according to Porter’s Model of Competitive Advantage:

1. Factor Conditions:
   - Employee Information.
   - Fibre Supply.
   - Production.
   - Level of technology.

2. Demand Conditions:
   - Marketing.

3. Firm Strategy, Structure, and Rivalry:
   - Distribution.
   - Operational Information.

5.1.1 Factor Conditions

5.1.1.1 Employee Information

In 1996, the companies interviewed had an average of 25 employees with a standard deviation (SD) of 19.0. On average, the companies projected that the number of employees in the year 2000 would grow to 31.9 (SD 24.4). This increase represents an annual compounded growth rate over 4 years of 6.3% per year. It is interesting to note that 33.3% of respondents projected that they would not grow at all over the next 3 years. The reasons given for this in order of importance are the following:

1. The company is at a comfortable size. (employees, tax brackets, production)
2. With increased technology they hope to become more efficient while maintaining at least the same output.

3. Lack of capital and/or a business plan to expand.

The average length of time that the respondents had been in business was 18.25 years (SD 15.4) with only 6.7% of the companies having operated for less than 5 years. One of the firms was currently in receivership with two others fearing that they would not be operating at the same time next year.

Of the companies surveyed, 86.7% were non-union and the average unloaded wage rate paid was $15.46 (SD 1.92). It should be mentioned that the highest wage was paid by a unionized company. It was one of the companies fearing for its future.

5.1.1.2 Fibre Supply

Hemlock was the dominant species used by respondents and was responsible for 34.3% of the moulding market with 62.5% of all companies interviewed using hemlock as a part of their species mix (refer to Table 7). Some of the respondents also mentioned that they had shifted to hemlock in the last few years due to increased availability. It is not only the companies on the lower mainland that have shifted to this species. Firms in Alberta that once used Douglas-fir and Lodgepole pine as their staple are switching to hemlock in their solid wood applications.

Douglas-fir was the next most popular species used in 25.2% of production applications. Seventy-five percent of the respondents use Douglas-fir in their species mix. Many producers had concerns with the increasing amount of second growth Douglas-fir replacing the declining

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29 Unloaded refers to the hourly rate paid not including benefits.
30 A small number of Alberta companies were interviewed with this project for exploratory purposes. Future research into the moulding sector of Alberta is strongly recommended for comparison to BC producers.
old growth Douglas-fir supplies in the market place. Producers complained that it was more
difficult to process this faster grown lumber. The larger growth rings seemed to cause the most
trouble in the drying stages (warping and twisting), and to a lesser extent in finger jointing and
further processing. These are technological challenges that the industry will be forced to
overcome, and can learn from many of the countries that operate mostly with fast growing
species.

Although hardwoods such as oak and maple are quite popular with designers and builders,
the producers interviewed used only a small proportion in production (9.5% for oak, and 4.8%
for maple). The logical reason for this is that the supply of softwood in British Columbia is far
greater than that of hardwoods. Ironically, as will be discussed in the fibre supply section, the
perception of having a secure fibre source for those that use hardwoods is much higher than for
those who use softwoods.
Table 7: Breakdown of Species Used for Production

<table>
<thead>
<tr>
<th>Species</th>
<th>Overall Company Use (%)</th>
<th>Percent of Companies that Used Species (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemlock</td>
<td>36.9</td>
<td>62.5</td>
</tr>
<tr>
<td>Douglas-fir</td>
<td>23.6</td>
<td>75.0</td>
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<tr>
<td>Western Red Cedar</td>
<td>12.8</td>
<td>37.5</td>
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<tr>
<td>Oak</td>
<td>8.9</td>
<td>43.8</td>
</tr>
<tr>
<td>Maple</td>
<td>4.5</td>
<td>31.3</td>
</tr>
<tr>
<td>Poplar</td>
<td>3.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Lodgepole Pine</td>
<td>2.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Cherry</td>
<td>2.3</td>
<td>25.0</td>
</tr>
<tr>
<td>Spruce</td>
<td>1.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Fir</td>
<td>1.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Walnut</td>
<td>0.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Mahogany</td>
<td>0.5</td>
<td>18.8</td>
</tr>
<tr>
<td>White Pine</td>
<td>0.5</td>
<td>18.8</td>
</tr>
<tr>
<td>Yellow Cedar</td>
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<td>6.3</td>
</tr>
<tr>
<td>Aspen</td>
<td>0.2</td>
<td>6.3</td>
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<tr>
<td>Birch</td>
<td>0.1</td>
<td>6.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

The three major types of raw material for the companies interviewed were green rough cut lumber, kiln dried dimension lumber, and kiln dried rough cut lumber (refer to Figure 39). The main reasons cited for buying green rough cut lumber were:

1. It is difficult to buy lumber that has been dried properly to the appropriate moisture content for use in a value-added facility. By drying it themselves they can be assured of proper drying for specific end uses.

2. Because many value-added producers need dimensions that are not produced by the primary mills, many plants are forced to buy rough cut lumber and then resaw it to their specific sizes. Even when secondary producers are buying dimension lumber from the primary mills, it is often necessary to further resaw it to a usable size.
A majority of producers surveyed, 73%, bought at least some of their wood supply from a primary mill, and of all the wood used by the companies surveyed, an average of 58% came from a primary saw mill (refer to Figure 40). Thirty-six percent of the wood used for production was purchased through a lumber wholesaler and 56% of the companies surveyed bought at least some of their wood through a wholesaler. Almost no producers had any form of logging rights or land tenure, with 99% of the raw material purchased in processed form.
5.1.1.3 Production

Seventy-one point four percent of the companies surveyed produced softwood architectural mouldings as a proportion of their product mix (please refer to Table 8). This represents 21.6% of all the products produced by the respondents. The obvious reason for this trend is that this study targeted companies that produced architectural mouldings as a proportion of their production, and that the fibre basket in BC is mostly softwoods. The remaining list is a breakdown of some of the other products that the respondents produced.
### Table 8: Products Produced

<table>
<thead>
<tr>
<th>Product</th>
<th>Overall Company Use (%)</th>
<th>Companies that Manufacture Product as a Proportion of their Production (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Soft Wood Mouldings</td>
<td>23.5</td>
<td>73.3</td>
</tr>
<tr>
<td>Natural Profile Stock</td>
<td>9.3</td>
<td>26.7</td>
</tr>
<tr>
<td>Natural Door Stock</td>
<td>7.6</td>
<td>26.7</td>
</tr>
<tr>
<td>Glulam Posts</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Siding</td>
<td>6.3</td>
<td>13.3</td>
</tr>
<tr>
<td>Natural Window Stock</td>
<td>5.7</td>
<td>33.3</td>
</tr>
<tr>
<td>Natural Hard Wood Mouldings</td>
<td>5.2</td>
<td>40.0</td>
</tr>
<tr>
<td>Natural MDF Mouldings</td>
<td>4.6</td>
<td>20.0</td>
</tr>
<tr>
<td>Veneer Wrapped Cabinet Components</td>
<td>3.7</td>
<td>13.3</td>
</tr>
<tr>
<td>Flooring</td>
<td>3.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Melamine/ P-lam Cabinet Components</td>
<td>3.0</td>
<td>6.7</td>
</tr>
<tr>
<td>S4S</td>
<td>2.3</td>
<td>13.3</td>
</tr>
<tr>
<td>Natural Jambs</td>
<td>2.3</td>
<td>26.7</td>
</tr>
<tr>
<td>Veneer Wrapped Furniture Components</td>
<td>2.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Fir Flat Finish</td>
<td>2.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Cut to Length</td>
<td>1.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Natural Turned Spindles &amp; Columns</td>
<td>1.3</td>
<td>13.3</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Door Style Glue Lam</td>
<td>1.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Upholstery</td>
<td>1.0</td>
<td>6.7</td>
</tr>
</tbody>
</table>

