REVERSALS IN INDUSTRIAL FORTUNE: A TALE OF THE FOX CITIES AND OSHKOSH

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ABSTRACT

This article chronicles the 19th Century origins of the manufacturing sectors of Oshkosh, Wisconsin, and the Fox Cities of Wisconsin. Despite close geographic proximity and the common bond of the Fox River, these communities have followed different paths of manufacturing. The Fox Cities developed a large and profitable flourmilling sector which almost disappeared by the beginning of the 20th Century. Oshkosh Manufacturing focused on lumbering and wood products. Despite being relatively inefficient, these manufacturers were very slow to disappear. Fox Cities industries evolved from flourmilling to the paper industry which has proven to be a prosperous industry, compared to lumbering and wood products.

The cities of the Fox River in Northeast Wisconsin include Green Bay as the river enters the Bay of Green Bay as well as other cities further up the river such as Oshkosh, Neenah, Menasha, Appleton, Kaukauna, and numerous smaller towns. This is a region with one of the highest concentrations of manufacturing employment in the United States. Over forty-seven percent of nonfarm earnings in Winnebago County, which includes Oshkosh, Neenah and Menasha, are manufacturing earnings.

Neenah, Menasha, Appleton and Kaukauna are known, collectively, as "The Fox Cities." The Fox Cities are commonly held to be culturally and economically superior to their 'underprivileged' cousin, Oshkosh, because of numerous white collar jobs, enviable public services, private colleges, large corporate headquarters and greater per capita income. This cultural divide is witnessed, for example, by the local custom of not including Oshkosh as one the "The Fox Cities," despite Oshkosh's presence on the Fox River and its close proximity to its neighbors. (See Figure 1 for a view of the locations of these cities) The relative economic status of these regional competitors is rooted in structural economic developments that took place in the 19th Century. These structural changes were the epitome of Joseph Schumpeter's writings a half century later when he wrote of "the perennial gales of creative destruction," that are the source of economic development in a capitalist society.[1] These cities experienced events over a hundred years ago, which set their courses for economic development during the Twentieth Century. This study is designed to identify these sources of economic change that occurred in the late decades of the 19th Century.

The Fox River

The Fox River was the center of most of the important events in the region. In the days of the early French explorers fur trade was the major economic activity in the region. These early explorers first focused on the early dream of discovering a water route to the western ocean. The discovery of the mouth of the Fox River at Green Bay and the short (two miles) portage to the Wisconsin River which flows into the Mississippi River briefly raised French hopes of a short cut to the great western ocean. Years later this proved to be an important smuggling route for fur traders in the late 18th Century.[2]

Although the lower Fox River has the superior characteristics for waterpower, it was the last section of the river to be settled and fully exploited by industry. Initially the Fox River with its tributary Wolf River, became a primary reason for the location of the sawmills in Oshkosh. Oshkosh's location was a fortuitous combination of dense timberland, The Wolf River Pineries, and exceptional water resources for transportation of cut logs to the Oshkosh sawmills.

The development of flour mills in the Fox Cities began in the 1850's, approximately the same time as the Oshkosh lumber industry, but these mills were disappearing when lumbering in Oshkosh plateaued in the 1880s. Paper mills replaced the flour industry in the Fox Cities while Oshkosh sawmills began to face problems diminishing sources of logs, among other problems. These industry adjustments and other events set the economic cast for the next century in this region.[3]

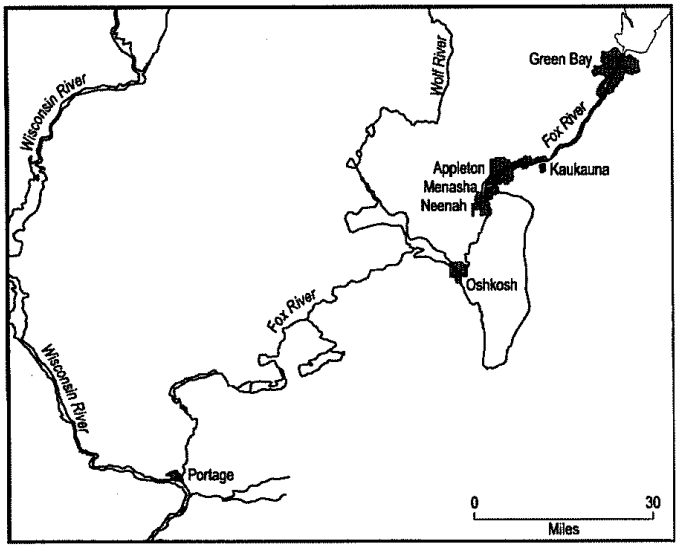

Figure 1: Cities of the Fox River Valley
in Northeast Wisconsin

Lumber Industry

The historical pattern of regional lumber production has been one of an ever shifting industry in the U.S. From the early colonial period until 1850 Maine was the leading lumber producing state. Then the regional movement of the industry increased as the nation's population moved and the supply of available timber changed. New York was leading lumber producing state from 1850 to 1860, producing twenty percent of the nation's lumber. Pennsylvania followed as the lead producer from 1860 to 1870. The industry next moved to the Lake States—Michigan, Wisconsin and Minnesota—with Michigan the lead state in 1980 and Wisconsin in 1890. Lake States lumber production peaked in 1892 at a level of over nine billion board feet.[4]

