

Iowa's Industrial Roots, 1890-1910

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ISSN 0003-4827

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Recommended Citation

Johnson, Keach. "Iowa's Industrial Roots, 1890-1910." *The Annals of Iowa* 44 (1978), 163-190.

Available at: <https://doi.org/10.17077/0003-4827.11351>

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IN HIS BIENNIAL REPORT TO GOVERNOR LESLIE M. SHAW IN 1901, Charles F. Wennerstrum, the energetic and perceptive Commissioner of the Iowa Bureau of Labor Statistics, called the governor's attention to the rapid pace of the state's industrial growth. Declaring that the prevailing view of Iowa as an agricultural state given over to farms and gardens was far from true, Wennerstrum documented his assertion with numerous statistics showing impressive gains in the state's urban population, number of factories, number of wage-earners, investment of industrial capital, and value of industrial output.¹

Wennerstrum was not notably successful in dispelling the popular misconception of Iowa as a land of cornfields and feedlots, which continues even today. And Iowa was preeminently agricultural in 1900. Measured by gross value of output, Iowa led the nation in value of agricultural products in 1900 (\$365,411,000) but ranked seventeenth nationally in value of manufactured products (\$164,617,000).²

Yet these and other figures confirm Wennerstrum's recognition that the forces of modern industrialism were transforming the economic and social life of Iowa. Possessing many advantages—a central location, an excellent network of railroads (in 1909 Iowa ranked fourth among the states in length of

¹State Bureau of Labor Statistics, *Report, 1899-1900*, Iowa Documents (1902), IV, 8, 27-29.

²Ruth L. Hoadley, *Industrial Growth of Iowa*, Iowa Studies in Business, No. II (Iowa City, 1928), 5-6; *Twelfth Census of the United States: 1900* (Washington, 1902), VII, cLxxix, ccLxxvii.

trackage) supplemented by the Mississippi and Missouri Rivers on her eastern and western borders, abundant supplies of such raw materials as bituminous coal, clay and gypsum, and a deep, fertile carpet of black and brown loams capable of producing all of the staple crops that could be grown in northern climates—Iowans were building a diversified economy based on manufacturing and commerce as well as agriculture. The number of manufacturing establishments (the term used by the United States Census Office) rose from 6,921 in 1880 to 14,819 in 1900; the amount of capital invested in these enterprises, from \$33,987,000 to \$102,733,000; the average number of wage-earners, from 28,372 to 58,553; and the value of manufactured products, from \$71,045,000 to \$164,617,000.³

Iowa's manufactures were diverse, being represented in each of the fifteen groups used by the United States Census Office to classify manufactures in 1900. Judged by value of product, the manufacture of food was Iowa's leading industry by far. The value of the state's food products—meat, butter, flour, canned and preserved fruits and vegetables, and food preparations—was \$70,180,000 in 1900, forty-three percent of the total value of Iowa's manufactured products. Next were the hand trades with an output of \$22,236,000, followed by lumber and lumber products which were valued at \$17,903,000. At the opposite pole was Iowa's miniscule ship-building industry whose products were worth only \$291,000. In between the two extremes were textiles, iron and steel, leather, paper and printing, liquors and beverages, chemicals, clay, glass and stone products, nonferrous metals, tobacco, vehicles for land transportation, and miscellaneous industries. The output of these middle groups ranged in value from \$2,373,000 for textiles to \$10,519,000 for vehicles for land transportation, a group of nine industries which included the manufacture and repair of bicycles and tricycles, carriages, sleds and wagons, and the rolling stock of steam and street railroads.⁴

³*Abstract of the Twelfth Census of the United States* (Washington, 1902), 332; *Abstract of the Thirteenth Census of the United States with Supplement for Iowa: 1910* (Washington, 1913), 633, 683; *Census of Iowa*: (Des Moines, 1905), Lxxxviii-Lxxxix, xci-xcii, xcvi-xcviii.

⁴*Twelfth Census*, VII, 44, 489.

Manufacturing in Iowa, as elsewhere, was largely an urban enterprise. The United States Census Office classified the industries of thirty-nine cities and towns in Iowa as urban manufactures in 1900. These urban industries, although comprising only thirty-seven percent of the manufacturing establishments in Iowa, dominated all other phases of manufacturing in the state. They represented seventy-five percent of invested capital, employed seventy-six percent of the wage-earners, and accounted for seventy-two percent of the value of manufactured products. Yet diffusion was more characteristic of Iowa manufacturing in 1900 than concentration: a dozen cities vied for industrial leadership. Des Moines, the state's capital which ranked first in population, led in the number of manufacturing establishments; Davenport, in invested capital; Dubuque, in average number of wage-earners; and Sioux City, in value of manufactured products.⁵

Most of Iowa's leading industrial cities were located in the eastern half of the state, which was the first part to be settled and the most densely populated. Of the fourteen cities with manufactured products worth \$1,000,000 or more in 1899, six were on the Mississippi River—Burlington, Clinton, Davenport, Dubuque, Keokuk, and Muscatine—and six were in central and eastern Iowa—Des Moines, Cedar Rapids, Fort Dodge, Marshalltown, Ottumwa, and Waterloo. The remaining two, Council Bluffs and Sioux City, were on the Missouri River, which forms Iowa's western boundary. Sioux City ranked first in value of manufactured products (\$14,227,000) because of its leadership in wholesale slaughtering and meat packing, which was Iowa's most important manufacture.⁶

The great majority of the manufacturing establishments in Iowa at the turn of the century were individually owned and operated, but the dominant thrust of industrial organization and ownership in the state, as in the nation, was the shift from individual to corporate enterprise. Of the 14,819 manufacturing establishments in Iowa in 1900, 10,392 were owned and operated by individuals, 3,170 by firms and limited partnerships, 991 by incorporated companies, and 266 by coopera-

⁵*Twelfth Census*, VIII, 237; Hoadley, *Industrial Growth of Iowa*, 32, 58-65.

⁶*Abstract of the Thirteenth Census with Supplement for Iowa*, 690.

tives and miscellaneous organizations. Although corporations accounted for only seven percent of Iowa's manufacturing establishments, they produced fifty-five percent of the state's manufactured wealth (\$89,567,000). These percentages of corporate ownership and production were comparable to the corresponding national figures, which were eight percent and sixty percent respectively.⁷

Also indicative of Iowa's transition to modern industrialism was the continuing shift from the hand trades to the factory industries. As defined by the United States Census Office, the essential difference between the two was that the hand trades performed custom and repair work for local consumers, whereas the factory industries made standardized products for general sale. The hand trades were preeminently the domain of the independent craftsman who combined the functions of capital and labor in the traditional workshop system of production. The hand trades were almost as numerous as the factory industries but were relatively insignificant otherwise. The factory industries comprised only fifty-three percent of Iowa's manufacturing establishments in 1900, but they contributed eighty-six percent of the value of the state's manufactured products. These percentages were roughly similar to the national proportions, which credited the factory industries with forty-six percent of the manufacturing establishments and ninety-one percent of the value of manufactured products.⁸

Iowa's most valuable manufactured products at the turn of the century were meat, butter, lumber and lumber products, and flour. The most important of these manufactures was slaughtering and meat packing, which had been a leading enterprise in Iowa since the earliest days of settlement. The foundations of the state's packing industry were laid in the 1840s and 1850s by the provision merchants of the Mississippi River communities, who packed pork for shipment downriver

⁷ *Twelfth Census*, VII, Lxv-Lxvi, 503.

