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Secondary manufacturing of solid wood products in Alberta 2017: Structure and economic contribution

Lili Sun and Bryan E.C. Bogdanski



Canadian Forest Service
Pacific Forestry Centre

Information Report
BC-X-448

The Pacific Forestry Centre, Victoria, British Columbia

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2019

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Fo46-17/448E-PDF (PDF)
Fo46-17/448E (Print)
ISBN (PDF): 978-0-660-29393-6
ISBN (Print): 978-0-660-29394-3

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Acknowledgements

The participation of many Alberta secondary manufacturing companies, Alberta Environment and Sustainable Resource Development, and the Alberta Forest Products Association made this research report possible and their co-operation is appreciated.

We are grateful for the expert advice on the survey content by Statistic Canada officials Kyle Virgin and Marie-Noëlle Parent as well as Linda Wong for her GIS support. We thank James Knowles, Brian Hawrysh, and Dan Wilkinson for their helpful reviews.

Finally, Correne Becvar, Nicole Bruce, Lori Goertz, Caitlin Laidlaw, Vicki Longhurst, Liselle Tsai, and Catherine Nguyen were invaluable with their administrative assistance.

Abstract

This report presents survey results for Alberta's secondary wood manufacturing industries in 2017. The survey compiled operational, employment, production, marketing, and financial information on nine business types. This is the second focused survey of the sector after the first one was conducted in 2013 allowing for comparisons between the two years and providing base information for continued tracking of the sector in subsequent years. The secondary wood manufacturing sector has grown tremendously over the past 20 years but certainly has struggled to grow over the last decade. The Alberta secondary wood product industries, clustered around Calgary and Edmonton, were significant users of Alberta's wood resources and suppliers of wood-based products to Alberta and the rest of North America. Most of the fibre used by Alberta manufacturers was in the form of lumber sourced from the Alberta market. The majority of sales were within Alberta (65%), with the rest distributed across British Columbia (8%), the Prairies (3%), eastern Canada (12%), and the United States (12%). Over one third of responding firms planned to expand operations, although a number of challenges were identified as hindering expansion opportunities. Market uncertainty and trade barriers, along with high cost and an inexperienced labour force, were identified as the most pressing challenges facing the industry.

Keywords: employment, forest industry, markets, policy, secondary manufacturing, value-added

Résumé

Ce rapport présente les résultats d'une enquête menée, en 2017, auprès d'entreprises de transformation secondaire du bois en Alberta, qui a permis de recueillir des données sur les activités, l'emploi, la production, la commercialisation et les finances pour neuf types d'entreprises. Il s'agit de la deuxième enquête ciblée de ce secteur, la première ayant été menée en 2013. On a donc pu comparer les résultats de ces deux années et obtenir des données de référence pour assurer un suivi continu du secteur au cours des années suivantes. Le secteur de la transformation secondaire du bois a pris énormément d'ampleur au cours des 20 dernières années, mais a certainement éprouvé des difficultés à se développer au cours de la dernière décennie. Les entreprises de transformation secondaire du bois de l'Alberta, qui sont regroupées autour de Calgary et d'Edmonton, sont des utilisatrices importantes des ressources ligneuses de l'Alberta et sont aussi des fournisseurs de produits dérivés du bois pour l'Alberta et le reste de l'Amérique du Nord. La majeure partie de la fibre utilisée par les producteurs de l'Alberta se présentait sous forme de bois d'œuvre provenant du marché de l'Alberta. La majorité des ventes se sont faites en Alberta (65 %), et le reste des ventes ont été réparties entre la Colombie-Britannique (8 %), les Prairies (3 %), l'Est du Canada (12 %) et les États-Unis (12 %). Plus du tiers des entreprises ayant répondu à l'enquête ont affirmé avoir l'intention d'élargir leurs activités. Cela dit, plusieurs défis susceptibles de nuire à une telle expansion ont été mentionnés, les plus urgents étant l'incertitude des marchés, les entraves au commerce ainsi que le coût élevé et le manque d'expérience de la main-d'œuvre.

Mots-clés : emploi, industrie forestière, marchés, politiques, transformation secondaire, valeur ajoutée

Key Points

- This report summarizes the results of a comprehensive survey of secondary manufacturing of wood products in Alberta for the year 2017. We achieved a response rate of 24%, which represented 83 respondents of a final survey population of 343 firms.
- For 2017, we estimated that 331 businesses (excluding panelboard businesses) employed 8,453 people, had sales of \$1.5 billion and used 4.1 million m³ wood fibre.
- Most sales were to Alberta (65%), with the rest distributed across British Columbia (8%), the Prairies (3%), eastern Canada (12%), and the United States (12%).
- The most common business type was millwork (29%), followed by cabinets (15%), and engineered wood products (14%).
- Most commonly used wood fibre species were softwoods (spruce, pine, and fir) in the form of lumber and logs, with 77% of it sourced from within Alberta.
- Internet use was prevalent, with 76% of companies reporting some form of internet use. Use of social media, such as Facebook and LinkedIn, was in its initial stages; early adopters tended to be companies producing finished products, such as furniture, buildings, millwork and cabinets.
- 35% of responding firms expected to expand in the near future, but markets, labour and wood supply were listed as potential constraints.
- Market issues stood out as a potentially significant limitation to industry growth. The downturn of oil, gas and mining sectors in 2014 had a dramatic and lasting impact on domestic markets, while the on-going softwood lumber dispute with the US has reduced opportunities for some secondary manufacturers to sell into this market despite the steady growth since 2011.
- To complement the survey results, auxiliary data from Statistics Canada were compiled to provide trend analysis for the sector. Alberta's secondary wood manufacturing sector grew tremendously from the early 90s until the financial crisis period in 2008. The sector gradually recovered from the downturn but was hit by the oil price crash in 2014 and was still recovering at the time of the survey. Despite the headwinds, the sector was comparable in size to Alberta's paper and sawmilling industries.

1 Introduction

Alberta's primary wood and paper industries face numerous challenges. Increasing competition, cyclical markets and declining demand for traditional paper products result in demand shocks, and the expanding threat of the mountain pine beetle across Alberta's forests could lead to a potential supply shock. Secondary manufacturing of lumber and its by-products into intermediate and finished products is one important industry strategy to help diversify forestry-dependent economic regions and mitigate risks related to markets or natural disturbances. Current and detailed data are essential as they will help communities and industry associations better understand the existing secondary manufacturing sector and perhaps discover viable strategies to support growth and diversification of this subsector. Ensuring effective policy responses also requires credible and up-to-date information on the sector. In order to provide such information, in 2014/2015, the Canadian Forest Service (CFS) conducted the first comprehensive survey of Alberta's secondary wood manufacturing sector in 2013 since the one carried out by Alberta Economic Development and Tourism in 1995.

Building on the 2013 survey results (Bogdanski and McBeath 2017), the CFS collaborated with Alberta Environment and Sustainable Resource Development and the Alberta Forest Products Association in 2017 to conduct a second survey of secondary wood manufacturing businesses. This survey was part of a larger national survey effort to study the Canadian secondary wood manufacturing sector. To provide important trend information and context for the survey results and supplementary information on the panelboard industry, we augmented the survey data with publicly available data from Statistics Canada and Innovation, Science and Economic Development Canada. This information is contained in Appendix 1.

This study follows the definitions of secondary manufacturing used in the 2013 survey (Bogdanski and McBeath 2017). Secondary manufacturing is the further processing of primary wood or wood-based materials into semi-finished or finished products. Appendix 2 contains a comprehensive listing of wood products organized by level of processing. Aggregated by business type, the major wood products groups in the secondary manufacturing industry include:

- remanufactured products
- engineered wood products—building components
- engineered wood products—buildings
- millwork
- cabinets
- furniture
- pallets and containers
- plywood and panelboards
- other wood products

Our definition of a manufacturer excludes a number of activities, with the primary being contractors/builders, or custom one-off operations. The business types to which this definitional consideration most frequently applies are engineered wood products, cabinets and millwork firms. For example, a firm that manufactures houses in a plant and then ships them out for final assembly falls within our definition of engineered wood products, whereas a contractor or builder who constructs houses at a job site does not.

The research methods of this study are described in the next section. In section 3, we provide an overview of the current secondary wood manufacturing sector in Alberta derived from the survey results. Section 4 reports the detailed survey results. Finally, conclusions are presented in Section 5.

2 Research Methods

An inventory of Alberta secondary wood manufacturing companies was compiled in 2013 with the membership lists of producer associations, commercial directories, and a list of companies provided by Alberta Environment and Sustainable Resource Development and the Alberta Forest Products Association. This inventory of 335 companies was updated for 2017 using Statistics Canada's Business Register (BR) database issued for November 2017. After adjusting for duplicate entries, 858 companies formed the initial sampling frame for the survey.¹ During the administration of the survey, 515 firms were found to be outside the scope of the survey, closed, or misclassified (including 8 companies active in 2013 but closed in 2017—2 millwork firms, 1 cabinets firm, 2 furniture firms, 2 remanufactured wood product firms and 2 engineered wood products firms). Therefore, 343 firms were identified as secondary wood manufacturers in Alberta for the 2017 survey year, which was significantly higher than the 205 identified secondary wood manufacturers in 2013. The higher population was largely due to the use of the BR database.

A multi-part questionnaire covering nine themes was developed based on previous surveys administered by the CFS for studies of the British Columbia and Alberta secondary manufacturing sector (Wilson et al. 2001; Stennes and Wilson 2008; Bogdanski and McBeath 2015, 2017). The first part sought basic information about the business (such as mill location, main activities, etc.) followed by sections focused on wood use, operational costs, employment, capacity and expansion plans, constraints to expansion, use of electronic commerce and social media, markets, sales revenue, and products (see Appendix 3).

¹ Statistics Canada's Business Register frame includes companies with defined employment size and companies with unidentified number of employees. We surveyed all companies with defined employment size and a random survey of only 20% for the latter. We received no responses from the random sample of companies with no employment classification and so we were confident in the accuracy of the population estimate.

The questionnaire was mailed in mid-January 2018 to all identified firms, with a follow-up in early March. Firms that did not respond to the faxes, emails, or mail-outs were contacted again by phone from March to August 2018. 83 firms returned the survey for a response rate of 24%. Some firms that elected not to complete the survey provided information by phone or email to confirm their business and in some cases to provide information on their products, employee numbers, or sales.

Table 1 summarizes the survey population and respondents by business type. Each respondent firm was classified into a business type (BT) according to its reported sales of specified product types; non-respondent firms were classified based on NAICS codes provided in the BR, communications with the company or indirectly through company webpages and industry directory information (see Appendix 4 for the specific activities within our defined business types). Most firms were classified as millwork firms (29%) or cabinets (25%). Although building firms are often included in the engineered wood products classification (e.g., Bogdanski and McBeath 2015), they were broken out into a separate subgroup for this study because of their significant size. The buildings subgroup is made up of firms that make log and timber-framed homes as well as commercial and residential prefabricated modular buildings.

Table 1. Survey population, response, and working sample

	Number of firms		Response rate (%)
	Population	Respondents	
Buildings	26	4	15%
Cabinets	85	21	25%
Engineered wood products	48	16	33%
Furniture	19	5	26%
Millwork	100	14	14%
Other wood products	8	2	25%
Pallets and containers	28	10	36%
Remanufactured products	17	10	59%
Subtotal	331	82	25%
Plywood and Panelboard	12	1	8%
Grand Total	343	83	24%

The classification of businesses into types of manufacturers is not without some ambiguity. Traditionally, we include firms that make panelboards as secondary manufacturers, yet several of these firms could be categorized as primary mills, depending on the product, process, and integration of processes at the mill. Oriented strand board (OSB) operations typically mill logs to produce final products that are processed into wood strands and then pressed together into panels using heat and adhesives within the mill. These multi-process mills are arguably primary mills; however, if the operation purchased wood strands from another mill, then it fits the definition of a secondary manufacturing mill. A similar distinction between primary and secondary mills could be made with plywood and medium-density fibreboard (MDF) mills. Unlike OSB mills, two equally common types of plywood mills exist—those that are multi-process and those that

purchase veneer sheets from other mills and in turn combine veneer using adhesives, heat, and pressure to produce plywood panels. Both types of plywood mill occur because of the multiple uses of veneer and readily available markets, whereas the wood strands used to make OSB are a specialty product and often tailored to a mill's particular panel process. Specialized wood inputs limit external opportunities and favour an integrated mill. Medium-density fibreboard mills generally co-locate near primary sawmills that produce small wood particles as a by-product and fall within the definition of secondary mills. Some Alberta sawmills produce secondary products, such as chips, fuel pellets, and animal bedding, using mill residues or further manufacturing their lumber outputs into specialty lumber products. In these instances, we either broke out the secondary process or dropped the firm from the analysis when the secondary business constituted less than 50% of sales.

Table 1 clearly shows that the number of respondents was low for some business types, raising the issue of confidentiality. For example, because only one panelboard firm responded, we dropped the panelboard business type from the study. Fortunately, very good supplementary data for this business type was available from Statistics Canada (See Appendix 1). In other cases, some business types answered few of the individual questions and so we suppressed those results to maintain confidentiality.

Data from completed surveys was stored in a secure database and survey results were checked for errors and anomalies. Employment data and sales data were acquired directly from non-participating firms through follow-up communication and indirectly from news articles or company reports. Employment and sales data were obtained for 230 (67%) and 141(41%) firms, respectively.²

Non-response to the survey by businesses raises concern of biased results. Firms that did not participate may be very different from firms that did respond, resulting in biased results and perhaps false conclusions. For example, there could be differences between owners' attitudes about completing surveys across different types of businesses. We conducted two statistical tests to check for non-response bias. The first test compared the frequency distribution of the responding firms across business types against the population distribution. This test found no difference at the 5% significance level; therefore, the survey respondent group provided a good representation of the distribution of business types across the population. A second test split the survey respondents into two groups: 1) those who responded to the survey with employment information; and 2) those that responded with employment information only with follow up calls at a later date. We tested the distribution of size of firms, in terms of employees, across the two groups and found no significant difference. In summary, the survey respondents were generally representative of the entire population of firms. However, as with any census survey that fails to collect information from all firms, some uncertainty remains and therefore caution should be exercised in extrapolating results to the entire population. Appendix 5 shows detailed results for tests of non-response bias.

² In some cases, returned surveys had missing sales and employment data. For these records, the missing data were estimated using information from similar businesses.

3 State of the Sector in 2017

This section provides insights from the survey describing the current state of the sector. It extrapolates the survey results to the total population, presenting estimates of population employment, sales, and wood use. The employee numbers were used to scale other variables of interest within each business type after developing coefficients per employee (see Table 2). This method of extrapolation is the same as the 2006 survey (Stennes and Wilson 2008). The employee information was obtained for 67% of all firms in our population. For those firms for which we were unable to obtain employment information, we estimated employee numbers from sample medians of each business type.³

3.1 Sales, Jobs and Wood Use

The estimated number of secondary wood product manufacturing firms, as defined in the survey, was 343 in 2017 (see Table 1). For 2017, aggregate employment and sales (excluding

panelboards) were estimated to be 8,453 and \$1.54 billion, respectively. The sector (excluding panelboards) was estimated to use 4.1 million m³ of wood fibre.

Table 2 shows employment and gross sales per unit of roundwood equivalent consumed as input, and gross sales per full time equivalent. In the case of employment, the labour intensive business types such as cabinets, furniture and millwork generated the most jobs per 1,000 m³ of wood fibre, however, these business types also created the lowest amount of sales per full-time equivalent employee. On the other hand, less labour intensive BTs such as pallets and containers and remanufacturing generated higher sales per full-time equivalent employee but lower employment per 1,000 m³. The remanufactured wood products BT had the highest sales per employee. Sales per employee is an indicator of the potential wage levels available to employees, as higher sales per employee may indicate the manufacture of higher value-added products.

