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Brad Stennes and Bill Wilson

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Natural Resources Canada
Canadian Forest Service
Pacific Forestry Centre
506 West Burnside Road
Victoria, British Columbia
V8Z 1M5
Phone (250) 363-0600

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BC Wood Specialties Group
Independent Lumber Remanufacturers Association
BC Log & Timber Building Industry Association
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Canadian Plywood Association

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Abstract

British Columbia is facing ongoing challenges in providing historic levels of production and employment opportunities based on a model of commodity production from the forest industry. Like many jurisdictions and other industries, it is seeking to expand value-added, or what we term secondary manufacturing in wood products. Given the significance of forestry to British Columbia, it is important that decision-makers seeking to promote an expansion in secondary manufacturing have accurate information. This report presents the results of a survey of the British Columbia secondary manufacturing wood industry for 2006. The survey gathered operational, employment, production, marketing and financial information on nine business types, with supplemental information added for a tenth, firms producing panelboards. The information is analyzed to provide both a quantitative and qualitative picture of the current structure and significance of secondary manufacturing, and sector trends through comparison to previous surveys. Overall, the size of the sector is similar to what it was in the last survey conducted for 1999, but the relative economic contribution has shifted away from remanufacturing and towards engineered wood products and cabinets, both business types which contribute to the strong domestic building boom in British Columbia.

Résumé

La Colombie-Britannique doit affronter des défis continus pour atteindre les niveaux de production d'antan et offrir les mêmes possibilités d'emploi qu'autrefois, si elle se base, dans le secteur forestier, uniquement sur le modèle de production de biens. Comme cela est le cas dans nombre d'administrations et d'autres secteurs industriels, on souhaite augmenter la valeur ajoutée ou procéder à ce que nous appelons la transformation secondaire des produits du bois. Si on considère la place qu'occupe l'industrie forestière en Colombie-Britannique, il est important que les décisionnaires qui essaient de promouvoir le développement de la transformation secondaire des produits du bois soient bien informés. Ce rapport présente les résultats d'un sondage effectué en 2006, en Colombie-Britannique, auprès des intéressés du secteur de la transformation du bois et dans le cadre duquel on a procédé à la collecte de données concernant les opérations, l'emploi, la production, la commercialisation et les finances sur neuf types d'entreprises, ainsi que des données supplémentaires au sujet d'un dixième type d'entreprises, les usines de fabrication de panneaux de distribution. Les résultats obtenus ont été analysés de manière à dépeindre des tableaux quantitatif et qualitatif de la structure actuelle, ainsi qu'à pourvoir la signification de la transformation secondaire et les tendances dans ce secteur, au moyen, notamment, de comparaisons avec les résultats de sondages antérieurs. Dans l'ensemble, l'envergure de ce secteur est équivalente au dernier sondage de 1999, cependant, sa contribution économique ne se concentre plus sur le processus de transformation lui-même, mais plutôt sur la fabrication de produits du bois et des armoires murales, car ces deux secteurs ont contribué grandement à l'essor spectaculaire de l'industrie de la construction en Colombie-Britannique.

Key Points

- This report summarizes the results of a comprehensive survey on secondary manufacturing of solid wood products in British Columbia for the year 2006. The final population surveyed was 716 firms and 295 firms (41%) responded.
- Remanufacturing decreased in relative importance while cabinets, engineered wood products, and log home and timber frame manufacturing increased in relative importance.
- The relative importance of the US market fell in this survey when compared to similar surveys through the 1990s, replaced by an increase in British Columbia domestic sales. This marks a departure from the trend of sector growth driven by sales into the US market. The US market is still very important and is the destination for 43% of sector sales.
- Compared to 1999, a smaller percentage of firms intend to expand. For those firms with expansion plans, the expected level of expansion has also declined since 1999.
- The factors viewed as the most serious constraints to expansion are labour and wood supply. Labour is now ranked much higher as a constraint than in previous surveys, while the relative importance of markets as a constraint has diminished.
- More firms now have websites at 73% overall versus 54% in the 1999 survey. Use of the web for sales is unchanged at 24% of firms and for purchases has increased by 10% to 55%.
- The amount of secondary manufacturing as a proportion of harvest is much greater on the coast than in the interior. Some of the coastal firms are using interior species (generally spruce/pine/fir).
- The bulk of secondary manufacturing occurs in urban rather than remote rural areas, the main exception being log home manufacturing and firms who produce commodity grade products such as finger jointing and wood pellets from low-value sawmill outputs. The majority of firms are located in the lower mainland or the Okanagan region of the province.
- The overall results were similar to the previous (1999) survey in terms of overall employment at 19,670 and sales at $4.9 billion, although a smaller number of firms are involved. When adjusting the 1999 sales for inflation, sales have fallen by 12% since 1999.
- The sector is estimated to have processed approximately 25 million m^3 of fibre (roundwood equivalent) in 2006, up slightly from the 1999 estimate of 23.8 million m^3. Netting out the large panelboard sector, wood use is virtually identical to the 1999 estimate at just under 18 million m^3.

Introduction

The Canadian Forest Service (CFS) partnered with the BCWood Specialties Group to examine the structure and economic contributions of secondary wood manufacturing in British Columbia. This is the latest in a series of surveys and associated reports on this important sector dating back to 1990, which provide the statistical basis to examine trends within secondary manufacturing. The previous surveys showed strong and sustained growth through the 1990s (Stennes *et al*. 2005). As the sector is facing new fibre supply arrangements, trade policies and rationalization in the primary wood sector, it is informative to see if the growth sustained through the 1990s has been maintained.

There is considerable interest in promoting value-added processing as a means to maximize the level of economic activity from each unit of fibre harvested in British Columbia. Ongoing problems in the coastal forest industry due to competitiveness issues and restructuring and upcoming timber supply shocks resulting from the mountain pine beetle outbreak in the interior are challenges to maintaining historic levels of activity. Communities in the pine-dominated areas of the province are keenly examining options to diversify away from commodity forest production. Secondary manufacturing of lumber into intermediate and finished products or adding value to waste streams through pelletization or energy production have the potential to replace some of the forestry jobs lost to falling harvest levels or industry rationalization. Ensuring effective policy responses requires credible and up-to-date information on the sector. Updated data will also be useful to communities and industry associations in their efforts to improve performance in and expansion of secondary manufacturing, and to those involved in multi-stakeholder policy discussions.

Table 1. Job and sales coefficients per unit RWE

Business Type	Jobs/'000 m^3	Sales/m^3
Cabinets and furniture	8.05	910
Engineered wood products	0.8	390
Log homes and timber frames	3.03	470
Millwork	7.6	900
Other wood products	1.01	110
Pallets and containers	0.43	70
Remanufactured products	0.51	160
Shakes and shingles	0.78	200

By its very definition, secondary manufacturing increases the level of economic activity associated with harvested timber when compared to the production of commodity products. Measures of employment and gross sales per unit of roundwood equivalent (RWE) harvest are shown in Table 1. In the case of employment, for most of the business types these jobs are incremental to those generated by woodlands and primary mill operations, which are approximately 0.8 jobs per 1000 m3 of timber.1

The business types that produce the greatest levels of employment and sales per unit of fibre input are the cabinet/furniture grouping and millwork, which have the highest coefficients for both of these measures. Also notable is the log home & timber frame business type, producing high levels of both employment and gross sales.

1 Examining the total logging, forestry and primary mill employment for 2006 (Statistics Canada 2008) and dividing this by the British Columbia harvest for 2006 (British Columbia Ministry of Forest and Range 2006) leads to employment coefficient of approximately 0.8 per 1000 m^3 of timber harvests for 2006.

This study defines secondary manufacturing as the further processing of primary mill wood or wood-based material into semi-finished or finished products. The major wood products in the secondary manufacturing industry, clustered into business types, include:

- remanufactured products (Reman),
- millwork (MW),
- engineered wood products (EWP),
- log homes and timber frames (LHTF)
- cabinets (Cab),
- furniture (Furn),
- pallets and containers (P&C),
- other wood products (OWP),
- shakes and shingles (S&S), and
- panelboards (PBS).

Within our definition of a manufacturer a number of activities are excluded, with the primary exclusions being contractor/builders, or custom one-off operations. The business types that are most affected are within engineered wood products, log home manufacturers and cabinet firms. For example, a firm that manufactures pre-built houses in a plant then ships them out for final assembly is within our definition of engineered wood products. A contractor or builder who builds houses at a job site does not. The same goes for log home builders, which means that our final population is smaller than some other researchers.[2] We also exclude small one-off custom manufacturers of specialty furniture or cabinets. A reasonably comprehensive listing and logical taxonomy of the products produced in solid wood secondary manufacturing are presented in Appendix A. Specific products within our defined business types are given in Appendix C.

Although we have tried to maintain a consistent definition of included business types there have been some changes over time. The first two surveys for the 1990 and 1994 production years did not include the panelboard or shake and shingle firms. Log home and timber frame manufacturing, one of the fastest growing subsectors in secondary wood manufacturing has been included in the engineered wood products business type in our previous surveys. In recognition of the growth in this particular activity, an appendix was devoted to log home and timber frame manufacturing in our survey report in 2001 (Wilson *et al*. 2001a). We extend this even further in this analysis by considering log home and timber frame manufacturing as a separate business type, although it is still included in EWP for some of the analysis of longer-term trends. This is not adding any firms to our definition, but simply classifies the firms in a different manner.

This report examines the structure and economic contribution of secondary manufacturing in British Columbia based on a 2006 survey of commercial activity by British Columbia companies. The results of this survey are compared to similar surveys completed during the past decade to examine trends in employment, sales, wood use and the number of firms operating within the industry.

2 For example Thony et al. (2006) who defined the population of the log homes and timber frames business type at approximately 200 firms.

Research Methods

An inventory of British Columbia companies involved in secondary wood manufacturing has been developed over time as part our previous surveys. This inventory was updated from membership lists of producer associations, commercial directories, from communication with industry experts, and finally through the ongoing survey process. It became clear early on in this process that the number of firms producing panelboards is now sufficiently small that reporting survey results could present confidentiality problems. Instead, data on wood use, employment and sales are added from publicly available sources and these results only appear in aggregate in the final section where industry-level results are reported. The end result is a survey final population of 716 firms[3].

A two-part questionnaire was used to provide some information on firms that would not complete the larger survey. Part A of the questionnaire asked for contact information, products, employment, species and markets to be used in the completion of a British Columbia company and product directory. Part B of the questionnaire asked for information on mill location, association affiliation, products, markets, employment, plant capacity utilization and any expansion plans, machinery, custom services, wood raw material use, species, source of lumber/log supply, sector challenges, sales, and operating costs. In order to protect respondent confidentiality with respect to the information provided in the second part, results for Part B are only presented in aggregate.

The questionnaire was first distributed in January 2007, with a follow-up several weeks later. Firms that did not respond to the faxes and/or mail-outs were contacted by phone during February – March 2007, and asked to complete and return the survey. A total of 295 surveys were returned, for a response rate of 41%.

The survey population and respondents are summarized by business type in Table 2. Each firm in the sample was classified into a business type based on the firm's reported distribution of and type of product sales. Most firms (19%) are classified as remanufactured product firms followed by log home and timber frame firms (18%), millwork (14%), and engineered wood products (12%).

Table 2. Survey population, response, and working sample

Business type	Number of firms		Response Rate [a] (%)
	Population	Respondents	
Cabinets	78	27	35
Engineered wood products[b]	83	32	39
Log homes and timber frames	130	49	37
Furniture	62	18	29
Millwork	101	43	43
Other wood products	43	25	58
Pallets and containers	21	7	33
Remanufactured products	141	71	51
Shakes and shingles	57	23	40
Total	716	295	41

[a] The response rate is calculated by dividing the number of survey respondents by the population with panelboards removed.

[b] The log home and timber frame firms have been removed from the EWP business type in this table.

3 In some cases a company may have more than one enterprise involved in secondary manufacturing at different locations. These are treated as individual firms for the purpose of the survey.

Results reported in the sections titled "Survey results" and "Results by business type" are calculated from survey respondents. There is no extrapolation of these results to the total population until the section titled "Sector trends," where estimates of population employment, sales and raw material use are presented. The method of extrapolation is different than our past surveys. In the follow-up phone calls all companies that are contacted are asked for the number of full-time equivalent employees. The number of employees was elicited from 84% of all firms in our population. The employee numbers for firms that refused to give employment, or could not be reached, are then estimated from sample medians[4]. The employee numbers are then used to scale other variables of interest within each business type after developing coefficients per full time equivalent employee.