⁸ *Ibid.*, xxxiv-xxxvii, 489, 582-583. The United States Census Bureau subsequently limited its compilation of manufacturing establishments to factories, eliminating the hand trades and all establishments manufacturing goods worth less than \$500. Revising its figures for 1900 accordingly to facilitate comparison, the Bureau reduced the number of manufacturing establishments in Iowa from 14,819 to 4,828. *Abstract of the Thirteenth Census with Supplement for Iowa*, 681, 683.

to St. Louis and New Orleans. Well established by the Civil War, Iowa's packing industry was soon caught up in the series of rapid changes that marked the emergence of the modern American meat industry: the expansion of the railroads, the advent of refrigeration, the utilization of waste to make valuable by-products, the transformation of the industry into a merchandising as well as a manufacturing business, and the increasing localization of the industry in the Middle West as packers moved closer to the principal source of their supplies.⁹

In Iowa as elsewhere in the United States, these rapid changes in technology and marketing produced feverish expansion and competition followed by consolidation and domination by the big packers. With the rapid westward movement of railroads and settlers across the state and the emergence of Iowa as the nation's foremost supplier of butcher stock—first in hogs and second in cattle in 1900—new packing centers arose: Cedar Rapids, Ottumwa, Des Moines, Marshalltown, Waterloo, and Mason City in central and eastern Iowa and Sioux City at the western edge of the state. The nationalization of markets, intense competition, the cost of modernizing plant and equipment, the resulting need for large amounts of capital, and the failure and reorganization of many packing houses during the hard times that followed the Panic of 1893 all contributed to concentration in the packing industry.¹⁰

As a result of these forces, increasing consolidation accompanied increasing output in Iowa as in other meat-producing states. The number of wholesale slaughtering and meat-packing establishments in Iowa fell from twenty-five in 1890 to twenty in 1900. However, the amount of capital invested in the remaining plants rose from \$4,105,000 in 1890 to \$6,264,000 in 1900; the average number of wage-earners, from 2,013 to 2,874; and the value of products, from \$19,615,000 to \$25,296,000, which constituted sixteen percent of Iowa's man-

⁹H. H. McCarty and C. W. Thompson, *Meat Packing in Iowa*, Iowa Studies in Business, No. XII (Iowa City, 1933), Chs. I, V; *Twelfth Census*, VIII, 234-235; Harry C. McCarty, "Slaughtering and Meat Packing," *Twelfth Census*, IX, 387-429. McCarty's article is an excellent overview of the principal trends in the growth of the American meat industry from 1850 to 1900.

¹⁰McCarty and Thompson, Ch. II; McCarty, "Slaughtering and Meat Packing," 391-393.

ufactured wealth. Conversely, the number of wholesale slaughterhouses, which did not pack meat but engaged only in the preparation and sale of fresh meat, rose from four in 1890 to seven in 1900. However, their capitalization fell from \$380,000 in 1890 to \$86,000 in 1900; the average number of their laborers from 562 to thirteen; and the value of their products, from \$3,810,000 to \$398,000.¹¹

Iowa's meat-packing industry had achieved national importance by the turn of the century, ranking eighth nationally in 1900. The industry consisted essentially of a small number of large companies, controlled in some cases by outside packers: John Morrell and Company of Liverpool, England in Ottumwa; T. M. Sinclair and Company in Cedar Rapids; the Agar Packing Company in Des Moines; Brittain and Company in Marshalltown; the Rath Packing Company in Waterloo; and Jacob E. Decker and Sons in Mason City. Fore-shadowing the powerful consolidation associated with big business in the early 1900s, the Chicago packers gained control of meat packing in Sioux City when Armour and Cudahy (to be followed later by Swift) acquired plants there during and after the Panic of 1893. These urban companies packed meat for sale throughout the United States and abroad, leaving local markets to be supplied largely by small packers and local butchers.¹²

THE TRANSITION from farm to factory in Iowa was even more rapid for butter than for meat. The creamery or factory system of making butter originated in the United States during the Civil War and began in Iowa in 1872 when the first creamery was established. Well adapted to the state's needs and resources, commercial buttermaking grew rapidly in Iowa, which led the nation in production of creamery butter in 1879, 1889, and 1899. Iowa was well suited by soil and climate to dairying. Making butter went hand in hand with raising cattle and hogs, for skim milk, butter's chief by-product, was fed to calves and pigs to the advantage of both industries. Many

¹¹*Twelfth Census*, VIII, 234-235; McCarty, "Slaughtering and Meat Packing," 394-396, 398-401, 410-411.

¹²McCarty and Thompson, Chs. II, III; McCarty, "Slaughtering and Meat Packing," 389-391, 406, 411-412.

Iowa farmers turned to dairying during the Panic of 1893 because of the relative stability of butter prices, leading the State Dairy Commissioner to comment that "the dairy industry booms when other lines of agriculture return but meager profits." By 1900 Iowa had 816 creameries which made 77,233,000 pounds of butter (eighteen percent of the national production of creamery butter) valued at \$14,911,000. The creameries also produced 477,164,000 pounds of skimmed milk valued at \$449,000.¹³

Despite the rapid growth of the factory system, commercial buttermaking in Iowa was still a rural industry in 1900. Most of the state's butter factories operated under the "separator plan" whereby farmers hauled their milk to the factory to be separated by a power-driven centrifugal cream separator, which had been invented by Dr. Carl De Laval of Stockholm, Sweden in 1878 and introduced into Iowa in the 1880s. Because of the time and labor required to haul milk to the creamery by horse and wagon—it was too expensive to ship whole milk by rail—creameries had to be located close to the source of their supply. They were most numerous in the north-eastern quarter of the state which was known as the dairy district.¹⁴

A number of the creameries were owned and operated by farmers' cooperatives. Of the 809 creameries and 185 skim stations (branches of creameries which separated and forwarded cream to the parent factories) in Iowa in 1900, 364 were cooperatives. The Iowa creameries were relatively large, averaging 94,000 pounds of butter per year per creamery in 1900, which was 22,000 pounds more than the national average. But they were essentially local enterprises whose milkshed extended only a few miles from the factory. In 1900 the aver-

¹³Earle D. Ross, *Iowa Agriculture: An Historical Survey* (Iowa City, 1951), 78-83; M. Mortensen, "Dairy Product Output from Iowa Farms," in *A Century of Farming in Iowa: 1846-1946* (Ames, 1946), 216-219; Eric E. Lampart, *The Rise of the Dairy Industry in Wisconsin: A Study in Agricultural Change, 1820-1920* (Madison, 1963), 94, Appendix, Table B-2, 449; State Dairy Commissioner, *Report, 1902*, Iowa Documents (1904), V, 54-55; *Report, 1903*, Iowa Documents (1904), V, 10; *Report, 1904*, Iowa Documents (1906), V, 12; Henry E. Alvord, "Cheese, Butter, and Condensed Milk, Factory Product," *Twelfth Census*, IX, 435, 439, 444.