The products listed in Table 9 are examples of some of the possible expansion opportunities for companies that are already producing similar products. These products make up a very small proportion of the products currently being produced by the value-added companies that participated in the survey. The reason for the possible expansion opportunities is that many of the existing companies already have most of the equipment needed to produce the above products, their major challenge would be to find profitable long term markets. Some investment would be required for many of them though to upgrade machinery or add equipment such as paint lines, veneer presses, etc.
Table 9: Products Produced by Less than 1% of Total Industry

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Industry Use (%)</th>
<th>Use by Industry (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veneer Wrapped Panels/Custom Veneer</td>
<td>0.9</td>
<td>13.3</td>
</tr>
<tr>
<td>Natural Furniture Components</td>
<td>0.8</td>
<td>13.3</td>
</tr>
<tr>
<td>Primed Hard Wood Mouldings</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Primed MDF Mouldings</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Melamine/P-lam Counter Stock</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Natural Finger Joint Profile Stock</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Stair Parts</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Finished Lumber</td>
<td>0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Natural Finger Jointed Soft Wood Mouldings</td>
<td>0.3</td>
<td>13.3</td>
</tr>
<tr>
<td>Veneer Wrapped Door Stock</td>
<td>0.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Painted Hard Wood Mouldings</td>
<td>0.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Veneer Wrapped Hard Wood Mouldings</td>
<td>0.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Veneer Wrapped Jambs</td>
<td>0.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Primed Finger Jointed Soft Wood Mouldings</td>
<td>0.0*</td>
<td>0.0*</td>
</tr>
<tr>
<td>Paper Wrapped MDF Mouldings</td>
<td>0.0*</td>
<td>0.0*</td>
</tr>
<tr>
<td>Primed Furniture Components</td>
<td>0.0*</td>
<td>0.0*</td>
</tr>
</tbody>
</table>

*Note: These products were produced by some companies that were surveyed in the U.S. and Alberta. They were not included in the analysis in this section.

Seventy-three percent of the companies surveyed used finger jointed material in their production schedule. Of that proportion, an average of 60% of the respondents purchased their finger jointed material and then further processed it. The other 40% produced their finger jointed material in-house. Many of the companies surveyed that produced their own finger jointed materials discussed the difficulties of making finger jointed lumber. Many producers found that their biggest challenge in the industry was the successful production of finger joined product.
The perceptions respondents had concerning fibre security varied greatly. Figure 42 shows the distribution of respondents' perceptions based on fibre security. It is interesting to note that 100% of the producers using hardwoods were very secure with their source of fibre. Ironically, the least secure producers were those that used mostly BC softwood as their raw material. These same companies were generally not in partnership with any major primary sawmills and were generally smaller producers who did not have the buying power or inventory capacity to purchase large quantities of lumber when market prices were low.
Sixty percent of respondents felt that if they were to expand production, there would be no problem for increased fibre supply. However the other 40% of interviewees did not feel that they could expand their fibre supply with increased production. The reasons are shown in Table 10:
### Table 10: Fibre Supply Expansion Problems

<table>
<thead>
<tr>
<th>Reason</th>
<th>Proportion of 40% with fibre constraints on expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The large primary mills are holding the necessary wood for their own value-added mills.</td>
<td>67%</td>
</tr>
<tr>
<td>2. Do not have capital to hold large inventories and therefore are forced to buy in smaller quantities meaning a higher price and a longer delivery time (i.e. have trouble filling truck to deliver small load of lumber from island to mainland, JIT inventory problems).</td>
<td>67%</td>
</tr>
<tr>
<td>3. Market price for appropriate fibre has been driven too high due to provincial logging restrictions and the Japanese market, as a result downstream profits are declining making survival difficult enough let alone expansion.</td>
<td>50%</td>
</tr>
<tr>
<td>4. Lack of long term commitment from the primaries to supply the secondary manufacturers.</td>
<td>17%</td>
</tr>
<tr>
<td>5. Poor wood quality (e.g., drying, dimensions, grade consistency)</td>
<td>17%</td>
</tr>
<tr>
<td>6. Shortage of low grade (mostly for finger jointing purposes).</td>
<td>17%</td>
</tr>
</tbody>
</table>

#### 5.1.1.4 Level of Technology

In the survey, companies were asked to list and rank their three most important pieces of machinery. A variety of questions were then asked about each machine. In order to determine a ranking of the most important pieces of machinery, a ranking system was applied. Machinery that was ranked as the most important received five points, the second most important piece was given three points, and the third most important piece of machinery was given one point. The numbers shown in column three of Table 11 are the rating points received by each piece of machinery. By this means, an overall ranking could be found for the companies interviewed. The third column shows the breakdown of how each machine was rated. An example would be that
the moulder was rated as the most important machine by 3 companies, second most important by 4 companies, and the third most important machine by 5 companies. Therefore, the column would have the numbers (3,4,5).

One of the producers surveyed explained the importance of machinery in a very simple manner. He said that there were two stages of production when a company focuses its production on components that need to be moulded. The first stage is preparing the wood for the moulder. That is resawing, finger jointing, drying, etc. The second stage is actually feeding the moulder and having it perform properly.\(^{31}\)

Because of the nature of the survey, it being targeted to companies that produce mouldings as a component of their production, it is not surprising that the most important piece of equipment overall was the moulder. The resaw was the second most important machine and this is not all that surprising because of the high percentage of respondents that complained of the difficulty in purchasing appropriate dimensions for value-added processing.

The companies that produced finger jointed lumber either bought their blocks from the primaries and other remanufacturing plants or they bought low grade lumber, re-graded it, and ran them through a chop saw, optimized or manual.

\(^{31}\) Because of the confidentiality of the data collected, the person who made this statement must remain anonymous.
### Table 11: Machinery Used in Production

<table>
<thead>
<tr>
<th>Overall Ranking</th>
<th>Name</th>
<th>Rating Points</th>
<th>Rating Count (Machine 1, Machine 2, Machine 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moulder</td>
<td>32</td>
<td>(3,4,5)</td>
</tr>
<tr>
<td>2</td>
<td>Resaw</td>
<td>19</td>
<td>(3,1,1)</td>
</tr>
<tr>
<td>3</td>
<td>Finger Jointer</td>
<td>15</td>
<td>(3,0,0)</td>
</tr>
<tr>
<td>4</td>
<td>Planer</td>
<td>13</td>
<td>(2,1,0)</td>
</tr>
<tr>
<td>5</td>
<td>Dry Kilns</td>
<td>9</td>
<td>(1,1,1)</td>
</tr>
<tr>
<td>6</td>
<td>Rip Saw</td>
<td>7</td>
<td>(0,2,1)</td>
</tr>
<tr>
<td>7</td>
<td>Glue Clamp Press</td>
<td>6</td>
<td>(0,2,0)</td>
</tr>
<tr>
<td>8</td>
<td>Shaper</td>
<td>6</td>
<td>(1,0,1)</td>
</tr>
<tr>
<td>9</td>
<td>Panel Saw</td>
<td>5</td>
<td>(1,0,0)</td>
</tr>
<tr>
<td>10</td>
<td>Sliding Table Saw</td>
<td>5</td>
<td>(1,0,0)</td>
</tr>
<tr>
<td>11</td>
<td>Edge Bander</td>
<td>3</td>
<td>(0,1,0)</td>
</tr>
<tr>
<td>12</td>
<td>Jointer</td>
<td>3</td>
<td>(0,1,0)</td>
</tr>
<tr>
<td>13</td>
<td>Mortise and Tenoner</td>
<td>3</td>
<td>(0,1,0)</td>
</tr>
<tr>
<td>14</td>
<td>Veneer Press</td>
<td>3</td>
<td>(0,1,0)</td>
</tr>
<tr>
<td>15</td>
<td>Chop Saw</td>
<td>1</td>
<td>(0,0,1)</td>
</tr>
<tr>
<td>16</td>
<td>Lathe</td>
<td>1</td>
<td>(0,0,1)</td>
</tr>
<tr>
<td>17</td>
<td>Optimized Chop Saw</td>
<td>1</td>
<td>(0,0,1)</td>
</tr>
<tr>
<td>18</td>
<td>Sander</td>
<td>1</td>
<td>(0,0,1)</td>
</tr>
<tr>
<td>19</td>
<td>Veneer Stitcher</td>
<td>1</td>
<td>(0,0,1)</td>
</tr>
</tbody>
</table>