Statistics on quantities of local lumber production vary from source to source. It is probable, however, that Oshkosh lumber production was over six billion feet of logs during its heyday from 1860 to 1910. The Paine Lumber Company, alone, accounted for over one billion feet. These data only represent lumber production and do not include the production of wood shingles and lath which were very important in the late 19th and early 20th Centuries.

After 1850 things began to speed up in the lumber industry. While the first sawmills were located in Neenah and Menasha, it soon became apparent that Oshkosh had a great advantage in the location of sawmills. The first sawmills in Oshkosh began operations in 1857. By 1872 there were twenty-four sawmills in Oshkosh.[5] In 1878 there were twenty-eight sawmills in Oshkosh.

The Oshkosh location advantage was based on its close proximity to the boom bays used to collect and sort logs of the various lumber interests that had been floated down the Wolf River. The Wolf River Pinery is estimated to have held an original stand of about 7 billion feet. Most of this ended up in Oshkosh sawmills. Oshkosh's sawmills advantage over the Fox Cities existed because it sits next to two large lakes, (Lakes Poygan and Butte des Morts) which serve as excellent grounds for sorting the logs which have been floated down the Wolf River from the forest.[6]

The slow muley saw disappeared after the 1850's despite the use of steam power which increased production of the saw. Evidence of new sawing technology appeared in the area in 1850 with the introduction of a buzz saw. It was reported that this saw cut a twelve inch log, fourteen feet long, six times in five minutes. At continuous operation this totaled perhaps eight thousand feet in a twelve-hour workday. This represented an increase in output of at least ten times that of the muley saw.[7] It was the circular saw which cut eighty thousand feet of lumber per day that substantially increased lumber production later in the 1870's. This was followed by the band saw, which was even cheaper to operate, but cut lumber more slowly. Large sawmills often operated combinations of these saws. The largest of these sawmills in Oshkosh, The Paine Lumber Company, used a pair of double band saws and two sets of gang saws. In these combinations, the mill could cut, in a twenty hour period, five hundred thou-

sand feet of lumber. Several Oshkosh mills had production capacity of near this amount.

American logging techniques represented a wholesale invasion of forestland completely without regard to thoughts of resource depletion. Sawing waste probably increased during the 19th Century as production technology improved. The old, inefficient, slow, muley saw caused little waste because it cut wood straight due to its being fixed at both ends. The fast and, hence, efficient circular saw was fixed only at its center and hence tended to wobble as it turned. This wobble of the saw blade resulted in a wide cut in the log. This problem was aggravated when double saws were used when logs greater than two feet in diameter were cut. As long as timber was plentiful and available at low cost wasteful production techniques were compensated by high cutting speeds. It wasn't until the end of the 19th Century that high speed band saws became widely used. These saws cut a narrower line than the old muley saw, but ran at speeds similar to circular saws. In addition they handled large logs very efficiently.[8]

The local market for sawed lumber increased because of the rising population and the "export" market for Oshkosh wood products increased after 1860 because of the arrival of railroad lines connecting Oshkosh mills to Milwaukee, Chicago and the rest of the country. With its excellent position on the river and with rail outlets to the south after 1859 Oshkosh became the second leading city in the state, threatening to overtake Milwaukee.[9]

Oshkosh production volumes were prodigious. In 1860, eleven sawmills produced 27 million feet of pine lumber; 9 million shingles and substantial quantities of sash and doors. By 1866, Oshkosh mills produced 85 million feet of lumber, 80 million shingles, and 14 million laths. It had also been reported that in 1864 Oshkosh manufactured timbers for war-damaged bridges in East Tennessee amounted to "seven car loads of lumber each day for forty days which were sent to Chattanooga."[10]

The combination of wasteful lumbering methods and booming markets for wood products led to a rapid depletion of white pine from the Wolf River Pinery, as well as other 'pineries' in the country. Maine had been the leading lumber producing state from early colonial times until 1850. New York was the leading lumber state in the 1850s followed by Pennsylvania in the 1860s. Lake States lumbering dominated in the last three decades of the century with Michigan the lead state in 1880. Wisconsin was the leading state in lumber production in the U.S. in 1890. By 1920, however, the state was ranked tenth in lumber production.[11] Wisconsin white pine had been the objective of the first loggers, to the exclusion of the state's hardwoods. After 1890 when reduced freight rates permitted long distance transportation of pine logs from southern states, loggers began to focus on Wisconsin hardwoods to supply the wood manufacturing firms that earlier had relied on pine lumber.[12]

