Taking note of the paper industry

Consumer participation in recycling, improvements in technology, increased consumption of paper products, and liberalization of international trade together have had an enormous influence on employment in paper-related industries

Cynthia Engel

Paper is an indispensable component in the production, packaging, and delivery of a wide variety of products used daily by most Americans. For many it begins with breakfast. Most of us would be lost without our newspaper, coffee filters, napkins, cereal boxes, and milk and juice cartons. In some cases, our entire breakfast is baked, sold, reheated, and served in its original cardboard box.

Americans consume more paper than do the citizens of most countries. Compared with the 1994 world average of 97 pounds, the U.S. per capita consumption of paper is more than 700 pounds, approximately 2 pounds per person per day. Per capita consumption of paper products in the United States has grown 43 percent since 1980.1

Steady increases in paper consumption have had divergent impacts on employment in manufacturing production, in wholesale trade distribution, and in recycling collection. Employment in paper manufacturing, which historically has been volatile, has fluctuated less in recent years. Employment gains have been elusive, however, and 16,000 jobs have been lost, on net, since 1990.2 At the same time, employment in recycling collection and paper distribution reflects a steady and increasing rate of growth. Increases in these jobs in recent history have far outweighed employment declines in paper manufacturing.

Employment is driven in part by changing regulations and consumer demands. New government regulations and an environmentally conscious population have required industry to use more recycled waste and to produce fewer contaminants in production. These changes have led to costly, but necessary, investments in new equipment. Improvements have been implemented with state-of-the-art technology, resulting in less labor-intensive employment. While increased productivity within paper manufacturing has allowed output to grow even in times when employment has not, recycling and exports have buoyed employment in the paper-related industries.

This article examines the changing market for paper, including the demand for recycled products and exports, and its effect on employment trends.

Types of paper

Paper manufacturers produce both paper and paperboard products. The designation "paper industry" generally refers to the production of both products. Paperboard is used to make items for the packaging of products, such as cardboard boxes, shipping containers for produce, and appliance containers. "Paper" may also identify the subgroup of products that excludes paperboard, such as newspaper, catalog paper, bond paper, tissue paper, and computer paper. In this article, the term will be used to identify the broader group, including both paper and paperboard products.

Paper products are classified according to content. Products with recycled content contain various amounts of recycled paper, with the balance
made up of mill scraps, which often include virgin fiber. Other paper products contain only virgin fiber. To extract the cellulose, which makes up less than half of wood fiber, lignin and other substances are removed. The remaining cellulose is then bleached, beaten, and rinsed, resulting in a pulp to be used for papermaking.

Recycling plants must purchase wastepaper rather than wood, repulp the fiber, and feed the pulp into an ink removal system. At this point, both virgin and recovered pulp go through the same processes. The labor requirements for producing recycled fiber are similar to those for producing virgin fiber, although total costs of recycling are approximately 20 percent less. Production using recycled paper takes less energy than production using virgin paper.

The profitability of recycled products has caused some companies to replace pulp mills with deinking plants and to expand their use of recovered paper in existing mills. Companies are increasing domestic recycling capacity, as worldwide demand for recovered paper is expected to rise to 150 million tons by the year 2000, up from 110 million tons in 1993.

Where the jobs are

Paper-related employment is scattered among several industry categories. The largest block of workers is involved in the manufacture of paper and allied products, which employs 681,000, down slightly from its peak employment of 697,000 in 1990. The second-largest category of paper-related employment is in the paper and paper products component of wholesale trade, where 259,000 are employed in the distribution of paper products. Not included in the 259,000 are another 150,000 jobs in recycling activities undertaken by scrap material brokers and dealers, also found in wholesale trade. While a significant portion of these jobs are directly tied to paper recycling, others support metal or other material recycling. Scrap material brokers contract with those who actually collect wastepaper; these companies are primarily found in the refuse component of sanitary services (some portion of 156,000 jobs). This list does not exhaust all the remaining jobs that are hidden among the various categories of the Standard Industrial Classification structure: those employed in government transportation services, and those who produce the new equipment, chemicals, and processes to be used in the mills. However, when adding up an abbreviated list of categories, we find well over 1 million jobs supporting the consumption and production of paper in the United States.

Employment trends vary widely

Paper manufacturing. Employment has exhibited significant volatility in paper manufacturing over the last 20 years, with less fluctuation occurring recently. The growth in global markets, combined with production processes that require less human intervention, have contributed to greater stability in employment. Furthermore, the growth of exports has diversified the customer base of paper manufacturers.

