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# Secondary manufacturing of solid wood products in New Brunswick and Nova Scotia 2017: Structure and economic contribution

Linda Wong and Bryan E.C. Bogdanski



Canadian Forest Service  
Pacific Forestry Centre

Information Report  
BC-X-452

The Pacific Forestry Centre, Victoria, British Columbia

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## Abstract

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This report presents the 2017 survey results for the secondary wood product manufacturing industries in New Brunswick (NB) and Nova Scotia (NS). The surveys were part of the Canadian Forest Service's first nationwide survey of secondary manufacturing. We collected operational, employment, production, marketing, and financial information on nine business types. Analysis of the survey results provides a comprehensive picture of the state of these industries and allows for comparison with similar surveys conducted by the Canadian Forest Service. Cabinet, furniture, and millwork manufacturers represent the largest subsector in our survey, accounting for 44% of NB and 61% of NS firms. We estimate that secondary manufacturers in NB employed 2,870 full-time equivalent workers, generating \$491 million in sales. Nova Scotia's secondary manufacturers employed approximately 922 full-time equivalent workers, generating \$152 million in sales.

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

## Résumé

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Ce rapport présente les résultats de l'enquête de 2017 menée auprès des industries de transformation secondaire des produits du bois au Nouveau-Brunswick (N.-B.) et en Nouvelle-Écosse (N.-É.). Ces enquêtes étaient menées dans le cadre de la première enquête nationale du Service canadien des forêts sur la transformation secondaire. Nous avons recueilli des renseignements sur les opérations, l'emploi, la production, la commercialisation et les finances de neuf types d'entreprises. L'analyse des résultats de l'enquête permet de dresser un portrait complet de l'état de ces industries et de comparer les résultats avec ceux des enquêtes semblables menées par le Service canadien des forêts. Les fabricants d'armoires de cuisine, de meubles et de menuiseries représentent le sous-secteur le plus important de notre enquête, soit 44 % des entreprises du Nouveau-Brunswick et 61 % de celles de la Nouvelle-Écosse. Nous estimons que les fabricants de produits secondaires du Nouveau-Brunswick employaient 2 870 équivalents temps plein, générant des ventes de 491 millions de dollars. Les fabricants de produits secondaires de la Nouvelle-Écosse employaient environ 922 équivalents temps plein, générant des ventes de 152 millions de dollars.

**Mots-clés :** emploi, industrie forestière, marchés, politiques, fabricants de produits secondaires, valeur ajoutée

## Key Points

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- This report summarizes the results of a comprehensive survey on secondary manufacturing of solid wood products in New Brunswick (NB) and Nova Scotia (NS) for the year 2017. The final survey population included 98 NB and 69 NS firms of which 29 NB and 17 NS firms responded, yielding a 30% and 25% response rate for NB and NS, respectively.
- In NB, the sector employed an estimated 2,870 full-time equivalent workers, generating \$491 million in sales.<sup>1</sup> Nova Scotia's sector employed an estimated 922 full-time equivalent workers, generating \$152 million in sales.
- New Brunswick's secondary manufacturers processed an estimated 1.5 million m<sup>3</sup> of fibre (roundwood equivalent). Nova Scotia processed around 395,000 m<sup>3</sup> of fibre.
- Cabinet, furniture, and millwork (CFM) manufacturers represented the largest subsector in our survey, accounting for 44% of NB and 61% of NS firms.
- In terms of sales, engineered wood product and CFM producers made the greatest economic contribution in NB, accounting for 52% and 21% of sector sales, respectively. In NS, CFM manufacturing comprised 37% of sector sales.
- In NB, CFM represented 34% of sector employment and engineered wood product manufacturing for 28%. In NS, CFM comprised 44% of sector employment.
- For NB, responding firms employed an average of 30 people and a median of 12 people. Average and median employment for NS was 12 and 8 people, respectively.
- For NB, 11% of responding firms earned more than \$5 million in gross revenue and 52% of firms had sales in the \$1.1 to 5 million range. For NS, 5% of responding firm declared sales exceeding \$5 million while 45% of firms had sales in the \$1.1–5 million range.
- Average capacity utilization was 78% in NB and 73% in NS.
- Respondents relied heavily on domestic markets, with 69% of NB and 93% of NS respondents earning over half of their sales in local markets. The United States was an important market for many NB firms.

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<sup>1</sup> Excluding plywood & panelboard manufacturing due to insufficient data.

# 1 Introduction

In 2018, the Canadian Forest Service (CFS) expanded its survey program on secondary wood product manufacturing to include New Brunswick (NB) and Nova Scotia (NS). The groundwork was from a series of surveys and associated reports for British Columbia that date back to 1990. In addition to these two Atlantic provinces, the 2017/2018 survey program included British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec. The British Columbia survey, which was administered first, collected operational data on 2016 sector activity and the surveys of the remaining provinces collected 2017 data.

While this is the first CFS survey of the sector, there have been previous studies on this sector in Atlantic Canada. In 1998, the Atlantic Canada Opportunities Agency conducted a study of the wood products sector in Atlantic Canada with a focus on value-added activities (ACOA 1998). This six-part study looked at: the state of the resource; the state of the industry; its productivity and economic benefits; its products and markets; trade and regulation; as well as its needs, challenges and targets. The study highlighted that although Atlantic Canada produced 10% of Canada's raw wood volume in 1998, the region only accounted for 4% of value-added and wages at the national level. The report concluded that "the major challenges facing the industry are an allocation of resources between the various sectors of the forest industry based on the value-potential of the wood resource, developing new value-added products in the intermediate or final phases of processing, diversifying into new and existing export markets, and assuring that smaller wood manufacturers have the same opportunities to benefit from the further development of the industry" (ACOA 1998). More recently in 2014, the Government of Canada and Province of New Brunswick funded a study on NB's valued-added wood sector (InPro 2014). The study used secondary sources of information to develop a detailed profile of the sector, with a focus on labour. The InPro study included both primary and secondary wood manufacturers, unlike this current survey study, and provided a very detailed description of the sector, its labour force, and its challenges. In particular, the study highlighted the issues created by lost capacity within the primary industry due to the late 2000s US recession, high cost structure (wood fibre, power and wages), and competing interests over NB's wood fibre supply.

This report summarizes the survey results for NB and NS and although the secondary manufacturing sectors in these provinces are comparatively small, there is considerable interest in promoting value-added processing as a means to maximize the value of wood fibre harvested. The challenges facing primary forest industries in the Maritimes are similar to those experienced across Canada—increasing global competition, climate change impacts, and trade frictions with the United States that have taken a toll on forest operations. Secondary manufacturing of lumber and its by-products into intermediate and final goods may help forest-dependent communities diversify and lower the risks from market and natural disturbances. Credible, up-to-date information on secondary manufacturing helps to ensure effective policy responses and

may aid communities and industry associations in creating viable approaches to support growth and diversification.

This survey uses the definition of secondary manufacturing established in earlier surveys. Secondary manufacturing is the further processing of primary mill wood or wood-based material into semi-finished or finished products. Clustered by business type (BT), the major wood products in the secondary manufacturing industry include:

- remanufactured products
- engineered wood products (EWP; including log homes and timber frames),
- cabinets,
- furniture,
- millwork,
- pallets and containers,
- plywood and panelboards, and
- other wood products (OWP)

Our definition of a "manufacturer" excludes several activities, the primary being contractor/builders, or custom one-off operations. Most affected firms are log home manufacturers within the engineered wood products category and cabinet manufacturers. For example, a firm that manufactures pre-built 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. We also exclude small one-off custom manufacturers of specialty furniture or cabinets. Finally, we exclude a small group of lumber/remanufacturing mills that are more like lumber manufacturers than remanufacturers given their consumption of whole logs instead of lumber. Appendix A contains a reasonably comprehensive listing and logical taxonomy of the products produced in solid wood secondary manufacturing. To further aid readers in understanding the state and structure of the sector in Nova Scotia and New Brunswick, additional and complementary information on the sector produced by Statistics Canada is presented in Appendix B.

## 2 Research Methods

Our inventory of NB and NS secondary wood product manufacturers was created from the Statistics Canada's Business Register (BR). This was done to ensure the use of a consistent population for the Maritimes and the other provinces surveyed in 2017/2018.

The target population of manufacturers consisted of 167 firms, including 3 panelboard producers. As we did not receive any completed surveys from panelboard producers, our analysis excluded this business type.

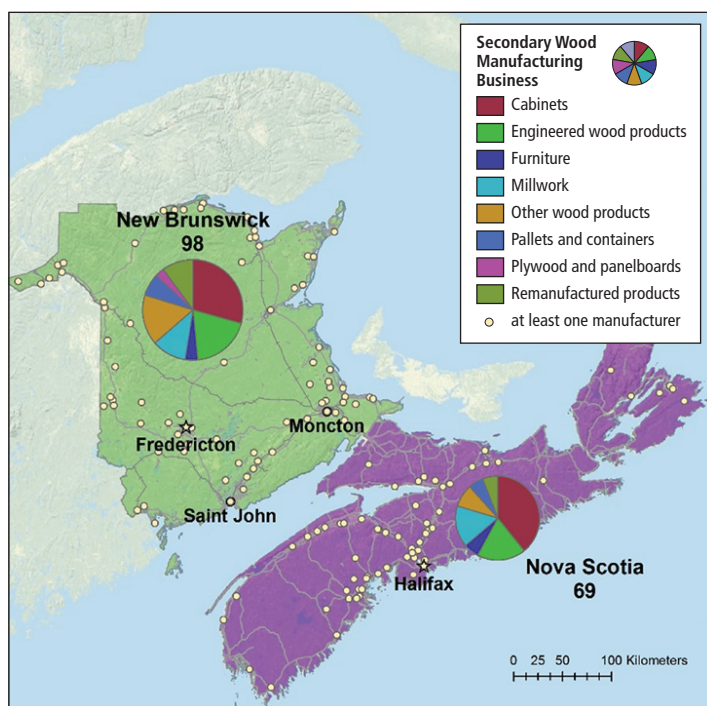
This survey was derived from previous surveys on secondary wood product manufacturing administered by the CFS, the first of which was introduced for British Columbia in 1990 (see Wilson, Stennes, Wang, & Wilson (2001b), Stennes & Wilson (2008), and Bogdanski & McBeath (2015)). Surveys were mailed in May 2018, with follow-ups commencing several weeks later. Firms that did not respond to mail-outs or faxes were contacted by phone or email between June and August to complete and return the survey. We received 29 surveys for NB, representing a 30% response rate, and 17 surveys for NS, representing a 25% response rate. Appendix C contains the survey questionnaire. Respondents took an average of one hour and twenty minutes to complete the survey.

**Table 1.** Distribution of survey population and response rates

		Number of Firms			Response Rate (%)		
		NB	NS	Total	NB	NS	Total
CFM	Cabinets	29	27	56	24	22	23
	Furniture	4	4	8	25	50	38
	Millwork	10	11	21	40	27	33
EWP	Engineered wood products	11	8	19	45	25	37
	Log homes & timber frames	8	5	13	13	0	8
OWP	Pellets	4	1	5	0	0	0
	Shakes & shingles	4	–	4	100	–	100
	Other wood products	8	5	13	13	60	31
Reman/P&C	Pallets & containers	7	4	11	43	0	27
	Remanufactured products	10	4	14	30	25	29
	<b>Subtotal</b>	<b>95</b>	<b>69</b>	<b>164</b>	<b>31</b>	<b>25</b>	<b>28</b>
	Plywood & panelboards	3	–	3	0	–	0
	<b>Total</b>	<b>98</b>	<b>69</b>	<b>167</b>	<b>30</b>	<b>25</b>	<b>28</b>
	<b>Percentage</b>	<b>59</b>	<b>41</b>				

Table 1 and Figure 1 summarize the survey population and respondents by BT and region. Each firm in the survey population was classified into a BT according to its distribution of product sales (see Appendix D for specific activities within our defined business types). Due to issues related to confidentiality, our analyses used broader business type definitions than those employed by provinces with larger secondary manufacturing sectors. For NB, businesses were aggregated into four groups: cabinets, furniture, and millwork (CFM); engineered wood products (EWP), including log homes and timber frames; other wood products (OWP); and remanufacturing/pallets & containers (Reman/P&C). Only two BTs were used for NS: CFM and all other business types. The majority of NB firms were classified as CFM (44%) and EWP (19%). For NS, 61% of firms were classified as CFM.

