

# The Representation of Industry in the Canadian Census, 1871–1891

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*The author investigates the representation of industrial activity and the industrial establishment in the Canadian censuses from 1871 to 1891. Published and unpublished materials reveal that an explicit definition of industrial activity successfully guided the enumeration and tabulation of the census data, although difficulties were encountered with domestic production and multi-purpose establishments. The information recorded by enumerators reveals the presence of a large number of firms operating more than one industrial process in the same or closely adjacent buildings, particularly where water power was available. A re-examination of the census manuscript evidence indicates that industrial establishments were more numerous and their total output in 1871 larger than has been recognized previously.*

*L'auteur étudie la représentation de l'activité industrielle et des établissements industriels dans les recensements canadiens de 1871 à 1891. Des documents publiés et non publiés révèlent qu'une définition explicite de l'activité industrielle a permis au dénombrement et à la mise en ordre des données du recensement de bien se faire, malgré les difficultés éprouvées en matière de production intérieure et d'établissements à vocations multiples. L'information recueillie par les recenseurs montre la présence d'un grand nombre d'entreprises ayant recours à plus d'un procédé industriel au même endroit ou à l'intérieur d'immeubles adjacents, surtout où il y avait de l'énergie hydraulique. Un nouvel examen des données du recensement révèle que les établissements étaient plus nombreux et que leur production totale était plus grande en 1871 qu'on ne l'avait constaté auparavant.*

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A DIVERSE AND LIVELY literature chronicles the early evolution of Canadian manufacturing. Historians examine the fate of individual firms, the earnings of workers, the survival of craft skills, and the relationship of manufacturing to transportation systems, urbanization, government policy, class, gender, raw materials and inanimate power, technology, banks, merchants, and many other topics. Underlying much of this research is some understanding of the broad dimensions of manufacturing activity, which in most cases derives from a census. Only a census offers the possibility of a comprehensive description of all industrial activity. Of course, some censuses are more successful than others, and even a good census has weaker as well as stronger aspects.

The censuses undertaken by the Canadian government during the springs of 1871, 1881, and 1891 are generally thought to be good ones.<sup>1</sup> Nevertheless, a small but important literature cautions that care is needed to interpret the early census data.<sup>2</sup> The 1860–61 census, in particular, has attracted attention.<sup>3</sup> Recent scholarship has also raised questions about what was meant by industrial establishment and industrial activity in the context of the Canadian census.<sup>4</sup> Published and unpublished materials reveal that an explicit definition of industrial activity successfully guided the enumeration and tabulation in the censuses of 1871 to 1891, although difficulties were encountered with domestic production and multi-process establishments. Examination of the information recorded by enumerators reveals the presence of a large number of firms operating more than one industrial

- 1 M. C. Urquhart, "Three Builders of Canada's Statistical System", *Canadian Historical Review*, vol. 68, no. 3 (September 1987), pp. 425–430.
- 2 Jean-Pierre Beaud and Jean-Guy Prévost, "Classement statistique, représentations sociales et discours économique : les métiers et professions dans les recensements canadiens", *Interventions économiques*, no. 24 (1992), pp. 129–149; Gilles Lauzon, "Cohabitation et déménagements en milieu ouvrier Montréalais : essai de réinterprétation à partir du cas du village Saint-Augustin (1871–1881)", *Revue de l'histoire de l'Amérique française*, vol. 46, no. 1, (Summer 1992), pp. 115–142; Marvin McInnis, "Some Pitfalls in the 1851–52 Census of Agriculture of Lower Canada", *Histoire sociale/Social History*, vol. 14, no. 27 (May 1981), pp. 219–231; Christian Pouyez and Yolande Lavoie, *Les Saguenayans* (Sillery, Quebec: Presses de l'Université du Québec, 1993), chap. 1.
- 3 A. A. Brooks, "Doing The Best I Can: The Taking of the 1861 New Brunswick Census", *Histoire sociale/Social History*, vol. 9 (1976), pp. 73–77; Bruce Curtis, "On the Local Construction of Statistical Knowledge: Making Up the 1861 Census of the Canadas", *Journal of Historical Sociology*, vol. 7 (1994), pp. 416–434; David P. Gagan, "Enumerators' Instructions for the Census of Canada, 1852 and 1861", *Histoire sociale/Social History*, vol. 7 (1974), pp. 355–365; Nicolas Landry, "L'exploitation agricole à Caraquet : étude basée sur le recensement de 1861", *Acadiensis*, vol. 20, no. 2 (Spring 1991), pp. 145–157; Michael Wayne, "The Black Population of Canada West on the Eve of the American Civil War: A Reassessment Based on the Manuscript Census of 1861", *Histoire sociale/Social History*, vol. 28, no. 56 (November 1995).
- 4 Serge Courville *et al.*, "The Spread of Rural Industry in Lower Canada, 1831–51", *Journal of the Canadian Historical Association*, new series no. 2 (1991), pp. 43–70; Doug McCalla, *Planting the Province: The Economic History of Upper Canada, 1784–1870* (Toronto: University of Toronto Press, 1993), p. 93.

process in the same or in closely adjacent structures. The multi-process establishment was particularly common in the presence of water power. Finally, a re-examination of the census manuscript evidence indicates that industrial establishments were more numerous and their total output in 1871 larger than has been recognized previously.

### **The Concept of Industrial Activity**

The Census Bureau instructed its officials to enumerate every industrial establishment, which was defined to be

a place where one or several persons are employed in manufacturing, altering, making up or changing from one shape into another, materials for sale, use or consumption, quite irrespectively of the amount of capital employed or the products turned out. ... It matters not whether the raw material is in the ownership of the manufacturer or not, whether it is transformed on account of one or another person, whether the working is a profitable or losing business. ... The number of people employed may be made up exclusively with members of the family of the proprietor.

... in the case of industrial establishments it must be remembered that many farmers or others have attached to their ordinary industries a lime kiln, a saw-mill ...<sup>5</sup>

These remarks convey the breadth of coverage intended by census authorities. Industry was defined to encompass a good deal of part-time and small-scale activity that would have been overlooked in other censuses, including the one taken 10 months earlier in the United States. American enumerators were instructed to ignore workshops with less than \$500 in production and workshops attached to a home or some other building if the artisan “habitually work[ed] in any other shop which could be separately enumerated”.<sup>6</sup> Enumerators in both countries encountered difficulty fulfilling their instructions with respect to small production units, but certainly the Canadian coverage was intended to be broad.<sup>7</sup>

5 Canada, Department of Agriculture, *Manual Containing the Census Act and Instructions to Officers* (hereafter *Manual*), Sessional Papers, 1871, no. 64, pp. 18, 30–32. Another passage repeats the instruction to include output consumed by the producer: “the grand quantity produced, whether consumed by the producer himself, sold, exported, or still on hand”. See *Manual*, 1871, p. 19; 1881, p. 22; 1891, p. 10.

6 United States, Ninth Census 1870, *Instructions to Assistant Marshals* (Washington: GPO, 1870), p. 20.

7 Canada, *Census, 1870–71*, vol. III, pp. ix–x; United States, Ninth Census, vol. III, *The Statistics of the Wealth and Industry of the United States* (Washington: GPO, 1872), pp. 373–375; John B. Jentz, “A Note on Evaluating the Errors in the Gilded Age Manufacturing Census: The Problem of the Hand Trades”, *Historical Methods*, vol. 15, no. 2 (Spring 1982), pp. 79–81.

Inevitably there arose a need to distinguish industrial from other kinds of activity. The line between mining and processing, for example, was given by the instruction to include in the latter the marble-cutter's shed but not the quarry, and the purifier of plumbago but not the plumbago mine.<sup>8</sup> The key to understanding these distinctions was the transformation of raw materials.

Some confusion appears to exist in the public mind, as voiced by one or two journals, on the question "What is an Industrial Establishment?" from the view-point of the Census. An answer to the question seems needed. An industrial establishment is a place where one or several persons are employed in manufacturing, altering, making up or changing from one shape into another, materials for sale, use or consumption.<sup>9</sup>

Application of the principle, however, required considerable subtlety. The bottling of liquids, the splitting of wood into kindling, the crushing of stone and laundrying did "not involve sufficient change in form of the materials used to meet our definition of an industrial establishment".<sup>10</sup> The burning of limestone to make lime, on the other hand, was acceptable because the product changed form and acquired an enhanced value.<sup>11</sup> Another difficult case was the butcher.