Table 2. Jobs and sales per unit roundwood equivalent and sales per full-time equivalent 2017

	Jobs (per 1,000 m ³)	Sales (per m ³)	Sales per full-time equivalent (000s)
Cabinets and furniture	31.8	\$4,481	\$152
Engineered wood products	1.8	\$427	\$181
Millwork	16.6	\$3,448	\$166
Other wood products	0.3	\$136	\$220
Pallets and containers	0.6	\$161	\$248
Remanufactured wood products	0.6	\$132	\$258
All BTs	1.8	\$393	\$180

Note: Wood fibre use such as log, lumber, panelboards, etc. was converted into roundwood equivalents.

3.2 Regional Distribution of Businesses

Figure 1 shows the geographic distribution of Alberta's secondary wood manufacturers in 2017. The regions used were the Land-use Framework Planning Regions used by Alberta Environment and Sustainable Resource Development, Forestry Division – Forest Management Branch. We further grouped the Upper and Lower Peace, and the Upper and Lower Athabasca into one region called the North; and we referred to the remaining regions as the South. Most firms were in the south where the population and demand for products were concentrated, with 45% in the South Saskatchewan region and 35% in the North Saskatchewan region. Secondary manufactures were sparse in the North region (~15%), with 3% of those firms located in the Upper Peace, 3% in the Lower Peace, 7% in the Upper Athabasca, and 1% in the Lower Athabasca.

Figure 2 further shows the location of Alberta's secondary wood manufacturing firms by BT. Millwork includes architectural millwork that is used in commercial buildings and these business types were logically located around the commercial hubs of

³ Extrapolation was done using medians rather than means because the distributions for sales and employment were skewed toward a few large firms. Under these conditions, using means to scale up sample results would overestimate the true population parameters.

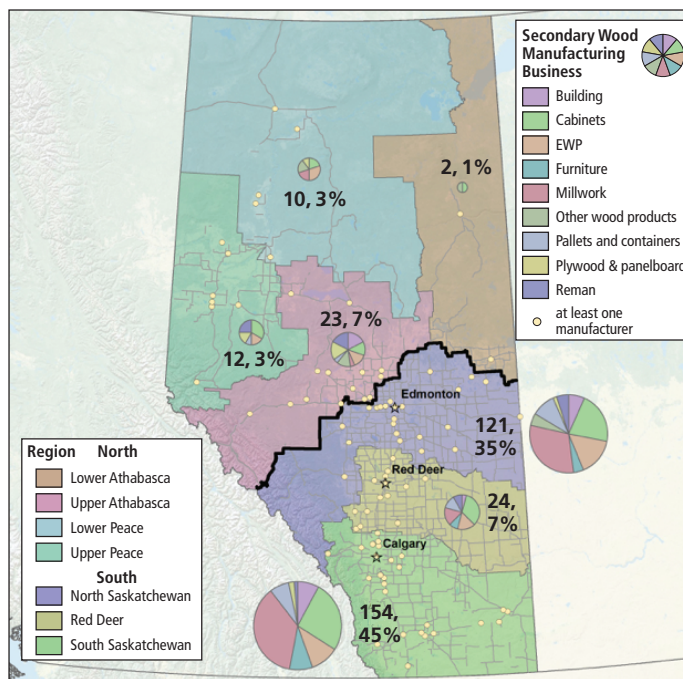


Figure 1. Location of Alberta's secondary wood manufacturers in 2017— number of firms and business type.

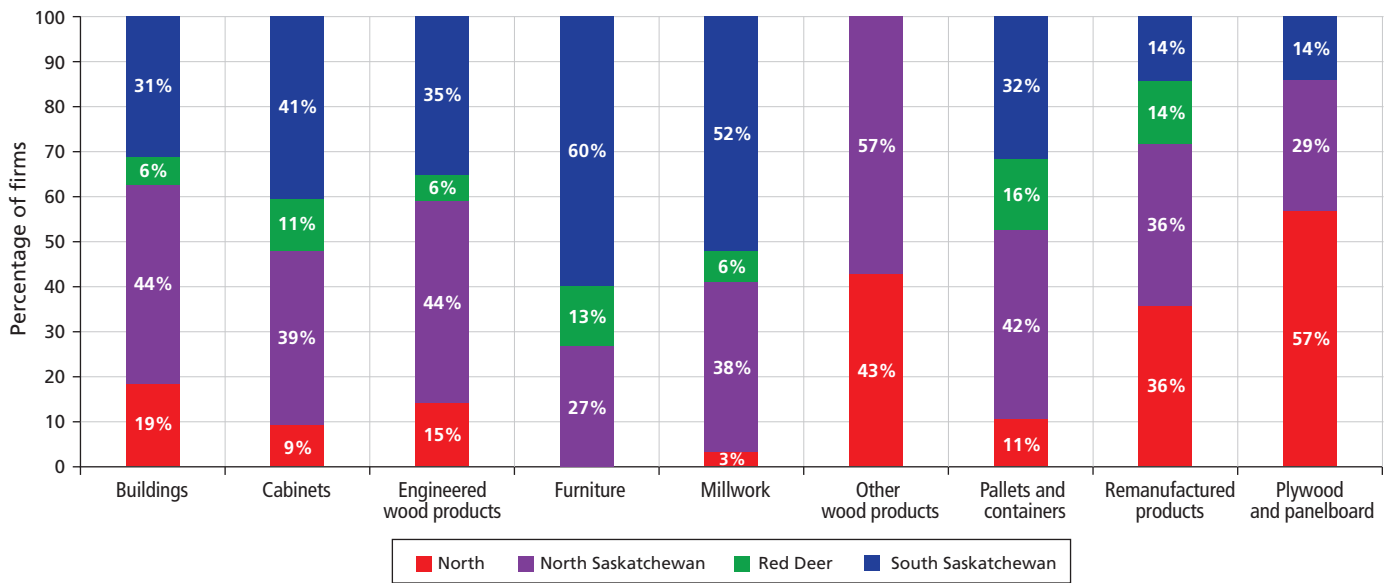


Figure 2. Location of Alberta's secondary wood manufacturers in 2017, by business type.

Edmonton and Calgary in the North Saskatchewan and the South Saskatchewan regions. The BTs producing commodities (i.e., remanufacturing and other wood products) or using more wood inputs (i.e., plywood and panelboards) were in the north, closer to their wood fibre inputs sourced from the primary production mills. Furniture businesses were clustered in the south, close to large population centres and within reach of United States regional markets via major transportation hubs. Cabinets and engineered wood products (i.e., trusses and joists) were well distributed and close to major housing markets. The pallet and container operations were located throughout the south to serve the key manufacturers and the transportation hubs of Calgary and Edmonton. Building businesses focused on prefabricated and mobile buildings were clustered around the manufacturing centres of Calgary and Edmonton. The few building businesses in the north tended to specialize in log and timber-framed buildings.

4 Survey Results

In this section, detailed results from the 2017 survey are provided for employment, sales, products and services, raw material use, operating costs, markets, capacity utilization and expansion plans. These results exclude information from panelboard producers.

4.1 Employment

Companies with employee numbers provided by the survey or on the phone were included in this part of the analysis. The average firm had 27 employees, while the median was 13. Firms were classified into three groups according to the number of employees. Figure 3 shows that 60% of the firms were small, having 1–15 employees; 28% of the firms were medium size

with employees 16–50; and 12% were large firms with employees over 50. The 27 large firms were all located in the three southern forest regions, which contained most of the provincial population. These large firms were almost equally split between the South and North Saskatchewan regions.

Figure 4 further shows the number of employees by firm size and by region. Although large firms (>50 employees) only made up 12% of all firms, they accounted for 52% of employment in the sector and while 60% of firms were small, they employed only 15% of the sector's employees. Medium size firms represented 28% of firms, and 32% of the sector's employment. Geographically, the North Saskatchewan and South Saskatchewan regions accounted for 89% of reported employment.

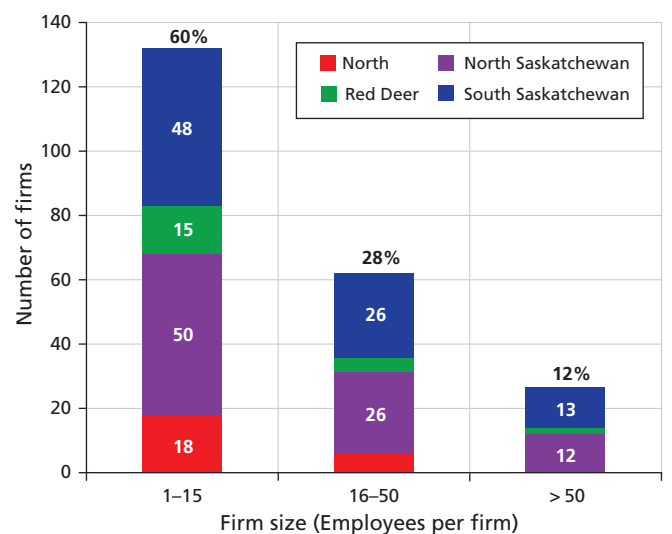


Figure 3. Distribution of secondary wood manufacturing firms by size and geographical region ($n=222$).

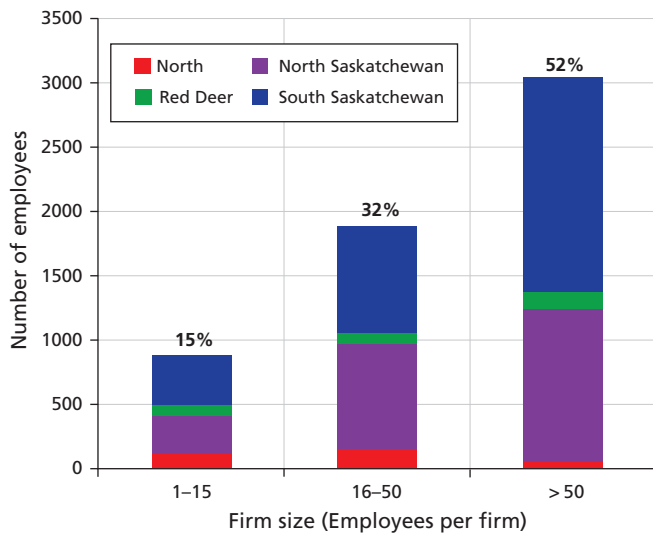


Figure 4. Number of employees in secondary wood manufacturing by firm size and geographical region ($n=222$).

Figure 5 shows the employee distribution across business types. Engineered wood products, millwork and cabinets accounted for the highest employment of the sector, at 23%, 21% and 17%, respectively. Figure 6 illustrates the relative size of firms in each BT based on number of employees. Small firms dominated all

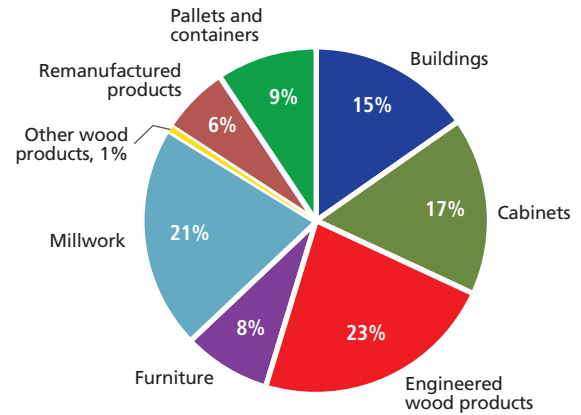


Figure 5. Employee distribution of secondary wood manufacturing firms by business types ($n=222$).

BTs except the engineered wood products, where the medium-sized firms were predominant. The building BT had the highest proportion of large firms at 38%, followed by the furniture BT at 20%.

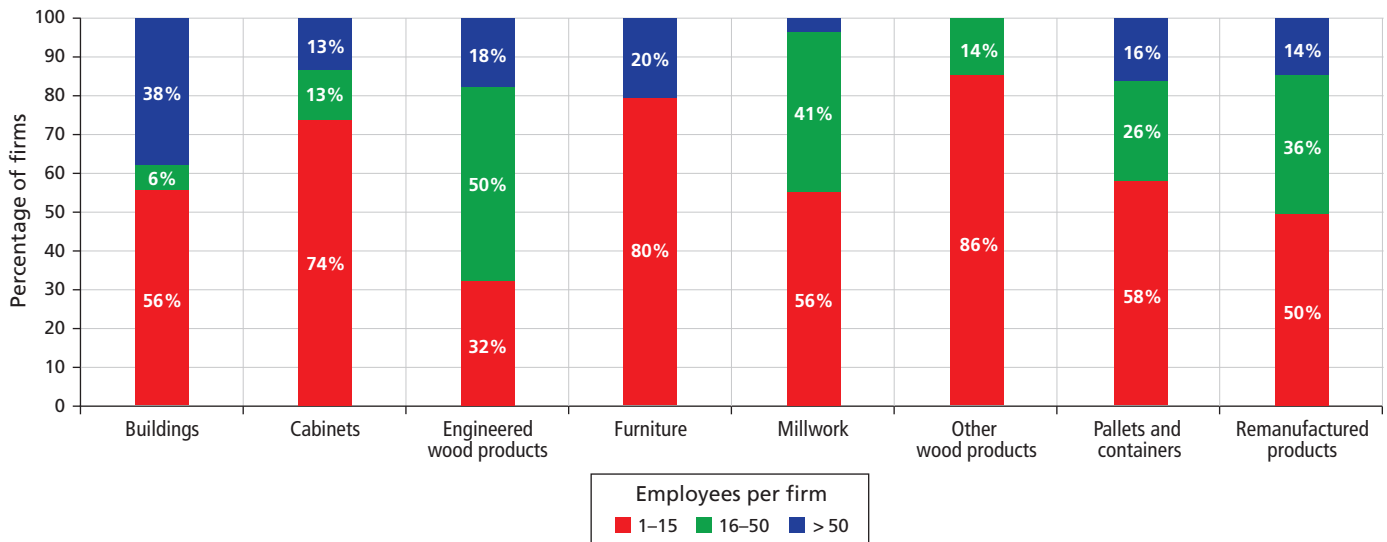


Figure 6. Firm size distribution of secondary wood manufacturing firms by business type ($n=222$).

4.2 Sales

137 companies provided gross sales for 2017, either by direct response to the survey or on the phone. The average firm sales was \$4.4 million and median sales was \$2 million. Many respondents generated modest sales, with 37% of firms selling less than \$1 million, and only 2% with sales more than \$24 million. Figure 7 shows the sales revenue distribution across BTs. Engineered wood products, cabinets, furniture and millwork accounted for 77% of the total sales for the sector. Figure 8

further shows that low-sales firms (<\$1 million) were spread across all BTs, with the greatest percentage of low-sales firms falling in the furniture and other wood products BTs. Medium-sales firms (\$1 million to \$12 million) were more common within the engineered wood products, millwork, pallets and containers and the remanufactured products BTs. A significant share of buildings, furniture, and pallets and containers were large-sales firms (>\$12 million).

Respondents were asked to provide sales from 2016 and 2017 as well as expected sales in 2018. Figure 9 shows the change in nominal sales by BT in relation to 2017.⁴ From 2016 to 2017, sales increased by 1% in total, with 33 (49%) of firms reporting an increase in revenue and 32 (47%) firms reporting a decrease. Only the millwork and cabinets BTs experienced a decrease in sales over this period while the building BT reported the highest increase—53%.⁵ The overall outlook for 2018 was positive with an expected 8% increase in sales over 2017, with 52 (76%) firms predicting a growth in revenue and only 12 (18%) firms predicting a decrease. Remanufactured products and furniture BTs were expecting decreased sales revenue at -26% and -17%, respectively.