Non-response to the survey would result in biased results, and perhaps false conclusions, if firms that did not participate were substantially different from firms that did respond. For example, if only more profitable firms responded, then our estimates for



**Figure 1.** Location and number of NB and NS secondary wood manufacturers, 2017.

sector sales would be overstated. We conducted two statistical tests to check for non-response bias (Appendix E). The first test compared the frequency distribution of the responding firms across BTs against the population distribution. This test found no difference at the 5% significance level for both provinces; therefore, the survey respondent groups provided a good representation of the distribution of business types across the populations. A second test compared the frequency distribution of the responding firms across employment sizes against the population distribution. This test also found no difference at the 5% significance level for both provinces indicating that the survey respondent groups provided a good representation of firm size distribution across the populations.

### 3 Current State of the Sector

This section extrapolates survey results to the total population, presenting estimates of sector employment, sales, and raw material use. The method of extrapolation started with the 2006 BC survey (Stennes & Wilson, 2008) and differed from older surveys (Wilson, Stennes, Wang, & Wilson, 2001b; Wilson, Stennes, & Wang, 1999). All companies contacted in follow-up phone calls were asked for the number of full-time equivalent employees. Combined with survey responses, this process elicited employee information for 60% of NB and 52% of NS firms. Information for a further 24% and 35% for NB and NS, respectively, were gathered from internet sources, such as company websites and social media profiles. The remainder were estimated from information in the BR. These employee numbers were used to develop coefficients per employee, which were then used to scale other variables of interest within each business type.

### 3.1 Sales, Jobs, and Wood Use

In New Brunswick, the sector employed an estimated 2,870 full-time equivalent workers, generating \$491 million in sales and processing approximately 1.5 million cubic metres (m<sup>3</sup>) of fibre (roundwood equivalent).<sup>2</sup> Nova Scotia's sector employed an estimated 922 full-time equivalent workers, generating \$152 million in sales and processing around 395,000 m<sup>3</sup> of fibre.

Secondary manufacturing, by its very definition, increases the level of economic activity associated with harvested timber when compared to the production of primary commodity products. Table 2 shows employment and gross sales per unit of roundwood equivalent used.<sup>3</sup> In the case of employment, for most BTs, these jobs are incremental to those generated by woodlands and primary mill operations. These represent approximately 0.90 and 1.0 jobs per 1000 m<sup>3</sup> of timber harvested in NB and NS, respectively.<sup>4</sup>

**Table 2.** Job and sales coefficients, 2017

Business type	Jobs (per 1000 m <sup>3</sup> )	Sales (per m <sup>3</sup> )	Sales per full-time equivalent (000s)
CFM	17.3	\$1,717	\$99
EWP	1.0	\$311	\$316
<b>NB</b> OWP	2.1	\$218	\$105
Reman/P&C	1.5	\$213	\$143
<b>Sector</b>	<b>1.9</b>	<b>\$325</b>	<b>\$171</b>
CFM	16.5	\$2,293	\$139
<b>NS</b> Other	1.4	\$256	\$185
<b>Sector</b>	<b>2.3</b>	<b>\$384</b>	<b>\$165</b>

The business types producing the greatest levels of employment and sales per unit of fibre input were cabinet, furniture, and millwork manufacturers, which had the highest coefficients for both of these measures. In addition to looking at sales per unit of fibre, we also examined sales per full-time equivalents (FTEs). For NB, this value was highest for engineered wood products. The different indicator values across BTs reflect the varying combinations of labour, capital, and other inputs involved in the production of the different products within each BT. For example, cabinet and furniture production requires significant inputs of skilled labour and other materials, such as hardware, textiles, glue, and stone, whereas the production of engineered wood products requires relatively little labour but lots of machinery.

2 Excluding plywood & panelboard manufacturing due to insufficient data.

3 Roundwood equivalent volume (log volume equivalent) was an estimate of the volume of logs used to manufacture wood-based products.

4 This employment coefficient was calculated using total employment in logging, forestry, and primary mill employment for 2016 (i.e., 8,428 NB and 3,763 NS jobs; see Statistics Canada, n.d.) as a ratio of the provincial harvest for 2016 published in the National Forestry Database (<http://nfdp.cfm.org/en/data/harvest.php>). 2016 values were used as 2017 harvest volumes were not yet available.

## 4 Survey Results

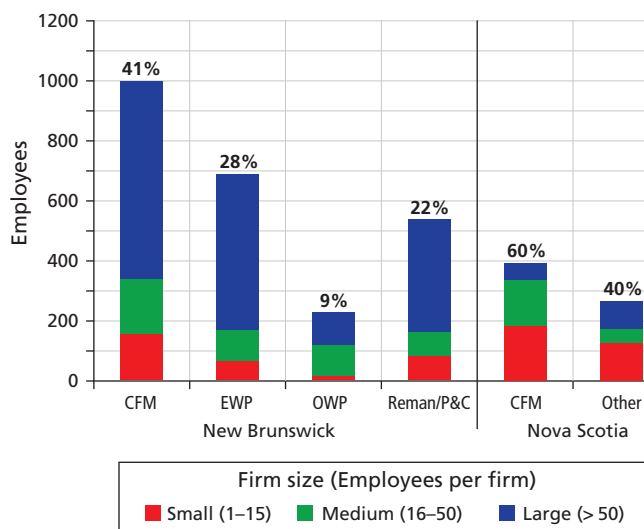
This section contains results for employment, sales, products and services, raw material use, operating costs, markets, capacity utilization and expansion plans.

### 4.1 Employment

Companies who completed the survey or provided responses during follow-up correspondence were included in this part of the analysis. Figure 2 shows the distribution of employment by province and business type in 2017, with firms ( $n_{NB}=81$ ,  $n_{NS}=57$ ) classified into three groups according to the number of employees. For NB, the median number of employees is 12 and the average is 30; the corresponding values for NS are 8 and 12 for the median and mean, respectively (Table 3). The distribution of employment was quite different across provinces. In NB, the majority (68%) of sector employment was with large firms (19% of firms); in contrast, small firms with no more than 15 employees (84% of firms) were the largest employers (48% of employment) in NS.

**Table 3.** 2017 employment: summary statistics

	Number of Respondents	2017 Employment (FTEs)		
		Total	Median	Average
CFM	37	1,001	10	27
EWP	16	691	18	43
<b>NB</b> OWP	12	231	20	19
Reman/P&C	16	543	13	34
<b>All BTs</b>	<b>81</b>	<b>2,466</b>	<b>12</b>	<b>30</b>
CFM	39	398	5	10
<b>NS</b> Other	18	264	10	15
<b>All BTs</b>	<b>57</b>	<b>662</b>	<b>8</b>	<b>12</b>

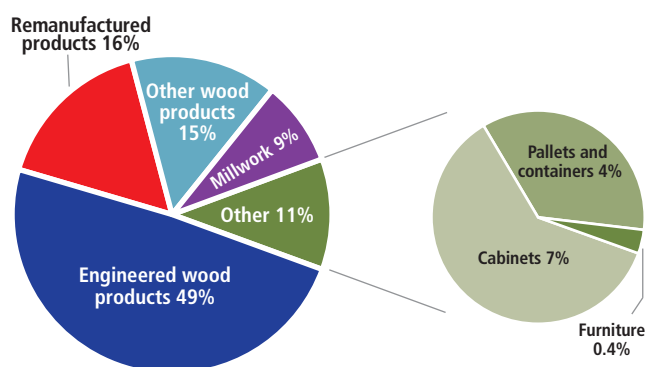


**Figure 2.** Number of employees for firms with employment data, by size of firm (employees per firm), business type, and province.

In both provinces, a significant portion of the sector's workers were employed in cabinet, furniture, and millwork manufacturing (Figure 2). Firms in this subsector were typically on the smaller side with small firms making up 62% and 85% of this subsector in NB and NS, respectively.

## 4.2 Sales

For both provinces, 48 companies provided gross sales for 2017 either through direct response to the survey or by phone. Reported revenue was \$154 million, and Figure 3 shows the distribution across business types. Engineered wood product and remanufacturing firms accounted for almost two-thirds of 2017 sales.



**Figure 3.** 2017 revenue distribution of secondary wood manufacturing respondents, both provinces.

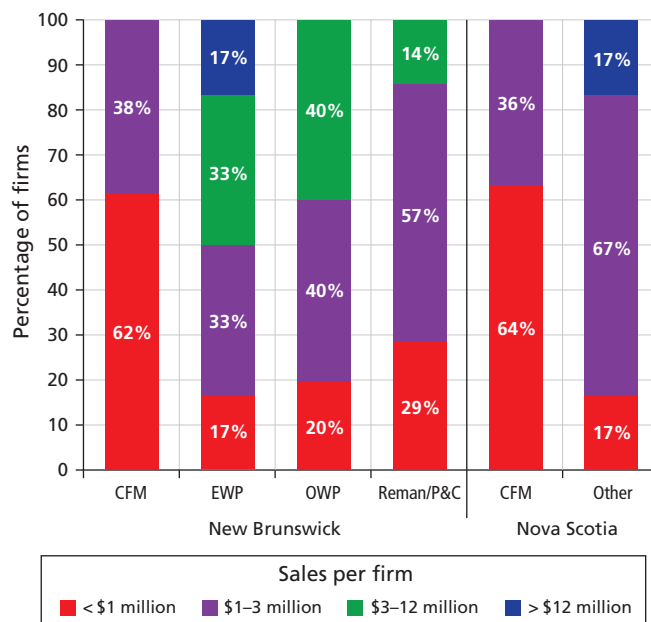
Table 4 contains select summary statistics by province and BT. Sixty-five percent of respondents operated in NB, where the average firm earned \$3.8 million and the median firm earned \$1.8 million. Average and median sales for manufacturers operating in NS were much lower at \$2.1 million and \$1 million, respectively. In NB, engineered wood product producers reported the most revenue, while remanufacturers reported the most revenue in NS.

**Table 4.** 2017 sales: summary statistics by province and business type

	Number of Respondents	2017 Sales (\$ millions)		
		Total	Median	Average
CFM	13	15.4	0.9	1.2
EWP	6	×	3.0	×
<b>NB</b> OWP	5	×	3.0	×
Reman/P&C	7	×	1.1	×
<b>All BTs</b>	<b>31</b>	<b>119.3</b>	<b>1.8</b>	<b>3.8</b>
CFM	11	8.9	0.3	0.8
<b>NS</b> Other	6	26.1	1.4	4.4
<b>All BTs</b>	<b>17</b>	<b>35.0</b>	<b>1.0</b>	<b>2.1</b>

a ×=suppressed for confidentiality.

The majority of respondents generated modest sales with 39% of firms earning less than \$1 million and only 4% with sales exceeding \$12 million. As shown in Figure 4, smaller firms dominated the cabinets, furniture, and millwork category, with 62% of NB firms and 64% of NS firms earning under \$1 million. Medium-sized firms were more common within the other BTs. The firms with sales exceeding \$12 million were engineered wood product producers and remanufacturers.



**Figure 4.** Distribution of respondents by revenue class and business type.

Respondents were asked to provide sales from 2016 as well as expected 2018 sales. Figure 5 shows the change in nominal sales by business type in relation to 2017.<sup>5</sup>

From 2016 to 2017, sales in NB rose by 14%, with 74% of respondents reporting an increase in revenue and 17% reporting a decrease. The other wood products business type experienced a mild decrease in sales, while all other BTs indicated significant growth. The situation was different for NS, however, where sales fell by 3% and one-third of respondents reported a decrease in revenue. Revenue declined, albeit mildly, for both business types in NS.