As the following tabulation shows, recession-related reductions in the monthly industrial production index and employment in paper manufacturing reveal that recessions have become far less austere over the last two decades:

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<th>Percent change in</th>
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<tr>
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In the 1973–75 recession, the industrial production index for paper dropped by 24 percent as employment dropped 12 percent, with employment losses regained by 1978. Subsequent recessions do not come close to the severity of this decline. Over the combined recessionary period in the early 1980s, production dropped by 8 percent, while employment fell by 7 percent. Employment recovered much more slowly than in the 1975 recession, taking twice as long to reach prerecession levels. In the 1990–91 recession, the production index increased, as export tonnage grew by 8 percent and employment fell by 2 percent. Fortunately, exports bolstered demand for producers, providing some protection from more dramatic losses.

Although production continues to follow the cyclical pattern of the economy, its vulnerability to domestic recessions has been greatly reduced, and with this reduced vulnerability, employment has stabilized. (The declining nature of employment losses during recessions is shown in table 1.) Furthermore, as increasing amounts of capital are substituted for labor, employment declines in the current climate are not associated with reductions in demand.

While recessionary job losses occurred in paper and pulp mills, they were small compared with secular losses posted between 1990 and 1996. Postrecession losses did not reflect a reduction in demand; rather, they reflected technological improvements in the papermaking operation. Between the prerecession peak in 1990 and December of 1996, production increased by 12.6 percent, while employment declined by 1 percent. As computerization became more integral to production operations, mills became more capital-intensive and used less labor.

While manufacturing employment is declining overall, exports are adding jobs in paperboard containers and boxes, as exports of paperboard increased dramatically between 1990 and 1996. Employment also is increasing in wholesale trade and in sanitary services, outweighing losses in paper manufacturing. Employment trends in paper manufacturing have been more affected than those in other paper-related indus-
### Table 1: Recession peaks and troughs in employment in paper manufacturing and related industries, 1973-96

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<td>Sanitary services</td>
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</table>

**Note:** Data are based on monthly, seasonally adjusted employment estimates, except in the cases of pulp mills and scrap material, in which employment does not display measurable seasonality. The peak and trough months used in this table are those specific to the paper manufacturing industry but related to official recessions. Dash indicates data not available.

Employment by establishments categorized under scrap and waste materials increased by 11 percent in 1995 as waste paper prices soared, and maintained this gain in the weaker paper market of 1996. Between 1991 and 1996, employment rose a moderate 20 percent. (See chart 2.)

**Sanitary services.** Companies involved in the actual collection of scrap materials fall within the sanitary services industry. As recovery of recyclable materials has grown, so has employment in privately owned sanitary services collection. (Data are not available on employment in government-owned sanitary services, nor are specific data available on private sanitary service workers who are involved in paper recovery.) Employment growth was extremely rapid in the mid-80s, just as use of recycled paper became popular and was deemed a revenue-builder. Another growth spurt occurred between 1993 and 1995, when collection efforts were intensifying. The number of material recovery facilities (MRF) increased from 104 in...
1991 to 386 in 1995. While thirty-seven new projects are being planned for 1996-98, although they are smaller in size. Recycling facilities handle a variety of recyclable materials, the employment impact of paper recycling, as opposed to metal or plastic recycling, is unknown.

While material recovery facilities originally were concentrated in the Northeast, increasing paper demands have resulted in a nearly even distribution of these processing centers throughout the country. Consequently, hiring is no longer restricted to urban environments. Municipal governments throughout the country are experiencing increased demands for haulers and sorters, especially as public ownership of processing facilities has increased since 1995. Networks to collect, sort, and resell paper are continuing to expand.

Factors behind employment trends

As we have seen, employment growth in paper manufacturing is cyclical, and has failed to return to previous peaks during recent recoveries. In contrast, the numbers of jobs in the other paper-related industries have grown in recent years. This section explores some factors behind these differing trends—the increasing demand for paper products in general, and for those with recycled content in particular, and productivity gains from new equipment installed, in part, to use wastepaper instead of wood and to meet new environmental standards.

Changes in domestic demand for paper are primarily tied to changes in population and income growth. Increases in U.S. population and income were particularly strong between 1940 and 1970, followed by growth that was more subdued. While real economic growth has slowed, the information industry has transformed both our home and work lives, also stimulating greater per capita consumption of paper.

