

EMPLOYMENT CHANGES DURING RECESSION : THE CASE OF THE BRITISH
COLUMBIA FOREST PRODUCTS MANUFACTURING INDUSTRY : 1981-1985

by

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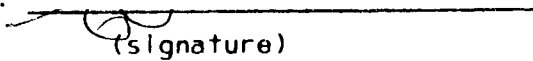
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Employment Changes During Recession : The Case of the British

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ABSTRACT

The recession which began in British Columbia in 1981 signalled the beginning of a fundamental restructuring of the forest products industry. To maintain a competitive position many firms adopted cost reducing 'leaner and fitter' approaches and in many cases job loss ensued. The objective of this thesis is to assess and explain the nature and magnitude of employment change within the forest products manufacturing industry of British Columbia between 1981 and 1985.

Recent work within industrial geography has emphasized the need to place employment change within specific organizational and production contexts. Massey and Meegan (1982), for example, interpret job loss as arising from intensification, rationalization and investment and technical change. This study accepts that interpretation, with the modification suggested by Hayter (1985) to link employment change to the market roles played by firms, to analyze job change in the British Columbia wood processing and pulp and paper industries between 1981 and 1985. Ninety-six plants from the sawmilling, plywood and pulp and paper industries were selected on a random sample basis from 10 size strata. In the fall and winter of 1986 interviews were conducted with management resident at the plants. The data were then coded, summarized and analyzed using BMDP4F.

Among the respondent plants that were interviewed some 3000 direct jobs were permanently lost over the period 1981-1985. An

additional 2400 permanent jobs were lost in those plants which had been sampled but which, had since 1981, closed. Significant variation in both the direction and rate of employment change is exhibited both by sub-sector and by region as dichotomized between the coast and the interior. The greatest stability among the sample is found in pulp and paper, plywood and interior sawmills. Coastal sawmills show the greatest variation.

Among the respondents job losses were associated with all three production contexts. Investment and technical change as well as rationalization have had, however, the most profound effect upon employment levels particularly in the coastal region. The main expression of rationalization was plant closure. On the other hand investment and technical change, while leading to job loss, also strengthened market competitiveness. In addition, investment and technical change served to widen differences in market linkages between the coast and the interior. In particular, plants in the coastal region became more diversified in terms of product-mix and geographic destination while interior plants remain highly dependent on the housing market in the United States.

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DEDICATION

To my Mother and Father

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CHAPTER I
THE CONTEXT

This study is concerned with understanding employment changes that have occurred in the wood processing and pulp and paper industries of British Columbia between 1981 and 1985. The justification for such a study is as follows. First the forest products industries represent the major "engine of growth" in the economy of British Columbia. Indeed, the forest products industry in the period since 1950 has grown in both size and importance "accounting for some 48 per cent of the value added by all primary and manufacturing industries in the province" in 1974 (Reed, 1975, p.i see also Reed, 1973, p.i). The rapid rise in size has meant that forest based firms have, directly and indirectly, through multiplier effects, become major source of employment in the province. However, the recession, which began in late 1981 early 1982 in British Columbia, raises the question as to the nature and extent to which the employment picture has changed. Did the recession mark a cyclical downturn or the beginning of longer run qualitative and quantitative changes? Given the importance of the forest industries to the economy of British Columbia there is a need to know what is happening to them.

In analyzing the effects of recession on the forest products industries of B.C. this study draws on existing studies of the forest products industries particularly by Hayter (1980, 1982,

1985) and the geography of recession literature (see, for example, Massey and Meegan 1982, Hayter 1985, Hayter, 1986 Peck and Townsend, 1984).

Firms in Recession

In response to recessions, reactions by firms are not uniform, and the differential responses by individual enterprise collectively serve to alter the economic landscape in varying degrees. Clearly, changes made by firms in their input and output markets have implications for changes in regional economic structure. On the output side, firms can increase or decrease total output levels, increase or decrease export efforts, move up-market or down-market or diversify their product mix. On the input side producers may seek to reduce costs by laying off workers, running down inventories, or employ more technically-advanced production processes. These kinds of input-output adjustments take place within the context of plant openings or closings, plant capacity changes or changes in the employee to output ratio. Ultimately, the changes which do take place are reflected in employment conditions.

The adaptations made by firms to recessionary conditions can be classified according to short-and long-run time horizons. In the short run firms may lay off employees, alter marketing and sales efforts relative to advertising, and direct personal contacts with future potential clients (Hayter, 1985). In the

long run firms may plan for investment and disinvestment and even change their overall strategy and philosophy. For example, firms may shift from a growth-oriented policy to one of "management for survival" (MacKay, 1983, p.342). When firms are faced with recessionary conditions they may become defensive, where a 'defensive strategy' is a "major attempt [aimed] to increase a flagging rate of profit...or to capture a larger share of a declining market"(Massey and Meegan, 1982, p. 66). Further when firms are operating in threatened environments we may find a predatory mode of competitive closure (see, for example, Shaw and Shaw, 1983) where firms with a small market share die through competitive attrition as they are 'forced' to withdraw from the marketplace. Single firm death may take the form of closure or mergers and acquisitions by 'leader' firms within the industry where at some future date the acquired firm may not fit into revised corporate plans and may be closed (see, for example Mick, 1975 ; Green and Cromley, 1982).

When individual companies are confronted by an exogenous shock they may alter their product mix by reducing the number of products which are manufactured. Complete withdrawal from weaker market areas reduces diversification thereby allowing for increased concentration on products in which the firm enjoys some relative competitive strength. Of course, even in recessions demand for some products expands. This in turn can lead to a geographic expansion of markets.

The changes which become manifest in the industrial landscape may occur through plant expansion or contraction, new plant construction or demolition, modernization and shifts in output characteristics. In their study of the West European synthetic fibres industry Shaw and Shaw (1983) point out that between 1975 and 1979 two restructuring processes were at work simultaneously. The dominant form of employment restructuring in that industry was through plant closure as "many small and uneconomic plants were closed and weaker competitors in each of the three synthetic fibres were forced out of the market. The exceptions were ... mainly Italian companies dependent on state aid for survival...." In addition, most competitors chose to withdraw from weaker market areas and concentrate their efforts on narrower product ranges (Shaw and Shaw, 1983, p. 165). The point made here is that options may be employed singularly or in combination with some other strategy(ies). For multi-plant firms contraction at one plant neither implies contraction at another plant nor precludes expansion at another facility. For single plant firms the available options are more restrictive. Employment restructuring at the level of the plant is therefore complex. Such restructuring needs to be understood, however, in order to understand more completely the changes manifest at the macro level.

Production Contexts

Within industrial geography there has been growing concern over the changing nature of regional employment structures in recessionary periods (Gillespie and Owens, 1981; Townsend, 1981). This literature has stressed the need to place such employment change within specific organizational and production contexts (Hayter, 1985a; Martin, 1984; Meager, 1984; Hayter and Watts, 1983; Massey and Meegan, 1982). Many studies to date have emphasized an input-oriented analytical framework in which employment change, normally job loss, is explained in terms of corporate attempts to reduce costs (see Holmes, 1983 ; Peck and Townsend, 1984). In this context, there has been much reference to Massey and Meegan's (1982) interpretation of job loss. There have also been some attempts to interpret changes in employment patterns during recession in terms of changing market roles played by firms (Hayter, 1985a). Yet few studies have actually used Massey and Meegan's approach to job loss and none have been done with respect to the forest products industries of British Columbia.

Massey and Meegan (1982) have interpreted job loss as arising from one or more of three production contexts : *intensification, rationalization and investment and technical change.*

"Intensification is defined as being changes designed to increase the productivity of labour but without major new investment or substantial reorganization of production technique; *investment and technical change* is

where job loss has occurred in the context of significant investment often related to changes among techniques of production; and *rationalization* is defined as simple reduction in total capacity...." (Massey and Meegan, 1982, p.18).

Further, Massey and Meegan state "most obviously, only with rationalization and technical change will actual closure of capacity occur." In practice, as this study will show, technical change does not in all cases lead to a reduction in capacity. Indeed, capacity may in some cases increase as with for example, the introduction of a new product line.

Admittedly, Massey and Meegan's classification scheme is neither mutually exclusive or comprehensive. Their approach leaves unanswered problems in relating plant-level to firm-level analysis and how these 'micro' changes relate to 'macro' change. Nevertheless Massey and Meegan (1982) are correct in recognizing that employment change needs to be placed in wider production contexts and their study provides an appropriate point of departure for the present analysis. In so doing, the present study will also draw upon Hayter (1985a) who, in an extension of the Massey and Meegan (1982) interpretation, has shown the importance of the inclusion of market linkages in any analysis of the spatial implications of employment restructuring. These two studies then, provide the methodological approach to analysing the local circumstance of recessionary employment change in the B.C. forest products industries.

Rationalization

Rationalization was defined as simply reductions in total capacity from partial or total closure of facilities. However, the most visible form of capacity reduction is found in the total closure of a plant. Closure as used here is "defined as the cessation of production at a plant which is not accompanied by the opening of another plant" (Healey, 1982). Given its high visibility and relative ease of measurement rationalization in this form (i.e. plant closure), and the immediate impact it has on workers, tends to receive more attention in the literature (see, for example, Gordus et al., 1981 ; Stern et al., 1979). However, rationalization does occur in a number of different ways including by reductions in the product mix concurrent with reductions in employment.

Intensification

Intensification is defined as attempts to increase the productivity of labour in the absence of any major new investment or realignments of the production technique. In Massey and Meegan's (1982) study it is assumed that intensification only occurs at shop floor levels. However, it is argued that intensification may also applies with respect to supervisors, technicians and professional personnel. The difficulty with intensification is that it is not clear how it may be measured. One possible method of measuring intensification is to compare changes in output with changes in

the number of employees. For example, if output remains constant or increases while the number of workers decreases, in the absence of other changes, it can be inferred that intensification has taken place. For measuring intensification in this manner it is assumed that there has been no investment and technical change nor has there been any change in the product mix of the firm. Another way of measuring intensification is to look for changes on the shop floor which are directed at increasing the individual workers productivity. Massey and Meegan (1982) note that a further way of looking at intensification is to examine the employment ratio of productive to non-productive workers. As Massey and Meegan (1982) define this measure more non-productive workers, for example, supervisors, are required in order to ensure that the speed up in production is carried out in an orderly fashion. If there is no change in this ratio then it is assumed that intensification has not occurred in this way but rather in some other fashion. This is an appropriate approach, however, only to the extent that processes of intensification do not apply to supervisors.

Investment and Technical Change

Massey and Meegan (1982) note that investment and technical change can be associated with job loss. Indeed it is often assumed that all investment and technical change is of the labour saving type. Generally it is argued that any changes which take place will eventually displace workers. In fact, some investment may be labour expanding as in the case of a new

product where jobs are created as the product mix expands. Indeed, the indirect effects may be as, if not more, important in the case of new product introduction. Massey and Meegan (1982) nevertheless argue that job loss results from 'heavy' net capital investment (p. 63). However, they do not define or elaborate on what constitutes 'heavy'. Moreover, when confronted with obsolete technology a situation arises where firms may engage in what is called 'compensatory scrapping'. In these cases new plants are built and old facilities closed (Massey and Meegan, 1982, p. 126). If the new plant is constructed on the old site this form of investment and technical change may lead to *in situ* employment cuts. If, however, there is a shift in location from the old site to a new one then compensatory scrapping may give way to what is termed *in transit* job loss where the number of employees required at the new location is somewhat less than at the previous site.

In summary, job loss occurs in different kinds of production contexts. In this regard Massey and Meegan (1982) have emphasized the role of (1)intensification, (2)rationalization and (3) investment and technical change. These categories are not mutually exclusive nor all encompassing. Thus, job loss may also result from lay-offs proportionate to declining demand or the selective transfer of production functions following mergers or acquisitions or simply through task redefinition.

Marketing Considerations

When the survival of a firm is threatened by a recession management is forced to rethink its product and market plans. The first consideration is usually given over to reducing production costs and by and large this involves the laying off of workers. The revision of plans also revolves around production philosophies, product lines and the availability of future raw material. In the forest products industries of British Columbia, for example, production philosophies centred on decisions which have traditionally emphasized lineal throughput are increasingly complicated by those which emphasize product quality. Product line decisions are made with respect to specialization or diversification and these are intimately tied to the quality, quantity and cost of raw materials. A further link to product mix decisions lies in the marketing efforts of firms and whether they are seeking to expand or contract their market linkages. For example, export expansion plans may include increased exposure through the establishment of foreign sales offices and/or increased expenditure on promotional advertising.

Recessionary conditions and the subsequent reductions in demand may enhance or activate plans in product mix strategy. As it is argued traditional industries would slowly shift 'up-market' and then export more (Hayter, 1985). In the present context firms would be focussing on high quality products which can be produced in one pass and promoting exports to high income countries such as Japan. This strategy would have two effects.

First, costs are reduced as less labour is required and second revenues are increased as more high grade recovery takes place. The question is to what extent did the recession induce changes in product mix and export linkages? Of course the size of the firm will play a large role in its ability to change its product mix and export plans. The next section reviews the literature which relates employment change to size of plant and size of firm.

Employment Change in Relation to Firm and Plant Size

In understanding how firms behave in a dynamic environment it is conventional to distinguish between large and small firms. In general, large firms have more resources and options in responding to change. On the other hand, if the size of the firm is small relative to others within the industry survival options are more restricted than if the firm is a large multiplant operation. If a small firm, for example, receives an increase in orders, and if the site is amenable to expansion the firm may expand its facilities. Alternatively, it will either have to establish a branch plant or relocate, both of which are uncertain and costly options. However, if a large multiplant firm finds its orders rising and if one site can no longer accept a larger facility, it may be possible to expand at other sites. Similarly, small and large plants may respond differently to recessionary conditions. In a study of the textile and clothing industry of the United Kingdom, Healey (1981, 1982)

found size of plant to be a significant factor in the locational adjustment process. O'Farrell (1976) in an analysis of industrial closures in Ireland also found plant size to be significant. In the case of textiles it was found that small plants were closed more frequently while large plants were more likely to increase their employment levels. In the Irish case, O'Farrell found that 20.3 per cent of establishments with below 75 employees had closed while only 10.5 per cent of establishments with greater than 75 employees had shut down operations. Consequently the proportion of establishments which closed tended to decrease with increasing size. Thus the impacts on employment will be different depending upon the size of the firm and the size of the plant.

Objectives

Overall this study examines the anatomy of employment change in the forest products industries along the lines suggested by Massey and Meegan as well as others. The major research question addressed in this study is : What impact has the recession had on employment in the forest products industry of British Columbia? This research question comprises three broad objectives :

1. to determine the extent of employment change between 1981 and 1985 according to size of plant and region with respect to occupational structure and gender composition
2. to assess the permanent nature of employment change relative

- to the three production contexts of intensification, rationalization and investment and technical change
3. to examine the effects of the recession on the product and market plans of forest products plants.

Research Design

Study Regions

This study is conducted within the province of British Columbia which is broadly sub-divided into two major regions. The coastal region consists of the forest districts of Vancouver and Prince Rupert and the interior region is made up of the forest districts Cariboo, Kootenay, Nelson and Prince George (see, Figure 1). It should be noted that this coastal-interior distinction is a fundamental one which is referred to in all major studies of the forest products industries. This distinction is based upon physical characteristics (e.g. climate, topography) which give rise to physical separation and different species mix. The difference in species then gives rise to differing production processes. Thus, the dichotomy between the coast and the interior is both physically and economically based.

Data Sources

The empirical analysis is based on several sources of information. The source of data for national and provincial gross unemployment profiles is Statistics Canada published (Cat.

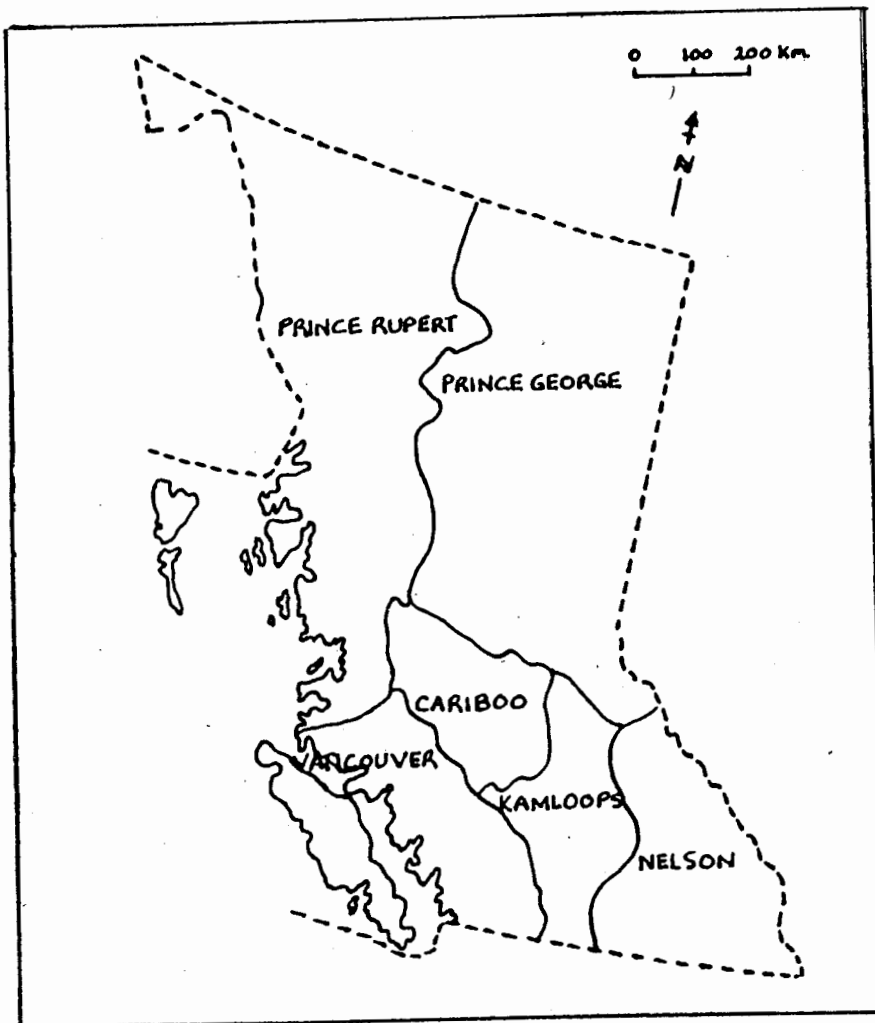


Figure 1: Study Regions.