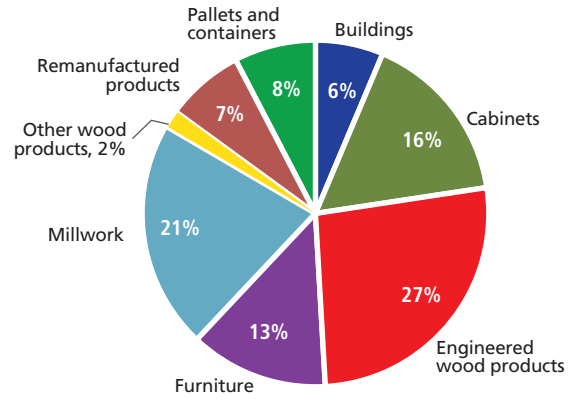


Figure 7. Revenue distribution of secondary wood manufacturing firms by business type (n=137).

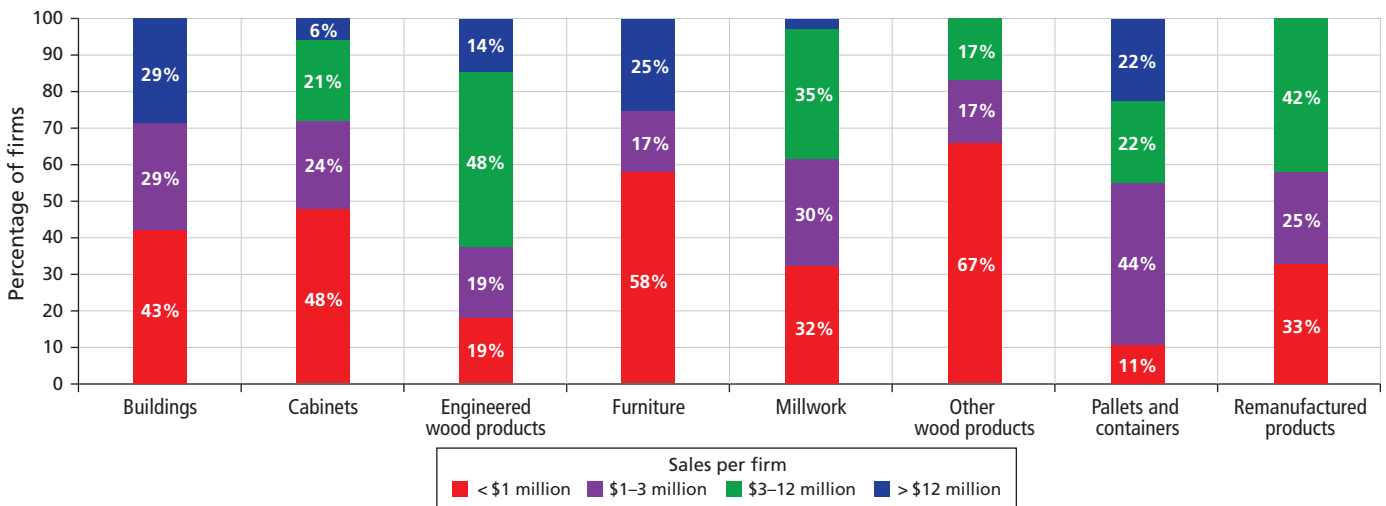


Figure 8. Revenue class distribution of secondary wood manufacturing firms by business type (n=137).

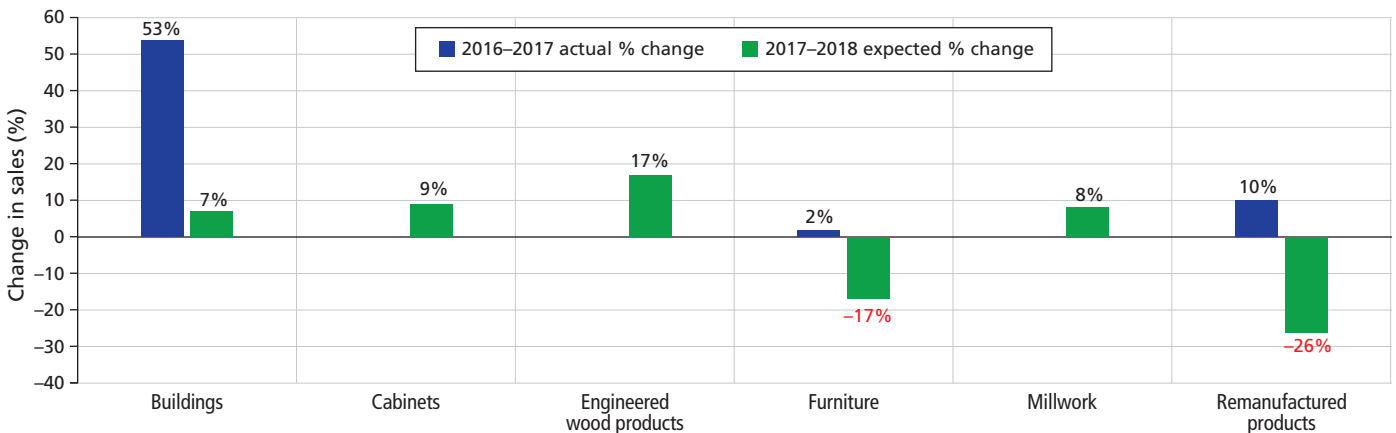


Figure 9. Percentage change in sales revenue in relation to the 2017 sales (n=66).

⁴ Constructed as the % change in total sales for each business type.

⁵ Caution needs to be exercised as the % was based on only two firms in building business type.

4.3 Products and Services

This section summarizes the end-use markets that secondary manufacturers produce products for and services that they provide and purchase. Table 3 shows the percentage of

respondents in each business type that manufacture for particular end-use markets.

Table 3. Percentage of respondents that manufacture for select end-use markets (*n*=79)

Business type	New residential	Multiple-unit housing	Remodeling	Commercial buildings	Industrial buildings	Industrial uses	Other
Buildings	100	25	100	75	50	25	25
Cabinets	90	60	85	40	30	10	0
Furniture	100	60	100	60	40	20	20
Millwork	77	54	77	92	54	23	0
Pallets and containers	11	11	0	0	11	78	22
Engineered wood products	94	75	38	69	38	31	19
Remanufactured products	20	10	20	10	10	80	30
All respondents	72	49	58	50	33	36	13

The majority of companies manufactured products for new residential buildings (72%) and remodeling (58%). The furniture, building and cabinets BTs mainly targeted new residential and remodeling end markets, while pallets and containers and remanufactured products primarily produced for industrial end-users. Millwork and engineered wood products were balanced between the residential, commercial and industrial end-use markets.

services were classified as manufacturing (e.g. resawing, planing, kiln drying) and non-manufacturing (e.g. marketing, distribution, logistics). 43% of respondents provided custom services while 47% purchased custom services from other businesses. Of the business that offered services, 88% provided manufacturing services, 30% delivered non-manufacturing services, and 18% provided both. Resawing and planing were the main services provided (Figure 10). Kiln drying and non-manufacturing services were the main services purchased by respondents. Only 5% of respondents planned to expand into new custom service.

Respondents were asked whether they bought or sold custom services, and the types of services acquired or provided. Custom

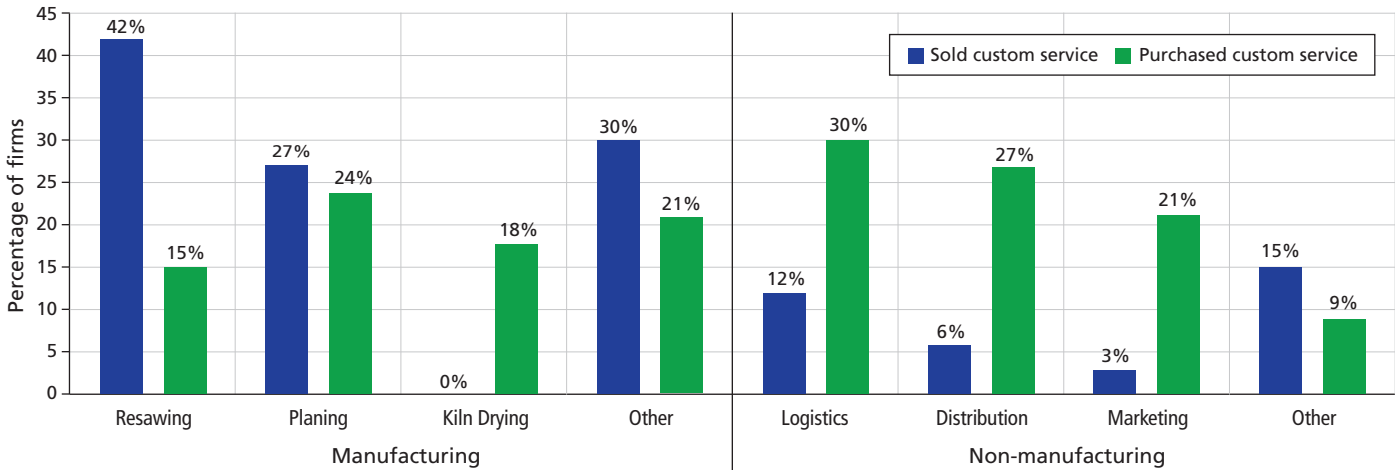


Figure 10. Percentage of respondents selling or purchasing custom services (*n*=33).

4.4 Cost Structure

Respondents were asked to list the proportion of their operating costs attributable to wood, labour, interest payments, depreciation, and other production costs. Wood costs were the largest cost component at 42% of operating costs on average, and labour followed at 36%. Thus, labour and fibre accounted for nearly 80% of the total manufacturing costs for secondary wood manufacturers in Alberta. The "other" category varied across BTs and was reported by respondents to include overhead, maintenance, transportation, and utilities.

Figure 12 highlights the cost distribution across the four cost categories by BT. Wood costs was the most significant cost component for pallets and containers, buildings, remanufactured products, and engineered wood products. Labour was a substantial cost component across all BTs but was greatest for furniture and

millwork BTs. Depreciation and interest were generally a small part of overall costs but for furniture, millwork and remanufactured product businesses these expenditures made up a larger share of the cost structure.

The building business cost mix was significantly different from that reported in the 2013 survey, when wood costs made up a smaller proportion of total costs. The difference was due to a different mix of building firms responding to the survey. In this survey, there was a lower response from commercial building manufacturers compared to the 2013 survey and a greater relative response from log home manufacturers. As log homes use a greater proportion of wood than other building types, wood costs made up a larger proportion of total costs.

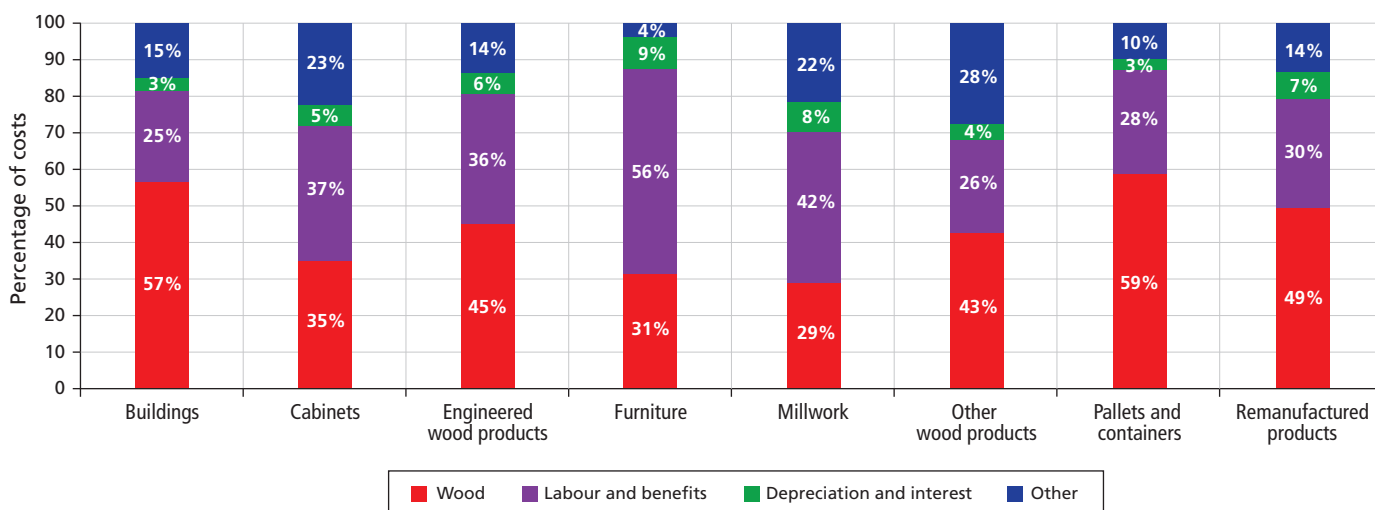


Figure 11. Distribution of operating costs across business type ($n=68$).

4.5 Wood Material Utilization and Species

Wood fibre inputs reported by respondents in terms of logs, lumber, panelboards, and other wood products, were converted into roundwood equivalents to facilitate comparison across BTs and types of wood inputs.⁶ The survey respondents ($n=73$) used about 0.9 million m^3 of roundwood equivalents. Of this total wood fibre, 65% was in the form of lumber, with logs as the second largest wood fibre input at 17% (Figure 12). About 12% of wood fibre used was in the form of plywood, veneer, oriented strand board and MDF boards. Lumber was the dominant wood material used by pallets and containers, and remanufactured products BTs. Plywood was used by furniture, cabinets, buildings and millwork business types, while all the MDF was consumed by millwork, cabinet and furniture businesses. Logs are a major wood material in other wood products, buildings, and engineered wood products. Particleboard and melamine covered boards are used by cabinet, millwork and remanufactured product BTs.

Figure 13 shows the volume of wood fibre species by type of tree species. Softwood species made up most of the volume used and were the key input for several BTs. Spruce (48%) and lodgepole pine (36%) were used extensively and are both commonly found in Alberta. Douglas-fir (11%) was also used, as well as various hem-fir (3%) species. The businesses in the North region used softwood species exclusively with hardwoods comprising only 2% of total volume. Maple (1%) was the most commonly used hardwood species. Other hardwoods, such as poplar, oak, birch, walnut, and cherry, made up the remaining 1%.

Figure 14 shows species use by business type. The cabinet businesses used nearly 100% hardwoods. The furniture BT used a large percentage of both other hardwood and other softwood. Millwork businesses used the greatest variety of species with hardwood dominating. The rest of the BTs used softwoods exclusively.

⁶ Conversion factors are based on Nielson et al. 1985.

