Kotex, Kleenex, Huggies
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Kotex, Kleenex, Huggies: Kimberly-Clark and the Consumer Revolution in American Business.
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Kimberly, Clark and Company was founded on March 26, 1872, by five Wisconsin businessmen who pooled $30,000 to build a paper mill in Neenah, a small city in the eastern part of the state. Like many other newcomers to the Gilded Age paper industry, the founders had general business experience but—unlike earlier generations of entrepreneurs—were not “practical papermakers,” the nineteenth-century term for craftsmen whose knowledge of papermaking technologies and business practices was the result of lifelong trade experiences. Charles Clark, the driving force behind the establishment of the company, was part owner of a local hardware store. John A. Kimberly, scion of one of the area’s most prominent families, owned a general store and operated Neenah’s largest flour mill in partnership with his father. Havilah Babcock, another co-founder of the paper company, was Kimberly’s business associate in both the store and the flour mill. Frank Shattuck was a salesman, as was George Whiting.1

Their lack of industry-specific experience notwithstanding, the founders were well aware that papermaking presented major business opportunities. Locally, Myron Haynes, a pioneer of Wisconsin papermaking, ran a mill founded in 1864. His success demonstrated that the area’s natural resources, notably the Fox River, provided a hospitable environment for the industry. According to company lore, Clark decided to build a paper mill after listening to Haynes boasting about his profits. Moreover, demand for printing papers rose
markedly in the course of the Gilded Age when literacy improvements turned publishing into a major business. In the Midwest the swift rise of new population centers, especially Chicago, Detroit, and Milwaukee with their sizable publishing industries, created new markets for newsprint, magazine grades, and book paper that buttressed Kimberly-Clark’s growth in the late nineteenth century. The pulp and paper industry also profited from major technological innovations, including the introduction of wood-based newsprint grades and manila wrapping papers, which attracted scores of newcomers to papermaking in northeastern industry centers as well as the Old Northwest, with its considerable timber resources. The 1870s and 1880s marked the formation of major new paper companies that turned pulp and paper into a major American industry.

After outlining the structures and dynamics of the late-nineteenth-century pulp and paper industry that facilitated Kimberly-Clark’s rise to prominence, the present chapter examines the firm’s founding, its mills, and its product strategies. From 1872 to the turn of the century Kimberly-Clark grew from a one-mill newsprint operation into one of the industry’s major players, operating nine mills that produced a wide range of grades. Commitment to product development and technological innovation was one of the firm’s core strengths. While its early product mix of newsprint, magazine paper, and book grades was fairly conventional, the founders encouraged experiments with new production methods, pulps, and marketing strategies that enabled the company to expand into new markets. Its early ventures into product development set important trends for the interwar period, when Kimberly-Clark developed innovative consumer non-durables that were marketed in one of the most unusual sales campaigns in the history of the American paper industry.

I.

Post–Civil War papermaking was an industry in flux. The most important changes resulted from the introduction of groundwood pulp, which fundamentally altered the business structure and industrial geography of American papermaking. Traditionally dependent on rags as the principal source of pulp, the industry clustered near East Coast urban centers where the raw material was either collected from city dwellers by rag merchants or imported. In the last antebellum decade rapidly increasing rag prices emerged as a serious
problem, limiting papermakers’ ability to expand production to meet the growing demands of the publishing industry. Papermakers and inventors spent considerable energies and resources to develop alternative fiber sources, including hemp, straw, jute, and wood. Wood was widely seen as the most promising, partly because timber was more readily available than hemp or jute. Inventors, however, found it difficult to develop reliable grinding mechanisms that reduced logs to fibers suitable for paper production. Major technological breakthroughs were made during the 1840s in Germany, where Heinrich Völter—working from a design conceived by Friedrich Keller—developed a wood grinder that produced finely ground chips suitable for low-quality pulp that was turned into newsprint. The first American groundwood pulp was made in 1867 in Curtisville, Massachusetts, in a Völter grinder imported by Alberto Pagenstecher and other investors.²

Over the next two decades, a new generation of paper entrepreneurs sought out timber-rich locales suitable for groundwood paper production on a large scale. The ventures of Alberto Pagenstecher and his associates, principally his brothers Albrecht and Rudolph, as well as the Massachusetts investor Warner Miller, illustrate these trends. Like Clark, Kimberly, and Shattuck, these men had made money outside the paper industry. Alberto Pagenstecher, for example, was an engineer who made a small fortune in the South American railroad industry. Instead of developing their own wood-grinding technology, as several “practical papermakers” had tried unsuccessfully in the 1850s, the Pagenstecher group acquired the American patent rights for the Völter process and licensed them to other papermakers in return for royalties. In 1869 the group also formed the Hudson River Pulp & Paper Company to produce wood-based newsprint. Inaugurating the industry’s soon-to-be continuous search for new locales suitable for wood-based paper production, Pagenstecher and his associates built a new mill in Corinth, New York. Deep in the Adirondacks with large, easily accessible spruce stands, the company took a significant step in setting up operations in upstate New York, rather than Massachusetts, the traditional center of American papermaking, where the group had conducted its first experiments with the Völter process. The Hudson River Company was capitalized at $250,000, more than three times the average amount a papermaker invested into a startup mill in 1870. Indicative of the major changes occurring in the U.S. pulp and paper industry, these considerable sums were required to finance wood-grinding operations, large mill buildings
that accommodated the Corinth mill’s three paper machines, as well as fourdrinier machines, which were among the largest and most expensive pieces of manufacturing equipment used in nineteenth-century America.3

Other new paper companies evolved along similar lines. Vermont, New Hampshire, upstate New York, and other regions with rich timber resources that were often located far from East Coast urban centers became the new core regions of the U.S. pulp and paper industry. In upstate New York, extensive mill properties were developed by the Tilden Paper Company at Watertown and by the Glens Falls Paper Company near Corinth. Pagenstecher and his associates, who remained the industry’s most influential figures until the turn of the century, ventured deep into the Old Northwest. In 1870 Alberto Pagenstecher and Warner Miller teamed up with Chicago investors to build a pulp factory in Appleton, Wisconsin, the first groundwood mill west of New York State. In 1882 the group sold the property, which included valuable water rights on the Fox River, to Clark, Kimberly, and their associates.4

Like attempts to use iron instead of wood in shipbuilding, efforts to replace rags with groundwood touched off controversies among industrialists. Unlike rags with their high cellulose content, groundwood contained large amounts of lignin that reduced paper quality, convincing many fine paper specialists to reject wood pulp as a papermaking material. Furthermore, wood grinding produced short fibers that made groundwood paper less tear resistant than rag-based grades. As a remedy, papermakers usually mixed groundwood pulp with rag-based pulps to improve paper quality and strength in the 1870s. This method for improving quality was followed a decade later by the introduction of sulfite pulping which dissolved large woodchips chemically, producing stronger, high-quality pulps that were frequently mixed with groundwood pulp to produce newsprint. However, sulfite cooking equipment required major investments that many papermakers were unwilling to make. As a result, many paper mills clung to tried-and-proven rag-based newsprint despite higher raw material costs. Kimberly-Clark, for example, remained committed to newsprint rag pulp until 1878, when it built a new mill in Appleton to produce groundwood-based paper. Patent issues further delayed the widespread adoption of groundwood pulp. Pagenstecher and his associates jealously guarded their Völter process rights and frequently filed infringement suits against papermakers suspected of using the process without a license. The aggressive tactics employed
by Pagenstecher and his colleagues earned the group the somewhat
derisive label the “Völter Combine” in trade circles. The Combine’s
aggressive attempts to defend its valuable source of royalties delayed
the widespread adoption of groundwood pulp until the early 1880s,
when the expiration of the patent triggered vast increases in the pro-
duction of wood-based paper.5

While technological innovations contributed to the transforma-
tion of the U.S. pulp and paper industry, changing demand structures
also played a significant role. Rapid urbanization created large poten-
tial markets for publishers, nearly quadrupling the circulation of
weekly newspapers from 11 million copies (1870) to 43 million
copies (1899). Growth was even more pronounced in the circulation
daily newspapers, which quintupled to 15 million copies during the
same period. Much of this increase was concentrated on the East
Coast, especially New York City, where yellow journalism practiced
by William Randolph Hearst’s New York Journal and others led to
enormous increases in tabloid circulation. By the end of the 1890s
Joseph Pulitzer’s New York World alone had a daily circulation
exceeding 500,000 copies.6

Midwestern population centers also witnessed a marked growth in
newspaper publishing, notably Chicago, Milwaukee, Detroit, and
Kansas City. Chicago dailies such as the Tribune (founded 1872) and
the Daily Express (1875), Detroit papers like the Evening News
(1873), as well as the Kansas City Star (1885) and other major mid-
western publications, became major customers of the newsprint
industry. Some, notably the Chicago Tribune, procured their
newsprint from East Coast manufacturers, but many turned to mid-
western suppliers. Kimberly-Clark’s largest newsprint customers
included Milwaukee’s Evening Wisconsin and the Kansas City Star.