72-201) and unpublished. The empirical data are primarily based upon questionnaire interviews conducted by the author in the fall of 1986. Given the size of the industry a stratified random sampling procedure was used. Specifically, the study focuses upon veneer and plywood mills, sawmills and pulp and paper mills. The majority of interviews were conducted at the plant site and were directed toward management resident at the individual operations. The three industries (veneer and plywood, sawmills and pulp and paper mills) were selected because they dominate the forest products industries as a whole in terms of employment, revenue generated, number of plants in operation and product offered. The plants within the three selected industries range in size from less than 50 to over 1000 employees. Such a range thus allows for a closer examination of how strategies differ based upon the size of the plant. Moreover, within the three industries are found multi-plant firms and those which are owner operated. It is therefore possible to analyze differences based upon organizational structure. X

Sampling Procedure

The study is concerned with the employment changes occurring in the three major forest products industries of British Columbia. To conduct interviews at all forest products based plants, however, was clearly not possible for practical reasons. Therefore some type of sample was in order and it was decided to direct the study toward the top three subsectors of the forest industry namely, veneer and plywood, sawmills and pulp and paper

mills. From these three it was decided to aim for a total survey sample of approximately 100 plants on a random basis from 10 size strata. Within the three industries the number of per plant employees ranges from a minimum of one to greater than 1000. In deriving the sampling frame no restrictions were placed upon the size of plant to be included. This was deemed necessary if a true cross-section was to be obtained.

The population of forest products plants was obtained from a reasonably comprehensive list of employers by sector contained in a study headed by Farris (appendix E, Volume 2, 1983).

Next the plants were arranged in decreasing order of size by each industry, categorized by region and assigned a number beginning with 001. Finally, random number tables were consulted to obtain the actual sample of respondents. This ensured that all elements of the sample frame had an equal opportunity of selection and this eliminated any conscious or unconscious bias which may have otherwise occurred (Babbie, p.195; Sudman, pp. 49-52).

The Questionnaire

The questionnaire (see Appendix) is composed of a total of twenty questions. These are sub-divided into three groups with each group having a desired objective. The first set of questions (section A) address employment, output and investment characteristics. The primary purpose of these questions is to determine the dimensions of employment change between 1981 and

1985. The questions in section B are directed at active sales linkages while section C examines the question of whether these firms are actively pursuing new markets. The purpose of sections B and C is to gain responses which have implications for current and future levels of employment. The implications coming out of section C are of particular consequence. Any future growth within the forest products industry will come from expanding market linkages away from a traditionally strong but singular market (i.e. the U.S.). Section C, therefore, looks at market diversification plans.

The Field Survey

A field survey was conducted during the fall of 1986. Respondents were questioned concerning various aspects of their operations. It should be noted that the attitude of the respondents was, in the majority, very cooperative particularly in light of two very significant events. The first was the lengthy and bitter strike which was taking place and which caused some problems for the author. The second event was the tariff negotiations which were taking place with the United States and which caused some logistical problems in terms of interviews. More importantly this event weighed heavily on the minds of many respondents as they were unsure of their immediate future. In spite of these problems the respondents were, on the whole very receptive.

Overall the unadjusted response rate is sixty-six (66) per cent. The non-respondents cited various professional/personal reasons for being unable to take part in the survey. In this regard it might be noted that 11 of the plants selected had, since 1981, failed. If these 11 plants are included then the response rate is 77 per cent. The closure of these plants represented a net loss of approximately 2400 jobs. The remainder of the analysis focusses principally on surviving plants. Regionally the response rates are quite good with the coast having a response rate of 80 per cent and the interior coming in at 59 per cent. By sub-sector the response rates are : sawmills 68 per cent, veneer and plywood 56 per cent and pulp and paper 66 per cent. Figure 2 shows the distribution of the sample and as it clearly shows all parts of the province are represented.

Summary

This study subscribes to the view that to be properly understood employment change has to be examined at the level of the plant and within the particular production and organizational contingencies facing each plant. The crucial point is that there exists an explicit dependency between employment levels and the production processes of individual plants and that any changes which are made will have a direct effect upon employment. The rationale for examining job loss from the level of the plant is twofold. First, such an examination offers the opportunity to go beyond a description

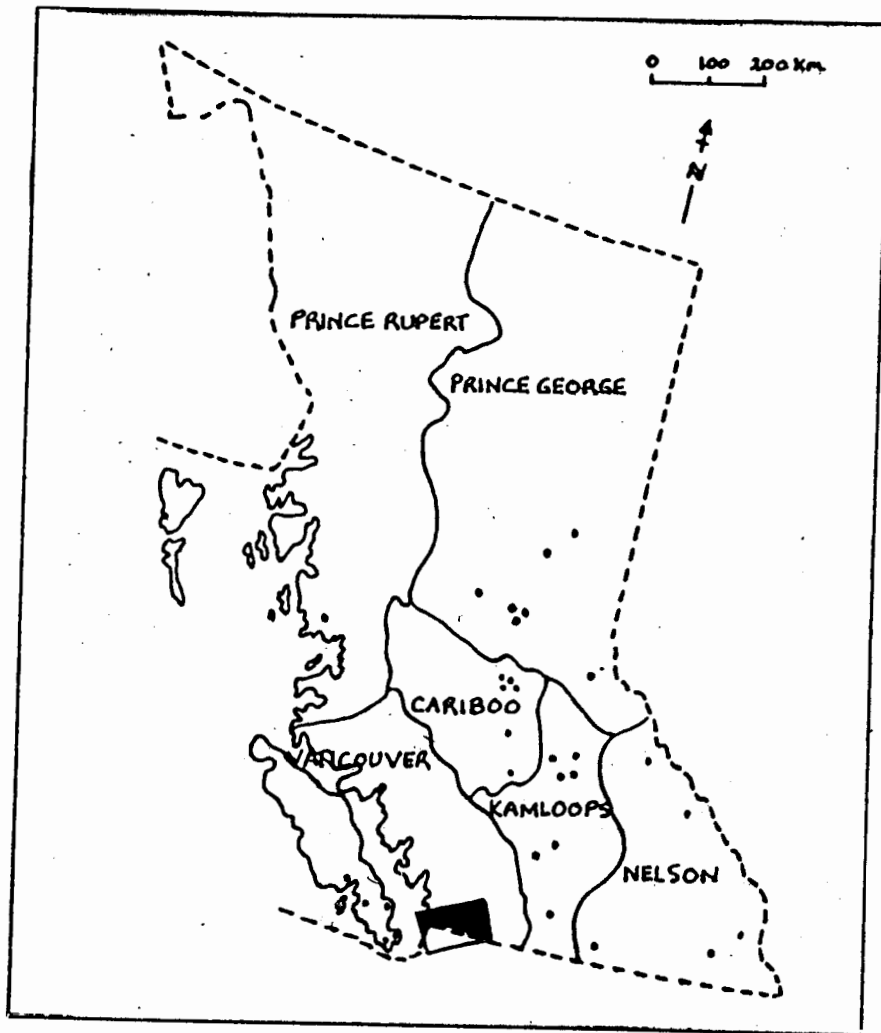


Figure 2 : Distribution of Sample.

based upon aggregate statistics. Second, an analysis at the level of the plant enables us to make more informed assessments and predictions of a qualitative nature.

Studies of employment restructuring at the level of the plant are essential. Yet there are very few studies of this nature on resource based economies and none in B.C. of employment restructuring during times of recession. The study will aid in revealing (1) the permanent nature of job loss within the forest products industry of British Columbia and (2) the spatial and organizational patterns of job loss and permanent job change. Before going on to discuss the changes which have taken place in B.C.'s forest industry with respect to employment the next chapter will look at the nature of the industry itself. The third chapter will present the empirical results on job loss while the fourth chapter will look at export patterns and future market and product plans. The concluding chapter will summarize the results and offer suggestions for future research.

CHAPTER II

THE WOOD PRODUCTS INDUSTRY

The coast has been the traditional heart of the forest industry in British Columbia. Its forest resources consist mainly of cedar, Douglas fir, western hemlock and Sitka spruce. In general these species grow to a much larger size than those of the interior. Indeed, smaller trees of differing species are found in the interior where rapid growth is restricted by a less favourable climate than that of the coast. In the interior the dominant species is spruce with interior Douglas fir and lodgepole pine also being important. As one moves northward the growing season shortens as the climatic conditions worsen. Thus, the range of species found in, for example, the Prince George area become limited to spruce and some firs. Given the smaller size of trees found in the interior region more trees have to be cut to reach the same level of output as compared to the coast. That is, given that trees on the coast reach greater size fewer trees have to be cut to reach the same level of output. More generally, the species mix dictates the nature of the product produced and hence the structure of the industry.

The differences in tree size also give rise to differences in production processes. Large coastal logs necessitate a sawing technique which gives logs individual attention so as to recover as much high quality lumber as possible. Normally this is done using a headrig. The rest of the mill further processes the

output from the head saw. Smaller interior mills usually cut construction grades only which allows them to process logs in one pass using automatic sawing systems (COFI, 1983).

Levels of Production

Figure 3 shows the levels of production for lumber for the period 1945 to 1985. As the graph indicates production in the interior has far outstripped that of the coast. By 1985 about 71 percent of lumber production was from the interior with the remaining 29 per cent from the coast. The coast, however, produces products which have a higher value-added while in the interior lumber is processed from smaller trees and is primarily construction grade. Production of pulp and paper for the period 1960-1985 is shown in Figure 4. The numbers indicate a tremendous growth and development of this industry during the 1960s and 1970s. Figure 5 shows plywood production for the period 1976-1985. Generally the recent downward trend reflects growing competition from substitute products such as particle board and waferboard.

The Role of Forest Products in B.C.

In B.C. the forest products industry is the dominant industrial group with sawmills and planing mills being the leading "three-digit" forest products manufacturing industry (Reed, 1973, p.7). As a result the forest industry of British Columbia makes large direct and indirect contributions to

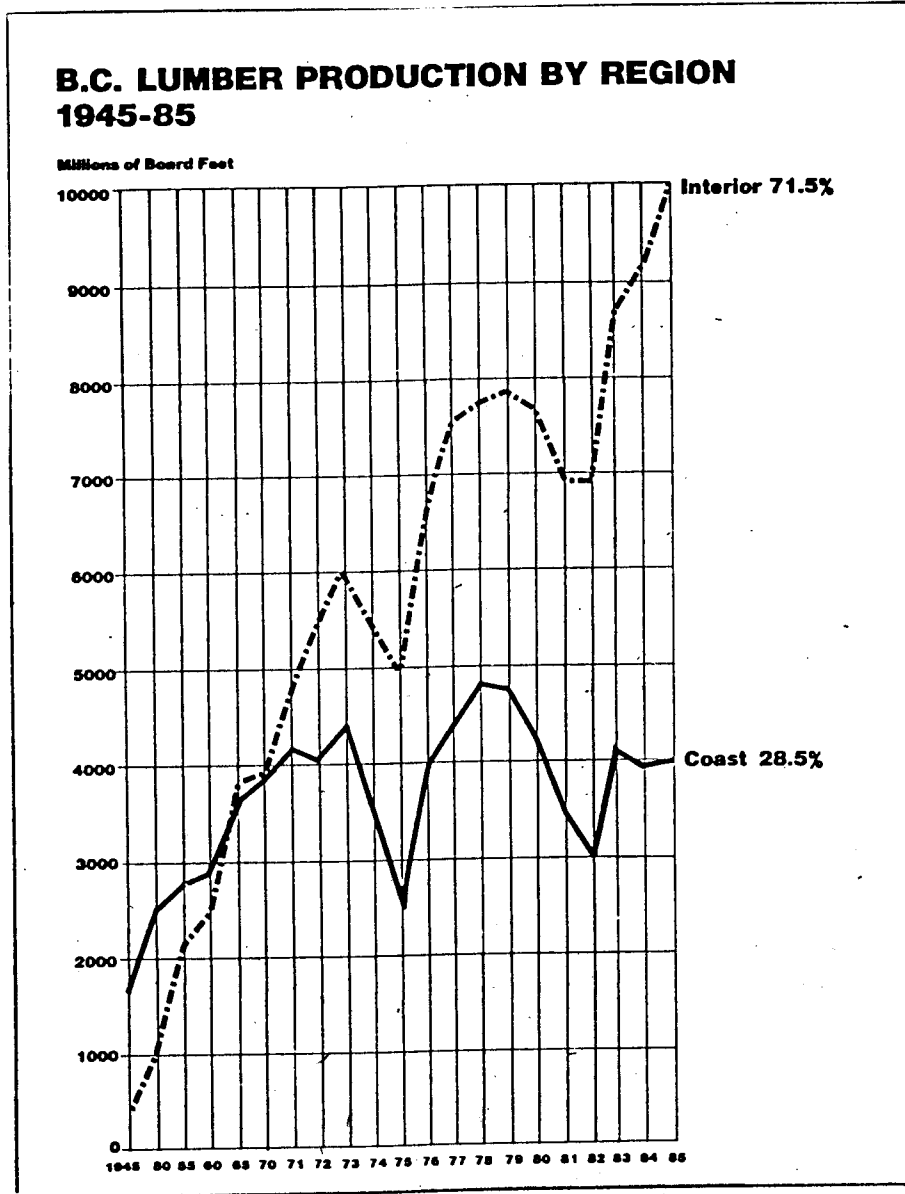


Figure 3 : Levels of Production, Lumber, 1945-1985.

Source : COFI, 1986

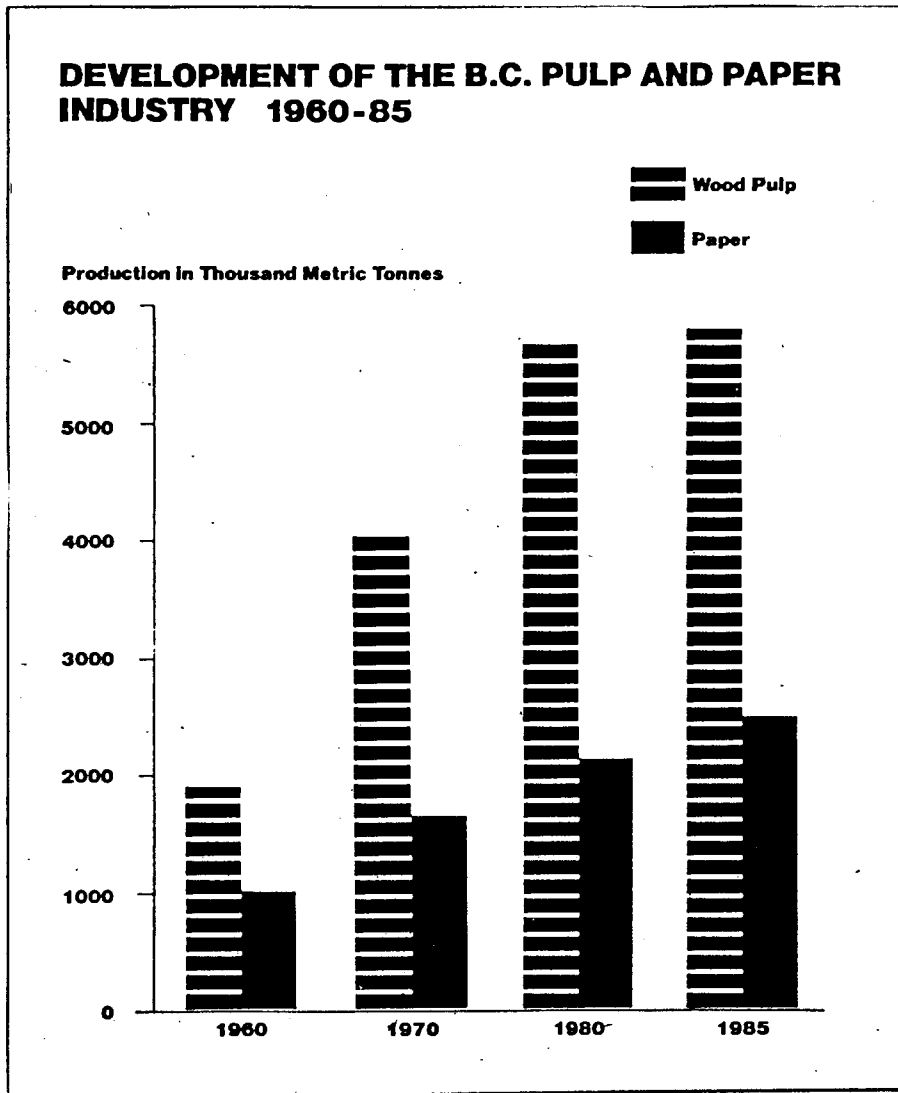


Figure 4 : Levels of Production, Pulp/Paper, 1960-1985.