The mid-19th century economy of communities in the Fox River Valley principally attended to providing the basics needs of life: food, clothing and shelter. Consequently manufactures of wood and food products dominated industrial life of that period. In 1870, sawmills and wood products manufactures produced slightly more than one-

fourth of the total manufacturing output of Winnebago County. Even more impressive was the output of flour mills which amounted to over half of the county's total manufacturing output in 1870.[13]

The structure of the economies in Winnebago and Outagamie during 1879 is outlined in Table 1. Sawmills and wood products manufacturers provided the bulk of employment opportunities with 1,681 hands employed during the year, out of a total number of 2,760 hands employed in manufacturing in Winnebago County. It was the Flour Industry that was the most surprising as it accounted for nearly $2.5 million of production in the county, compared to almost $3 million of production in the Sawmill and Wood Products Industries. It is apparent that capital and labor were much more productive in the Flour Industry than in the Sawmill or Wood Products Industries. It should be noted that of the 17 Winnebago County firms in the Flour Industry, only one was located in Oshkosh, and it was a small operation. On the other hand, almost all of the Winnebago County sawmills were located in Oshkosh. A telling statistic for Oshkosh was the low productivity of invested capital in Winnebago County sawmills. Table 1 demonstrates that these sawmills had more than twice the invested capital of the Flour Industry, but produced less than half the Value of Product that the Flour Industry produced.

The information in Table 1 also shows that the Outagamie County manufacturing industry was approximately one-third the size of that found in Winnebago County, in terms of invested capital and manufacturing employment. The table provides a clue to the future of Outagamie County by identifying the fledgling paper industry as its greatest source of manufacturing employment and the industry with the greatest amount of invested capital. However, the Flour Industry in Outagamie County provided the largest share of total manufacturing output with $857,890 in 1879.

The Flour Industry

The historical location pattern of the flour industry runs very similar to the lumber industry. Lumber and wheat are both weight losing products in the manufacturing process. Hence both products have a tendency to be processed at locations closer to the source of the resource than to the point of final consumption. Sawmills tend to be located close to forests. Flour mills tend to be located close to wheat fields vis-à-vis the consumer.

Despite these gravitational pulls, flour milling has shifted west in the United States with the shift in the population. 19th Century milling began in cities such as Philadelphia and then migrated to Rochester, New York which had eighteen mills by 1835. However, Rochester suffered several calamities e.g. bankruptcies, fires, which seem common to many cities of the day causing local investors to lose their money while creating market opportunities elsewhere. Milling locations developed in several Ohio cities and in St. Louis. In 1841, St. Louis millers began operation, and by 1860 they were producing over 800,000 barrels of flour per year. The St. Louis flour success was

due to its success in processing soft winter wheat. At the same time spring wheat production was increasing in Wisconsin, allowing Milwaukee to develop into a moderate flour milling center producing 178,000 barrels of flour in 1860. By the late 1860's Milwaukee was producing over half a million barrels and was challenging the lead of St. Louis millers.[14]

Table1. Winnebago and Outagamie County Manufacturing Statistics – 1880 Winnebago County

Industry	# Firms	Invested Capital	Average Number of Hands	Total Annual Wages	Value of Materials	Value of Product
Flour Industry						
Flour & Gristmills	17	498,500	132	55,339	2,317,069	2,475,427
Sawmill Industry						
Lumber, planed	2	11,000	6	2,600	22,000	26,000
Lumber, sawed	28	1,172,500	631	154,829	864,775	1,224,214
Wood Products Industry						
Cooperage	12	65,900	287	94,535	142,900	288,465
Furniture	10	49,300	46	15,735	24,050	64,640
Matches	1	325,000	370	56,200	454,800	532,932
Sash, Doors, Blinds	10	439,000	341	121,701	549,732	835,120
Paper Industry						
Paper	5	223,000	196	72,840	284,600	428,000
Other Manufacturing Industries						
Brick & Tile	6	19,700	74	9,515	6,925	27,600
Carriage & Wagon Materials		125,000	180	53,000	110,000	180,000
Carriages & Wagons	10	80,975	189	71,268	195,684	319,600
Clothing, Mens	9	90,000	153	48,708	92,300	190,579
Foundry & Machine Shop Products	12	178,500	155	71,341	96,617	243,018
Total.....	123	$3,278,375	2,760	$ 827,611	$5,161,452	$6,835,595
Outagamie County						
Flour Industry						
Flour & Gristmills	13	233,000	64	24,895	740,390	857,890
Sawmill Industry						
Lumber, Sawed	15	225,500	134	39,105	218,664	312,068
Wood Products Industry						
Cooperage	5	4,800	32	12,850	20,300	46,500
Furniture	2	25,600	92	35,375	22,400	68,300
Sash, Doors & Blinds	4	27,100	20	8,100	8,400	21,700
Paper Industry						
Paper	4	515,000	272	113,615	353,250	603,736
Wood Pulp	3	64,000	48	16,564	21,948	76,000
Other Manufacturing Industries						
Carriage & Wagon Materials	5	88,000	88	35,800	48,800	122,000
Carriages & Wagons	3	12,000	13	5,800	8,000	20,000
Clothing, Mens	5	8,850	42	10,850	19,575	37,000
Foundry & Machine Shop Products	2	29,000	19	7,800	12,500	27,000
Total.....	61	$1,232,850	824	$310,754	$1,474,227	$2,192,194