Even though there is a relatively high standard deviation, the average age of equipment used by the producers surveyed was old (refer to Table 12). Some of the reasons given for the old machinery being used are:

1. Lack of capital to invest in new machinery even though it would improve production efficiency.

2. Producers would generally add machinery to production, not replace existing ones. When asked when machinery would be replaced, a high percentage of respondents said that it would be in an indeterminate amount of time. This caters to the school of thought, "Why change it if it ain't broke?"
3. The older machines, particularly the moulders, were very solid and over engineered. If properly maintained they would last for ever.

**Table 12: Average Age of Machinery**

<table>
<thead>
<tr>
<th>Machine Rank</th>
<th>Average Age (Years)</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Important Machine</td>
<td>16.6</td>
<td>15.3</td>
</tr>
<tr>
<td>Second Most Important Machine</td>
<td>19.3</td>
<td>19.9</td>
</tr>
<tr>
<td>Third Most Important Machine</td>
<td>19.6</td>
<td>24.7</td>
</tr>
</tbody>
</table>

Taking into consideration the three most important machines of each company only 2.38% of these machines were computer numerically controlled (CNC). Seven point one percent of the machines were computer driven or programmable logic controlled (PLC), and the remainder (90.48%) were manually set up and operated. The average book value of the machinery used by the respondents was $CAN 120,452.

Forty-five percent of all of the three most important machines had an indeterminate amount of time before they were to be replaced. This suggests that the respondents had no long term plans to replace or upgrade the machinery. Seven point four percent of the machines were to never be replaced. Of the machines that were planned to be replaced (47.4%), the average replacement time was 7.6 years.

The average capacity utilization rate was quite similar for the three most important machines used by respondents. The most important machine ran an average of 67% of the time,
the second most important machine an average of 67% of the time, and the third 63%. This suggests that the respondents were running their top three machines just over 2/3 of the time.

In the primary sawmilling industry British Columbia is a world power. As the industry grew, the sawmill machinery business grew as a spin off. Today, BC built primary sawmilling machinery is some of the most technologically advanced and efficient in the world (Binkley Cohen, Maness 1993). The situation in the secondary manufacturing industry is somewhat different. Respondents were asked if they knew of any machinery produced in Canada that they would consider using in their facility, and if that machinery was price competitive with similar machinery available on the international market. An overwhelming 66.7% of respondents found that they were not aware of any machinery produced in Canada that they could use. The 33.3% of respondents who either did use Canadian machinery or had considered using it in their facility all referred to the same company from Quebec; Doucet (Glue Clamp Presses, or Finger Jointer).

A large proportion of the three most important pieces of machinery used by the companies surveyed originate from the USA or Germany (refer to Figure 43)
As is clear in Figure 43 Canadian machinery is the third most popular used by the companies interviewed. However, it should be noted that almost all of the newer Canadian machinery used is made by Doucet. The remaining Canadian machinery still operating is older machinery previously used by the primary forest industry, or it is very old (40 years plus) secondary manufacturing machinery with some originating before the turn of the century.

When one looks at the whole picture concerning the level of technology in these plants, it is pretty grim. In a country where high labour costs must be out weighed by cutting edge technology, high quality products, highly motivated and well trained employees, it does not seem that the companies that participated in this survey are even close to cutting edge or progressive with their level of technology (Binkley, Cohen, and Maness 1993). In general, the machines used by the respondents are old and are not used to their full operating capacity. Companies in general have no long term development plan to upgrade machinery.
5.1.2 Demand Conditions

5.1.2.1 Markets

The majority (55.8%) of all products shipped in 1996 by the companies surveyed was sold within BC, with 87.5% of the producers having some proportion of their production being sold within BC (see Figure 44). A distant second was the Pacific North West receiving 16.8% of goods produced by respondents, and with 68.8% of firms with a proportion of their production being exported to the US. The third most popular destination for goods produced was Japan, and respondents indicated that this market was growing. Most producers interviewed felt that within the next few years, a growing percent of their production would be going there. Currently, 56.3% of the respondents ship a proportion of their production to the Japanese market which absorbs 16.4% of all production from respondent firms.

Figure 44: Markets of BC Producers

Unfortunately, the information presented in Figure 44 may not be an accurate reflection of the final distribution of finished products for companies interviewed. This is because some of the
value-added producers process products for other remanufacturers or primary processing companies who then export the products themselves. Also, a large proportion of producers sell their products to wholesalers, who then redistribute the goods. Therefore, as a final destination of products produced by the respondents, the export numbers may be slightly higher.

Because the population size is too small, cluster analysis was not statistically feasible. However, general trends from the data collected suggest that the smaller companies (with less than 25 employees) tend to ship almost all of their production within BC. It is the larger companies that are doing most of the exporting. This suggests that the market in BC for moulded products may not be saturated, as the smaller producers can survive solely on selling within the province, and have not been forced to look elsewhere either for market and production expansion or purely for survival.

In general, the U.S./Canada Countervail Duty seems to have affected the companies interviewed in a negative manner. In the area of products, that being what the company produced before the duty and what they are producing now, only 41.7% claim that it has had no effect. Thirty-three point three percent of respondents felt that it had somewhat affected the products they produce, and 25.0% felt that it had drastically affected them. The reasons given for the change in products, and product quality are:

1. The raw material costs have skyrocketed because all of the highest grade lumber, which is used by a large proportion of the value-added producers in BC, is being shipped to the U.S. This is the result of the primary sawmills desire to fill their quota with the lumber that has the highest potential profit margin.
2. Even if price were not an issue, it was much more difficult to locate the high grade of wood necessary to make certain products for the same reasons mentioned above.

The reason given by the producers who have not been directly affected by issues concerning the countervail duty is that most of their product mix is exempt.

In terms of how the countervail duty affected production schedules (percent capacity of machines running, product mix, etc.) the results were similar to that of the products section. Fifty four point five percent of respondents felt that the duty had no affect on their production schedules. The remaining 27.2% felt that it affected their production schedules somewhat, and 18.1% felt that it drastically affected them. The reasons given for the problems were exactly the same as for the product section.

Only 9.1% of respondents indicated that the U.S./Canada Countervail Duty helped in terms of the markets they served (refer to Figure 45). Again, the main reason for this was because they were exempt from the quota. Seventy-two point seven percent of respondents felt that it did not affect the markets for their business, but 18.1% felt that it hurt their markets and they would be forced to seek other markets for their goods. The main reasons given for the negative affects on markets by the countervail duty were:

1. The companies filled their quota quickly and would be forced to pay a penalty if they continued to ship products south.