II.

Neenah’s paper industry originated in 1866, when six local investors
built a one-machine plant named the Neenah Paper mill on the Fox
River, which provided both energy to drive paper machines and
water for freshwater-intensive production processes. Capitalized at
$40,000, the mill initially produced straw paper at mediocre returns,
convincing its owners to add rag-based newsprint and book grades to
its product line. The founders also hired Myron Haynes, an experi-
enced manager who had been a key figure in the Wisconsin paper
industry since the 1850s, to supervise the mill. Haynes stayed with Neenah Paper after the original founders leased the property to a new group of investors in 1868, turning it into a profitable operation by hiring experienced craftsmen from Massachusetts and Connecticut. By the early 1870s the mill produced 465 tons of newsprint, 20 tons of straw paper, and 16 tons of low-quality book grades annually.7

During the 1860s the paper mill was one of Neenah’s few manufacturing enterprises in a local economy dominated by flour milling. Situated in the heartland of Wisconsin wheat farming, the town boasted several large flour mills that shipped their output via railroad directly to Green Bay and from there to Chicago. Flour milling did not provide a basis for long-term growth, however. As Charles Glaab’s and Lawrence Larsen’s study of economic development in the Fox River Valley has shown, the town was unable to compete with larger and better-financed flour mills in Minneapolis. Over the long haul the secular shift in Wisconsin agriculture from wheat to dairy farming left flour milling with an uncertain future. Local entrepreneurs, aware of these looming problems, frequently plowed their flour milling profits into manufacturing industries, notably woodenware, machine building, and paper. The Kimberly family, whose patriarch John R. Kimberly had founded Neenah’s first flour mill, was only one among several prominent local families whose efforts to develop more reliable sources of long-term growth turned the Fox River Valley into one of the region’s most important industrial centers.8

It did not take entrepreneurs long to recognize the papermaking potential of the fertile valley, with its trees that had remained almost untouched for centuries. During the 1870s local as well as extra-regional investors established five pulp and paper companies in the Fox River Valley. The Pagenstecher group, in partnership with the Chicago paper merchant house Bradner Smith & Co., built a mill in Appleton to produce groundwood pulp for other papermakers. Kimberly, Clark and Co. was founded in 1872 on the initiative of Charles Clark, who learned about the success of the Neenah Paper mill from superintendent Haynes at gatherings of local business leaders at the town’s hardware store. Clark and Haynes developed a plan to start another mill but lacked the funds to finance it on their own. Haynes had no cash to invest, and Clark had only about one-fourth of the necessary money, most of it collected by his widowed mother from the Army pay he had sent home while serving as an enlisted man during the Civil War. Looking for additional sponsors, Clark turned to John A. Kimberly, the co-owner of Neenah’s general store, which he
founded after graduating from Lawrence College in Appleton. They were joined by Kimberly's business partner, Havilah Babcock, who, in addition to co-owning the general store, was a partner in the Reliance Flour mill along with John R. Kimberly. A portion of the startup investment was still needed, and Kimberly suggested Shattuck, a traveling salesman and Wisconsin representative for a Chicago wholesale dry goods firm. They were joined by George Whiting, a salesman for a machine company in Janesville, Wisconsin. Whiting soon left the firm and teamed up with another group of investors who established Winnebago Paper mills in Neenah, which became one of Kimberly-Clark's local competitors. Realizing the potential for papermaking in the Fox River Valley, other groups quickly pooled funds to form their own companies. A group headed by Asa Patten, a cabinetmaker and flour miller, in 1874 formed the Patten Paper Company in Appleton. Two years later, Henry Hewitt, Jr. and his associates organized the Menasha Paper Company.9

In summer 1872 Kimberly, Clark and Co. built its first paper mill, the Globe mill, on the former site of a flour mill. The Fox River provided power as well as comparatively clean process water for pulping, creating a major advantage for Kimberly, Clark and Co. and other Fox River Valley paper companies vis-à-vis their New England competitors. In the Northeast, paper mills frequently operated on rivers with poor water quality, forcing them to rely on expensive freshwater wells. The Fox River, by contrast, provided abundant water for an industry that was highly dependent on clean water for pulping (producing one ton of paper required as much as 189 tons of water). Other ecological advantages included local river banks, whose terrain—contrary to the image evoked by the term Fox River “Valley”—was level, enabling mill builders to avoid expensive hillside construction. The latter kept mill construction costs high in Berkshire County, Massachusetts, and in New York's Hudson River Valley. There, river banks featured steep inclines, complicating the architectural layout of paper mills whose large fourdrinier machines required level, uninterrupted floors. Like other paper mills built after mid-century, the Globe mill, measuring 210 by 88 feet, was larger and more spacious than the older paper mills in New England and New York. Instead of unified structures, old mills in the Northeast were often nothing more than architectural hodgepodes of small buildings with extensions added on over the decades without much long-term planning. The two-story Globe mill was small and crowded compared to the standards of twentieth-century, single-story
paper mills, which frequently exceeded 800 feet in length. Unlike electricity, which was transmittable over longer distances without appreciable power loss, waterwheels were connected to machinery through shafts and belts whose friction losses increased rapidly with distance (the same was true for steam power). As a result, nineteenth-century mill builders placed a premium on compact plant designs that kept distances between power sources and machines at a minimum instead of accommodating an efficient sequencing of machinery to facilitate throughput. Moreover, the Globe and other paper mills built after mid-century featured brick walls, a departure from earlier wooden mills that was facilitated by insurance companies keen on reducing fire hazards. Fires were especially widespread in the pulp and paper industry because its highly flammable rag supplies created frequent blazes that could not be contained within wooden buildings.10

Pulp and paper production at the Globe mill involved five major steps performed by forty workers:

1. The rag department was located on the second floor, where unskilled men, women, and children sorted and cleaned cotton rags, an operation that required little heavy machinery and could hence be performed on second-story factory floors supported by wooden beams.
2. Clean rags were transferred to the bleaching room downstairs, where they were combined with water and bleaching agents and boiled for several hours in large vats, producing a whitish pulp that required further processing before it could be turned into paper.
3. Rag pulp was refined in a Hollander beater, which combined the pulp with more water and chemicals. It then pounded the slurry for several hours to flatten the fibers by delaminating their cell walls, increasing the bond potential between fibers to produce strong paper sheets.
4. The pulp was filled into a cone-shaped Jordan machine whose rotating knives cut fibers to the required length in preparation for papermaking.
5. Machines turned pulp into paper.