We do not consider a butcher's shop an industrial establishment though the "porker" by the heels in the doorway is changed very considerably in appearance in consequence of the operations denuding him of his bristles and depriving him of his interior. But if the pig is cut into prime mess, short ribs, clear sides, salted, smoked into bacon and hams, canvassed, pickled or otherwise prepared, we consider that the establishment in which these changes are effected should be ranked as industrial establishments, just as much as the printing office in which figures and words are stamped upon paper and issued as a label, poster or newspaper.<sup>12</sup>

The various examples reflect the attempt by public officials to develop a consistent interpretation of industrial activity (and to persuade the reading public of their success). However, even the most careful definition would have trouble with a single establishment engaging in both industrial and non-industrial activity. The nineteenth-century economy had many establishments of this nature. Manufacturing was often undertaken in connection with a retail store, wholesaling operation, mining, forestry, or farming. Dentists and photographers made up their own material even though their

<sup>8</sup> *Manual*, p. 138.

<sup>9</sup> Canada, Department of Agriculture, *Bulletin 10*, June 1892, p. 3.

<sup>10</sup> *Ibid.*, pp. 3-4.

<sup>11</sup> *Ibid.*, p. 1.

<sup>12</sup> *Ibid.*, pp. 3-4.

primary economic identity lay in what we would call the service sector.<sup>13</sup> Carpenters, joiners, painters, glaziers, blacksmiths, plumbers, and gasfitters tended to work out of shops, and hence were included in the nineteenth-century definition of industry, even though a great deal of their work consisted of on-site construction and repairs excluded from modern manufacturing statistics.<sup>14</sup>

Possibly the most difficult challenge to enumeration arose with production within or adjacent to an artisan's residence. Enumerators occasionally reported that tanning, tailoring, wagon-making, shoemaking, cooperage, millinery, carpentry, weaving, brush manufacture, tinsmithing, shingle making, or some other activity was undertaken within the proprietor's home. However, there is no sign that household production was enumerated or tabulated consistently. Indeed, the Census Bureau recognized a failure to include much household production in 1871, reporting that its 1871 tables included only those "industries of any importance conducted in separate establishments or workshops" and that a good deal of manufacturing activity had been omitted, especially in rural areas.

These Tables do not include the products of domestic industries such as building, furniture making, clothing, tools, boat and carriage building, etc., done by the farmers and among the sea-side population, which in general cannot be separately classified.<sup>15</sup>

A useful example of the failure to include household production is afforded by handweaving, which was underenumerated so severely that the compilers did not bother to summarize the data which had been collected.<sup>16</sup>

The handweaving of cloth for use within the weaver's family and for exchange with other households was common in rural Canada. Many thousands of women and smaller numbers of men made clothing, blankets, and other kinds of cloth from a blend of purchased cotton yarn and local wool. The production process was complex. Local mills typically carded and sometimes spun the wool and fulled the cloth. The weaver or members of her family often did the spinning, weaving, and various ancillary operations.

The complex organization of rural cloth manufacture would have challenged the enumerators even if instructions had been internally

13 Canada, *Census*, 1880–81, vol. IV, p. x.

14 *Manual*, p. 139.

15 Canada, *Census*, 1870–71, vol. III, pp. ix–x.

16 The following discussion draws upon Janine Roelens Grant and Kris Inwood, "Labouring at the Loom: A Case Study of Rural Manufacturing in Leeds County, 1870", *Canadian Papers in Rural History*, vol. 7 (1990), pp. 215–236; Janine Roelens Grant and Kris Inwood, "Gender and Organization in the Canadian Cloth Industry", *Canadian Papers in Business History*, vol. 1 (1989), pp. 17–32; Kris Inwood and Phyllis Wagg, "The Survival of Handloom Weaving in Rural Canada circa 1870", *Journal of Economic History*, vol. 54, no. 2 (June 1993).

consistent, which they were not. The industrial schedule was one of nine sets of questions comprising the 1871 census.<sup>17</sup> There were two schedules for agricultural products including the cloth produced by many farm households. Enumerators were instructed to record farm-based cloth on the agricultural schedule 5 rather than the industrial schedule 6: "homemade fabrics are to be kept distinct from those made in linen and cloth factories."<sup>18</sup>

Unfortunately, the distinction relied on a prior understanding of a factory, which could only be obtained from the definition of industrial activity described above. This definition already implied that the farm-based handweaver, as a transformer of raw materials, constituted an industrial establishment. The inconsistency in census instructions allowed some enumerators to enter all cloth on the industrial schedule, others to use the farm schedule, and yet others to distinguish farm from factory cloth and therefore to use both schedules. Consequently, the enumeration of handwoven cloth on schedule 6 was incomplete in a particularly complicated way.

The total cloth yardage recorded on both schedules is summarized in Table 1. Ontario produced 85 per cent of all cloth recorded on schedule 6, but less than half the handweaving of other provinces on a per capita and per farm basis. Enumerators in Quebec, New Brunswick, and Nova Scotia used the industrial schedule very little.<sup>19</sup> Even at a local level there is evidence of inconsistency. Several districts reported yardage similar to that of a neighbouring district, but in very different proportions, for no apparent reason. Northumberland in New Brunswick, for example, returned 381 industrial weavers responsible for 55 per cent of all cloth in the district, while in nearby Gloucester the total yardage was comparable and yet no industrial weavers were reported.<sup>20</sup>

It is tempting to think that the Ontario enumerators were more willing to use schedule 6 because the handweaving in that province was, in some sense, more industrial, but there is no corroboration of this from other sources. Indeed, it is just as likely that provincial differences reflect census practice alone. As the 1871 census was administered along provincial lines,<sup>21</sup> enumerators and district commissioners were trained and directed by different people in each province. Consequently, it is impossible to

17 The schedules examined personal and demographic characteristics, deaths, property, agriculture, industry, mining, forestry, and fishing.

18 *Manual*, p. 29.

19 Cloth in excess of 10,000 yards was recorded on schedule 6 in a very few districts east of Ontario: Pontiac South (district no. 191), Joliette (102), Huntingdon West (114), Richmond (138), Quebec Conté (144), Charlotte (175), and Northumberland (184).

20 Other examples include Waterloo South and North (districts no. 31 and 32), Wellington North and Grey South (35 and 36), Halton and Peel (38 and 39), Hastings East and North (61 and 62), Carleton and Lanark South (78 and 79), Joliette and Berthier (102 and 103), Huntingdon West and Laprairie (114 and 115), Richmond and Wolfe (138 and 139), and Montmorency and Charlevoix (148 and 149).

21 It could hardly have been otherwise given that the Canadian bureaucracy had no previous experience in the Maritime provinces and that Quebec and Ontario were so different from each other.

**Table 1 Quantities and Sources of Handwoven Cloth, 1871**

	Yardage returned on:		Yardage of all kinds of cloth	
	schedule 6	schedule 7	per capita	per farm
Ontario	1,460,987	1,800,822	2.0	19
Quebec	160,795	4,899,176	4.2	43
New Brunswick	79,209	1,125,069	4.2	39
Nova Scotia	8,124	1,587,990	4.1	34
Canada	1,709,116	9,413,057	3.2	30

*Source:* The schedule 5 data are taken from Canada, *Census*, 1871, vol. III, table XXIV. The number of farms is taken from Canada, *Census*, vol. III, table XXI. The total from schedule 6 data is a new compilation of the handweaving records from the 1870–71 Industrial Database: NAC, RG31, series 1, 1871, schedule 6. The quantity of yardage from each record is taken if available; otherwise the value of production is deflated at \$0.65/yard. These data differ from those of Grant and Inwood, “Gender and Organization”, table 4, and Inwood and Wagg, “The Survival of Handloom Weaving”, table 1, because power-woven cloth is excluded here.

disentangle regional differences in census administration from those in handweaving itself, given that the manual of instructions to enumerators was internally inconsistent.

The staff of the 1871 census did not tabulate the handweaving recorded on schedule 6, probably because this inconsistency was recognized.<sup>22</sup> Ten years later, some handweaving was included in the published category of wool cloth making, judging by the sharp rise in the number of establishments and decline in their size from 1871 to 1881. The 1891 enumeration made further improvements permitting the compilation and reporting of a separate industry of handweaving with 2,000 participants.