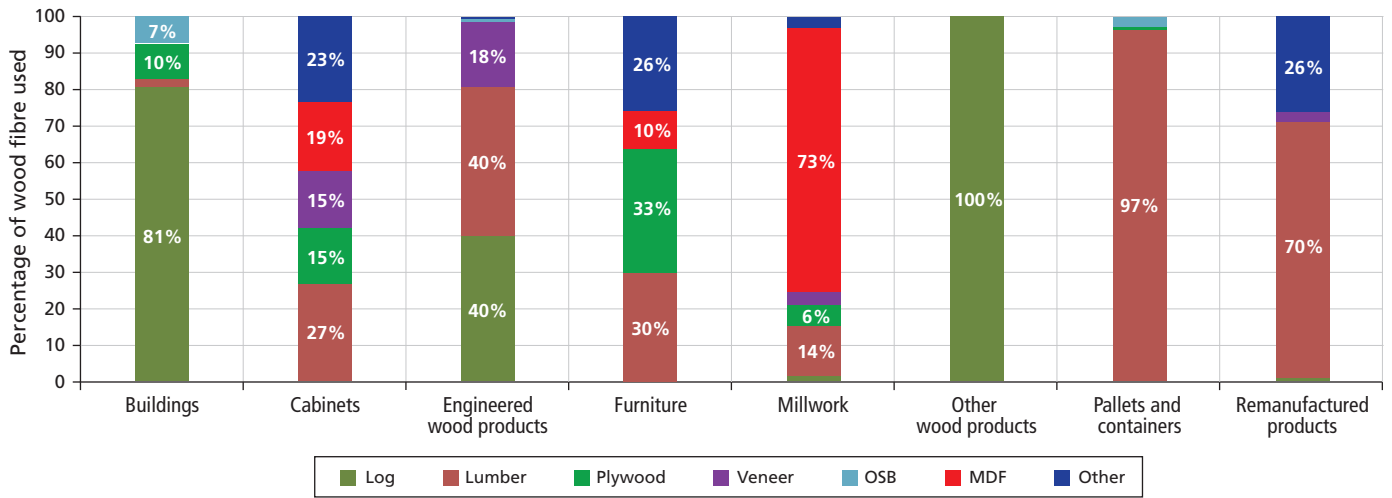


Figure 12. Distribution of wood fibre by business type (n=73).

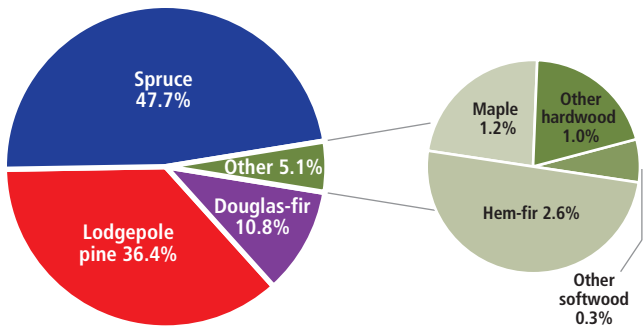


Figure 13. Percentage of wood fibre species used (n=65).

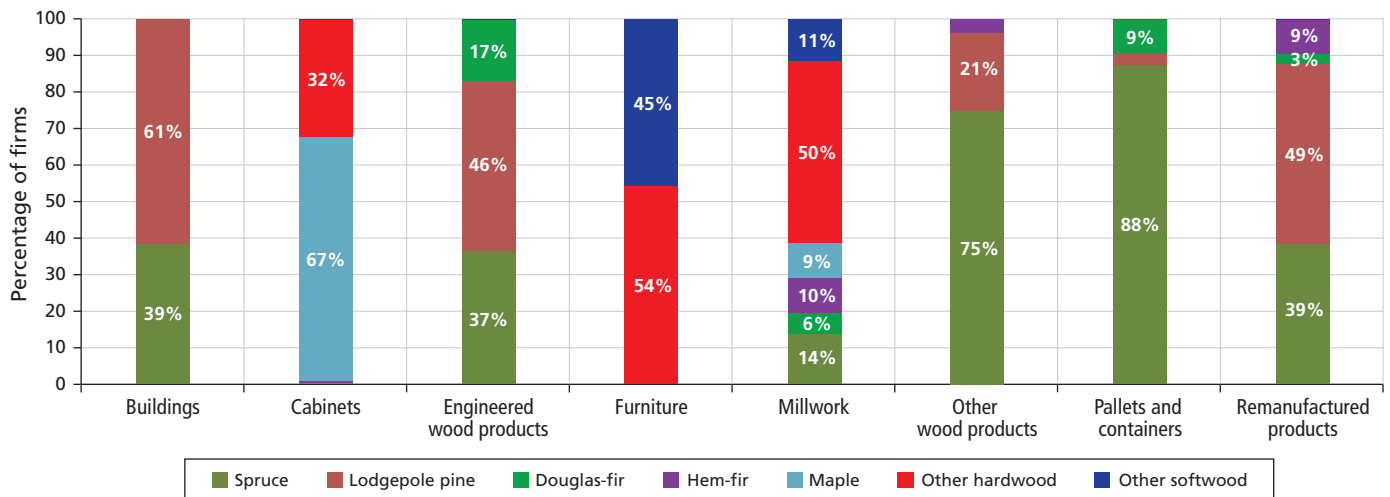


Figure 14. Wood species use by business type (n=65).

Figure 15 shows that most (77%) of the wood volume used by the responding firms was sourced from Alberta, either from the open market (74%) or directly from the forest through a harvest license or trade with other with other companies (3%). The remaining volume was sourced from the rest of Canada (22%) or imported (1%). 90% of the firms sourced some of their wood fibre domestically in Alberta while 41% of firms obtained some of their fibre from the rest of Canada and 18% of the firms sourced some of their wood fibre from outside of Canada.

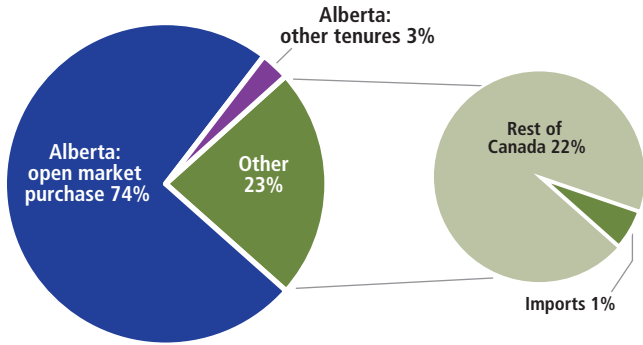


Figure 15. Percentage of wood volume by source (n=76).

4.6 Markets

To understand market specialization and highlight possible opportunities for market diversification and growth, we asked respondents to list the markets in which they sold their products. Not surprisingly, the markets for Alberta's products were concentrated locally, with 65% of sales going to the Alberta market (Figure 16). This was higher than the 57% estimated in the 2013 survey. The rest of Canada accounted for 23% of sales,

which were distributed across Eastern Canada (12%), British Columbia (8%), and the Other Prairies (3%). About 12% of 2017 sales were to markets in the United States, with two-thirds of these sales going to the western US and one-third to the Midwest. At the time of the survey, sales to overseas markets were very low (less than 1%) and far less than British Columbia's 20% overseas sales (see Bogdanski and McBeath 2015).

Across all BTs, buildings and cabinets had the least diversified markets (Figure 17), with an almost exclusive focus on the Alberta market. Respondents in the furniture BT indicated that sales were somewhat diversified across North America, with only 23% of sales to Alberta. Millwork, pallets and containers, engineered wood products and remanufactured products all sold over 50% of their goods into the Alberta market, but also had a presence in the rest of Canada and the US. Other wood products was the only BT which was dominated by US sales.

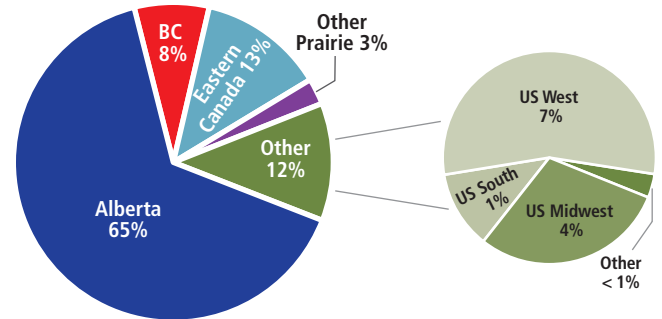


Figure 16. Market shares of Alberta secondary manufacturing sales (n=75).

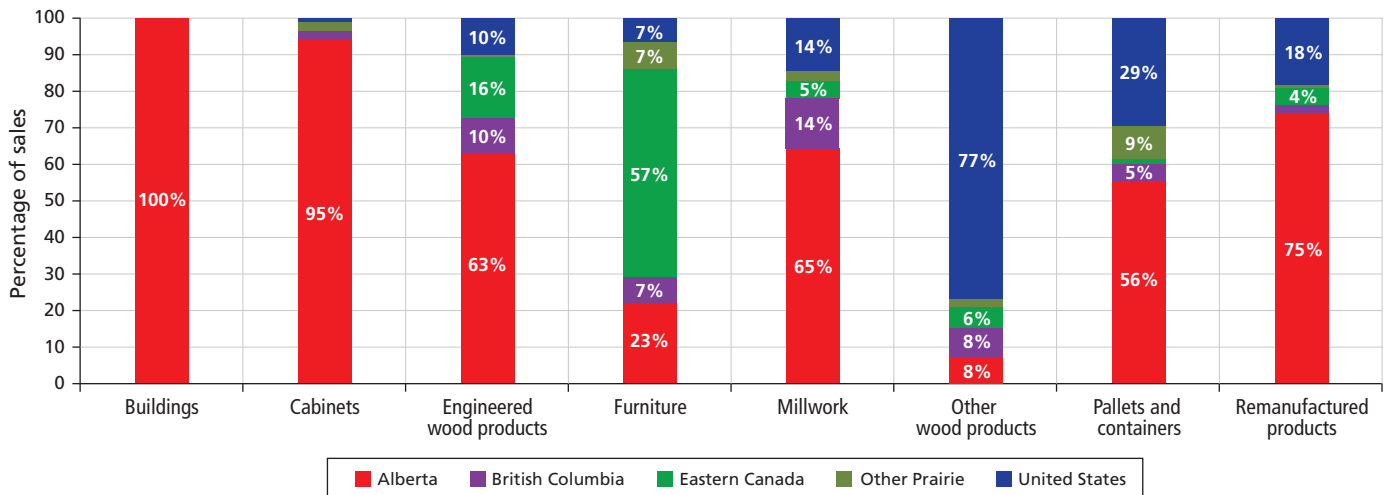


Figure 17. Distribution of sales to destination market by business type (n=75).

34% of respondents planned to expand sales to new market regions. The building (50%) and other wood products (50%) business types were the most interested in expansion to new markets while the furniture BT had no interest. Overall, respondents were most interested in expanding within the local Alberta market (69%) and into other provinces (47%). 32% of respondents wished to expand into US markets and

9% showed interest in the Asian market. Figure 18 shows the appeal of new market regions for each BT. Overall, firms were most interested in increasing their market presence within Alberta, followed by expanding to other provinces and US. Remanufactured products only planned to expand within Canada. In addition, pallets and containers was the only BT that showed an interest in moving into Asia.

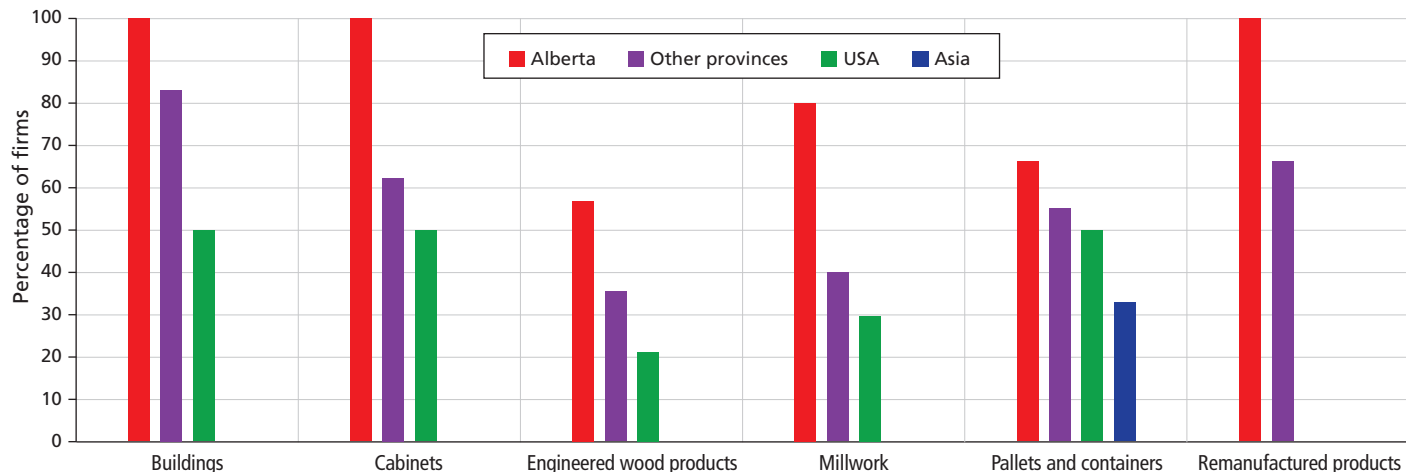


Figure 18. New market regions of interest (n=25).

4.7 Use of the Internet

To gauge the use of emerging electronic business practices, survey respondents were asked if they used the internet in some way to support their business. The survey responses were arranged into three groups that represented the firms' use of the internet: (1) management, (2) e-commerce, and (3) marketing (Table 4).

When using the internet for management purposes, 76% of firms used it to acquire knowledge and information and 30% used it to access LinkedIn. LinkedIn, a social media tool suited to finding employment and employees, was used to some degree by all BTs

except furniture. In terms of e-commerce, 33% of firms took advantage of the internet to purchase products, whereas only 10% used it to sell their products. The furniture BT was the most likely to sell their products via the internet followed by buildings.

Nearly 76% of the businesses reported having a website. This was by far the most common use of the internet for marketing purposes. When using the internet for more novel marketing tools, 49% of firms accessed Facebook, followed by 13% for Twitter, and 9% for Instagram. The buildings, cabinets, millwork, and furniture business

Table 4. Percentage of firms using the internet for management, e-commerce, or marketing by business type (n=77)

Business types	Management		E-commerce		Marketing					
	Knowledge/ Information	Linked-In	Purchase	Sell	Website	Facebook	YouTube	Twitter	Pinterest	Instagram
Buildings	100%	50%	50%	25%	100%	75%	25%	25%	0%	25%
Cabinets	85%	20%	45%	5%	75%	50%	5%	15%	0%	15%
Engineered wood products	75%	50%	44%	13%	81%	63%	6%	31%	0%	6%
Furniture	60%	0%	20%	60%	100%	80%	0%	20%	20%	20%
Millwork	77%	31%	23%	0%	85%	46%	8%	8%	0%	8%
Other wood products	33%	33%	0%	0%	67%	33%	0%	0%	0%	0%
Pallets and containers	56%	22%	11%	0%	67%	11%	0%	0%	0%	0%
Remanufactured products	82%	27%	27%	9%	45%	36%	9%	0%	0%	0%
Total	76%	30%	33%	10%	76%	49%	6%	13%	1%	9%

types, which tend to sell finished consumer products, were more likely to take advantage of these marketing tools, perhaps seeing them as an effective channel to final consumers.

13% of survey respondents indicated that they planned to expand their use of the internet. 18% of these firms did not access the internet or simply had a website, whereas 82% already used the internet beyond a simple web presence to support their businesses. 82% of the firms intending to expand were either of small or medium size (i.e., less than 50 employees). 65 of the 82 survey respondents provided various reasons for not adopting or expanding e-commerce. The two most common reasons were: (1) they did not see how the internet would benefit their business; and (2) they did not have the required skills.

4.8 Capacity Utilization

Respondents were asked about their manufacturing capacity utilization and expansion. Manufacture capacity refers to the maximum volume of products that a mill is designed to produce for a one-year period. Table 5 shows that all BTs were operating below 100% capacity and had room for expansion. The average capacity utilization level was 68%. Capacity utilization was lowest for the buildings, engineered wood products and remanufactured products BTs. The utilization was generally lower than the percentage reported in the 2013 survey except for furniture, pallets and containers and other wood products. About 35% of firms expected to expand over the next few years (Table 6) by an average of 30%.