In the last step the Globe mill initially produced paper in a 72-inch cylinder machine, which Kimberly, Clark and Co. bought in Connecticut. Unlike the fast fourdrinier machine, the slower but more
reliable cylinder machine featured a cloth-covered cylinder that rotated partially submerged in a pulp vat, depositing a fiber web on a wire. The web was then picked up by felt belts to be transferred to press-and-dry rolls, as well as calendar rolls that imparted the desired finish.\textsuperscript{11}

The pulp- and papermaking process as described relied heavily on craft experience, often confounding outsiders who stood in awe of men and machines that turned piles of dirty rags into neat rolls of smooth book paper and newsprint. A visitor to a Neenah paper mill reported in 1875 that he

saw the massive machinery do its work in a way which made me feel that it must be endowed with superior intelligence, saw the pulpy masses decomposed in some strange way, hidden from our inexperienced eyes, in a shower of spray upon broad wooden belts, which, gathering and holding the fibers, passed over and under seven cylinders, coming out only to pass upon cotton belts over steam heated dryers, and emerge at last, fresh and clean and dry white paper.\textsuperscript{12}

The Kimberly, Clark and Co. partners, none of whom had any craft experience to speak of, may have felt similarly puzzled about the art and science of papermaking. The trade was, as a matter of fact, far more art than science because most craftsmen knew surprisingly little about the chemical reactions involved in bleaching and beating or about the bonding properties of microscopic fiber surfaces invisible to the naked eye. Given the scarcity of scientific inquiry and literature, most pulp composition formulas were the result of trial-and-error guesswork. Like other newcomers to papermaking after the Civil War, the Kimberly, Clark and Co. partners compensated for their lack of craft knowledge by hiring paper mill workers who had been apprenticed in New England. Initially, the results were unsatisfactory, most likely because the skilled craftsmen refused to share their technical expertise with the managers. After trying to manage production by themselves for a few months after the Globe mill came onstream on October 22, 1872, the partners hired Myron Hayes, who left his position as superintendent of the Neenah Paper mill and became foreman of the Globe.\textsuperscript{13}

Their background in flour milling, merchandising, and sales provided the Kimberly, Clark and Co. partners with the requisite business skills that became more important than craft experience in the
late-nineteenth-century paper industry. Historian Judith McGaw’s investigation of survival rates among paper companies in Berkshire County has demonstrated that commercial experience became a far better predictor of business success than craft experience in the post–Civil War paper industry. Her sophisticated quantitative analysis reveals that a paper entrepreneur with general business background was twice as likely to succeed as one who had been trained as a craftsman. Kimberly and Clark’s early history confirms these findings. Leaving shop-floor management to Haynes, Clark and Kimberly concentrated on accounting, raw materials purchases, and sales (Babcock and Shattuck were not closely involved in the firm’s day-to-day operations). The partners developed close business relations with rag dealers in Milwaukee and Chicago, who supplied rags at rates that enabled the mill to compete with nonlocal suppliers in the Fox River Valley newsprint and book paper markets. Clark and Kimberly also cleverly touted the image of rag-based newsprint, whose printing properties were superior to those of wood-based paper, convincing newspaper publishers in Milwaukee and Chicago to buy the better product even if its price was slightly higher at 14¢ per pound, compared to 12¢ for wood-based newsprint. Economies of scale, combined with continually favorable conditions in the midwestern rag market, enabled the firm to cut its newsprint price in half by the late 1870s, to little more than 7¢ per pound. The latter price was competitive with that charged by East Coast mills, which suffered the disadvantage of higher transportation costs.  

Day-to-day management was based on an arduous schedule. Clark and Kimberly spent ten to twelve hours a day in the office. They arrived in the Neenah office by 7:00 each morning and spent the first couple of hours opening the mail and writing business letters. They were assisted by an office boy, and they also occasionally drew on the legal expertise of Moses Hooper, the company’s general counsel. After assuming the management of another mill in Appleton in 1878, Kimberly and Clark made the four-mile trip each morning at 8:00 by carriage or sleigh. They attended to business in Appleton until noon; then they rode back to Neenah, where they spent the rest of the afternoon discussing the day’s activities. The partners left each evening at 6:00 but returned for a couple more hours each evening to prepare for the next day. The schedule was maintained for many years. In fact, it took the death of Clark at age forty-seven in 1891 to end the habit.  

During the 1870s the partners made substantial improvements to
the Globe mill, which turned it into one of the largest paper mills in the Midwest. In 1876 they acquired Neenah's Peckham & Kruger foundry, situated next to the paper mill on waterfront real estate along the Fox River. The purchase included extensive water rights, ultimately more than doubling the mill's waterpower. The partners removed the foundry and constructed a new rag storage facility. Increased energy and raw materials were necessary because the partners planned to install a $30,000 state-of-the-art fourdrinier paper machine, which produced higher economies of speed than the cylinder machine but which also required more power, wasted more pulp, and suffered frequent technical problems. The “wet end” of the fourdrinier machine (so called because it received watered pulp) featured a large head box that deposited pulp on an endless perforated wire. The wire formed a cellulose fiber web by draining excess water, feeding the sheet into press-and-dry rolls that resembled those used in cylinder machines. In the 1870s the fourdrinier machine ran at more than twice the speed of the cylinder machine, or 135 feet per minute (by the turn of the century, speeds of 400 feet per minute were common), requiring considerable amounts of pulp as well as large, precisely controlled power inputs. Kimberly, Clark and Co.'s acquisition of waterpower rights on the Fox River provided the mill with the type of strong and reliable power source required to drive a fourdrinier machine, even though dry spells and flooding created problems later on. The firm also expanded its papermaking capacity by purchasing the Neenah Paper mill and by installing a bleaching machine as well as other production equipment.¹⁶

While improving their holdings in Neenah, the partners helped build a new mill complex in Appleton that became the midwestern center of groundwood pulp and paper production. They launched the new venture in cooperation with the Fox River Pulp & Paper Company, formed in 1876 by a group of Milwaukee investors headed by John T. Averill to build a groundwood pulp mill in Appleton under the auspices of a newly formed firm, the Fox River Pulp & Paper Company. At this time Appleton already had a groundwood pulp mill built earlier in the decade by the Pagenstecher group and Chicago investors, who promptly charged the Averill group with infringements on the Völter patent even before the new company had completed its mill. In an implicit admission of guilt, the Averill group agreed in 1878 to pay royalties to Pagenstecher and his associates, clearing the way for the construction of the pulp mill. Keen on developing an outlet for the mill’s production, Averill approached Clark and Kimberly
with a proposal under which the Neenah company would build a paper mill in Appleton. Negotiations succeeded, and in February 1878 the parties signed an agreement stipulating that “the Fox River Pulp and Paper Company shall complete the erection and equipment of a pulp mill . . . to contain twelve grindstones for the manufacture of groundwood pulp.” Kimberly, Clark and Co. in turn agreed to “acquire a site and water power to equal 500 [horse power] and thereon erect, furnish, and put in complete running order . . . a complete paper mill to have twelve beating engines and three paper machines to manufacture manila wrapping papers from jute butts and groundwood pulp.” Both parties further agreed to transfer the pulp factory and the paper mill to a new entity, the Atlas Paper Company, which was capitalized at $250,000 and whose principal stockholders were Clark, Kimberly, Shattuck, Babcock, and Averill, as well as two investors in Fox River Pulp & Paper. The new Atlas paper mill, completed in fall 1878, featured three fourdriniers that produced the first groundwood-based manila paper made in the Midwest. (Four years after its founding, Atlas Paper acquired the groundwood pulp mill built by the Pagenstecher group and their associates in 1870.) “Here,” remarked Kimberly some twenty years later, “commenced the war to demonstrate to the consumer that wood manila could take the place of jute papers.” Jute paper, made exclusively in Ohio, was the standard heavy-duty paper used in the late 1870s. Wood manila was more cost-efficient than jute and held its own in performance tests. After a difficult start the new product became a success in the early 1880s, and Atlas gained ground over its major competitors in Ohio, producing twenty-five tons of paper per day.