2. Because of the extra volume not being moved to the U.S. market, competition within the Canadian market increased greatly which drove profit margins down.
5.1.3 Firm Strategy, Structure, and Rivalry

5.1.3.1 Distribution

In the area of distribution channels, most of the respondents sold a large percentage (41.5%), of their products through a wholesaler (refer to Table 13). Although the number of home centres opening up in BC is constantly growing, it is interesting to note that only 13.3% of producers sold a small proportion of their production to these companies. The reason suggested by some producers was that Home centres were quite difficult to deal with and that the profit margin realized selling to them was minimal. Another challenge faced by producers supplying large home centres is that the responsibility of carrying inventory has been shifted onto the primary producer. These home centres operate on a Just-In-Time inventory system and delivery times for the producers must be precise and inventories must be maintained at a level to supply the home centre as often as need be.
Table 13: Distribution Channels

<table>
<thead>
<tr>
<th>Distribution Channel</th>
<th>Proportion of respondents’ total production (%)</th>
<th>Proportion of respondents that use this channel (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale Distributor</td>
<td>41.53</td>
<td>66.67</td>
</tr>
<tr>
<td>End Users</td>
<td>19.73</td>
<td>40.00</td>
</tr>
<tr>
<td>Agent Broker</td>
<td>14.33</td>
<td>26.67</td>
</tr>
<tr>
<td>General Contractors</td>
<td>7.00</td>
<td>13.33</td>
</tr>
<tr>
<td>Primary Sawmills</td>
<td>5.67</td>
<td>6.67</td>
</tr>
<tr>
<td>Retailers</td>
<td>4.00</td>
<td>26.67</td>
</tr>
<tr>
<td>Industrial Supply</td>
<td>3.67</td>
<td>20.00</td>
</tr>
<tr>
<td>Manufacturers</td>
<td>1.80</td>
<td>20.00</td>
</tr>
<tr>
<td>Designer/ Architects</td>
<td>1.67</td>
<td>13.33</td>
</tr>
<tr>
<td>Small Business</td>
<td>0.33</td>
<td>6.67</td>
</tr>
<tr>
<td>Home centres</td>
<td>0.27</td>
<td>13.33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

If the distribution channel groups are analyzed based on user groups the picture becomes a little clearer (refer to Figure 46). The majority of products are sold initially to redistributors to be resold to the other various channels. The obvious reason for this is that many of the producers are relatively small and do not produce the volume of product, nor the variation of product line to justify their own distribution network. The redistributors would then sell a wider range of products that they have sourced from various producers farther down the distribution channel.

Some of the larger home centres such as Home Depot generally source their moulding material directly from the manufacturer rather than through a wholesaler. This practice is to reduce costs as much as possible.
5.1.3.2 Operational Information

In this survey the respondents were asked to measure their 1996 production based on lineal throughput and gross sales dollars. Unlike the primary sawmilling industry though, it is difficult to analyze the production of a value-added company based on lineal throughput. This is because most companies produce a variety of products that are difficult to measure. For example, the ACME Moulding Company could produce:

- 33% of its production in architectural mouldings. This is measured in lineal metres.
- 15% of its production 1” tongue and groove siding. This is measured in board feet (bf).
- 52% of glue laminated products. These are generally measured in cubic metres (m³, cum.) or board feet.

For this reason sales for products were based on dollar value and not lineal volume. The average gross sales for the respondents in 1996 was $CAN3.86 million with a standard deviation of 2.85. Sales figures ranged from $CAN 600,000 to 9.0 million. Projecting to the year 2000, respondents expected to be selling an average of $CAN 8.57 million, which is a compounded
growth of 22.1% annually over four years. It is promising to see that the people involved with the industry have a positive outlook for growth in the near future.

When asked about their geographical locations in terms of market access, their ability to attract skilled employees, and their ability to get machinery delivered and servicing, respondents perceptions were positive. On a scale of 1 to 10, with 1 being easy and 10 being difficult, respondents felt that markets were easily accessible (average 1.92). In terms of their ability to attract skilled employees, the response was still positive with an average of 3.23. Respondents that felt they had some difficulty attracting skilled employees gave the following reasons:

1. There are very few skilled artisans left in the industry.
2. Many of the potentially skilled employees already have their own business and were reluctant to work for anyone else.
3. Companies were forced to send out their own employees for training because there are so few people that are already trained in the industry.

In terms of being easily accessible for machinery delivery and servicing, the respondents found that they had little difficulty with an average of 2.08.

5.1.4 Summary

In general, the producers surveyed produced high quality products at a reasonably efficient rate and cost. But if these firms wish to compete with some of the newer developing industries from such countries as Chile, or even New Zealand the industry will be forced to modernize. BC must balance high labour costs with technology if it wishes to remain competitive, especially internationally. Canada has a highly educated, motivated, and easily trainable work force and companies must be willing to invest capital in machinery, training and marketing. If one is to compare BC with the developments in countries such as Chile where they actually have clear
fibre surpluses and are building modern plants, as well as have aggressive marketing plans; BC has much to learn.

In today's political situation, the challenges facing the BC value-added producers seem to be inexorable. The fibre availability is questionable, and is increasingly expensive. Products such as architectural mouldings are very price sensitive. Advanced technology exists, but the capital is very hard to come by. The labour to produce these products is very expensive compared to other countries, but the province has some of the most highly educated work force in the world, many of whom are very trainable. New markets for new and existing products exist, but finding the proper markets is difficult and expensive.
6. **Discussion**

The BC moulding sector seems to be in a state of change. Many of the producers interviewed expressed interest in researching opportunities for expansion, or simply becoming more efficient at what they produce. This chapter will focus on some of the lessons learned from the primary data analysis and literature review. It will also incorporate useful information from other studies that have examined this issue.

There is much that the domestic producers can learn from the different operating cultures found in the US and in countries like Chile. By being exposed to the various operating regions one can understand how they compare to their international and domestic competitors.

Because this survey was geared towards the coastal producers, some of the problems and solutions may not apply to interior manufacturers. There are many similarities between the two regions, but the same study should be applied to the interior producers to understand the dynamic differences between the two areas.

Comparisons to the US Benchmarking Survey (refer to Chapter 3: Competitor Analysis) completed by R.E. Taylor and Associates in 1996 will be used to compare the BC coastal producers with some of the US producers located in the Pacific North West. From the field visits a number of factors emerged that were considered crucial to an average firm’s relative competitive position in the value-added wood sector. The factors were derived from US firms, but many of them could have just as easily been BC coastal producers. Some of these factors which often reflect their most important concerns are discussed and compared to BC producers below.
6.1.1 Factor Conditions

6.1.1.1 Raw Material Costs:

Many of the value-added producers in BC that were surveyed had difficulties sourcing lumber (refer to Table 10). Not only was access to lumber a challenge, but getting high enough grades, lengths, and quality were also problematic. Unlike in BC, US remanufacturers have long been viewed as an integral part of the US sawmilling industry. As a result, some of the largest remanufacturing facilities in the Pacific North West boast thousands of employees…in BC even the best examples are a fraction of such a scale of operation (Taylor 1996).

However, there are a number of producers in BC who are not connected directly to a large primary producers who feel that the lumber that people desire is on the market, and is accessible. Sam Zirnhelt of Zirnhelt Brothers Custom Sawmilling in Williams Lake, BC is one a handful of people who suggests that the lumber is within reach of many value-added producers, the only problem facing the operators is the price. Many producers cannot buy the volume of wood on a regular basis required to lower the price, as the price of many products can be reduced as the volume purchased is increased. These companies are not producing products that command a high enough margin to absorb increasing raw material costs.

There are a number of possible solutions for the above concerns. Although it seems ironic, imported pines and hardwoods seem easier to buy than the domestic softwoods. BC firms should try to source these different species and incorporate them into their species mix. This strategy would allow them to rely less on the domestic species.

The other solution is to join forces and establish lumber buying co-ops to take advantage of economies of scale. The result should be lower prices and faster delivery times to the various regions.
Chile, on the other hand has the exact opposite problem. They have vast quantities of clear radiata pine waiting to be milled. More and more pruned radiata is coming on line and the quantities are more than domestic moulding mills can absorb. Not only are large quantities of cut stock and finished product being exported, but log exports are increasing also. Manufacturers in the US are beginning to understand how to dry and process the fast grown species and as the price of ponderosa climbs it becomes more relevant to import.