Source: *1880 Census of Manufactures*

*The 'Output-Capital Ratio' is equal to Industry 'Value of Product' divided by 'Invested Capital' from Table 1.

** 'The Value Added to Capital Ratio' is equal to Industry 'Value Added' divided by 'Invested Capital'. Value Added is equal to Value of Product minus Value of Materials and Total Annual Wages as shown in Table 1.

Flour milling never came to Oshkosh to any significant degree, but it was very evident in the Fox Cities, especially in Neenah and Menasha. The lumber industry located in Oshkosh because the Fox River flowed slowly through the city allowing the

easy maneuvering of floating logs. The flour milling industry located in the Fox Cities because the river flowed rapidly through these cities. In fact it was the rapids and waterfalls through these cities which provided the energy to power the flour mills.

The Federal Government's outpost on Winnebago Rapids (Neenah) produced a small amount of grain in the 1830's and was eventually privatized in the 1840's. As the region's population began to increase the market for wheat grew. In the 1850's Fox Cities millers were able to supply the entire local market and were able to export flour to other markets through the lower Fox River to Green Bay. High profits served as an inducement to investors to build additional flour mills. There were six mills in Neenah and two mills in Menasha by 1860 producing 50,000 barrels of flour annually.

The Civil War increased the demand for Fox Cities flour. As railroads were built into the region, millers were able to ship flour during the winter months when prices were normally higher. Prior to the arrival of the railroads frozen water routes prevented local millers from taking advantage of high winter flour prices.[15]

These seemed like exciting times. Fox Cities leaders were hoping to overcome the industrial lead of Oshkosh by hosting additional flour mills and seeing increasingly large and profitable operations from its existing mills. Chamber of Commerce boosterism was evident in the local newspaper when it was speculated that if the mills were to run year round, production could "easily" reach 300,000 barrels per year. "The figures show a flour trade surpassing in magnitude that of any five cities in the whole Northwest. And there is waterpower still unoccupied, which in time, if used, will make our yearly shipments of flour reach up into millions of barrels."[16]

There was, perhaps, some justification to the optimistic outlook for the flour milling industry. During the 1860's the Fox Cities saw six new mills go into business while Milwaukee experienced only one new mill in operation. The Fox Cities were receiving new rail connections, being served by three large railroads in 1870. They were then in a better position to receive wheat from farmers in the Rock River Region of southern Wisconsin, the source of wheat for Milwaukee millers. Flour milling in these Fox Cities increased 500 percent during the 60's.[17]

Flour milling was an industry that experienced very little technical improvement prior to the Civil War. Milling techniques in the Fox Cities were similar to those in the leading mill towns of the country, including St. Louis. The "flat" grinding process as it was known consisted of crushing the wheat between two large stones with as much pressure as possible to produce as much ground flour as possible. The problem with the technique was that pieces of wheat bran were so pulverized that they could not be separated from the flour, even with extensive sifting or other separation attempts. This system of processing wheat into flour was best suited for winter wheat which has a softer kernel. The soft kernel could be crushed with less pressure from the stone. Thus, the starch was converted into flour with less bran contamination. Furthermore, this flour was easier to clean because the broken pieces of bran were quite large and hence easier to separate from the flour. Thus, mills with access to the winter wheat were able to produce a higher quality flour. Improved varieties of winter wheat were

being introduced to northern wheat producing areas. However, it is evident, now, that further development of the flour industry in the north was limited until improved methods of processing hard spring wheat were devised. Consequently, the nearness of St. Louis to the winter wheat growing areas allowed it to maintain a strong lead over northern milling areas.[18]

Fox Cities residents retained great hopes for their communities as a growing flour milling center. The area had abundant water power resources which were still the dominant source of energy for flour mills in other parts of the country. Its simple technology allowed for relatively modest sums of capital allowing for this form of manufacturing to grow in undeveloped areas of the country where there was little capital available. This is not to say that members of the Flour Industry were not trying to improve their methods of production. Several local improvements such as the development of the suction smut machine and separator for cleaning grain and an improved flour packer to increase barrel capacity were examples of local developments. Most notable however, was the effort by John Stevens, a Neenah miller, who developed a grooved steel roller which enabled him to produce a flour of extremely high quality. He first operated his mill in 1874, but did not receive a patent for this invention until 1880. He and other members of the local industry, however, who were probably keeping their eyes out for industry trends were beginning to see the writing on the wall. They understood they were going to have trouble from the West.[19]

Flour Competition From Minneapolis

Developments two hundred fifty miles to the west of the Fox Cities in the 1870's dictated harsh terms of development which rather quickly destroyed the Fox Cities Flour Industry. The inauspicious beginning of the Minneapolis flour industry did not give cause for an early concern to Fox Cities millers.