Source : COFI, 1986

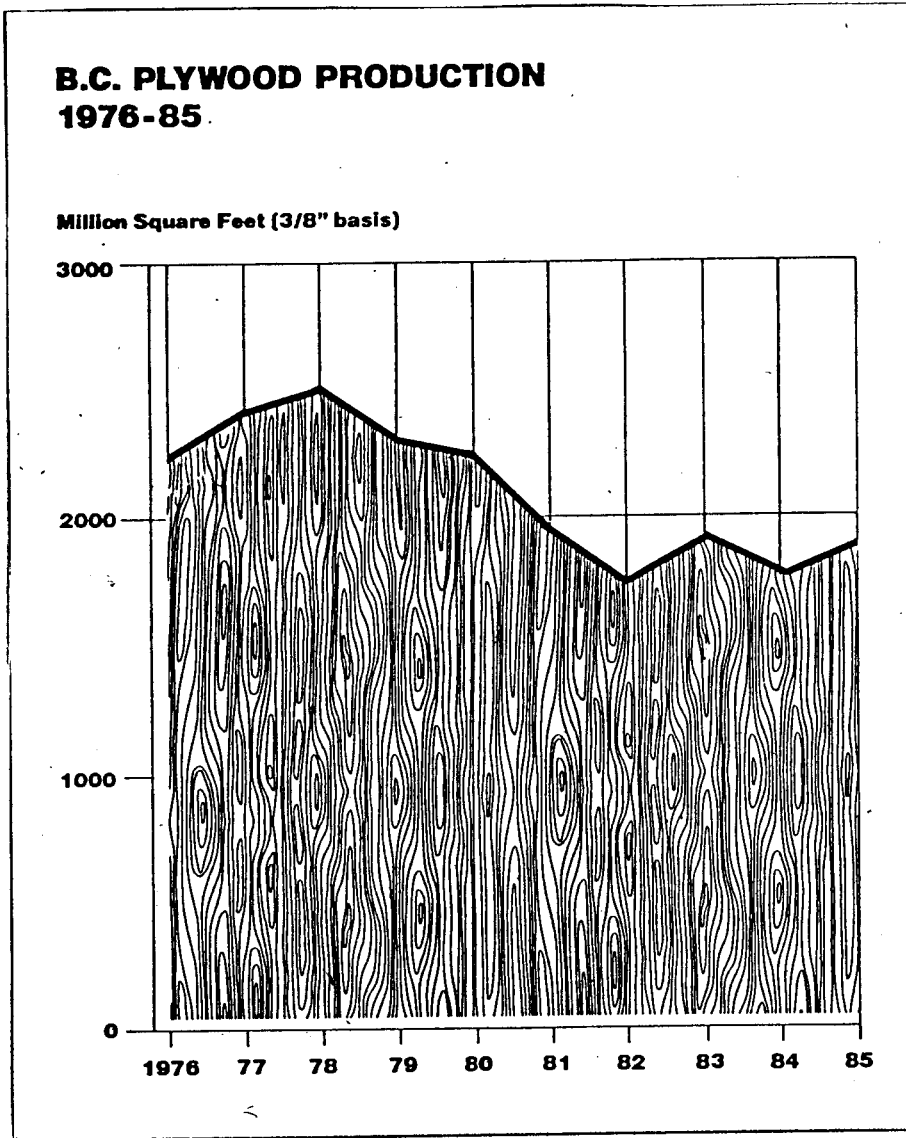


Figure 5 : Levels of Production, Plywood, 1976-1985.

Source : COFI, 1986

society. Forestry and wood-based industries are major sources of employment in rural areas. In numerous small communities, forestry and its associated activities provide the only stable avenues of income and employment. The forest sector is also a major source of foreign exchange earnings, not only for the province but for the country. As Reed notes "...British Columbia leads all Canadian provinces in timber harvested and in the production of lumber....By virtue of her domination...British Columbia contributes more to value added of Canadian forest industry production than any other province."(Reed, 1973, p.19) With one half of Canadian forest product exports originating in British Columbia (Reed, 1975, p.14) and given the range of products derived from the forest sector, any changes within the industry will have direct economic and social effects on Canada as a whole and British Columbia in particular.

Throughout the 1950s and 1960s most segments within the forest products industry registered strong growth rates. However, in the early 1970s the signs of long term change began to appear. In 1971 and again in 1975 demand dropped sharply as recession set in. However both of these recessions were neither as long nor as painful as the recession which began in 1981 and which served to highlight that the forest products industries were experiencing some long term secular change as well as a drastic 'short term drop in demand. In particular, it was realized that increased substitution of forest products by alternative materials such as concrete, metal, and plastics was

occurring and that technological change was promoting efficiencies in wood utilization thereby reducing demands for some products (for example, lumber for single family home construction). Moreover, in the major markets served by B.C.'s forest industries population growth is slowing down and there are further delays in new family formation culminating in less demand for forest products.

Thus, due to changing social and economic conditions the rate of market growth in the late 1970s early 1980s had been slower than in the 1950s and 1960s. Unemployment, inflation and changes in consumption patterns have restricted the forest sectors capacity to generate demand. Similarly, the increased use of substitute products coupled with restrictive monetary policies continued to dampen demand for forest products and contributed to some substantial changes within the forest products industry. The most immediate change was the significant drop in the number of people employed within the forest products industry. For example, Employment of pulp paper and allied workers was some 23,000 in 1981. By 1985 this figure had decreased to 18,000. A decline of 21.74 per cent. Further membership in the Canadian Paperworkers Union and the Pulp, Paper and Woodworkers of Canada decreased from 13,000 to 11,000 during the period 1984 to 1986. Further, where 10 per cent of British Columbia's labour force in the 1960s was in the forest products sector today only 5 per cent are in that sector.

The impact of the recession is also reflected in the financial and employment performance of many companies. The record high profits of 1979 were translated into record level losses by 1982 (see, Table 1) and positive returns on capital quickly became negative (see, Figure 6). For the early 1980s six major public corporations announced losses of \$422.4 million between 1982 and 1984. The impacts to employment have been equally severe. According to a study conducted for the Federal Government almost 10,008 jobs were lost in all phases of the forest products industries including logging and miscellaneous wood industries between 1979 and 1981 (Farris, 1983, Volume 2, Table B-6, p. A14). Part of the table from Farris is reproduced in Table 2. To get a better feel for the impact of recession on employment the next section looks at changes in unemployment rates at the national and provincial levels both in general and for, forest products.

Unemployment rates

This section begins with a brief description of the national and provincial unemployment scenes. The period for which the data are analyzed is 1981-1985. When the recession began in 1981 the wood processing and pulp and paper industries were subjected to a profound exogenous shock. The discussion of unemployment trends serves to highlight the timing and extent of the recession and serves as a background for the following chapter in which the forest products industry is disaggregated

Table 1: Forest Industry Profit/Loss, 1981-1985
(wood based operations only)

<u>Company</u> ¹	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
B.C.F.P.	17.2	-61.0	-32.7	9.2	30.1
Crown	17.1	-23.3	-17.2	-4.9	16.6
Canfor	3.2	-84.5	-44.2	-23.8	-61.4
MB	-18.6	-96.2	-1.0	5.1	18.8
Weld.	4.8	-15.9	9.6	-5.3	7.4
Whon.	<u>-9.4</u>	<u>-21.2</u>	<u>4.7</u>	<u>-19.8</u>	<u>-6.9</u>
Total	14.3	-302.1	-80.8	-39.5	4.6

Source : COFI, 1986.

¹ B.C.F.P = British Columbia Forest Products, Crown = Crown Forest Products, Canfor = Canadian Forest Products, MB = MacMillan Bloedel, Weld. = Weldwood, Whon. = Whonnock Industries

Figure 6 : Returns to Capital, 1976-1985.

Source : COFI, 1986.

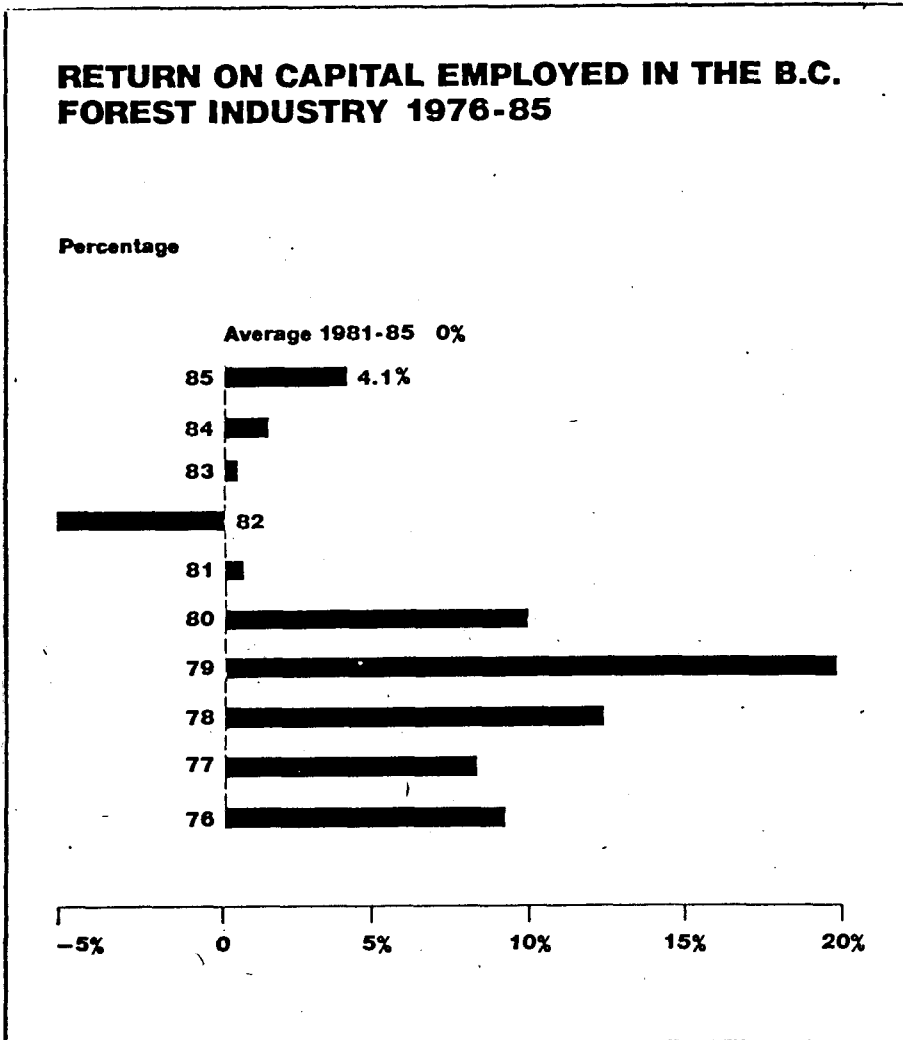


Table 2 : B.C. Forest Industry Employment, 1979-1981

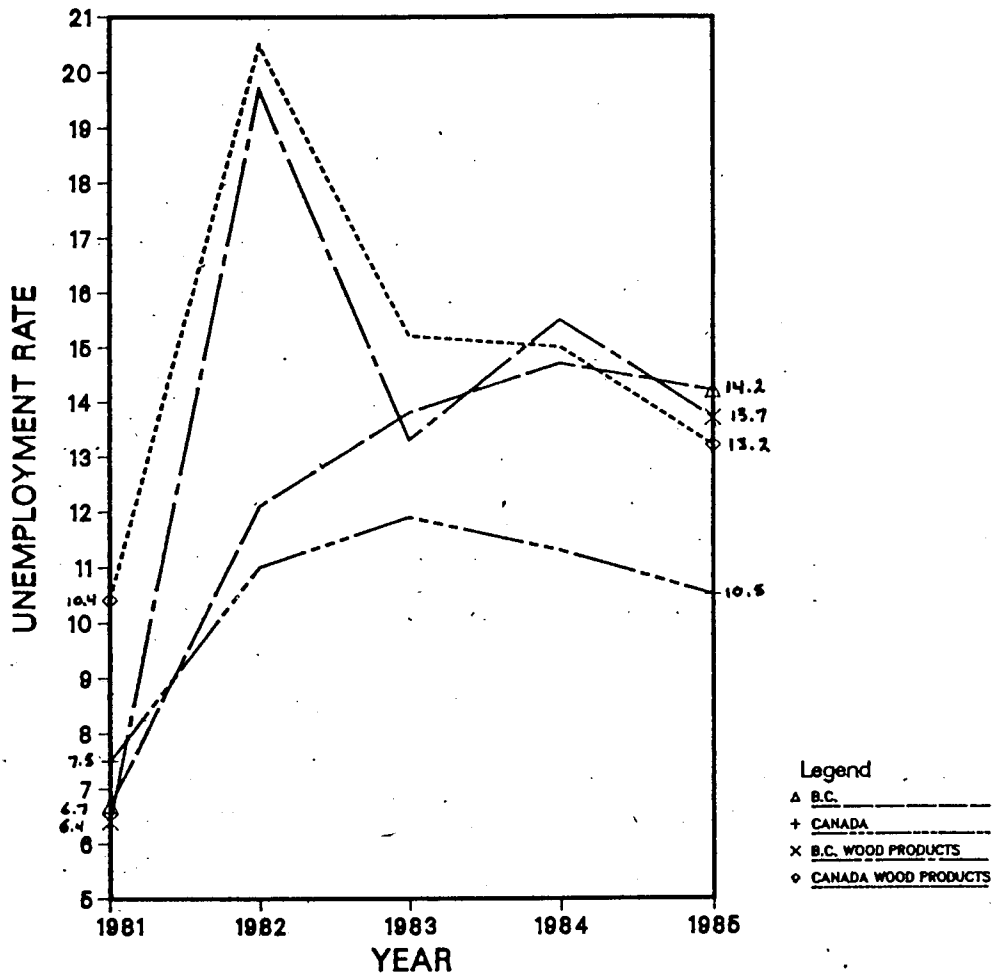
<u>Year</u>	<u>Logging</u>	<u>Wood Industries</u>	<u>Paper and Allied</u>	<u>Total</u>
1979	24,474	51,369	20,998	96,841
1980	24,270	49,708	21,540	95,518
1981	19,561	46,628	20,660	86,849

Source : Farris, 1983, Table B-6 p. A14.

temporally, (for the years 1981 and 1985), structurally (by industry sub-sector), occupationally and spatially (in terms of the coast and interior regions) as well as by firm size.

Figure 7 details unemployment rates provincially and nationally. In 1981 the national rate of unemployment stood at 7.5 per cent while the provincial level was marginally less at 6.7 per cent. By 1982 the national level had increased by 3.5 per cent to 11.0 percent. At the provincial level, the change in the unemployment rate was even more dramatic. Starting from a 1981 level of 6.7 per cent the provincial unemployment rate increased 5.4 per cent or to a level of 12.1 per cent by 1982. By 1983 the national level stood at 11.0 while the provincial rate was at 13.8. In short, provincial unemployment rates were increasing more rapidly than national rates. The trend continued through 1984 and by 1985 the provincial unemployment rate stood at 14.2 per cent (more than twice the 1981 rate) while at the national level unemployment rate was 10.5 per cent. For the wood products industry the story is somewhat similar.

UNEMPLOYMENT RATES



SOURCE: STATISTICS CANADA, (CAT. 72-201)
 STATISTICS CANADA, UNPUBLISHED DATA

Figure 7 : Unemployment Rates, 1981-1985.

Source : Statistics Canada

The 1981 unemployment rate for wood products, at the national level, was 10.4 per cent. At the provincial level for the same year the unemployment rate stood at 6.4 per cent. In short, the provincial rate was some 4 per cent less than the national rate. The difference reflects the fact that the recession had set in at different times throughout Canada. ~~rate~~. In 1982 the picture began to take on a different color. Nationally the rate of unemployment for the wood products industry nearly doubled from 10.4 percent to 20.5 per cent. While this is quite dramatic it was not as great as that for British Columbia. As noted, the 1981 provincial level for unemployment in the wood products industry stood at 6.4 per cent while by 1982 the unemployment rate for B.C. had tripled to to 19.2 per cent. In 1983 the unemployment rates for the wood products industry at both the national and provincial levels had decreased to 15.2 and 13.3 respectively. However, by 1984 we once again see provincial levels above those of their national counterpart. By 1985 the provincial wood products unemployment rate was marginally higher than the national rate, with the respective rates being 13.7 per cent provincially and 13.2 nationally.

The severity of increasing unemployment can not be underestimated. As was seen the unemployment rate for the wood products industry, at the national level, increased some 2.8 per cent between 1981 and 1985. At the provincial level the rate of unemployment, for the same period, increased from about 6 per

cent to about 13.5 per cent. For the economy of British Columbia, which relies heavily on a healthy wood products sector, the changes in employment patterns with respect to the recession are of major consequence.

The experience of the forest products industry has in some measure been cyclical (Redish and Schworm, 1986). However, there is recognition that the recent recession has emphasized and reinforced significant secular changes in demand, resource and technological conditions underlying the industry. The precise employment implications of these secular changes are, however, less clear. Important questions revolve around the extent to which the recession has enabled firms to become "leaner and fitter" and better able to diversify market linkages in terms of value and geography. The implications of employment change clearly depend upon whether or not such change has been associated with increases or decreases in capacity, increases or decreases in market contacts and the degree to which plants are being modernized. The following data (x Hayter, 1987) give an indication of the magnitude of employment change for MacMillan Bloedel and Crown Forest Products.

LABOUR FORCE CHANGE

Location	Employment		Net Change	% Change	Reason
	1979	1984	1979-84	1979-84	
<i>MacMillan-Blodel</i>					
Vancouver	1200	560	-737	-61.4	I&R
Chemainus	682	100	-562	-82.4	M
Vancouver	740	400	-340	-45.9	C
Vancouver	400	0	-400	-100.0	D
Alberni	1522	1249	-273	-17.9	I
Powell River	2335	1598	-737	-31.5	M&C
Harmac	1399	1347	-52	-3.7	I
New Westminster	161	156	-5	-3.1	
New Westminster	222	372	+150	+67.5	E
Burnaby	94	94	0	0	
Total	24500	14944	-9556	-39.0	

Crown Forest

Vancouver	260	190	-70	-26.9	I&R
Richmond	145	0	-145	-100.0	D
Armstrong	450	450	0	0	
Lumby	111	99	-12	-10.8	I
Coquitlam	1100	600	-500	-45.4	M&Rt
Elk Falls	1320	1291	-29	-2.1	I
Total	6800	5400	-1200	-17.6	

I=Intensification M=Modernization C=Cutbacks E=Expansion

D=Divestiture R=Reorganization Rt=Rationalization

Source : Hayter, 1987.