Kimberly, Clark and Co. incorporated in 1880 and was renamed Kimberly & Clark Company. Planning a somewhat risky expansion strategy in Neenah, the four founders evidently saw incorporation as a means to protect their personal assets, which—under Wisconsin law governing private partnerships—could be seized to pay off creditors if the company went bankrupt. Like many other partnerships that were reorganized and incorporated by their founders in the late nineteenth century, Kimberly & Clark became a “closely held corporation” whose stock was not publicly traded. Each former partner received one hundred $1,000 shares in the new company. Its major holdings included the Globe and Neenah mills, which had received substantial upgrades in the late 1870s, reflected in Kimberly & Clark’s $400,000 capitalization, a thirteen-fold increase over the capitalization of the old partnership. Kimberly became president,
Babcock vice president, Clark the secretary, and Shattuck the treasurer. Locally known as the “Big Four,” they managed their business from a small brick office building on Commercial Street in Neenah.20

Around the same time, the Atlas Paper Company acquired the Genessee Flour mill in Appleton, located in close proximity to the manila paper mill, to expand its presence in groundwood grades. The lingering effects of the Panic of 1873 made it impossible to build a mill, however. Capitalizing on their prior experience as flour millers in Neenah, Babcock and Kimberly continued to grind flour at the Genessee mill for the next four years. In 1881 Kimberly & Clark Co. built the one-machine Vulcan paper mill next to Atlas. The Vulcan mill, adjacent to the Genessee flour mill, featured an 88-inch fourdrinier machine to manufacture nine tons of groundwood-based book and printing paper a day. The new project, though owned by Kimberly & Clark, was managed as part of the Atlas mill. Two years later the old Genessee flour mill was demolished and replaced by the Tioga mill, equipped with two machines that produced groundwood-based newsprint. Like Vulcan, it was supervised by Atlas mill managers. These additions turned Appleton into the premier midwestern centers of groundwood-based paper production.21

The Kimberly & Clark Co. mill complex at Neenah, which continued to produce rag-based paper, expanded with the purchase of two old flour mills, the Smith & Proctor mill and Kimberly and Babcock’s Reliance mill, together with water rights in 1884. The Smith & Proctor mill was subsequently demolished and replaced with the Badger paper mill, whose 88-inch fourdrinier machine had the capacity to produce 8 tons of rag-based manila and book grades. The Reliance mill became part of the Badger factory, and locals called it “the Old Stone Mill” because its limestone walls were two feet thick. In 1885 the mill complex underwent further development when Kimberly & Clark Co. tore down the Neenah mill built twenty years earlier and replaced it with a more modern, three-story paper mill featuring one 68-inch and one 84-inch fourdrinier to produce rag-based book grades. The new mill employed one hundred workers and dwarfed the output of the original mill, which produced only around three tons a day.22

Haynes, who had served as superintendent of the Globe, Badger, and Neenah mills, was replaced by Peter R. Thom, who had emigrated from Scotland at the age of 13 and had served an apprenticeship with a Connecticut papermaking machinery manufacturer. After learning the craft, Thom traveled widely for that company installing equipment.
Thom joined Kimberly and Clark in 1882 as superintendent of the Vulcan and Tioga operations in Appleton. He was subsequently named the company’s general superintendent and a member of its board of directors. 

Although determined to maintain complete financial control over Kimberly & Clark Co., the four founders were willing to admit some of their managers as stockholders in new ventures. In 1887 they formed the Telulah Paper Company to build a new mill in Appleton that featured 90-inch and 110-inch fourdriniers respectively with a combined capacity to produce twenty tons of groundwood pulp newsprint a day. Clark, Kimberly, Shattuck, and Babcock owned the vast majority of stocks in the $250,000 company but gave away smaller shares to managers of the Kimberly & Clark and Atlas Paper mills to reward them for their service.

In 1887 the four Appleton mills owned and operated by Clark and his associates—the Atlas, Tioga, Vulcan, and Telulah mills—received a boost from the introduction of sulfite pulp, which improved paper quality. Most producers of wood-based grades mixed groundwood and rag pulps to increase tear resistance, but some experimented with new alternatives, including chemical wood-pulping technologies that yielded longer cellulose fibers with better bonding qualities than mechanically ground pulp. The sulfite process, developed in the mid-1870s by chemists Alexander and Richard Mitscherlich in Germany and Carl Ekman in Sweden, dissolved large wood chips in a cooking liquor containing soluble and sulfurous acid, delignifying the fibers to produce cleaner pulp. Industrial-scale production required large digesters, whose considerable costs (perhaps combined with the repugnant odor released by the chemicals involved) delayed the widespread adoption of sulfite pulping. A few mills in New England and the Mid-Atlantic states introduced sulfite pulping in the early 1880s, followed in 1887 by the Appleton mill complex, which became the first papermaking center west of Pennsylvania to adopt the new technology. The Appleton complex featured two digesters with a daily output capacity of nine tons. They were made of deoxidized bronze that resisted the corrosive effects of sulfurous acids. Their output was combined with groundwood pulp to produce higher-quality manila wrapping grades, book paper, and newsprint (the latter consisted of 80 percent groundwood pulp and 20 percent sulfite pulp), giving the Appleton mills an advantage over competitors who had remained committed to a groundwood-rag mixture because sulfite pulp was cheaper than rag-based pulp. Outside the mill, sulfite pulping created
environmental problems. Harmful chemicals were dumped into the Fox River until after the turn of the century. At that time papermakers developed recycling processes for some acids, and other acids were replaced with new agents that reduced the ecological impact of sulfite pulping, including calcium, which was replaced with other soluble acids.25

Kimberly & Clark Co. suffered a major setback in 1888, when the Atlas mill burned to the ground. Fire was a major concern for factory owners well into the twentieth century, since most towns had neither adequate fire-fighting capabilities nor a means for detecting fire before it was too late. The Atlas plant was lit by lanterns and gas and kerosene torches, which made it vulnerable. On the night of the fire a worker went into the basement with a torch to look into the stock box under the beater. He left the torch in the basement as he went upstairs on an errand, and the wind toppled the torch onto some oily rags. The fire quickly spread and destroyed the entire mill. Fortunately, no was killed, and the Vulcan and Tioga mills were spared. The ten-year-old Atlas mill represented the core of the company’s groundwood paper business, and its destruction could easily have prompted customers to buy elsewhere. However, management concentrated on getting the factory rebuilt and into production, and only five months later the reconstructed mill produced at a greater capacity than before the blaze. Paper output increased from 25 tons a day to 32 tons with three fourdrinier machines, two measuring 82 inches and one 56 inches.26

Kimberly & Clark Co. expanded its newsprint capacity with the construction of a large pulp and paper mill in the village of Kimberly, just three miles east of Appleton. To finance the expansion and machinery, the owners increased their stock from $400,000 to $1.5 million. In 1888 they bought the farm land and waterpower rights along the Fox River for $120,000, erected a hotel, rented out or sold sixty houses, and sold lots to new residents. Kimberly & Clark Co. turned the design of the new plant over to the renowned paper mill architect A. B. Tower of Holyoke, Massachusetts. The Kimberly mill included three machines, a 25-ton-per-day groundwood pulp mill, a 30-ton sulfite mill, and a 10-ton straw wrapping paper mill. It was the first in the Fox River Valley to use a professional architect. Over the next two years four fourdriniers (each costing $35,000) were added to produce newsprint. Reflecting this increased capacity, Kimberly & Clark Co. negotiated a long-term newsprint contract with the Kansas City Star.27
In 1891 the partners entered bond and ledger paper production with the formation of the Shattuck & Babcock Company, capitalized at $500,000. Its two-machine, 20-ton mill was built downstream from Kimberly at DePere, Wisconsin, which produced high-quality, loft-dried grades. Although they held the majority of the company’s stock, the founders chose to include more junior executives in the subsidiary’s ownership, including Frank Sensenbrenner, who would later become president of Kimberly-Clark. Although the Shattuck & Babcock mill made the finest expensive grade book paper in the West, the 1893 economic panic made the paper difficult to sell. The problem of marketing the product caused the firm to postpone several projects. Later, a group of businessmen representing the American Writing Paper Company of Holyoke offered cash, bonds, and preferred stock to buy the plant. The shareholders of Shattuck & Babcock thought the offer was too good to refuse, so in 1899 they sold the writing paper business to the easterners.28

III.