Table 5. Capacity utilization by business type (n=78)

Business type	2017 Capacity utilization (%)	2013 Capacity utilization (%)
Buildings	38	61
Cabinets	75	85
Engineered wood products	56	87
Furniture	75	68
Millwork	74	79
Other wood products	80	68
Pallets and containers	72	65
Remanufactured products	67	74
All business types	68	76

The remanufactured products and other wood products were leaders in planned expansion. 55% of remanufactured wood product firms had planned expansion and, given they had lower capacity utilization (see Table 6), physical capital should not be a constraint in the future. Conversely, other wood products firms already reported a high level of capacity utilization, and so physical capital could be a short-term constraint to proposed expansion. In contrast, furniture makers were less confident in expanding with only 20% expecting to reach into new markets.

Table 6. Planned capacity expansion (n=78)

Business type	Proportion of firms expecting to expand (%)	Average Expansion (%)
Buildings	25	100
Cabinets	37	24
Engineered wood products	31	32
Furniture	20	15
Millwork	31	25
Other wood products	50	15
Pallets and containers	38	32
Remanufactured products	55	29
All business types	35	30

Most firms that intended to expand had more than 10 employees and over \$1 million revenue, suggesting that labour resources, expertise, or cost may limit smaller companies from pursuing the same strategy. Furthermore, 43% of firms expecting to expand their capacity were also hoping to break into new markets, all outside of Alberta. Almost all of the 28 firms that intended to expand used the internet, social media or e-commerce, supporting the view that a strong web presence might support business expansion, especially outside of Alberta.

Clearly, as the Alberta, broader Canadian and United States economies continue to grow, expenditures on housing and other types of construction are expected to increase. This was positive for the secondary manufacturing sector overall and is likely reflected in the responses of the survey respondents.

4.9 Constraints to Expansion

Our survey examined six factors that may constrain a firm's ability or expectations for expansion: (1) wood supply; (2) labour; (3) markets; (4) financing; (5) management capacity; and (6) transportation and distribution. Firms were asked to rate each of these factors on a scale of 1 to 5 (i.e., from not at all constraining to extremely constraining). Figure 19 shows the distribution of firms' ratings of the six factors.

Survey respondents also ranked subcategories of these six factors, providing some insights into the specific issues that may have constrained expansion. Table 7 provides the mean score for each constraint and their subcategories. In contrast to the 2013 survey where labour issues were perceived as the most limiting to a firm's ability to expand in Alberta, Table 7 clearly indicates that market issues (3.5) was the number one issue in 2017 while labour was a more moderate constraint to growth (2.7). These results are not a surprise given that Alberta's economy and that of neighboring Saskatchewan underwent significant change since the last survey. In 2013, the price of oil was around \$100 per barrel but steeply dropped from the middle of 2014 to near \$30 per barrel in early 2016, and hovered around \$50 per barrel in 2017. The downturn in the oil and gas and

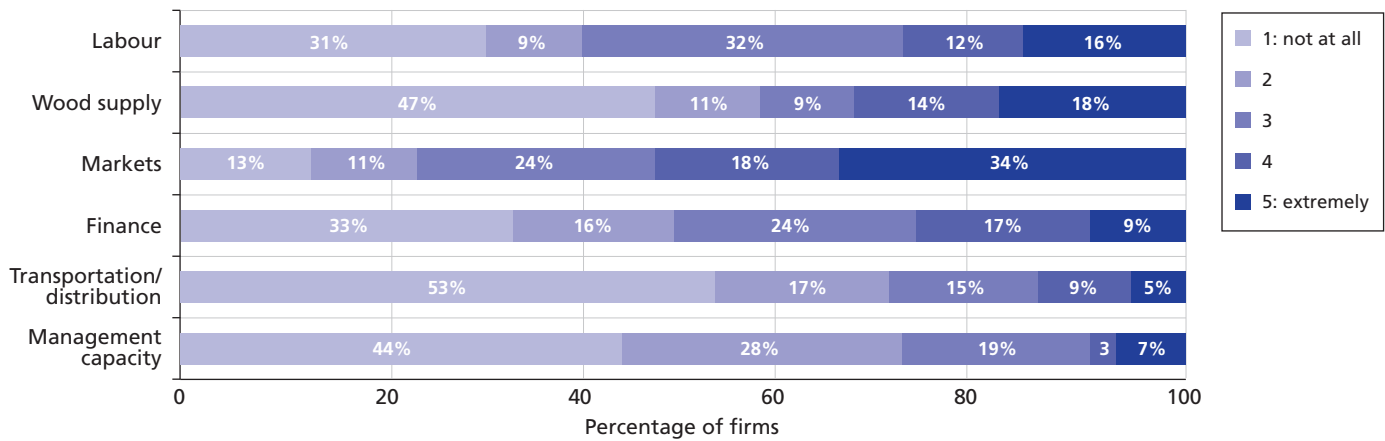


Figure 19. General constraints to expansion: distribution of rankings (n=77).

Table 7. Constraints to expansion: mean constraint scores (n=77)

Markets	3.5
Softwood Lumber Agreement	2.5
Market diversification	2.3
Product diversification	2.1
Market/Product research	2.1
Foreign regulations	1.9
Labour	2.7
Experience	3.1
Cost	3.0
Training/Skills	2.7
Flexibility	2.4
Wood Supply	2.5
Price volatility	3.0
Price	2.9
Volume	2.5
Quality/Grade	2.5
Finance	2.5
Cost	2.5
Availability	2.3
Flexibility	2.2
Repayment schedule length	2.1
Management	2.0
Increasing labour efficiency	3.1
Reducing manufacturing costs	3.1
Improving raw material recovery	2.3
Implementing lean manufacturing technology	2.3
Improving product quality	2.2
Transportation	2.0
Costs	2.9
Logistics	2.3
Access	2.2
Frequency	2.2

mining sectors slowed down the entire Alberta economy including the construction and housing sectors, upon which secondary wood product businesses rely greatly. According to housing start data from the Canadian Mortgage and Housing Corporation (<https://cmhc-schl.gc.ca/en/data-and-research/data-tables/housing-market>), housing starts fell from over 40 000 in 2014 to less than 25 000 in 2016. However, the economic shock decreased demand for all wood products, not just those directly linked to construction. The shock also resulted in increased unemployment. As the Alberta economy continues to recover slowly from the oil shock, with housing starts still well below pre-2014 levels (2017 starts were around 28 000), secondary wood products businesses' main concern was to rebuild sales.

Figure 20 further presents the general constraints to expansion by BT. All BTs scored markets above 3 out of 5, except for other wood products that scored it at 2.5. Buildings scored markets the highest at 4.5 while millwork gave markets a score of 4.1 because of the slump of higher-end housing markets and commercial building construction. The detailed breakdown of the market constraints shows that the US-Can softwood lumber dispute was a concern and was particularly important for remanufactured products (3.8), pallets and containers (3.6), and engineered wood products (2.7). Market diversification represented a moderate issue for cabinets (2.3), furniture (1.8) and millwork (2.6) BTs. Overall, the market posed constraints across BTs by limiting firms' abilities to expand sales. Companies had products and knew which markets could benefit from their products, but the diversification challenge centred on how to break into new markets while the softwood lumber dispute resulted in increased costs to serve the US markets.

Firms across all BTs rated labour as the second greatest constraint to growth (2.7). In detailed responses, we noted that firms were concerned not only about the cost (3.0) of labour but also about the level of experience (3.1) as well as training and skills (2.7). Alberta's economy is dominated by the oil and gas and mining sectors, well known for their high levels of labour demand and high wages. Even though there was more labour available from

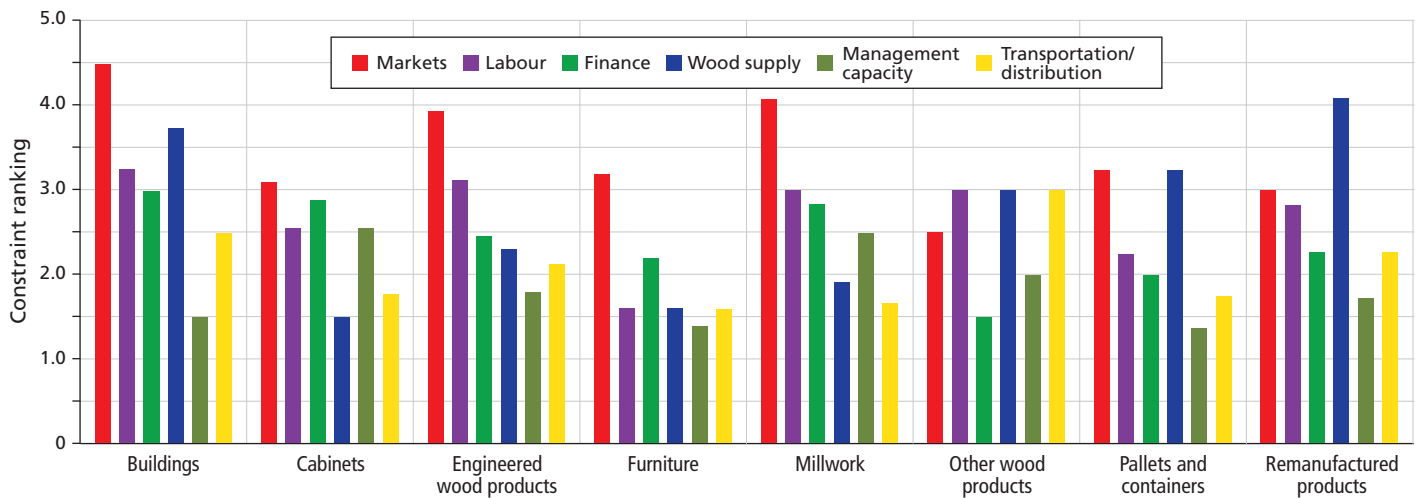


Figure 20. Constraints to expansion, where 1 = not at all constraining and 5 = extremely constraining.

the slowdown of the oil and gas sector, a shortage of experience, skills and training posed a significant barrier. Level of experience was the highest rated issue for buildings (4.3), cabinets (3), engineered wood products (3.3), and millwork (3.6). Cost of labour was rated highest for furniture (2.2), pallets and containers (3), and remanufactured products (3.3). Furthermore, responses to the closely related question on labour efficiency under “Management Constraints” were rated highest (3.1). Clearly, the survey respondents perceived multiple issues surrounding labour as limitations to expansion.

Finance was rated as the third most constraining factor. Building, cabinets, millwork all scored it above 2.5. Details in subcategories show that cost and availability of financing were the two outstanding concerns for businesses with cost scores over 2.5 and the number one concern for all BTs except cabinets, which rated finance availability as the number one issue.

Wood supply came in as the fourth most important constraint, on average, across BTs but was the number one concern for two BTs: remanufactured products (4.1) and pallets and containers (3.3). It was also the second highest rated limitation for buildings (3.8), after market concerns. Several companies commented on industry concentration and less wood available for small, independent operators. Most wood supply related concerns were related to price and price volatility. Wood quality, grade, and volume were all raised as concerns for buildings, whereas volume of wood fibre was mentioned as an issue for furniture.

Management was a less important constraint, with no BT scoring it greater than 2.5. Transportation came in as the least important limitation, but was most constraining for the other wood products BT (3.0).

Markets, labour and wood supply were the top three concerns constraining growth and all are areas where public policy actions could be considered. Policy actions that focus on developing new markets through increased awareness of market opportunities

or lower market access barriers may reduce market constraints. For example, CFS research in British Columbia found that some firms opened up specialized wood marketing businesses or co-operated with other firms (business clusters) to share the marketing costs and knowledge of new markets (Bogdanski and McBeath 2015). These types of efforts could be encouraged and supported, especially with an eye to expanding overseas market opportunities. Labour may be a difficult factor to influence as high wages in the oil and gas and mining sectors draw labour from Alberta as well as the rest of Canada, creating a challenge for the secondary wood manufacturers. However, efforts to support labour skills development and labour mobility might help this and other manufacturing sectors in Alberta. Policies that improve wood supply utilization may help diversify the types of businesses in the sector. For example, policies that decrease access costs to mountain pine beetle or fire-killed timber might expand opportunities for bioenergy, especially fuel pellet manufacturing.

5 Conclusion

The Alberta secondary wood product manufacturing sector was a very different industry in 2017 than it was 30 years ago when the last comprehensive study of the industry was conducted. Unlike during the 1980s, the industry produced over 120 products in 2017 for Alberta and external markets using primarily Alberta wood resources. The sector was well balanced with no one business group dominant, although the large size of the buildings business type is noteworthy. One aspect that did not change was the relative concentration of the industry around the urban centres of Calgary and Edmonton. However, a sizeable industry existed within the buffer zone of Red Deer, and a more commodities-focused industry grouping was co-located near primary industry and the wood supply in the northwest of the province. Increased market and product diversification and generating more value added from its domestic timber base was a clear success story for the industry. The United States’ share of Alberta sales (12%)

would be expected to grow as its housing market improves, and while overseas markets were and still are a challenge owing to distances to ports, there continues to be opportunities for growth.

The industry contracted similarly to the other forest sectors during the recession of 2008–2009 and the rebound was impeded by the oil shock that hit Alberta's economy in 2014 and 2015. However, many firms surveyed expected to grow over the near term. At the time of this survey, firms indicated that markets, labour, and wood supply were the key constraints to growth. Responses indicated that market issues such as the softwood lumber dispute between Canada and the United States and market diversification were the most pressing challenges facing efforts to expand. The recession in the oil and gas and mining sectors alleviated some aspects of the labour issue that faced the sector in 2013, but finding skilled and experienced labour remained an issue in 2017 and may require focused efforts to address.

The cyclical nature of commodity forest product markets and the potential timber supply risks from eastward movement of the mountain pine beetle means continued interest in promoting sustainable growth of the Alberta value-added wood processing sector. Through accurate and timely information on the existing structure and challenges provided by this survey, a comprehensive assessment of various options is made possible, greatly benefitting future policy development focused on the Alberta secondary wood product sector.

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Appendices

Appendix 1: Auxiliary information on the Alberta Secondary Wood Product sector

Secondary wood manufacturing industries, as defined in our study, largely fall within five industrial groups of the North American Industry Classification System (NAICS) used by Statistics Canada:

- 3212 – Veneer, Plywood and Engineered Wood Product Manufacturing;
- 3219 – Other Wood Product Manufacturing;
- 337110 – Wood Kitchen Cabinet and Counter Top Manufacturing;
- 337123 – Other Wood Household Furniture Manufacturing; and
- 337213 – Wood Office Furniture, including Custom Architectural Woodwork, Manufacturing.

The business type “remanufactures” falls under several NAICS groups:

- 3211 – Sawmills and Wood Preservers (Siding and Dressed Lumber);
- 321919 – Other Millwork (Planed Lumber);
- 321999 – All Other Miscellaneous Wood Product Manufacturing (Fencing).

Also, businesses making products such as wood fuel pellets or horticultural products that are under our “other” business category, fall under NAICS 321999 (i.e., All Other Miscellaneous Wood Product Manufacturing). Table A1 lists the NAICS codes and names corresponding to the business groupings of secondary forest products used in this study.