For many business types, the outlook for 2018 was quite different than 2017. Respondents expected an increase in total sales of 5% and 6% for NB and NS, respectively. 63% of NB and 69% of NS survey participants anticipated sales growth. Across both provinces, all BTs expected sales to either remain unchanged or to increase. In NB, the Reman/P&C (+17%) and OWP (+10%) business types projected the largest changes in total sales. Little growth was expected within the cabinet, furniture, and millwork manufacturing business type.

<sup>5</sup> Constructed as the percentage change in total sales for each business type.

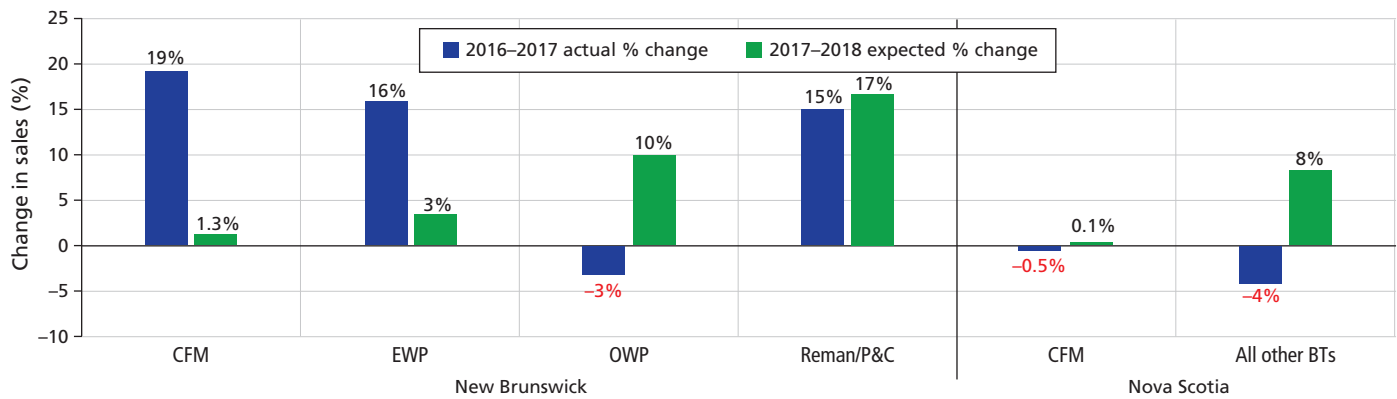


Figure 5. Percentage change in sales revenues.

### 4.3 Products and Services

This section summarizes the end-use markets that secondary manufacturers produced goods for and the services that they provided and purchased. Table 5 contains the percentage of respondents ( $n_{NB} = 28$ ,  $n_{NS} = 17$ ) in each BT that manufactures for particular end-use markets.

The majority of respondents manufactured products for new residential buildings and remodelling—virtually all firms in the categories that service the building sector (cabinet, shakes and

shingles, millwork, EWP and remanufacturing BTs) target these markets, with a significant share producing for commercial buildings as well.

Respondents ( $n_{NB} = 28$ ,  $n_{NS} = 16$ ) were asked whether they bought or sold custom services and about the types of services acquired or provided. Custom services were classified as manufacturing (e.g., resawing, planning, kiln drying, etc.) or non-manufacturing (e.g., logistics, distribution, and marketing). Table 6 and Figure 6 summarize these results.

Table 5. Percentage of respondents that produce goods for select end-use markets

Business type	New residential	Remodeling	Multi-unit housing	Commercial buildings	Industrial buildings	Other <sup>a</sup>
CFM	92	83	50	50	42	25
EWP	100	83	100	100	50	33
<b>NB</b> OWP	100	100	75	75	25	25
Reman/P&C	50	50	50	17	33	50
<b>All BTs</b>	<b>86</b>	<b>79</b>	<b>64</b>	<b>57</b>	<b>39</b>	<b>32</b>
CFM	100	91	36	18	18	9
<b>NS</b> Other	67	67	50	83	50	50
<b>All BTs</b>	<b>88</b>	<b>82</b>	<b>41</b>	<b>41</b>	<b>29</b>	<b>24</b>

a Industrial and commercial uses

Table 6. Percentage of respondents buying or selling custom services in 2017

Region	Purchase custom services (%)	Sell custom services (%)	Sell manufacturing services <sup>a</sup> (%)	Plan to expand services (%)
NB	44	32	88	17
NS	38	56	100	7
Combined	42	41	93	14

Note: Values are percentage of respondents unless otherwise noted.

a Percentage of custom service providers that sell manufacturing services.

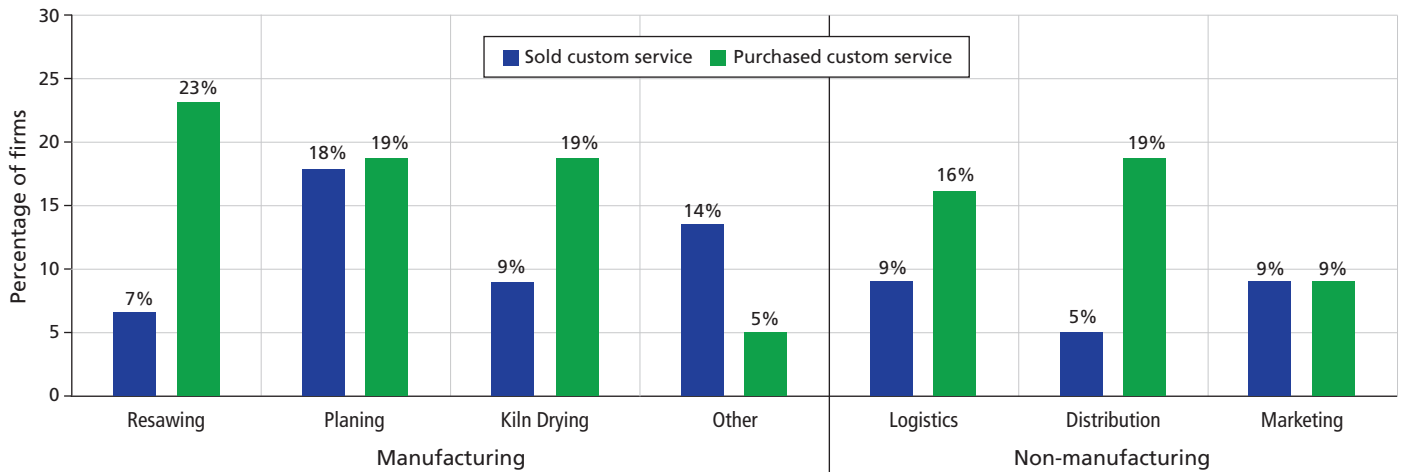


Figure 6. Percentage of respondents selling or purchasing custom services in 2017.

Custom services were provided by 32% of NB and 56% of NS respondents, and 44% of NB and 38% of NS respondents purchased these services from other businesses. Of the businesses in NB that sold custom services, 50% offered manufacturing services only, 13% provided non-manufacturing services only, and 38% delivered both.<sup>6</sup> In NS, manufacturing services were sold by all businesses that offered custom services and 29% of these businesses also provided non-manufacturing services.

As shown in Figure 6, planing was the main service sold, offered by 18% of respondents. Resawing (23% of respondents) was the main service purchased, followed by distribution, kiln drying, and planing at 19% each.

Only 17% of NB and 7% of NS respondents planned to expand into new business services, with many of these businesses intending to add planing services.

#### 4.4 Markets

Figure 7 shows that local markets were the most important for 67% of NB respondents ( $n_{NB}=26$ ) and 93% of NS respondents ( $n_{NS}=16$ ).<sup>7</sup> Over 90% of firms sold some of their products within their own province, and over 50% exported products to other provinces. The share of respondents exporting to the US was larger for NB (50% of respondents compared to 25% for NS) while the share exporting overseas was larger for NS (25% of respondents compared to 12% for NB).

The distribution of revenue from Canadian and US markets was quite different for the two provinces (Figure 8). Just under half of NB sales were generated in domestic markets, with 26% of revenue earned in Atlantic Canada and 23% earned in the rest of Canada. In contrast, 80% of NS sales were received from domestic markets with sales in Atlantic Canada accounting for the majority (59%).

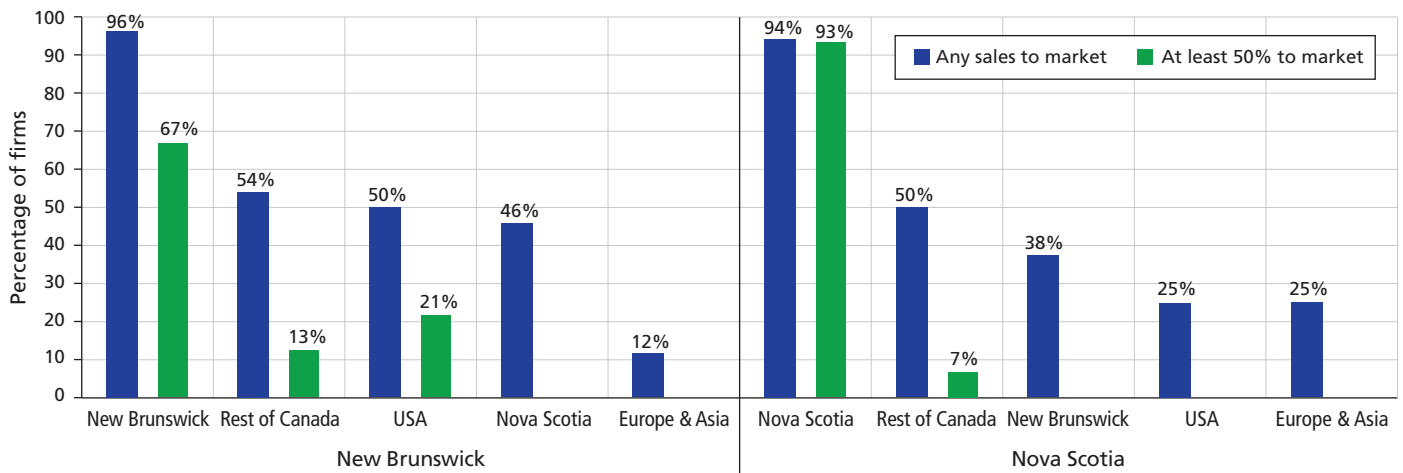
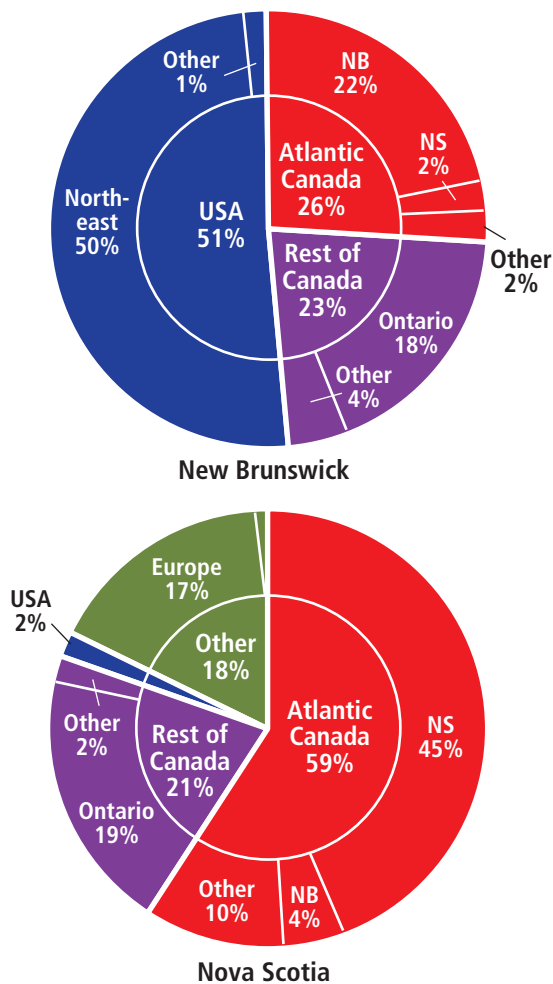


Figure 7. Percentage of firms reporting sales to various markets in 2017.