Growth in per capita consumption of paper has been averaging 2 percent a year over the last decade, with reductions in consumption coinciding with recessionary periods. (See chart 3.) Per capita consumption hit its peak in 1994, at 734.5 pounds, nearly 100 pounds more than in 1985. Consumption fell in 1995 and through 1996, as higher paper prices encouraged more efficient use. Between 1996 and 1998, consumption of paper (excluding paperboard) almost doubled.

Growth linked to computers. Contrary to speculation that computers would transform the American workplace into a paperless environment, the opposite result has occurred. The increased availability of photocopiers, fax machines, and computers has resulted in a dramatic increase in the use of "office paper" over the last two decades. (See chart 4.) While the U.S. population grew 16 percent from 1972 to 1987, copier paper waste increased by 150 percent and other office paper waste by 87 percent. This growing use is correlated with...
tremendous growth in production output of printing and writing paper, the type of paper that is used in printers and fax machines. Since 1982, production of printing and writing paper has increased by 60 percent. While the use of electronic mail has displaced some paper usage, conventional wisdom among paper industry forecasters is that "for every ton of paper displaced by computers, there is more than one ton of new demand generated."\textsuperscript{14}

Newspaper and book sales. While much of the growth in paper consumption is generated in the business sector, such as in direct-mail advertising, households also are large consumers, and many products are used by both home and office. Newspapers are a large consumption item for both, accounting for about 25 percent of all paper consumed in the United States (excluding paperboard).\textsuperscript{15} Despite the growing popularity of the Internet, 1995 readership of daily newspapers outpaced levels recorded in the 1989–94 period, following a period of decline between 1970 and 1989.\textsuperscript{16} The percent of American adults reading a Sunday newspaper also posted a record high in 1995, compared with the 1970–94 period. Clearly, newspapers are a popular medium, and newspaper advertising is more popular than any other form of advertising. Newspapers received 22.4 percent of all advertising dollars in 1995—more than broadcast TV and direct mail, with print-related advertising dominating over other media.\textsuperscript{17}

Not only is newspaper circulation healthy, but book sales also are holding their own. Adults purchased 1 billion books in 1995, compared with 776 million in 1991, with most of the increase occurring between 1991 and 1994.\textsuperscript{18} While most Americans report reading less, book sales have continued to grow. The Internet may be a substitute for some printed media, but its use also has encouraged sales, with books representing the commodity most frequently sold on the web after computer software. Not surprisingly, computer-related books are an increasing share of total sales, accounting for an additional 13 million books sold between 1991 and 1995.\textsuperscript{19}

Furthermore, an increasing standard of living is associated with greater paper usage, as consumption of most products involves some paper content in packaging, labeling, and advertising. Increased consumption is not limited to our borders; as economies develop abroad, worldwide consumption of paper has increased.

A growing foreign market. The market for paper is growing throughout the world, causing U.S. paper exports to more than double between 1985 and 1996.\textsuperscript{20} Growth in exports of recovered paper and printing and writing papers has been especially healthy.\textsuperscript{21} Exports, in dollars, rose from 6 billion in 1991 to 10 billion in 1996, as tonnage increased by 45 percent. (See table 2.) This burgeoning demand has insulated paper industry workers from further layoffs.

Much of U.S. trade is with our partners in the North American Free Trade Agreement (NAFTA); 39 to 45 percent of our exports are sent to Canada and Mexico.\textsuperscript{22} In 1994, the first full year after implementation of NAFTA, U.S. paper exports to those two countries increased by a combined 15.5 percent, on a tonnage basis. Exports to Mexico increased 33 percent between 1993 and 1996, and those to Canada, by 50 percent.\textsuperscript{23} However, despite this rapid growth, the share of all paper exports sent to our NAFTA partners has remained relatively stable due to increased demand from other trading partners. Exports to the emerging markets—which are among the fastest growing economies—more than doubled between 1991 and 1996, and represented 8.4 percent of the total market for U.S. producers in 1996, nearly equal to paper exports to Japan. (See table 3.)