Minneapolis milling began because of the water power available at St. Anthony Falls, on the Mississippi River, at a government mill. However, Minneapolis millers suffered from wheat shortages, who resorted to shipping it up the Mississippi River from Iowa and Missouri farmers. Thus, early Minneapolis industrial development paralleled the experience of the Fox Cities industries. Abundant water power was available. Consequently, both lumber and flour mills were initially present in Minneapolis. However, by the time of the Civil War flour milling was the main industry, although it was still very small. Production grew to 200,000 barrels of flour in 1870, putting it on a level comparable to the Fox Cities' mills.

While Fox Cities residents were optimistic about their economy, Minneapolis residents were considerably less so. The market for Fox Cities flour was growing, but Minneapolis flour was not yet transported to distant markets. Most local capital seemed to be moving into other industries. In fact, a proposal to build a railroad from Lake Superior to St. Paul was frowned on (despite the possibility of opening up export markets to local mills) because the railroad would be terminating on the other side of the

Mississippi River in St. Paul, a rival community.[20] But it was the decision of several entrepreneurs, in Minneapolis, that doomed the flour industry of the Fox Cities. Almost immediately after the Civil War these entrepreneurs[21] began about a five year process of improving on a known European milling technique of gradual reduction of the wheat kernel to flour. Called the New Process, this technique employed multiple grinds of the wheat using less pressure to result in a means of milling spring wheat on a large scale. In 1873, a large new mill was constructed in Minneapolis, and it was immediately successful. Although the new milling process was much slower than the old one it more than compensated by producing an extremely high quality flour. These entrepreneurs tried to keep the New Process a secret, but other Minneapolis millers were quick to copy this innovation in milling techniques.[22]

An indication of the early sophistication of the Minneapolis millers is that they formed a buying pool (cartel), with eighteen of the twenty Minneapolis mills participating. This group was successful at diverting grain supplies from other millers and obtaining grain at lower prices than if they negotiated arms-length prices individually. The also cooperated with the building of a second railroad from Minneapolis. The railroad to Lake Superior created substantial traffic to Duluth, thus providing competition to Chicago as a regional port. Furthermore, the Minneapolis, St. Paul and Sault Saint Marie (the Soo Line) was constructed across northern Wisconsin and Michigan and connected to the Canadian Pacific, thus giving Minneapolis shippers direct access to foreign ports as well as leverage against the high freight rates charged by the Chicago and Northwestern on shipments to Chicago.

A final factor contributing to the demise of Fox Cities flour mills was the realization that the successful adoption of the New Process required a large investment of capital. Throughout most of the 1870's milling experts were convinced that an annual output of 100,000 barrels of flour was too large a scale to maintain low costs of operation. However, in the 1880's it was realized that larger mills enjoyed several advantages: independence from local sources of raw material, sales were possible over a wide market area, an increased ability to negotiate reductions in freight rates, and the opportunity for large orders that existed in international trade.[23]

The manufacturing statistics shown in Table 1 demonstrate that the level of capital required to successfully operate a flour mill had been quite modest due to the simple machinery required in milling up to that point in time. The flour mills in Winnebago County averaged less that $30,000 of invested capital while sawmills averaged over $40,000 each. The 1880 Census data show that the similar establishments in Outagamie County were smaller than those in Winnebago County. This difference is owed to the more immature economy in Outagamie County. The difference in the maturity levels of these two counties is due to the earlier mentioned difficulty businesses had in establishing themselves on the rapidly flowing part of the Fox River, as well as the fact that railroads reached Outagamie County a few years later than they reached Winnebago County. Thus, the economic birth of Outagamie County's was delayed past that of Winnebago County.

The consequence of these developments was a multiple-fold increase in Minneapolis flour production. Production grew from 193,000 barrels in 1870 to over 2 million barrels in 1880. By 1890 flour production reached nearly 7 million barrels in Minneapolis. The combination of large-scale capital investment, new transportation routes and the innovative application of milling technology destroyed the dreams of Fox Cities residents who had imagined their city gaining in importance as a milling center. While some of the mills remained in operation after the turn of the century, it is now apparent that a number of local flour mill entrepreneurs knew the end was near.