Initially, the partners derived rather modest financial benefits from their papermaking ventures. When the company incorporated in 1880, the officers earned salaries comparable to those of manufacturing enterprises of similar size. Shattuck received $4,000 annually; Babcock received $3,000; and Kimberly and Clark each received $3,000 from the corporation plus $1,000 each for managing Atlas Paper. Like owner-managers of other “closely held corporations,” the four men pursued fairly conservative financial policies, often plowing profits back into the mills instead of paying dividends to themselves. Kimberly & Clark Co. declared its first dividend in March 1883, three years after its formation, yielding $3,000 for each of the four stockholders. Later that same year they voted 2 percent more, which remained the dividend into the next quarter. This dividend was the last one issued for two years. During those difficult economic times the company reinvested its meager earnings back into plant improvements. In July 1886, after regaining its financial footing and posting a profitable year, the board of directors voted a 10 percent dividend and maintained that rate the next year. These dividends netted each owner $20,000.29

Turning the various mills owned and operated by the Kimberly & Clark partners into productive operations presented major challenges.
By 1892 Kimberly & Clark Co. was by far the largest paper company in the Fox River Valley; their $1.5 million capital represented more than 30 percent of all investments in the region’s pulp and paper industry. Remarkably, however, Kimberly & Clark Co.—whose balance sheet included the Globe, Badger, Neenah, Tioga, and Vulcan mills—ranked near the bottom of a list of nineteen regional companies in terms of capital productivity, yielding only $1.35 in output for every dollar invested compared to $2.59 in output for every dollar invested by the Thilmany Paper Company in Kaukauna, a new firm established in 1889 (table 1.1). Although the correlation is far from perfect, these statistics indicate that smaller mills yielded higher capital productivity and that Kimberly & Clark Co.’s strategy of heavy investments into equipment and physical plants did not raise its mills’ productivity rates. The picture was far brighter in terms of worker productivity. With a per capita value output of more than $4,000, Kimberly & Clark Co. ranked fifth in the list of nineteen companies. The three original Kimberly & Clark mills in Neenah, with their well-managed and coordinated workforces, produced above-average per capita output ($4,349), followed by the newsprint mill in Kimberly

### Table 1.1
Fox River paper companies, 1892

<table>
<thead>
<tr>
<th>Company</th>
<th>Capital</th>
<th>Value of Product</th>
<th>Output per Capital Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kimberly-Clark &amp; Co.</td>
<td>1,500,000</td>
<td>2,017,927</td>
<td>1.35</td>
</tr>
<tr>
<td>Shattuck &amp; Babcock</td>
<td>500,000</td>
<td>650,000</td>
<td>1.30</td>
</tr>
<tr>
<td>Badger Paper Co.</td>
<td>493,000</td>
<td>598,312</td>
<td>1.21</td>
</tr>
<tr>
<td>Fox River Paper Co.</td>
<td>350,000</td>
<td>520,000</td>
<td>1.49</td>
</tr>
<tr>
<td>Gilbert Paper Co.</td>
<td>310,000</td>
<td>800,000</td>
<td>2.58</td>
</tr>
<tr>
<td>Atlas Paper Co.</td>
<td>250,000</td>
<td>492,371</td>
<td>1.97</td>
</tr>
<tr>
<td>Telulah Paper Co.</td>
<td>250,000</td>
<td>345,545</td>
<td>1.38</td>
</tr>
<tr>
<td>Winnebago Paper Mills</td>
<td>200,000</td>
<td>300,000</td>
<td>1.50</td>
</tr>
<tr>
<td>Outagamie Paper Co.</td>
<td>200,000</td>
<td>298,000</td>
<td>1.48</td>
</tr>
<tr>
<td>Patten Paper Co.</td>
<td>200,000</td>
<td>250,000</td>
<td>1.25</td>
</tr>
<tr>
<td>Kaukauna Fiber Co.</td>
<td>175,000</td>
<td>300,000</td>
<td>1.71</td>
</tr>
<tr>
<td>Neenah Paper Co.</td>
<td>150,000</td>
<td>152,000</td>
<td>1.01</td>
</tr>
<tr>
<td>Charles W. Howard</td>
<td>135,000</td>
<td>245,000</td>
<td>1.81</td>
</tr>
<tr>
<td>Thilmany Paper Co.</td>
<td>130,000</td>
<td>337,000</td>
<td>2.59</td>
</tr>
</tbody>
</table>
($4,186) and the mill complex in Appleton ($3,638). But the fact that the Gilbert mill in Menasha and the Thilmany mill in Kaukauna produced considerably higher per-worker output ($7,273 and $5,617 respectively) demonstrated that there was room for improvement in worker productivity at all Kimberly & Clark mills.30

In the early 1890s the partners reorganized and streamlined production at the various mills. Newsprint production was consolidated at the new Kimberly mill, which received a third fourdrinier in 1893, increasing its aggregate daily output to 55 tons. The Appleton mill complex meanwhile exited newsprint and converted to higher-quality groundwood grades. The Vulcan and Tioga mills switched to book paper while the Atlas mill was rebuilt to manufacture fancy manila wrapping and cover grades. Likewise, the Globe mill in Neenah, whose 72-inch paper machine installed in 1872 could no longer compete with more modern newsprint mills featuring 156-inch machines, abandoned newsprint production and switched to rag-based wrapping papers. The Telulah Paper Company two-machine mill in Appleton, which had produced newsprint since its formation in 1887, was rebuilt in 1893 to produce book and bond papers.31

Plans to install additional new equipment and build new mills were shelved in 1893, which marked the beginning of a three-year depression that caused turmoil throughout the nation’s manufacturing economy. From 1893 to 1895 fifty paper companies went bankrupt as prices plunged to record lows; newsprint prices, for example, dropped by more than 40 percent, as did book and bond paper prices. In August 1893 only fifteen of the Fox River Valley’s forty-five paper machines were still running. One observer noted, “Mills are running along in a from hand to mouth style, with only one or two days’ orders ahead and the prospect of a shut down continually staring them in the face.”32

Kimberly & Clark and other Fox River Valley companies weathered the crisis by cutting wages and collaboratively scaling back production. In February 1894 the region’s employers reduced wages for unskilled paper workers by 8 to 10 percent, followed several months later by similar reductions for skilled workers. In a controversial move that received nationwide attention, Fox River Valley paper executives teamed up with their brethren from the Wisconsin River and Marinette districts to form the Paper Makers’ Association, which coordinated mill shutdowns throughout the region. The organization was headed by John A. Kimberly and an executive committee that included George Whiting, Kimberly, Clark and Co.’s co-founder who
had left the partnership early on to head other paper companies. The association, like similar cartels of the early 1890s, was short-lived because it lacked enforcement mechanisms. However, in the short run it helped stabilize the Fox River Valley paper industry, which did not lose a single mill to bankruptcy or reorganization during the Depression of the 1890s. Kimberly & Clark, in fact, managed to survive the crisis virtually without negative earnings; in 1895, the worst Depression year, the company still produced almost $64,000 in profits (table 1.2). 33

In the wake of the Panic, Kimberly & Clark Co. resurrected expansion plans dating to the years prior to 1893. After taking modest dividends, the three surviving founding partners (Clark had died in 1891) invested the bulk of the substantial 1898 profits into a new paper mill in Niagara, Wisconsin, 135 miles north of Neenah. In the Fox River Valley, the paper and lumber industries’ insatiable appetite for timber had thinned out the region’s spruce and hemlock stands, precipitating the search for timber-rich locales. In 1889, on the Wisconsin side of the river, a Fox River Valley papermaker established a small pulp mill employing only twelve men. Its outgoing pulp and incoming supplies had to be rafted across the Menominee River to the