The first clear appearance of handweaving in 1891 does not indicate the birth of a new Canadian industry. Quite the opposite: by the 1880s factories and mills had eclipsed the solitary handweaver as a source of most types of cloth, even in rural areas. The reluctance to report handweaving as an industry in earlier years reflects a general presumption that part-time work by rural women in their own homes was not industrial employment, as well as the rather particular complication of the farm census. The 1891 census had a different outcome because of improvements in census administration. Possibly the most important change was a new restriction on the definition of industrial activity permitting more complete enumeration of a reduced range of domestic production.

22 Various comments and markings on schedule 6 confirm that handweavers were deliberately excluded. Interestingly, the manuscript schedule 5 is also somewhat confused in several Ontario districts with heavy revision of the original report of farm cloth. The published tables, however, appear to report the original rather than the revised manuscript figures.

The manual of instructions given to enumerators did not change from 1871 to 1891, but census staff appear to have developed rules of implementation that subtly changed the definition of industrial activity. Given the limited resources available to the Census Bureau and the enormous challenge of enumerating *all* domestic manufacturing, the central problem was to find a consistent basis for excluding some of it. The 1881 census, for example, claimed to represent only the products offered “for sale” and to exclude “such products as are made at home for family use”.<sup>23</sup> It seems unlikely, however, that this distinction could have been implemented consistently since the enumerators did not collect information about the disposition of output. A second possible criterion was suggested ten years later in the comment that the enumeration encompassed production providing the principal means of livelihood for an individual or family.

The Statistical Branch of the Department of Agriculture exercised great care in compiling the returns of the enumerators, and cut out all very small industries, where the output, though making a large sum in the aggregate, was in each case *an adjunct to a regular occupation* [emphasis added], rather than the occupation by which a livelihood was obtained.<sup>24</sup>

Furniture, boots and shoes, etc. made in the houses of Canada during “off-hours” are not included. On the other hand, dress-making and millinery, carried on by people who *make their living by so doing* [emphasis added], have necessarily to be given their legitimate place. ... Many small industries were returned but were cut out of the tabulated statement ... because they were evidently adjuncts to the regular occupations by which livelihoods were maintained.<sup>25</sup>

“Making a living” was probably interpreted differently for men than for women, since enumerators were instructed not to record an occupation for women “unless they have a definite occupation besides their share in the work of the family or household”.<sup>26</sup> Nevertheless, it is unclear how enumerators could have implemented these rules consistently for either men or women, since there were no guidelines to distinguish between regular and adjunct occupations or to determine the level of income that qualified as “making a living”.<sup>27</sup>

A third and more workable basis for determining which kinds of house-

23 Canada, *Census*, 1880–81, vol. III, p. viii.

24 Canada, *Statistical Yearbook for 1893* (Ottawa, 1894), pp. 187 and 203.

25 Canada, *Census*, 1890–91, vol. III, p. v.

26 *Manual*, 1871, p. 23; 1881, p. 30; 1891, p. 13.

27 We know that some tailoring and dressmaking establishments were returned by enumerators only to be rejected by the compilers in 1891. The precise basis for this rejection is unclear. Canada, *Statistical Yearbook for 1893*, pp. 186–187, 203, and *Census*, 1890–91, vol. III, p. vi; National Archives of Canada (NAC), Manuscript Group (MG) 29 E18, vol. 2, June 1885–92, George Johnson to J. Carling, July 6, 1892.



hold production would count as “industrial” is revealed in the 1894 Report of the Minister of Agriculture.<sup>28</sup> The report indicates that the Bureau routinely excluded production valued at less than \$50 in the preparation of its 1881 and 1891 industrial tabulations. Unlike other criteria, the \$50 threshold could be implemented by tabulators in Ottawa without any additional information. Its convenience very possibly made it the primary criterion for exclusion in 1881 and again in 1891.

Some contemporaries, principally census workers laid off prematurely (or so they thought), claimed that small firms excluded from earlier censuses were counted in 1891 for the first time. The opposition Liberal Party adopted the allegation in support of its position that industrial activity in the aftermath of tariff increases was less robust than claimed by the governing Conservative Party. An investigation by the Census Bureau rejected these charges and reaffirmed a consistency from one census to the next.<sup>29</sup>

The example of handweaving demonstrates that the critics were correct for at least that industry.<sup>30</sup> It is difficult to know if there might be other examples. The 1871 census data were published in 140 categories; in 1881 additional categories brought the total to 167. By 1891, 312 categories were used. The changes were complex; some categories were divided or merged, some disappeared altogether, and others appeared for the first time in 1891. Of course, industries based on new products (such as bicycles) and technologies (such as electrical equipment) could not have existed in 1871. Nevertheless, other 1891 industries did exist in 1871 and were returned by the enumerators, even though they are absent from the published compilations.<sup>31</sup> These examples lend weight to the charge that the 1891 tabulation encompassed records ignored in earlier censuses.<sup>32</sup>

28 “In the censuses of 1881 and 1891 they were included if the value of the articles produced amounted to \$50 in the year”; see Canada, Sessional Papers, 1895, no. 8d, *Appendix to the Report of the Minister of Agriculture of 1894: Special Bulletin on Mechanical and Manufacturing Industries*, pp. 4–6. I am grateful to Gordon Holmes for this reference.

29 M. C. Urquhart, *Gross National Product, Canada, 1870–1926: The Derivation of the Estimates* (Kingston and Montreal: McGill-Queen’s University Press, 1993), p. 281 and p. 285, n. 10. The view from within the Census Bureau is given in Canada, *Statistical Yearbook for 1893*, pp. 187 and 203; Canada, *Appendix 1894*, pp. 4–6; NAC MG29 E18, vol. 2, June 1885–92, George Johnson to J. Carling, July 6, 1892. The Liberal position is given by Sir Richard Cartwright, *Reminiscences* (Toronto: William Briggs, 1912), pp. 323–329 and 98–103.

30 The principal evidence cited by Liberals was hand knitting and weaving of various sorts; see Cartwright, *Reminiscences*, pp. 327–328.

31 Admittedly, it is difficult to be sure that these firms are not reported within some other category, since the Bureau never reported its criteria for allocating firms into the various industries. The examples include establishments producing wine, malt, cocoa and chocolate, coffee, chicory, sorghum, yeast, macaroni, tallow, fish-oil, gloves and mitts, embroidery, felt, shoddy, yarn, suspenders, linen, staves, picture frames, coffins, blocks, fire kindling, beekeeper’s supplies, and, of course, handweaving. At least one industry, quartz crushing, was returned in 1871 but not in 1891.

32 The Bureau could have used a \$50 threshold at the same time as it was broadening the range of industries on which it reported.

Another innovation was the shift in 1891 to a piece-rate payment to enumerators, which may have provided an incentive for more thorough enumeration.<sup>33</sup> The important question, of course, is not overenumeration in 1891 but rather underenumeration in earlier censuses. Various indications suggest a weaker census commitment in 1881. The first hint is that the census budget was smaller in 1881 than in 1871 or 1891; it is easy to suspect (although difficult to confirm) that the funding reduction may have influenced the quality of the census. A second cause for concern is the barrage of contemporary criticism and complaint which greeted publication of the 1881 tabulations.<sup>34</sup> Finally, a separate schedule was used for industry in 1871 and 1891 but not in 1881, when the manufacturing questions were added to the schedule for real estate and public buildings.<sup>35</sup>

The hints of underenumeration in 1881 are inconclusive. It is even more difficult to make the case for 1871, because the census in that year was administered closely and is generally recognized to have been thorough. Enumerators in 1871 were well paid by the standards of other censuses. Although they did not receive a piece rate, enumerators did receive extra compensation if they returned an unusually large number of firms,<sup>36</sup> and the manuscript schedules confirm that many very small establishments were returned in 1871.

The underlying principle of the industrial census was to enumerate establishments responsible for the transformation of raw materials. Instructions to enumerators and ancillary documents generated by the Census Bureau provided a clear definition of industrial activity and its changing implementation from 1871 to 1891. The concept of industrial establishment, by contrast, was never defined, except indirectly as the site of industrial activity. We have no knowledge, therefore, about the treatment of independent businesses sharing the same premises or of separately located operations which were owned jointly, managed together, using the same power source, or linked in some fashion other than arms-length transactions. We can learn a little about what may have happened in Canada from documents of the United States census, since its enumeration and compilation were conducted in similar circumstances. The only Canadian sources of importance, however, are the manuscript schedules for 1871.