<sup>6</sup> Does not sum to 100% due to rounding.

<sup>7</sup> The "most important market" was defined as the market where at least 50% of revenue was earned.



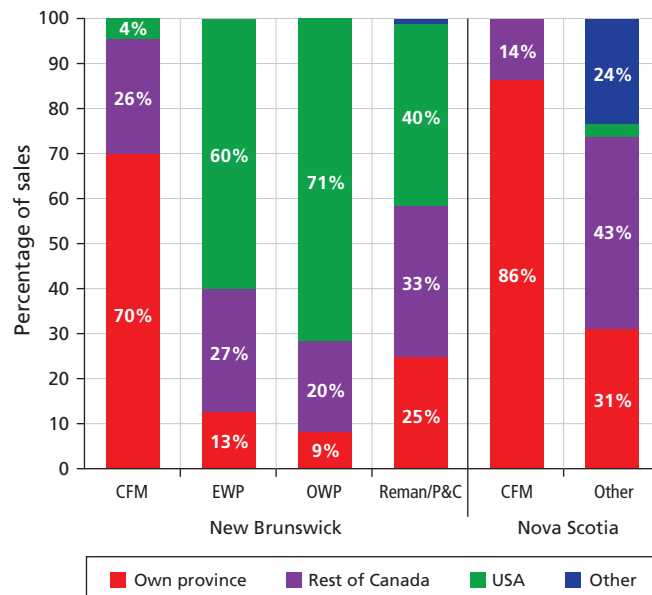


**Figure 8.** Distribution of sales revenue by market in 2017.

International exports were a greater source of revenue for NB, where just over half of secondary manufacturing revenue was from US exports while overseas exports were negligible. In contrast, only 2% of NS sales were from US exports whereas overseas exports, primarily to Europe, accounted for 18% of sales.

Figure 9 provides more detail on the share of revenue earned by each BT in various markets. The market mix for each province varies considerably across business types. For NB, the engineered wood products and other wood products BTs relied heavily on US markets, which accounted for 60% and 71% of their respective revenues. In comparison, the cabinets, furniture, and millwork BT earned over 95% of its revenue domestically with local markets consisting 70% of sales. For NS, this business type was entirely reliant on domestic markets with local markets representing 86% of sales. For all other BTs, very little was exported to the US while overseas exports were considerably more important accounting for 24% of sales.

Respondents were asked whether they intended to expand into new market regions and to indicate the regions of interest. In



**Figure 9.** Distribution of 2017 sales by market and business type.

NS, 15 out of 29 (52%) respondents and in NB, 5 out of 16 (31%) respondents planned to expand sales to new market regions—remanufacturers and pallet & container manufacturers in NB (with 83% of respondents) were the most interested in expansion. Of these respondents, 60% wished to increase their market presence within Atlantic Canada and the US.

#### 4.5 Cost Structure

Respondents were asked to provide the proportion of their operating costs attributable to wood, labour, interest payments, depreciation, and other production costs. Figure 10 shows the operating cost mix by BT for 2017, calculated as the simple average for each business type.<sup>8</sup> For both provinces, wood costs was the largest cost component at 43% and 45% of operating costs for NB and NS, respectively. Labour and benefits followed closely at 35% for NB and 33% for NS. The “other” category is quite varied, but the larger components can be classified as operating and maintenance (O&M) and non-wood supplies.

The importance of the different inputs into overall operating costs differed across BTs. For NB, wood costs ranged from 47% for Reman/P&C firms to 38% for OWP firms. Labour costs ranged from 26 to 44%, making up the largest share of operating costs for OWP firms and the lowest for Reman/P&C in NB. For NS cabinet, furniture, and millwork firms, wood costs occupied a larger share of the cost mix compared to their NB counterparts (50% for NS compared to 43% of NB). For all other BTs in NS, “other” costs, which largely consisted of non-wood supplies and O&M, accounted for just over 30% of operating costs.

<sup>8</sup> As the survey questionnaire did not elicit information on total costs or profit, we were not able to construct an adequate weighted average.

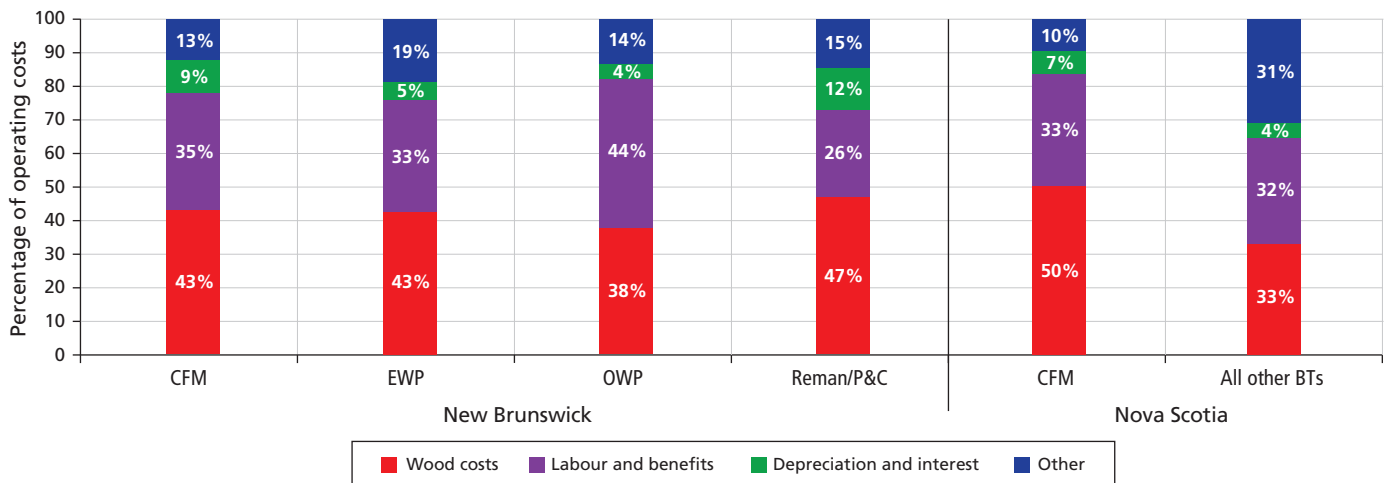


Figure 10. Operating cost mix by business type.

#### 4.6 Raw Material Use

Firms were asked to estimate their total wood fibre use in 2017 by species and form (e.g., lumber, logs, panels, etc.). These responses were then converted to roundwood equivalent (RWE) cubic metres to facilitate comparisons.<sup>9</sup> In 2017, NB respondents ( $n_{NB} = 28$ ) utilized just over 379,000 m<sup>3</sup> of fibre, and the main input materials were lumber (60%), logs (22%) and panels (16%); NS respondents ( $n_{NS} = 15$ ) used just under 103,000 m<sup>3</sup> of fibre, which consisted of lumber (90%), logs (7%) and panels (3%).<sup>10</sup>

For NB, 39% of respondents only utilized softwoods (SW) and 36% only used hardwoods (HW). For NS, the corresponding values were 47% and 20% for SW and HW, respectively. On average, two-and-a-half different species were used in secondary wood product manufacturing in NB while three different species were used in NS. In each province, the cabinet, furniture, and millwork BT had the most varied species mix, using an average three-and-a-half different species.

In terms of cumulative RWE volumes, softwoods accounted for the largest shares at 73% and 87% for NB and NS, respectively (Figure 11). Although both provinces primarily utilized spruce and cedar, the rate of usage was different across provinces, with NB using more spruce (41%) than cedar (29%) while NS utilized more cedar (39%) than spruce (25%).

Table 7 provides species use across BTs, calculated by dividing each business type's RWE volume use for each species by RWE volume use by business type. In NB, shake and shingle manufacturers made up the majority of firms in the OWP business type, and their sole feedstock was cedar.<sup>11</sup> The high rates of spruce and aspen usage in NB was due to their prevalence in engineered wood products manufacturing, which consumed over 60% of the province's cumulative RWE volume. The species mix for the

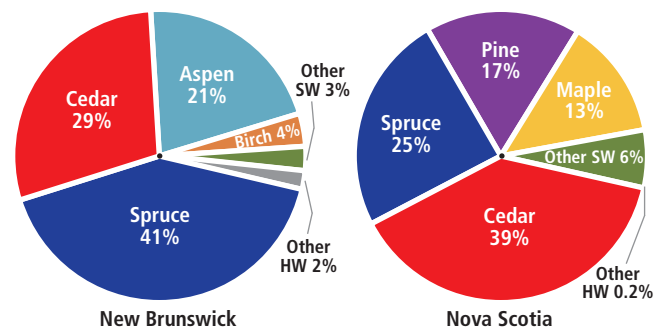


Figure 11. Roundwood equivalent volume used by species for survey respondents

Reman/P&C business type was quite diverse—the main input was cedar at 54% of cumulative RWE volume, but significant quantities of hardwoods and pine were used as well. The cabinets, furniture and millwork BT in NB primarily used hardwoods with birch occupying 52% of the species mix followed by maple at 28%. In contrast, hardwoods only made up 10% of the species mix for the CFM business type in NS, where pine occupied 52% of the species mix followed by all other softwood species, including spruce, at 38%. In both provinces, the CFM business type consumed the least fibre, at 2% and 3.6% of provincial RWE volume for NB and NS, respectively.

Secondary wood product manufacturers in NB and NS primarily sourced their fibre from domestic markets, with only NB importing a small share (5%) from outside of Canada.<sup>12</sup> For NB and NS, imports from other provinces accounted for 64% and 78% of fibre purchase, respectively. Although we cannot provide import volumes, Figure 12 shows the share of respondents ( $n_{NB} = 17$ ,  $n_{NS} = 10$ ) importing from various regions. As expected, the majority of respondents purchased from Eastern Canada, with 88% of NB and 50% of NS respondents indicating that fibre was sourced from Quebec. A significant proportion (40%) of NS respondents also imported from Western Canada, but only 12% of NB respondents purchased from this region.

<sup>12</sup> NS imports from outside Canada were negligible.

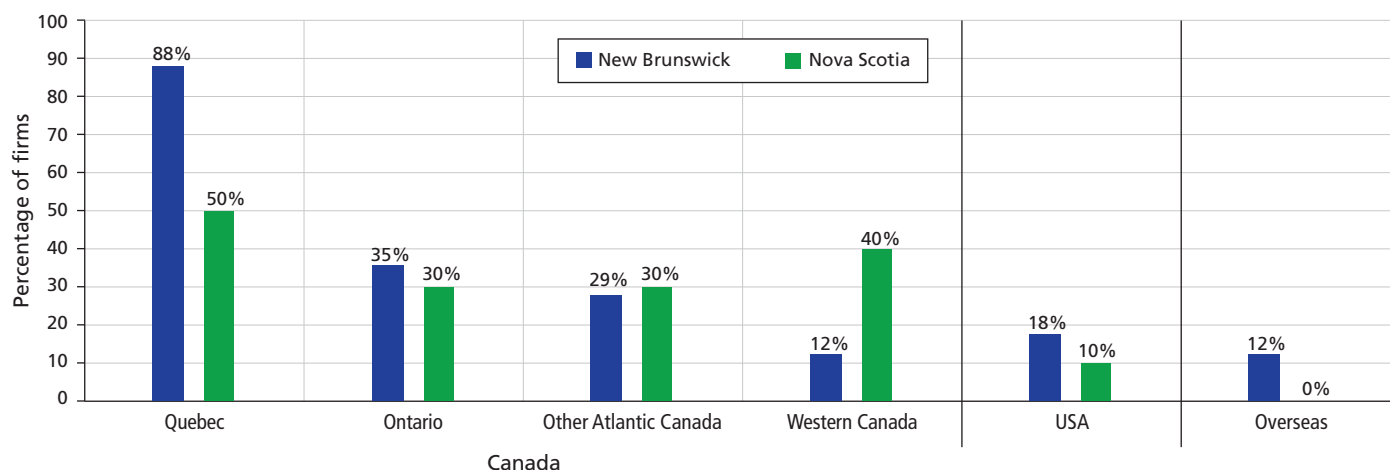
<sup>9</sup> Conversion factors were based on Nielson, Dobie, & Wright (1985).