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1893</td>
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<td>150,000</td>
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<td>1895</td>
<td>50,000</td>
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<td>1896</td>
<td>100,000</td>
</tr>
<tr>
<td>1897</td>
<td>150,000</td>
</tr>
<tr>
<td>1898</td>
<td>250,000</td>
</tr>
</tbody>
</table>
mill and then hauled by wagon the five miles between the dock and the North Western Railway depot in Quinnesec. In 1892 the property was acquired by the Quinnesec Falls Paper Company, a subsidiary of a Fox River Valley firm, which improved the site by building a one-machine paper mill after convincing the railroad to build a spur from Quinnesec to the mill. When Kimberly & Clark Co. arrived on the scene five years later, the area was still a tiny settlement of log cabins and no sidewalks. Abandoned tree stumps littered the main street of Quinnesec Falls, and one man served as town supervisor, general merchant, hotelkeeper, bartender, and postmaster. The Menominee River provided waterpower, the most important resource. In summer 1897 Kimberly & Clark Co. made overtures about buying the mill to the Badger Paper Company of Kaukauna. After lengthy negotiations they closed the deal on a bitterly cold day the following February after enduring a long train ride and a bobsled ride down the river to the mill. Shortly thereafter, the old mill was replaced with a larger building featuring two 156-inch fourdrinier machines with an operating speed of 400 feet per minute—among the nation’s largest and fastest paper machines. The plant and the town were renamed “Niagara,” although it was often referred to as Quinnesec, or simply “Q.” In 1901 Kimberly & Clark Co. added two new paper machines to the Niagara mill to produce 50 tons a day of water-finish manila wrapping paper. The groundwood mill produced 60 tons daily, and the sulfite mill 50 tons daily. Niagara’s output dwarfed the company’s previously largest mill, the Kimberly mill, by 33 percent.

Shortly after the Niagara mill turned out its first sheet of wrapping paper, tragedy struck as fire destroyed large parts of the Kimberly mill, leaving Kimberly & Clark with no newsprint capacity. At the time, Shattuck estimated the loss at more than $300,000. To respond to customers’ demands and to fulfill many outstanding contracts, the firm placed emergency orders for machinists to convert Niagara’s new machines from wrapping paper to newspaper. In only four weeks the Niagara mill shipped its first batch of newsprint, which remained its main product until 1916.

Kimberly & Clark Co. rebuilt the Kimberly mill in 1904 to manufacture book grades, which emerged as the company’s most important product line. While the Neenah, Tioga, and Vulcan mills produced low-grade book paper from a mixture of groundwood and sulfite pulps, the new two-machine Kimberly mill used sulfite pulp combined with small amounts of rag pulps, which was more expensive
than groundwood-sulfite compounds but yielded higher-quality grades. Paper made from sulfite pulp gained a strong position in markets for high-quality book paper, which had heretofore been dominated by producers of rag-based grades. The latter tried to protect their position by cautioning paper merchants against manufacturers of sulfite-based book paper, claiming that the new grade was inferior in terms of brightness, printability, and tensile strength. This campaign was carried out at trade conventions and on the pages of industry periodicals.  

Kimberly & Clark Co. reorganized in 1906 to accommodate recent changes in ownership. Shattuck died in 1901 and Babcock in 1905, leaving John A. Kimberly as the sole survivor of the “Big Four,” who owned Kimberly & Clark, Atlas Paper, and Telulah Paper in conjunction with the estates of the three other men. In late 1906 Kimberly, together with several associates, organized the Kimberly-Clark Company, which was capitalized at $2 million. A few months later, in 1907, the new company took over the property of Kimberly & Clark, Atlas Paper, and Telulah Paper. Principal stock ownership rested with John A. Kimberly and three sons of founders, Bill Clark, James C. Kimberly, and Frank Shattuck, who—with the exception of John A. Kimberly, who withdrew from active business—also served as managers and members of the board of directors. They were joined by three managers who had worked their way into ownership roles: Frank Sensenbrenner, Peter Thom, and William Ryan. James Kimberly was appointed vice president, and Sensenbrenner, who had commenced his career at Kimberly & Clark in 1889 as a bookkeeper, became general manager.

The new senior managers, principally Kimberly and Sensenbrenner, changed the company’s management structure, replacing the personal business practices of the founders with formal departments responsible for accounting, purchasing, materials, and sales. The founders had handled accounting until 1889, when they hired Sensenbrenner who—like many other bookkeepers in nineteenth-century paper mills—remained committed to single-entry bookkeeping. In 1908 the reorganized company hired Harry Price, an auditor who had examined Kimberly & Clark Co.’s financial records in prior years, to organize and head a separate accounting department. Price and his twelve clerks introduced double-entry bookkeeping and instituted basic cost accounting procedures for the company as well as for individual mills. The purchasing department was formed in 1908 and headed by John S. Sensenbrenner (a Frank Sensenbrenner
relative) whose staff of four clerks handled procurement and storage of market pulpwood, chemicals, coal, and other materials. It soon became clear that storage management required more specialized skills, leading in 1914 to the formation of a rudimentary staff materials department headed by Edward Young, who supervised the construction and stocking of small warehouses at the company’s mills. Marketing, which had previously been handled informally by John A. Kimberly and his assistant William Stuart, was formalized with the establishment of a sales organization. James Kimberly, who headed the department, opened Kimberly-Clark’s first district office in Chicago in 1913, followed two years later by the New York district office, to develop close business relations with paper merchants and publishers.38

The technical department, organized in 1914 to handle research, development, and mill equipment problems, became by far the most important organization in the new management structure. The groundwork was laid when Kimberly and Sensenbrenner recruited professional engineers and scientists, starting in 1912 with the hiring of Frank Wheeler. Wheeler established a test laboratory at the Kimberly mill in 1913 and hired scientist H. A. Rothschild to test pulp and paper samples for composition, tear resistance, and uniformity. One year later Kimberly-Clark hired the Austrian-born research scientist Ernst Mahler, arguably one of the most important figures in the history of the company. Mahler had received his degree in chemistry from the prestigious Darmstadt Institute of Pulp and Paper Technology in Germany. In 1914 he established a research laboratory across the street from Kimberly-Clark’s main office in Neenah, where he developed an innovative groundwood pulping process as well as a cellulose substance that became the base material for the Kotex sanitary napkin. Kimberly-Clark’s early commitment to laboratory research stood in marked contrast to the views of most competitors, whose laboratories rarely conducted research and development. International Paper, for example, hired a paper chemist and organized a laboratory in Glens Falls, New York, in 1901. However, as with most other American paper laboratories, its activities were restricted to testing pulp and sheet samples shipped by the mills to ensure product uniformity. The Glens Falls laboratory did not conduct systematic product development until the 1940s, when Kimberly-Clark already looked back on almost three decades of active research and development.39
The new management organized Kimberly-Clark’s exit from the newsprint market in a drawn-out process that lasted until 1916, when the Niagara mill produced its last sheet of newsprint. The decision to phase out a product that had been one of the company’s mainstays since its inception in 1872 was intertwined with seismic shifts in the pulp and paper markets that reduced the profitability of newsprint production in the United States. It was hastened by the elimination of tariffs on Canadian newsprint in the Underwood Tariff Act of 1913 which transformed the entire industry.