The Paper Industry of the Fox Cities

Several factors contributed to the demise of the local flourmills, including the need to modernize existing facilities, the loss of a source of supply of wheat and high opportunity cost of continued flourmill operations.[24] In regard to this latter point, it may be argued that faced only with difficulties such as high costs or declining sources of raw materials, the mill owners may have continued to struggle against the market forces and may have lost all their capital.[25] However, the extremely high opportunity cost of lucrative profits in the fledgling paper industry encouraged many of them to give up flourmilling without much of a fight. These decisions, collectively, to convert from flourmilling to papermaking ensured the ultimate success of the Fox Cities communities as a healthy manufacturing region.

The first paper mill in the Fox Cities was built in 1853 by Charles Richmond. Its founding was important mostly because it brought skilled papermakers from the East to the Fox Cities. It produced a course rag paper and straw wrapping paper. Early paper production was distributed entirely to local customers. The mill burned in 1859 and was rebuilt. It eventually produced 8,000 pounds of paper a day by 1864. This mill continued in operation until 1890. A second mill was not built until 1865 in Neenah. It produced 3,000 pounds of paper a day using rags as raw material. Subsequent mills constructed in the next ten years were also built to make wrapping paper from straw. Production techniques have been characterized as primitive at that time, compared to those used by mills in the East.[26] Despite local inefficiencies existing papermakers managed to make money. Knowledge that improved production technologies existed and the understanding that the region contained all of the natural resources necessary for the successful growth of a paper industry led to optimism for the future potential for the industry. The timing of the the Minneapolis threat to the local flourmills added further encouragement for local millers to reconsider their investments, despite their own prosperity. The first group to make the switch from flour milling to paper production was John Kimberly, Charles Clark, and Havilah Babcock. Kimberly and Babcock were part owners of the largest Neenah flourmill at that time. The Kimberly-Clark mill (Babcock was kicked out of the company due to management disputes) was called the Globe Mill and was extremely successful selling newsprint.[27] Most of the newsprint in the Midwest was purchased from mills on the Atlantic coast.

Newsprint from the Globe Mill were easily sold to Midwestern markets at competitive prices while earning the partners a substantial return.

The success of the Globe Mill in the 1870's and subsequent years was due to the ownership belief that earnings should be retained in the business for the purpose of expanding whenever possible, even during recessions. Purchases of neighboring mills and additional land made the Globe the largest in the city by 1876. In 1878 Kimberly and Clark attempted to obtain additional water power by offering existing landowners owners attractive prices. The refusal of the existing owners to accept what historians have suggested were attractive offers had the effect of determining that Neenah would not dominate the region, industrially. An editorial in the paper blamed local leaders for not helping to ensure that an important industry remain in the community.[28] This was an early recognition that success or failure of future local economic development rested in the decisions by local leaders regarding the use of water power.

Investors in the Paper Industry benefited from several local conditions which served to further encourage them to move out of flour production. Not only was Minneapolis serving as a competitor in purchasing wheat from the new wheat producing areas of the Great Plains, but former sources of wheat in Wisconsin were disappearing as farmers switched from grain farming to dairying. In addition, the topography of the Fox Cities, Neenah and Menasha in particular, was level. This allowed the location of paper machinery in a straight line. It was not necessary to carve out sides of hills or to invest in complicated conveyor systems to connect the different stages of paper production. This fortuitous condition helped to hold down construction costs of new paper mill operations. This list of advantageous features does not include the use of the Fox River as an important power source or as a basic resource in the papermaking process. It should also be noted that since the owners of the existing flour mills controlled access to the Fox River, they already owned the best sites available for paper production. Other raw materials such as rags and straw to be used as raw material were also available in sufficient quantities.

But it was perhaps the location of the Pineries of the Wolf River that eventually became a major advantage to the Fox Cities paper mills. Wood pulp was used in the 1860s as paper stock on only an experimental basis in some Eastern mills. All efforts to utilize wood pulp in mass production had failed due to high costs and mechanical problems. During the 1870s an advanced process for digesting wood-the sulfite process was perfected and its use of wood pulp stock became common in the 1880s.

The next significant development was the decision by Kimberly and Clark to form a separate company, The Atlas Paper Company, in 1878. The new Atlas Mill was constructed in Appleton and was one of the largest mills in the West at that time. This mill was especially important to the future of the local industry because it successfully established the technique of manufacturing sulfite fiber.[29] In 1886 the company went another step by introducing the sulfite process for treating pulp wood which was first used in Sweden ten years before. This was a process where sulfite pulp is produced from pine wood chips. These chips are cooked in sodium sulfite and then bleached,

thus producing a fairly long and strong fiber. This was the most widely used form of pulp for much of the next century.