For MacMillan Bloedel there had been a substantial reduction of employees between 1979 and 1984. In absolute terms the hardest hit community was Powell River which saw a reduction of some 737. In terms of percentages, however, the hardest hit community was Chemainus which saw an 82.4 per cent reduction in employment between 1979 and 1984. A brief review of the manner in which MacMillan Bloedel, the largest forest manufacturing company in the province, has coped with recessionary conditions provides an indication of the speed and extent of changes that have occurred in the British Columbia forest products industries.

Turmoil at MacMillan Bloedel

British Columbia is home to MacMillan Bloedel (MB) one of North America's largest forest products companies with integrated operations in both Canada and the United States and with other major operations worldwide. Despite its size MB strongly felt the effects of the recession. During 1981 net earnings fell by \$3.3m, sales fell by \$227m and loss on equity investments totalled \$3.9m (MB, 1981, pp. 5-8). A restrictive monetary policy gave rise to high interest rates in North America and elsewhere and this coupled with limited mortgage funding led to reduced demand for wood products in particular. Indeed, it became clear to MB administrators that drastic cost-cutting measures were needed to be implemented if the company were to survive. Immediately lumber production was cut

by 1/2 and plywood production was curtailed to avoid inventory accumulations. Further MB announced the permanent closure of its Chemainus sawmill "as it no longer was cost competitive" (MB, 1982, pp. 2-3). For the same reason the closure of the Port Alberni linerboard machine was also announced. To continue reducing costs "salaried staff was reduced by 1,351 persons from mid-1981 to year end 1982, a drop of 23 per cent." To bring in some much needed capital MB sold its Vancouver head office building for \$62m (MB, 1982, p. 3). At the Harmac mill on Vancouver Island the least efficient pulp line had been shut down for an indefinite period while at Powell River 2 paper machines were also closed for an indefinite period (MB, 1982, p.2).

To streamline operations a modernization scheme was put into place. The overall strategy had become one of "survive-or-die" and emphasis was placed on producing higher value-added and specialty wood products. While some of the measures which were being instituted by MB during 1982 were drastic they nevertheless allowed for "a much leaner and cost effective organization." In spite of some of the cost reducing measures, MB, during 1982, sustained a loss of \$96.2m as compared to 1981's loss of \$18.6m and the production of lumber and plywood was down 30 per cent over 1981 (MB, 1982, p. 5). To re-emphasize, the decentralization and restructuring of the complete organization was deemed necessary if the company was to remain competitive. In 1982 this came to fruition as "the

company was decentralized and restructured on a regional basis." By 1983 the economic climate was a bit brighter as losses amounted to \$1m. To avoid continuing losses cost reducing plans continued to remain in effect.

The leaner, streamlined and decentralized operations had by 1983 "become standard procedure" which had allowed MB to realize some gains in that year (MB, 1983, p. 2). However the restructuring process was far from over. During 1983 MB either closed or reconfigured its "non profitable and marginal operations" (MB, 1983, p. 2). Decentralization of decision making continued to be stressed as it was felt that autonomous decision making allowed marketing and key management personnel a better feel for the needs of their customers. Moreover, by being responsive to customer requirements the company could build up a base of knowledge "from which to determine product lines and configurations" which would afford MB a comparative advantage over its competitors (MB, 1983, p. 2). Clearly, there was a recognition that customer satisfaction had to play a paramount role in the company's overall strategy. But it was also recognized that that was not enough : production had to become more cost efficient. "Old sawmills must be modernized or replaced with smaller, more efficient mills...." To meet this end the new sawmill which was to be built in Chemainus "will be designed for cost-effective extraction....and will replace the antiquated Chemainus sawmill --a mill built for the markets and competitive forces of a bygone era..." (MB, 1983, p. 3). In

conjunction with cost-efficiency there was a clear recognition that the overreliance on one market was dangerous. The vagaries of the U.S. housing market were not conducive to maintaining a strong B.C. lumber sector. What was required was the support of other key markets as this was deemed essential to the restoration of mills to healthy levels of returns on investment. Apart from that there was an explicit recognition of the regional differentiation of the industry (MB, 1984).

The nature of the resources found in the interior and the coastal regions in part give rise to differing cost structures. However there are other differences which have to be taken into account. "To compete with other producers [e.g. interior] we must recognize regional disadvantages such as high labour costs [and] inefficient work practices and inflexibility in seeking alternate forms of compensation" (MB, 1984, p.10). The incentive oriented schemes in place in the interior had led to higher rates of productivity and the time was nigh to employ the same technique on the coast. The result of the interior schemes upon incomes and employment were either to maintain or enhance those levels. On the coast however, resistance to incentive plans remained strong. It was argued by MB that if the coastal forest industry was to "regain labour cost competitiveness" new forms of rewarding labour had to be found. It is felt that Chemainus was a step in that direction. The mill would achieve three times the output per man day over the former mill and there would be a link between productivity and reward. In short, employee

participation would be encouraged and there would be a reward for performance (MB, 1984, pp. 10-13).

In 1985 strict policies of minimizing discretionary spending and cost control continued to be adhered to. The salary freeze instituted in late 1981 remained in effect and administrative staffing levels were further reduced (MB, 1985, p. 3). Emphasis was placed on labour-management relationships as MB sought to rid itself of "rigid practices born at different times...." It was felt that the security of employees was threatened by adherence to outmoded methods and that new styles of supervision (such as those found in the interior) must be put into effect (MB, 1985, p. 6). This included the "team approach" which allowed for a high level of employee participation in operating the mill. Apparently the concept had worked as net sales from Chemainus had risen by about 40 per cent, recovery rates had increased and production levels were "close to three times the lumber per man day previously produced..." (MB, 1985, p. 17). While achieving higher productivity it was necessary to reduce the "excess capacity" which existed. Explicit directions were also given to product mix. At some plants the product mix was expanded while at others the range of product was reduced. The net effect was a redistribution of labour through rationalization and plant transfers.

To help restore profitability the reconfiguration of operations gave focus to specialized markets and higher value added products. The focus at Chemainus was to meet the more

specialized needs of customers such as the "...manufacture of Japanese Shoji screens" (MB, 1985, p. 17). At the Alberni Pacific and Somass divisions a number of different operating modes were implemented. In fact "Somass became a cedar speciality operation with a heavy emphasis on the production of bevel siding (MB, 1985, p.17). In plywood the Alberni mill reoriented its product mix by introducing new or reintroducing products such as texturized and grooved siding panels (MB, 1985, p.21). In all cases employee involvement is encouraged and the new management style appears up to this point to have worked.

Summary

This look at MB has provided insights on the range of coping strategies -- layoffs, rationalization, investment and technical change plus, new management-employee relations as well as new marketing strategies and organizational structure. The crucial point is that for a large multiplant firm competing in an environment of increasing costs there are a number of alternatives which can be adopted to reduce costs. Some of the cost-cutting measures involve employee layoffs while others are geared toward shifting production between plants. The point is that multi-plant firms have a far greater array of alternatives than do their single plant counterparts. The significance of the difference between multi and single plant firms will be tested later.

The period of transition which began in the 1970s was punctuated by the deep recession which began in 1981. Rather than just a temporary economic trough this recession has led to a fundamental restructuring of the B.C. forest products industry. The next chapter discusses this restructuring as it relates to overall employment levels, employment by occupation and gender, by firm size as measured by the number of employees by organizational structure (i.e. multi-plant versus single plant) and how this relates to the production contexts laid out in Chapter 1.

CHAPTER III
PATTERNS OF EMPLOYMENT CHANGE 1981-1985

The purpose of this chapter is to describe employment change for the period 1981 to 1985. Specifically, I wish to assess the extent to which change is related to size of firm, to region and to sub-sector. In so doing employment change will be assigned to one of three categories of major loss, minor loss or no change. As used in the analysis major loss is defined as loss equal to or greater than 50 employees, minor loss is 49 or fewer and no change is exactly no change. The next section will assess change as it relates to occupation, gender and patterns of shift work. Finally, this chapter assesses employment change in light of the three production contexts of intensification, rationalization and investment and technical change.

Employment Change Among Sampled Plants

Aggregate Patterns

Table 3 gives the aggregate employment totals for the sample for each of the five years and by region. Between 1981 and 1985 aggregate employment among surviving plants decreased from 19202 to 16189 representing a net change of -15.69 per cent. And if you add in the 2400 jobs lost in the plants which had closed job loss is 25.1 per cent. Of 2400 jobs which were lost in those plants 1700 were from the coastal region. As the figures indicate the greatest overall change both absolutely and

Table 3 : Aggregate Employment Change, Sampled Plants, 1981-1985

<u>REGION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>% Chg 81-82</u>	<u>% Chg 81-85</u>
<i>Coast:</i>							
Van	10048	7981	7854	7524	7305	-20.5	-27.2
P.R.	<u>250</u>	<u>160</u>	<u>200</u>	<u>220</u>	<u>220</u>	<u>-36.0</u>	<u>-12.0</u>
Sub Total	10298	8141	8054	7744	7525	-20.9	-26.9
<i>Int.:</i>							
Kam	849	825	792	831	804	-2.8	-5.3
Nel	2712	2591	2568	2485	2463	-4.4	-9.1
Car	2638	2530	2504	2324	2486	-4.0	-5.7
P.G.	2705	2912	3075	3062	2911	+7.6	+7.6
Sub Total	<u>8904</u>	<u>8858</u>	<u>8939</u>	<u>8702</u>	<u>8664</u>	<u>-0.5</u>	<u>-2.6</u>
Grand Total	19202	16999	16993	16446	16189	-11.4	-15.6

Source : Fieldwork, 1986.

relatively, took place between 1981 and 1982. The change in employment between those two years was 11.47 per cent. This accounts for some 73 per cent of the total decline between 1981 and 1985. Disaggregation by region shows that all but one (Prince George) suffers a net decline in total employment. Of those regions experiencing decline the greatest decrease occurs in the Vancouver region. Here total employment declines by 27.29 per cent. Again, the period 1981-1982 accounts for the greatest

amount of the change, that being a decline of 20.57 per cent (or 75 per cent of the total change). Only one region, Prince George, experiences a net increase in employment. In the Prince George region employment grew by 7.61 per cent. In the same region, for the period 1981-1982, employment has a net growth of 7.65 per cent. Essentially the figures suggest a swift regional reaction to the recession. Subsequent to the 1981-1982 staggering declines, plant level employment, to some degree, levels off. While there was a net decline over the period 1983-1985 these were, relative to 1981-1982, small. For the period 1983-1985 the greater majority of change is attributed to loss through attrition. Having looked at the magnitude of change over the sample period it becomes necessary to examine the spatial dimensions of that change. Specifically, is there a relationship between significant job change and region? If so, is the relationship statistically significant?

Regional Patterns

The interest here is to determine the association between region and significant job loss which is defined as ≥ 50 . For the purposes of analysis each region is assigned one of two categories : coast (Vancouver and Prince Rupert districts) and interior (Prince George, Cariboo, Kamloops and Nelson districts) These categories are cross-classified against job change which is classified into one of three categories : major change ≥ 50 , minor change ≤ 49 and no change. The null hypothesis of independence is tested at the 0.05 level of significance. With

Table 4 : Job Change by Region

<u>Region</u>	<u>Major</u>	<u>Minor</u>	<u>No Change</u>	<u>Total</u>
Coast	12 (4)	6 (3)	7	25
Interior	7 (1)	12 (3)	19	38
<u>Total</u>	<u>19</u>	<u>18</u>	<u>26</u>	<u>63</u>

Source: Fieldwork, 1986.

Notes :

1. $\chi^2=6.446$ Cramer's V=0.320
2. Major job change is defined as loss equal to or greater than 50. Minor job loss is defined as loss equal to or less than 49.
3. Figures in parentheses refer to those plants which had been sampled but which subsequent to 1981 had closed.
4. If the figures in brackets are added to the figures immediately above them then the resultant $\chi^2 = 8.509$ with a p of 0.0142 and a Cramer's V of 0.339.

two degrees of freedom and a 0.05 critical χ^2 of 5.991 the null hypothesis is rejected and it is concluded that region is associated with significant job change. In particular, the results suggest that the greatest degree of change is associated with the coastal region. To gain some further insight into this association a partitioning for linearity is carried out. The χ^2 due to linear regression is calculated to be 5.715 with 1 degree of freedom. The departure from regression is thus $6.446-5.715 = 0.731$. Since the χ^2 value of only 0.731, based on 1 degree of freedom is a long way from being significant this reinforces the earlier conclusion that significant job change is closely associated with region. This point is reinforced if the plant

closures are included. That is, if plant closures are added the adjusted $\chi^2 = 8.509$ with a p value of 0.0142.

In dealing with recession interior plants invoked some innovative techniques which increased employee involvement. For example, to accomplish increased rates of productivity team meetings were and continue to be held on a weekly basis with shift production figures being posted on a daily basis. Since small independently owned operations have greater flexibility in shifting production schedules it often means that single orders can be met with quick dispatch. Moreover, a widespread practice among interior plants is the 'team concept', 'participative management system'. This, it is felt, creates an environment more conducive to friendly working relationships between labour and management. Indeed, this is the type of system which MacMillan Bloedel were arguing for in 1984 and which subsequently was put into effect in their Chemainus operation on the coast. An important strategy for maintaining employment levels in the interior was to concentrate efforts on increasing existing customer satisfaction by offering faster service most often at a reduced price. In some cases this meant marginal wage reductions but the overall level of employment was maintained. For those who had taken pay cuts these were replaced with incentive/bonus schemes where fiscal year end profits were divided up among employees. As already noted in the previous chapter coastal workers are somewhat reluctant to accept alternative forms of payment and this could in fact be one

Table 5 : Regional Gainers and Losers

<u>Region</u>	<u>Gainers</u>	<u>Losers</u>	<u>No Change</u>
Vancouver	4	17	3
Prince Rupert	0	1	0
Prince George	5	4	0
Cariboo	5	4	5
Kamloops	2	3	0
<u>Nelson</u>	<u>2</u>	<u>8</u>	<u>0</u>
Total	18	37	8

Source : Fieldwork, 1986.

reason which accounts for the differences in the pattern of change in employment levels between the two regions. Given that a relationship between region and job loss exists the next question is : what is the breakdown of job loss among the three industries of sawmilling, plywood and pulp and paper?

Employment Change by Sub-sector

Sawmills

In terms of employment figures sawmills are the largest, and have experienced the greatest overall employment change (see, Table 6 and Figure 8). For the sample period, employment in the sawmilling sub-sector decreases by -19.5 per cent. Similar to the change in total employment the greatest decline occurs

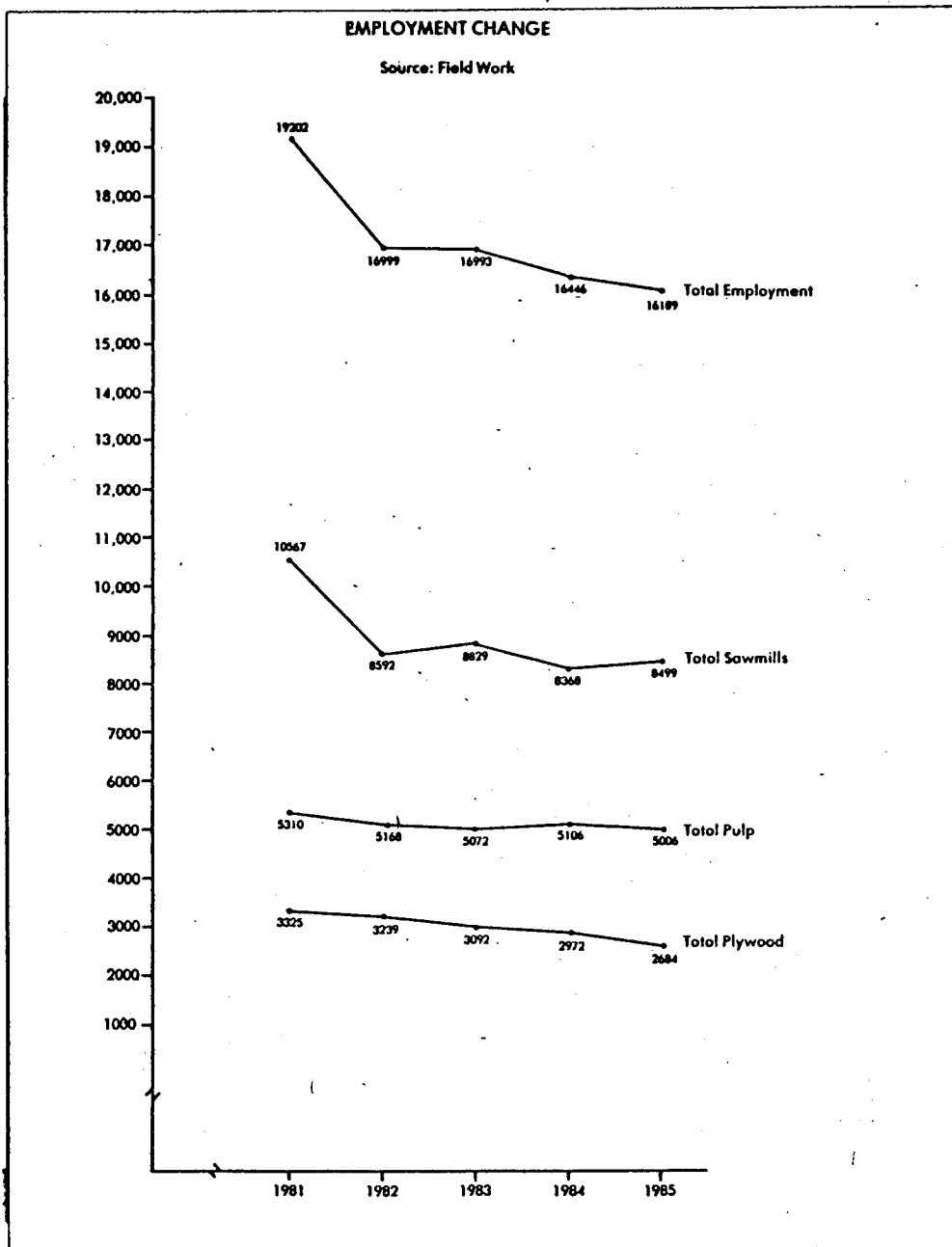


Figure 8 : Employment Change, Total and by Sub-sector.