As indicated above, the survey was broadened in 1997 to include both panelboard producers and shake and shingle producers; both of these activities fit within a definition of secondary manufacturing as the further processing of primary mill wood or wood-based material into semi-finished or finished products (Wilson *et al*. 2001b). In order to facilitate comparisons with all of our previous surveys, some results in the section "Secondary Manufacturing Trends" are calculated net of these two business types. Selected results are reported by region, with our regions defined as illustrated in Figure 1. These are simply the British Columbia Ministry of Forests and Range forest regions (pre-2003) with the two most northerly regions combined. Generally results are regionally disaggregated only on the basis of coastal versus interior.

Figure 1. Location of British Columbia secondary wood manufacturers (2006).

4 Extrapolation is done using medians rather than means because the distributions for sales and employment are heavily weighted towards the origin, and we assumed that we were more successful in eliciting responses from the large firms. Under these conditions using means to scale up sample results would overestimate the true population parameters.

Table 3. Regional distribution of firms by business type for population.

Business Type	Coast	Interior
Cabinets	52	26
Engineered wood products	46	37
Log homes and timber frames	39	91
Furniture	39	23
Millwork	69	32
Other wood products	14	29
Pallets and containers	18	3
Remanufactured products	91	50
Shakes and shingles	49	8
Panelboards	1	15
Total	418	314
Percentage	57	43

Table 3 provides a regional distribution summary of the population of firms by business type. The majority of firms are located on the Coast (57%) and the rest are Interior operators, primarily in the Kamloops (23%) and Nelson (8%) forest regions. Among the nine business types the Interior region had a higher proportion of engineered wood products (59%) and other wood products (67%) than the Coast.

Survey Results

The following section of the report provides an analysis of the results from the survey prior to any extrapolation methods. Therefore, as the panelboard subsector was not surveyed, the results from this business type are not included in any of the results from the survey. Results for panelboards are included in the final parts of the report where select survey results are extrapolated up to estimate industry totals.

Employment

Figure 2 shows plant size distribution by number of employees (full-time equivalents) in 2006. The median number of employees is 12, with 45% of the firms employing 10 or fewer people and 88% employing fewer than 50 people. There were few large firms and mean employment was 25 people per firm. Regionally, the coast (Vancouver region) accounted for 57% of reported employment, the Kamloops forest region 20%, and the Nelson region 10%.

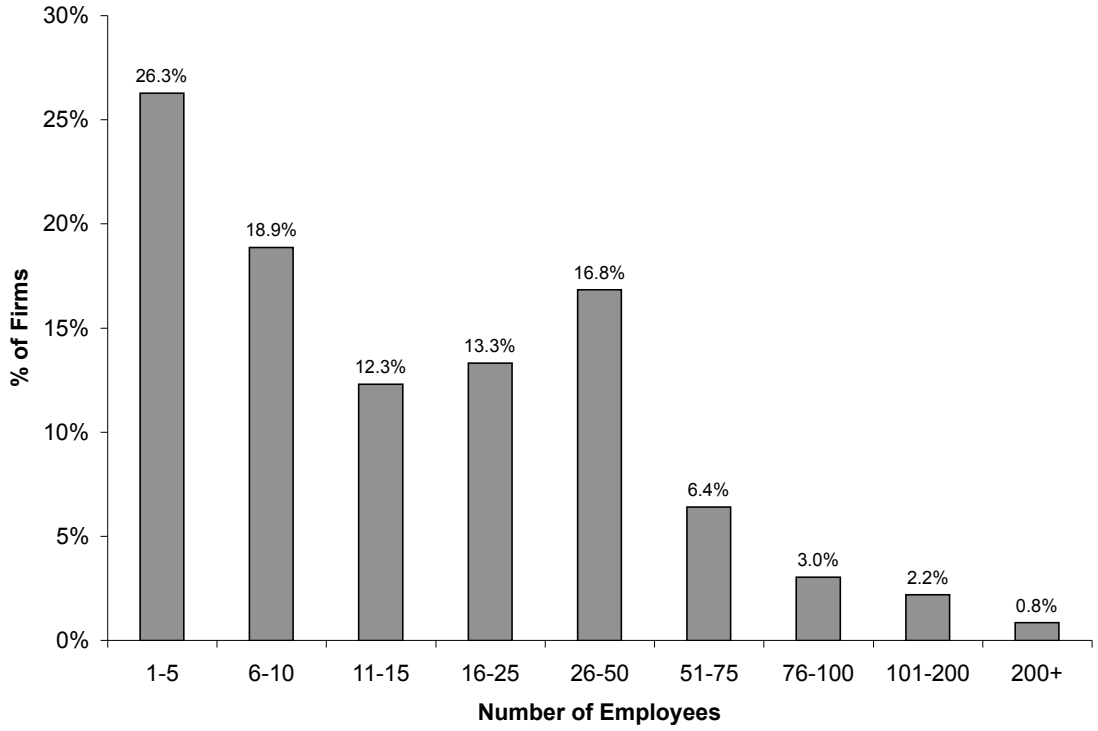

Figure 2. Distribution of firms by number of employees (based on 588 firms).

Sales Revenue

The distribution of firms on the basis of sales revenue is also skewed towards smaller firms, with 1/3 of firms selling $1 million or less in 2006 (Figure 3). Median revenue from product sales lies in the $1.1 million to $3.0 million range, with approximately 70% of plants earning revenues of $6 million or less. However, plants with sales revenue of more than $9 million earned approximately three-quarters of total respondent sales, and the average sales are $6 million. Coastal firms accounted for 54% of respondent earnings, with firms in the Kamloops forest region representing 17% of sales and those in the Nelson region 16%.

Survey respondents were asked to provide the change in sales from the previous production year (2005). The average change in sales from 2005 to 2006 was an increase of approximately 8%, with 22% of firms reporting a reduction in revenue, 32% no change and 46% reporting an increase.

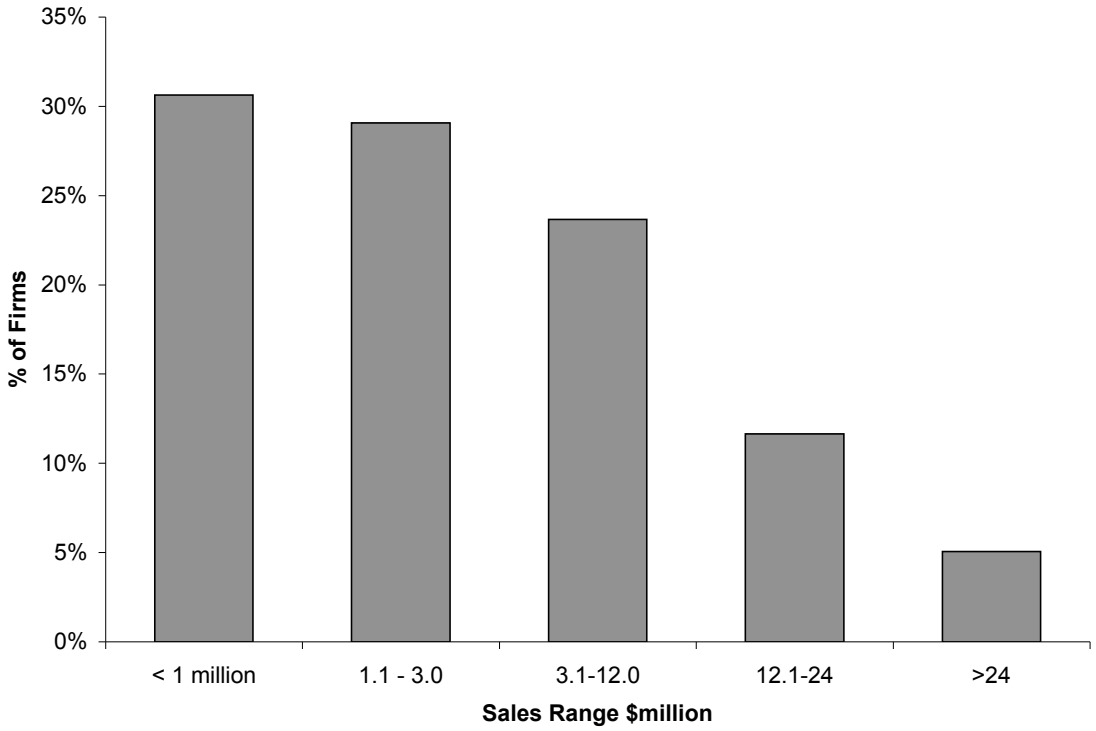

Figure 3. Distribution of firms by sales revenue.

Raw material use

Firms were asked to estimate their total wood fibre use in 2006, including questions on both product form (i.e, logs, lumber or panel products) and species. Fibre use was converted into roundwood equivalents (RWE)[5] to facilitate comparison. The total roundwood utilization level is 8.7 million m^3 for the sample respondents. The main fibre inputs are lumber (62% of the total), logs (23%) and residuals in the form of shavings and sawdust (12%).

Douglas-fir and cedar are the species that are most likely to be used by our respondents, with 55% of respondents using Douglas-fir and 53% using cedar (Figure 4). The next most commonly used species groups are lodgepole pine and spruce, both used by greater than 25% of firms. Hardwoods are used by just under 20%. Cedar is used for at least half of the fibre for over 30% of firms while 20% of firms use Douglas-fir for at least half of their fibre.

In terms of cumulative RWE volumes used by the survey respondents (Figure 5), SPF accounted for the largest portion at 29%, followed by cedar at 28%, lodgepole pine at 18%, spruce at 7% and Douglas-fir at 6%. Examining both this figure and the preceding one (Figure 4) it is clear that SPF is used by relatively few of our respondents, but the firms that use it tend to be large and use a high proportion of SPF. Conversely, Douglas-fir is used by a large number of small firms or as a small proportion of their overall fibre supply.

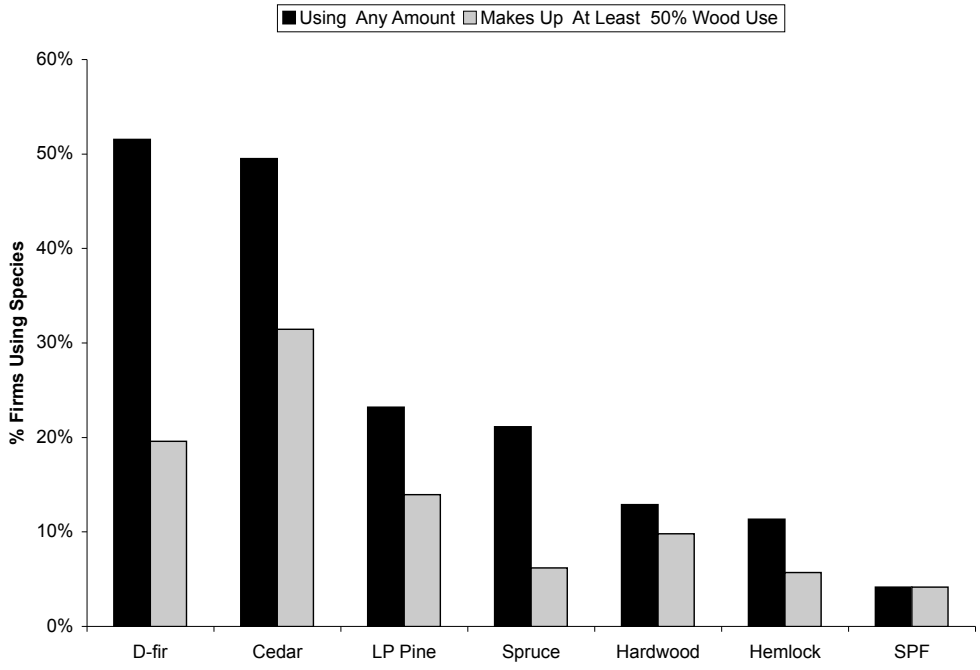

Figure 4. Distribution of firms by species use.