33 Richard Pomfret, *The Economic Development of Canada*, 2nd ed. (Toronto: Nelson, 1993), p. 293.

The principal features of enumerator payments are conveniently summarized by Normand Fortier, "Les recensements canadiens et l'études de l'agriculture québécoise, 1851-1901", *Histoire sociale/Social History*, vol. 17, no. 34 (November 1984), pp. 257-286.

34 The Census chief responded to some of these criticisms in Canada, *Census*, 1881, vol. IV, introduction.

35 See the introductions to Canada, *Census*, 1881, vol. III and IV and the reports of the Minister of Agriculture 1871-1874, 1881-1883, and 1891-1893.

36 NAC, Record Group (RG) 2, series A1b, vol. 2950, no. 155, February 23.

### The Concept of the Industrial Establishment

Today we think of industrial activity as being organized in firms or companies defined in terms of either independent management or ownership. There is considerable reason to suspect, however, that the nineteenth-century census tended to view the establishment as a spatially distinct production unit and, to some extent, a technologically distinct process. This conception engendered product-specific tabulations of information obtained from multi-product firms. Francis Walker, Superintendent of the U.S. Census, commented on the processing of data from firms which contributed products classifiable in distinct industries.

One of the first difficulties encountered in the compilation of Industrial Statistics is found in the fact, that in the same establishment are frequently carried on two or more industrial processes which are distinct in idea, and in general practice, are separately pursued.<sup>37</sup>

The U.S. census compiled reports of individual industries, according to Walker, by tabulating the records of multi-product establishments on the principle that industrial processes that could and did exist on their own would be regarded as independent establishments. Two or more milling activities appearing in every visible respect as a single firm — sharing a single power source, the same premises, common management and ownership — would be recorded in published tabulations as if they were separate establishments, even if they had been enumerated jointly. A joint saw and grist mill, for example, appears in the American published compilation as two distinct establishments with no warning that a single industrial return had been divided during the processing of the data.<sup>38</sup>

This division could not be made, of course, in the absence of information about the individual lines of production. Perhaps for that reason enumerators were encouraged to use as many lines of their worksheet as were needed to detail the different products of large firms.<sup>39</sup> If the enumerator failed to provide sufficient information, the decomposition was based on

correspondence with the proprietors of the establishments, so far as they were disposed to afford the information, or the Census Office had the force to acquire it; and in the remaining cases, by an analysis somewhat arbitrary in

37 United States, *The Statistics*, pp. 382–383.

38 *Ibid.*, p. 383. Walker reports the frequency of decomposition in the leather and iron-working industries. In one county, enumerators returned 20 establishments currying leather, three tanners, and 16 firms which combined tanning and currying; the census office compiled and published this information as 19 tanners and 36 curriers (pp. 388–389). In the same manner foundries were separated from furnaces, mining from milling, and so on.

39 United States, *Instructions 1870*, p. 20.

form, but conducted according to carefully obtained and approved formulae, at the Census Office.<sup>40</sup>

Scholars working with the American industrial manuscripts have confirmed that the post-enumeration editing of manuscripts included, in some cases, the division of multi-process establishments into distinct entries.<sup>41</sup>

There are no visible indications of American influence although Canadian census staff certainly had the opportunity to learn from their American counterparts who attempted systematic industrial enumerations in 1820, 1832, 1850, and 1860.<sup>42</sup> Walker's explication of the 1870 American census was published and available to the Canadians more than a year before they began their own industrial compilations.<sup>43</sup> Perhaps more influential, however, was the desire shared by American and Canadian officials to produce tabulations of individual industries; this goal almost inevitably drove them to divide the information returned by multi-process firms.

The planners of the 1871 Canadian census probably anticipated the need to divide some records. One way to minimize this process or at least reduce its arbitrariness would have been to collect information on a disaggregated basis. Spatial disaggregation was the easiest route toward this end, if only because the enumerators' manual emphasized place of production.<sup>44</sup>

Entries in this schedule are only to be made when an industrial establishment of some kind is met with, but the Enumerator is required to ask whether such does or does not exist, *at every visit* he makes ... *an industrial establishment is a place* where

The returns of industrial establishments are to be recorded in the district, sub-district and division where the enumerator finds the establishment, and no-

40 United States, *The Statistics*, p. 384.

41 Jeremy Atack describes several examples in *Estimates of Economies of Scale in Nineteenth-Century United States Manufacturing* (New York: Garland, 1985), pp. 49–55. Margaret Walsh systematically compares the manuscript and published data in "The Census as an Accurate Source of Information: The Value of Mid-Nineteenth Century Manufacturing Returns", *Historical Methods*, vol. 3, no. 4 (September 1970), pp. 3–13, and "The Value of Mid-Nineteenth Century Manufacturing Returns: The Printed Census and the Manuscript Census Compilations Compared", *Historical Methods*, vol. 4, no. 2 (March 1971), pp. 43–52.

42 Margo Anderson, *The American Census: A Social History* (New Haven: Yale University Press, 1988); Ken Sokoloff, "Was the Transition from the Artisanal Shop to the Non-Mechanized Factory Associated with Gains in Efficiency? Evidence from the U.S. Manufacturing Censuses of 1820 and 1850", *Explorations in Economic History*, vol. 21, no. 4 (October 1984), pp. 351–382.

43 Dates recorded on the Canadian manuscript schedules indicate that the industrial data were processed in 1873, two years after the enumeration. The Canadian census staff collected reports of enumerations elsewhere. For example, a preliminary report of the British census arrived in Ottawa just as the tabulation of Canadian population began. See NAC RG17, vol. 49, no. 4669, Dixon to Dunkin, July 10, 1871.

44 *Manual*, pp. 18, 20, 30–32.

where else. This principle is essential in every case. The *production is attached to the locality*.

... the quantities must be ascertained and recorded *on the spot* where they are found, or have been extracted, raised or manufactured.<sup>45</sup> [emphasis added]

The effect of these instructions may be comprehended most easily by visualizing a rural mill complex in the Canadian countryside of spring 1871.<sup>46</sup> Many mill sites centred on a pond which vented into several channels, each driving a turbine and mill machinery. The saw-milling machinery would be housed in one shed, the grist-milling machinery in another building. Other mill complexes spanned successive falls of a river, each of which drove a separate industrial process (for example, a grist mill, a saw mill, a carding mill, possibly a woollen or shingle mill, and sometimes a machine shop to maintain the equipment). One individual or company might own and manage all of these activities in separate structures over an area encompassing a half-mile or more in each direction. Even the mills which switched to steam power might continue to house their machinery in adjacent structures.

The physical layout of the worksite varied a great deal, although it seems likely that mills in recently settled regions tended to erect several small buildings rather than a large one because land and timber were inexpensive and skilled tradesman scarce. Industry-specific considerations also encouraged the use of distinct structures, in some cases. Many blacksmiths adjunct to some larger enterprise, for example, seem to have been housed in a separate structure, presumably because of the risk of fire.<sup>47</sup> The location-specific bias in the census encouraged independent returns of separate structures even if they were part of a larger enterprise.

Comments made by enumerators confirm this interpretation of census practice. Some returns were noted to be a “department” of some larger enterprise.<sup>48</sup> Many other industrial processes returned separately by the

45 Canada, *Census, 1870–71*, vol. III, p. ix. Note also: “If a boarder has any industry, or produces anything himself, entirely separate from the family in which he is domiciled, a separate entry must be made of his products ... .” (*Manual*, p. 18).

46 McCalla, *Planting the Province*, chap. 6.

47 We read, for example, that “this forge is for the purpose of his mills” (ID nos. 216005001 and 209105001), that the carriage and blacksmith shop of Lewis Hicks were “connected together” (105908013), and that the smith and carriage shop of James Laurance were returned separately even though “the proprietor would not give separate particulars” (104102022, 1042090228, and 1042090229). ID no. references are to the 1870–71 Canadian Industrial Database, which is a transcription of NAC, RG31, series 1, 1871, schedule 6. See Kris Inwood, *Interpretation Guide and Coding Manual to the 1870–71 Canadian Industrial Database* (Guelph: University of Guelph, 1994). The references indicate the province (e.g., 1 for Quebec), the census district (e.g., 160), the sub-district (e.g., 05), the enumeration division (e.g., 00), and the proprietor (e.g., 1). District and sub-district numbering corresponds to usage in the published census volumes.