Exports that are correlated with economic growth abroad have stimulated expansion of the U.S. paper industry. More than 50 percent of the industry's growth between 1989 and 1995 was due to this factor.\textsuperscript{24} Between 1990 and 1996, an average 11 percent of production was devoted to exports, compared with 6 percent in 1985. According to the American Forest and Paper Association, about 16 percent of total U.S. production went overseas in 1995, and approximately 42 percent of new capacity in the industry made products for export mar-

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**Table 2** Percent distribution of paper and paperboard exports to major markets, 1991–96

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<td>27.3</td>
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<td>Subtotal</td>
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<td>Rest of world</td>
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<td>Total exports, in thousands of dollars</td>
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<td>$6,525,040</td>
<td>$6,605,152</td>
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<td>$7,800,150</td>
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Source: U.S. Department of Commerce.

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*Monthly Labor Review* September 1997 37


### Table 3

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**Source:** U.S. Department of Commerce

### Table 4

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*1 Data are preliminary. 
Not: Dash indicates data not available. 
Source: Sample of the American Forest and Paper Association. 
Expenditure data are from the Census Bureau and from the National Council of the Paper Industry for Air and Stream Improvement.
New equipment and productivity. The growth in the demand for paper has led to large gains in output and has prevented steep job losses in manufacturing following the introduction of less labor-intensive equipment. Expenditures on new plant and equipment by establishments involved in the manufacture of paper products peaked in 1990 and remain higher than expenditures in the 1980s, as capital improvements have increased over the last decade. (See table 4.) Measured in real terms, average dollar expenditures for new capital in the period 1989–94 also are slightly higher than in the prior 5-year period, with 1989 and 1990 standing out as the strongest years for new investments. Although the number of machines installed or rebuilt has been declining since 1988, there has been new growth in recycling equipment. 46 Because recycling mills can be installed on a smaller scale and at a lower capital cost per ton of output than can virgin pulp mills, these facilities could better support incremental expansions in the industry, especially following a period of capital stock replenishment. 47 Demands for a cleaner environment also have contributed to more rapid replacement of equipment in the industry, likely improving productive efficiency.

The increased use of recycling equipment also carries productive efficiencies, compared with the use of wood fiber. Most grades of recycled paper appear to use less energy in production and produce less air pollution, although some grades require more purchased electricity. 38 According to one study, recycling 1 ton of materials in a typical curbside recycling program can save at least $183 worth of electricity, after deducting the cost of transportation to collect the materials. 49 Many types of paper are produced less expensively using recycled content, while most use some virgin fiber. 40

Furthermore, using recovered paper can provide more flexibility in production. Imbalances in the supply of wood pulp are easily corrected for if manufacturers have the ability to substitute recovered paper. While recovered paper has a limited number of “lives” and is used in small quantities in most products, it can be recycled 5 to 8 times. As a result, manufacturers are using more of this resource. Use of recycled paper is forecast to increase as mill capacity for recovered pulp more than doubles between 1994 and 1998. 41 Lower energy costs, lower raw material costs, and lower labor costs per ton of output have resulted in a more efficient industry.

An increasing amount of output was produced in mills, with hours worked declining, between 1966 and 1995. (See chart 5.) Thus, labor productivity, as measured by output per hour, more than doubled over this period; the gains were not steady, but followed business cycle movements. Productivity gains over the period in pulp, paper, and paperboard mills were
The Paper Industry

greater, on average (4.5 percent per year), than in paper industry
components that used to output the units of these (folding
paperboard boxes, 2.6 percent; corrugated solid fiber boxes,
3.8 percent; paper and plastic bags, 1.2 percent).

The Confluence of Consumer Participation in Recycling, Improvements in Technology, Increased Consumption of Product, and Liberalization of Trade have had an enormous influence on employment in paper-related industries. Technological changes, while costly, have facilitated increased output of recycled products as improvements in efficiency and output quality are attained.