¹⁴Mortensen, 219-220; Lampard, 204-212; State Dairy Commissioner, *Report, 1900*, Iowa Documents (1902), V, 89-91; *Report, 1901*, Iowa Documents (1902), V, 54; *Report, 1904*, Iowa Documents (1906), V, 11; *Report, 1905*, Iowa Documents (1906), V, 7-8; Alvord, 439.

age Iowa creamery served 113 patrons and was valued at \$3,286.¹⁵

Iowa farmers continued to make large amounts of home-made butter (61,789,000 pounds in 1900) which supplied much of the local demand. The creameries, therefore, sold most of their butter outside the state. Their shipments to outside markets fluctuated from year to year but averaged about 75,000,000 pounds annually at the turn of the century. In 1902, a representative year, 640 Iowa creameries—about two-thirds of the total number—reported sales of 66,657,000 pounds of butter: 4,025,000 pounds to their patrons, 5,791,000 to other customers in Iowa, and 56,841,000 in urban markets across the nation. Of the outside markets, by far the most important was New York City, the nation's leading butter market whose quotations determined butter prices throughout the country. Iowa creameries shipped seventy-one percent of the butter that they marketed outside the state in 1902 to New York City; nine percent to Chicago; three percent each to Boston, Philadelphia, and New Orleans; and two percent to the Pacific Coast. Iowa creameries also made small shipments, less than 1,000,000 pounds annually per city, to numerous other cities, such as St. Louis, Elgin (Illinois), Pittsburgh, Brooklyn, Newark, Cleveland, Buffalo, and Washington, D.C.¹⁶

Unlike the packers and buttermakers, Iowa sawmillers and woodworkers, lacking adequate supplies at home, had to import their raw materials. It was the white pine forests of Wisconsin and Minnesota plus the cheap transportation afforded by the Mississippi River that made possible the rise of the lumber industry as a major Iowa enterprise. There was, to be sure, enough timber in Iowa to enable pioneer sawmills to meet the local needs of the early settlers. Numerous groves sprinkled the Iowa prairie; timber lined the banks of rivers and streams; some parts of eastern Iowa were densely forested. But not enough trees grew in Iowa to meet the demands

¹⁵State Dairy Commissioner, *Report, 1900*, Iowa Documents (1902), V, 31-32, 34-35; *Report, 1903*; Iowa Documents (1904), V, 11, 35, 46, 47-48; Alvord, 436, 439.

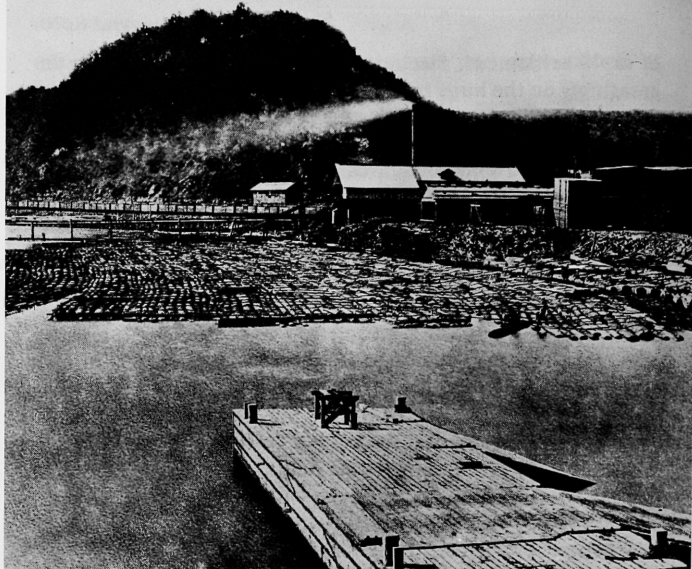
¹⁶State Dairy Commissioner, *Report, 1900*, Iowa Documents (1902), V, 38-39, 71, 86-91; *Report, 1901*, Iowa Documents (1902), V, 50; *Report, 1902*, Iowa Documents (1904), V, 23, 33-35; *Report, 1903*, Iowa Documents (1904), V, 26, 27, 46, 93.

of rapid settlement, forcing the state's sawmillers to rely increasingly on the huge rafts of white pine logs that the lumbermen of Minnesota and Wisconsin began to float down the Mississippi River as far south as St. Louis in the 1840s and 1850s. Of the 183,000,000 board feet of lumber produced by the 540 sawmills operating in Iowa in 1859, only 22,000,000 board feet were cut from Iowa logs, mostly oak and walnut. The remaining 161,000,000 feet were cut from the white pine logs of Minnesota and Wisconsin.¹⁷

Iowa's lumber industry grew rapidly after the Civil War, which was a time of intense activity for lumbermen all along the upper reaches of the Mississippi River. The introduction of steamboats to tow the rafts inaugurated a new era in rafting, which greatly increased the flow of logs to the seventy-five or so sawmills that dotted both banks of the Mississippi River from Stillwater, Minnesota to St. Louis. The massive rafts that poured down the river, comprising millions of logs and billions of feet of lumber, constituted the largest volume of traffic on the upper Mississippi River from 1870 to 1900. The rapid settlement of the prairies and plains west of the river—Iowa's population grew from 192,214 in 1850 to 1,911,896 in 1890—created a feverish demand for building materials, greater than any that America had yet experienced. The settlers included sawmill operators, coopers, sawyers, and other woodworkers from Germany, Sweden, New England, New York, and Pennsylvania, who provided experienced leadership and a plentiful supply of skilled laborers. The coming of the railroads speeded up the production and marketing of lumber by releasing lumbermen from their dependence on water transportation, opening up for logging vast tracts of pineland hitherto inaccessible, and linking the milling centers of the Upper Mississippi Valley to markets throughout the nation.¹⁸

¹⁷Floyd B. Haworth, *The Economic Development of the Woodworking Industry in Iowa*, Iowa Studies in Business, No. XIII (Iowa City, 1933), 7-24; George B. Hartman, "The Iowa Sawmill Industry," *Iowa Journal of History and Politics*, XL (January, 1942), 52-65; Lyda Belthuis, "The Lumber Industry in Eastern Iowa," *Iowa Journal of History and Politics*, XLVI (April, 1948), 115-135; Agnes M. Larson, *History of the White Pine Industry in Minnesota* (Minneapolis, 1949), Ch. VI.

¹⁸Haworth, 24-31; Hartman, 65-83; Belthuis, 135-146; Larson, Chs. VII, VIII; Robert F. Fries, *Empire in Pine: The Story of Lumbering in Wisconsin, 1830-1900* (Madison, 1951), Chs. 5, 6.



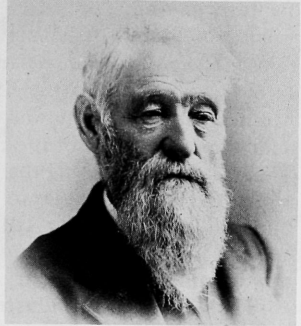
The Fleming sawmill and log raft in Clayton County circa 1900.

The effect of these developments in Iowa was to concentrate the state's lumber industry in the Mississippi River towns, which became major marketing and milling centers after the Civil War. They were advantageously located to profit from the cheap water transportation of the river and their newly-acquired railroad connections with the burgeoning lumber markets of the Middle West and West. Lumbermen in western Wisconsin and eastern Minnesota, whose sawmills were tributary to the Mississippi River, consigned more than half their lumber to wholesalers and retailers in the Iowa river towns for sale in Iowa, Illinois, Missouri, Kansas, and Nebraska.¹⁹

The Iowa river towns were important markets for logs as well as lumber; thirty-three sawmills with a seasonal capacity of 376,680,000 feet of lumber were at work in the river towns

¹⁹Haworth, 28-30; Hartman, 82-83; Belhuis, 130, 137-138, 142; Larson, 100-102, 105; Fries, 78-83; George W. Sieber, "Railroads and Lumber Marketing, 1858-78: The Relationship between an Iowa Sawmill Firm and the Chicago and Northwestern Railroad," *Annals of Iowa*, Third Series, XXXIX (Summer, 1967), 33-46.