BC producers are slowly warming to the idea of fast grown radiata pine. The industry in BC, especially coastal producers, has been long spoiled with slow grown, dense species like Douglas-fir. They are experts at milling old growth timber, but have a difficult time with the increasing amount of second and third growth, faster grown Douglas-fir. Many BC manufacturers are having real challenges adjusting to the changes in wood density and machining properties. Once they can adapt to the changing domestic wood supply, milling fast grown radiata should be no problem. The technology and know-how of properly drying and efficiently manufacturing fast grown species exists, and the sooner the BC secondary manufacturing industry can learn from the producers that already work with fast grown timber, the better off they will be.

6.1.1.2 Labour Costs:

Companies' labour costs in BC were slightly higher than the US producers. Most producers had between a $CAN 4.00 and $CAN 8.00 per hour benefits package on top of salary depending on whether or not the company was unionized and relative to its size. Many companies feel that if they moved to Washington state or Oregon that they could save money on wages. From the Taylor study, unless one can employ skilled "imported" labour, the wage
benefits of moving south are minimal. A number of US producers were interviewed as a part of the BC analysis for some general comparison, and although the sample size was very small, the number indicated that it was quite difficult to justify moving operations south on wage rate alone.

One strong concern should be mentioned that was expressed by some of the unionized BC companies that were interviewed. In general, the secondary manufacturing industry does not pay the same wage rates as the primary mills. The value-added operators that do pay wages comparable to primary saw mills fear that they may not be operating a year from now.

Of the Latin American countries, Chile is one of the most developed. But to the advantage of the manufacturing sector, the wage and benefit rates are much lower than in countries like the US and Canada.

6.1.2 Level of Technology

The benchmarking report and the primary data analysis suggested that a lot of the new technologies have not yet been incorporated into BC facilities although they are common place in Europe and Asia. The average age of the most important piece of machinery was 16.6 years with 45% of those machines having an indeterminate amount of time before they would be replaced. The Taylor study does not necessarily see this as a problem. It suggests that the apparent large volumes of lower-grade lumber that are going to the US could be remanufactured just as easily in BC with lower end technology. The utilization of higher-technology equipment is an evolving state in the remanufacturing industry; it cannot always be employed without a creative track record. In other words, success in value-added can be achieved from a low-technology business that carefully balances raw material inputs with processing to produce targeted products to markets or to well-established customer base in a planned and orderly manner.
But producers should be aware that not everyone can re-mill the low grade lumber. While simplicity in an operation is important, BC producers should be looking up the value chain. There are many opportunities that exist where the local producers can take advantage of highly trainable employees, government assistance, and access to cutting edge technologies.

Chile has the mix of both worlds. It still is home to many ancient mills with low technology, but as has been mentioned earlier there are many mills being built with modern machinery.

6.1.3 Related and Supporting Industries

6.1.3.1 Access to Capital/Financing

As mentioned in the competitors section, most of the companies visited on the US benchmarking tour were smaller and it would be expected that they faced challenges in acquiring new capital (Taylor 1996). Not surprisingly, any producers that were divisions of larger companies were in the best position.

Many of the BC producers are in the same situation. They are smaller operators with tighter purse strings. To try to overcome access to capital problems, a number of companies are aligning themselves with larger primary producers.

It has been suggested that many of the primaries, for various reasons, are almost being forced into the secondary manufacturing arena. This is a great opportunity for the value-added sector. It is the authors opinion that the primaries know that they are pretty much the best in the world when it comes to efficient mass flow production of lumber, but realize their lack of expertise in batch processing found in most secondary applications. Primary mills are also always looking to increase their fibre supply. If a smaller operator were to successfully win a
small business license (16.1)\(^\text{32}\) it could offer the timber rights to the large primary in exchange for the specific species and grade requirements it desires for production.

When this solution was recently suggested to a number of producers at a value-added conference in Tofino, BC, their immediate reaction was to say they would be back where they started when the four year access to raw material ended. Although this may be true, it would give the company 4 solid years to become more profitable, flexible, and prepare itself to possibly source materials elsewhere.

Most of the Chilean producers are somehow linked to a large primary or pulp producer; either as a direct subsidiary or as a joint venture. Although there are still many small archaic producers around, these are not companies that are generally looking for expansion but prefer to survive with the status quo.

6.1.4 Firm Strategy, Structure, and Rivalry

6.1.4.1 Relative Position in Value Chain/Distribution Channels

BC has many operators who are very aware of the market place. Some producers have developed their own niches and are extremely successful. A large number of smaller manufacturers have done the necessary market research and sell desirable product lines to wholesalers for redistribution. But just as many producers do not. The producers' most important pieces of machinery ran an average of 65.7% of the time. This suggests that they were not running near full capacity and that there are opportunities in the market being missed.

Ron Small, president of Vancouver Island Wood Producers Association suggests that many BC producers are not producing their optimal mix of products. Rather than being production

\(^{32}\) A 16.1 Small Business License refers to a provincial program that allows small operators access to timber, usually on a 4 year timber supply basis.
based like many companies are, he encourages companies to be more market oriented. He uses
the following analogy.

There was a man on one side of town who invented the large metal filters for draining the
tin cans of oil into the engine of an automobile. As his production of the filters grew, he became
extremely efficient. All he concentrated on was building the filters faster and better. Meanwhile,
across town another gentleman had just designed the world’s first plastic oil container with a long
neck for easier pouring. This eliminated the need for metal filters, but the fellow kept on
producing, getting more and more efficient every day.

Ron Small suggests that many producers in BC are excellent at producing their product
line, but they are not always sure whether or not their expertise couldn’t be better put to
producing something that the market desires more.

A possible solution is to expose the BC producers to the resources that are on their front
doors. BC has top notch universities and technical schools that can be used for product and market
research, technology development, as well as employee development and training. UBC, BCIT,
and the BC Wood Specialties Training Centre are all excellent sources.

Many new manufacturing associations have been formed aligning the producers under one
umbrella. Some examples are:

- BC Wood Specialties Group.
- Vancouver Island Wood Producers Association.
- Interior Wood Producers Association.
- Cariboo Made Value-Added Society.
- Northern Interior Wood Manufacturers Association.
These associations can source new ideas for their members, organize benchmarking tours, and generally keep their members informed and up to date as to developments in the industry.

6.1.4.2 Competitive Advantage

As mentioned in the competitors section, the US producers had a number of competitive advantages. These included good access to end markets, low operating overhead, strong niche markets, focused business plans, favourable lumber supply, and a relatively high level of technology. The Chileans boast vast amounts of high quality clear timber, a growing number of manufacturers that have cutting edge technology, low operating costs, and a supportive government.

From the primary analysis and literature review, a number of competitive advantages surfaced for BC producers. The industry has a lot of social and government support. Although the government generally means well when it gets involved in an industry some people feel that much of its involvement in the forest products industry has inhibited the progress of the industry. Some positive results have been achieved with regards to the secondary manufacturing industry though. Government funding has helped provide strong manufacturing associations that can disseminate up to date information to its members. Another result has been increased cooperation between producers.

The recent Jobs and Timber Accord will have a drastic effect on both the primary and secondary industry. Both the Small Business License Program (16.1) and the Timber accord will channel increased fibre supply to secondary producers. The accord is also supposed to forcefully create many new jobs in this industry. It will remain to be seen whether forcing unionized job creation on an already profitless primary and secondary industry will be successful.
Trade and benchmarking missions are also funded by the government that have been very successful in the past. As well, Canada boasts many cooperative overseas consulates that are ready to assist manufacturers with research or expansion.

One of BC's largest competitive advantage is its proximity to the US market. Fast, efficient trade routes have been long established to the growing market to the south.