48 ID nos. 102612031, 106502021, 1068020049, 1068020067, 1060020069, 2106030823, and 2106030823.

census appear to have shared labour, power, or fixed capital. The Tripp saw mill, grist mill, and cheese box factory were returned separately even though “the whole establishment is driven by the one steam power.” It was noted that Therieault and Levitte’s “carding and saw mill are powered by the same force”, and that “fixed and floating capital refer to both the saw mill and grist mill” of A. A. McLaughlin. A Toronto enumerator remarked that the “fixed capital includes both saw and grist mill” of Henry Howland. A Nova Scotian enumerator commented that “the amount for floating capital is the combined amount for both shoemaker and tannery” of Ebenezer Coldwell. Again, “all mills under the name of Hugh R. MacDonald are driven by the same stream and the same steam.”<sup>49</sup>

The sharing of power need not indicate joint operation, since power could be rented, and indeed some firms said to be sharing power did not have the same proprietor.<sup>50</sup> More convincing is the sharing of labour among separately returned activities. Edward Cole’s tannery and saw mill, for example, were “connected and often worked together by the same hands”. The Phippen Brothers’ saw mill and sash and door factory were “worked by the same men and steam”, just as George Snider’s shingle mill was worked “in connection with the saw mill, some hands work both establishments”; Antoine Verault was “employed by a company for both mills” and “the two men work in both establishments”. William Edmondson’s bakery and millinery shop were returned separately even though the former was “connected with the millinery establishment and the proprietor could not separate the capital or wages”.<sup>51</sup>

Some enumerators appear to have made separate returns of industrial processes in the same building. The grist and saw mills of John Kroetsch were “both in one building”, as were the mills of M. W. Copp; the various Saunders and Co. mills were “run by the same power ... and in the same building”; the mills of Elezeur Dupond were “dans la même bâtisse et ... la même pouvoir” just as the nearby mills of Roberge Narcisse shared “la même bâtisse”; Heburne Nadeau’s mills were “worked by the same machinery under the same roof”. The carpenter and shoe shops of Isaac Finley were “owned by same man under the same roof divided by a partition”.<sup>52</sup> Contemporary representations also indicate that separately returned mill activities may have been housed together.<sup>53</sup>

49 ID nos. 101301021, 318106001, 105306021, 104402062, 418902001, and 107404021.

50 ID nos. 1030030352, 1049020126, 1067060022, 2131010022, 31074010238, 31074010241, and 31074010249.

51 ID nos. 104804021, 100802031, 103501011, 216401021, 419010011, and 1041030243.

52 ID nos. 10270431, 214103002, 106706001, 214811001, 214811002, 318108001, and 104903001.

53 Possible examples are the mills of W. and J. Spinks (ID no. 104801031) in Pickering Township, represented as being housed in one building in the Ontario County atlas (p. 32); Saunders and Co. (106706001) and W. T. Benson (106903011) in the Leeds and Grenville atlas (pp. 33 and 60); R. Sylvester (105001031), Dickey and Cornstock (105004041), and Needles and Walker (105003011) in the Northumberland and Durham atlas (pp. 22, 63, and 87).

An indirect indication of census practice is the absence of fixed and, even more commonly, floating capital for proprietors who returned multiple processes.<sup>54</sup> These data are missing, presumably, because neither the enumerator nor proprietor was able to divide capital between the two jointly operated activities. In some cases an obviously arbitrary separation was made. Fixed capital, for example, might be divided into equal thirds among three constituent milling processes.

The clearest documentation of this tendency to divide multi-process establishments is the annotation on one mill entry “should be separated”. The entry subsequently was crossed out and the information rewritten to create the appearance of separate establishments.<sup>55</sup> It is unusual to find explicit instructions, but the practice was common, judging by the number of people listed as proprietors of more than one process within the same enumeration division. Of course, the recurrence of a name may indicate either the same person listed twice or two people with the same name. Fortunately, personal identities may be verified through a search of census schedule 1, which reports personal information and makes it possible to determine, for example, if the saw-milling John Smith was also the flour-milling John Smith.

Nearly 2,000 people were returned as proprietors of two or more industrial processes on successive lines of the census manuscript. Saw and grist milling account for half of these records and other kinds of milling 20 per cent, while many of the remaining activities were attached to a mill complex.<sup>56</sup> The information was first entered as a multi-product firm and later divided to produce two records, each with its own labour and capital in 10 per cent of the entries. Another 29 per cent of the examples were entered separately in the manuscript space normally reserved for a single firm. The remaining observations appear in successive spaces on the manuscript page. If, as seems likely, enumerators entered firms in the order in which they were encountered, then the shared-proprietor processes must have been situated in close proximity.<sup>57</sup> Illustrations and site plans in the Ontario county atlases of the 1870s confirm that the various enterprises of a single proprietor typically were located directly beside one another.<sup>58</sup>

54 Data on floating capital were also collected, but never tallied and published, perhaps because of the greater difficulty of effecting a plausible division of floating capital in the joint-product firms. I am grateful to Barb Sibley for pointing out the significance of this problem.

55 ID no. 211808001.

56 After milling, the most common activity to be organized jointly was tanning, which coincidentally or not was also mentioned by Francis Walker, Superintendent of the U.S. Census.

57 The enumeration divisions in 1871 were small, typically part of a rural township or parish or an urban ward, and home to 380 families on average.

58 In a few cases it is possible to confirm that the census generated independent returns of these activities. See the Booth mills (ID no. 106307021) in the Frontenac, Lennox and Addington atlas (p. 24); the McIntosh mills (ID no. 106705001) in the Leeds and Grenville atlas (p. 28); the Wilson

Although census authorities generally tried to represent multi-process firms as a series of distinct establishments, the attempt was not always successful. The enumerator of the Montreal Rolling Mills described a nail works, lead works, tack works, nail tack works, and set of rolling mills, but complained that it was “impossible to divide different branches, being all the same capital”. Similarly the several factories of Thomas Speight and Sons were “all carried on together and the accounts cannot be separated or any separate entries given”. One district commissioner commented that “the enumerator says he could not get a division of the establishment” (the saw, shingle, and lathe mills of Francis Short).<sup>59</sup>

Even more telling are the hundreds of records for rural mills whose diverse products were summarized with a single value. These establishments were recorded in such terms as “saw/shingle mill” or “grist/carding mill”.<sup>60</sup> Even the most assiduous tabulator could not divide these records because the basic product-specific detail was not collected by the enumerator. Canadian census authorities publicly acknowledged their failure to separate the various industrial processes as fully as was deemed desirable:

[I]n the same establishments there are often to be found grouped together several branches of industry, information regarding which it is impossible to present separately.<sup>61</sup>

[S]everal known industries are mixed in various establishments which must be recorded under one title, because it is positively impossible to discriminate between them and make accounts for each separate element of the joint industries.<sup>62</sup>

Such statements published alongside the industrial tables give the impression that multi-process establishments were returned intact. The existence of enumerators’ manuscripts in 1871 allows us to see that precisely the opposite was true for a large number of entries. The inconsistency is illustrated by the tiny St. Lawrence and Ottawa Railway, which provided sepa-

mills (ID no. 105909021) in the Hastings and Prince Edward atlas. Correlation between the two sources is difficult because of imprecision in proprietor names or location and changes in ownership or proprietorship between the 1871 census and the atlases published at the end of the decade. The representation of individual sites and companies in the atlases was, of course, highly selective. Moreover, the atlases simply did not exist in parts of the country with most of the joint mills. On the atlases as a business see Betty May, *County Atlases of Ontario* (Ottawa: Public Archives of Canada) and Heather Maddick, *County Maps: Land Ownership Maps of Canada in the Nineteenth Century* (Ottawa, Public Archives of Canada, 1976), especially the introduction by Joan Winearls.

59 ID nos. 2107010228, 1045040329, and 419911013.

60 In some cases the enumerator commented explicitly that the mill encompassed more than one industrial process; see ID nos. 1038060522 and 2093160022.

61 Canada, *Census*, 1870–71, vol. III, p. x.

62 Canada, *Census*, 1880–81, vol. IV, pp. x, xviii.



rate returns for its blacksmith, machine, and carpenter/paint shops even though most railways operating a variety of workshops returned them as a single establishment.<sup>63</sup> Possibly the census staff worked with rules which, if properly understood, would restore faith in their consistency. Unfortunately there is no evidence to this effect. Indeed, it would have been difficult for a census tabulator in Ottawa more than two years after the enumeration to divide a small flour and saw mill entry if no raw material or product quantities were reported and only one material/product value was given.