in 1877. Every Iowa town on the river from Lansing on the north to Keokuk on the south had one or more sawmills, but Clinton, Muscatine, Davenport, and Dubuque were the principal centers of production. Only the mills of Minneapolis sawed more lumber than those of Clinton, which ranked with La Crosse, Wisconsin and Winona, Minnesota as the most important downriver milling centers. The "lumber barons" of the river towns—W. J. Young and Chauncy Lamb of Clinton, David Joyce of nearby Lyons (now North Clinton), Peter Musser and Benjamin Hershey of Muscatine, Frederick Weyerhaeuser (later to become America's leading lumberman) and F. C. A. Denkman of Davenport and Rock Island, and John Knapp and Henry Stout of Dubuque and Fort Madison, to mention only the most prominent—built and operated their own sternwheelers to raft logs down the river and equipped their mills with huge steam-powered circular, gang and band saws that cut millions of feet of lumber annually.²⁰



John Knapp

Sawmilling in Iowa reached its peak in 1889 when it ranked second among the state's manufactures in value of output and twelfth in the nation in quantity of sawed lumber. That year Iowa sawmills produced 571,166,000 feet of lumber, 209,640,000 shingles, and 110,500,000 lath; the value of their production was \$12,056,000. But the days of the Mississippi River sawmills were numbered; the output of the Iowa mills fell in value to \$8,677,000 in 1899. By this time the virgin white pine forests of the upper Mississippi Valley were approaching exhaustion. The Wisconsin River Valley, the first

²⁰Haworth, 35-36; Hartman, 71-72, 75, 78, 79, 80-81; Belhuis, 133-134, 139-141; Larson, 126-128; Jesse J. Fishburn, "Ben Hershey—Lumber Baron," *Palimpsest*, XXVIII (October, 1947), 289-299.

source of logs for the downriver mills, was striped of white pine as early as 1876. The ceaseless onslaught of the loggers soon produced the same result in the river valleys north of the Wisconsin River. The Black River district was denuded by 1897; logging along the Chippewa River, the principal source of logs for Iowa sawmills, ended in 1905; the St. Croix River Valley yielded no more logs after 1914.²¹

The dwindling supply and increasing cost of white pine forced the closing of the Mississippi River sawmills below Minneapolis. Their day was done; the future belonged to the yellow pine sawmills of the Pacific Northwest and the South. The Iowa sawmills along the Mississippi fell silent in the early 1900s; the last companies to close were the Standard Lumber Company of Dubuque in 1911 and S. and J. C. Atlee of Fort Madison in 1913. Sawmilling in Iowa had come full circle; it now became a local industry as it had been in pioneer days.²²

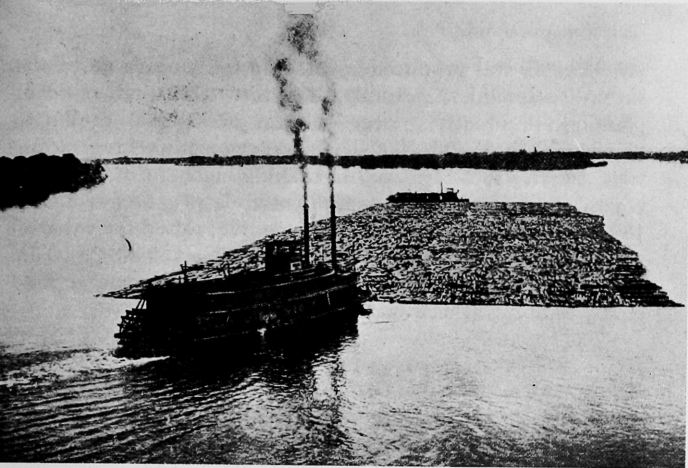
The woodworking industries of Iowa, which had grown up around the sawmills, continued to prosper despite the decline of sawmilling. This was notably true of the planing mills which manufactured blinds, doors, door and window frames, interior woodwork, sash, and kindred products. The explanation of this seeming paradox is that yellow pine from the Pacific Northwest became available in the Middle West in the 1890s when the northern railroads, led by the Northern Pacific, sought to increase their eastbound traffic by adopting a favorable schedule of freight rates on the shipment of lumber from the sawmills of Oregon, Washington, Idaho, and Montana to midwestern markets. This enabled Iowa planing-mill operators to replace the northern white pine lumber, which they had formerly obtained from the state's sawmills, with yellow pine which was equal in quality to the white pine and cheap enough to allow Iowa manufacturers of planing-mill products to compete in eastern markets.²³

The transition of the Iowa lumber industry from sawmilling to woodworking was well along by the turn of the century.

²¹Haworth, 31-40, Appendix, Table 22, 88; Hartman, 69, 72-73; Belthuis, 139-140; Larson, Ch. XII; *Twelfth Census*, VII, 286-289, VIII, 234-235.

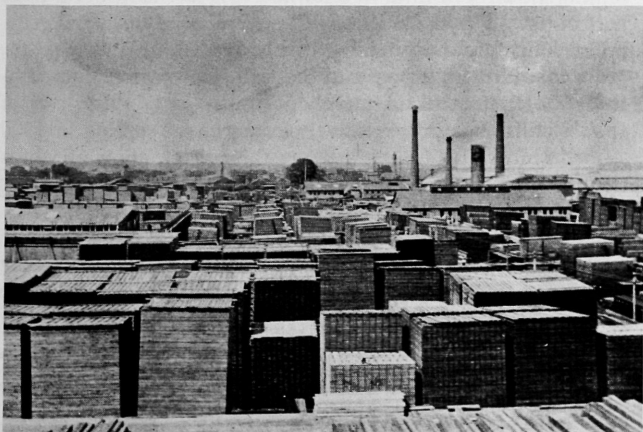
²²Hartman, 76-77, 81-82, 83-93; Belthuis, 144-146.

²³Haworth, Ch. IV; Belthuis, 132-134, 140, 142-144.



Log raft in 1898.

The output of the state's planing mills rose in value from \$3,588,000 in 1889 to \$5,295,000 in 1899 when Iowa ranked eighth nationally in planing-mill production. The production of the state's sawmills, as mentioned above, was valued at \$8,677,000 in 1899, but forty percent of this amount



W. J. Young sawmill in Clinton, early 1890s.

(\$3,389,000) was produced by planing mills operated by the sawmill companies. Actually, therefore, the total value of planing-mill products exceeded that of sawmill products, \$8,684,000 to \$5,288,000. The smaller woodworking industries, such as those engaged in making cigar boxes, packing boxes, caskets, cooperage, and furniture also grew during the 1890s; the furniture factories, for example, raised the value of their production from \$1,054,000 in 1890 to \$1,419,000 in 1900. Woodworking, unlike sawmilling, had become permanently established as a major Iowa industry.²⁴

THE MANUFACTURE OF FLOUR and meal was one of Iowa's oldest and most valuable industries. Gristmills appeared on the rivers and streams of eastern Iowa almost as soon as the pioneers harvested their first crops of grain. These were typical frontier custom mills, grinding the grain that local farmers brought to the mill in return for a portion of the product. Custom milling to meet local needs continued in Iowa throughout the nineteenth century, but merchant milling, which comprised the purchase of grain and the manufacture of flour for sale at home and abroad, came to form the backbone of the milling industry in Iowa as elsewhere. As late as 1900, almost half of Iowa's mills—330 of 702—were neighborhood gristmills, which ground for toll or exchanged flour and meal for grain that farmers brought to the mill. However, a comparatively small number of merchant mills—only thirty-two of Iowa's mills engaged exclusively in merchant milling in 1900—made most of the state's flour; their production of wheat flour alone accounted for sixty percent of the value of the flour and gristmill products manufactured in Iowa in 1900.²⁵

Merchant milling began in Iowa in the 1840s and 1850s in response to the demands of rapid settlement, the increasing production of wheat, and the expansion of markets. The

²⁴Haworth, Chs. V-VII; Belthuis, 146-155; *Abstract of the Eleventh Census of the United States: 1890* (Washington, 1894), 138-139; *Twelfth Census*, VII, cLxxiv-cLxxxv, 222-225, 286-289, 290-293, VIII, 234-235; Henry Gannett, "Lumber," *Twelfth Census*, IX, 808, 822, 827, 874, 888.