<sup>10</sup> Panels included plywood, particleboard, OSB, MDF, and veneer. The remaining 2% for NB consisted of wood residue and unspecified wood material.

<sup>11</sup> Other softwoods were used by other manufacturers in this category, but due to the relatively small volumes, the shares were rounded to zero.

**Table 7.** Species mix by business type (%)

	Business type	Spruce	Cedar	Aspen	Pine	Maple	Birch	Other SW	Other HW
NB	CFM	1	0	0	6	28	52	0	13
	EWP	66	0	31	0	0	2	0	0
	OWP	0	100	0	0	0	0	0	0
	Reman/P&C	0	54	12	15	4	10	1	4
NS	CFM	1	0	0	52	5	3	37	2
	Other	25	40	0	16	13	0	5	0



**Figure 12.** Sources of imported fibre supply.

#### 4.7 Capacity Utilization and Expansion Plans

Table 8 shows that, in 2017, respondents ( $n_{NB} = 25$ ,  $n_{NS} = 16$ ) operated at an average capacity utilization level of 78% in NB and 73% in NS. Firms operating two or more shifts (28% of NB and 13% of NS respondents) had higher average utilization in NS (85%) but not in NB.<sup>13</sup>

**Table 8.** Average capacity utilization (%)

Region	1 shift	2 or more	All
NB	78	78	78
NS	72	85	73

In NS and NB, 52% and 29% of respondents, respectively, planned to increase capacity over the 2018–2020 period (Table 9), with the average level of planned expansion fairly similar across provinces at 28% for NB and 27% for NS.

**Table 9.** Expansion plans

Region	Planning expansion (%)	Average level of expansion (%)
NB	52	28
NS	29	27

<sup>13</sup> Due to the small share of NS respondents operating two or more shifts, not much meaning should be attached to this difference.

Survey respondents ( $n_{NB} = 28$ ,  $n_{NS} = 14$ ) were asked to rank a predefined list of constraints to capacity expansion using a five-point scale (where “1” equalled “not at all constraining” and “5” equalled “extremely constraining”). Figure 13 shows the distribution of responses and Table 10 provides the mean score for each constraint. Wilcoxon-Mann-Whitney tests were used to test whether the mean score of a particular constraint was lower (i.e., less constraining) than that of the constraint rated immediately higher.

In 2017, labour was the most important constraint for both provinces, with 39% of NB and 50% of NS respondents ranking it as 4 or higher. Markets followed closely, with 36% of NB and 42% of NS respondents rating it as 4 or higher. The mean scores for these two constraints were not significantly different.<sup>14</sup> For NS, the remaining general constraints were less restricting than labour and markets, but for NB, there were no statistical differences among the general constraints. Comparing each constraint across provinces, only the mean scores for finance were statistically different, implying that financial constraints were more problematic for NB respondents.<sup>15</sup>

<sup>14</sup> Based on Wilcoxon-Mann-Whitney tests. The same conclusions would be drawn from t-tests with Welch’s approximation.

<sup>15</sup> Significant at the 1% level.

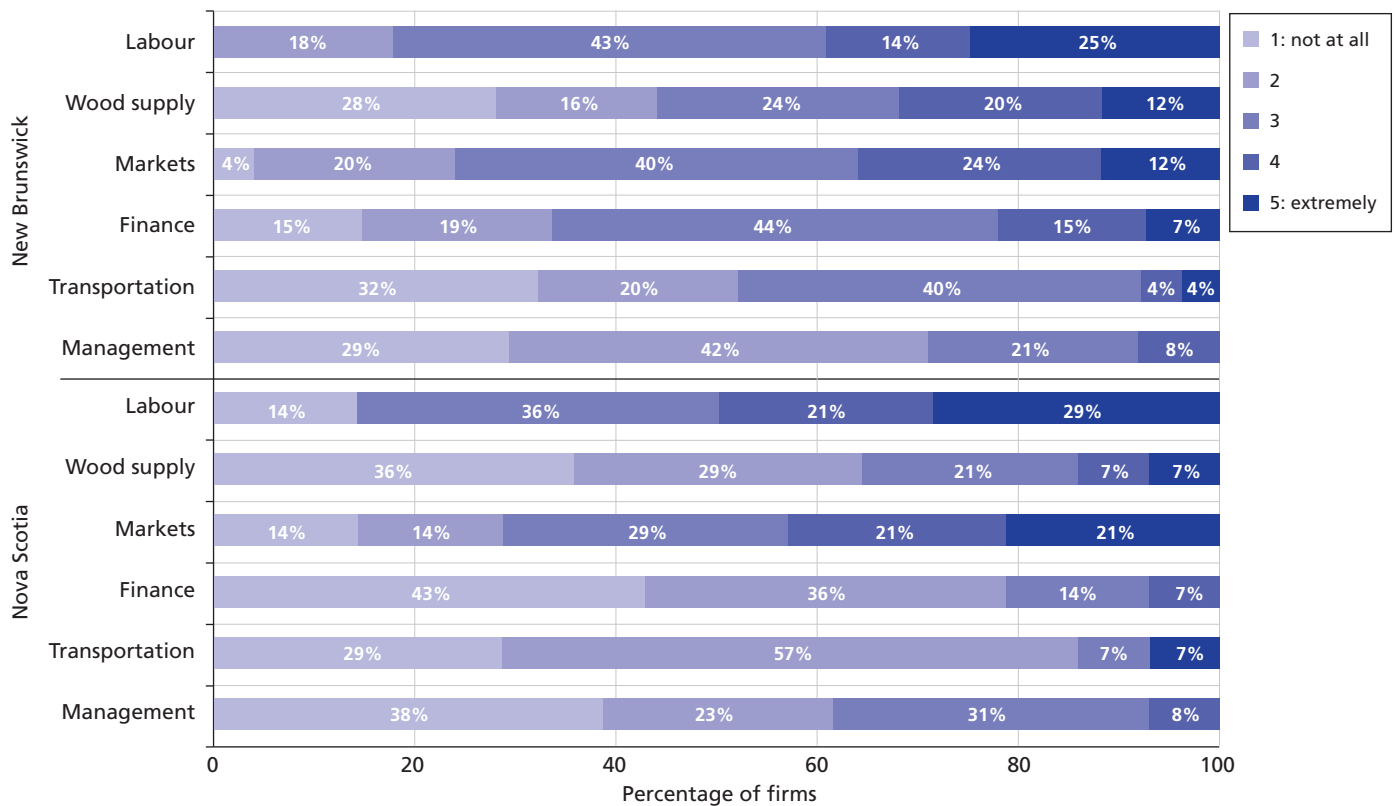


Figure 13. General constraints to expansion: distribution of rankings

Table 10. General constraints to expansion: mean constraint scores

General constraint	NB	NS
Labour	<b>3.5</b>	<b>3.5</b>
Markets	3.2	3.2
Wood supply	2.7	2.2**
Finance	2.8	1.9
Transportation/distribution	2.3	2.0
Management capacity	2.1	2.1

The highest mean score is in bold. A Wilcoxon-Mann-Whitney test was used to compare each factor to the one ranked immediately higher.

\*\* means are statistically different at the 5% level.

\*\*\* means are statistically different at the 1% level.

Within each constraint category, respondents were asked to rate a more detailed set of impediments to expansion using the method described previously. Table 11 presents the results. One-way ANOVA was first used to compare means within each constraint category. If we did not reject the null hypothesis and the equal variance assumption was not violated, then we concluded that the detailed constraints within a category were not statistically different. For example, using one-way ANOVA on the Wood Supply category for NS responses, the equal variance assumption was not violated and we failed to reject the null hypothesis at the 5% significance level; thus, the

specific wood supply constraints were all mildly limiting for NS respondents, but no single limitation was more important, statistically speaking, than the others in this category. If we concluded that at least one constraint was statistically different from the others, then Wilcoxon-Mann-Whitney tests were used in the manner described for the general constraints.

### Wood supply

For NB respondents, price volatility and price, with mean scores of 3.5 and 3.4, respectively, were the top wood supply constraints and their ranks were statistically higher than quality/grade and volume at the 10% significance level. For NS respondents, price was the top limitation, with a mean score of 2.8, but as explained previously, no single constraint was significantly more restricting than the others. Comparing the two provinces, price volatility was more limiting for NB respondents (statistically different at the 1% level), but for the remaining constraints, there were no statistically significant regional differences.

### Labour

For NB, lack of experience and labour costs were the most constraining labour specific impediments to expansion (48% ranked experience and 37% ranked cost as 4 or 5). At the 10% significance level, these two limitations were more constraining than training/skills and flexibility. For NS

respondents, lack of experience was the top constraint, with a mean score of 3.1 and 47% of respondents ranking it as 4 or 5, but no single constraint was significantly more limiting than the others. For all constraints, there were no statistically significant regional differences.

### Markets

Market diversification was the top constraint in this category, with a mean score 2.6 and 2.3 in NB and NS, respectively. For NB, the limitations in this category were not significantly different from each other. For NS, foreign regulations were less impeding than the other constraints (at the 10% significance level). There were no statistically significant regional differences.

### Finance

The majority of NS respondents ranked constraints in the finance category as 2 or lower; however, NB manufacturers tended to indicate greater challenges with financing. With the exception of availability, there were significant regional differences—cost was significant at the 5% level, while flexibility and repayment schedule length were significant at the 10% level.

### Manufacturing Advice

For NB, the lack of means to increase labour efficiency was the top constraint, with 50% of respondents ranking it 4 or higher; it was also statistically different from the remaining constraints. There were no statistically significant regional differences.

### Transportation

Cost was the most important transportation specific constraint, with a mean score of 3.1 and 3.0 for NB and NS, respectively. For NS, this impediment was statistically different from the remaining constraints; however, this was not the case for NB. Access to transportation was more restricting for NB than NS (statistically different at the 10% level).

Figure 14 presents the general constraints to expansion by business type. Labour adequacy was very limiting for other wood product manufacturers in NB (mean score of 4.3) and non-CFM BTs in NS (mean score of 4.0). Compared to the different BTs in NB, other wood product manufacturers tended to indicate greater challenges with transportation/distribution (statistical difference at the 5% level). In NS, businesses engaged in cabinet, furniture, and millwork found wood supply to be less constraining than other BTs in the province (statistical difference at the 5% level). Across provinces, CFM manufacturers in NB expressed greater difficulty with financing than their counterparts in NS.