6.1.5 Suggested Opportunities for BC Producers

Once analyzed, the Triangle for Success (refer to Figure 47) reveals certain opportunities where BC producers may succeed. The first leg, the competitors, describes the current and future competition in the wood moulding industry. Both Chile and New Zealand must be monitored for their increased production of clear, high quality radiata pine products. Both radiata pine producers and MDF producers have the same problem; an increasing supply of high quality product with few markets to absorb the material. This will force producers to climb up the value chain and produce more value-added products that will compete with BC. Domestic producers also must realize that the void created by reduced supply of Ponderosa pine is being filled by other US species such as Eastern White pine (*Pinus strobus*) and Southern Yellow pine (*Pinus spp.*), as well as finger-jointed material. In niche markets, such as outdoor applications composite mouldings should also be noted.
The second leg of the Triangle for Success discussed the demand side of the North American market, specifically the US market. In this arena demand for moulded products is increasing while production and supply of conventional moulding substrates is decreasing. This situation offers many opportunities.

Finally, a survey of the BC coastal value-added producing industry presented some interesting results. Producers face challenges in the areas of softwood fibre access, level of technology, access to capital, and have high production costs. With these challenges in mind, there are a number of opportunities that manufacturers may wish to consider.

Both the US benchmarking study and results of the primary research of this study suggest a number of opportunities for BC remanufacturing facilities to consider. There are varying degrees of capital and risk for each suggestion. They are:

1. Resawing combined with kiln drying and moulding.
2. MDF mouldings (paint grade, high end intricate patterns).
3. Finger-joint line.
4. Glulam products (Laminating and Edge Gluing).
5. Lower grade cut line.
6. Pallet or industrial lumber components.
7. Mobile and pre-fabricated housing components.
8. Veneer slicing.
9. I-beam production.
11. Custom cutting for value-added industry.

The key to survival in the future mouldings market is in niche marketing. But not necessarily the type of niche marketing that most people currently think. Steve Tolnai (1996), Chief Forester for Weyerhaeuser Canada Ltd. suggests that the trend in both primary and secondary manufacturing is towards mass niche markets, that is establishing long term relationships with customers and gearing production to supply only them with specific products. A good example of this is Weyerhaeuser Canada’s commitment to supply a number of Home Depots in the US with all of their Douglas-fir products. They have focused one BC mill’s production on only this species and customer. Sauder industries is doing much the same thing by supplying many of Canada’s Home Depots with much, if not all of their mouldings.

MDF is well on its way to securing both the mass low end paint grade and high end intricate mouldings market. Fingerjoint products compete in both the low end paint grade as well as some medium end stain grades. The conventional clear mouldings made from Ponderosa pine, radiata pine, and many other US domestic species will remain in the medium to high end mouldings category. Companies who wish to succeed in the mouldings industry will have to manufacture well defined product lines and understand their future development and expansion through continuous market research and a flexible but strong business plan.
In many cases, a manufacturing plant's strategic advantage centres around the entrepreneur or the owner/operator. It is this key individual who directs the company based on experience, track record or industry knowledge. The US entrepreneurs have been able to develop strong businesses without access to such government sponsored programs as those found in BC (designed to promote remanufacturing). Instead, the stronger base of experienced and knowledgeable US remanufacturers has propelled the value-added sector over a much longer time span to diversify production - both in raw material inputs and product outputs. Like the US, some of coastal BC's most successful remanufacturing plants have evolved from the initiation of value-added processing by key individuals who previously gained experience by working for a larger primary sawmill. They did this before establishing their own business, thereby minimizing their downside risk later on.

The subtle differences between marketing and sales, and between construction and industrial markets, appear to be well-understood by some US plants and wholesalers. Within certain BC manufacturing facilities, these functions appear to be less understood or pursued. The two industries are, in fact, remarkably different: the BC industry is based mostly on the sheer volume growth of a primary product, while the US sector is structured more on "free enterprise" strategies, e.g., looking for the niche opportunities between the many suppliers of lumber and end-use buyers of finished products. In BC, many of the strategic attributes - very evident in the US - appear to be missing in many cases. In some ways, BC's SBFEP bid proposal program - the government's vehicle to promote more value-added manufacturing - appears to emphasize the lumber "inputs" and the higher-technology "processing" elements of the remanufacturing business rather than many of the "output" success factors evident in the value-added sector in the US.
Although this comparison may be simplistic and does not fully recognize the difference in timber ownership or the remanufacturer’s ability to source industrial lumber, it does indicate some remarkably different operating and business concepts between the two regions.  

6.1.6 Recipe for Success

There are a number of specific windows of opportunity that are open to BC producers. The US mouldings market will continue to grow at a moderate pace. This will create opportunities for non US producers.

Because of the large volumes of clear mouldings, Chile and New Zealand will most likely dominate the high end solid wood mouldings sector. As MDF increases in popularity it will control both the low end paint grade moulding market and the high end, expensive, wide moulding market (large wide crown mouldings with intricate designs, cornice mouldings, etc.). The BC solid wood sector will be able to compete servicing the medium quality price point. There are also opportunities in producing some finger joint products for both low end paint grade and an emerging niche market of natural finger joint mouldings.

Managerial and production style must be flexible and customer driven. This means producing market oriented products. Companies must broaden their product lines and species mix to satisfy customers. Producers must build long term relationships with both suppliers and customers. Niche markets will be mass niche markets producing products for specific customers. Relationship marketing is a key to success. This is where BC can learn from the Chilean approach to doing business in the US mouldings arena.

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33 Most of the above information referring to the US industry and some of the suggestions for the BC industry was extracted from an FRBC Report done by R.E. Taylor and Associates titled, Southern Interior Value-added Wood Products Bench-Marking and Opportunity Identification Study in January 1996.
Qualities shared by successful moulding companies in the future will be:

- Flexibility.
- Relationship marketing
  2. Long term customer development.
- Develop mass niche markets.
- Market oriented production.
- Broad product line and species mix.
7. Conclusion

The future of the BC moulding industry can be best described using the analogy of the double bladed sword. If on one blade there is a problem, turn the blade around, look at it from a different angle and it becomes an opportunity.

In general, the producers surveyed produced high quality products at a reasonably efficient rate and cost. But if these firms wish to compete with some of the newer developing industries from such countries as Chile, or even New Zealand the industry will be forced to modernize. BC must balance high labour costs with technology if it wishes to remain competitive, especially internationally. Canada has a highly educated, motivated, and easily trainable work force and companies must be willing to invest capital in machinery, training and marketing. It also must determine which products the market desires that BC manufacturers can produce better than any other region. If one is to compare BC with the developments in countries such as Chile where they have actually have clear fibre surpluses and are building modern plants, as well as have aggressive marketing plans; BC has much to learn.

In today’s political environment, the challenges facing the BC value-added producers seem to be inexorable. The fibre availability is questionable, and is increasingly expensive. Products such as architectural mouldings are very price sensitive. Advanced technology exists, but the capital is very hard to come by. The labour to produce these products is very expensive compared to other countries, but the province has some of the most highly educated general public in the world, many of whom are very trainable. New markets for new and existing products exist, but finding the proper markets is difficult and expensive.
From discussions with many of the producers interviewed, some of the areas of improvement that are necessary that could also be turned into profitable business ventures are:

- Various types of mouldings.
- Custom drying wood for the value-added wood products sector.
- Custom cutting for value-added industry.
- High quality finger jointing.
- Producing laminated glue products.
- Veneer slicing.
- I-Beam production.

The US market is an attractive target for moulded products. While the traditional supply of moulding, Ponderosa pine, is declining, the demand for moulded products is not. The US demand for mouldings is growing yearly, and as a result members from all levels of the distribution channel are being forced to source their products from new areas.