On the surface the turn-of-the-century U.S. newsprint industry appeared prosperous. Newsprint represented more than one-fourth of the nation’s aggregate paper output of 2.7 million tons in 1899, more than any other product category, and involved some of the largest American paper companies, including International Paper, Crown-Zellerbach, St. Regis Paper Company, and H. C. Craig & Co. Moreover, the accelerating downward trend in newsprint prices that plagued the industry since the 1870s came to an abrupt halt in 1898, giving way to occasional increases in subsequent years. The formation of International Paper (IP) in 1898 was frequently cited at the time as a major factor that precipitated the turnaround in newsprint prices. Capitalized at $40 million, IP owned 17 northeastern mills and operated 101 paper machines with 1,500 tons daily output capacity, giving it control of a staggering 60 percent of the U.S. newsprint production capacity. Its board of directors included Alberto Pagenstecher and several of his associates who had pioneered groundwood pulp production in the United States thirty years earlier. Like the Pagenstecher group during its heydays in the late 1870s, publishers quickly labeled IP a “Paper Combination” or “Paper Trust.” They feared that the company would exploit its dominant position in the newsprint market by raising prices. Market trends in the decade after 1898 seemed to confirm this prognosis, giving a boost to a campaign led by the American Newspaper Publishers’ Association to check IP’s market control by lifting the tariff on Canadian newsprint.40

Subsequent research, including our own study of IP, revealed that the giant paper company was in no position to exercise monopoly power. Weighted down by a $5 million debt which it had accumulated by 1904, IP produced mediocre net earnings and disappointing dividends as it watched its market share drop by more than half, to
26 percent by 1913. Epitomizing a trend that later plagued large segments of the U.S. newsprint industry, the gap between production costs and market prices grew dangerously narrow, largely because IP faced precipitous increases in pulpwood costs as a result of irresponsible forestry practices and rapidly shrinking timber supplies. What contemporary critics viewed as monopolistic pricing was in fact a somewhat desperate attempt to prevent newsprint prices from dropping below production costs.41

The development of Kimberly & Clark Co.’s newsprint business paralleled industry trends. By the end of the 1890s the company produced 55 tons of newsprint at the three-machine Kimberly mill. When large sections of the mill burned down in 1901, Kimberly & Clark transferred the contracts to the new Niagara mill. The latter manufactured newsprint for the Evening Wisconsin and other old Kimberly & Clark customers in the region, as well as newspapers in New Orleans and Salt Lake City, increasing its output by 43 percent from 1901 to 1906 (table 1.3). For the first two years, Kimberly & Clark bought approximately 85 percent of the mill’s pulpwood supplies on the open market and procured the remainder from its own timber holdings in Wisconsin and Northern Michigan. The large

| TABLE 1.3 | Kimberly-Clark newsprint production at the Niagara mill, 1901–1907 |

![Graph showing Kimberly-Clark newsprint production at the Niagara mill, 1901–1907](heinrich_chap1_3rd.qxd 10/4/2004 10:44 AM)
percentage of expensive market pulpwood evidently worried James Kimberly and Frank Sensenbrenner, by now the principal managers of the company. The two managers teamed up with other paper companies in the region to form the Wisconsin Wood Pulp Company. The latter circumvented pulpwood dealers, purchased timber directly from lumbermen, and supplied the affiliated mills for a nominal fee with pulpwood at cost. Mirroring broader market trends, Kimberly & Clark’s newsprint prices held steady and in some years even increased slightly, particularly in 1903 and 1907, when burgeoning demand taxed production capacity to the limit (table 1.4). In 1906, Kimberly & Clark even refused to renew a contract with a Denver newspaper because, as Sensenbrenner explained, “the sizes required by it were not advantageous to our machines.”

Closer analysis reveals troubling trends in Kimberly-Clark’s newsprint business, however. Rising costs consistently outpaced price increases in every year from 1901 to 1907 (table 1.5). The single largest factor responsible for mill costs was pulpwood, whose price grew by 55 percent over the same time period despite strenuous attempts to control the Niagara mill’s pulpwood bill through the Wisconsin Wood Pulp Company. From 1905 to 1907 the difference

**TABLE 1.4**
Kimberly-Clark newsprint price per 100 pounds, 1878–1907
between production costs and f.o.b. mill prices shriveled to from 23.3 percent to 8.9 percent, not counting transportation costs that sometimes added 10 percent to f.o.b. mill prices—charges that were usually covered by the mill. Unnerved by this precarious situation, Kimberly-Clark’s new management team switched the aging Badger mill in Neenah from newsprint to book grades in 1907, consolidating all newsprint operations at the Niagara mill.

Obtaining adequate pulpwood resources for the Niagara newsprint mill, which required 175 cords or 22,400 cubic feet of wood to sustain maximum production, became a top priority. In 1902 Kimberly & Clark Co. made its first purchase of timberland—18,000 acres in a county west of Niagara. This purchase was followed by acquisition of the William Bonifas Lumber Company, one of the largest lumber companies in Northern Michigan. William Bonifas, who owned extensive timber lands on the so-called Garden peninsula, had supplied Kimberly-Clark with pulpwood for several years and in 1909 had formed a partnership with his three brothers. The company continued accumulating large tracts of hemlock and spruce timber in the Upper Peninsula. In 1912 Bonifas sold the com-

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**TABLE 1.5**

Kimberly-Clark Niagara mill production costs and market prices, 1901–1907

![Bar chart showing newsprint price (1901 = 100 percent) and newsprint production costs from 1901 to 1907.]

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pany to Kimberly-Clark, which obtained a valuable pulpwood source for the Niagara mill.43

Kimberly-Clark’s attempts to secure the viability of the Niagara newsprint mill suffered a debilitating blow in 1913 when the Underwood Tariff Act lifted the tariff on Canadian newsprint. Tariff reform was largely the result of a successful political campaign by newspaper publishers, the American Newspaper Publishers’ Association, and John Norris, the business agent of The New York Times who became the association’s full-time lobbyist. Norris and other reform advocates argued that the abrupt halt in the long-term decline in newsprint prices at the turn of the century was the result of IP’s monopolistic pricing and various cartels among paper and pulp manufacturers. Eliminating the tariff could reintroduce a measure of price competition into rigidly structured markets by allowing Canadian mills to supply U.S. publishers with inexpensive newsprint, Norris and others argued. In their counteroffensive, newsprint producers predicted unsurprisingly that even mild tariff reductions would wreak irreparable damage. The complete removal of import duties had far more dramatic implications, they claimed. Canadian newsprint mills, drawing on more abundant pulpwood supplies and cheaper labor, enjoyed an $8 to $10 per-ton cost advantage over their American competitors. Eliminating the newsprint tariff, papermakers told the Wisconsin Congressional delegation in a meeting in 1909, “will bring about the ruin of the paper manufacturing industry in the States of Wisconsin, Minnesota, and Michigan.”44 Their prediction was grossly exaggerated because Kimberly-Clark, Thilmany, the Fox River Paper Company, the Park Falls Pulp & Paper Company, and other major firms in the region produced mostly non-newsprint grades. Tariff reform would have detrimental effects on non-newsprint markets, however, as Sensenbrenner pointed out to a Congressional panel in 1908: “[It would] stimulate the building of mills in Canada, and . . . take present news-paper mills off those grades and drive them to other grades,” increasing competition among producers of book and magazine papers, manila grades, and writing papers.45

These prescient comments describe the development of the U.S. pulp and paper industry after 1913. IP and other large U.S. companies built newsprint mills in Quebec and Ontario, as did Canadian firms, precipitating the swift rise of the Canadian newsprint industry. Some U.S. producers, notably Crown-Zellerbach, responded to the Canadian challenge by improving their existing newsprint capacities south of the border. Others admitted defeat and rushed to convert
their American operations to other grades, particularly tariff-protected book and magazine papers. They challenged firms that had dominated these markets in the past, creating downward price pressures that in turn unleashed a search for more profitable specialty products, including refined groundwood grades, toilet paper, linerboard, and sanitary napkins. Kimberly-Clark, whose management was keenly aware of these wider implications of the tariff revision, converted its Niagara newsprint mill to specialty groundwood paper only three years after the passage of the Underwood Tariff Act.

V.

The conversion of the Niagara mill strengthened Kimberly-Clark’s position as one of the nation’s leading manufacturers of book and magazine paper, by now the company’s most important product. Kimberly-Clark and its predecessor firms had manufactured the product on a large scale in the 1880s and had, over the next two decades, converted the Tioga, Vulcan, Telulah, Kimberly, and Atlas mills to book and magazine paper. Using a mixture of conventional groundwood pulp and small amounts of sulfite or rag pulps, these mills produced mostly low-grade paper for publishers of cheap, mass-produced books and magazines, leaving the high-quality end of the market to manufacturers of rag-based paper. This market segmentation was reinforced by prestigious paper merchant houses like Carter Rice & Company that cautioned publishers against groundwood pulp–based book and magazine papers, which lacked the strength, brightness, and distinctive texture of rag-based grades.