5 Conversion and mill recovery factors are based on Nielson *et al*. 1985; BCMOFR 2005.

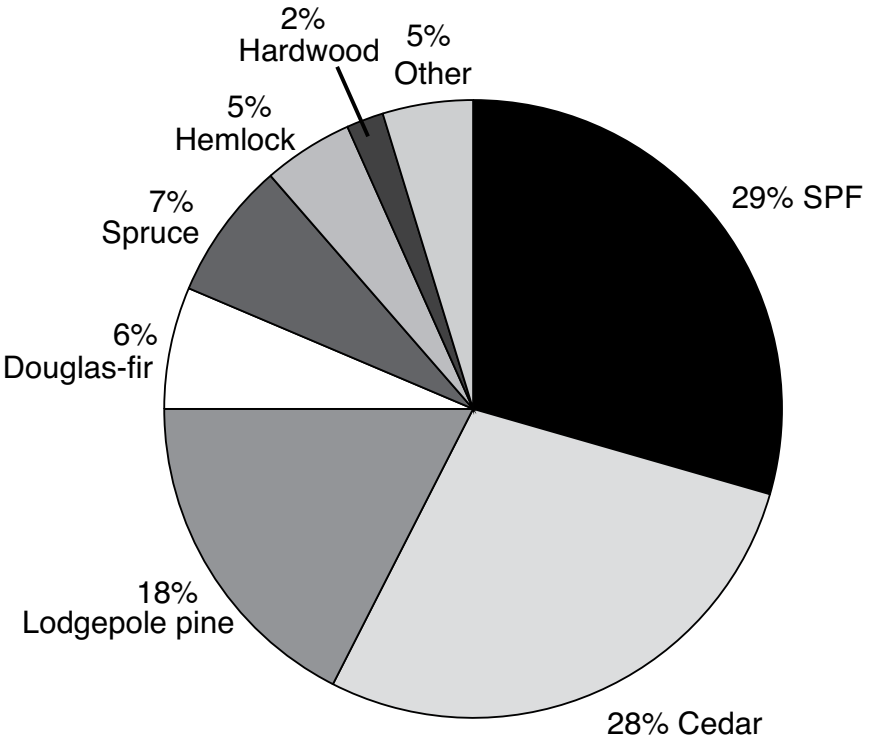

Figure 5. Roundwood equivalent volume use by species for survey respondents.

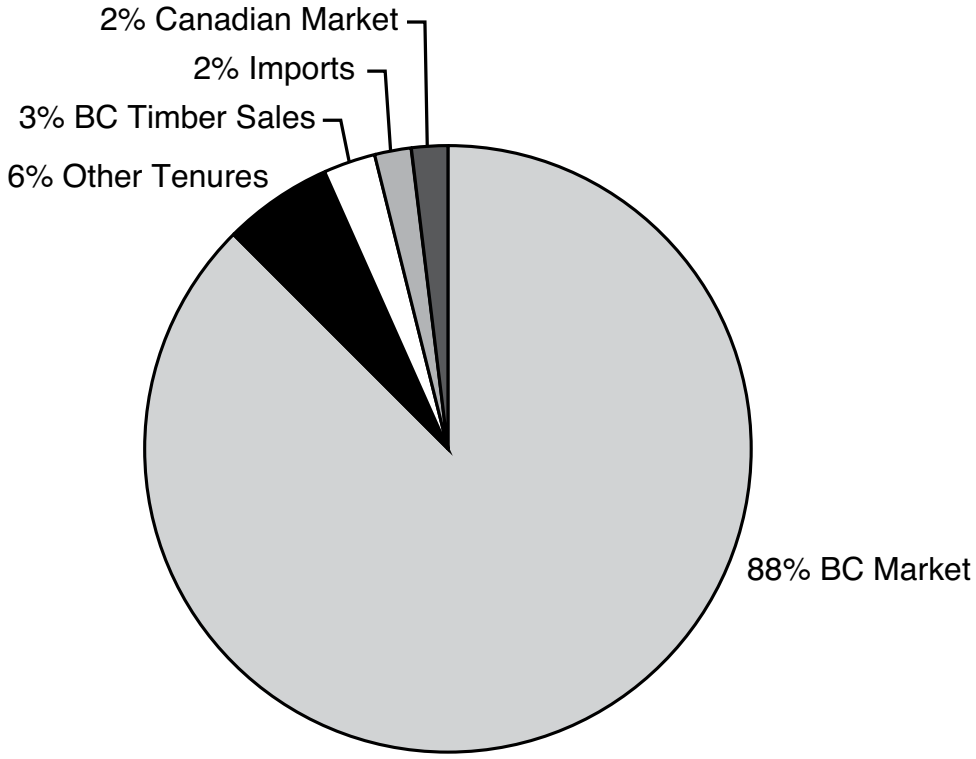

Figure 6. Sources of supply.

The main source of supply for secondary wood manufacturing in British Columbia is through British Columbia market purchases that account for nearly 90% of fibre purchases for our responding SM firms (Figure 6). Tenures other than British Columbia Timber Sales account for 6%, British Columbia Timber Sales 3%, and imports from other countries 2%.

Firms were asked separate questions on whether they had renewable tenure, or were affiliated with a company that had renewable tenure. Five percent of the firms that answered this question did have renewable tenure and an additional 7% were affiliated with companies that had renewable tenure.

Operating costs

Respondents were asked to list the proportion of their operating costs attributable to wood, labour, interest payments, depreciation, and other production costs. Proportions varied among respondents, but when taking simple means of the responses the largest cost components are wood purchases at 41% followed by costs for labour which averaged 32% (Figure 7). Labour and fibre accounted for over 70% of the total manufacturing costs for secondary wood manufacturers in British Columbia.

Markets

British Columbia is the major market in 2006 for approximately 46% of the responding firms, and nearly 95% of firms reported some sales into the British Columbia market (Figure 8). In addition to a heavy British Columbia market concentration, 30% of the companies sold at least half of their shipments in the US market and approximately 7% sold at least half to other provinces in Canada. Japan and Europe were the major markets for a small number of respondents.

The majority of sales from the SM respondents are to the domestic market with 28% to the British Columbia market and 18% to the rest of Canada, adding up to 46% of overall sales (Figure 9). Sales to the US are nearly as great accounting for 43% of overall sector sales. The percentage of overall sales to Japan and Europe were similar to each other and represented approximately 4% and 6% respectively.

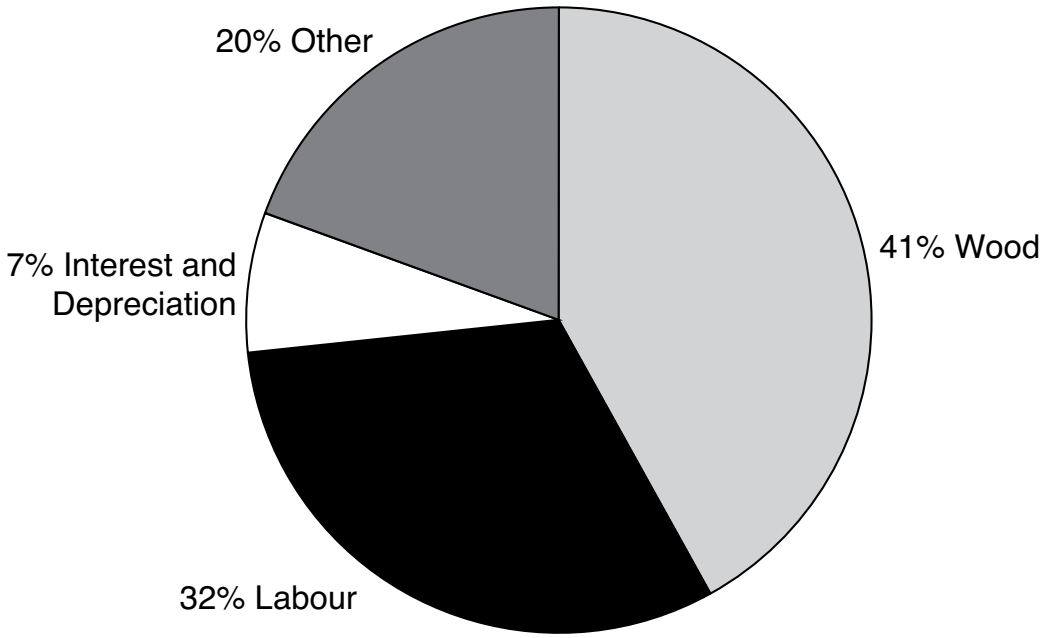

Figure 7. Average distribution of operating costs.

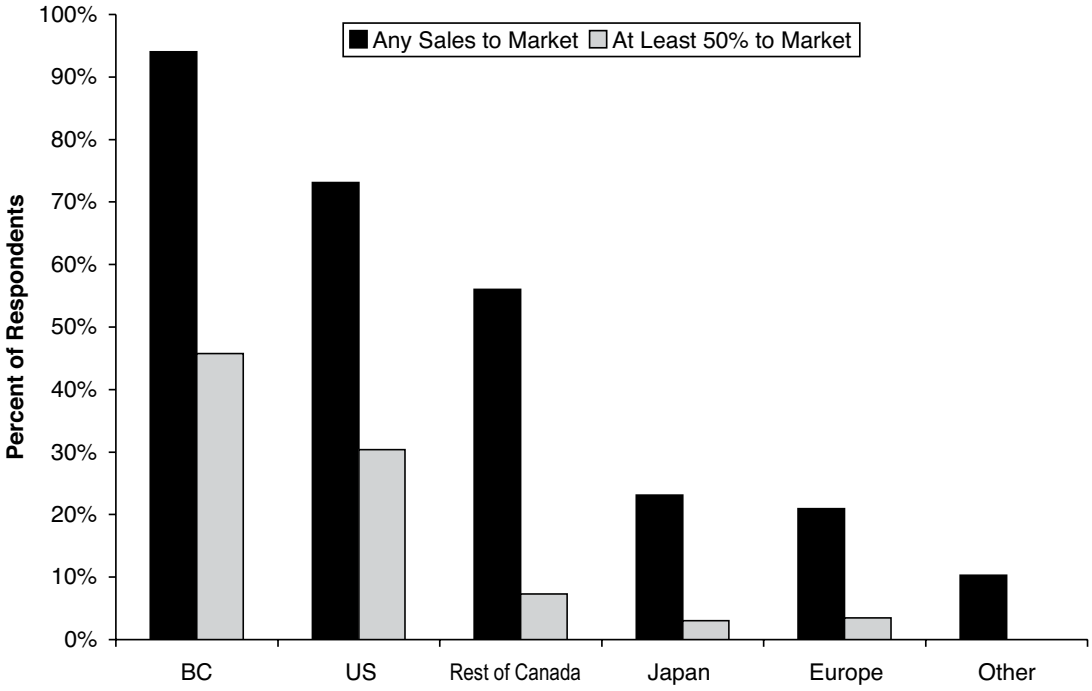

Figure 8. Percentage of respondents reporting sales in various markets

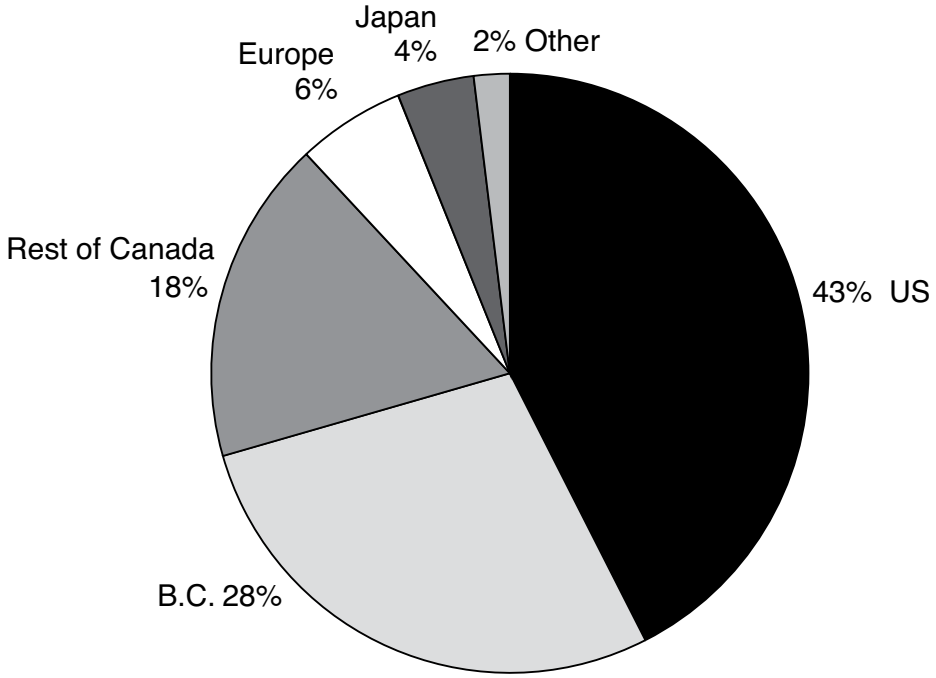

Figure 9. Percentage of total sales revenue by market

Capacity utilization and expansion plans

Firms operated at an average capacity utilization level of 73% in 2006 (Table 4). Firms operating two or more shifts (20% of respondents) reported a higher capacity utilization (83%). Capacity utilization is greater in the interior (75%) than on the coast (71%). Provincial capacity utilization is almost unchanged from 1999 where it was 72%.