Other domestic species of pine such as southern yellow pine, white fir, and eastern white pine are making inroads into the growing gap left by the reduction of Ponderosa pine supply. These resurging species are also formidable competitors BC softwood mouldings.

But the other side of the sword is that the production of domestic mouldings from all species is on the decline and is not expected to level off until the turn of the century. On top of this, the domestic wood that is being harvested is producing less and less high quality grades due to logs being harvested at younger ages.

Another major development in the mouldings market is the rapidly increasing acceptance of finger-jointed products. These items can be produced from single or mixed species, and will
help BC's challenge in the US market as the capacity to produce finger-jointed products increases.

Composite mouldings are developing a niche market for themselves in specific applications. Most of these are in outdoor situations and where the moulded products need to be bent. Although composite substrates should be respected for what they are, they are not as serious a threat to the BC softwood mouldings industry as imported pines and MDF.

It is critical that the BC softwood moulding industry pay close attention to developments in both MDF and radiata pine from both Chile and New Zealand. However, it seems that Chile will be the main solid wood competitor in the North American market, and possibly the Pacific Rim in the near future. Chile must be monitored for its fast grown plantation wood that works very favourably for uses in both structural and non-structural situations and their stated target of increased penetration of the US and Canadian moulding market. MDF must be monitored due to existing and increasing over-capacity and the product's positive characteristics in terms of painting, laminating and workability.

The BC moulding industry must hold the double edged sword firmly and respect and observe the different sides of the blade carefully. Where ever there are challenges there are opportunities. The moulding market has evolved from being dominated by a single species and type of product to one that is very dynamic. BC must be aware of these changes and modify the industry to take advantage of the dynamic opportunities that present themselves.
LITERATURE CITED


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Wilson, B. 1995. Market Studies of New Zealand and Australia. FRDA II. 17-6-36


APPENDIX I: MOULDING PRODUCERS SURVEY 1997

1. Please complete the following identification information.

Name: ____________________________  Job Title: ____________________________

Company: __________________________________________________________________

Address: _________________________________________________________________

Number of Employees 1996: ____________________________  Is Your Company

Expected Number of Employees 2000: ____________________________  What is your average

How long has your company been in business? ________ Years

The following questions concern the fibre supply of your value-added plant.

2. Please indicate your species breakdown in percent (%).

Ponderosa pine: _______  Lodgepole Pine: _______  White Pine: _______

Hemlock: _______________  Douglas-fir: _______  Western Red Cedar: _______

Aspen: _________________  Other: ________________________________

3. Please indicate your sources of raw materials

%  a) Raw log

%  b) Rough Cut lumber

%  c) KD Rough Cut lumber

%  d) Kiln dried dimension lumber

%  e) Kiln dried cut stock

%  f) MDF

%  g) Other

%  h) Other

100%

4. Please indicate from where you receive your raw material supply.

%  a) Direct from primary mill

%  b) Lumber wholesaler

%  c) Log broker

%  d) Small business license

%  e) Private land

%  f) Wood lot

%  g) Other

%  h) Other

100%
5. Please estimate the percent of total linear production that your operation produced in 1996.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Natural %</th>
<th>Primed %</th>
<th>Painted %</th>
<th>Veneer Wrapped %</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Softwood mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Hardwood mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Finger joined softwood mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Finger joined hardwood mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) MDF mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Jambs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Profile Stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Window Stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Door Stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) Cabinet Components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k) Furniture Components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l) Counter stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. If your plant uses finger jointed material, please indicate what percent is purchased and what percent is produced in house.

<table>
<thead>
<tr>
<th>Purchased</th>
<th>Produced In House</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

7. How secure is your fibre source? (Please circle)

<table>
<thead>
<tr>
<th>Not Secure at All</th>
<th>Relatively Secure</th>
<th>Very Secure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. If you wished to increase production, could you easily increase your fibre supply?

Yes        No     (Please circle one)
9. If your fibre supply is not secure, why?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

The following questions concern the level of technology in your plant.

10. Please indicate the three most important pieces of manufacturing equipment to your production facility.

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>$ Value (Book Value)</th>
<th>Age (Yrs)</th>
<th>When Will You Replace it? (Yrs)</th>
<th>At What Percent Capacity Running?</th>
<th>How is it Controlled? (1=manual, 2=CNC setup)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Where do your three main pieces of machinery come from, and how easy is it to get servicing for them? (If same equipment as #10, leave “Equipment Name” blank.

(A = Canada, B = USA, C = Italy, D = Germany, E = Sweden, F = Austria, G = Finland, H = Norway, I = Other, J = Other)

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Country of Origin</th>
<th>Product Support* (1=easy, 10=difficult)</th>
<th>Technical Support** (1=easy, 10=difficult)</th>
<th>Maintnce *** (1=easy, 10=difficult)</th>
<th>Maintnce In House? (0=yes, 1=no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Product Support refers to the availability of parts for your machinery.
**Technical Support refers to the ease of receiving assistance from the manufacturer of the machinery.
***Maintenance refers to how often the machine breaks down and how easily it is repaired.
12. Is there any Canadian produced machinery that you would consider using in your plant? Is it price competitive with foreign machinery of similar quality?

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Is it Price Competitive?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td></td>
</tr>
</tbody>
</table>

The following questions concern the marketing aspects of your firm.

13. Estimate the proportion of Volume shipped to the following in 1996. (Total should equal 100%). Please also estimate whether you think the following markets will grow (note with a “+”), decline (“-”), or remain unchanged (“0”), in the next 3 years.

<table>
<thead>
<tr>
<th>% of Volume Shipped</th>
<th>% Market Change</th>
<th>Reason for Market Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) British Columbia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Pacific North West</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Other USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Other-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Other-------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Please indicate how the recently signed U.S./Canada Countervail Duty has affected your business in the following areas: (Please circle)

<table>
<thead>
<tr>
<th>Products</th>
<th>Not at All</th>
<th>Somewhat</th>
<th>Drastically</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7  8  9  10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Markets</th>
<th>Helped</th>
<th>No Change</th>
<th>Hurt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7  8  9  10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Production Schedules</th>
<th>Not at All</th>
<th>Somewhat</th>
<th>Drastically</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Capacity, Product Mix, etc.)</td>
<td>1  2  3  4  5  6  7  8  9  10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>Not at All</th>
<th>Somewhat</th>
<th>Drastically</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7  8  9  10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
15. For each of the following distribution channels, please indicate the percent of volume your facility shipped in 1996.

<table>
<thead>
<tr>
<th>Channel</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Home centres</td>
<td></td>
</tr>
<tr>
<td>b) Wholesaler/Distributor</td>
<td></td>
</tr>
<tr>
<td>(takes ownership)</td>
<td></td>
</tr>
<tr>
<td>c) Agent/Broker (does not take</td>
<td></td>
</tr>
<tr>
<td>ownership)</td>
<td></td>
</tr>
<tr>
<td>d) Industrial Supply</td>
<td></td>
</tr>
<tr>
<td>e) Direct to Retailers</td>
<td></td>
</tr>
<tr>
<td>f) Other</td>
<td></td>
</tr>
<tr>
<td>g) Other</td>
<td></td>
</tr>
</tbody>
</table>

16. Please indicate the five most important products that compete with your product line. Rank 1 to 5 with 1 being the most important and 5 being the least.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Natural</th>
<th>Primed</th>
<th>Painted</th>
<th>Veneer</th>
<th>Wrapped</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDF mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger joined mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardwood mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foam mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum mouldings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Please indicate current and future information regarding your production.

<table>
<thead>
<tr>
<th>Production Year</th>
<th>LF</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996 Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000 Expected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Please indicate how your location affects the following:

**Access to Markets**

<table>
<thead>
<tr>
<th>Accessibility</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easily Accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Employees** (ability to attract skilled employees)

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Difficult</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Machinery** (servicing, delivery, etc.)