²⁵Jacob A. Swisher, *Iowa: Land of Many Mills* (Iowa City, 1940), Chs. I-V, VII-XV; George C. Duffield, "Frontier Mills," *Annals of Iowa*, Third Series, VI (July, 1904), 425-436; H. W. Wiley, "Flouring and Grist Mill Products," *Twelfth Census*, IX, 356-369, 372-373, 374-375.

state's population grew from 43,112 in 1840 to 674,913 in 1860, creating an expanding home market which required merchant milling. Iowa farmers, in characteristic frontier fashion, turned to wheat as their principal cash crop, growing 154,000 bushels in 1840, 1,530,000 bushels in 1850, and 8,500,000 bushels in 1860 when Iowa ranked eighth nationally in wheat production. The availability of wheat stimulated the growth of flour milling in an age when millers needed to be close to the source of their supplies. In some cases, merchants took up flour milling to facilitate the disposal of the ever-increasing amount of wheat that they bought from the farmers. Iowa farmers and millers shipped much of their wheat and flour down the Mississippi to St. Louis, which became the nation's leading manufacturer and distributor of flour during the third quarter of the nineteenth century. Even more important for the expansion of markets was the coming of the railroads in the 1850s, which gave Iowa farmers and millers access to eastern markets.²⁶

Flour and meal had become Iowa's most valuable manufactured products by 1860 when the output of the state's 333 flour mills and gristmills was valued at \$6,779,000. The mills were scattered throughout sixty counties, but the principal milling centers were the towns and counties of eastern Iowa, mainly those bordering the Mississippi River. Scott County, which ranked second among Iowa counties in value of manufactured products (Muscatine County was first), had fifteen flour mills in 1858, twelve of them steam powered; the value of their production in 1860 was \$688,000. The Albion Mills of Davenport, the largest in the state, made 350 to 500 barrels of flour daily, much of it for sale in eastern markets.²⁷

The modern American milling industry was born in the years following the Civil War. The post-war years opened auspiciously for Iowa millers. The state's output of wheat rose to 29,435,000 bushels in 1869, when only Illinois grew more wheat than Iowa, and 44,131,000 bushels in 1875. The state's

²⁶Swisher, 94, 99, 123, 139, 179, 188-189; Ross, *Iowa Agriculture*, Chs. II, III; Herman Steen, *Flour Milling in America* (Minneapolis, 1963), Chs. IV, VI; Thomas P. Christensen, "An Industrial History of Scott County, Iowa: The Pioneer Period, 1833-1865," *Annals of Iowa*, Third Series, XXII (October, 1939), 118.

²⁷Swisher, 173-175, 234; Christensen, 118-122.



Flouring mill at Iowa Falls.

milling industry grew apace, consolidating its position as Iowa's ranking manufacture by raising the value of its production to \$15,635,000 in 1869 and \$19,089,000 in 1879. However, the 1870s were the peak years for flour and wheat in Iowa; the production of both declined thereafter.²⁸

Faced with rising land values, declining yields of wheat due to soil depletion, and the need to diversify their production, Iowa farmers turned increasingly to the cultivation of corn and oats, the feeding of cattle and hogs, and dairying. The rise of hard spring wheat in Minnesota and the Northwest, and the development of hard winter wheat in Kansas and the Southwest pushed wheat cultivation steadily westward. The shift from soft to hard wheat was made possible by revolutionary changes in the mechanics of milling: the introduction of rollers, for example, which ground the flinty hard wheat berries more efficiently and made more and better flour at less cost than the traditional millstones. The new milling

²⁸Swisher, 189-191, 285; Hartman, "The Iowa Sawmill Industry," 88-89.

technology led to the construction of huge mills, the gravitation of the industry to cities, and the emergence of Minneapolis as the world's foremost milling center.²⁹

The migration of wheat and flour to the north and west signalled the decline of Iowa's milling industry. The production of wheat varied from year to year but the overall trend was downward, the state's output falling from 44,131,000 bushels in 1875 to 22,769,000 bushels in 1899 and considerably less thereafter. The value of flour and gristmill products declined from \$19,089,000 in 1879 to \$11,833,000 in 1889, rose to \$13,823,000 in 1899, then levelled off around that figure in subsequent years. The flour mills and gristmills lost their position of state leadership, falling to second place in 1889, third place in 1899, and fourth place in 1909. The manufacture of flour continued to be an important enterprise in Iowa, but it had passed its prime.³⁰

THE MANUFACTURES discussed so far illustrate the localization of modern industry: the tendency of manufactures to gravitate to localities or regions offering special advantages for their development.³¹ Processing the raw materials of farm and forest formed the original basis of Iowa's leading manufactures because these materials were abundant, accessible, and relatively cheap and, even more important, because the rivers and railroads of the state provided relatively cheap transportation to regional and national markets. But the forces of industrialization made for national uniformity as well as local and regional specialization: they operated, to a greater or lesser degree, to promote the development of similar manufactures in all parts of the United States. The influence of these general forces on the industrialization of Iowa can be seen in the rapid rise of railroad construction and repair shops, printing and publishing, and foundry and machine-shop products.

²⁹Swisher, Chs. XVII-XXI, XXV; Ross, Ch. VI; Steen, Ch. V; Wiley, "Flouring and Grist Mill Products," 356-357; Thomas P. Christensen, "An Industrial History of Scott County: The Middle Period, 1865-1900," *Annals of Iowa*, Third Series, XXII (April, 1940), 285-289.

³⁰Swisher, 219-224, 234-236, 285; Hartman, "The Iowa Sawmill Industry," 88-89; *Twelfth Census*, VIII, 234-235; *Abstract of the Thirteenth Census with Supplement for Iowa*, 684-685.

³¹See *Twelfth Census*, VII, ccix-ccxiv, for a discussion of the causes of industrial localization.