Overall, 56% of respondents plan to increase their capacity over the 2007-2009 period by an average amount of 55% (Table 5). Coastal firms were less optimistic about expansion plans both in terms of proportion of firms planning to expand and by the average expansion amount.

Comparing plans for expansion to the results obtained in 2000, we see a drop in both the proportion of firms looking to expand and by how much. In the 2000 survey 77% of firms had expansion plans and the average level of planned expansion was 76%. This is notably higher than in the current survey.

Survey respondents were also asked to rank a predefined list of constraints to capacity expansion, using a scale of 1 to 5 with 1 being the "least constraining" up to 5 as "most constraining".[6] The overall ranking of constraints to expansion, using the mean values of responses in descending order, is given in Table 6.

When asked about constraints to expansion, the most constraining factor is labour, followed very closely by wood supply. In fact, these two values are so close that we can not differentiate between the two of them. It should be noted that this is a change from the results obtained in 2000 where markets was ranked as the largest constraint to expansion. This factor has fallen to third in this survey (statistically significant). Labour, which was the third most constraining factor in 2000, is now the largest constraint to expansion in the British Columbia secondary manufacturing sector. Finance and manufacturing advice were chosen as the least constraining factors limiting expansion. Within each of these five categories of constraints, firms were asked to rate a more detailed set of constraints to expansion using the same methodology as described above. The results are given in Table 7.

Within the two most important constraints to expansion, wood supply and labour, the most important factors within wood supply were wood quality and grade, and for labour the particular factor that was ranked the highest was experience followed closely by training and skills. It should be noted that approximately 5% of respondents identified simple availability of workers as the main constraint, even though this was not one of the available choices (i.e, it was written in the "other" category). This indicates that this should have been one of the choices.

6 There is also an "other" category with a spot to write in a constraint category of the respondents choosing. For details on how the questions are structured, see the survey in Appendix B.

Table 4. Average capacity utilization (%), Coast versus Interior Firms

Region	1 Shift	2 or more	All
Coast	69	84	71
Interior	73	82	75
BC total	71	83	73

Table 5. Expansion plans for Coastal versus Interior firms

Region	Planning expansion (%)	Level of expansion (%)
Coast	52	50
Interior	61	60
BC total	56	55

Table 6. Overall constraint to expansion in British Columbia secondary wood manufacturing (1 =least constraining, 5 = most constraining)

	Mean Constraint Score[a]		
General constraint	Coast	Interior	All
Labour	3.88	3.70	3.81
Wood supply	3.71	3.93	3.80
Markets	2.91***	3.05***	3.00***
Finance	2.53**	2.59**	2.58***
Manufacturing. advice	1.83***	2.01***	1.92***

a Each factor is compared to the one ranked above by testing the means using the t-test. ** indicates that the mean is significantly different at the 5% level, and *** indicates significantly different at the 1% level. No asterisk means that a value is not significantly different from the one above it.

Table 7. Detailed constraints to expansion (1 =least constraining, 5 = most constraining)

Detailed constraint	Mean Constraint Score[a]
Wood supply	
Quality/grade	3.72
Volume	3.56
Price	3.53
Price volatility	3.19***
Labour	
Experience	3.66
Training/skills	3.6
Cost	3.27***
Flexibility	2.81***
Markets	
Market diversity	2.98
Product diversity	2.80**
New softwood lumber agreement	2.58
Market research	2.58
Finance	
Availability	2.97
Cost	2.87
Flexibility	2.79***
Scheduling	2.63**
Manufacturing advice to:	
Increase labour efficiency	3.79
Reduce cost	3.38
Improve recovery	3.04***
Implement lean manufacturing technology.	2.99
Improve Prod Quality	2.73***

a Each factor is compared to the one ranked above by testing the means using the t-test. ** indicates that the mean is significantly different at the 5% level, and *** indicates significantly different at the 1% level. No asterisk means that a value is not significantly different from the one above it.

Results by Business Type

The size of firms in each business type as measured by the number employed is shown in Figure 10. This is a more detailed version of that shown in the previous section (Figure 2), which indicated that the secondary manufacturing sector is highly skewed towards small firms (≤15 FTE). In fact, the only business types that have less than 50% of the firms in this category are remanufacturing and shake & shingles. At the other end of the spectrum, in the log home business type small firms are typical, with 85% of firms having 15 or fewer employees.

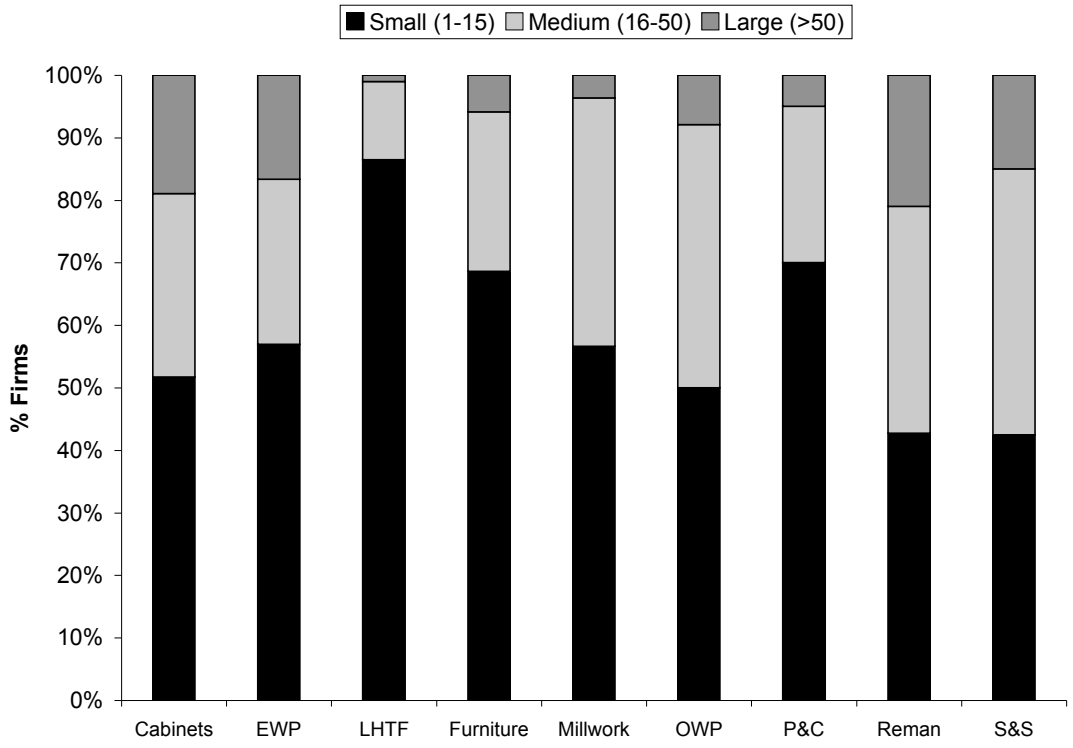

Figure 10. Relative size of firms by business type on basis of number employed, 2006.

The average change in dollar sales from 2005 to 2006 by business type is given in Figure 11. All of the business types experienced an increase in sales with the sole exception being pallets & containers. The largest sales gains were from remanufacturers, furniture firms and the log home and timber frame firms.

The market mix does vary considerably amongst the different business types with shake & shingles selling the highest overall percentage into the US market and both cabinets and millwork selling over 60% locally into British Columbia (Figure 12). Other business types that send greater than 50% of their output to the US include log home manufacturers, pallets & container firms and remanufacturers. Furniture firms sell approximately 75% into the domestic market, with much of that going to other provinces. Europe and Japan are fairly minor markets, with the exception being other wood products sold into Europe, which is a reflection of large exports of wood pellets. The highest proportion of sales to Japan occurs with the log home and timber frame group.

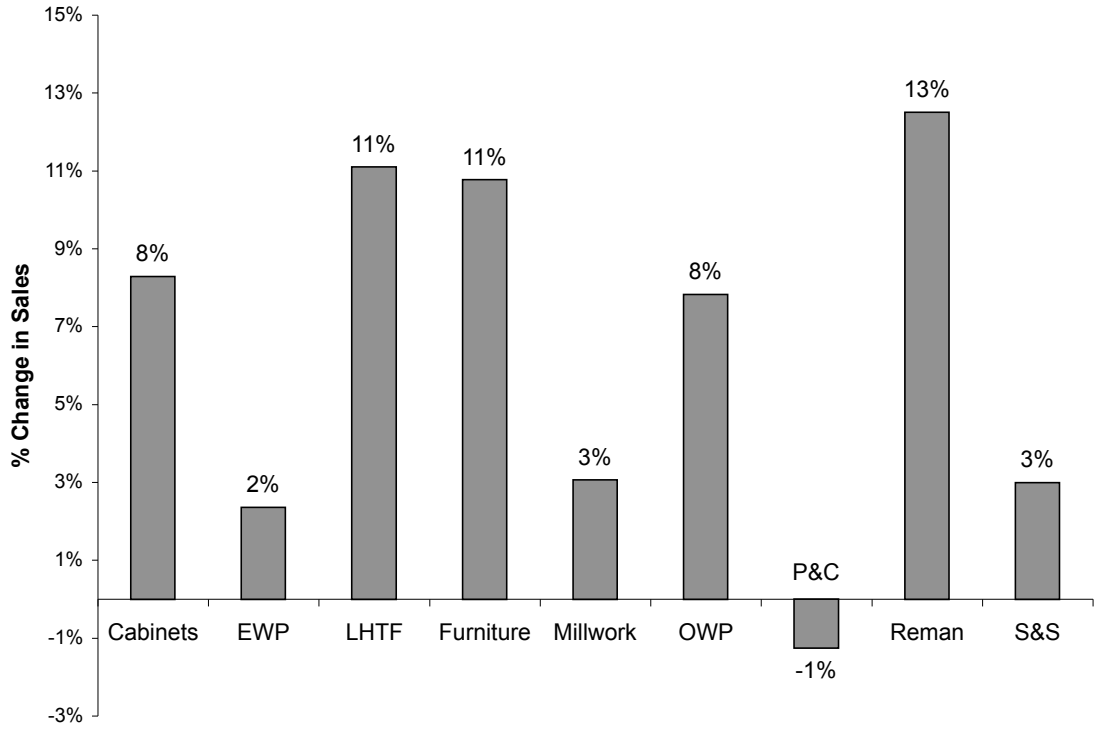

Figure 11. Percentage change in sales revenue from 2005 to 2006.