Table 2. Winnebago and Outagamie County Manufacturing Industry Performance Statistics1880

Industry	Output-Capital Ratio*	Average Output per Worker	Annual Wage	Value Added to Capital Ratio *
		Winnebago County		
Flour Industry				
Flour & Gristmills	4.9	$ 18,753	$ 419	.20
Sawmill Industry				
Lumber, planed	2.4	4,333	400	.13
Lumber, sawed	1.0	1,941	245	.17
Wood Products Industry				
Cooperage	4.4	1,005	329	.77
Furniture	1.3	1,405	342	.50
Matches	1.6	1,440	151	.07
Sash, Doors, Blinds	1.9	2,449	356	.37
Paper Industry				
Paper	1.9	2,183	371	.31
Other Manufacturing Industries				
Brick & Tile	1.4	372	128	.56
Carriage & Wagon Materials	1.4	1,000	294	.14
Carriages & Wagons	3.9	1,691	377	.65
Clothing, Mens	2.1	1,245	318	.55
Foundry & Machine Shop Products	1.4	1,567	460	.42
		Outagamie County		
Flour Industry				
Flour & Gristmills	3.7	13,404	388	.39
Sawmill Industry				
Lumber, Sawed	1.4	2,328	291	.24
Wood Products Industry				
Cooperage	9.6	1,453	401	2.78
Furniture	1.4	742	384	.41
Sash, Doors & Blinds	0.8	1,085	405	.19
Paper Industry				
Paper	1.2	2,219	417	.27
Wood Pulp	1.2	1,583	345	.59
Other Manufacturing Industries				
Carriage & Wagon Materials	1.4	1,386	406	.43
Carriages & Wagons	1.7	1,538	446	.52
Clothing, Mens	4.2	880	258	.74
Foundry & Machine Shop Products	0.9	1,421	410	.23

* The 'Output-Capital Ratio' is equal to Industry 'Value of Product' divided by 'Invested Capital' from Table 1.
** 'The Value Added to Capital Ratio' is equal to Industry 'Value Added' divided by 'Invested Capital'. Value Added is equal to Value of Product minus Value of Materials and Total Annual Wages as shown in Table 1.

Performance of the Local Industries

A microeconomic perspective of the local industries of the Fox River is given by the performance statistics shown in Table 2. The high productivity of invested capital

in the Flour Industry is confirmed. The Flour Industry's Output-Capital Ratio is among the highest of all industries and easily exceed the Output-Capital Ratio of the Wood Products Industry, with the exception of the Cooper Industry. The productivity of capital and labor in flour milling, no doubt, enabled it to pay relatively high wages to its employees. The average output per worker in flour milling exceeded average labor output in the other industries by a factor of at least seven times. It is especially significant and interesting that owners of the flour mills in both Winnebago and Outagamie Counties withdrew from the industry. All flour mills were gone by 1907. Such was the power of the market forces moving through the Fox River Valley. It was also significant for the local economy that entrepreneurs moved their capital to the Paper Industry. When the local flour mills disappeared this caused the demise of the Cooperage Industry, another high productivity-high wage industry. However, wages of Paper Industry workers were on a par with workers in the Flour Industry and the Cooperage Industry. The young Paper Industry, with its attendant high wages, served to maintain the standard of living of the communities hosting paper mills.

The Lumber Industry, primarily resident in Oshkosh, was not as productive as the Flour Industry or the Paper Industry. It was a low wage industry that was in long run decline due to the disappearance of local lumber sources. As the major employer in the community with a large base of invested capital, the Lumber Industry in Oshkosh served to slow the further development of Oshkosh.

Epilogue

By 1900, the economic die was cast for Oshkosh and the Fox Cities communities. The economic base of Oshkosh was the lumber industry and associated wood product companies. The long run consequence of being tied to the lumber and wood products industries was that they were maturing industries with little potential for future local growth as lumber soon encountered competition from other products as popular building materials. As the Wisconsin forests were depleted lumber supplies had to be shipped from greater distances to provide raw material for local wood product companies. They were were very susceptible to national business cycles, causing widespread layoffs during recessions. The process of shifting out of this mature industry into other types of manufacture was slow, occurring one bankruptcy at a time.

The 20th Century manufacturing industry in Oshkosh is remarkably diverse. Only remnants of the wood product industry remain. Oshkosh has been home to industries ranging from grass rugs, breweries and motorboats to heavy duty axles, military vehicles and children's clothing. But the nickname, Sawdust City, has remained, and appropriately characterizes the city as a blue collar community. Unfortunately, 'blue collar' communities earn less than white collar communities such as the Fox Cities where per capita income is roughly $2,000 greater than in Oshkosh.

The Fox Cities have enjoyed the benefits associated with the large presence of paper product manufacturers. These manufacturers of nondurable goods weather re-

cessions quite well. In fact Fox Cities employment rose during the Great Depression. Fox Cities paper industries have invested huge quantities of capital requiring large numbers of highly skilled and highly paid workers. The paper industry, in 1900, was a young industry which enjoyed the benefits of a growing national population. As this industry matured it has always been adept at designing new products to take the place of old ones so that the Fox Cities have not been forced to rely on bankruptcies as the prime mover of industrial change.