Source : Fieldwork, 1986.

Table 6 : Total Employment Sawmills by Region

<u>Region</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>% CHG 81-82</u>	<u>% CHG 81-85</u>
Coast	6042	4235	4511	4174	4239	-29.9	-29.8
Int.	<u>4525</u>	<u>4357</u>	<u>4318</u>	<u>4194</u>	<u>4260</u>	<u>-3.7</u>	<u>-5.8</u>
Total	10567	8592	8829	8368	8499	-19.5	-18.6

Source : Fieldwork, 1986.

between 1981 and 1982. This period accounts for approximately 95 per cent of the overall change. Regionally, the coastal based sawmills witness a drop in employment from 6042 to 4239 for a decline of -29.8 per cent. Over the 1981-1982 period the change is 29.9 per cent. Given the relative stability after 1983 it is fair to say that permanent job loss, for this sub-sector, in this region, is some 1800 employees. For the interior region there is a decline over both periods (1981-1982 and 1981-1985) however the change is not as severe as that of the coast. For the interior region employment over the 1981-1982 period declines by 3.7 per cent or approximately nine times less than that of the coast.

Plywood

The most domestically oriented of the major sub-sectors within the B.C. forest products industry is plywood. In part this stems from the duties which are imposed by the United States and in part from the nature of the product and it

acceptance in foreign markets. Total employment change for the respondents in the plywood group over the sample period are shown in Table 7. At the onset of recession employment for the sample stood at 3325. By 1985 employment declines to 2684 for a net change of -19.2 per cent. Unlike sawmilling where 1981-1982 proved to be critical, plywood in the same two year period, sustained a decline of -2.5 per cent.

Regionally, the biggest loser is once again the coastal region which experienced a decline -30.8 per cent over the sample period as compared to the interior region which declined by -8.1 per cent. Surprisingly, the drop in employment in the coastal region between 1981 and 1982 was -0.9 per cent. For plywood plants the largest net change took place between 1984 and 1985 when employment went from 1443 to 1127 or in percentage terms a drop of -21.8 per cent. In total there were six plants which decreased employment levels, two which increased while two remained stable. Part of the decrease is attributed to the increased use of substitute products such as waferboard and particleboard and partly because of plants moving away from sanded plywoods to hardwood plywoods. That is, away from the more traditional interior/exterior grades into higher more specialized products.

Table 7 : Total Employment Plywood by Region

<u>Region</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>% CHG 81-82</u>	<u>% CHG 81-85</u>
Coast	1629	1614	1478	1443	1127	-0.9	-30.8
Int.	<u>1696</u>	<u>1625</u>	<u>1614</u>	<u>1529</u>	<u>1557</u>	<u>-4.1</u>	<u>-8.1</u>
Total	3325	3239	3092	2972	2684	-2.5	-19.2

Source : Fieldwork, 1986.

Pulp and Paper

The industry which shows the least amount of change in terms of employment is pulp and paper. Over the sample period employment declined by 5.7 per cent (see, Table 8). One major reason for this employment stability lies in the nature of the industry. Already highly capital-intensive the opportunity for introducing labour-saving technologies are less. Similarly, when pulp and paper plants expand additional employee requirements are limited.

The period 1981-1982 accounts for about half of the total change in pulp and paper employment levels i.e., 2.6 per cent of the total 5.7 per cent. While the provincial change has been relatively static the figures reveal some significant regional variation. Specifically, the coastal region show a drop in employment from 2627 in 1981 to 2159 in 1985 for a change of -17.8 per cent. Yet while the coast was exhibiting a net decline the interior region witnessed a net increase from 2683 in 1981 to 2847 in 1985. In percentage terms this represents an increase

Table 8 : Total Employment Pulp/Paper by Region

<u>Region</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>% CHG</u> <u>81-82</u>	<u>% CHG</u> <u>81-85</u>
Coast	2627	2292	2065	2127	2159	-12.7	-17.8
Int.	<u>2683</u>	<u>2876</u>	<u>3007</u>	<u>2979</u>	<u>2847</u>	<u>7.1</u>	<u>6.1</u>
Total	5310	5168	5072	5106	5006	-2.6	-5.7

Source : Fieldwork, 1986.

of 6.1 per cent. The important point here is that the low overall net provincial decline is accounted for by the fact that the interior region's strong growth partially offset the coastal region's significant losses. Hence, there is a strong evidence that there is a regional component to employment change in this industry.

In all three industries it is interesting to note that, in spite of the recession, in general, plants have increased average capacity per shift (Tables 9, 10 and 11). This trend indicates that investment was taking place during the recession even though there were cutbacks in employment. These increases in capacity among surviving plants helped to offset the loss in capacity of the closed plants.

Employment Change by Sex

Among the surviving plants in absolute terms male employment declined from a 1981 level of 18498 to 15640 in 1985 for a net

Table 9 : Average Capacity per Shift

<u>Sectors</u>	<u>1981</u>	<u>1985</u>
Sawmills	210 MFBM	229 MFBM
Plywood	447,000 3/8"	471,000 3/8"
Pulp	636 tonnes	721 tonnes

Source : Fieldwork, 1986.

Table 10 : Capacity Change : Coast

<u>Sector</u>	<u>Expand</u>	<u>Decline</u>	<u>No Change</u>
Sawmills	10	4	4
Pulp and Paper	2	0	1
Plywood	1	2	4

Source : Fieldwork, 1986.

Table 11 : Capacity Change : Interior

<u>Sector</u>	<u>Expand</u>	<u>Decline</u>	<u>No Change</u>
Sawmills	19	1	5
Pulp and Paper	4	0	3
Plywood	0	0	3

Source : Fieldwork, 1986.

change of -15.4 per cent (Table 12). Female employment (Table 13) experienced an absolute decline of 155 for a net change of -22.0 per cent. In relative terms, for the province as a whole, female employment in the wood processing and pulp and paper industries has been dropping faster than that of their male counterparts. Regionally Vancouver has the largest absolute decline of both males and females. For males employment declines by 26.6 per cent while for females the figure is -47.0 per cent or about twice as large as the total provincial change. As with the changes previously discussed it is once again the Prince George region which emerges diametrically opposite to that of the Vancouver region. In the Prince George region employment for males does not decline. Rather, this region shows a net increase of some 7.3 per cent. For females the employment rate does decrease but by only 1.2 per cent. All other regions exhibit a net decline in employment for both males and females. Given that there is a general downward trend in both male and female employment levels it is important to know which occupations exhibit the greatest change and for which gender.

Employment Change by Occupation and Sex

Table 14 and Figure 9 detail change by occupation and it is clear from that there has been some significant alteration in the composition of the workforce. The segment traditionally believed to have the most job security is that of administrative personnel with production line workers showing the least amount

Table 12 : Male Employment by Region

<u>Region</u>	<u>1981</u>	<u>1985</u>	<u>% CHG 81-85</u>
Vancouver	9780	7171	-26.6
Kamloops	807	769	-4.7
Nelson	2618	2392	-8.6
Cariboo	2494	2345	-5.9
Prince George	2562	2750	+7.3
Prince Rupert	<u>242</u>	<u>213</u>	<u>-11.9</u>
Total	18498	15640	-15.4

Source : Fieldwork, 1986.

Table 13 : Female Employment by Region

<u>Region</u>	<u>1981</u>	<u>1985</u>	<u>% CHG 81-85</u>
Vancouver	253	134	-47.0
Kamloops	42	35	-16.6
Nelson	94	71	-24.4
Cariboo	144	141	-2.0
Prince George	163	161	-1.2
<u>Prince Rupert</u>	<u>8</u>	<u>7</u>	<u>-12.5</u>
Total	704	549	-22.0

Source : Fieldwork, 1986.

Figure 9 : Aggregate Occupational Change.

AGGREGATE OCCUPATIONAL CHANGES AMONG SELECTED FOREST PRODUCTS PLANTS IN BRITISH COLUMBIA BETWEEN 1981 AND 1985

Source: Field Work, 1986.

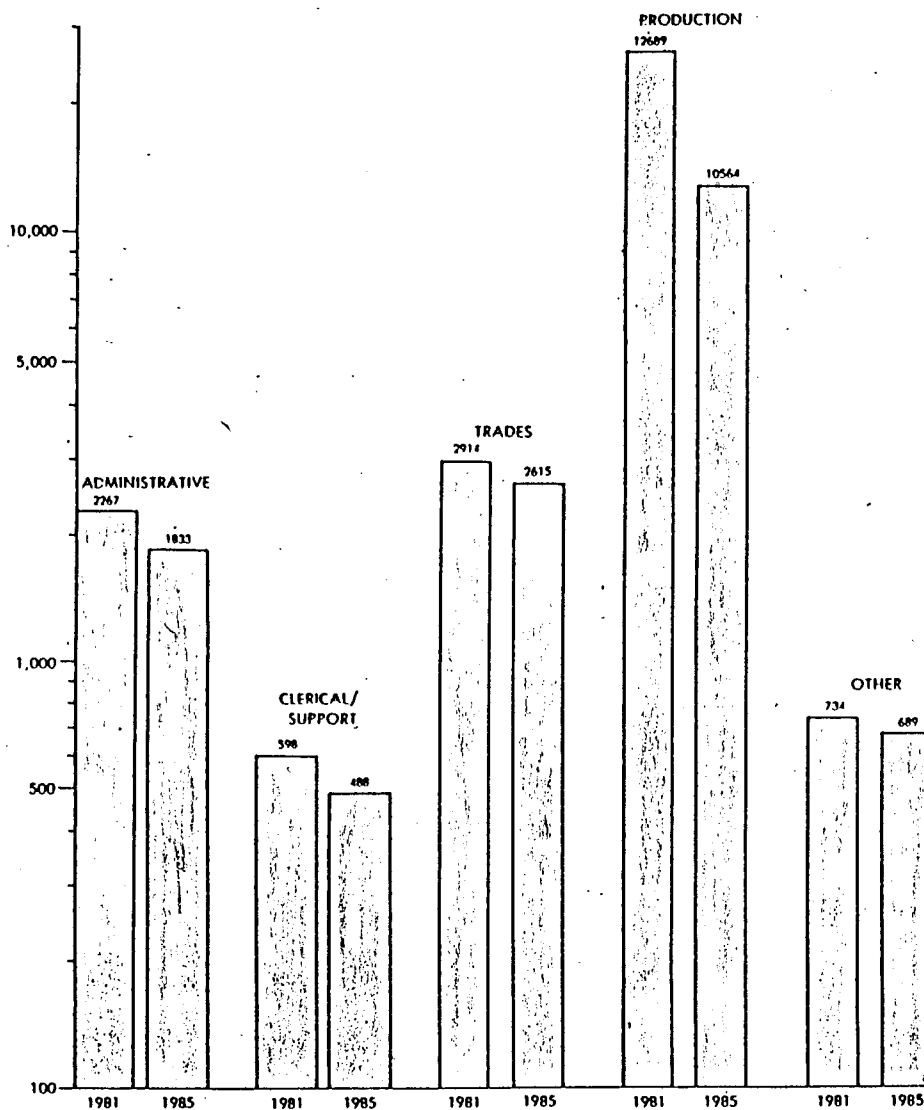


Table 14 : Employment Change by Occupation

<u>Occup.</u>	<u>1981</u>	<u>1985</u>	<u>% CHG 81-85</u>
Admin	2267	1833	-19.1
Clerical	598	488	-18.3
Trades	2914	2615	-10.2
Prod.	12689	10564	-16.7
<u>Other</u>	<u>734</u>	<u>689</u>	<u>-6.1</u>
Total	19202	16189	-15.6

Source : Fieldwork, 1986.

of security. For the sampled plants these beliefs do not appear to be the case. Indeed, the administrative personnel show a rather large decline relative to other occupational groups. While production line employees show a greater absolute decline the relative decline is less than for the clerical or administrative groups (Table 14). Over the study period administrative personnel decline from 2267 to 1833 for a net change of -19.1 per cent over 1981.

Closely, although not surprisingly, aligned with administration is the clerical/support staff group where the net decrease over 1981 was 18.3 per cent. The change exhibited in the trades group is -10.2 per cent and this is totally or partially attributed to the cessation of apprenticeship programs at several of the plants throughout the province. In the production category employment drops from a 1981 level of 12689 to a 1985 level of 10564 for a net change of -16.7 per cent. The

decline in this group is attributable to at least three factors. First, the introduction of new technology at some plants led to a need for fewer workers. Second, the fact that some plants closed down part of their on site operations. And third a reorganization and reorientation in decision making processes. Clearly, the results suggest that there has been a realignment of occupation within the firms under study. The question remains however, how do the changes relate to gender? It is to this that we now turn.

Occupation by Gender

Table 15 highlights changes which have occurred in the different occupational groups by gender. By gender male clerical/support positions decline by 13 per cent while for females the percentage is 22.7 almost twice that of males. For production line personnel the overall decline is 16.7 per cent with males declining by 16.3 and females by 32.2 per cent. The next substantial decline is in the trades group with males accounting for 100 per cent of the total 10.2 per cent drop. Note no females in this category were dropped because the sample in 1981 only included one female. She was still employed in 1985. In the administrative group the total decline is 19.1. For males in that group the decline between 1981 and 1985 is 19.6 per cent while for females it is 1.5 per cent. In other words, male employment in the administrative group is much greater than that of females. However, there were among the plants which were sampled very few females employed in this position. The final

Table 15 : Occupation by Gender

<u>Occup.</u>	<u>1981(M)</u>	<u>1981(F)</u>	<u>1985(M)</u>	<u>1985(F)</u>	<u>% CHG Male</u>	<u>% CHG Female</u>
Admin	2202	65	1769	64	-19.6	-1.5
Clerical	269	329	234	254	-13.0	-22.7
Trades	2913	1	2614	1	-10.2	0
Prod.	12391	298	10362	202	-16.3	-32.2
Other	723	11	661	28	-8.5	+154.5

Source : Fieldwork, 1986.

Table 16 : Proportion of Trade Workers by Region

<u>Region</u>	<u>1981</u>	<u>1985</u>
Coast	60	61
Interior	61	64

Source : Fieldwork, 1986.

Table 17: Proportion of Production Workers by Region

<u>Region</u>	<u>1981</u>	<u>1985</u>
Coast	71	62
Interior	76	77

Source : Fieldwork, 1986.

group (other) shows males declining by 8.5 per cent and females increasing by 154.5 per cent. Increases in this group reflect the importance of part-time/on call staff (e.g. relief work, unskilled labour pool supplement). Overall, during the

recession, among the sampled plants, the relative position of females in the workforce has deteriorated. Between 1983 and 1984 a number of plants had marginal increases in employment but these were more than offset by declines in other plants. The period 1984 to 1985 again saw some large absolute decreases however this trend was counteracted by a general levelling off.

Employment Profiles of Sampled Firms 1981-1985

Figures 10, 11 and 12 detail the employment profiles of the sampled plants. Plant level variations show considerable differences in the rate and direction of change both by region and sub-sector. In the three graphs which detail the change the X axis represents time while the Y axis represents actual employment levels. Each graph was plotted on three cycle semi-log paper. The first point to make is that the in coastal region (Figure 10) employment change appears to be more chaotic than in the interior. Indeed, only one interior plant experiences a precipitous decline between 1983 and 1984. This abrupt drop was not due to economic factors but rather to a fire which destroyed the mill. Subsequently, the mill was reconstructed in 62 days at a cost of \$4.7 million. The mill, now technically more efficient has a production capacity of 65 million board feet per year, runs two shifts per day but employs 40 people less than the old mill. Apart from this anomaly the interior sample appears to exhibit a high degree of collective stability. By contrast the coastal sample fluctuates widely. A

closer look at this group shows a general downward trend for the period 1981-1982 with a relative levelling off between 1982-1983. Before looking at the three production contexts it is interesting to look at some of the individual plant responses and in particular responses centred around new technology.

Some examples of the use of technology and a decline in employment are provided by plants A and C (Figure 10). For plant A investment in more technically advanced production equipment totalled \$10 million while for plant C investment amounted to \$23 million. Plant G (Figure 10) not only provides a good example of investment and technical change but also of what Massey and Meegan call "compensatory scrapping". The old mill which employed 600 was eventually scrapped and a more technically advanced mill employing 150 replaced it (on the same site). This "modernization" reflects the "managing for survival" approach where the intent is to produce a "lean, tough agile competitor" (MacKay, 1983, p. 342). The structural changes were occasioned by a change in product demand and market orientation. Indeed, 80 per cent of this plant's output is exported and of that 80 per cent only 10 per cent is shipped to the United States. The same is also true of plant F where there has been a decrease in exports to the U.S. but an increase in exports to the E.E.C. and other markets. At plant D however there was investment in new technology but this was accompanied by an increase in employment of 15. The reason for the increase was a conversion of part of the old mill into a tie mill. In short

this mill diversified its product mix and this helped to create a need for additional employees. Overall, the two sample groups showing the most stability are interior sawmills and pulp and paper mills. Indeed, in total employment in interior pulp and paper mills actually increased. The group exhibiting the most abrupt change was that of the coastal sawmills as evidenced by the slope of the total employment curve for that group (Figure 10) particularly between 1981 and 1982. Present corporate plans continue to focus on producing higher value-added products which in turn means the utilization of new technologies. Given the recent past experience this may signal the further loss of jobs in the coastal region.