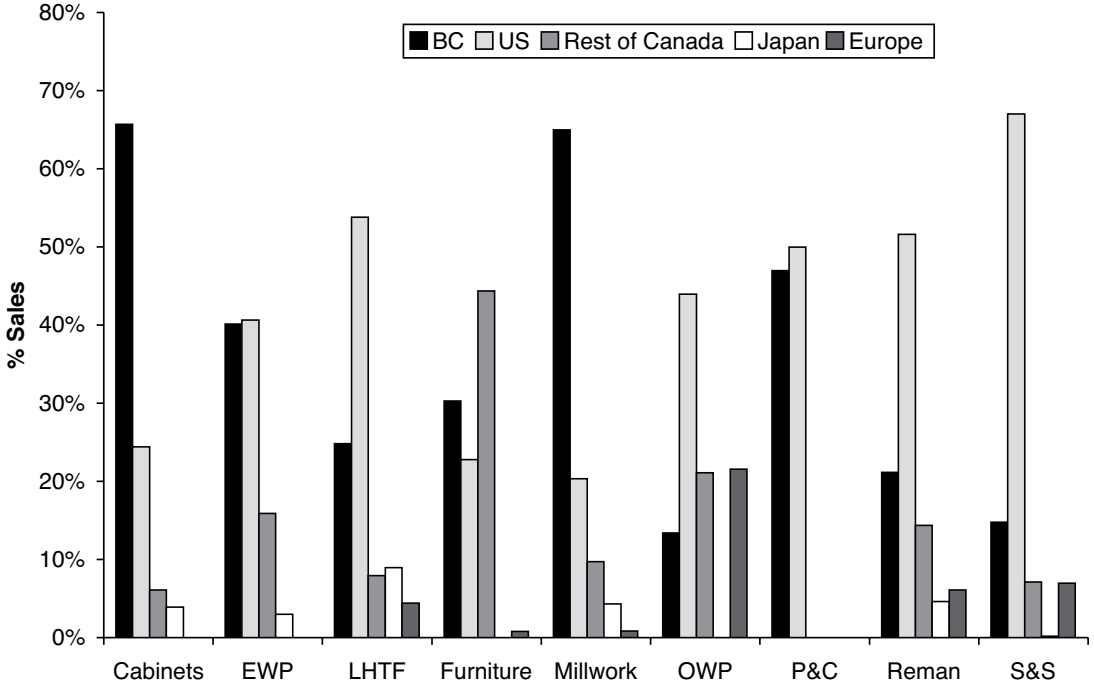

Figure 12. Percentage of overall sales to market by business type, 2006.

Species use varied across business types (Table 8) with cedar being the most heavily used by shake & shingle firms (99%) and within the log home and timber frame group (43%). SPF is the major species mix used by remanufacturers, when measured by total volume, although cedar was also important. When we add the SPF constituent species that are specifically identified to SPF, it then comprises over 60% of the wood use by remanufacturers. Douglas-fir and hemlock are the main species used by millwork firms with the former making up approximately half of the total volume. Cabinet and furniture firms are heavily dependent on hardwoods which comprised over 70% of their fibre supply.

The importance of the different inputs into overall operating costs for secondary manufacturing firms varies widely across business types (Figure 13). Remanufacturing and shake & shingle firms pay the largest proportion of operating costs to fibre, both at approximately 50%. Labour costs are the largest cost component for log home & timber frame (42%) followed by furniture (38%) and millwork (36%) firms.

Table 8. Percentage of overall volume by species for individual and business types, 2006.

Business type	Cedar	SPF	D-fir	LPP	Spruce	Hem	HW	Other
Engineered wood products	1	14	42	15	6	12	9	1
Log homes and timber frames	43	0	29	14	13	1	0	0
Millwork	2	0	49	0	0	35	12	1
Other wood products	4	28	3	39	3	0	0	22[a]
Remanufactured products	27	38	2	15	10	6	1	1
Shakes and shingles	99	0	0	1	0	0	0	0
Cabinets and furniture	0	0	3	18	3	1	72	4

[a] Other is in the form of whitewood shavings and sawdust.

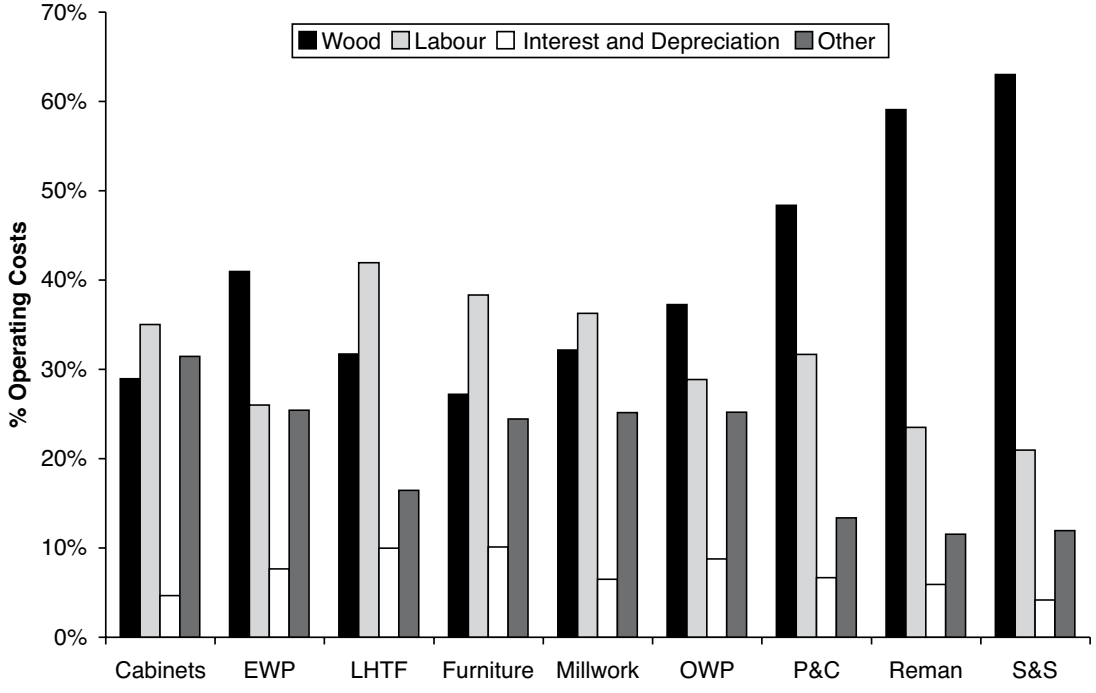

Figure 13. Operating costs for British Columbia secondary wood manufacturers by business type, 2006.

Examining the constraints to expansion by business type (Table 9) further shows the level of importance that the survey respondents placed on labour and wood supply as constraints. Every business type identified labour as either the top constraint or number two. Labour is the top constraint to those business types which service the building sector such as cabinets, EWP and millwork. Log home manufacturing, shake & shingle mills and remanufacturers all listed wood supply as the key constraint to expansion.

E-Commerce

There are four basic questions related to e-commerce on the most recent survey that ask whether or not the firm has a website, whether sales are made over the internet, whether inputs are either located or purchased over the web, and finally whether the firm used the internet for manufacturing advice. The results are given in Figure 14.

Overall, approximately 75% of firms had a website, 24% used the web for the sales, 55% for purchases and 47% to search for manufacturing advice. In the last survey done in 2000, 50% of firms had a website, 24% used the web for sales and 45% for purchases (Stennes *et al*. 2006). A higher proportion of firms have websites and use the internet for purchasing inputs compared to the last survey, while the use of the web for sales has not changed.

In each of the business types at least 50% of firms have a website, with shake & shingle firms the least likely and log home & timber frame firms the most likely. The group with the greatest percentage of firms using the internet for sales is the log home & timber frame business type at 54%, followed by furniture at 46%. Log home & timber frame manufacturers are also the most likely to use the web for purchasing inputs with 73% of respondents involved in this activity, followed by furniture at 69% and cabinets at 64%. Overall, the log home & timber frame sector uses the internet the most in this survey as was the case in the 1999 survey. Furniture firms are second with greater than 50% of firms having a website, purchasing and going to the internet for manufacturing advice.

Table 9. The top two constraints to expansion by business type

Business type	Most Constraining	Second Most Constraining
Cabinets and furniture	Labour (4.57)	Markets (2.96)
Engineered wood products	Labour (3.90)	Markets (3.73)
Log homes and timber frames	Wood Supply (4.03)	Labour (3.86)
Millwork	Labour (4.48)	Wood Supply (3.52)
Remanufacturing	Wood Supply (4.38)	Labour (3.24)
Shakes and shingles	Wood Supply (4.83)	Labour (3.61)

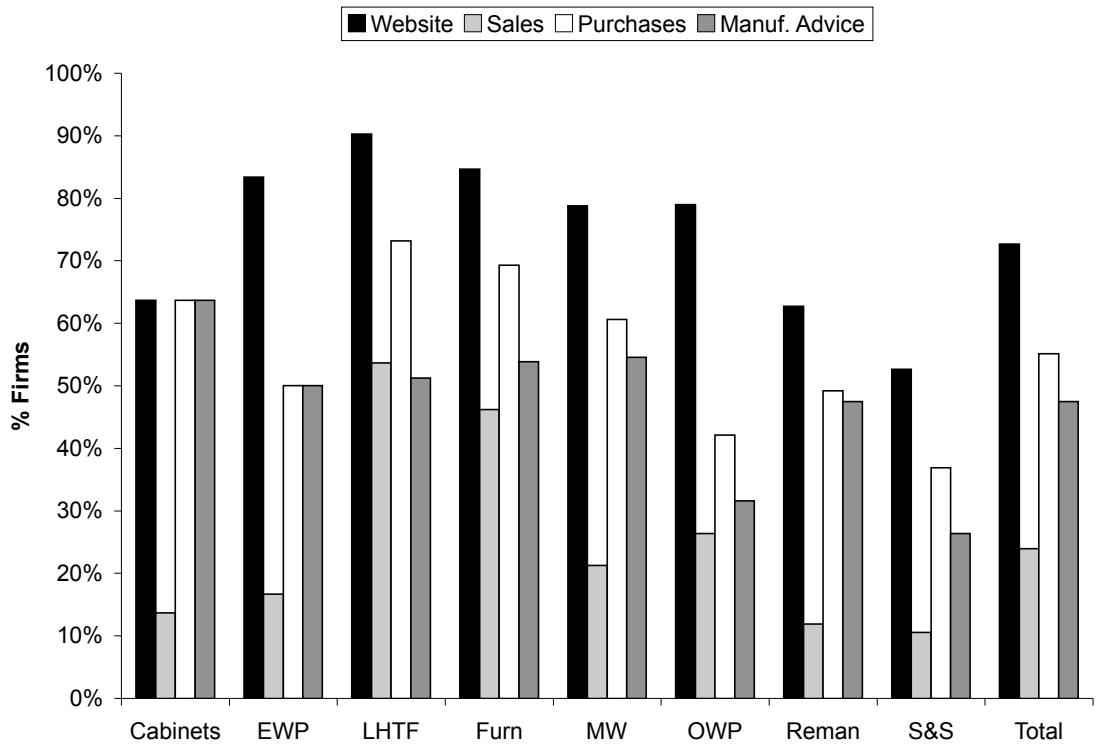

Figure 14. Internet use by British Columbia secondary manufacturing firms, 2006.

Secondary Manufacturing Trends, 1990-2006

The Canadian Forest Service survey of secondary manufacturing has been ongoing since 1990, yielding a dataset that permits analysis of changes in both the scale and composition of this sector over the better part of two decades. In this section some of those changes are examined. As we did not include shake and shingle or panelboard firms in our first two surveys, many of the following results exclude these two business types. This is also the first section that includes results based on extrapolating our survey results to population estimates. Panelboards are therefore included in the discussion in this section (i.e., in Table 10).

Remanufacturing is still the most important secondary manufacturing sector in British Columbia in terms of combined percentage of sales and employment (Table 10). It is less dominant than in 1999, when it represented 36% of sales and 32% of employment. Four business types have increased their relative share of both sales and employment, cabinets, engineered wood products, millwork and other wood products. In addition to remanufacturing other business types that have declined in their relative importance are furniture and panelboards.

The changes in employment over the last 17 years are shown in Figure 15. The aggregate employment levels have remained stable, although the split between business types has clearly shifted, with employment in remanufacturing increasing to nearly 6000 employees in 1997, then dropping back to just over 4300 in the latest survey. The largest increase in employment is for the EWP category[7] which has steadily increased in each survey since 1990. There are now nearly as many employees in the EWP business type as in remanufacturing.

The increase in the average size of firms over time can be seen in the greater proportion of firms in the categories of medium and large when defined on the basis of sales volumes (Figure 16). In the 1990 survey, 45% of firms had sales of less than $1 million and 4% were greater than $15 million in sales. The proportion of small firms has dropped in the latest survey to only 32% and 12% of firms have sales in excess of $15 million.

Table 10. Percentage economic contribution (% of total) by business type, 2006.