Table A1. Correspondence between business types used in this study and North American Industrial Classification System (NAICS) 6-digit groups

NAICS code	NAICS description	Corresponding business type in this study
321114	Wood preservation	Other wood products
321211	Hardwood veneer and plywood mills US	Panelboards
321212	Softwood veneer and plywood mills US	Panelboards
321215	Structural wood product manufacturing	Engineered wood products
321216	Particle board and fibreboard mills	Panelboards
321217	Waferboard mills	Panelboards
321911	Wood window and door manufacturing	Millwork
321919	Other millwork	Millwork/remanufacturing
321920	Wood container and pallet manufacturing	Pallet and containers
321991	Manufactured (mobile) home manufacturing	Buildings – engineered wood products
321992	Prefabricated wood building manufacturing	Buildings – engineered wood products
321999	All other miscellaneous wood product manufacturing	Other wood products/remanufacturing
337110	Wood kitchen cabinet and counter top manufacturing	Cabinets
337121	Upholstered household furniture manufacturing	Furniture
337123	Other wood household furniture manufacturing	Furniture
337213	Wood office furniture, including custom architectural woodwork, manufacturing	Furniture/millwork

Statistics Canada’s Annual Survey of Manufacturing and Logging Industries provides information on Alberta’s forest sector industries and includes information on revenues, employee numbers, number of firms, and costs; this survey used data from the 2016 manufacturing year. Because of confidentiality laws, information is often suppressed, preventing a detailed disaggregation of the industry that could separate out non-wood and wood material industries, such as furniture manufacturing and related industries (NAICS 337). Sometimes data are not available for each year; although the available data can still provide a good understanding of historical and recent trends.

For the aggregation of furniture (NAICS 337), other wood product manufacturing (NAICS 3219), structural wood product manufacturing (NAICS 321215), and wood preservation (NAICS 321114), sales from manufacturing and employment experienced significant growth between 1990 and 2007 before falling quickly during the Financial Crisis (Figures A1 and A2). Although the data included non-wood furniture manufacturing, they were still a good indicator of industry changes from 1990 to 2016. "Furniture" manufacturing grew steadily from 1990 to around 2001 before leveling off for several years and then falling after 2007. Because this broad aggregate included both wood and non-wood furniture, it is not clear how wood furniture manufactures fared over this period. A closer look at subindustries that fit the definition of wood furniture manufacturing (NAICS 337121, 337123, 337213) and cabinetry (NAICS 337110) showed that only cabinetry saw growth since 2000. "Other wood products" grew steadily between 1990 and 2007 before dipping during the recession. It gradually recovered back since 2011, peaked around 2013, and then fell again due to the fluctuation of oil price causing Alberta's economy slowing down. This sector includes prefabricated wood building and manufactured (mobile) home manufacturing. The available data suggested about half of the sales in each year between 1990 and 2016 were associated with these activities. Another interesting observation was that the sales of other wood product manufacturing exceeded the sales of furniture and related product manufacturing since 2006.

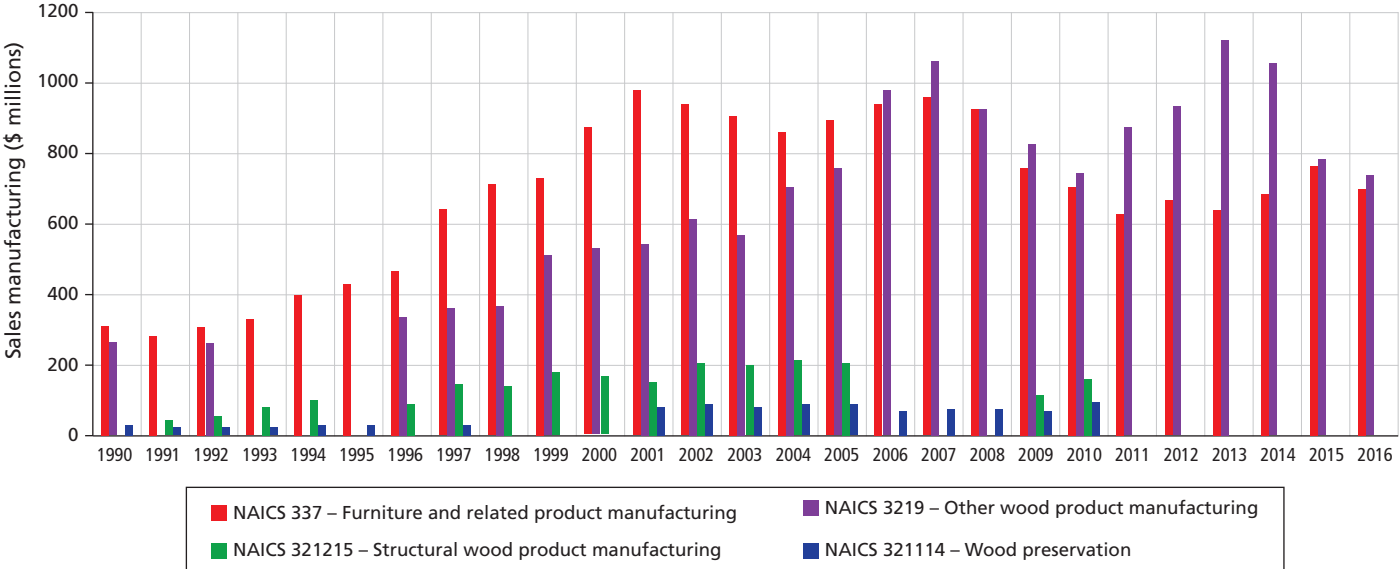


Figure A1. Sales from manufacturing select industry aggregates, 1990–2016 (source: Statistics Canada 2018a).

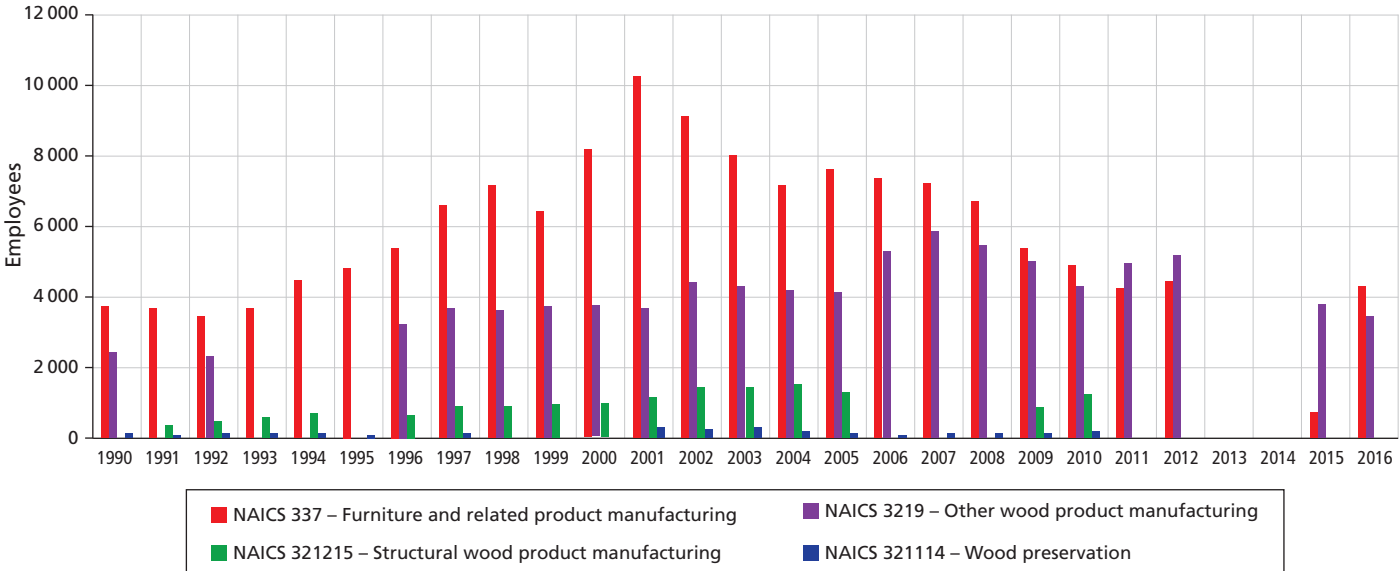


Figure A2. Total number of employees for select industry aggregates, 1990–2016 (source: Statistics Canada Statistics Canada 2018a).

Information on manufacturing sales was available from Statistics Canada’s monthly manufacturing sales and inventory survey (Statistics Canada 2018b); however, for confidentiality reasons, complete information on the detailed manufacturing aggregates was not available. Available monthly sales data for detailed industry aggregates show interesting trends across the sector (Figure A3). By far the most volatile was the “all other wood product” (NAICS 32199) category, which includes mobile home and prefabricated wood buildings in addition to a disparate group of industries, such as wood turners, wood pellets, some remanufacturers, and fence makers. This collection of manufacturers saw monthly sales vary from \$22 million during the early 2010 to a high of nearly \$102 million in mid-2013. Since mid-2013, monthly sales were in a free fall to \$23 million by the end of 2017. Combining this information with the Annual Survey of Manufacturers pointed to the “buildings” group of firms (i.e., NAICS 321991 [mobile homes] and 321992 [prefabricated wood buildings]), which accounted for 78–85% of aggregate NAICS 32199 annual sales between 2005 and 2010, as the source of the variation. As many companies falling within this group make buildings for the oil and gas and mining sectors, the ups and downs may be related to the ebbs and flows of these sectors.

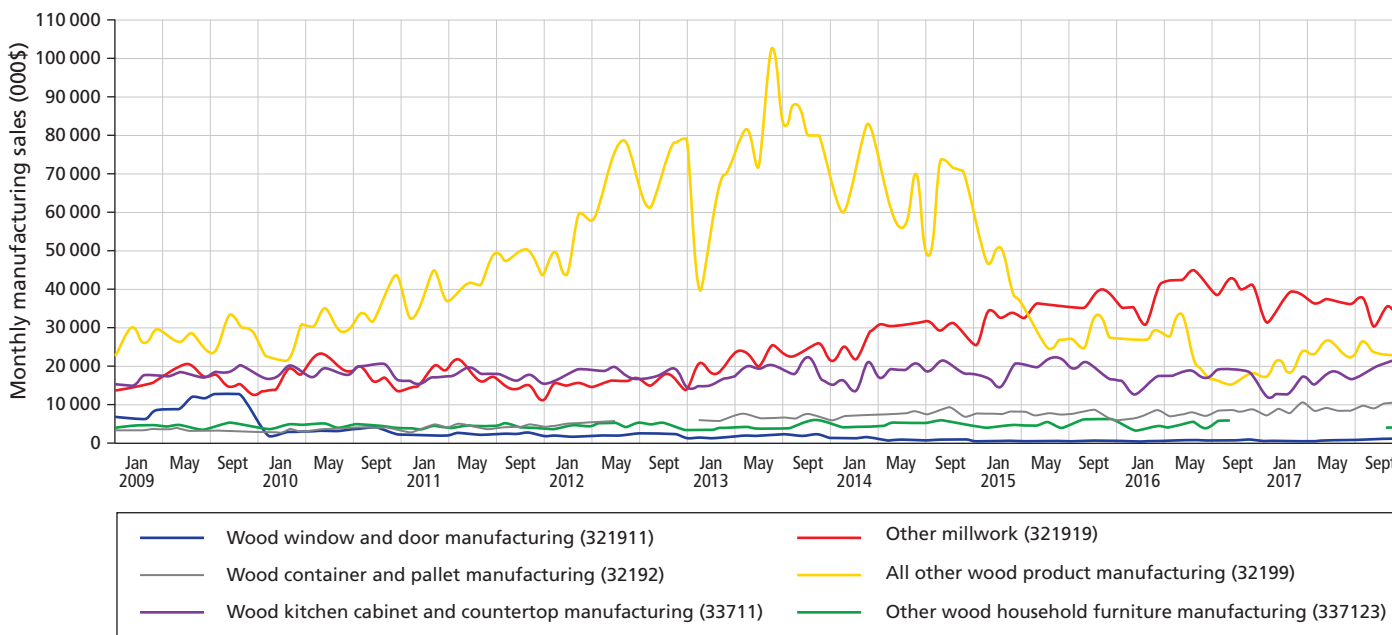


Figure A3. Monthly sales for select industry aggregates, 2009–2017 (source: Statistic Canada 2018b).

In contrast to NAICS 32199, businesses involved in “other millwork” (NAICS 321919), cabinetry (NAICS 33711), other wood household furniture (NAICS 337123), and wood container and pallet manufacturing (NAICS 32192), have had steady to marginally growing nominal sales over the past years. Only “wood window and door (NAICS 321911)” manufacturers have seen sales steadily drop to very low levels.

Table A2 shows the relationship between business types used in the survey report and the Harmonized system of traded products used internationally. Using these links, export and import traded data of secondary wood products to and from Alberta are illustrated in Figure A4. Alberta went from a net exporter in 2000 to a large net importer by 2014 until the time of this report with this change having occurred in 2007. Looking into the detailed data, beginning in 2001, exports of furniture products began to fall from peak values of \$291 million in 2000 to just near \$17 million in 2017. Over this same period, Alberta’s imports of furniture products increased from around \$30 million to \$85 million. Decreased export demand and increased import competition were likely behind the reduced overall sales and employment of the furniture industry over this period. Although it is difficult to determine which factors contributed to these fluctuations, the overall export and import trends tracked the changing US–Canadian dollar exchange rate, suggesting a loss of competitiveness related to the strengthening Canadian dollar (Figure A4).

Table A2. Harmonized system for traded products code, description, and correspondence to business types used in this study

Business type used in study	Harmonized system for traded products code	Product description
Other	HS 440131	Sawdust, wood waste and scrap w/ or not agglomerated in logs, briquettes, pellets: wood pellet
Other	HS 440310	Wooden telephone poles, fence posts, other wood in rough — painted, stained or treated
Other	HS 4404	Hoopwood, split poles, piles, pickets and stake
Other	HS 440690	Cross-ties (sleepers) railway/tramway — wood — impregnated
Panelboard	HS 4408	Veneer/plywood sheets (thickness <6 mm)
Millwork	HS 4409	Wood (lumber) continuously shaped
Panelboard	HS 4410	Particle board of wood or other ligneous material
Panelboard	HS 4411	Fibreboard
Panelboard	HS 4412	Plywood (plies <6 mm thick) and veneered or laminated panel
Other	HS 4413	Densified wood — in blocks, plates, strips or profile shape
Other	HS 4414	Wooden frames
Pallets and containers	HS 4415	Cases, boxes, crates, drums, pallets, load boards and similar packing articles of wood
Other	HS 4417	Tools (bodies and handles), broom/brush bodies, footwear parts of wood
Millwork	HS 4418	Windows, doors, shingles and shakes, panels and other builders, joiners and carpentry of wood
Other	HS 4419	Tableware and kitchenware of wood
Other	HS 4420	Wood statuettes, ornaments, caskets, cases; wood marquetry and inlaid wood
Other	HS 4421	Other articles of wood
Furniture	HS 940161	Seats with wooden frames — upholstered
Furniture	HS 940169	Seats with wooden frames — not upholstered
Furniture	HS 940330	Wooden furniture for office use
Furniture	HS 940340	Wooden furniture for kitchen use
Furniture	HS 940350	Wooden furniture for bedroom use
Furniture	HS 940360	Wooden furniture for other use
Buildings – engineered wood products	HS 940600	Prefabricated buildings (“industrialized buildings”)

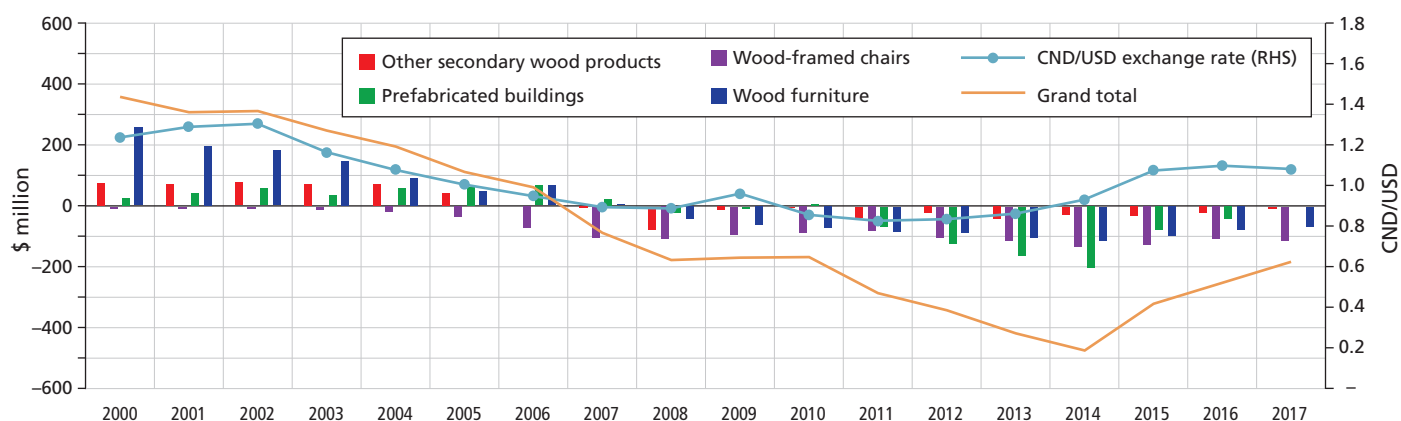


Figure A4. Trade Balance for select industry aggregates (source: Trade Data Online: <http://www.ic.gc.ca/eic/site/tdo-dcd.nsf/eng/Home>). **Note:** Wood furniture aggregate (HS 940330, 940340, 940350, 940360); Prefabricated building (HS 940600); Wood-framed chairs (HS 940161, 940169); Other secondary wood products (HS 4404, 4409, 4413, 4414, 4415, 4417, 4418, 4419, 4420, 4421, 440310, 440690).