Construction and repair shops were an integral part of railroad operations. As the railroads grew, they established shops at convenient points along their lines to build and service their plant and equipment. Construction and repairs grew rapidly in the 1890s because of continuing expansion and because the railroads' desire for greater efficiency and economy, the public's demand for greater speed and better service, and a series of technological advances permitting the use of bigger and faster trains all led to reconstruction of the American railroad system. The application of steel to the construction of rolling stock increased the size and carrying capacity of boxcars and the motive power, size, and weight of locomotives. The average payload of freight trains rose from 175 tons in 1890 to 244 tons in 1900. The invention and improvement of the Westinghouse air brake, moreover, enabled freight and passenger trains to travel safely at higher rates of speed than before. The operation of faster and heavier trains, in turn, forced the railroads to rebuild their roadbeds, tracks, and bridges.³²

In Iowa, the railroads built 759 miles of additional track in the 1890s, raising the state's total mileage from 8,412 in 1890 to 9,171 in 1900. The roads also began a large-scale program to modernize existing facilities in order to accommodate the increasing number, speed, and weight of their trains. The Iowa Board of Railroad Commissioners reported in 1899 that the railroads had become "thoroughly aroused" to the necessity of better service and had spent "hundreds of thousands" of dollars during the year to improve the roadbeds of their trunk lines in Iowa. "The time is not far distant," the Board continued, "when a railway with heavy grades, sharp curves, wooden bridges and inferior ties, rails and ballast, must either improve and better its condition or go into the hands of a receiver."³³

³²Edward H. Sanborn, "Locomotives," *Twelfth Census*, X, 243-245; George A. Hutchins, "Cars, Steam Railroad," *ibid.*, 263-264. Sanborn describes the 1890s as "probably the era of most notable development" in the history of locomotive construction. Hutchins speaks of the "phenomenal growth" of the steel car industry, which was in its infancy in 1890. Larger boilers, thicker shells, and bigger fireboxes raised the weight of engines alone, exclusive of tenders, from about 90,000 pounds in 1890 to 129,000 pounds in 1900. The carrying capacity of boxcars rose from around 60,000 pounds in 1890 to 80,000 or even 100,000 pounds in 1900.

³³Iowa Board of Railroad Commissioners, *Report, 1899* (Des Moines, 1900), 3; *Report, 1900* (Des Moines, 1901), 8.

Needing no admonition, the railroads in Iowa as in other states rebuilt their roadbeds with stone and gravel to provide firmer ballast, laid millions of new ties, substituted heavy steel rails for iron and light steel rails, double-tracked additional portions of their main lines, replaced wooden bridges and trestles with steel and stone structures, introduced interlocking and derailing switches to prevent trains from crashing into one another at railway intersections, reduced grades, and straightened curves. The roads also improved their rolling stock by buying or building new locomotives and cars, equipping their cars with air brakes and automatic couplers, and installing gas and electric lights on their through passenger trains in place of the dim and dangerous oil lamps.³⁴

The Iowa shops played a major part in the reconstruction of the state's railway system. Their principal functions were to repair and renew rolling stock and to make the materials used in rebuilding roadways. With the rapid growth of specialization, the manufacture of rolling stock had become largely a separate industry, carried on mainly in the locomotive works and car factories of Illinois, Michigan, New York, Ohio, Pennsylvania, and other industrialized states. In 1899, for example, the Iowa shops built no passenger cars and only eight locomotives and thirty-eight freight cars. However, they repaired 62,664 locomotives and 228,415 passenger cars and freight cars. Their bridge and building departments processed much of the lumber, iron, and steel that went into the reconstruction of bridges, tracks, and other structures.³⁵

Railroad construction and repairs had become one of Iowa's principal manufactures by 1900. The value of the shops' products rose from \$4,473,000 in 1890 to \$6,221,000 in 1900, an increase of thirty-nine percent. However, these figures represent only the cost of production (labor, materials, and miscellaneous expenses, such as rent and taxes), whereas

³⁴Iowa Board of Railroad Commissioners, *Report, 1898* (Des Moines, 1899), 4-6, Tables 22-23, 131-132; *Report, 1899*, 3-4, 10-11, 12-13, Tables 22-23, 159-160; *Report, 1900*, 3-6, 9, Tables 22-23, 254-256; also see Richard C. Overton, *Burlington Route: A History of the Burlington Lines* (New York, 1965), 67-70, 106-197, 163-164, 199-201, et passim. The railroads increased their expenditures for the maintenance, repair, and renewal of equipment, roadways, and structures in Iowa from \$11,430,000 in 1898 to \$13,514,000 in 1900.

³⁵Sanborn, "Locomotives," 243-244; Hutchins, "Cars, Steam Railroad," 275, 278-280.

the value of products of the other manufactures discussed so far represent market value. Consequently, comparison of the value of products, the criterion used heretofore to determine the relative importance of industries, can not be applied to the railroad shops.³⁶

Judged by another standard—number of wage-earners and total wages—the shops ranked first among Iowa manufactures. Their average number of laborers rose from 3,812 in 1890 to 5,497 in 1900, while their total wages increased from \$2,121,000 to \$2,948,000 during the decade. The shops varied considerably in size, but frequently they were among the largest employers in their communities. Of the fifty-eight shops in Iowa in 1900, seven employed between 100 and 250 workers each, seven had from 250 to 500 employees apiece, and two employed between 500 and 1,000 wage-earners each.³⁷

Probably no industry was affected more drastically by the rise of industrialism than printing and publishing. The United States Census Office declared in 1900 that the evolution of printing and publishing during the previous decade had been "more extraordinary in its character and in its effects than any similar progress in industry of which this census makes record." Both branches of the industry, newspapers and periodicals and book and job printing, changed rapidly, but the most important change was the spectacular rise of popular journalism. Newspapers and magazines, under the leadership of editors and publishers like Joseph Pulitzer, became instruments of mass communication which built circulation by featuring crusades, human-interest stories, illustrations, interviews, and various kinds of sensationalism.³⁸

³⁶Hutchins, 265-276, 278-279, 282-283; *Twelfth Census*, VIII, 234-235.

³⁷Hutchins, 276, 284-285; *Twelfth Census*, VIII, 234-235. The shops played a vital, and in some cases, a dominant part in the economic life of the communities in which they were located. The location of the Chicago Great Western Railway Company's shops in Oelwein, for example, transformed that community from a village into a town of 5,000 in a few years. "Oelwein is President Stickney's town," commented the *Des Moines Register and Leader*, referring to Alpheus B. Stickney, president of the Chicago Great Western, who moved the company's principal shops from South Park, Minnesota, a suburb of St. Paul, to Oelwein in 1898-1899. *Des Moines Register and Leader*, March 2, 1904; also see James Thomas Craig, "Oelwein Secures the Machine Shops of the Chicago Great Western Railway Company, 1894," *Annals of Iowa*, Third Series, XXIV (January, 1943), 211-235; *idem*, "Great Western Builds Oelwein Shops," *Annals of Iowa*, Third Series XXVI (October, 1944), 90-128.

³⁸*Twelfth Census*, VII, cLii; Frank Luther Mott, *American Journalism. A History: 1690-*

Numerous factors contributed to the rise of popular journalism, including the growth of population, particularly in the cities, the decline of illiteracy, cheap postal rates, fast mail trains, and rural free delivery. However, the new journalism would have been impossible without a series of mechanical inventions and refinements that made possible the mass production and distribution of papers and periodicals selling for only a few cents a copy. Successive improvements in capacity and speed produced presses capable of printing 140,000 sixty-four-page papers an hour. The invention of the linotype mechanized composition, substituting machine-set type for the laborious hand-set method. The manufacture of paper from wood pulp instead of rag pulp reduced the price of newsprint from three cents a pound in 1892, already the lowest price in the history of the paper industry, to one and four-fifths cents in 1897.³⁹

The emergence of popular journalism stimulated the growth of newspapers and periodicals throughout the United States. In Iowa, the number of publications of all classes—dailies, weeklies, triweeklies, semiweeklies, monthlies, and quarterlies—virtually doubled between 1880 and 1900, increasing from 569 to 1,104. Aggregate circulation per issue more than trebled during these years, growing from 547,000 in 1880 to 1,884,000 in 1900 when Iowa ranked thirteenth nationally in aggregate circulation per issue for all classes of newspapers and magazines. Value of products, which was about equally divided between advertising and sales and subscriptions, rose from \$2,088,000 in 1880 to \$3,777,000 in 1900.⁴⁰

The growth of Iowa's newspapers and magazines reflected

1960, 3rd ed. (New York, 1962) Chs. XXV-XXXV; Richard Hofstadter, *The Age of Reform: From Bryan to F.D.R.* (New York, 1955), 185-196.