<table>
<thead>
<tr>
<th>Servicing</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at All</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat</td>
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<td></td>
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</tr>
<tr>
<td>Drastically</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX II: COMPARATIVE TESTING OF RADIATA PINE TO

COMMON PACIFIC NORTH WESTERN SPECIES.

A comprehensive series of tests evaluated the timbers in terms of their machining and related mechanical properties were performed by The New Zealand Forest Research Institute. Radiata pine (*Pinus radiata*) was compared with 13 North American timbers sourced by the University of California, Berkeley, and widely used in the construction and manufacturing industries. For the purpose of this report, only 4 commonly used species used in the Pacific North West were adopted and compared to New Zealand grown Radiata pine.

Using techniques of the American Society for Testing and Materials (ASTM), tests were designed to evaluate the timbers in terms of their machining and related mechanical properties. The tests were specifically selected to assess the timbers’ suitability for panelling, mouldings, joinery and furniture manufacture and included evaluations in planing, shaping, turning, sanding, and gluing. Each species was represented by a batch of 20 lengths of 19mm thick lumber. Samples of the North American timbers were obtained from US lumber merchants, and together with the radiata pine samples, conditioned to 8% equilibrium moisture content.

Radiata pine was of average quality in terms of wood density and stand history. The trees were 33 years old at the time of felling and had been thinned three times in that period to maintain growth rates. They had also been pruned at three stages - a technique designed to
promote the clear grades of lumber. Overall the Radiata pine specimens out performed all other species tested. The overall averages were as follows:

Table 14: Species Performance

<table>
<thead>
<tr>
<th>Species</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiata Pine</td>
<td>70%</td>
</tr>
<tr>
<td>Ponderosa pine</td>
<td>65%</td>
</tr>
<tr>
<td>Douglas-fir</td>
<td>64%</td>
</tr>
<tr>
<td>Western Hemlock</td>
<td>52%</td>
</tr>
<tr>
<td>Western White Pine</td>
<td>52%</td>
</tr>
<tr>
<td>Total Overall Average for the Original 13 Species Tested</td>
<td>59%</td>
</tr>
</tbody>
</table>

(New Zealand Forest Service 1996)

To provide the timbers with an overall rating, each test was given a “weighting” (1 or 2) according to the perceived importance of the characteristic being tested. The weighting for each of the categories was as follows:

Table 15: Test Weighting

<table>
<thead>
<tr>
<th>Test</th>
<th>Weighting</th>
<th>Test</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planing</td>
<td>2</td>
<td>Finger Jointing</td>
<td>1</td>
</tr>
<tr>
<td>Shaping</td>
<td>2</td>
<td>Gluing</td>
<td>2</td>
</tr>
<tr>
<td>Turning</td>
<td>2</td>
<td>Hardness</td>
<td>1</td>
</tr>
<tr>
<td>Cross-Cutting</td>
<td>1</td>
<td>Nail-Withdrawal</td>
<td>1</td>
</tr>
<tr>
<td>Boring</td>
<td>1</td>
<td>Nail-Splitting</td>
<td>1</td>
</tr>
<tr>
<td>Mortising</td>
<td>1</td>
<td>Screw-Splitting</td>
<td>1</td>
</tr>
<tr>
<td>Sanding</td>
<td>2</td>
<td>Stability</td>
<td>2</td>
</tr>
</tbody>
</table>

(New Zealand Forest Service 1996)
Once all the testing and weighting had been completed, the results were as follows:

*Table 16: Radiata Pine Comparative Analysis*

![Bar chart showing comparative analysis of Radiata Pine with other woods in various processes.](chart)

(New Zealand Forest Service 1996)
APPENDIX III: INDUSTRY STRUCTURE IN CHILE

In 1994, CONAF listed 39 companies as involved in exports of green radiata pine lumber: a handful of other companies exported only value-added radiata products such as kiln-dried lumber, flitches and clear blocks. No more than four dozen firms dominate Chile's trade in forest products. Just ten companies accounted for 65% of the country's forest products exports by value in 1994. The top four exporting firms sold pulp and paper. Lumber and logs were the main export products of all but one of the next six companies. The top ten companies existing today in Chile are:

1. Celulosa Arauco y Constitución
2. Santa Fé
3. CMPC
4. Aserraderos Arauco
5. Forestal del Sur
6. Andinos
7. Inforsa
8. Forestal Arauco
9. Aserraderos Mininco
10. Forestal San José

CMPC owns or controls more than half of the country's radiata pine plantations. Arauco, is Chile's largest pulp producer, and will have an annual capacity of 1 million metric tonnes a year of radiata pine pulp, plus 400,000 metric tons a year of eucalyptus pulp\textsuperscript{34}.

\textsuperscript{34} The above information was adapted from Wilson, Bill. 1995. A Market Study of Chile. FRDA II. Pacific Forestry Centre. Victoria, BC. 146 pp. And Blackman, Hillman, Sowle. The Forestry and Wood Processing Industries of the ABC Countries: Argentina, Brazil, Chile. Miller Freeman. 365 pp.
Figure 48: Chilean Major Forest Products Investors 1995-2000

(Angle 1995)
APPENDIX III: CHILEAN PLANTATIONS - FOREST

MANAGEMENT PHILOSOPHY AND CRITERIA

The driving force behind the development of radiata pine and eucalyptus plantations are government subsidies. A legacy of General Pinochet’s military regime is the Decree Law 701. The money it offered landowners to plant trees on degraded farms and other unused private lands spurred widespread planting throughout the nation’s central and southern regions. The reason for the concentration of plantations in the southern region is that Chile’s northern region is too dry to support large tree farms. Decree Law 701 pays about 75% of the standard development costs of plantations, and companies are supposed to repay the subsidies when the timber is cut and sold.

In 1993, the management of CMPC, Chile’s largest pulp and paper producer wrote, “In view of the nation’s now more-developed markets and numerous sector participants, such a stimulus (as DL701) may no longer be necessary, at least in the country’s dynamic forestry regions”.

However, it might still be an advantageous stimulus to encourage the aforestation of eroding or otherwise unproductive lands. Smaller companies tend to take advantage of DL 701 payments these days, as many large firms do without the money in order to avoid the restrictions that come with it. For large companies, the subsidy’s value is not as important now as it was 20 years ago. In 1974, a planting subsidy’s value per hectare was about three times the cost of degraded, plantable land (US$100/hectare versus US$30/hectare). Today, the land could be
worth more than six times the value of the planting subsidy (US$1000/hectare versus US$150/hectare).

Yet, the most recent proposal called for DL 701 to be extended for another 15 years. The efforts are directed at Chile’s small landowner to encourage forestry practices instead of farming or leaving land fallow to erode. Emiliano Ortega, the minister of Agriculture of Chile claims that the nation’s small landowner have around 1.5 million hectares of land suitable for forestry that now grows no profitable plants. Erosion is Chile’s major environmental problem and helps to explain why so much former farmland is now under-used. Ninety percent of the country’s tree farms have been planted on degraded lands of this type.

Debate over the ecological consequences of plantation forestry continues in Chile. Minister of the Economy Alvaro García noted that planting non-native trees, "has made it possible to recover considerably degraded land, thus transforming it from land with small economic value to land with tremendous economic value." There is scientific uncertainty about the effects of introducing both Radiata Pine and Eucalyptus, both in terms of the sustainability of the forest itself and of its effects on adjacent lands. García also added that Chile needs to spend more money on R&D so it can better assess the environmental impacts of plantation forestry. But, in accordance with Maslow’s Hierarchy of Needs theory, García adds that the country, "must first overcome poverty which, as has been shown, leads to considerable plundering of native forests for use as firewood. Many families have no other alternative fuel (Blackman, Hillman, and Sowle 1995)."