Notes

1. U.S. Department of Commerce, *County Business Patterns*, 1998.

2. In his book, *Capitalism, Socialism, and Democracy,* 3rd edition, 1950, Schumpeter emphasized the role of innovations vis-à-vis inventions as a means of differentiating the innovating entrepreneur from the risk-taking entrepreneur who typified the mass of risk-taking business people. In addition, he coined the term, 'perennial gales of creative destruction,' which he cited as a fundamental source of economic development.

3.Edward R. Smith, "The City of Diversified Industries," *The Wisconsin Magazine*, September, 1928, 289-290.

4. Nelson C. Brown, *The American Lumber Industry,* (New York: John Wiley & Sons, Inc. 1923), 46.

5. Raney, William F., *Wisconsin, A Story of Progress*, New York: Prentice-Hall, Inc. 1940, 201.

6. William A. Titus, *History of the Fox River Valley, Lake Winnebago and the Green Bay Region,* II, Chicago, 1939, 420, 421.

7. *Oshkosh Democrat*, November 1, 1850.

8. *Engineering Magazine*, XVI, March 1899, 932-946.

9. Frederick Merk, *Economic History of Wisconsin During the Civil War,* (Madison: The State Historical Society of Wisconsin, 1916), 25.

10. These statistics were quoted from undated issues of *The Chicago Republican* and the *Daily Missouri Democrat* in *Prairie, Pines, and People,* James Metz, (Oshkosh: Oshkosh Northwestern Company, 1976), 247.

11. Brown, *The American Lumber Industry*, 45.

12. Titus, William A., *History of the Fox River Valley, Lake Winnebago and the Green Bay Region,* II, (Chicago: The S.J. Clarke Publishing Company), 1930, 419- 421.

13. U.S. Bureau of the Census, *Products of Industry, 1870. (note: Outagamie County manufacturing was not yet reported, probably due to low levels of economic and industrial development at that time.)*

14. John Storck and William Teague, *Flour for Man's Bread,* (Minneapolis: Solomon Printing Compnay, *1952), 44.*

15. Publius V. Lawson, ed. , *History, Winnebago County, Wisconsin: Its Cities, Towns, Resources, People,* I , (Chicago: C.F. Cooper and Company, 1908), 232,233.

16. *Menasha Island Times,* January 1, 1867.

17. James G. Thompson, *The Rise and Decline of the Wheat Growing Industry in Wisconsin,* (reprinted from the *Bulletin of the University of Wisconsin Economics and Political Science Series,* 5, Madison, 1905.

18. Storck and Teague, *Flour for Man's Bread, 17, 18.*

19. Lawson, *Winnebago County,* I, 415-423.

20. The details of Minneapolis' early history can be gleaned from studying several sources such as: I.Atwater, ed., *History of the City of Minneapolis,* (2 Volumes) New York, 1893; H.B. Hudson, ed., *A Half Century of Minneapolis,* Minneapolis, 1908; and M.D. Shutter, *History of Minneapolis: Gateway to the Northwest,* Chicago, 1923.

21. The most notable of these entrepreneurs was Cadwallader Washburn. He was a lumberman from Wisconsin who had been the state's Governor.

22. The business people who copy successful innovations of entrepreneurs were referred to as 'imitators" by Joseph Schumpeter. The collective effect of successful innovations and the 'imitations' which follow caused what he termed "perennial gales of creative destruction." In this sense the collective impact of the New

Process was to destroy the old milling technique of flat milling, and put out of business those mills that were not able to adapt to the new method of production.

23. Charles N. Glaab and Lawrence H. Larsen, *Factories in the Valley, Neenah-Menasha, 1870-1915,* (Madison: The State Historical Society of Wisconsin, 1969), 68-69.

24. Not only were local mills shut out of new wheat supplies from Minnesota and the Dakotas because of the location of the Minneapolis flourmills, but Wisconsin farmers began to convert from wheat growing operations to dairy farming.

25. The situation was made clear by an observation in the local newspaper, "The flour milling business was perhaps never duller than at this time. Margins are very close and sales slow. If any man thinks there is a fortune in flour just now he ought to interview some of our millers." *Neenah Daily Times,* January 30, 1883.

26. A summary of the early production methods is given in Lawson, *Ibid.,* 1, 431-2.

27. Glaab and Larsen, *Factories In the Valley,* 90-95.

28. The editorial complained that, "Messrs. Kimberly, Clark & Co. have been trying for a year or more to secure additional water power in this Place, and it has been generally understood that they have offered several parties big prices for their sites, and have asked the privilege of making extra water power by digging for it, enlarging the mouth of the river, etc. but have failed in all plans for making it possible for them to increase their business in this place. It would seem that our people, or more particularly those who have control of our water power, and with it the growth and prosperity of the place to not fully appreciate the general advantages accruing from the establishment of such industries among us." *Neenah Gazette,* February 2, 1878.

29. James Kimberly, "Twenty-five Years Operation of a Wisconsin Paper Mill," *Lake States Timber Digest,* no. 2.(March 11, 1948), 9-10.