A more complete division of production units would have required the return of complete product detail, more expeditious tabulation, and, most importantly, clarity about the desired unit of observation. Was the firm to be defined around ownership or management, and if the latter at what level? Successful implementation of any of the obvious alternatives would have required enumerators to ascertain various details about the relationship between ownership and management and the contractual relationships with semi-independent artisans and customers, for example.<sup>64</sup> Such information would have been difficult to acquire consistently from diverse industries operating in very different circumstances. The 1871 industrial enumeration, the first in Canada and, after the United States, one of the first anywhere, was incomplete, inconsistent, or both on several points less complicated than the locus of effective decision making.<sup>65</sup>

Given the practical limitations of census administration, it is not surprising that enumerators tended to distinguish spatially distinct structures coinciding to a large extent with technologically distinct processes. If the enumerator for a particular mill complex failed for one reason or another to return information at the appropriate level of disaggregation, tabulators tried, and in many cases were able, to divide the information. If the information was not easily divisible, then the entry remained a multi-product establishment and probably was tabulated as a single firm.

As a result, the industrial enumeration divided some but not all multi-process firms. Apart from the obvious problem of inconsistency, the divided entries distort any analysis involving the determinants or effects of establishment size. The problem might be ignored if fewer firms were involved, but the relevant records contain 10 per cent of national industrial output and employment. The proportion of all manuscript entries which are pseudo-independent is reported in Table 2. More than a third of the firms using water power fall into this category compared with 16 per cent of the steam-powered activities and only 4 per cent of the hand processes. All of the rural mill industries have a high proportion of pseudo-independent entries.

63 ID no. 106902011.

64 The “proprietors” of some rural mills provided a building and machinery which local farmers would use as needed.

65 Problematic aspects of the enumeration include information about power, floating capital, and individual products and specific industries such as handweaving.

**Table 2** Number and Proportion of Linked Firms, Total Output, and Output at Select Points in the Size Distribution Before Reconstitution

	Number	Share linked	Total output (\$1,000)	Mean output (\$)	Median output (\$)
Canada	43,183	0.10	84,351	1,953	425
Ontario	21,228	0.07	44,005	2,073	553
Quebec	13,748	0.13	28,569	2,078	320
New Brunswick	3,547	0.13	5,820	1,641	384
Nova Scotia	4,660	0.12	5,956	1,278	308
Hand power	32,021	0.04	34,958	1,092	390
Steam power	3,115	0.16	33,114	10,631	2,874
Water power	8,047	0.34	16,278	2,023	371
Carding/fulfilling	666	0.68	292	438	245
Flour/grist	2,322	0.48	4,298	1,851	614
Lath mills	23	0.48	114	4,973	762
Distilleries	20	0.45	1,122	56,110	12,693
Gypsum mills	23	0.39	77	3,367	911
Dyeing/scouring	28	0.36	39	1,377	421
Match factories	19	0.26	53	2,779	886
Saw mills	5,093	0.24	11,664	2,290	346
Stave mills	95	0.24	280	2,943	899
Flax mills	37	0.19	217	5,871	1,615
Shingle mills	977	0.19	554	567	137
Planing/moulding	58	0.17	186	3,214	1,715
Cider mills	48	0.15	20	414	305
Foundry/machine shops	362	0.14	4,116	11,371	3,378

*Sources:* The industries are those with 20+ entries of which more than 15% are linked to another. These industrial categories, used to report the 1890-91 industrial census, are assigned following Inwood, *Interpretation Guide*, Appendix 2. The basic source is NAC, RG31, series 1, 1871, schedule 6.

One way to reduce inconsistency is to reconstitute firms that appear to have been divided by the census process. The only possible link between records is "the proprietor's name or company name" which the manual instructed all enumerators to record.<sup>66</sup> The criteria for combining two or more entries into a larger and more complex firm are that they share a proprietor name within an enumeration division, that they appear immediately adjacent to each other in the manuscript schedule, and that an examination of the personal schedule 1 for the immediate area does not reveal the presence of two potential proprietors with the same name. Entries are not combined if more than one other establishment appears in the manuscript between them, since the activities might then have been situated several

66 *Manual*, p. 30. I am grateful to Marvin McNinnis for suggesting the reconstitution strategy.

miles apart in the township and the probability of joint operation is thus diminished; about 5 per cent of the shared proprietorships fall into this category.

The procedure results in the consolidation of 4,380 activities into 1,959 multi-process establishments. Each reconstituted firm acquires the industrial classification of the component contributing most to output. The resulting data are reported in Table 3. The reconstitution procedure shares many of the difficulties of nominal record linkage.<sup>67</sup> Use of the technique presumes more precision in the recording of names than was intended by enumerators, who received no instruction in the matter. The technique does not consolidate jointly operated worksites on opposite sides of a street or a river if they happen to have been enumerated by different people or if the proprietor's name is misspelled in one of its entries. Moreover, the technique errs in consolidating establishments in which a landlord with little or no influence over daily operation has been entered as proprietor of activities in premises rented from him.<sup>68</sup> There may even be examples of two enterprises at the same site, owned and managed by the same person, but operated in a completely independent manner.

Such circumstances probably were rare, but regardless of the complications it is necessary to choose between two representations of the data, partially divided as in the manuscripts or reconstituted by the above technique. Reconstitution shifts a small amount of output into the steam-powered sector mostly from the hand-powered sector, decreases by 8 per cent the apparent number of firms, and increases their size correspondingly. The increase in size is greatest in Quebec and the Maritime provinces. The average water-powered firm is 21 per cent larger under reconstitution, the steam-powered 8 per cent larger, and the hand-powered one per cent larger.<sup>69</sup>

The effect on individual industries is diverse; some are affected a great deal, others not at all. In general, reconstitution reassigns output among industries allowing an increase in the size of an average establishment in most, although not all, industries. There is considerable variation in the effect on average, median, total output, and the number of firms. There does not seem to be a consistent pattern in the relationships between average size

67 Christian Pouyez *et al.*, "Linkage of Census Name Data", *Journal of Interdisciplinary History*, vol. 14, no. 1 (Summer 1983), pp. 129–152; E. A. Wrigley, ed., *Identifying People in the Past* (London: Edward Arnold, 1972), pp. 1–17.

68 Enumerators were not asked to enquire about the ownership of industrial structures, but several dozen must have done so because their comments indicate that the premises, power, or both were rented. In most of these cases the tenant was named as proprietor. There are exceptions, of course. In one case (ID no. 1007020030) the proprietor is the owner while in another (1029050321) the tenant and owner are named jointly! Another enumerator recorded the on-site employee of an absentee owner as proprietor (216401021).

69 The reconstituted firm is recognized as steam-powered if any of its components used steam and water-powered if no component used steam and at least one used water.

**Table 3** Number and Proportion of Reconstituted Firms, Total Output and Output at Select Points in the Size Distribution After Reconstitution

	Number	Share linked	Total output (\$1,000)	Mean output (\$)	Median output (\$)
Canada	40,761	0.05	84,351	2,069	440
Ontario	20,381	0.04	44,005	2,159	560
Quebec	12,705	0.07	28,569	2,249	333
New Brunswick	3,305	0.06	5,820	1,761	408
Nova Scotia	4,370	0.06	5,956	1,363	331
Hand power	31,247	0.01	34,317	1,098	391
Steam power	2,943	0.11	33,922	11,526	3,211
Water power	6,571	0.19	16,112	2,452	469
Carding/fuling	455	0.54	741	1,629	590
Flour/grist	1,662	0.27	3,994	2,403	767
Lath mills	18	0.33	189	10,510	1,450
Distilleries	13	0.15	683	52,530	11,463
Gypsum mills	21	0.33	123	5,838	980
Dyeing/scouring	22	0.18	43	1,953	1,255
Match factories	15	0.07	46	3,052	886
Saw mills	4,420	0.12	10,881	2,462	399
Stave mills	81	0.11	232	2,863	1,149
Flax mills	35	0.14	253	7,219	2,117
Shingle mills	891	0.11	804	902	127
Planing/moulding	56	0.14	293	5,235	2,113
Cider mills	47	0.13	28	586	327
Foundry/machine shops	323	0.03	4,000	12,383	3,745

*Sources:* The criteria for establishing a link between two entries and then reconstituting them are described in the text. The source is NAC, RG31, series 1, 1871, schedule 6.

and frequency, between mean and median, or among output at select percentiles in the size distribution.