³⁹*Twelfth Census*, VII, cLi-cLii; Mott, *American Journalism*, 497-501, 506-508, 597-602. The *Twelfth Census* reported that many of the large paper-manufacturing companies had acquired forests during the 1890s and built wood-pulp mills which they operated in conjunction with their paper mills. "Nowhere in industry has there occurred an evolution so striking as that which has entirely changed the source and character of the material used," the Census commented.

⁴⁰William S. Rossiter, "Printing and Publishing," *Twelfth Census*, IX, 1050, 1056. Rossiter's valuation of the products of Iowa's newspapers and periodicals is less than that given in the General Tables of the *Twelfth Census*, which list their value as \$4,935,000. See Vol. VII, 370-373.

the widespread distribution of the state's population in moderately-sized cities, towns, villages, and farms. Responding to urban growth, the number of dailies, which were city newspapers, doubled between 1880 and 1900, increasing from thirty to sixty-five, which corresponded to the state's growth rate in number of newspapers and magazines. However, the dailies' aggregate circulation per issue grew from 38,000 in 1880 to 217,000 in 1900, a sixfold increase which was twice the state's growth rate in readership.⁴¹

The growth rate of the weeklies, which were primarily country newspapers, lagged behind that of the dailies, but the weeklies continued to lead all classes of Iowa newspapers in number and circulation. Their number rose from 500 in 1880 to 831 in 1900, while their aggregate circulation per issue during these years grew from 449,000 to 1,105,000. The preponderance of weeklies in Iowa was characteristic of the Middle West, which the Census of 1900 described as the "chief stronghold" of the weekly.⁴²

Book and job printing, to the extent that it can be separated from the publication of newspapers and periodicals, had become an urban industry by 1900. In villages, towns, and cities of less than 20,000 inhabitants, newspapers did most of the job printing; the newspaper office was also the job office. Only in the larger cities was there enough specialized demand for printing to support a separate industry.⁴³

In Iowa, the products of book and job printers were valued at \$1,086,000 in 1900. Of this amount, the state's eight cities with 20,000 or more people—Des Moines, Dubuque, Davenport, Sioux City, Council Bluffs, Cedar Rapids, Burlington, and Clinton—accounted for \$966,000 or eighty-nine percent of the total. This was somewhat below the national average of ninety-eight percent for cities of 20,000 or more inhabitants. Job printing was by far the most important branch of Iowa's printing industry, accounting for \$949,000 or eighty-seven percent of the industry's value of products. The remaining \$137,000 were scattered among books and pamphlets, book-

⁴¹Rositer, "Printing and Publishing," 1061, 1068-1069.

⁴²*Ibid.*, 1061, 1068-1069, 1075.

⁴³*Ibid.*, 1039.

binding, blank books, and miscellaneous products.⁴⁴

Des Moines was the printing and publishing center of Iowa. The transfer of the state capital from Iowa City to Des Moines in 1857 generated a demand for large amounts of official printing, which stimulated the growth of job printing. The growth of the city's insurance companies, led by the organization of the Equitable Life Insurance Company of Iowa in 1867 and the Banker's Life Company in 1879, provided additional work for the job printers. In 1900, the products of the twenty-two printing plants in Des Moines were worth \$463,000, which constituted forty-three percent of the total value produced by the state's printing industry.⁴⁵

Even more important for the development of printing and publishing in Des Moines was the growth of locally-published farm journals and newspapers geared to the interests and needs of farmers and townspeople throughout Iowa. The founding of the *Iowa Homestead* in 1881, *Wallaces' Farmer* in 1896, and *Successful Farming* in 1902 made Des Moines one of the nation's leading centers of agricultural journalism. Meanwhile, Coker Clarkson and his sons, James and Richard, had announced their intention to make the Des Moines *Register* (then the *Iowa State Register*) "the daily as well as the weekly paper of the enterprising and intelligent citizens of every city, town and farm neighborhood in the state." Under the able leadership of the Clarksons and their successors, Gardner Cowles, Sr., and Harvey Ingham, the *Register* became Iowa's most widely-read newspaper with a circulation of 35,000 in 1910.⁴⁶

The various industries manufacturing foundry and machine-shop products were a broad and diverse group, which defy exact classification. They made engines, machinery, machine tools, stoves and ranges, structural iron and steel, vehicles, and countless other articles. The foundries and

⁴⁴*Ibid.*, 1084-1086, 1108-1109. Rossiter's valuation of the products of Iowa's book and job printers is less than that given in the General Tables of the *Twelfth Census*, which list their value as \$1,210,000. See Vol. VII, 366-369.

⁴⁵Rossiter, 1084, 1086; Howard J. Nelson, "The Economic Development of Des Moines," *Iowa Journal of History*, XLVIII (July, 1950), 203-204, 210-212.

⁴⁶Nelson, 212-214; George Mills, "The Des Moines Register," *Palimpsest*, XXX (September, 1949), 273-304; also see Cyrenus Cole, *I Remember, I Remember: A Book of Recollections* (Iowa City, 1936), 133-145, et passim.

machine shops of Iowa raised the value of their products from \$3,432,000 in 1890 to \$4,460,000 in 1900, an increase of thirty percent. However, the manufacture of foundry and machine-shop products in Iowa was far more important than these figures indicate, for they do not include the products of allied industries whose operations required the casting and processing of iron and steel but which were classified separately in the Census of 1900.⁴⁷

Particularly important among the allied industries was the manufacture of farm implements, motive-power appliances, and metal-working machinery. Foundries and machine shops were an integral part of the organization and operation of the farm implement industry. The principal business of the implement factories was the manufacture of machinery to till the soil, plant or sow the seed, harvest the crops, and prepare the crops for market. Incidental to the manufacture of these machines, however, the implement factories made numerous farm-related foundry and machine-shop products, such as dairy machinery, grinding mills, grubbing machines, portable sawmills, portable steam engines, pumps, wagons, well-boring tools and castings, and windmills.⁴⁸

The manufactures of motive-power appliances and metal-working machinery were, in effect, specialized branches of the foundry and machine-shop industry. The principal motive-power appliances were steam boilers, steam engines, internal-combustion engines, and water wheels. The manufacture of metal-working machinery comprised the various power-operated machines that were used to bend and straighten, bore and drill, forge, grind and polish, hammer, punch and shear, rivet, stamp, and thread metal bars, castings, plates, rods, sheets, and wire. The Census of 1900 was the first to tabulate metal-working machinery separately; previous census reports had classified these machines as foundry and machine-shop products.⁴⁹

None of the three allied industries ranked among Iowa's

⁴⁷*Twelfth Census*, VII, 210-213, 258-261, 410-413, 695; VIII, 234, 236.

⁴⁸Joseph D. Lewis, "Agricultural Implements," *Twelfth Census*, X, 343-344, 347, 353-354.