Business Type	1999 Survey		2006 Survey	
	Sales	Jobs	Sales	Jobs
Remanufactured products	36	32	28	22
Engineered wood products[a]	14	18	15	22
Cabinets	2	4	5	11
Furniture	3	6	2	5
Millwork	4	9	6	10
Other wood products	1	2	7	5
Pallets and containers	1	1	1	2
Shakes and shingles	7	9	8	7
Panelboards	31	20	28	18

[a] The log home business type is included in EWP for this table to facilitate comparison with prior surveys.
Due to rounding, sums of columns may not be 100.

7 There is no way to separate the loghome and timber frame firms from the early surveys so here EWP includes those firms.

The change in percentage of overall volume attributable to each species group of fibre inputs for the past three surveys is given in Figure 17.[8] The largest relative increase in volume over this period is for SPF, which is now the most important species group in secondary manufacturing. The largest decrease is for cedar, which accounted for nearly 40% of the volume used in 1997 and has dropped to approximately 27%. The proportion of lodgepole pine and Douglas-fir have remained static while hemlock and spruce have both dropped.

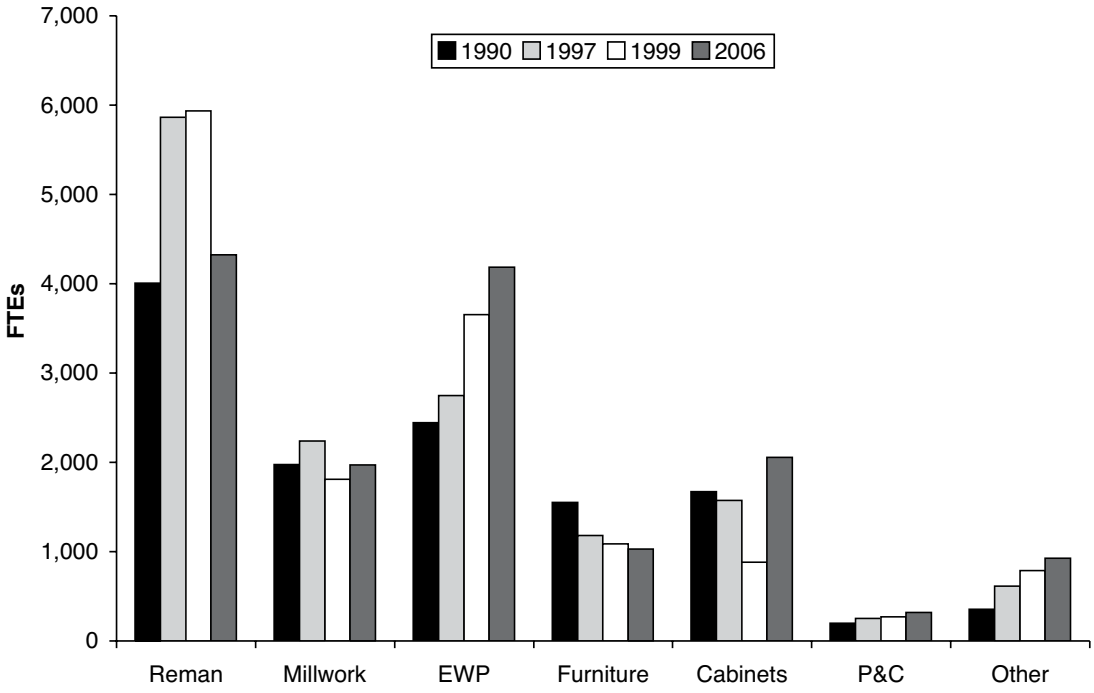

Figure 15. Employment by business type (FTEs - full time equivalents) from 1990 to 2006.

8 For the 1997 and 1999 results, the volumes used in panelboards were netted out as this group was not surveyed in 2007.

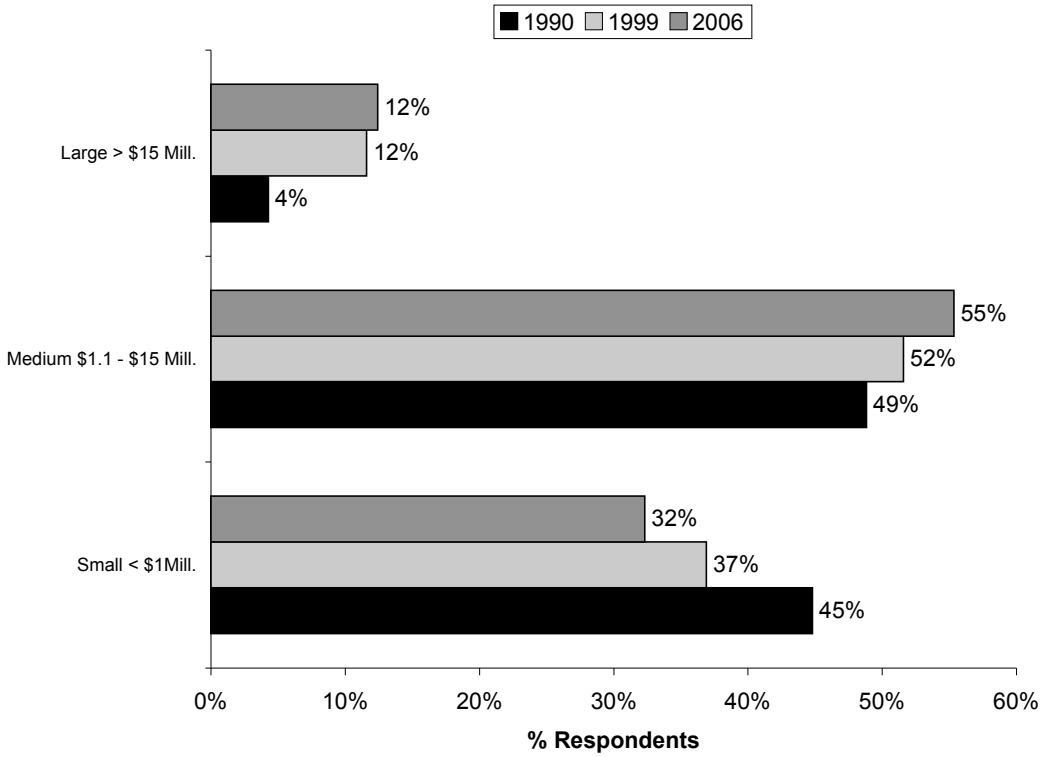

Figure 16. Percentage of firms ordered by volume sales category, 1990, 1999 and 2006 (Panelboard and Shakes and Shingles business types removed)

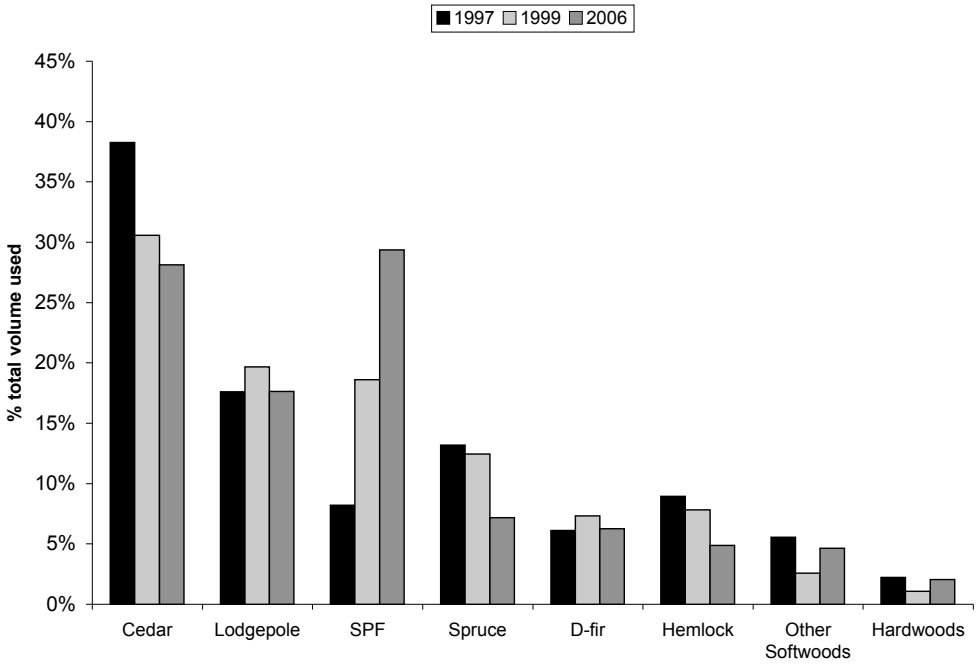

Figure 17. Percentage of overall species use, by volume, from 1997-2006 for British Columbia secondary manufacturers (Panelboards excluded).

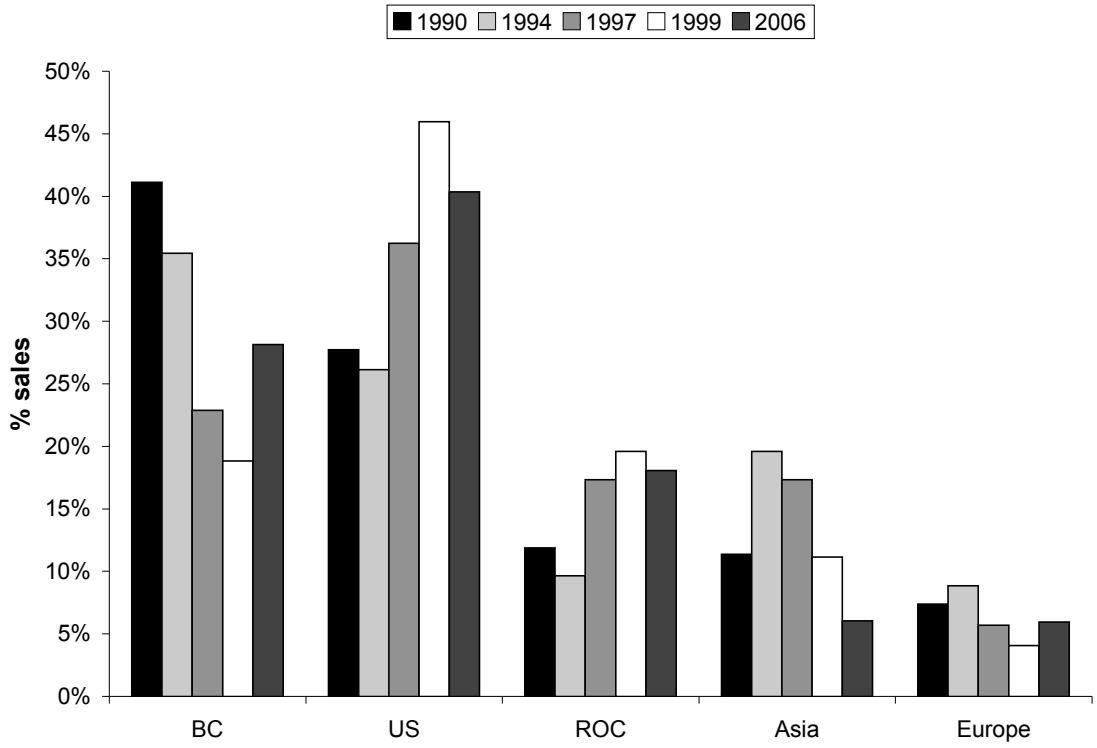

Figure 18. Percentage of overall sales to major markets for British Columbia secondary manufacturing shipments, 1990-2006 (Panelboard and Shakes and Shingles business types removed).

The trends in proportion of sales to domestic and export markets do show some change when the 2006 results are included (Figure 18). Through the 1990s the greatest growth was seen in increased exports to the US market.[9] This has clearly shifted between 1999 and the current survey, with the proportion of sales into the US falling and those in the local British Columbia market increasing. The proportion of sales into the British Columbia market have increased at the expense of every other market except Europe where a small increase occurred. The percentage of sales to the Asian market continue the decline which began in the mid 1990s.

Questions on capacity utilization and plans for expansion of capacity have been part of our survey since 1994. Capacity utilization has remained static for the past 13 years (Figure 19), but there has been notable changes in the plans for expansion. Through the three surveys in the 1990s there is both an increase in the proportion of firms planning to expand and the mean level of expansion planned by those firms. There is a clear drop in both the proportion of firms looking to expand and the average level of planned expansion between 1999 and 2006, reversing a trend across the preceding three surveys.