### The Size of the Manufacturing Sector in 1871

The process of combining records and reconstituting firms has a significant effect on the estimate of the number of firms, no effect on total output, and a complicated impact on the distribution of output among various industries and sizes of establishment. The concept of output used here is the value added to raw materials during processing. A firm's output, therefore, is the value of its products less the cost of its raw materials and any other miscellaneous costs for which information is available.<sup>70</sup> Adding together the

<sup>70</sup> The value-added concept is used by Urquhart, *Gross National Product*. I adopt Urquhart's proportions of miscellaneous costs to revenue in each industry (pp. 394ff) and allocate industries into

output of all firms generates an estimate of the overall size of the manufacturing sector.

Determining the size of the manufacturing sector along these lines requires a series of assumptions and source interpretations.<sup>71</sup> For example, we exclude firms with production less than \$50 in order to ensure comparability with later censuses. Similarly, organization of the 1871 manuscript data into the categories used in 1891 permits comparison with at least that census.<sup>72</sup> Of course, not all of the enumerated establishments were “industrial” according to the 1891 categories. We exclude various records which fall outside this definition of the manufacturing sector.<sup>73</sup> Quartz crushing, for example, did not transform raw materials.<sup>74</sup> Dentists, plumbers, and gasfitters are excluded because their primary purpose appears to have been the provision of a service, even though admittedly they also manufactured.<sup>75</sup> Many painters, glaziers, carpenters, and joiners engaged in building as well as manufacturing. Descriptions in the industrial schedules suggest that it would be appropriate to exclude roughly 60 per cent of the painting and glazing output and 40 per cent of the carpentry and joinery as being construction rather than manufacturing.<sup>76</sup>

The definition of manufacturing used here includes photographic galleries and portrait studies, which in 1871 produced frames, prints, likenesses, ferrotypes, paintings, tintypes, pictures, artwork, and commercial art. Much of this work was done on a custom basis but the presence of custom work in many industries makes it impossible to use this criterion as a basis for

groups following Morris Altman, “A Framework for Organizing the Canadian Manufacturing Census Material, 1870–1910”, University of Saskatchewan Department of Economics Discussion Paper, 88–04, January 1989.

- 71 The following discussion follows Urquhart, *Gross National Product*, chap. 4, with exceptions noted below.
- 72 The precise decision rules needed to assign 1871 establishments into industries are reported in Inwood, *Interpretation Guide*.
- 73 Records are excluded if the activity is duplicated in another record or if there is some sign that the establishment was inactive during the year.
- 74 Nova Scotian gold mines were the only important crushers of quartz in 1871.
- 75 Most dentists indicated the manufacture of artificial teeth, dentures, medicines or plates. Unfortunately dentistry appears to have been underreported: only 26 establishments were returned in 1871. Many plumbers and gasfitters fabricated their own fittings and in some cases functioned as general-purpose brass foundries. Unfortunately the returns provide no basis for distinguishing work on structural heating systems as opposed to boiler and engine systems, or on-site repairs from work in the shop.
- 76 About half of the painters and glaziers provided no product detail and some of the others reported both manufacturing and construction work. Of the remainder, 40% indicated manufacturing alone (carriages, furniture, signs, show cards, tapestries, and miscellaneous painted objects), while 60% indicated construction alone (houses and other structures). The same information for carpenters indicates that 60% fabricated articles or equipment (carts, ploughs, sleighs, wheels, blocks, furniture, hubs, cradles, dressed lumber, machinery, tools, doors, ladders, for example), while slightly less than 40% indicated construction activity (such as houses, barns, building, batiments, masons, fencing, or bridges).

exclusion.<sup>77</sup> It is tempting to exclude marble and stone cutting, which was closely integrated with quarrying, a non-manufacturing activity. However, firms classified in this industry produced grindstones, tombstones, grave-stones, monuments, milled marble, sills, slate, millstones, and other dressed stone. The compromise is to include these establishments unless they were identified as quarries.<sup>78</sup>

Distilling is a troublesome industry, because some distillers in 1871 included excise taxes in the value of their whisky while others did not; by 1891 taxes appear to have been systematically excluded.<sup>79</sup> Fortunately, it is possible to adjust the appropriate manuscripts in order to remove excise taxes from particular firms.<sup>80</sup> Another awkward activity is handweaving, which, as noted above, was enumerated inconsistently in 1871. Some weaving was returned on the agricultural schedule and some on the industrial schedule, and the proportions varied regionally (and with individual enumerators). A simple solution is to combine the value of cloth returned on the industrial schedule and a value-equivalent for cloth reported on the agricultural schedule.<sup>81</sup>

A number of industries included at least one and often several establishments which returned partial or unreliable data. In total, 3,793 manuscript entries representing nearly 10 per cent of all establishments lack a value for products, materials, or both.<sup>82</sup> The treatment of incomplete records, therefore, is an important aspect of any compilation. No information is available about the procedures adopted by the staff of the 1871 census. The method used here is to impute the industry ratio of product value to value added if a firm lacks a material value, and the industry ratio of material value to value added if the product data are lacking. In both cases the result is an estimate of value added for the firm. If both material and product value are

77 Urquhart, *Gross National Product*, p. 237. The problem is best illustrated by rural grist milling, which was almost all custom work. Nobody would advocate its removal from the industrial sector on that basis.

78 The latter group includes two firms returning dressed stone as part of their output.

79 Chris French, "Brewing and Distilling in Nineteenth-Century Ontario: What We Know and What We Don't Know" (Economics MA paper, University of Guelph, 1993).

80 The inconsistent enumeration of excise taxes would imply that the deduction of all excise taxes is an overcorrection; see Urquhart, *Gross National Product*, p. 339. Unfortunately, there is no alternative to working with the published tables, other than the manuscripts.

81 I assume the cloth returned on the agricultural schedule was worth \$0.65 per yard and the value added share was 37% (the average for schedule 6 records). Inwood and Wagg, in "The Survival of Handloom Weaving", use a slightly different method and provide sources.

82 Firms whose raw materials, or raw materials plus wages, equal the reported value of products are treated as being without information, since a cost-based valuation is inconsistent with the attempt to estimate value added. Firms which do not appear to have been active during the census year and records which appear to be duplicates are excluded from the calculation. In rare cases, a figure is reported but it cannot be used. The Great Western Railway's Hamilton works, for example, appears to have been reported jointly with all employees in the railway's western division. I am grateful to Paul Craven for assistance in interpreting this record.

missing, the report of employee-months permits interpolation on the basis of labour productivity in the industry.<sup>83</sup>

It is necessary to make allowance for enumeration divisions in which no industrial schedules survive.<sup>84</sup> Although some divisions may indeed have had no industrial activity, in most cases the information appears to have been lost.<sup>85</sup> The total population in divisions with missing data is 46,935 (about 1.5 per cent of the 1871 Canadian population).<sup>86</sup> We adjust for the missing data on the assumption that per capita manufacturing income in a particular division was the same as in the remainder of the district. This method produces an acceptable approximation, given that very little output is at stake for most districts and that the resulting district shares of provincial production are consistent with those of the published census compilations.<sup>87</sup>

An overview of the various steps in the estimation is given in Table 4. The first line in the table indicates the level of output resulting from the compilation made by census staff during the early 1870s and published in volume III of the 1871 census report.<sup>88</sup> This figure replicates the recent estimate by M. C. Urquhart (after allowing for a small difference in the choice of industries).<sup>89</sup> Lines 2 to 6 in Table 4, which are based on the new compilation of the manuscript data described above, are not directly comparable to line 1 because they include a larger set of industries. The figures in the second line reflect the use of all surviving manuscripts for which both products and material values are reported. The interpolation of missing values raises this total (line 3), as does an allowance for manuscript schedules which have not survived (line 4) and the addition of cloth returned on agricultural schedules (line 6). On the other hand, output is

83 These procedures are undertaken with the provincial average or, if that is not possible, nationally.

84 Inwood, *Interpretation Guide*.

85 The relatively broad definition of industry used by the Canadian censuses revealed activity in almost all enumeration divisions including most small ones. Moreover, industry is known from other sources to have been present in some of the missing divisions.