Footnotes

1 "1996 Statistics. Data through 1994" (American Forest and Paper
2 Employment data are from the Current Employment Statistics survey
and appear in various issues of Employment, Hours, and Earnings. Data are
expressed in annual averages unless otherwise noted.
3 See Paper Task Force Report (at p. 172), a voluntary public-sector
initiative sponsored by the Environmental Defense Fund, which developed
recommendations for purchasing paper that reduce environmental impact
while meeting business needs.
4 American Museum of Papermaking.
5 Technology and Labor in Pulp, Paper, Paperboard, and Selected Con-
6 Using recycled newspapers from an average residential recycling pro-
gram saved 11.4 million nis, per ton of material compared to using virgin
materials, according to the Role of Recycling in Integrated Solid Waste Man-
agement to the Year 2000 (Stamford, CT: Franklin Associates, Ltd. for Keep
America Beautiful, Inc., September 1994), pp. 6-12, appendix I-49.
7 What’s the Outlook for Paper? Bicycle, June 96, pp. 78-80.
8 1626 manufacturers pulp, 1626 manufactures paper, and 1626 manu-
factures paperboard. 1626 produces paperboard containers and boxes
from purchased paperboard. 1626 produces various forms of converted
paper products, such as sanitary paper products, paper and plastic bags, coated
laminated paper, and others, from purchased paper and paperboard.
9 Recycling is a large component of 16993, but this category includes
molds and minerals as well as other scrap materials.
10 "New Growth was substantial in 1995," World Wastes, February 1996,
p. 6
11 "Materials recovery facilities: A 1996 Update," Bicycle, August 1996,
pp. 83-84
12 Ibid., p. 83.
13 Ibid., p. 84.
14 "1996 Statistics. Data through 1995" and monthly statistical sum-
maries of the American Forest and Paper Association.
15 Source Reduction: It’s a Necessity. (North Carolina Recycling
16 see Long-Term Pulp and Paper Review (Boxford, MA: Resource
17 According to "1996 Statistics," production of newsprint is also grow-
ing. In 1980, we produced approximately 40 percent of newsprint consumed,
while today we are producing over one-half.
18 More efficient use of paper by publishers may explain growing circu-
lation coincident to reductions in the tonnage of newsprint consumed.
19 Accounting to data compiled by McCann-Erickson, a prominent re-
search and information consulting firm in the advertising industry, the print-
related share of advertising expenditures has ranged from 36.5 percent in
1980 to 57.2 percent in 1994.
20 "In so Many Words: How Technology Reshapes the Reading Habit," American Demographics, March 1997.
21 Ibid.
22 "1996 Statistics," p. 2; and U.S. Department of Commerce, National
Trade Data Bank.
23 "Global Growth in U.S. Pulp and Paper Exports," American Paper-
24 "Another bumper year for exports," Journal of Commerce Special
Report, Mar. 11, 1996.
25 Measured by product value, not tons. Data are from U.S. Department of
Commerce, National Trade Data Bank.
27 "Global Growth in U.S. Pulp and Paper Exports," American Paper-
maker, June 1995, pp. 43-49.
28 Market barriers should be gradually reduced over this period as the
result of the General Agreement on Tariffs and Trade (most recently, the
Uruguay Round), NAFTA, and the USA-Japan Paper Agreement.
29 According to the U.S. Environmental Protection Agency, paper and
paper products accounted for 37.6 percent of landfills waste in 1993.
30 See the 1995 and 1996 data summaries of the American Forest and
Paper Association, p. 57.
31 The most important uses for recycled paperboard are folding cartons,
corrugated containers, paper tubes, wallboard facings, book covers and bind-
ers, and insulation board. See "Recycled paperboard: market pricing trends
and weaker demand for lower wastewater costs", Pulp and Paper vol. 70, no.
6, p. 12.
32 The Environmental Defense Fund developed a task force including
institutions such as Duke University, Johnson & Johnson, National Bank
Corporation, McDonald’s, the Prudential Insurance Co., and Time, Inc., which
together purchase more than $1 billion in printing and writing papers
and share the common goal of finding ways to use environmentally preferable
paper.
33 "Buying Recycled: Investing Dollars to Close the Loop," World
34 "Beverage Year for Paper Recovery at U.S. Mills," Bicycle, August
1997, p. 11.
35 Published since 1960, Bicycle is a prominent magazine on composting
and recycling.
36 "1995 Statistics. Data through 1994" (American Forest and Paper
Association, September 1995), p. 66
38 Paper Task Force Report, table A-1-A-5. Most grades show a signi-
ficant savings in energy used in production compared to virgin manufac-
turing processes.
39 According to "Advantage Recycling: Assessing the Full Costs and Ben-
efits of Curbside Recycling," a report by the Environmental Defense Fund,
31 percent of the savings was attributable to newspaper versus other recy-
cleable products.
40 See Paper Task Force Report, ch. 3, p. 68. Refers to letterboard, cor-
rugated medium, newspapers, specialty uncoated printing and writing paper,
among others. However, unprinted office paper is an example of one type
which is more costly to produce using recycled pulp.
41 "What’s the Outlook for Paper?" Bicycle, June 96, vol. 37, no. 6,
pp. 78-80.

40 Monthly Labor Review September 1997