**Table 11.** Detailed constraints to expansion

Detailed constraint	NB	NS
<b>Wood supply</b>		
Price	3.4	<b>2.8</b>
Price volatility	<b>3.5</b>	2.3
Quality/Grade	3.0*	2.5
Volume	2.8	2.4
<b>Labour</b>		
Experience	<b>3.4</b>	<b>3.1</b>
Cost	3.3	2.9
Training/Skills	2.9*	2.8
Flexibility	2.9	2.7
<b>Markets</b>		
Market diversification	<b>2.6</b>	<b>2.3</b>
Softwood Lumber Agreement	2.5	2.1
Market/Product research	2.4	2.1
Product diversification	2.3	2.2
Foreign regulations	2.0	1.6*
<b>Finance</b>		
Cost	<b>2.9</b>	<b>2.1</b>
Flexibility	2.6	1.8
Availability	2.5	2.0
Repayment schedule length	2.5	1.8
<b>Manufacturing advice for:</b>		
Increasing labour efficiency	<b>3.5</b>	<b>3.4</b>
Reducing manufacturing costs	3.0**	3.1
Improving raw material recovery	3.0	2.6
Implementing lean manufacturing technology	2.9	2.7
Improving product quality	2.5*	2.1
<b>Transportation</b>		
Costs	<b>3.1</b>	<b>3.0</b>
Logistics	2.7	2.4*
Frequency	2.7	2.3
Access	2.7	2.1

1 = not at all constraining and 5 = extremely constraining. Within each constraint group, a Wilcoxon-Mann-Whitney test was used to compare each factor to the one ranked immediately higher.

- \* significantly different at the 10% level.
- \*\* significantly different at the 5% level.
- \*\*\* significantly different at the 1% level.

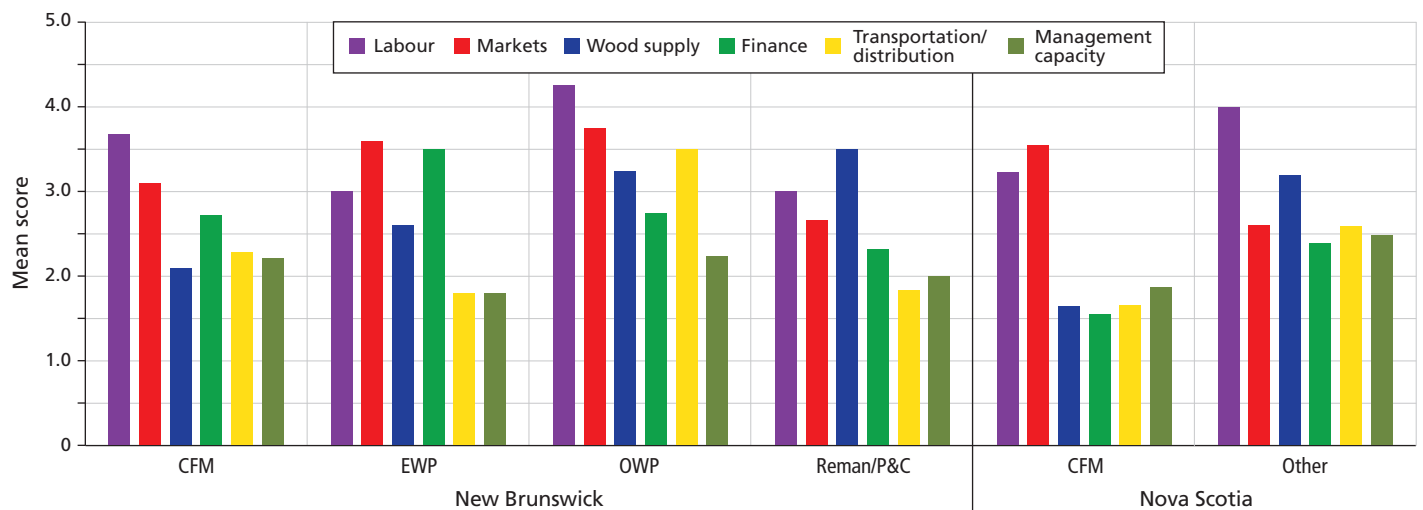


Figure 14. General constraints to expansion by business type.

#### 4.8 Electronic Commerce

The survey contained four questions related to electronic commerce. Respondents ( $n_{NB} = 29$ ,  $n_{NS} = 17$ ) were asked whether their firm: (1) had a website; (2) sold products over the Internet; (3) searched for, or purchased, inputs over the Internet; and (4) searched the Internet for manufacturing advice. Respondents were also asked whether their firm has adopted social media as a platform for commerce. Table 12 summarizes the responses to these questions.

In 2017, 76% of NB and 82% of NS respondents hosted a website. In NB, only 11% of firms sold products online, but

53% purchased inputs online. A larger share of NS respondents engaged in e-commerce, with over half of respondents conducting internet sales and two-thirds of respondents making internet purchases. In NB, 59% and in NS, 75% of respondents searched for manufacturing advice online, and just over half of respondents in each province used Linked-In. Social media use was similar across provinces, with 59% of NB and 65% of NS respondents using some form of social media—Facebook was the most popular, utilized by all NB and 91% of NS firms with a social media presence.

Table 12. Percentage of firms using the internet for management, e-commerce, and marketing

Business types	Management		E-commerce		Marketing				
	Info	Linked-In	Buy	Sell	Website	Facebook	Instagram	Twitter	YouTube
CFM	50	50	67	11	67	100	50	0	17
EWP	50	25	33	0	83	100	0	0	0
<b>NB</b> OWP	60	50	50	0	60	100	25	25	25
Reman/P&C	83	100	40	20	100	100	67	67	33
<b>Total</b>	<b>59</b>	<b>53</b>	<b>53</b>	<b>11</b>	<b>76</b>	<b>100</b>	<b>35</b>	<b>18</b>	<b>18</b>
CFM	70	50	67	71	91	100	50	0	17
<b>NS</b> Other	83	25	67	33	67	75	50	75	25
<b>Total</b>	<b>75</b>	<b>55</b>	<b>67</b>	<b>54</b>	<b>82</b>	<b>91</b>	<b>36</b>	<b>36</b>	<b>18</b>

## 5 Conclusion

New Brunswick and Nova Scotia were part of the Canadian Forest Service's first nationwide survey of secondary wood product manufacturing. In 2017, the secondary manufacturing sector in NB employed an estimated 2,870 full-time equivalent workers, generating \$491 million in sales. Nova Scotia's sector employed an estimated 922 full-time equivalent workers, generating \$152 million in sales.

Although the two provinces were similar in structure, NB was more export-market oriented. Just under half of NB sales were generated in domestic markets, with 26% of revenue earned

in Atlantic Canada and 23% earned in the rest of Canada. In contrast, 80% of NS sales were earned in domestic markets, with sales in Atlantic Canada accounting for the majority.

Many survey respondents expected to grow over the near term, but they indicated that labour and markets were the key constraints to growth. In particular, the lack of experienced workers and labour costs were important challenges, which echoes some of the findings from the InPro (2014) New Brunswick study.

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# Appendices

## Appendix 1: Taxonomy of secondary manufactured wood products

This taxonomy is based on Wilson and Ennis (1999). Some products can be intermediate as well as final.

Log products	Wood products		
	Primary <sup>a</sup>	Intermediate	Final
Chopsticks	Boards	Building/home	Boxes, bins and crates
Firewood	Cants	Components	Cabinets
House logs	Flitches	Cutstock	Coffins
Pilings	Lumber/Industrial timber	Door stock	Countertops
Poles	Treated timber	Edge glued components	Decking
Posts	Veneer	Finger-jointed stock	Fencing
Log homes		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/Ready-to-assemble (RTA)
		Pallet, crating stock	Garden buildings/products
		Medium density fibreboard	Laminated veneer lumber
		Particleboard	Millwork/Architectural
		Pattern stock	Medium density fibreboard
		Sawmill specialty products	Mouldings
		Staircase components	MSR lumber
		Turning squares	Oriented Strandboard
		Window stock	Pallets
			Paneling
			Plywood
			Prefab buildings/manufactured homes
			Siding
			Staircases
			Stakes, lathe, strips and batten
			Structural laminated beams
			Treated lumber
			Trusses
			Turned wood products
			Windows
			Wood novelties
			Wood pellets

<sup>a</sup> This column does not include secondary products but is inserted to provide a more complete taxonomy.



## Appendix 2: Auxiliary information on NB and NS secondary wood product manufacturing

Secondary wood product 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
- 337213 – Wood office furniture, including custom architectural woodwork, manufacturing

The “remanufactured products” business type falls under several NAICS groups:

- 3211 – Sawmills and wood preservation (siding and dressed lumber)
- 321919 – Other millwork (planed lumber)
- 321999 – All other miscellaneous millwork (fencing)

Additionally, businesses producing products such as wood fuel pellets or horticultural products that are under our “other” business type category, either fall under NAICS 321999 (All other miscellaneous wood product manufacturing) or NAICS 321111 (Sawmills except shingle and shake mills). 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 6-digit NAICS codes

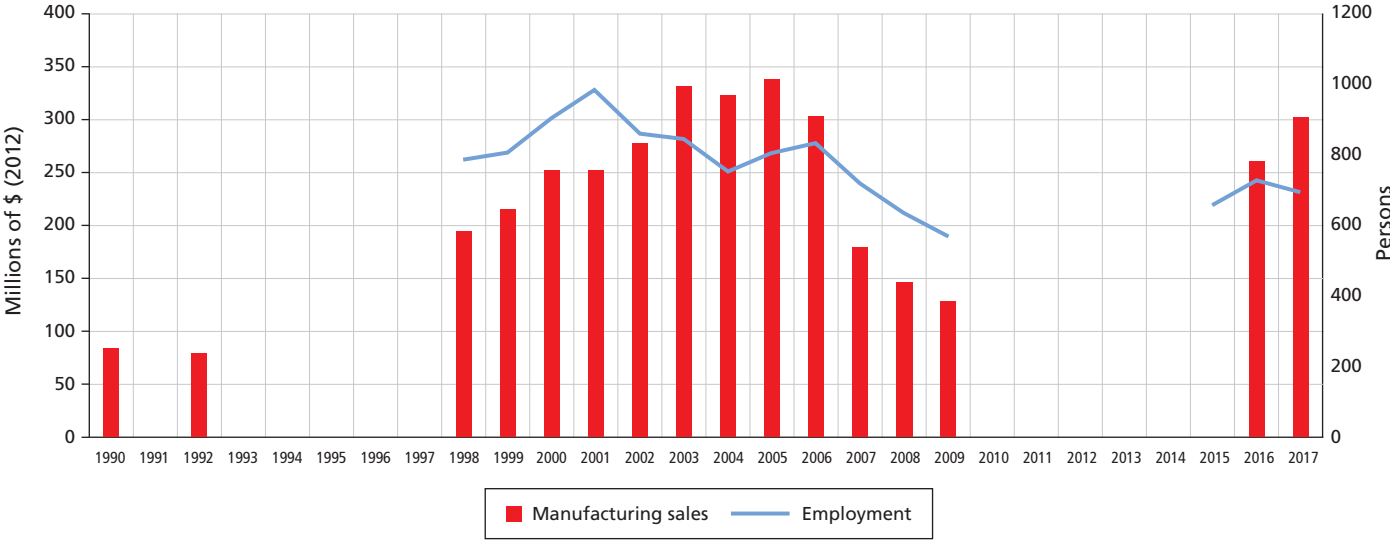
NAICS code	NAICS description	Corresponding business type in this study
321112	Shingle and shake mills	Other wood products
321114	Wood preservation	Engineered wood products
321211	Hardwood veneer and plywood mills	Panelboards
321212	Softwood veneer and plywood mills	Panelboards
321215	Structural wood 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	Engineered wood products
321992	Prefabricated wood building manufacturing	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

Statistic Canada’s Annual Survey of Manufacturing and Logging Industries provides information on forest sector industries, including information on revenues, employee numbers, and costs.<sup>1</sup> Information is currently available from 1990 to 2017, but because of confidentiality laws, data are often suppressed for provinces with smaller secondary manufacturing sectors. Additionally, separating non-wood and wood manufacturing can be difficult for some industries (e.g., furniture and related industries – NAICS 337), and separating primary and secondary wood product manufacturing can also be challenging.

<sup>1</sup> Information on the number of firms was terminated in 2012.