9 In fact, through the 1990s the total value of sales grew in all markets except Europe.

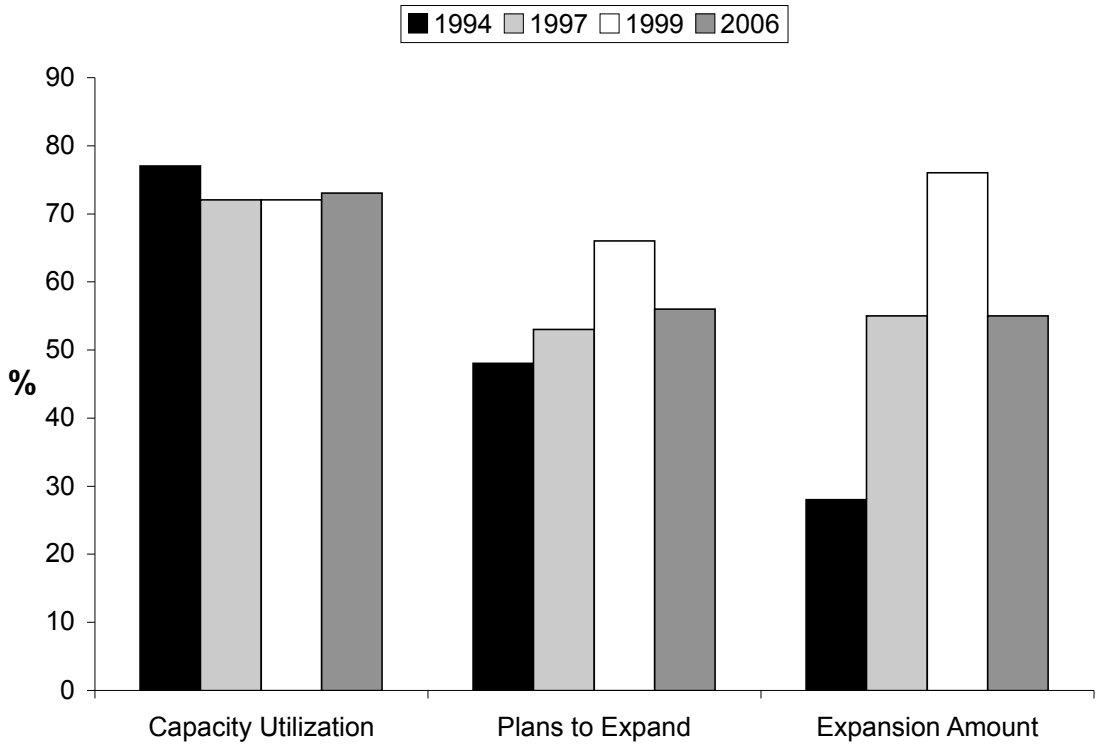

Figure 19. Capacity utilization and expansion plans for British Columbia secondary wood manufacturing 1994 through 2006.

Table 11. Ordinal ranking of constraints to expansion for secondary manufacturing in British Columbia, 1999 and 2006.

Constraint	1999	2006
Labour	4	1
Wood supply	2	2
Markets	1	3
Finance	3	4

Comparing the constraints to expansion of secondary manufacturing in this and the 1999 survey, the results are markedly different. Labour, the most important constraint to expansion in 2006, was the least constraining of the four factors in the 1999 survey. In 1999, markets was the most constraining factor to expansion, and was the only factor that could be shown as more constraining on a statistical basis (Stennes *et al*. 2005).

The changes over time in the key indicator variables from our survey are given in Table 12. The public policy goal of increased secondary manufacturing activity was realized over the decade of the 1990s as the number of firms, sales and employment all increased over that period. It is clear that the growth in secondary manufacturing that occurred through the 1990s has leveled off since the end of that decade. In fact when adjusting for inflation, sales since the last survey in 1999 have fallen by 7% for 7 business types and 11% for the full definition.[10] Overall employment levels are similar to that in the late 1990s and the volume of wood (in RWE) which flows through the secondary manufacturing sector increased from 24 to 25 million m^3. When the large, by fibre demand, panelboard sector is netted out fibre use is virtually unchanged since 1999 at approximately 17 million m^3.

Table 12. Changes in number of firms, sales and employment in British Columbia secondary manufacturing, 1990-2006.

	1990	1994	1997	1999	2006	% Change
Excluding S&S and Panelboard Firms						2006/1990
Firms	565	525	683	703	660	17%
Sales ($B)[a]	1.54	1.93	2.69	2.9	3.15	104%
Employment	11,660	14,010	14,460	14,410	14,800	27%
Including S&S and Panelboard Firms						2006/1997
Firms	n.a.	n.a.	774	774	732	-5%
Sales ($B)[a]	n.a.	n.a.	3.87	4.68	4.88	26%
Employment	n.a.	n.a.	19,490	20,190	19,670	-1%

[a] These sales numbers are in nominal dollars.

10 If we adjust the 1999 estimates of sales for inflation using the implicit GDP price deflator we find that the estimates of sales in 1999 are $3.4 billion and $5.5 billion for the 7 business type (excluding S&S and panelboards) and full definitions respectively.

Summary and Conclusions

The decade of the 1990s saw strong growth in secondary wood manufacturing in British Columbia with increases in firm numbers, sales and employment. Since the last survey, conducted in 2000 for the 1999 production year, growth has stalled. Most measures of growth are stagnant since 1999, and sector sales although higher than 1999, have not increased as quickly as inflation.

The relative performance of the business types is not consistent with growth in cabinets, engineered wood products and the log home & timber frame industries, and a decline in remanufacturing. The 1990s saw strong growth in our most important export market, the US (see Stennes *et al*. 2005). Since the end of the 1990s, growth has shifted to the local British Columbia market away from the US, and subsequently the business types which depend most heavily on the domestic market have performed better than those more reliant on US sales. There has also been strong growth in sectors using mill residuals, most notably wood pellet production which has increased the relative share of the Other Wood Product business type and reversed the decline in European market sales in our previous surveys (most wood pellet sales are to Europe).[11]

Most of the activity in secondary manufacturing occurs in the more urban areas of the lower mainland and the Okanagan. Secondary manufacturing as an aggregate has not been successful in replacing jobs lost due to primary sector rationalization in the more remote rural areas of the province. However, there are specific business types that are more prevalent in rural, forest dependent areas including the log home & timber frame and those that use low value fibre from sawmills including finger-jointing and wood pellet production. A more thorough understanding of why secondary manufacturing firms tend to locate near urban areas rather than near wood supply is a research question that will be investigated further in future studies. This question is especially germane in the British Columbia interior which is facing a restructuring of their primary sector due to the mountain pine beetle epidemic impact on timber volume and quality.

Policy makers are struggling to respond effectively to the impacts of timber supply shocks and competitive global markets (Wilson, 2000). Policy responses will benefit from the accurate and timely information in this and future reports, which will allow for a realistic assessment of various options. This project provides comprehensive information on the existing structure and dynamics of secondary manufacturing in British Columbia.

Creating an institutional setting to complement and promote sustainable growth in secondary manufacturing is an objective in many jurisdictions that have a substantial commercial forestry industry or at least a domestic market for forest products. British Columbia has used policy interventions seeking to facilitate a forest industry transition that reflects a more balanced use of public forestlands and one which has a larger share of secondary manufacturing in the product mix. Securing these objectives is a difficult challenge but fortunately British Columbia has a number of strengths to build upon in promoting balanced resource use and increased secondary manufacturing. These strengths are important but they are not sufficient to generate sustainable growth in secondary manufacturing. Effective responses to problems with labour and wood supply will be required to complement the existing strengths.

11 For an examination of the factors contributing to this flow of fuel pellets see Stennes and McBeath (2006).

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APPENDIX A: Taxonomy of secondary manufactured wood products

Table A1. Taxonomy of secondary manufactured wood products

Log Products	Wood Products		
	Primary[a]	Intermediate	Final
Chopsticks	Boards	Building/Home	Boxes, Bins and Crates
Firewood	Cants	Components	Cabinets
House Logs	Flitches	Cutstock	Coffins
Pilings	Lumber/	Door Stock	Countertops
Poles	Industrial	Edge Glued Components	Decking
Posts	Timber	Finger-Jointed Stock	Doors
Log Homes	Treated Timber	Furniture Components	Fencing
Shakes	Veneer	Joinery Stock	Finger-Jointed Lumber
Shingles		Ladder Stock	Flooring
Treated		Laminated Components	Flooring/Engineered
Pilings		Laminated Stock	Furniture/Commercial
Treated Poles		Metric Stock	Furniture/Household
Treated Posts		Moulding, Panel Blanks	Furniture/Patio
Novelties		Pallet, Crating Stock	Furniture/RTA
		Medium Density	Garden Buildings, Products
		Fibreboard	Laminated Veneer Lumber
		Particleboard	Millwork/Architectural, Custom
		Patern Stock	Medium Density Fibreboard
		Sawmill Specialty	Mouldings
		Products	MSR Lumber
		Staircase Components	Oriented Strandboard
		Turning Squares	Pallets
		Window Stock	Paneling
			Plywood
			Prefab Buildings and Manufactured
			Homes
			Siding
			Staircases
			Stakes, Lathe, Strips and Batten
			Structural Laminated Beams
			Treated Lumber
			Trusses
			Turned Wood Products
			Windows
			Wood Novelties

Based on Wilson and Ennis (1993).

[a] This column is not secondary products but is included for completeness.

APPENDIX B: Survey of BC Secondary Manufacturing

There are two parts to the survey. Part A asks for basic information to support the publication of a BC secondary manufacturing company/product directory.

Please fill out Part A regardless of whether or not you fill out part B.

The information in Part B will not be reported for individual companies, but will be used in aggregate to develop important up-to-date information on this sector such as the economic contribution and the identification of important constraints to growth.

Part A

Company Name:

_____

Mailing Address:

_____

_____

_____

Name of Contact Person:

☐ Mr. ☐ Ms. _____

Phone ( ) _____ Fax ( ) _____

Email: _____

Will you be completing PART B of the questionnaire?

☐ Yes ☐ No

2. Do you want the company/product directory sent to you?

☐ Yes ☐ No

Do you want a copy of the final report sent to you?

☐ Yes ☐ No

4. Please check the Business Type that accounts for the majority (greater than 50%) of your **2006** sales revenue.

☐ Roundwood mill (commodity, specialty, shakes/shingles)

☐ Reman products (FJ, lumber specialties, fencing, panels)

☐ Engineered wood products (glulam, LVL, I-joists, laminated posts/ beams, trusses, prefab buildings, log homes, treated wood)

☐ Millwork (doors, windows, architectural and custom woodwork, turned wood products, mouldings)

☐ Cabinets (kitchen/vanity cabinets, cabinet doors, countertops)

☐ Furniture (household, RTA, commercial, institutional and patio)

☐ Pallets and containers (pallets, boxes, bins, crates)

☐ Plywood & Panelboards (net of veneer production)

☐ Other (please specify)

_____

5. List the major products manufactured at your plant

_____

(b) _____

(c) _____

(d) _____

6. Which custom services do you provide? Please check.

☐ Kiln Drying ☐ Planing ☐ Resawing

☐ Other (specify) _____

7. Estimate the average number of full-time equivalent employees in **2006**. A full-time equivalent is 220 or more days worked in the year.

_____ Full Time Equivalent Employees

_____ Production Staff

_____ Non-Production Staff

8. What are your current market areas?

☐ BC ☐ Other Canada ☐ US

☐ Europe ☐ Japan ☐ Korea

☐ China ☐ Other (please specify)

_____

_____

_____

9. Please indicate new market areas of interest.

_____

_____

_____

10. Identify the top five species used (measured in volume terms).

_____

_____

_____

_____

_____

11. Are you aware that BC Wood marketing programs for value-added products are cost-shared by the Provincial & Federal Government and participating companies?

☐ Yes ☐ No

12 . Would you like information on the marketing programs sent to you?

☐ Yes ☐ No

13. Are you aware of Forintek's manufacturing advice program, Solutions for Wood?

☐ Yes ☐ No

14. Would you use the services more if they were cost-shared?

☐ Yes ☐ No

Part B

No information collected in Part B will be reported on an individual company basis. Some questions in Part A are repeated in Part B to allow value-added industry level analysis.