Similar to wood furniture trade trends, the prefabricated buildings industry, which falls under product code HS 940600 that covers wood, steel, aluminum, and inflatable buildings and industry code NAICS 321992, went from being a large net export product group to a large net import product group (Figure A4). Industry Canada’s special trade data aggregation for NAICS 321992 show that Alberta’s industry moved from exporting over \$43 million of wood buildings in 2006 to just over \$2 million in 2017.⁷ Over the same period, Alberta’s imports (almost entirely from the United States) went from just over \$1 million to nearly \$110 million in 2014 but fell to around \$4 million in 2017. The big change in Alberta’s trade balance occurred between 2007 and 2008 at the start of the financial crisis and the beginning of a period when the US–Canada dollar exchange rate exceeded \$0.90 US for \$1.00 Canadian.

Although panelboard mills are technically classified as secondary manufacturing mills because of the large average size of mills and the scale of the industry, they are sometimes treated as a primary industry. In this study, we recognized panelboards as part of the secondary wood manufacturing sector but excluded them from the survey analysis owing to confidentiality issues and low survey response rate. In this survey, we provided a cursory overview of the industry trends and current state using data available from Statistics Canada and Innovation, Science and Economic Development Canada.

Between 1990 and 2016, the industry grew considerably with employment and revenues peaking in the mid-2000s. After a significant decline during the United States housing slump beginning in 2007 and the subsequent financial crisis of 2008–2009, the industry grew slowly over the past few years with sales around \$976 million and employment 2165 in 2016 (Figure A5).

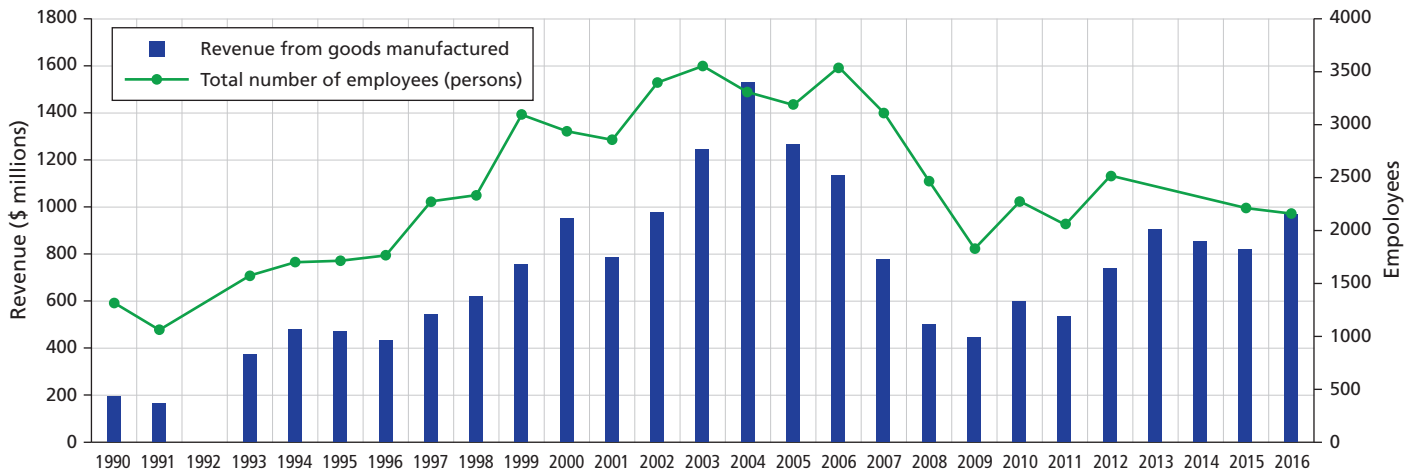


Figure A5. Manufacturing sales revenue and total number of employees for Alberta panelboard industry, 1990–2016 (source: Statistics Canada 2018a).

In 2017, Alberta’s exports of panelboard products reached \$627 million after hitting a low of \$130 million in 2008 in the middle of the financial crisis (Figure A6). At the time of this survey, nearly all of Alberta’s particleboard, fibreboard, and plywood was shipped to the United States, with the province’s panel industry fueled by demand for waferboard (orientated strand board) in United States housing construction. After reaching a low point for exports in 2012, exports of particleboard to the United States reached \$557 million in 2017 as its housing market began to stabilize and grow. Alberta’s exports of fibreboard were less volatile than particleboard with around \$56 million shipped to international markets in 2017. Imports of fibreboard and plywood have been growing with China as the dominant supplier, although some fibreboard was sourced from Europe. With growing imports and declining exports, Alberta’s balance of trade was slightly positive for fibreboard in 2017 and slightly negative for plywood.

⁷ Ibid.

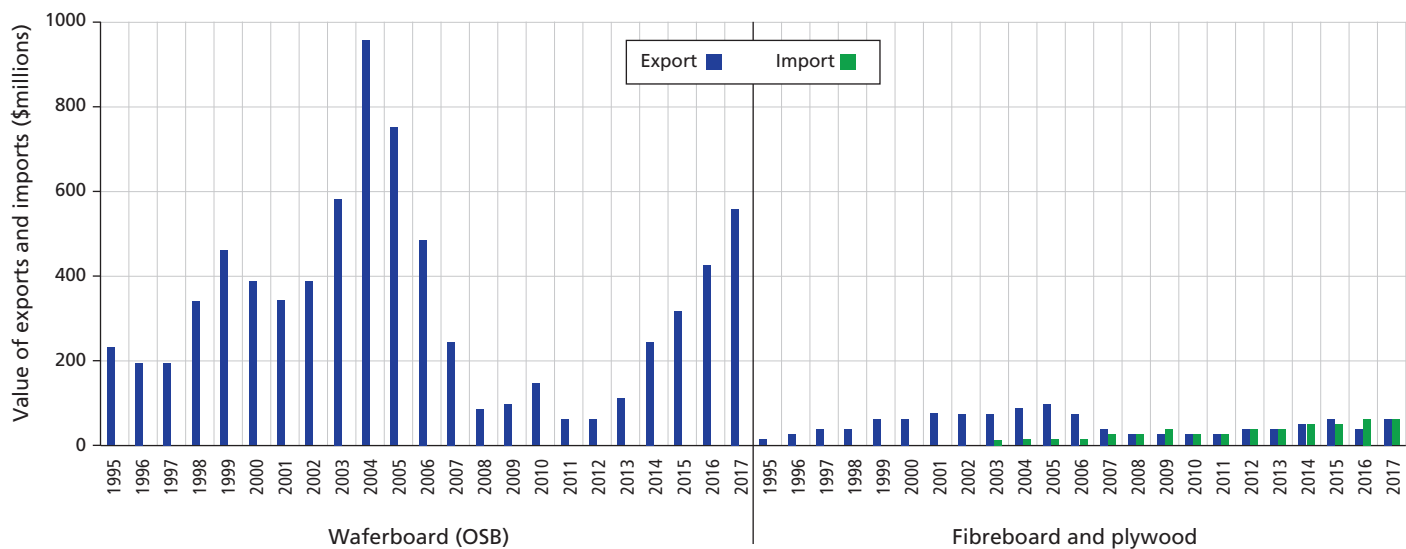


Figure A6. Value of exports and imports of waferboard (oriented strand board), fibreboard, and plywood, 1995–2017. **Note:** Waferboard (OSB) – HS 4410; Fibreboard and Plywood – HS 4411 and 4412. Source: Trade Data Online.

Since 1992, the industries associated with secondary wood product manufacturing have increased considerably, although most of this growth occurred in the 1990s (Figure A7). Real manufacturing sales, measured in 2016 dollars for “secondary wood manufacturing” (NAICS 3219, 3371, 3372), grew 73% from \$756 million in 1992 to over \$1.3 billion in 2017, with peak sales occurring in 2007 (\$2.1 billion). In comparison, over similar periods, real manufacturing sales increased 61% for pulp and paper (1993–2017), 23% for sawmilling (1996–2017), and 105% for panelboards (1993–2017). At the end of 2014, secondary manufacturing was the second largest forest industry group in sales, although it declined since then due to the low oil prices and the slowdown in Alberta’s economy. If panelboards were included, however, it would have been the largest forest industry grouping in Alberta.

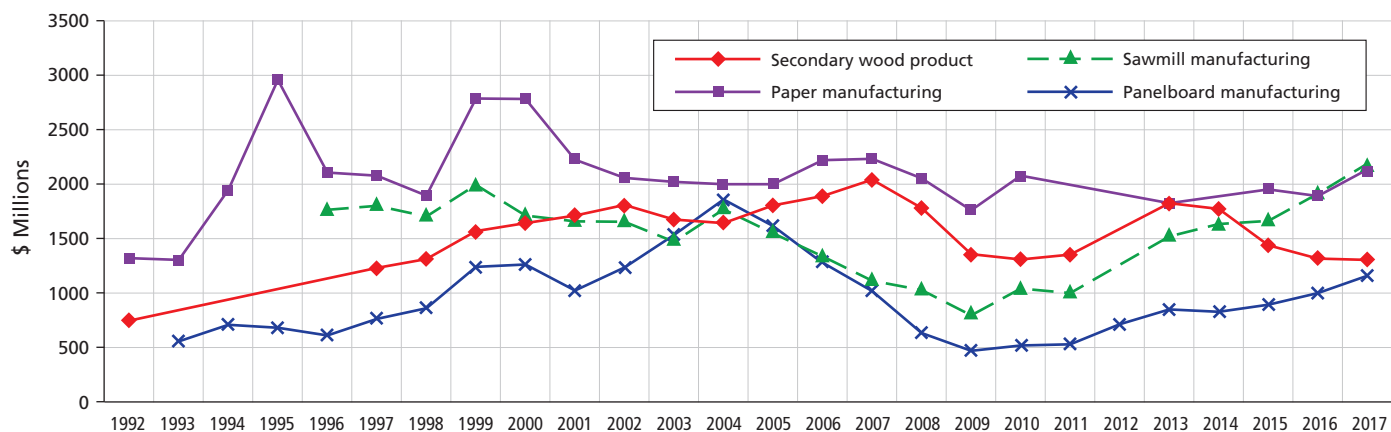


Figure A7. Real sales from manufacturing (2016 constant dollars), 1992–2017. **Note:** Data unavailable for some years. Engineering wood product components included in “panelboard manufacturing” and not all furniture included in “secondary wood manufacturing” was wood furniture (source: Statistics Canada 2018b).

Appendix 2: Taxonomy of secondary manufactured wood products

This taxonomy is based on Wilson and Ennis (1993).

Log products	Wood products		
	Primary ^a	Intermediate	Final
Chopsticks	Boards	Building/home	Boxes, bins, and crates
Firewood	Cants	Components	Cabinets
House logs	Chips	Cutstock	Coffins
Pilings	Flitches	Door stock	Countertops
Poles	Lumber/Industrial timber	Edge-glued components	Decking
Posts	Treated timber	Finger-jointed stock	Fencing
Log homes	Veneer	Furniture components	Finger-jointed lumber
Shakes		Joinery stock	Flooring
Shingles		Ladder stock	Flooring/engineered
Treated pilings		Laminated components	Furniture/commercial
Treated poles		Laminated stock	Furniture/household
Treated posts		Metric stock	Furniture/patio
Novelties		Moulding, panel blanks	Furniture/RTA
		Pallet, crating stock	Garden buildings/products
		Medium-density fibreboard	Laminated veneer lumber
		Particleboard	Millwork/architectural, custom
		Pattern stock	Medium-density fibreboard
		Sawmill specialty products	Mouldings
		Staircase components	MSR lumber
		Turning squares	Oriented strandboard
		Window stock	Pallets
			Paneling
			Plywood
			Prefab buildings and manufactured homes
			Oil and gas drill rig mats
			Siding
			Staircases
			Stakes, lathe, strips, and batten
			Structural laminated beams
			Treated lumber
			Trusses
			Turned wood products
			Windows
			Wood novelties
			Wood pellets

^a This column does not include secondary products but was inserted to provide a more complete taxonomy.

Appendix 3: 2017 Alberta Secondary Wood Manufacturing Survey

Survey purpose

This survey collects manufacturing and related information on the Alberta secondary wood manufacturing sector. This is the second survey that Natural Resources Canada, through the Pacific Forestry Centre, has done, with the last conducted in 2014. The information provided allows for an accurate information base used to describe the structure, performance and needs of the secondary manufacturing sector in Alberta. This is a key source of information on the sector that is used by policy makers in Alberta and is supported by the Alberta Forest Products Association. These data are used for statistical analyses and to produce published reports and presentations on the state of the industry.

1. Please give the location of where the mill site is located, if different from mailing address.

Complete a separate questionnaire for each of your mill sites, if more than one. Please contact us if you have questions.

Address (number and street)	
Town/City	Postal Code

2. In what year did the mill begin operations? _____

- 3a. What is the legal status of your business?

- Sole proprietorship
 Partnership
 Corporation
 Other _____

- 3b. Is this business owned by Indigenous people?

- Yes, wholly owned
 Yes, partially owned
 No

- 4a. Please select the activity that accounted for the majority of your **2017** manufacturing sales revenue. Please select **one** only.