In summation, major losses are greater in the coastal region than in the interior. This trend reflects, in part, the fact that a greater proportion of larger, older, less technically advanced plants were coastal and such were more labour intensive. As the recession set in the first cost-cutting measure was to reduce employment levels.

Employment Change by Plant Size

The data contained in Table 18 are used to determine the association between plant size and significant job change. Job change is again assigned to one of three categories : major change ≥ 50 , minor change ≤ 49 and no change. These categories are cross-classified against small ≤ 250 and large ≥ 251 plants and the null hypothesis of independence is tested at the 0.05 level

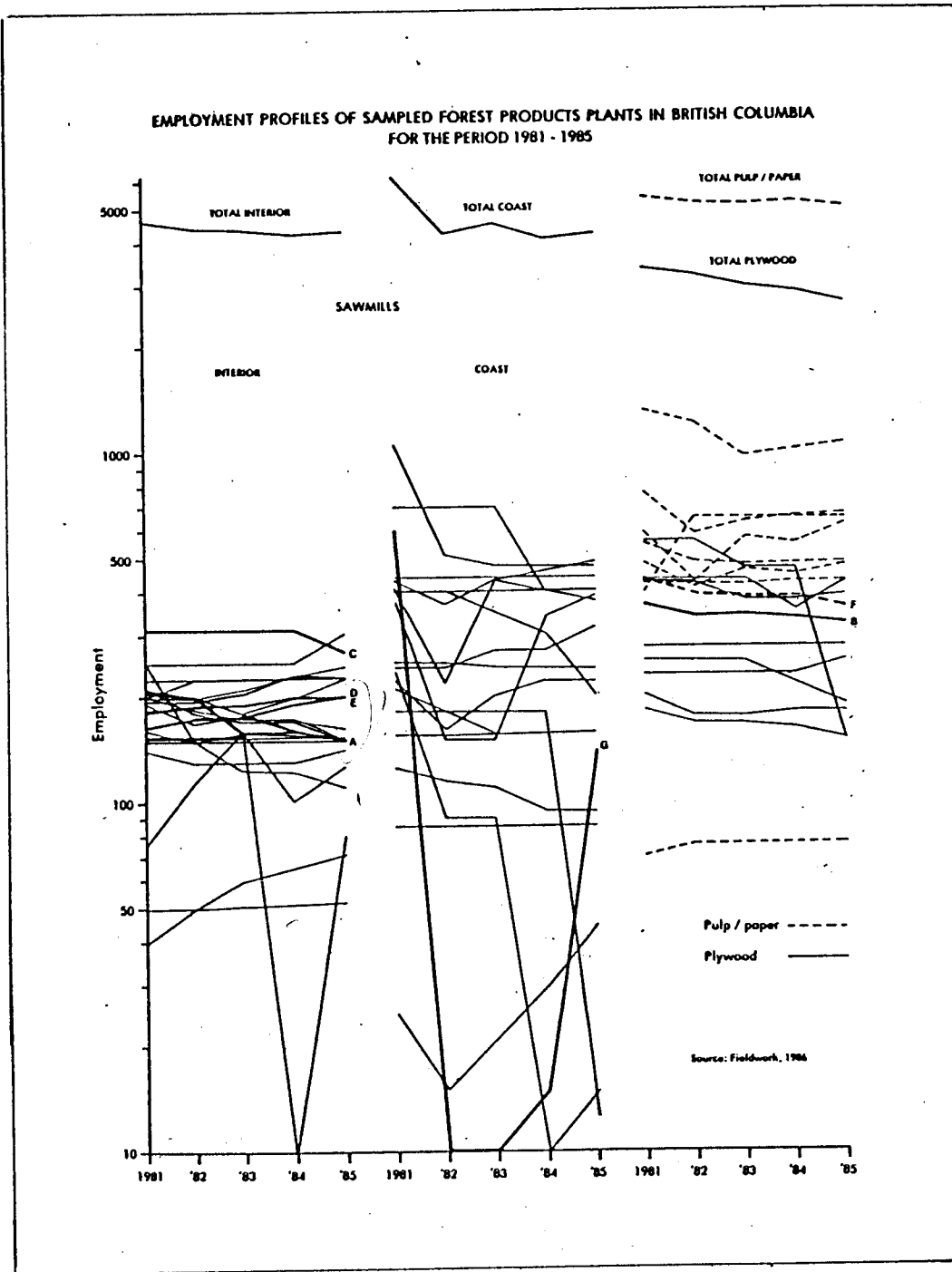


Figure 10 : Employment Profiles : Total Sample.

EMPLOYMENT PROFILES OF SAMPLED FOREST PRODUCTS PLANTS
FOR COASTAL REGIONS OF BRITISH COLUMBIA
FOR THE PERIOD 1981 - 1985

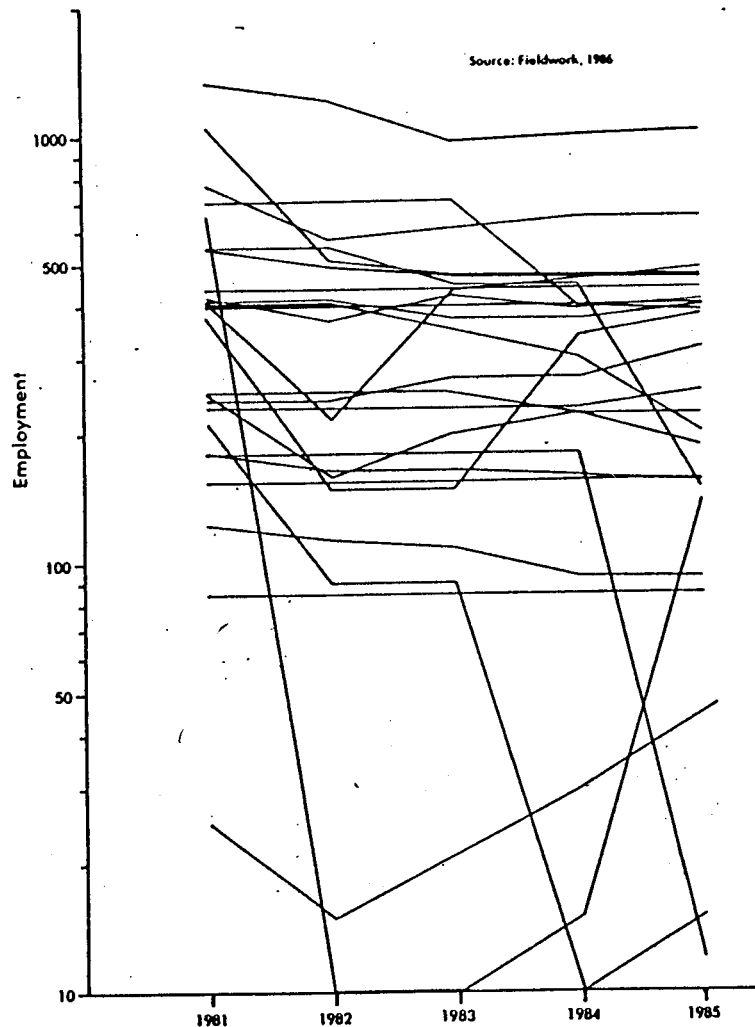


Figure 11 : Employment Profiles : Coastal Region.

EMPLOYMENT PROFILES OF SAMPLED FOREST PRODUCTS PLANTS
FOR INTERIOR REGIONS OF BRITISH COLUMBIA
FOR THE PERIOD 1981 - 1985

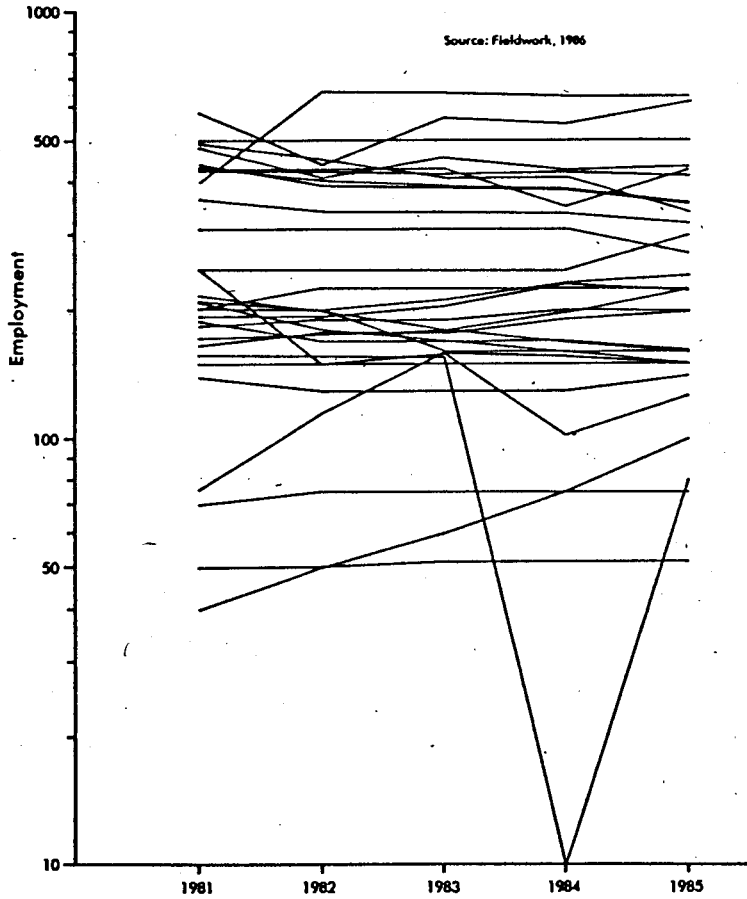


Figure 12 : Employment Profiles : Interior Region.

Table 18 : Job Change and Plant Size : 1

<u>Size</u>	<u>Major</u>	<u>Minor</u>	<u>Other</u>	<u>Total</u>
Small	4	8	17	29
	(4)	(7)		
Large	<u>15</u>	<u>10</u>	<u>9</u>	<u>34</u>
Total	19	18	26	63

Source : Fieldwork, 1986.

Notes:

1. $\chi^2 = 8.710$, $p = 0.0128$.
2. Cramer's V = 0.372.
3. Likelihood-Ratio $\chi^2 = 9.110$, $p = 0.0105$.
4. Major job change = loss ≥ 50 .
5. Minor job change = loss ≤ 49 .
6. Small plant = ≤ 250 employees, Large plant = ≥ 251 employees.
7. Figure in brackets refer to those plants which had been sampled but which subsequent to 1981 had closed.
8. Others refers to those plants which either did not change employment levels or which gained in employment.

of significance. With 2 degrees of freedom and a 0.05 critical region the χ^2 value is 5.991. The computed χ^2 (8.710) is in the critical region so the null hypothesis must be rejected and it is concluded that the size of plant is associated with significant job change. In particular, the results suggest that large plants contribute more to major job loss over the period 1981-1985. Table 19 gives the adjusted standardized deviates for the data contained in Table 18. The residuals indicate that we can expect greater job loss in large sized plants than in smaller ones. For the category labelled no change the signs suggest that it is the smaller plants which exhibit the most stability. To test this notion a subsequent χ^2 test was

Table 19 : Adjusted Standardized Deviates

<u>Size</u>	<u>Major</u>	<u>Minor</u>	<u>No Change</u>	<u>Total</u>
Small	-2.6	-0.2	2.6	-0.2
Large	<u>2.6</u>	<u>0.2</u>	<u>-2.6</u>	<u>0.2</u>
Total	0.0	0.0	0.0	0.0

Source : Fieldwork, 1986.

Notes :

1. Major job change = loss ≥ 50 employees
2. Minor job change = loss ≤ 49 employees
3. Small plants = ≤ 250 employees
4. Large plants = ≥ 251 employees.

performed. In this case the category no change is disaggregated into firms which do not shed labour and those which gained. The calculated χ^2 (8.749) with 3 degrees of freedom and a 0.05 critical region still led to a rejection of the null hypothesis. In short, large plants and significant job decline are associated. Both χ^2 tests were partitioned to test for linearity. In the first case the departure from linearity is .008 and in the second .523. Both cases suggest that there is a significant increase in job decline as the size of the plant increases. In a relative sense however, small firms had a greater proportion of firms laying off 10 per cent or more of their workers. In general, this reflects the fact that during the recession the majority of firms (48 out of 74) dropped employment levels.

Multi-plant versus Single Plant Firms

The organization of the firm (i.e. multi or single plant) has potential implications for employment levels. It is often argued, for example, that small plants are particularly vulnerable to recessions. On the other hand, multi-plant firms have more discretion as to the when, where and type of employment change. To test the association between job change and firm organization a χ^2 test was performed. Single- vs multi-plant firms are cross-classified against major job loss, minor job loss and no change (Table 22). With 2 degrees of freedom and a χ^2 value of 16.331 the results are statistically significant beyond .0004 and indicate the major job loss is more likely to occur in multi rather than single plant firms.

Table 20 : Job Change by Plant Size : 2

<u>Size</u>	<u>Major</u>	<u>Minor</u>	<u>No Change</u>	<u>Gain</u>	<u>Total</u>
Small	4	8	5	12	29
Large	<u>15</u>	<u>10</u>	<u>3</u>	<u>6</u>	<u>34</u>
Total	19	18	8	18	63

Source : Fieldwork, 1986.

Notes :

1. $\chi^2 = 8.749$, $p = 0.0328$
2. Likelihood-Ratio $\chi^2 = 9.152$, $p = 0.0273$
3. Cramer's V = 0.373.
4. Major job change = loss ≥ 50 .
5. Minor job change = loss ≤ 49 .

Table 21 : Adjusted Standardized Deviates

<u>Size</u>	<u>Major</u>	<u>Minor</u>	<u>No Change</u>	<u>Gain</u>	<u>No Change</u>
Small	-2.6	-0.2	1.0	2.1	0.3
Large	<u>2.6</u>	<u>0.2</u>	<u>-1.0</u>	<u>-2.1</u>	<u>-0.3</u>
Total	0.0	0.0	0.0	0.0	0.0

Source : Fieldwork, 1986.

Notes :

1. Major job change = loss ≥ 50 .
2. Minor job change = loss ≤ 49 .

Further tests were conducted to examine the relationship between organization and region. In the first instance job loss at multi-plant firms is cross-classified against region (Table 23). With 2 degrees of freedom the results are significant at the 10 per cent level. The indications are that multiplant firms on the coast are more likely to lay off workers than their counterparts in the interior. In this regard, it might be noted

that if there are lay-offs and if skilled workers are required at some later date the coastal region has a larger labour pool from which to draw. In the interior there is, it is felt, greater reluctance to lay off workers because the costs of securing and training new employees, especially in the interior, may be greater than retaining employment levels through the recession. For single plant firms the results are somewhat different. Here major and minor job loss and no change for single plant firms are cross-classified against region (Table 24) and single plant firms do not exhibit any statistical difference regionally. Moreover single plant firms are more likely to exhibit either minor loss or no change in employment. If multi- and single-plant firms are compared by region then it appears that multi-plant firms are more likely to shed labour in the coast but not the interior.

Patterns of Shift Work

As demand changes, a plant may alter the number of shifts it operates. Since running extra shifts entails increases variable costs, especially that of labour, plants may reduce the number of operating shifts as a cost saving measure (even if average fixed costs increase). Not only does this reduction cut back on straight-time wages paid out it also reduces the extra wages paid out for second and third shift differentials. Further there are reduced costs associated with utility bills as well as administrative and clerical staff wages. Thus, there is a direct

Table 22 : Job Loss by Firm Organization

<u>Organi zation</u>	<u>Major Loss</u>	<u>Minor Loss</u>	<u>No Change</u>
Multi- Plant	15	10	5
Single Plant	4	8	21
Total	19	18	26

Source : Fieldwork, 1986.

Notes :

1. $\chi^2 = 16.331$, $p = 0.0003$, d.f. = 2
2. Cramer's V = 0.509
3. Likelihood-Ratio $\chi^2 = 17.449$, $p = 0.0002$

Table 23 : Job Loss by Region : Multiplant Firms

<u>Region</u>	<u>Major Loss</u>	<u>Minor Loss</u>	<u>No Change</u>
Coast	11	4	1
Interior	4	6	4
Total	15	10	5

Source : Fieldwork, 1986.

Notes :

1. $\chi^2 = 5.357$, $p = 0.0687$, d.f. = 2
2. Cramers V = 0.423
3. Likelihood-Ratio $\chi^2 = 5.594$, $p = 0.0610$

Table 24 : Job Loss by Region : Single Plant

Region	Major <u>Loss</u>	Minor <u>Loss</u>	No <u>Change</u>
Coast	1	2	6
Interior	3	6	15
Total	4	8	21

Source : Fieldwork, 1986.

Notes :

1. $\chi^2 = 0.049$, $p = 0.9757$, d.f. = 2
2. Cramer's V = 0.039
3. Likelihood-Ratio $\chi^2 = 0.050$, $p = 0.9756$

Table 25 :Number of Operating Shifts
Employed by Number of Plants 1981-1985

<u>Year</u>	1 <u>Shift</u>	2 <u>Shift</u>	3 <u>Shifts</u>	<u>Fluc.</u>	<u>No Shifts</u>
1981	6	36	20	1	0
1982	19	24	10	9	1
1985	10	30	17	4	2

Source : Fieldwork, 1986.

Notes : 1,2 and 3 refer to the number of daily operating shifts at each plant. Fluctuating means that each plant altered the number of shifts between 1,2 or 3 depending upon market demand. No shifts is self-explanatory.

Table 26 :Percentage of Operating Shifts

<u>Year</u>	<u>1 Shift</u>	<u>2 Shifts</u>	<u>3 Shifts</u>	<u>Fluc. Shifts</u>	<u>No</u>
1981	9.5	57.1	31.7	1.5	0
1982	30.1	38.0	15.8	14.0	1.5
1985	15.9	47.6	27	6.3	3.1

Source : Fieldwork, 1986.