⁴⁹Edwin Sanborn, "Metal-Working Machinery," *Twelfth Census*, X, 381-383; *idem*, "Motive-Power Appliances," *ibid.*, 391.

top manufactures. Taken together, however, they formed an important segment of the state's industry. The aggregate value of their output, which was \$3,400,000 in 1900, must be taken into account in considering the pervasive influence of foundry and machine-shop products in Iowa's industrial development.⁵⁰

STEADY GROWTH, urbanization, and consolidation continued to characterize Iowa manufacturing as it moved into the twentieth century. The value of the state's manufactured products virtually doubled between 1899 and 1909, rising from \$132,871,000 to \$259,238,000 during the decade.⁵¹ However, these figures must be discounted to allow for rising prices, which were as much or more responsible for the growth in value as increasing output. Iowa's production of cured and salted pork, for example, grew in value from \$15,369,000 in 1899 to \$24,852,000 in 1909, an increase of thirty-eight percent. However, the quantity of cured and salted pork produced in the state climbed only from 206,036,000 pounds in 1899 to 219,106,000 pounds in 1909, an increase of six percent.⁵²

Another notable example of price inflation was the butter industry. The value of Iowa's creamery butter advanced from \$14,911,000 in 1899 to \$24,440,000 in 1909, an increase of thirty-nine percent. Yet the quantity of the state's creamery butter grew only from 77,233,000 pounds to 88,582,000 pounds, an increase of thirteen percent for the decade. In

⁵⁰Lewis, "Agricultural Implements," 345; Sanborn, "Metal-Working Machinery," 381, 383; *idem*, "Motive-Power Appliances," 392-393. Davenport led Iowa in the production of foundry and machine-shop products, manufacturing axles, farm implements, metal wheels, ornamental iron work, steam engines, and steel sideframes and underframes for railroad freight cars and other vehicles. The products of the city's eleven foundries and machine shops were valued at \$1,008,000 in 1900. Thomas P. Christensen, "An Industrial History of Scott County: The Middle Period, 1865-1900," 293-294; *idem*, "An Industrial History of Scott County: The Twentieth Century, 1900-1936," *Annals of Iowa*, Third Series, XXII (July, 1940), 369-370; *Twelfth Census*, VIII, Table 8, 245-255.

⁵¹*Abstract of the Thirteenth Census with Supplement for Iowa*, 683, 700-701. The *Twelfth Census* listed the value of Iowa's manufactured products in 1899 as \$164,617,000, some \$32,000,000 more than the *Thirteenth Census*. This was because, as explained in footnote 8, the *Twelfth Census* included the hand trades as well as the factory industries, whereas the *Thirteenth Census* limited its tabulation to the factory industries, revising the 1899 figures accordingly for comparative purposes. The discrepancy between the two reports illustrates the pitfalls involved in using the census reports to make comparisons.

⁵²*Abstract of the Thirteenth Census with Supplement for Iowa*, 477-478, 684, 697.

some cases, rising prices camouflaged falling production. White wheat flour milled in Iowa rose slightly in value between 1899 and 1909, increasing from \$7,632,000 to \$7,814,000. However, production fell sharply, declining from 2,273,000 barrels in 1899 to 1,493,000 barrels in 1909.⁵³

As the above figures suggest, growth rates varied considerably from industry to industry. Wholesale slaughtering and meat packing consolidated its leadership in Iowa by raising the value of its products from \$25,763,000 in 1899 to \$59,045,000 in 1909. These figures represented a gain of 129 percent over the decade and raised the industry's proportion of the state's manufactured wealth from sixteen percent in 1899 to twenty-three percent in 1909. Iowa packers improved their national standing by climbing from eighth to sixth place among the nation's meat packers. The manufacture of creamery butter continued to be Iowa's second most valuable industry, but the state's creameries lost their national leadership to those of Wisconsin, falling into a second-place tie with the Minnesota creameries. Foundries and machine shops surged into third place with the fastest manufacturing growth rate in Iowa. The value of their products jumped from \$5,511,000 in 1899 to \$14,064,000 in 1909, an increase of 156 percent. Only the railroad construction and repair shops employed more laborers than the foundries and machine shops whose wage-earners made up eight percent of the workers employed in Iowa's manufacturing industries in 1909.⁵⁴

Flour and gristmill products barely held their own, rising in value only from \$11,012,000 in 1899 to \$12,870,000 in 1909. The decline of sawmilling caused lumber and timber products to lose ground both absolutely and relatively. The value of their products fell from \$14,635,000 in 1899 to \$12,659,000 in 1909 when planing-mill products accounted for most of the value of the industry's output. Printing and publishing moved into sixth place by raising the value of its products from \$6,229,000 in 1899 to \$12,129,000 in 1909. This was largely due to continuing growth in the circulation of

⁵³*Ibid.*, 475, 476-477, 697-698.

⁵⁴*Ibid.*, 684-685, 697-698, 700-701; Lampard, *The Rise of the Dairy Industry in Wisconsin*, Appendix, Table B-2, 449.

newspapers and periodicals. Aggregate circulation per issue more than doubled between 1899 and 1909, climbing from 1,884,000 to 3,806,000. The railroad construction and repair shops rounded out Iowa's seven most important manufactures, increasing the value of their products from \$6,221,000 in 1899 to \$10,269,000 in 1909. The shops continued to be the state's leading employers of industrial labor, their 6,969 wage-earners comprising eleven percent of Iowa's industrial workers in 1909.⁵⁵

The urbanization of industry, already clearly evident in Iowa in 1900, became even more pronounced during the next decade as manufactures gravitated to the state's larger cities. The industrial growth rate of cities with populations of 25,000 or more was considerably greater than that of cities with populations of 10,000 to 25,000. The former increased their proportion of the number of manufacturing establishments from seventeen percent in 1899 to twenty-four percent in 1909; of wage-earners, from thirty-nine percent to forty-seven percent; and of value of products, from forty-one percent to fifty-four percent. In contrast, cities with 10,000 to 25,000 people had the same relative number of manufacturing establishments in 1909 as in 1899 (twelve percent each year), while their proportion of wage-earners and value of products both declined during the decade: the former from twenty-eight percent to twenty-six percent and the latter from twenty-six percent to nineteen percent.⁵⁶

There were some notable exceptions to these trends. Of Iowa's seventeen cities with populations of 10,000 or more in 1909, Council Bluffs was the sixth largest with 29,292 people but ranked thirteenth in value of products with \$3,768,000. Almost the reverse was true of Ottumwa which stood tenth in population with 22,012 inhabitants but sixth in value of products with \$14,838,000. In the final analysis, a city's industrial growth probably depended more on the nature of its industries than the size of its population. Ottumwa ranked high in Iowa's industrial hierarchy because it was second only to

⁵⁵*Abstract of the Thirteenth Census with Supplement for Iowa*, 684-686, 698, 700-701.

⁵⁶*Ibid.*, 689-690.

Sioux City in wholesale slaughtering and meat packing.⁵⁷

The trend toward large-scale corporate enterprise also became more pronounced between 1899 and 1909. Consolidation of ownership and operation went hand in hand with urbanization. Individuals and firms continued to own and operate most of Iowa's manufacturing establishments in 1909, but the corporations consolidated their domination of all other phases of the state's manufacturing between 1899 and 1909. They owned and operated only twenty-four percent of the factories in 1909 but employed seventy-four percent of the laborers and produced seventy-three percent of the manufactured wealth. Factories with an output valued at \$100,000 or above constituted only seven percent of Iowa's manufacturing establishments in 1909 but employed sixty-one percent of the state's industrial laborers and manufactured seventy-two percent of the total value of industrial products.⁵⁸

The outlines of twentieth-century industrialism were clearly discernible in Iowa by 1910. The manufacturing industries had broadened the scope and quickened the pace of the state's economic growth. The gathering momentum of industrialization was to become increasingly important in building the stable, well-balanced economy that distinguishes Iowa today.

⁵⁷*Ibid.*, 690-691.

⁵⁸*Ibid.*, 691-693.

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