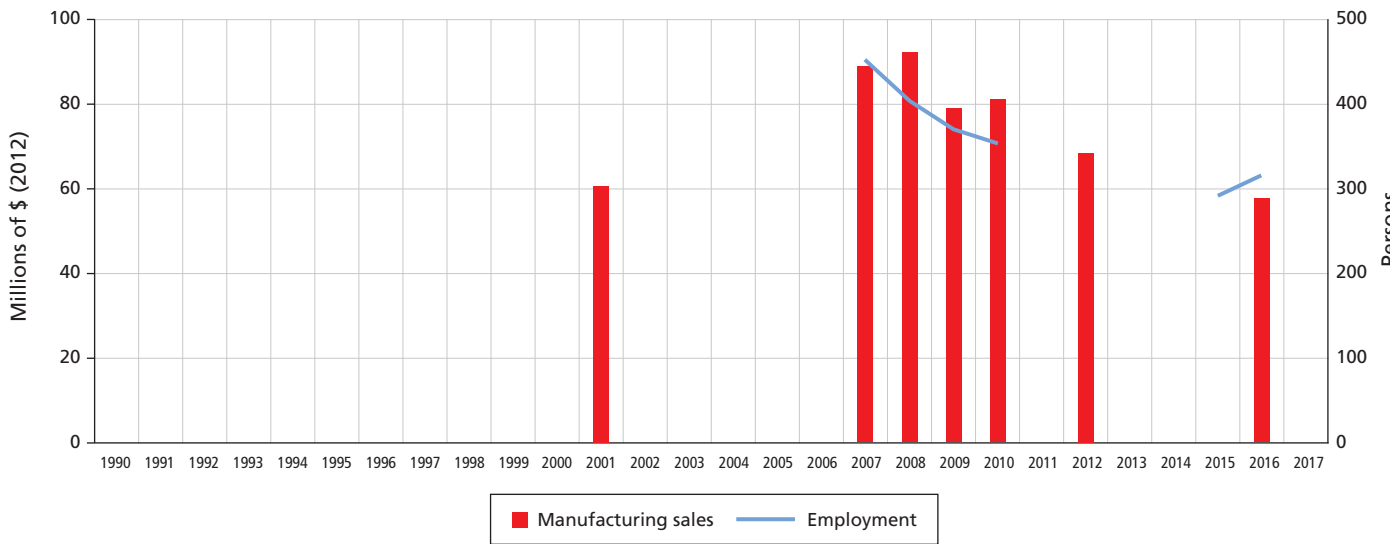
Whether panelboard mills are engaged in primary or secondary manufacturing is debatable, but in this study, they were considered part of the secondary manufacturing sector. Regrettably, we were unable to elicit responses from this industry, but available data from Statistics Canada provide an overview of the current state of the industry and recent trends.

Between 1990 and 2017, the panelboard industry grew considerably in New Brunswick, with employment peaking in the early 2000s and manufacturing sales remaining strong until the onset of the U.S. housing and financial crisis (Figure A1). Although much data has been suppressed, we can still see that the industry has grown in recent years, with nominal sales increasing to \$356 million (\$303 million inflation-adjusted) and employment reaching 700 people in 2017.



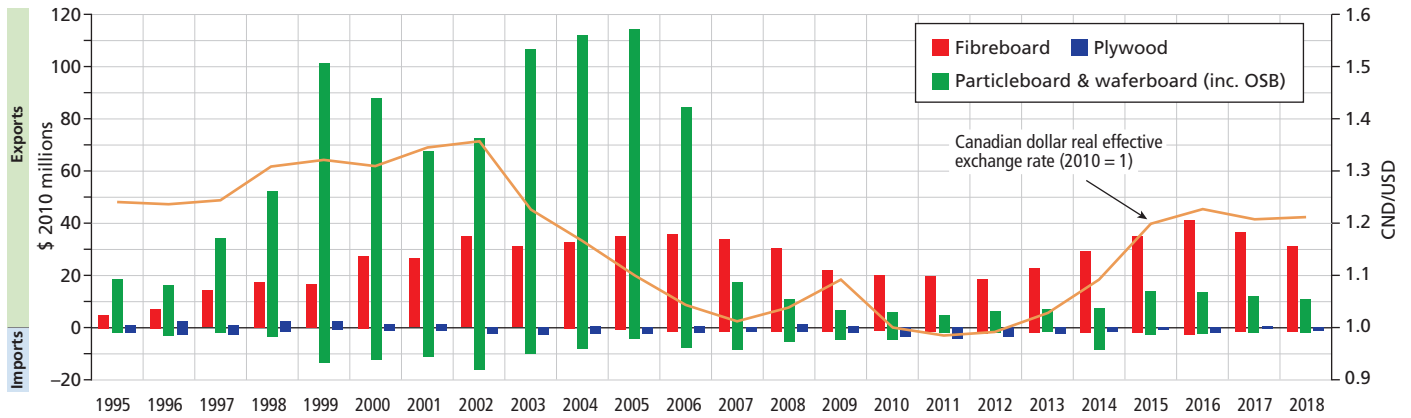
**Figure A1.** New Brunswick panelboard industry: Manufacturing sales revenue and total number of employees, 1990–2017 (NAICS 3212; source: Statistics Canada. Table 16-10-0117-01).

Information on Nova Scotia’s panelboard industry is sparse; manufacturing sales and employment both fell during the late 2000s and this downward trend seems to have persisted (Figure A2). In 2016, nominal sales was \$65 million (\$58 million inflation-adjusted) and the industry employed 318 workers.



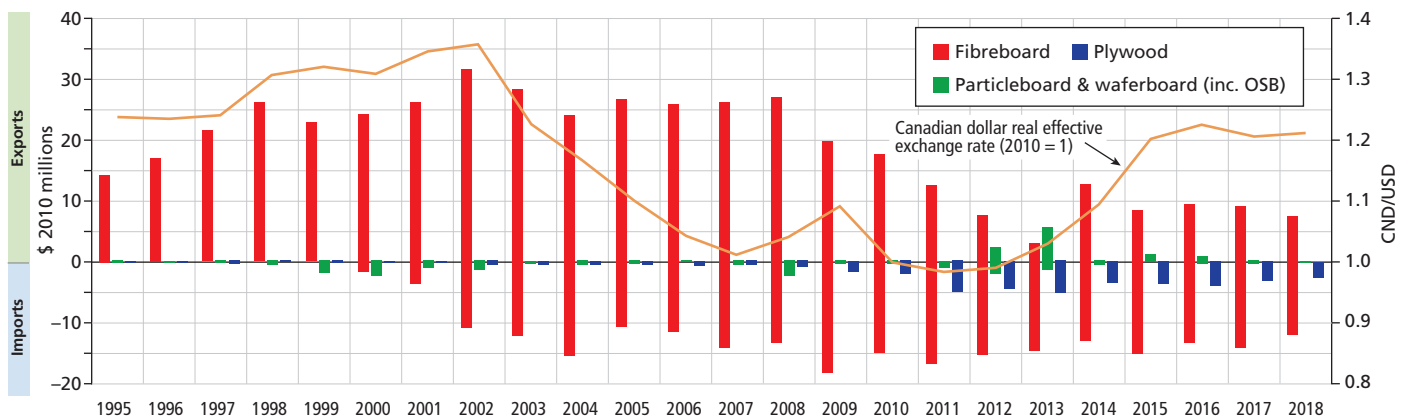
**Figure A2.** Nova Scotia panelboard industry: Manufacturing sales revenue and total number of employees, 1990–2017 (NAICS 3212; source: Statistics Canada. Table 16-10-0117-01).

In 2018, NB's net exports of panelboard products was \$46.6 million (\$37 million inflation adjusted; Figure A3), and nearly all exports were to the United States. Particleboard & waferboard dominated exports until the mid-2000s; the dramatic decline in exports throughout the remainder of the decade coincided with the downturn in the US housing market and recovery has been slow. In contrast, exports of fibreboard dipped during the US housing crisis and subsequent recession, but were now back to pre-recession levels at the time of this survey.



**Figure A3.** New Brunswick panelboard industry: Value of exports and imports, 1995–2018. Notes: An increase in the real effective exchange rate denotes a depreciation of the Canadian dollar; fibreboard (HS 4411), particleboard & waferboard (HS 4410), and plywood (HS 4412). Sources: Global Trade Atlas, FRED.

Since the late 2000s, Nova Scotia has been a net importer of panelboard products (Figure A4). In 2018, net exports were  $-\$8.5$  million ( $-\$6.7$  million inflation adjusted). Fibreboard has been the primary export, and the bulk was sold to European markets.



**Figure A4.** Nova Scotia panelboard industry: Value of exports and imports, 1995–2018. Notes: An increase in the real effective exchange rate denotes a depreciation of the Canadian dollar; fibreboard (HS 4411), particleboard & waferboard (HS 4410), and plywood (HS 4412). Sources: Global Trade Atlas, FRED.

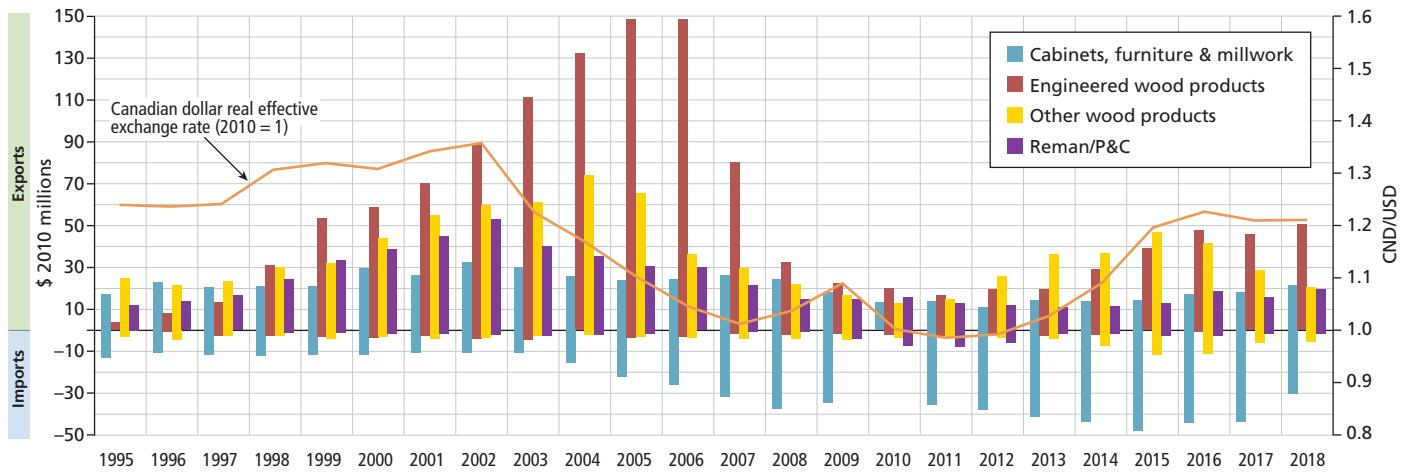
As for the remaining business types used in this study, Table A2 shows the correspondence to the Harmonized System (HS) of traded products used internationally. Figure A5 and Figure A6 show trade activity based on the information in Table A2.