86 Inwood, *Interpretation Guide*, Appendix 1. Enumeration divisions with fewer than 100 people are ignored. Manuscript schedule 1 provides the population of individual enumeration divisions (since the published tables report population at the sub-district level only).

87 Saint John accounted for 48% of New Brunswick industry according to published tables, but my procedure leaves the district with only 37% of the provincial total. The problem is that so much of provincial manufacturing was located in Saint John and a disproportionate share of the city's industry was in King's Ward for which the manuscripts are lost. In these cases, missing output is imputed on the assumption that per capita output in King's Ward was eight times the district average, in order to bring the district share of provincial activity up to 48%.

88 Taxes and miscellaneous and fuel costs are removed from the estimate following Urquhart, *Gross National Product*, p. 339 and tables 4.1, 4.3, and 4.4.

89 Urquhart excludes gas works, part of painting and glazing, part of carpentry and joinery, and photographic galleries (all included here). Excluding these industries from line 1 would drop the total to \$76.2 million, only slightly less than Urquhart's \$77 million. The remaining difference probably arises because Urquhart classifies industries differently than does Altman ("A Framework"), which alters the estimate of miscellaneous expenses.

**Table 4 The Size of the Manufacturing Sector in 1871 (\$1,000)**

	Ontario	Quebec	N.B.	N.S.	Canada
1. Output estimate based on published tables	39,051	26,878	6,699	5,403	78,032
2. Manuscript records with complete information	42,031	26,833	5,512	5,554	79,930
3. After interpolation for missing output	44,005	28,569	5,820	5,956	84,351
4. After adjustment for missing divisions	44,472	29,022	7,120	6,085	86,699
5. After removal of some carpentry and plumbing	44,406	28,985	7,103	6,071	86,565
6. After adding the value of schedule 5 cloth	44,839	30,163	7,373	6,453	88,829
7. Excess of line 5 estimate over published tables	15%	12%	10%	19%	14%

*Sources:* The source for line 1 is Canada, *Census*, 1870–71, vol. III, tables XXVII–LIII. The source for lines 2–6 is NAC, RG31, series 1, 1871, schedule 6, as described in the text.

reduced slightly by the removal of 60 per cent of plumbing and gasfitting and 40 per cent of carpentry and joinery deemed to be construction rather than manufacturing (line 5).

The new compilation yields an estimate of \$88.8 million in manufacturing output, 14 per cent larger than indicated by the Census Bureau's original compilations made during the 1870s (line 1). The difference arises from two sources: establishments and entire industries excluded from the Bureau's compilation and the interpolations made for missing values.<sup>90</sup> The former accounts for at least half of the difference and perhaps more, although we cannot be certain in the absence of information about the Census Bureau's interpolation and the definition of its industrial categories.

Use of the census manuscripts makes clear that any estimate of manufacturing output must be viewed as a more or less approximate representation depending on one's preconceptions about the appropriate estimating procedure. The only alternative to use of the manuscripts is a reliance on tables prepared during the 1870s by census staff who omitted thousands of establishments and did not document their procedures. The manuscript-based estimate is thus preferable because it embodies a partial correction for at least some of the deficiencies in the published tables.

### Conclusion

The size and structure of nineteenth-century Canadian manufacturing activity are known principally from information collected in the industrial censuses.

<sup>90</sup> Differences might also arise if manuscripts for the missing divisions were lost before the original compilation was made. However, there is no evidence of this.



Enumerators from 1871 to 1891 were instructed that an industrial establishment was a place where materials were manufactured, altered, made up, or changed from one shape into another. No restrictions were placed on this wide definition, which ensured reasonably consistent enumeration for many although not all kinds of production. The broad sweep of the Canadian census reveals a great deal of domestic or semi-domestic production. The importance of artisans is not surprising in a rural society, much of it recently settled, but the evidence is nonetheless useful. Other censuses ignore production in such small units. However, the difficulty of enumerating small producers, particularly those operating within or closely adjacent to a household residence, caused difficulty in 1871 and prompted changes in subsequent censuses which had the effect of altering the scope of enumeration and tabulation.

While the definition of industrial activity given in the enumerators' manual did not change, administrative procedures for its implementation did. A new payment structure in 1891 encouraged more diligent enumeration, although the effect was small unless more production was missed in earlier censuses than is generally thought. Reporting of the data in a more extensive set of categories implies that a broader range of activities may have been compiled in 1891; handweaving is an obvious example, although other possibilities await investigation. Enumerators were instructed to include manufacturing in the home for family consumption but they did not do so consistently in 1871; census officials ten years later may have sanctioned a retreat on this front. An attempt to exclude some activity through an occupational or means of livelihood criterion is mentioned in 1891, but it would have been difficult to implement on a systematic and consistent basis.

The most important development may have been the decision in 1881 and 1891 not to tabulate establishments reporting products valued under \$50. There is no evidence, but it would not be surprising if the enumerators had received verbal instructions to ignore very small producers in 1891. Ten years later, in 1901, the Census Bureau entirely abandoned small firms with its decision to ignore all establishments with fewer than five employees.<sup>91</sup> The effect of this rule was to remove from the industrial enumeration 80 per cent of all establishments, although the proportion varied in different parts of the country.<sup>92</sup> These changes created inconsistency in the published tables and deny us valuable information, but they did make it easier to provide consistent coverage of the establishments deemed eligible.

91 Canada, *Census of Manufactures*, 1901, pp. v–vi and table XXII. Cartwright's comments give the impression that the change in census coverage reflects a desire by the new Liberal government to demonstrate the lack of industrial activity in Canada in spite of nearly 20 years of Conservative tariff policy. See Cartwright, *Reminiscences*, p. 328.

92 Kris Inwood and John Chamard, "Regional Industrial Growth during the 1890s: The Case of the Missing Artisans", *Acadiensis*, vol. 16, no. 1 (1986), pp. 101–118.

The definition of industrial establishment was further complicated by the treatment of firms and companies operating in more than one location or structure, often with technologically distinct processes. The census reports are somewhat misleading on this point, since the practice in 1871 was to divide multi-process establishments if possible. An inability to do so in some cases created inconsistency in the 1871 tables. Reconstituting the divided firms provides a choice between two representations of the industrial sector.

Of course, the preferred option depends somewhat upon the purpose at hand. The published compilations of the Census Bureau reflect an interest in classifying industrial activity into different product categories. Decomposition is desirable for this purpose. Similarly, a comparison between different industrial censuses might also require use of the data on a divided basis, since the manuscripts needed for reconstitution are unavailable for later years in which the Bureau's treatment of joint-product firms is unknown. On the other hand, the reconstituted data are less inconsistent and fundamentally more appropriate for research involving the size of individual establishments.

The reconstitution of joint-product firms reveals their number and importance. Numerous proprietors with two or more production lines found some economy in housing them on the same site and perhaps even in the same building, in sharing other elements of fixed capital including power, and in a joint deployment of floating capital and labour. Reconstitution increases the average size of establishment in Quebec and the Maritimes relative to Ontario and indicates more clearly the internal complexity and diversity of water-powered establishments. Individual farmers operated small, part-time, and multi-product mills on the streams which ran through their fields; at the other extreme, Canada's most powerful businessmen deployed large numbers of workers in diverse mill processes and ancillary activities at sites offering substantial hydraulic power.

Clearly, the number of establishments reported depends on the definitions of industrial activity and establishment. Estimates of the size of manufacturing income or output are even more obviously conditioned by source interpretations, estimating assumptions, and definitions. A new estimate of manufacturing activity using the 1871 manuscripts provides evidence that Canada was somewhat more industrialized in 1871 than is apparent from the Bureau's compilations. Further research is likely to strengthen the point, since domestic manufacturing (apart from cloth) and illicit alcohol production have not yet been brought into the calculation.<sup>93</sup>

Industrial census data are intended by their creators to provide a comprehensive and faithful rendering of manufacturing activity. The same cannot be said for property tax records, directories, occupational returns, or any other potential source, although each contributes useful information more or less relevant to its particular purpose. Nevertheless, the apparent precision of row

93 Illicit alcohol production may have been considerable; see French, "Brewing and Distilling".

after row of official data should not blind us to ambiguities and biases in their origin. Indeed, an industrial census is especially difficult to interpret because manufacturing is a complex and diverse activity. The Canadian industrial censuses of 1871 and 1891 illustrate the potential for misinterpretation of even simple features such as the number of establishments and level of output.