Notes : 1,2 and 3 refer to the number of operating shifts at each plant. Fluctuating means that shifts were altered between 1,2 and 3 to meet market conditions. No shifts is self-explanatory.

Table 27 :Number of Operating Shifts by Region : Coast

<u>Year</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Fluc.</u>	<u>No Shift</u>
1981	2	14	8	1	0
1982	9	9	4	1	1
1985	5	12	5	2	2

Source : Fieldwork, 1986.

Table 28 :Number of Operating Shifts by Region : Interior

<u>Year</u>	<u>1 Shift</u>	<u>2 Shifts</u>	<u>3 Shifts</u>	<u>Fluc. Shifts</u>	<u>No Shift</u>
1981	4	22	12	0	0
1982	10	15	6	7	0
1985	5	18	12	3	0

Source : Fieldwork, 1986.

Table 29 :Shift Work by Firm Size : Large

<u>Year</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Fluc.</u>	<u>No Shift</u>
1981	0	18	13	0	0
1982	7	9	7	0	0
1985	0	12	12	0	0

Source : Fieldwork, 1986.

Table 30 :Shift Work by Firm Size : Small

<u>Year</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Fluc.</u>	<u>No Shift</u>
1981	6	18	7	1	0
1982	12	15	3	9	1
1985	10	18	5	4	2

Source : Fieldwork, 1986.

relationship between the number of operating shifts, reduced employment levels and the recession for all occupational groups.

Tables 25 and 26 detail the patterns of shift work both in absolute and relative terms. In 1981 6 plants were operating on

a one shift basis while in the same year 36 were running two shifts with the remainder either operating three shifts (20) or fluctuating (1). In 1981 all plants operated at least one shift. By 1982 this had changed remarkably. The number of plants operating on a one shift basis rises from 6 to 19 (more than three times the 1981 level); the number operating on a two shift basis declines from 36 to 24 while those which operated on a three shift basis falls from 20 to 10 with nine now fluctuating and one recording no shifts. The number of operating shifts did increase by 1985. They did not return to their previous 1981 levels however.

Table 26 shows the proportion of operating shifts among the sampled firms. Clearly the greatest changes occur between 1981 and 1982. For example, only 9.5 per cent of the plants are on a one shift basis in 1981. By 1982 the percentage of plants operating on a one shift basis increases from 9.5 to 30.1 per cent. In 1981 57.1 per cent of the sample plants are operating on a two shift pattern but by 1982 only 38.0 per cent continue to do so. The plants which operate on a three shift basis declines from 31.7 percent (1981) to 15.8 per cent (1982). It should be noted that the change in three shifts pattern is not as large as the change in the one and two shift groups mainly because the majority of three shift plants are pulp and paper plants which of necessity operate on a 24 hour 7 day-a-week basis. Moreover, when the recession set in the demand for pulp and paper did not decline to same extent as lumber and plywood.

Finally, the proportion plants which operated on a no shift basis rises from 0 to 1.5 per cent by 1982. By 1985 this increases to 3.1 per cent. In large part this was due to the fact that two plants had ceased operations completely while undergoing a corporate restructuring which entailed employee ownership.

Production Context of Employment Change

Massey and Meegan interpret job loss as occurring in one of three production contexts. The first is intensification where change increases the productivity of labour by shedding workers without drops in output or functions. The second, rationalization, occurs with reductions in plant capacity including plant closure. The third is termed investment and technical change and here job loss results from the incorporation of more technically advanced production equipment. It must be recognized that these categories are not exhaustive. In particular, job loss may also arise from lay-offs dictated by declining demand, interplant functional transfers, or through redefined job tasks. Apart from not being exhaustive these categories are not mutually exclusive and indeed there are difficulties associated with measuring intensification. The following classification of plants to one of these categories therefore did involve a degree of judgement.

Table 31 :Major Employment Change Among Sampled Plants

Sector	Intens- ification	Ration- alization	Invest/ Tech.Chg	No Change	Gain
Saw	8	5	13	5	12
Ply	0	(11) ¹ 3	2	1	2
P/P	2	0	4	2	4

Source : Fieldwork, 1986.

- Figure in brackets refers to the plants which had been sampled but which had subsequent to 1981 closed.

In aggregate, among the sampled plants investment and technical change is deemed to be the dominant form of job loss particularly in sawmilling. A total of 19 plants experienced "major" job reducing technical change in production equipment. That is, in 19 cases the job loss involved more than 50 employees per plant and these changes are attributed to equipment such as automatic bin sorters. As Table 31 indicates the impacts of technological change are greater in the coastal region than in the interior. In the interior 29 plants either experience minor job loss or no change whatsoever. These results suggest that a convergence of plant process technology may be taking place where the old (coastal) vs new (interior) dichotomy which existed in the past, has been reduced. Size differences by number of employees have also been reduced and this trend is likely to continue as firms continue to cut costs. Of the remaining plants there are varying degrees of change with 12 cutbacks, 18 expanding operations, 8 closing down part of their

operations which were either in production processes or office operations.

Rationalization is also a major source of job loss. Indeed, 19 plants which were sampled had closed down prior to 1985. Thus, in effect rationalization is almost as important as investment and technical change in terms of plants affected. One firm for example, closed down part of its operation which, in 1981 employed 1064 and in 1985 only 479. With respect to investment and technical change relative to capacity reductions one firm shut down operations completely only to rebuild on the same site. Prior to closure the plant employed 600 and had a capacity of some 225 mfbm per eight hour shift. In 1985 the employment level stood at 140 and the capacity at 160 mfbm. Part of the reason for the change occurring at this as well as other coastal plants lies in the nature of the timber available. In short, as the quality and size of available timber on the coast continues to decline it is expected that further capital using technology will be incorporated in the production system. This has led to a convergence of size differences by number of employees a trend which is likely to continue as firms try to reduce costs in increasingly competitive markets.

Job Change and New Technology

The introduction of new technology is often regarded as labour displacing. Tables 35 and 36 indicate the changes which have occurred within the coastal and interior regions. The

tables are for illustrative purposes only as there was no theoretical justification for conducting formal tests on the data. This arises from the fact that several cells have 0 entries which in turn affects the expected values. However, from the tables it is clear that the effects of technology with respect to major job loss have been greater on the coast than in the interior. In part this arises from the fact that the coastal mills have been older and thus more labour intensive. For example, the first plywood plant to operate in B.C.'s interior did not open until 1951. Even more significantly, this mill was the first mill in North America to operate and specialize in the peeling of small logs. In short, interior plants being of a later vintage had already incorporated more advanced technology. Thus any change in overall employment levels were in the form of minor loss. Indeed if new technology had an effect on employment in the interior it came in the form of automatic bin sorters and conveyor belts from green chain to planer operations. To further test whether major job loss is independent of region a subsequent χ^2 test was carried out (see, Table 32). The results indicate that the introduction of new technology has had a greater effect on the coast than in the interior.

Summary

The chapter began by looking at aggregate employment change for the respondents over the period 1981-1985. For the group as a whole employment between 1981 and 1985 declined significantly

Table 32: Job Change/Technology/Region

<u>Region</u>	<u>Major</u>	<u>Minor</u>	<u>No Change</u>
Coast	13	7	8
<u>Interior</u>	<u>6</u>	<u>11</u>	<u>18</u>
Total	19	18	26

Source : Fieldwork, 1986.

Notes :

2. $\chi^2 = 6.618$, $p = 0.0366$.
3. Likelihood-Ratio $\chi^2 = 6.705$, $p = 0.0350$.
4. Cramer's V = 0.324.

Table 33 :Number of Plants
Incorporating New Technology : Coast

<u>Sector</u>	<u>New Technology</u>	<u>No New Technology</u>
Sawmills	15	3
Pulp and Paper	3	0
Plywood	5	2

Source : Fieldwork, 1986.

Table 34 :Number of Plants
Incorporating New Technology : Interior

<u>Sector</u>	<u>New Technology</u>	<u>No New Technology</u>
Sawmills	20	5
Pulp and Paper	5	2
Plywood	3	0

Source : Fieldwork, 1986.

Table 35 :Job Change/New Technology : Coast

<u>Sector</u>	<u>Major Loss</u>	<u>Minor Loss</u>	<u>No Change</u>	<u>Gain</u>
Sawmills	8	3	4	3
Pulp and Paper	3	0	0	0
Plywood	2	4	0	1

Source : Fieldwork, 1986.

Notes :

1. Major loss is defined as loss equal to or greater than 50 employees.
2. Minor loss is defined as loss equal to or less than 49 employees.
- 3.

Table 36:Job Change/New Technology : Interior

<u>Sector</u>	<u>Major Loss</u>	<u>Minor Loss</u>	<u>No Change</u>	<u>Gain</u>
Sawmills	5	9	2	9
Pulp and Paper	1	1	1	4
Plywood	0	1	1	1

Source ; Fieldwork, 1986.

Notes:

1. Major loss is defined as loss equal to or greater than 50 employees.
2. Minor loss is defined as loss equal to or less than 49 employees.

with the most rapid change taking place in the period 1981-1982. From 1983-1985 employment levels remained fairly static. In short, permanent job loss for the sample is some 3000 employees. If this is combined with the 2400 jobs lost through closure then there has been a 25.1 per cent decline in employment. Next we looked at regional patterns of job change where it was concluded

that the greatest change had taken place in the coastal region. By sub-sector sawmills, and in particular coastal sawmills exhibited the highest degree of net overall decline for the sample period with pulp and paper showing the least amount of change. By occupation it was noted that administrative personnel no longer enjoy the comfort of job security. Indeed, relative to other occupations administrative personnel are just as likely to be laid off. Examination of the employment profiles of the sampled firms showed considerable variation in both the direction and rate of employment change. For the interior there appeared to be more stability than on the coast which exhibited a more erratic pattern of behaviour.

By plant size it appeared that smaller firms were able to maintain or increase employment levels thus giving credence to the notion that it is small business which creates employment. In particular this observation was true of owner-operated single plant interior facilities. By production context investment and technical change appears to have underlined employment change among the respondents. If, however, I include those selected in the sample but not responding because of closure, then rationalization was also important. Equally important to the future prospects of employment are the market linkages which a firm enjoys. The next chapter looks how market linkages have, for the sample, changed.

CHAPTER IV

CHANGING MARKET LINKAGES 1981-1985

The quality and prospects of current and future employment levels ultimately rests on the performance of firms in the market place, that is, on the nature of market linkages. Whether or not firms are gaining or declining in markets, have a competitive edge based on quality or efficiency, serve bulk or high value-added markets, are experiencing growing or declining market shares has strong implications for employment. Moreover, cost minimization does not equal revenue maximization. The purpose of this chapter is to look at the market performance of the sampled plants between 1981 and 1985 in terms of geography, product mix, product plans and export plans. It is expected that the recession may have led to a concerted effort to expand export market linkages as domestic demand dropped. It is also expected that product mix has changed relative to shifting market linkages.

Major Markets of Sampled Plants 1981 and 1985

Tables 37 and 38 break down major markets for the sampled plants in the coast and the interior for 1981 and 1985. Clearly there are distinct differences between the coastal plants and those of the interior. In part, this distinction derives from the nature of the product being produced. Interior sawmills, for example, "specialize" in construction grade lumber destined for

the United States housing market. Coastal sawmills, on the other hand, are geared to Japan, the E.E.C. and produce what is essentially clear higher value-added products. ¹ Part of the coastal-interior distinction stems from the type and size of the logs being used as those on the coast are much larger sized cedar and hemlock compared to the logs available in the interior. Further, mills on the coast are typically larger, presumably to take advantage of so-called "economies of scale" (or because they are obsolescent). This, in part helps to explain the changes which have taken place in employment.

The most important market for the sampled plants of the interior was, and continues to be, the United States (see, Table 37). 1981 exports to the U.S. constituted 61.4 per cent of output dropping only slightly to 60.5 per cent by 1985. Of the secondary markets exports to Japan rose by 1.6 per cent from 4.6 per cent in 1981 to 6.2 per cent in 1985. The increase to Japan was offset by a decrease in domestic consumption which dropped by 1.2 per cent from 22.8 per cent in 1981 to 21.6 per cent in 1985. The remaining markets, Other PAC (other Pacific Rim), the E.E.C. and other remained (e.g. Middle East) fairly constant between 1981 and 1985. For the coastal plants the markets are somewhat different.

¹Clear lumber comes from the outer section of the tree which is comprised of sapwood and outer heartwood. This region is relatively free of branches and will yield...lumber comparatively free from large characteristics and suitable for high quality products....(National Lumber Graders Authority, 1982, p.46)

Table 37: Markets of Sampled Plants 1981 and 1985 : Interior

<u>Market</u>	<u>1981</u>	<u>1985</u>
B.C.	6.1	5.2
Canada	16.7	16.4
U.S.	61.4	60.5
Japan	4.6	6.2
Other PAC ¹	0.5	0.5
EEC	8.9	9.2
Other	1.0	1.4

Source : Fieldwork, 1986.

¹Other Pacific Rim Countries.

Table 38: Markets of Sampled Plants 1981-1985 : Coast

<u>Market</u>	<u>1981</u>	<u>1985</u>
B.C.	12.1	13.3
Canada	22.2	19.2
U.S.	36.4	33.8
Japan	16.7	19.3
Other PAC ¹	3.4	4.2
EEC	5.6	7.5
Other	3.2	1.7

Source : Fieldwork, 1986.

¹Other Pacific Rim Countries.

The sampled coastal plants continue to export about one third of their output to the U.S. (36.4 per cent in 1981 and 33.8 per cent in 1985, Table 38). Over the same period linkages with the Pacific Rim played an increasing role as exports to Japan and other Pacific Rim countries rose by approximately 4 per cent. In addition, exports to the E.E.C. increased from 5.6 to 7.5 per cent while domestic consumption declined from 22.2 per cent to 19.2 per cent. In short, these results suggest that the coast is playing a much more active role in geographically diversifying the markets of British Columbia's forest products.

In reaction to the recession the interior plants did not, for the most part, change their aggregate pattern of export behaviour. The United States was, and continues to be, the major market for the interior plants in the sample. What did change was the nature of the product. While still dominantly construction grade there was a small move toward producing a higher valued products such as pine panelling. An important strategy for smaller plants was not to expand markets but rather, to maintain and solidify existing markets by offering faster service most often at a reduced price.

Export Thrust

The ability to expand exports is one key to maintaining high levels of employment. It is also often argued that in times of recession firms seek to expand exports. Over the sample period 20 plants were able to expand exports in absolute terms while 43

either decreased or saw no change in export sales (Table 39). In sawmilling, for example, 13 firms increased export levels, 11 firms experienced a decrease and 19 did not change. Interestingly of the 13 firms which increased export levels 9 were from the interior region and of the 11 which decreased only 5 were from the interior. In terms of employment levels of the 20 firms which increased export sales 14 experienced increases in employment.

Generally the point to be made is that for one-third of the plants the expansion of exports became increasingly important while for one-half of them the maintenance of established customers was more important. To test the association between changes in export sales ratios and regions Tables 40-42 were aggregated to form a 2 X 2 contingency table. The null hypothesis tested was that the increase or decrease is independent of region or equivalently, that the proportion of increases in the coastal region is equal to the proportion of increases in the interior region. The resulting χ^2 was 2.923 with a p of 0.0873. The Likelihood ratio χ^2 was calculated at 2.926 with a p of 0.0872. This supports the null hypothesis and suggests that the changes in export sales ratios are not related to region. Residual analysis however indicates that the coast is more likely to expand its export to sales than is the interior. This is not surprising. As the previous figures have indicated it is in the coast where some significant changes in export markets have occurred. To satisfy these newer markets the

Table 39 : Absolute Export Performance of Sampled Plants,
1981-1985

<u>Region</u>	<u>Increase</u>	<u>Decrease</u>	<u>No Change</u>
<i>Coast</i>			
Saw	4	6	7
Ply	4	1	0
P/P	0	0	3
<i>Interior</i>			
Saw	9	5	12
Ply	2	0	3
P/P	1	0	6

Source : Fieldwork, 1986.

Table 40: Changes in Export Sales Ratios : Sawmills

<u>Region</u>	<u>Increase</u>	<u>Decrease</u>	<u>No Change</u>
Coast	9	6	2
Interior	10	6	10

Source : Fieldwork, 1986.

Table 41: Changes in Export Sales Ratios : Plywood

<u>Region</u>	<u>Increase</u>	<u>Decrease</u>	<u>No Change</u>
Coast	4	1	0
Interior	2	3	0

Source : Fieldwork, 1986.

Table 42 : Change in Export Sales Ratio : Pulp/Paper

<u>Region</u>	<u>Increase</u>	<u>Decrease</u>	<u>No Change</u>
Coast	1	0	2
Interior	1	0	6

Source : Fieldwork, 1986.

coastal region has exhibited more aggression in producing a higher value-added product (e.g. more clear cedar etc.).

Product Plans / Range and Markets

In order to combat recession firms may alter their future plans in terms of the range of product and export markets. For the sampled firms on the coast 13 plan to expand their product range while 12 do not. Of the interior plants 13 had plans to expand their product range while 25 had no plans to expand their product range (Table 44). The plans for the interior represent an attempt to produce a higher volume of clear lumber and thus go up -market while on the coast the plans are to produce more construction grade lumber to take advantage of the smaller

Table 43 : Adjusted Standardized Deviates

<u>Region</u>	<u>Increase</u>	<u>Decrease</u>
Coast	1.7	-1.7
Interior	-1.7	1.7

Source : Fieldwork, 1986

poorer quality timber or in essence move downmarket.