Wood gained acceptance as a base material for fine papers after the turn of the century, when the Hammermill Paper Company convinced skeptical paper merchants to market sulfite pulp–based bond paper. Founded in 1898 by German emigrants in Erie, Pennsylvania, Hammermill went to great lengths to meet the needs of major wholesalers for watermarked bond paper, inventing a machine that watermarked paper at very high speeds. The company also organized annual meetings with paper merchants to discuss technical issues and plot marketing campaigns. In 1912 it introduced the industry’s first mill-watermarked bond paper that was marketed in an unprecedented advertising campaign as “Hammermill Bond.” The company’s remarkable success in marketing fine papers made from sulfite pulp, whose quality approached that of far more expensive rag pulps, con-
vinced other papermakers that wood-based grades could compete with rag paper in high-quality market segments, notably book paper. Hammermill's experience demonstrated that attempts to break into high-quality paper markets required a strong commitment to product development and marketing and a willingness to accommodate the needs of paper merchants.46

Kimberly and Sensenbrenner, keen observers of the Hammermill success story, were determined to duplicate it in the market for high-quality book and magazine paper. Their early initiatives focused on the Kimberly mill, the company's most modern mill after its reconstruction in 1904, which became a testing ground for new technologies and processes. Initially the mill produced book and magazine grades from a mixture of sulfite pulp, rag stock, and de-inked magazine paper that produced low-grade printing grades. Efforts to improve product quality to the point where wood-based paper became acceptable to paper merchants and publishers focused on pulp processing technologies. First Kimberly and Sensenbrenner hired engineers to improve the quality of sulfite pulp. In 1912 Wheeler designed and supervised the construction of an electrolytic chlorine plant at Kimberly that produced an inexpensive pulp bleaching agent, replacing dry bleaching powder which was difficult to handle and had to be shipped by rail from a chemical plant in Detroit. The new plant had a daily capacity of eight tons of chlorine that was used to bleach sulfite pulp. Kimberly and Sensenbrenner also recruited P. A. Paulson, a chemical engineer who improved the Kimberly mill's sulfite pulping processes, and installed steel revolving drums to debark large amounts of pulpwood, replacing less efficient hand-debarking equipment that sometimes left bark impurities in groundwood pulp. Furthermore, newly hired chemist Ernst Mahler developed groundwood pulps that were more suitable for high-quality paper production than conventional groundwood pulp. The latter contained large amounts of lignin that effected a brownish tinge in groundwood-based grades, rendering it unacceptable to manufacturers of high-quality papers. Searching for bleaching processes that produced higher brightness, Mahler and James Kimberly in 1914 visited Germany, widely recognized as a leading center of chemical research, where they discussed possible solutions with chemistry professors and pulp makers. Upon their return, Mahler developed a bleaching method for groundwood pulping that eliminated lignin and produced the light-blue tinge perceived as white. The process was commercialized at the Kimberly mill, which pioneered the production
of refined, bleached groundwood pulp in the United States. Refined
groundwood pulp, which was mixed with chlorine-bleached sulfite
pulp, produced an inexpensive, high-quality grade that was particu-
larly suitable for rotogravure printing.\textsuperscript{47}

Combining photogravure with rotary printing, the rotogravure
process transformed magazine printing. Placing a screen engraved
with a photograph on a copper plate, a printer etched holes of vary-
ing depth into the plate, which was rolled up on a cylinder and cov-
ered with ink. When the cylinder was rolled over damp paper, deep
holes deposited large amounts of ink, reproducing the photograph’s
dark fields, while shallow holes produced lighter dots. The process
required high-quality paper that absorbed ink while retaining sharp
borders between dots to produce a clear image. Most early roto-
gravure paper was made from costly sulfite pulp, limiting the use of
photographs to expensive magazines. Kimberly-Clark’s refined
groundwood paper, which possessed the same printing qualities as
sulfite-based grades but cost less, facilitated the introduction of inex-
pensive illustrated magazines, including magazine supplements to
Sunday papers. The first customer for Roto-plate, Kimberly-Clark’s
trademark for the product, was \textit{The New York Times}, which ordered
it for its Sunday magazine in 1915 and remained one of the largest
customers for rotogravure paper for decades.\textsuperscript{48}

Convincing paper merchants to market high-quality wood-based
grades was a more formidable challenge. Taking a leaf from Ham-
mermill, Kimberly-Clark invited merchants to annual conventions to
discuss marketing, advertising, and technical problems. The meetings
usually featured an opening address on trade issues by Sensenbren-
ner or Kimberly, followed by Mahler or one of his assistants who
explained recent improvements in pulping technology and finishing,
and finally a general discussion. Remarkably, management frequent-
ly asked the assembled merchants to “vote” on new pulp mixtures,
grades, colors, and finishes “proposed” by the company. These
clever marketing strategies, which facilitated the introduction of
Roto-plate and other refined bleached groundwood grades, distin-
guished Kimberly-Clark from most other paper companies that
rarely asked merchants for their opinions. International Paper, for
example, maintained unfriendly relations with most merchants in
part because the giant paper company preferred to deal directly with
publishers, circumventing the finely meshed network of jobbers and
paper merchant houses. These unfriendly relationships contributed to
the lackluster performance of IP’s book and bond paper operations,
which never rivaled those of Hammermill and Kimberly-Clark in terms of versatility, responsiveness to customer needs, and name recognition.49

Kimberly-Clark’s attempt to turn bleached groundwood paper into a new core product was evidently successful. Detailed financial records are missing, but sales of the new product quickly overtaxed the company’s ability to produce it, convincing management to expand capacity. In 1915 the chlorine plant at the Kimberly mill doubled its capacity. A year later Kimberly-Clark converted the Niagara mill from newsprint to bleached groundwood grades, including book, magazine, and catalog papers.

VI.

On the eve of World War I, Kimberly-Clark was one the nation’s leading pulp and paper companies. Its core strength was not its size—IP with its capitalization of $50 million and the $30 million American Writing Company dwarfed the $4 million Neenah company—but its management’s commitment to innovation, product development, and marketing. The founders’ keen interest in new products and technologies became evident as early as 1878, when they pioneered groundwood-based manila grades in the midwestern paper industry, and in 1887, when Kimberly & Clark Co. became the region’s first paper company to introduce sulfite pulp. Initially lacking the detailed technical knowledge of “practical papermakers,” the founders invested into new technologies because they expected new products to yield solid financial returns, particularly in the case of Charles Clark, who reportedly “could smell a profit around the corner.” After Clark’s premature death in 1891, the surviving partners pursued somewhat more conventional product and investment strategies. However, the new generation of managers who took control after 1906 rekindled Kimberly-Clark’s commitment to innovation, notably in the case of bleached groundwood pulp, which laid the groundwork for the company’s new core business in high-quality book and magazine paper. When introduction of the new grade forced management to confront the difficult challenge of marketing, James Kimberly and Sensenbrenner emulated the strategies of Hammermill, the savviest innovator in the paper business. Furthermore, at a time when most paper company managers viewed laboratory work primarily as a form of product quality control, Kimberly and Sensenbrenner hired
professional chemists and established a research facility with the express purpose to develop new products.

Innovation, scientific product development, and marketing played a critical role during the interwar period, when Kimberly-Clark developed consumer nondurables and launched advertising campaigns to kindle demand for the new products. As the present chapter has shown, the structural and strategic parameters for this new departure emerged before World War I. The basic product that precipitated the momentous changes of the interwar period also pre-dated the war, but only barely. In the course of their trip to Europe in 1914, when Mahler and Kimberly explored new methods to produce bleached groundwood pulp, they also queried German paper scientists about the possibility of developing a cellulose product that could serve as a substitute for cotton-based sanitary wound dressings. Mahler, in fact, developed such a product, trademarked Cellucotton, a few months after his return from Germany, at the exact time when Europe descended into unprecedented bloodshed. After the war Kimberly-Clark used Cellucotton as a base material for the Kotex sanitary napkin.