Location:

1. Please give the location of the mill/plant site is located.

_____

Products & Services:

2.a. List top 4 products manufactured at your plant and indicate approximate % of **2006** total sales revenue.

(a) _____ _____%

(b) _____ _____%

(c) _____ _____%

(d) _____ _____%

(e) others _____%

Total 100 %

2.b. Which custom services do you provide? Please check.

☐ Kiln Drying ☐ Planing ☐ Resawing

☐ Other(specify) _____

Markets:

3.a. List **2006** market areas (based on % of total sales revenue).

BC _____ % Other Canada _____% US _____%

Europe _____% Japan _____% Rest of Asia _____%

Other (please specify country & % of sales)

_____ _____%

_____ _____%

others _____%

Total 100 %

3.b. If you sell into BC, estimate the percentage of your BC sales that are to wholesalers and consolidators.

_____ %

Employment & Production Inputs:

4. Please provide the average number of full-time equivalent employees in **2006**. A full-time equivalent is 220 days or more worked in the year.

_____ Full Time Equivalent Employees

_____ Production Staff

_____ Non-Production Staff

5. Estimate volume of wood raw material used in 2006?

Logs (m^3) _____

Lumber (1,000 fbm) _____

Plywood (Sq. Ft. 3/8" basis) _____

OSB (Sq. Ft. 3/8" basis) _____

Other (please specify what & units) :

material _____

volume & units _____

6.a. Sources of lumber/log supply in **2006** (approximate) percent:

BC market purchases	_____%
Canadian purchases but outside of BC	_____%
BC Timber Sales	_____%
Other tenures	_____%
Imports from outside Canada	_____%
Total	100 %

* either direct supply or in the form of lumber or log trades

6.b. Does your company hold renewable tenure?

☐ Yes ☐ No

6.c. Is your company affiliated with a company that holds renewable tenure?

☐ Yes ☐ No

7. Estimate species use by % of total volume:

lodgepole pine _____ % spruce _____ %

balsam _____ % Douglas-fir _____ %

hemlock _____ % cedar _____ %

Other Softwoods (specify species & %)

_____ _____ %

_____ _____ %

_____ _____ %

Hardwoods (specify species & %)

_____ _____ %

_____ _____ %

_____ _____ %

Total 100 %

Capacity Utilization & Constraints:

8.a. Approximately what percentage of capacity was the plant operating in **2006**?

_____%

8.b. Was this a:

☐ 1 shift basis ☐ 2 shift basis

☐ Other (specify) _____

9.a. Do you plan to expand manufacturing capacity over the three-year period 2007 - 2009?

☐ Yes ☐ No

9.b. If yes, by what total % do you plan to expand capacity in this three-year period?

_____ %

The following questions ask you to rank a number of issues from least important (1) through to most important (5) on a scale of 1 to 5

10.a. Please rank the following possible constraints to capacity expansion for your firm from 1 to 5 where 1 = least constraining and 5 = most constraining).

Least					Most
	1	2	3	4	5
Wood supply	☐	☐	☐	☐	☐
Labour	☐	☐	☐	☐	☐
Markets	☐	☐	☐	☐	☐
Finance	☐	☐	☐	☐	☐
Mfg. Advice	☐	☐	☐	☐	☐
Other (specify below)	☐	☐	☐	☐	☐

_____

10.b. Please rank each of the following aspects of the possible constraints to capacity expansion by your firm from 1 to 5 where 1 = least constraining and 5 = most constraining)

i. Wood Supply (please rank the following)

Least					Most
	1	2	3	4	5
Volume	☐	☐	☐	☐	☐
Price	☐	☐	☐	☐	☐
Quality/Grade	☐	☐	☐	☐	☐
Price Volatility	☐	☐	☐	☐	☐
Other (specify below)	☐	☐	☐	☐	☐

_____

ii. Labour (please rank the following)

Least					Most
	1	2	3	4	5
Training/Skills	☐	☐	☐	☐	☐
Flexibility	☐	☐	☐	☐	☐
Cost	☐	☐	☐	☐	☐
Experience	☐	☐	☐	☐	☐
Other (specify below)	☐	☐	☐	☐	☐

_____

iii. Markets (please rank the following)

Least					Most
	1	2	3	4	5
New SWL Agreement	☐	☐	☐	☐	☐
Product Diversification	☐	☐	☐	☐	☐
Market Diversification	☐	☐	☐	☐	☐
Market/Product Research	☐	☐	☐	☐	☐
Other (specify below)	☐	☐	☐	☐	☐

_____

iv. Financing (please rank the following)

Least					Most
	1	2	3	4	5
Availability	☐	☐	☐	☐	☐
Cost	☐	☐	☐	☐	☐
Flexibility	☐	☐	☐	☐	☐
Repayment schedule length	☐	☐	☐	☐	☐
Other (specify below)	☐	☐	☐	☐	☐

_____

v. Manufacturing Advice (please rank the following)

Least					Most
	1	2	3	4	5
Improving Product Quality	☐	☐	☐	☐	☐
Reducing Manufacturing Costs	☐	☐	☐	☐	☐
Increasing Labour Efficiency	☐	☐	☐	☐	☐
Improving Raw Material Recovery	☐	☐	☐	☐	☐
Implementing Lean Manufacturing Techniques	☐	☐	☐	☐	☐

vi. Other constraints (specify) _____

_____

_____

Sales & Operating Costs:

11. Approximate 2006 gross sales revenue (FOB mill - C$).

☐ Less than 1 million

☐ 1.1 - 3 million
☐ 3.1 - 6 million
☐ 6.1 - 9 million
☐ 9.1 - 12 million
☐ 12.1- 15 million
☐ 15.1 - 18 million
☐ 18.1 - 21 million
☐ 21.1 - 24 million
☐ 24.1 - 27 million
☐ 27.1 - 30 million
☐ 30.1 - 33 million
☐ 33.1 - 36 million
☐ 36.1 - 39 million
☐ 39.1 - 42 million
☐ 42.1 - 45 million
☐ 45.1 - 48 million
☐ 48.1 - 51 million
☐ over 51 million (please specify approx. amount below)

_____

12. Please estimate the percentage change in gross sales revenue for **2006 over 2005** and indicate whether this was an increase (+) or a decrease (-). Calculate using the formula 2006 sales divided by 2005 sales and multiplied by 100.

_____ %

13. What proportion of **2006** operating costs do each of the following represent (approximate)

Wood costs	_____ %
Labour and benefits	_____ %
Interest	_____ %
Depreciation	_____ %

Other operating costs (specify top 2)

_____	_____ %
_____	_____ %
others	_____ %
Total	**100 %**

Electronic Commerce:

14.a. Does your company maintain a website?
☐ Yes ☐ No

14.b. Does your company sell products or services through the web?

☐ Yes ☐ No

14.c. Does your company purchase or search the web for inputs?
☐ Yes ☐ No

14.d. Does your company search the Web for manufacturing advice?

☐ Yes ☐ No

14.e. Where do you look for information that helps you with your manufacturing?

Trade media ☐ Yes

Industry events ☐ Yes

Internet ☐ Yes

Other _____

Additional Comments:

_____

_____

_____

_____

_____

APPENDIX C: Listing of products within each business type

1. Remanufactured Products

- lumber specialties
- custom processing
- cutstock
- decking
- sawmill specialties
- fencing
- siding

2. Engineered Wood Products

- laminated beams
- trusses
- prefab buildings
- log homes
- treated wood
- laminated veneer lumber

3. Millwork

- doors
- windows
- moulding
- flooring
- architectural woodwork
- turned wood
- stairs

4. Cabinets

- kitchen cabinets
- vanity cabinets
- cabinet doors
- countertops

5. Furniture

- household
- RTA
- commercial & institutional
- patio

6. Pallets and Containers

- pallets
- shipping materials
- boxes, bins & crates

7. Shakes and Shingles

8. Panelboards

- plywood
- particleboard
- oriented strandboard
- medium density fibreboard

9. Other Wood Products

- poles & posts
- veneer
- instruments
- wood novelties
- woodcrafts

Canadian Forest Service Contacts

For more information about the Canadian Forest Service, visit our website at
cfs.nrcan.gc.ca
or contact any of the following Canadian Forest Service establishments

1 Atlantic Forestry Centre
P.O. Box 4000
Fredericton, NB E3B 5P7
Tel.: (506) 452-3500 Fax: (506) 452-3525
cfs.nrcan.gc.ca/regions/afc

Atlantic Forestry Centre – District Office
Sir Wilfred Grenfell College Forestry Centre
University Drive
Corner Brook, Newfoundland A2H 6P9
Tel.: (709) 637-4900 Fax: (709) 637-4910

2 Laurentian Forestry Centre
1055 rue du P.E.P.S., P.O. Box 3800
Sainte-Foy, PQ G1V 4C7
Tel.: (418) 648-5788 Fax: (418) 648-5849
cfs.nrcan.gc.ca/regions/lfc

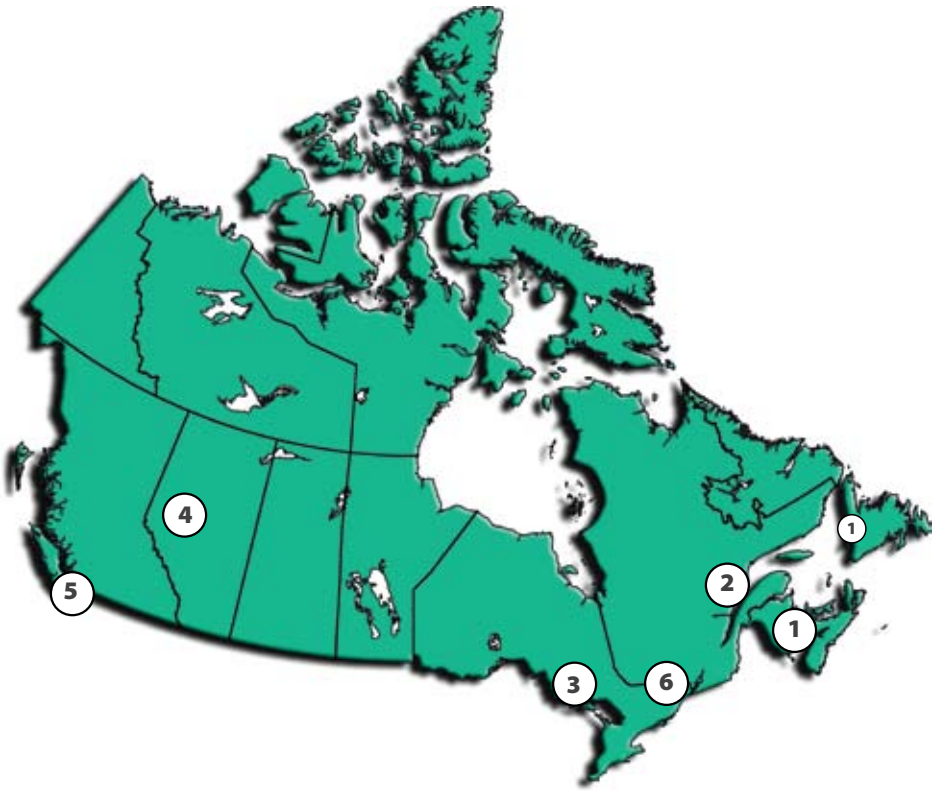
3 Great Lakes Forestry Centre
P.O. Box 490 1219 Queen St. East
Sault Ste. Marie, ON P6A 5M7
Tel.: (705) 949-9461 Fax: (705) 759-5700
cfs.nrcan.gc.ca/regions/glfc

4 Northern Forestry Centre
5320-122nd Street
Edmonton, AB T6H 3S5
Tel.: (403) 435-7210 Fax: (403) 435-7359
cfs.nrcan.gc.ca/regions/nofc

5 Pacific Forestry Centre
506 West Burnside Road
Victoria, BC V8Z 1M5
Tel.: (250) 363-0600 Fax: (250) 363-0775
cfs.nrcan.gc.ca/regions/pfc

6 Headquarters
580 Booth St., 8th Fl.
Ottawa, ON K1A 0E4
Tel.: (613) 947-7341 Fax: (613) 947-7396
cfs.nrcan.gc.ca/regions/ncr

Canadian Wood Fibre Centre
A virtual research centre of
the Canadian Forest Service,
Natural Resources Canada
cfs.nrcan.gc.ca/subsite/cwfc



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