- Remanufactured products (finger joint, lumber specialties, fencing, panels, rig mats)
 Engineered wood products (glulam, LVL, I-joists, laminated posts/beams, trusses, prefab buildings, log homes, treated wood)
 Millwork (doors, windows, architectural and custom woodworking, turned wood products, mouldings)
 Cabinets (kitchen/vanity cabinets, cabinet doors, countertops)
 Furniture (household, ready-to-assemble, commercial, institutional and patio)
 Pallets and containers (pallets, boxes, bins, crates)
 Plywood & Panelboards (excluding/net of veneer production)
 Other (please specify) _____

- 4b. Does a majority of your sales revenue come from construction/building at the job site or involve making one-off products (such as cabinets or furniture) for individual customers?

- Yes
 No
 Don't know/unsure

Wood Use

5a. Please provide the estimated volume of raw wood materials used by your mill in **2017**.

Note: **m³**=cubic meters; **mbf**=thousand board feet; **msf**= 1000 square feet 3/8" basis; **odt**=oven-dried metric tonnes

Type of Raw Wood Material	Volume	Units of Measure
Logs		<input type="checkbox"/> m ³ <input type="checkbox"/> mbf <input type="checkbox"/> other _____
Lumber		<input type="checkbox"/> m ³ <input type="checkbox"/> mbf <input type="checkbox"/> other _____
Plywood		<input type="checkbox"/> m ³ <input type="checkbox"/> msf <input type="checkbox"/> other _____
Veneer		<input type="checkbox"/> m ³ <input type="checkbox"/> msf <input type="checkbox"/> other _____
Oriented Strand Board (OSB)		<input type="checkbox"/> m ³ <input type="checkbox"/> msf <input type="checkbox"/> other _____
Medium density fibreboard (MDF)		<input type="checkbox"/> m ³ <input type="checkbox"/> msf <input type="checkbox"/> other _____
Wood residues		<input type="checkbox"/> m ³ <input type="checkbox"/> odt <input type="checkbox"/> other _____
Other wood material (please specify):		
		<input type="checkbox"/> m ³ <input type="checkbox"/> mbf <input type="checkbox"/> msf <input type="checkbox"/> other _____
		<input type="checkbox"/> m ³ <input type="checkbox"/> mbf <input type="checkbox"/> msf <input type="checkbox"/> other _____

5b. Please provide the sources of raw wood material used by your mill in **2017** (provide best estimate):

Source of Wood Supply	%
Alberta market purchases	
Logs from own tenured lands	
Other wood materials from own primary mills	
Log/lumber trades with other companies	
Canadian purchases outside of Alberta	
Imports from outside Canada	
Total = 100%	

5c. If you sourced wood material from outside Alberta in **2017**, please indicate where you sourced these raw materials from. Please check all that apply.

British Columbia	<input type="checkbox"/>	Europe	<input type="checkbox"/>
Other prairie provinces	<input type="checkbox"/>	Japan	<input type="checkbox"/>
Eastern Canada	<input type="checkbox"/>	China	<input type="checkbox"/>
US West	<input type="checkbox"/>	Korea	<input type="checkbox"/>
US South	<input type="checkbox"/>	Other Asia	<input type="checkbox"/>
US Midwest	<input type="checkbox"/>	Latin America	<input type="checkbox"/>
US Northeast	<input type="checkbox"/>	Africa	<input type="checkbox"/>
		Australia/New Zealand	<input type="checkbox"/>

6. Please provide an estimate of the wood species used by your mill by **percentage** of total volume in **2017**.

Softwood	Lodgepole pine	
	Spruce	
	Douglas-fir	
	Larch/tamarack	
	Western red cedar	
Other softwoods (please specify):		
Hardwoods	Aspen	
	Western birch	
	Alder	
Other hardwoods (please specify):		
Total volume of wood fibre used		100%

Operations

7. Please provide the percentage breakdown of operating costs for your mill in **2017**. (Provide your best estimate.)

Main Operating Costs	%
Wood Costs	
Labour and Benefits	
Interest	
Depreciation	
Other (please specify):	
Total of operating costs	100%

Employment

8a. Please provide the average number of full-time equivalent employees working at this mill in **2017**.
A full-time equivalent is 220 or more days worked in the year.

Production (manufacturing) staff	
Non-production staff	
Total	

8b. Of the total number of full-time equivalent employees reported in question 8a, how many are Indigenous people?

Manufacturing Capacity and Expansion

Manufacturing capacity refers to the maximum volume of products that your mill is designed to produce for a one-year period.

9a. Approximately what percentage of manufacturing capacity was the plant operating at in 2017? _____%

9b. On average how many 8- to 10-hour shifts were running in 2017?

- 1
- 2
- More than 2

9c. What percentage of your manufacturing capacity is used to provide custom manufacturing services to other businesses?

_____ % Unknown/unsure

9d. Does your business plan to expand manufacturing capacity over the three-year period 2018–2020?

- Yes
- No
- Don't know

If you responded yes, please continue to question 9e otherwise go to question 10a.

9e. By what percentage does your business plan to expand capacity over the three-year period of 2018–2020?

_____ %

Constraints to Expansion

10a. For each item below, please indicate the extent to which they represent a constraint to expand your business with 1 being not at all constraining and 5 being extremely constraining.

General constraints to expansion	1	2	3	4	5
Wood Supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Labour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Management Capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation/Distribution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10b. For each general constraint category below, please indicate the extent to which each specific factor represents a constraint to expand your business with 1 being not at all constraining and 5 being extremely constraining.

i. Wood supply specific constraints	1	2	3	4	5
Volume	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality/Grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Price Volatility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii. Labour specific constraints	1	2	3	4	5
Training/Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii. Markets specific constraints	1	2	3	4	5
Softwood Lumber Agreement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product Diversification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market Diversification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market/Product Research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foreign Regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv. Financing specific constraints	1	2	3	4	5
Availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Repayment Schedule Length	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. Management capacity specific constraints	1	2	3	4	5
Improving Product Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing Manufacturing Costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increasing Labour Efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving Raw Material Recovery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Implementing Lean/Just-in Time Manufacturing Techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vi. Transportation & distribution specific constraints	1	2	3	4	5
Costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logistics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Electronic Commerce and Social Media

11a. Does your company use social media (See list in 11b, below)?

- Yes
- No
- Don't know

11b. If yes, which social media sites does your company use? Please check all that apply.

- Facebook
- Twitter
- Pinterest
- Instagram
- Linked-in
- YouTube
- Snapchat
- Other (please specify) _____

11c. If no, does your company plan to use a social media site?

- Yes
- No
- Don't know

11d. Does your company have a website?

- Yes
- No
- Don't know

11e. If yes, what is your website name? _____

11f. Does your company search the web for manufacturing knowledge/information?

- Yes
- No
- Don't know

11g. Does your company currently engage in e-commerce?

- Yes
- No
- Don't know

If you answered no to 11g please go to question 12a, otherwise continue to 11h.

11h. If no, what are the key issues for not expanding e-commerce? Check all that apply.

- Too costly
- Too much time required
- Do not have required skills
- No business need
- Other (please specify) _____

11i. Does your company sell products or services through the web?

- Yes
- No
- Don't know

11j. Does your company purchase or search the web for inputs?

- Yes
- No
- Don't know

11k. Is your company planning to expand its use of e-commerce?

- Yes
- No
- Don't know

11l. If no, what are the key issues for not adopting e-commerce? Check all that apply.

- Too costly
- Too much time required
- Do not have required skills
- No business need
- Other (please specify) _____

11m. If yes, what type of e-commerce expansion are you planning?

- New web design
- Sales
- Purchases
- Other (please specify) _____

Markets

12a. What was the percentage breakdown of sales and revenues from the following markets in 2017?

Alberta	
British Columbia	
Other Prairie	
Eastern Canada	
US West	
US South	
US Midwest	
US Northeast	
Europe	
Japan	
China	
Korea	
Other Asia	
Latin America	
Africa	
Australia/New Zealand	
Total sales	100%

12b. What end markets do you target for your products? (Mark all that apply.)

- New Residential
- Remodeling
- Multiple-unit Housing
- Industrial buildings
- Industrial uses
- Commercial buildings
- Other _____

12c. Does your company plan to expand sales to new markets?

- Yes
- No
- Don't know

12d. If yes, please indicate new market areas (provinces/states/countries/regions) of interest. Mark all that apply.

- Alberta
- British Columbia
- Other Prairie
- Eastern Canada
- US West
- US South
- US Midwest
- US Northeast
- Europe
- Japan
- China
- Korea
- Other Asia
- Latin America
- Africa
- Australia/New Zealand
- Other (please specify) _____

12e. Please identify how you plan to access **new** markets (check all that apply).

- Own effort
- Partnering with other manufacturers
- Selling to wholesaler/distributors
- Working with existing Alberta wood industry associations
- Other _____
- Don't know/unsure

12f. Please identify resources your company considers important to develop and evaluate **new** markets (check all that apply)

- Timely market intelligence
- Evaluation of new products and market opportunities
- Coordinated presence on international market development missions and at trade shows
- In-market support from wood industry associations
- Other _____
- Don't know/unsure

Sales Revenue

13a. Please indicate this mill's **2017** gross revenue (to the nearest dollar). **(Free On Board at mill – C\$).**

Gross 2017 revenue: _____

13b. Please indicate this mill's **2016** gross revenue (to the nearest dollar). **(Free On Board at mill – C\$).**

Gross 2016 revenue: _____

13c. Please estimate the **expected 2018** gross revenue (to the nearest dollar). **(Free On Board at mill – C\$).**

Expected gross 2018 revenue: _____

13d. Please indicate the **percentage** of your mill's 2017 gross revenue that was attributed to custom **manufacturing services** such as planning or kiln drying services and **non-manufacturing services** such as marketing or distribution services.

Percentage of 2017 revenue: _____

Products

14a. Please list up to **4** of the top grossing products manufactured at this mill and indicate approximate percentage of **2017** total sales revenue reported in question 14a.

Main products	% of 2017 sales
All others products	
Total	100%

14b. Does your company plan to expand its product offering?

- Yes
- No
- Don't know

14c. If yes, what new products do you plan to offer?

Possible new products

Services

15a. Do you sell custom services?

- Yes
- No
- Don't know

15b. If yes, please indicate which custom services you provide. Please check all that apply.

Manufacturing Services		Non-manufacturing Services	
Planing	<input type="checkbox"/>	Marketing	<input type="checkbox"/>
Kiln Drying	<input type="checkbox"/>	Distribution	<input type="checkbox"/>
Resawing	<input type="checkbox"/>	Logistics	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>	Other (specify): _____	<input type="checkbox"/>

15c. In relation to your mill, where are the businesses you provide services to generally located?

- within 50 km
- within 51 to 100 km
- greater than 100 km

15d. Do you currently plan to expand into new businesses services?

- Yes
- No
- Don't know

15e. If yes, please indicate which services you plan to offer? Please check all that apply.

Manufacturing Services		Non-manufacturing Services	
Planing	<input type="checkbox"/>	Marketing	<input type="checkbox"/>
Kiln Drying	<input type="checkbox"/>	Distribution	<input type="checkbox"/>
Resawing	<input type="checkbox"/>	Logistics	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>	Other (specify): _____	<input type="checkbox"/>

15f. Do you currently purchase services from other businesses?

- Yes
- No
- Don't know

15g. If yes, please indicate which services you currently purchase? Please check all that apply.

Manufacturing Services		Non-manufacturing Services	
Planing	<input type="checkbox"/>	Marketing	<input type="checkbox"/>
Kiln Drying	<input type="checkbox"/>	Distribution	<input type="checkbox"/>
Resawing	<input type="checkbox"/>	Logistics	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>	Other (specify): _____	<input type="checkbox"/>

15h. And if yes, what percentage of the volume of logs or lumber used by your business in 2017 did you have custom processed by another business?

_____ % Unknown/unsure

15i. In relation to your mill, where are the businesses you purchase services from generally located?

- within 50 km
- within 51 to 100 km
- greater than 100 km

Company and product directory and survey reports

If enough companies participate, we hope to publish a directory of Alberta companies that produce secondary wood manufacturing products. This electronic directory will be made freely available through the on-line bookstore of the Canadian Forest Service (<http://cfs.nrcan.gc.ca/publications/>). The directory will include company name, contact information, and a list of principle products. We welcome you to be included in this directory. We also publish a report that summarizes the findings from the analysis of the data produced from this survey. This report is also made freely available on the on-line bookstore. If you would like to participate in the directory or directly receive either the directory or survey report, please indicate below.

Would you want to be included in the Alberta secondary wood product manufacturers' directory?

- Yes
- No

Would you like to receive a digital copy of the company/product directory?

- Yes
- No

Would you like to receive a digital copy of the final survey report?

- Yes
- No

Contact Person (name of person to contact about this questionnaire):

First name: _____

Last name: _____

Title: _____

Email: _____

Telephone number () _____ Fax number () _____

How long did you spend to collect the data and complete the survey? _____ hours _____ minutes

We invite your comments. Please be assured we read all comments with the intent of improving the survey.

Remember, all questionnaire responses are confidential. Thank you for your time.

Appendix 4: Listing of products within each business type

Remanufactured Products

- Lumber specialties
- Sawmill specialties
- Custom processing
- Fencing
- Cutstock
- Siding
- Decking

Engineered Wood Products

- Laminated beams
- Trusses
- Treated wood
- Laminated veneer lumber
- Cross-laminated timber

Engineered Wood Products: Buildings

- Log homes
- Prefab buildings

Millwork

- Doors
- Architectural woodwork
- Windows
- Turned wood
- Moulding
- Stairs
- Flooring

Cabinets

- Kitchen cabinets
- Cabinet doors
- Vanity cabinets
- Countertops

Furniture

- Household
- Commercial and institutional
- Ready to assemble
- Patio

Pallets and Containers

- Pallets
- Boxes, bins, and crates
- Shipping materials

Panelboards

- Plywood
- Oriented strandboard
- Particleboard
- Medium-density fibreboard

Other Wood Products

- Poles and posts
- Wood novelties
- Veneer
- Woodcrafts
- Instruments
- Fuelwood pellets
- Oil and gas drill rig mats

Appendix 5: Non-response bias tests

1. Chi-squared test for goodness-of-fit between population and sample distributions

Business type	Population	Observed (o)	Expected (e)	$o - e$ (d)	(d) ²	(d) ² /e
Cabinets and furniture	104	26	25.2	0.8	0.7	0.0
Millwork	100	14	24.2	-10.2	104.0	4.3
Pallets and containers	28	10	6.8	3.2	10.4	1.5
Engineered wood products	74	20	17.9	2.1	4.4	0.2
Other group	37	13	9.0	4.0	16.4	1.8
Total	343	83	83.0	0.0	135.9	7.9

Chi-square value is 7.9, which is less than the Chi-square statistic for 4 degrees of freedom at 5% level of significance (9.488). Do not reject hypothesis that distributions are the same.

2. Chi-squared test for goodness-of-fit between early respondents and late respondents on company employment size

Company size	Early response	Late response	Expected (e)	$o - e$ (d)	(d) ²	(d) ² /e
1-15	47	84	78.7	5.3	28.0	0.4
16-50	27	35	45.2	-10.2	104.4	2.3
> 50	9	20	15.1	4.9	24.3	1.6
Grand Total	83	139	139.0	0.0	156.6	4.3

Chi-square value is 4.3, which is less than the Chi-square statistic for 2 degree of freedom at 5% (5.991) level of significance. Do not reject hypothesis that two groups are the same.

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

nrcan.gc.ca/forests



Canadian Forest Service Contacts

- 1** Atlantic Forestry Centre
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- 3** Great Lakes Forestry Centre
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- 4** Northern Forestry Centre
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nrcan.gc.ca/forests/research-centres/nofc/13485
- 5** Pacific Forestry Centre
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Canadian Wood Fibre Centre
A virtual research centre of
the Canadian Forest Service,
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