Multiplant firms have greater flexibility in shifting production to meet specialized markets. To test this association a chi-square test was performed with multi-plant and single plant firms cross-classified against trends in product mix (Table 46). The null hypothesis is that there is no difference in product mix trends between multi-plant and single plant firms. The calculated χ^2 of 5.639 with 2 degrees of freedom is significant at 10 per cent which suggests that multiplant firms are more likely to specialize while single plant firms are more likely to diversify or not change their product mix. Indeed 33 per cent of the plants belonging to multi-plant firms plan to move toward more specialized products while only 9 per cent of the single plant firms have such plans.

Closely aligned with product mix plans are the plans for export expansion. A chi-square test of the association between multi-plant and single plant firms and export plans was performed on the data contained in Table 48. The null hypothesis

Table 44 : Product Plans : Expand Range

<u>Region</u>	<u>Yes</u>	<u>No</u>
<i>Coast</i>		
Saw	10	7
Ply	3	2
P/P	0	3
<i>Interior</i>		
Saw	12	14
Ply	1	4
P/P	0	7

Source : Fieldwork, 1986.

tested was that the plans for both single and multi-plant firms are the same. The calculated χ^2 with 1 degree of freedom is 4.054. The null hypothesis is rejected and it is concluded that the export plans differ according to the organization of the firm. It is felt that this difference is reflective of the fact that multi-plant firms have, through their marketing departments, greater flexibility in seeking out new markets while single plants in large part deal through agencies such as Seaboard. In short, multi-plant firms have greater direct control over the exports of their products.

Related to product plans are plans to increase export markets. For the coastal firms in the sample 19 indicate plans to expand exports while 6 had no future plans to expand their export markets (Table 47). For the interior sample 18 wish to

Table 45 : Trends in Product Mix Multi vs. Single Plant

<u>Firm</u>	<u>Diversify</u>	<u>Specialize</u>	<u>No Change</u>
Multi	6	10	14
Single	9	3	21
Total	15	13	35

Source : Fieldwork, 1986

Notes :

1. $\chi^2 = 5.639$, $p = 0.0596$, d.f. = 2
2. Cramer's V = 0.299, Likelihood-Ratio $\chi^2 = 5.847$ $p = 0.0537$

Table 46 : Market Plans : Export Expansion

<u>Region</u>	<u>Yes</u>	<u>No</u>
<i>Coast</i>		
Saw	14	3
Ply	2	3
P/P	3	0
<i>Interior</i>		
Saw	11	15
Ply	1	4
P/P	6	1

Source : Fieldwork, 1986.

Table 47 : Trends in Export Expansion : Multi vs Single Plant

<u>Firm</u>	<u>Increase</u>	<u>No Change</u>
Multi	22	8
<u>Single</u>	<u>16</u>	<u>17</u>
Total	38	25

Source : Fieldwork, 1986

Notes :

1. $\chi^2 = 4.054$, $p = 0.0441$, d.f. = 1
2. Cramer's V = 0.254, Likelihood-Ratio $\chi^2 = 4.122$ $p = 0.0423$

Table 48 : Trends in Product Mix

Region	Divers-ify	Special-ize	No Change
<i>Coast</i>			
Saw	6	8	3
Ply	1	2	2
P/P	0	0	3
<i>Interior</i>			
Saw	7	3	16
Ply	0	1	4
P/P	1	0	6

Source : Fieldwork, 1986.

Table 49 : Product Mix and Technolgy : Coast

	<u>Diversify</u>	<u>Speci alize</u>	<u>No Change</u>
New Tech	7	10	3
<u>No Tech</u>	<u>0</u>	<u>0</u>	<u>5</u>
Total	7	10	8

Source : Fieldwork, 1986

Notes :

1. $\chi^2 = 13.281$, $p = 0.0013$, d.f. = 2
2. Cramer's V = 0.729, Likelihood-Ratio $\chi^2 = 14.435$ $p = 0.0007$

Table 50 : Product Mix and Technology : Interior

	<u>Diversify</u>	<u>Speci alize</u>	<u>No Change</u>
New Tech	7	4	17
<u>No Tech</u>	<u>1</u>	<u>0</u>	<u>9</u>
Total	8	4	26

Source : Fieldwork, 1986

Notes :

1. $\chi^2 = 3.140$, $p = 0.2081$, d.f. = 2
2. Cramer's V = 0.287, Likelihood-Ratio $\chi^2 = 4.231$ $p = 0.1206$

expand exports while 20 did not plan to expand their export markets. Again this reflects a desire to service established markets in the United States. For the total sample 55 per cent had no plans to change their product range. There, are however, some interesting differences in product mix.

Product Mix

The coastal and interior operations produce different products for different markets and this difference is reflected in the product mix of both regions. Over the sample period 10 coastal firms had decreased their product mix (specialized), 7 expanded their product mix (diversified) and 8 exhibited no change (Table 48). For the interior region 8 firms diversified while 4 specialized and 26 exhibited no change. The relative degree to which product mix for the overall sample did not change reflects, it is felt, uncertainty over future markets. In other words a "better safe than sorry" approach was adopted by many firms, particularly the smaller interior operations.

The introduction of new technology allows the firm to implement change in the production process. Firms that changed their product-mix whether by specialization or diversification did so by the introduction of new technology. For example, new technology may allow the firm the ability to move upmarket and specialize or move downmarket and diversify its product mix. The question is : has there been a difference between the coast and the interior in terms of trends in product mix and the introduction of new technology? To test this association chi-square tests were performed on the data contained in Tables 49 and 50. The hypothesis tested is that the introduction of new technology has seen the same product mix trends occur on the coast and in the interior. For the coast (Table 49) the calculated χ^2 with 2 degrees of freedom is 13.281. For the

interior (Table 50) the calculated χ^2 with 2 degrees of freedom is 3.140. The null hypothesis must be rejected and it must be concluded that the introduction of new technology has produced different effects on the coast relative to the interior. Specifically coastal firms have either gone up or down market with relatively few showing no change in product mix. Indeed, 74 per cent of the respondents on the coast which had incorporated new technology in the production process indicated plans to either diversify or specialize. For the interior however, fully 61 per cent of the firms incorporating new technology in the production process had no plans to change their product mix. It is felt that these results are reflective of the fact that the interior mills are of newer vintage and that the firms in the interior are satisfied to service the United States housing market while the firms on the coast do not want to be subject to the vagaries of one market.

Summary

The chapter began by looking at the major markets of the coastal and interior firms for 1981 and 1985. Clearly there have been changes in market emphasis. The coastal firms have expanded markets in Japan and other Pacific Rim countries as well as the EEC. For the interior firms the United States continues to be the major source of demand. As the results indicate interior firms, for the most part, have no plans to expand their export markets while the same is not true for the coast. This is

particularly true for multi-plant firms where the results have indicated a strong desire to expand exports in terms of both geography and value. The dichotomy which exists between the coast and the interior was also exhibited in trends in product mix. While the coastal firms are generally either diversifying or specializing their product mix the interior firms remain content to produce a product mix which is geared to a large but singular market. Indeed, the interior firms want to maintain the status quo and this conservative attitude is clearly a form of risk avoidance aimed at preserving established market niches. This could in the future pose a problem especially if the demand for new housing in the U.S. declines. It is felt that these firms should be taking a page out of the coastal firms book by seeking alternate sources of demand. In doing so the future of interior firms would be more stable and thus so would be the future of employment.

CHAPTER V
SUMMARY AND SUGGESTIONS

The Coast vs The Interior

In examining regional differences it is necessary to have some understanding of the regions involved and the firms which exist within those regions.

Regions are constructed of many communities both large and small. However, the degree to which there is cohesiveness within those communities will in no small measure depend upon their size. It is felt that this unquantifiable cohesiveness may filter down to the plants operating within those regions and may contribute to management's willingness to maintain employment levels in the face of economic shocks.

The interior wood products industry is made up, by and large, of several smaller single plant operations. This is an important key to understanding the difference between the coast and the interior industries. Smaller independently owned forest products manufacturing operations have a higher degree of flexibility than their multiplant counterparts. The reason for this advantage stems from the top-heavy management structure associated with the decision-making process within multi-plant organizations. For multi-plant operations it often takes a "board" meeting to reach a consensus on strategy. For single plant operations the "board" is often comprised of two or three people all resident at the plant. Thus the decision which has to

be made is made now and not when all executives can get together. In short, the operations exhibiting a top heavy management structure have difficulty in responding quickly to changes in market demand (Sutton, 1973). The solution is to trim down management staff. As shown this as an option which was adopted during the period under study.

Another key to understanding labor relations within small communities derives from management's attitude toward labour, labour's attitude toward management, management's attitude and the role it sees in the community and community attitudes toward the plant. Numerous conversations with upper level plant-resident management within the interior suggest that they see their role in community development as central to maintaining stability within the community. In taking an active role in community affairs the plants management personnel gain increasing loyalty from other businessmen and community leaders. In short, management personnel were cognizant of their importance to a healthy community. Most of the plants visited in the interior region maintained an open door policy toward their employees. That is to say, if there was a problem which was deemed important to maintaining employee morale it is dealt with immediately. Several coffee room discussions revealed that labour's view toward management was somewhat similar. Labour did not see management as some ogre sitting around giving orders. Rather, labour viewed management as part of the team. Conversations with townsfolk and Chambers of Commerce for the

most part saw the plants as a positive attribute. There is pride attached to having those plants and there is pride in turning out a quality product. As a result, employees did not feel as though they were being mistreated by management. To illustrate the generally good labour-management relations it might be noted that at one plant, where employee productivity had increased, to show their appreciation for a job well done, management installed a sundeck/lunchroom on top of one of the warehouses. This sundeck was constructed in such a manner that it now serves as a picnic spot for employees and their families. In keeping with this family theme several plants have biannual company get togethers (one skating in the winter and one picnic in the summer) in addition to Christmas parties and Easter egg hunts.

It was noted earlier that this attitude prevailed amongst the smaller independently owned operations. While true, there are examples of large multiplant operations which have the same working and community relationships as those exhibited by the smaller operations (particularly in the interior). One reason for the differences lies in the attitude toward new technology. Notwithstanding the coast's more aggressive marketing it still does not belie the fact that in general, the coastal operation have "one of the greatest concentrations of obsolete infrastructure, outdated technology and debt-burdened, integrated companies" (The Province, January 15, 1987, p.31). In short, if the coast is to maintain its position as a provider of

quality wood products new technology and substantial investment is required.

Although interest in recession induced employment change receives much media attention during times of crises, research on the subject in this province at least has been relatively meager. This investigation of plant level employment change in the British Columbia wood processing and pulp and paper industries helps to fill that void. While temporal, financial, labour and international trade factors mitigated against a larger sample the results have significance for the future of the industry and for the future of regional employment. This study has also demonstrated the utility of plant level analysis. The question is what has been learned and what is left to be done?

In aggregate terms job loss among the surviving plants equalled -15.69 per cent. If those plants which had closed are included then aggregate job loss amounted to 25.1 per cent. This confirms the findings of Farris (1983). For the sample employment declined much more rapidly in the coastal region than in the interior. The difference is a reflection of the vintage of capital, the nature of the product produced in each region, the size of plant and differences in management styles. In the interior the use of more advanced technology is more widespread and reflects the fact that the coastal mills are historically older. In an attempt to "catch up" and adapt to smaller trees of poorer quality coastal mills have introduced new technology. The

precise magnitude of the relationship between more advanced sawmill technology and employment change requires further investigation. However, it is safe to say that, for the plants in the coastal region which have adopted some of the newer techniques, the effects on labour have been negative. That is, there was a larger overall net decline in employment levels in the coast than in the interior. The spatial differentiation as shown in this study also extends to products and product markets. The interior produces, in large part, construction grade dimension lumber bound for the United States. What this means for the future security of employees remains open to question. For the study period however, it appears that the interior was much more stable in terms of its regional labour market, particularly for those engaged in sawmilling. In plywood there was a decline in employment but this was mainly associated with : the rise in close substitutes such as particleboard and waferboard; a competition for high quality peeler logs which has forced up the price of raw materials; lower production costs in the interior relative to the coast; and market uncertainty which has meant that plywood producers on the coast have invested little in mill improvements (MacDonald, 1985).

Second, this study has pointed out the significance of small plants in the ability to maintain or increase employment in the midst of an economic crisis. While it is true that some plants did fail, of the surviving sampled plants losses were concentrated in larger multi-plant operations. Of those plants

maintaining employment levels only three employed 400 or more workers. The result found here appears to be consistent with some recent studies (Buongiorno, et.al., 1981) which suggest that wood processing optimum levels of employment are within the range of 100-250 employees. The results therefore suggest that further explicit investigation is required on the whole idea of plant/firm level economies and diseconomies as well as plant/firm level vertical and horizontal integration. Further, the research should be directed at the sawmilling group because that is where the greatest concentration of net decline took place and it is also the sub-sector which has typically been the most labour intensive.

Beyond what has already been said the implications of technological change on the occupational skill-mix are unclear. Suffice it to say administrative personnel are just as likely to be made redundant. Indeed, this study has shown that relative to other occupational groups administrative staff saw the largest net decline. In this area there is need for further research particularly in hiring and training policies. Moreover, the introduction of advanced technology is boosting recovery rates but unfortunately this is being accompanied by a reduction in employment. Further, the rejuvenation of existing coastal mills in conjunction with changing market niches has exerted pressures which have led to declining employment levels particularly in sawmills.

Another extremely important question revolves around the ability of a region or community to respond to change. While this has not been addressed in this study there remains an explicit need to do so. The present study has dealt only with net direct employment loss and has not considered any of the so-called multiplier effects. To clearly understand the full impacts of employment change, particularly in resource based communities a larger more comprehensive study could be conducted. The need for such a study may be close at hand especially if the coastal sawmilling operations continue to downsize their operations.

The nature and extent of market linkages, both backward and forward, needs to be detailed. As this study has pointed out the interior region relies heavily on one source of demand. Conversely, the coastal region appears to be diversifying markets. The precise nature of the markets to future employment levels is less clear. However, there is a danger that the interior may be facing a problem especially if demand from the United States declines.

The whole notion of technological change in sawmilling requires careful analysis. Technological change is not static and change in one aspect of the production process almost requires an accomodating change in others. The implications for regional employment are tremendous not only in net aggregate employment levels but also in terms of occupational and skill mix requirements. It is therefore impossible to understand the

effects of technological change in one facet of the production process without studying the variations in other facets in order to see how they are interrelated and integrated with one another. Only in this way can a fuller understanding of the dynamics of technological change and regional labour markets be fully grasped.

APPENDIX

Employment Change in the Forest Products Industry.

Dear Sir or Madam:

We are currently conducting a research project on plant-level employment restructuring within the British Columbia forest products industry. The objectives of the project are, first, to analyze the dimensions of employment change and, second, to determine the extent to which employment change is related to changes in capacity, technology and market linkages. The answers you supply to this questionnaire will be treated as **STRICTLY CONFIDENTIAL**. Please return completed questionnaire by August 30, 1986.

For further details please contact *Dr. Roger Hayter* or *Mr. Eric Grass*, Department of Geography, Simon Fraser University, Burnaby, B.C. V5A 1S6. Phone: 291-3321.

Respondent: _____ Status: _____

Name of plant: _____

Location of plant: _____

Company name (if different): _____

Location of head office: _____

Is the firm owner-managed: Yes__ No__

A. EMPLOYMENT AND OUTPUT CHARACTERISTICS

1. Estimate employment levels at this plant at the end of:

1985 _____ 1984 _____ 1983 _____ 1982 _____
1981 _____

2. Indicate employment of:

	1981		1985	
	M	F	M	F
(a) administrative	_____	_____	_____	_____
(b) clerical/support	_____	_____	_____	_____
(c) trades people	_____	_____	_____	_____
(d) production line	_____	_____	_____	_____
(e) other	_____	_____	_____	_____

3. Indicate percentage(%) of skilled workers:

1985 trades _____ production line _____
1981 trades _____ production line _____

4. Indicate major products manufactured at this plant:

5. Indicate output levels of major products:

1981 _____
1985 _____

6. Indicate output: 1985 _____ 1981 _____

7. Indicate capacity per eight hour shift at end of:

1985 _____ 1981 _____

8. What was the pattern of shift work during:
1981: predominantly 1__ 2__ 3__ fluctuating__ no shifts__
1982: predominantly 1__ 2__ 3__ fluctuating__ no shifts__
1985: predominantly 1__ 2__ 3__ fluctuating__ no shifts__

9. Please indicate any trends (1981-1985) :

(a) in the pattern of shift work:

(b) in the number of operating days:

10. Can you justify hiring more people now?

Yes_____ No_____

If yes, what type_____

11. Are you presently considering hiring new employees?

Yes__ No__

If yes, what type_____

B. INVESTMENT AND PRODUCT CHANGES

12. Estimate value of investments that were completed in plant and equipment during 1981-1985:

Indicate whether these investments :

(a) expanded capacity: Yes__ No__

(b) incorporated new technology: Yes__ No__

13. Indicate any investment plans for this plant within the next year:

14. Since 1981 indicate:

(a) any new or modified products:

(b) any products which have ceased to be manufactured:

15. Indicate firm's product plans over the next few years in terms of:

(a) output levels: more__ less__ no change__

(b) range of product: more__ less__ no change__

(c) product quality: higher__ lower__ no change__

16. What steps is the firms introducing to implement those plans indicated in question 15?

C. SALES LINKAGE

17. Estimate or broadly categorize total sales and export sales:

	1985	1981
total sales	\$ _____	\$ _____
export sales	\$ _____	\$ _____

18. Indicate the percentage (%) distribution of sales by major market:

	1985	1981
British Columbia	___	___
Canada(rest)	___	___
United States	___	___
Japan	___	___
Other Pacific Rim	___	___
E.E.C.	___	___
Other	___	___

19. Is this firm actively interested in expanding exports to Pacific Rim countries: Yes__ No__

If yes, identify the country(ies) with the greatest export potential_____

20. Indicate any plans you are taking, or may take, to realize this potential (in terms of advertising, trips, market research, product R&D.)

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