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

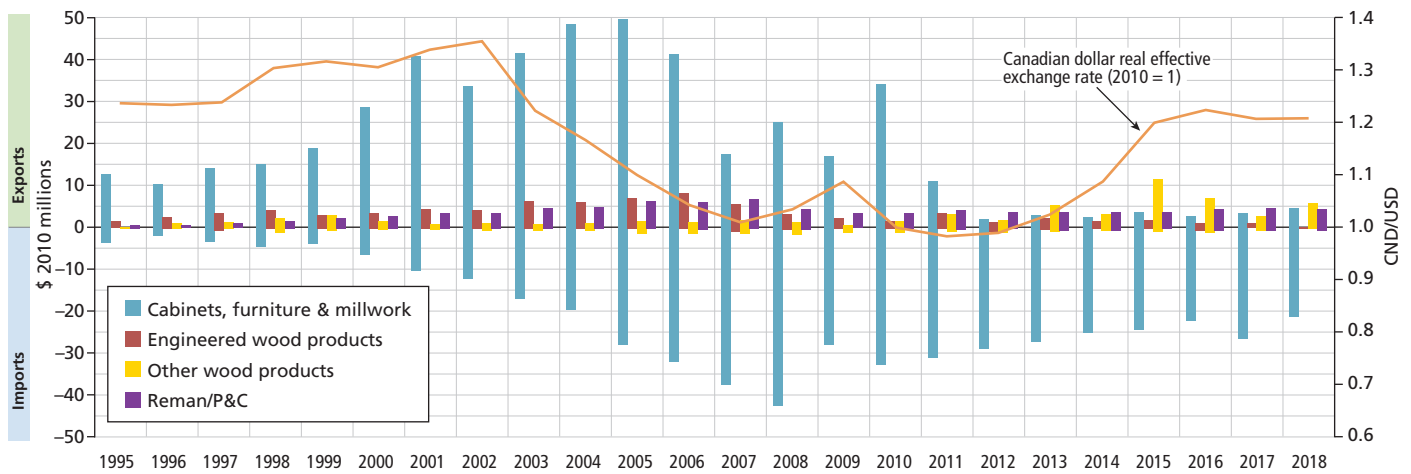
<b>Business type used in study</b>	<b>HS code</b>	<b>Product description</b>
Other	HS 440131	Sawdust, wood waste and scrap w/ or not agglomerated in logs, briquettes, pellets: wood pellet
Other	HS 440310	Wooden telephone poles, fence posts, other wood in rough – painted, stained or treated
Other	HS 4404	Hoopwood, split poles, piles, pickets and stake
Other	HS 440690	Cross-ties (sleepers) railway/tramway – wood – impregnated
Remanufactured products	HS 44071X10	Lumber, end-jointed
Millwork	HS 4409 <sup>a</sup>	Wood (lumber) continuously shaped
Remanufactured products	HS 440910XX HS 440920XX	Siding
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 <sup>b</sup>	Windows, doors, shingles and shakes, panels and other builders, joiners and carpentry of wood
Engineered wood products	HS 44189010	Beams and arches, of wood, laminated
Engineered wood products	HS 44189020	Fabricated partitions and panels, for buildings, of wood
Other	HS 441850	Shingles and shakes – wood
Engineered wood products	HS 44189091	Roof trusses, of wood
Engineered wood products	HS 44189092	Other fabricated structural members, 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 <sup>a</sup>	Other articles of wood
Remanufactured products	HS 442190XX	Fences and fences sections, of wood; fencing panels, 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
Engineered wood products	HS 940600	Prefabricated buildings (“industrialized buildings”)

a Excluding HS codes classified as remanufactured products.

b Excluding shingles & shakes and HS codes classified as engineered wood products.



**Figure A5.** New Brunswick secondary manufacturing sector: Value of exports and imports, 1995–2018. Notes: An increase in the real effective exchange rate denotes a depreciation of the Canadian dollar; see Table A2 for correspondence between business types and HS codes. Sources: Global Trade Atlas, FRED.



**Figure A6.** Nova Scotia secondary manufacturing sector: Value of exports and imports, 1995–2018. Notes: An increase in the real effective exchange rate denotes a depreciation of the Canadian dollar; see Table A2 for correspondence between business types and HS codes. Sources: Global Trade Atlas, FRED.

NB was a net exporter of secondary manufacturing products—the 2018 trade balance, excluding panelboards, was \$94 million (\$75 million inflation-adjusted). From the late-1990s to mid-2000s, engineered wood products, primarily consisting of prefabricated partitions/panels and other fabricated structural members for buildings, made up the majority of exports. Exports of these products were largely driven by US demand and, similar to what happened with panelboard exports, the dramatic decline throughout the remainder of the decade coincided with the downturn in the US housing market, and recovery has been slow. Since the mid-2000s, imports of cabinets, furniture and millwork have grown; this growth was primarily driven by increased imports of household furniture.

Since 2008, NS has largely been a net importer of secondary manufacturing products, of which the overwhelming majority is cabinets, furniture and millwork. The 2018 trade balance, excluding panelboards, was -\$7.9 million (-\$6.2 million inflation-adjusted).

## Appendix 3: 2017 survey of secondary wood product manufacturing in NB and NS

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**Note:** New Brunswick English version shown below. A similar survey was sent out to Nova Scotia businesses and an English and French version was sent out to New Brunswick businesses.

### Survey purpose

This survey collects manufacturing and related information on the New Brunswick secondary wood manufacturing sector. Natural Resources Canada has been doing similar surveys since 1990 in BC and this is the first for New Brunswick. This information provided allows for an accurate information base used to describe the structure, performance and needs of the secondary manufacturing sector. This will be a key source of information on the sector that will be used by policy makers in New Brunswick, and we hope will be useful for forest industry associations. This data is used for statistical analyses and to produce published reports and presentations on the state of the industry in New Brunswick.

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. We define a mill as a specific facility or area where manufacturing occurs such as a shop, planer mill etc.**

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 secondary wood 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 woodwork, 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:** m<sup>3</sup>=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 <sup>3</sup> <input type="checkbox"/> mbf <input type="checkbox"/> other _____
Lumber		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> mbf <input type="checkbox"/> other _____
Plywood		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> msf <input type="checkbox"/> other _____
Veneer		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> msf <input type="checkbox"/> other _____
Oriented Strand Board (OSB)		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> msf <input type="checkbox"/> other _____
Medium density fibreboard (MDF)		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> msf <input type="checkbox"/> other _____
Wood residues		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> odt <input type="checkbox"/> other _____
Other wood material (please specify):		
		<input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> mbf <input type="checkbox"/> msf <input type="checkbox"/> other _____
		<input type="checkbox"/> m <sup>3</sup> <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	%
New Brunswick market purchases	
Logs from own tenured lands	
Other wood materials from own primary mills	
Log/lumber trades with other companies	
Canadian purchases outside of New Brunswick	
Imports from outside Canada	
<b>Total= 100%</b>	

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

Other Atlantic Provinces	<input type="checkbox"/>	Europe	<input type="checkbox"/>
Quebec	<input type="checkbox"/>	Japan	<input type="checkbox"/>
Ontario	<input type="checkbox"/>	China	<input type="checkbox"/>
Western Canada	<input type="checkbox"/>	India	<input type="checkbox"/>
US Northeast	<input type="checkbox"/>	Other Asia	<input type="checkbox"/>
US South	<input type="checkbox"/>	Latin America	<input type="checkbox"/>
US Midwest	<input type="checkbox"/>	Africa	<input type="checkbox"/>
US West	<input type="checkbox"/>	Australia/New Zealand	<input type="checkbox"/>





**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.

<b>i. Wood supply specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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"/>
<b>ii. Labour specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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"/>
<b>iii. Markets specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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"/>
<b>iv. Financing specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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"/>
<b>v. Management capacity specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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"/>
<b>vi. Transportation &amp; distribution specific constraints</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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

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) \_\_\_\_\_

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

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?

New Brunswick	
Nova Scotia	
Other Atlantic Provinces	
Quebec	
Ontario	
Western Canada	
US Northeast	
US South	
US Midwest	
US West	
Europe	
Japan	
China	
India	
Other Asia	
Latin America	
Africa	
Australia/New Zealand	
<b>Total sales</b>	<b>100%</b>

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.

- New Brunswick
- Nova Scotia
- Other Atlantic Provinces
- Quebec
- Ontario
- Western Canada
- US Northeast
- US South
- US Midwest
- US West
- Europe
- Japan
- China
- India
- 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	
<b>Total</b>	<b>100%</b>

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





## Appendix 4: Listing of products within each business type

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### Remanufactured Products

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

### Engineered Wood Products

- Laminated beams
- Log homes
- Trusses
- Treated wood
- Prefab buildings
- Laminated veneer lumber

### 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 (RTA)
- Patio

### Pallets and Containers

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

### Shakes and Shingles

- Shakes
- Shingles

### Panelboards

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

### Other Wood Products

- Poles and posts
- Wood novelties
- Woodcrafts
- Instruments
- Fuelwood pellets

## Appendix 5: Non-response bias tests

### 1. Chi-square test for goodness-of-fit between population and sample business type distributions for New Brunswick

Business type	Population (Number of firms)	Observed (o)	Expected (e)	$o - e$ (d)	(d) <sup>2</sup>	(d) <sup>2</sup> /e
CFM	43	12	13.1	-1.13	1.27	0.10
EWP	19	6	5.8	0.20	0.04	0.01
OWP	16	5	4.9	0.12	0.01	0.00
Reman/P&C	17	6	5.2	0.81	0.66	0.13
<b>Total</b>	<b>95</b>	<b>29</b>	<b>29.0</b>	<b>0.00</b>	<b>1.98</b>	<b>0.23</b>

The chi-square statistic was 0.23, which was less than the critical value for 3 degrees of freedom at the 5% significance level (7.81); thus, we did not reject the hypothesis that the distributions were the same.

### 2. Chi-square test for goodness-of-fit between population and sample business type distributions for Nova Scotia

Business type	Population (Number of firms)	Observed (o)	Expected (e)	$o - e$ (d)	(d) <sup>2</sup>	(d) <sup>2</sup> /e
CFM	42	11	10.3	0.65	0.43	0.04
Other	27	6	6.7	-0.65	0.43	0.06
<b>Total</b>	<b>69</b>	<b>17</b>	<b>17.0</b>	<b>0.00</b>	<b>0.85</b>	<b>0.11</b>

The chi-square statistic was 0.11, which was less than the critical value for 1 degree of freedom at the 5% significance level (3.84); thus, we did not reject the hypothesis that the distributions were the same.

### 3. Chi-square test for goodness-of-fit between population and sample employment distributions for New Brunswick<sup>1</sup>

Number of employees	Population (Number of firms)	Observed (o)	Expected (e)	$o - e$ (d)	(d) <sup>2</sup>	(d) <sup>2</sup> /e
1-9	39	10	12.4	-2.43	5.90	0.47
10-50	34	13	10.8	2.16	4.69	0.43
>50	18	6	5.7	0.26	0.07	0.01
<b>Total</b>	<b>91</b>	<b>29</b>	<b>29</b>	<b>0.00</b>	<b>10.65</b>	<b>0.92</b>

The chi-square statistic was 0.92, which was less than the critical value for 2 degrees of freedom at the 5% significance level (5.99); thus, we did not reject the hypothesis that the distributions were the same.

### 4. Chi-square test for goodness-of-fit between population and sample employment distributions for Nova Scotia<sup>2</sup>

Number of employees	Population (Number of firms)	Observed (o)	Expected (e)	$o - e$ (d)	(d) <sup>2</sup>	(d) <sup>2</sup> /e
1-9	37	10	9.5	0.47	0.22	0.02
10-50	25	6	6.4	-0.44	0.19	0.03
>50	4	1	1.0	-0.03	0.00	0.00
<b>Total</b>	<b>66</b>	<b>17</b>	<b>17</b>	<b>0.00</b>	<b>0.41</b>	<b>0.05</b>

The chi-square statistic was 0.05, which was less than the critical value for 2 degrees of freedom at the 5% significance level (5.99); thus, we did not reject the hypothesis that the distributions were the same.

Due to the small sample sizes, exact multinomial tests, or binomial test where applicable, were also performed. The conclusions drawn from these tests did not conflict with those drawn from the chi-square tests.

1 The employment distribution for the population was from Statistics Canada's Business Register (BR), which provides an employment range for each firm (e.g., 20 to 49 employees). Four non-respondents were not listed in the BR, but the exclusion of these firms did not affect the conclusion drawn from the chi-square test.

2 The employment distribution for the population was from Statistics Canada's Business Register (BR), which provides an employment range for each firm (e.g., 20 to 49 employees). Three non-respondents were not listed in the BR, but the exclusion of these firms did not affect the conclusion drawn from the chi-square test.

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