

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: The Output of Manufacturing Industries, 1899-1937

Volume Author/Editor: Solomon Fabricant, assisted by Julius Shiskin

Volume Publisher: NBER

Volume ISBN: 0-87014-038-8

Volume URL: <http://www.nber.org/books/fabr40-1>

Publication Date: 1940

Chapter Title: The Output of Individual Manufacturing Industries:
Paper Products

Chapter Author: Solomon Fabricant

Chapter URL: <http://www.nber.org/chapters/c6414>

Chapter pages in book: (p. 206 - 212)

Paper Products

THE industries in this group manufacture pulp, paper and paperboard from pulp, and converted paper products (boxes, bags, etc.) from paper and paperboard. In terms of value added, the group has risen steadily in importance. By 1937 its contribution to total value added by all manufacturing exceeded that of leather products, rubber products, petroleum and coal products, beverages and miscellaneous products.

TRENDS IN THE PHYSICAL OUTPUT OF THE PAPER PRODUCTS INDUSTRIES

Pulp. This basic industry embraces establishments engaged primarily in the manufacture of pulp from wood and other fibers, many of which transfer their output to closely affiliated paper mills. The physical output of the pulp industry increased at a rapid rate during the 38-year period (Table 34 and Chart 14). From 1899 to 1937 it achieved a net rise of over 500 percent. In the first ten years output more than doubled. While growth was less rapid in the later periods, output increased in each of them by about two fifths.

Among the individual products of the pulp industry, sulphate-fiber pulp is outstanding because of its particularly rapid growth. In 1914, the first year in which the output of this type of pulp reached such proportions that it had to be shown separately, production totaled 50,000 tons; by 1937 it had climbed to 2,140,000 tons. Another kind of pulp, sulphite-fiber, which accounted for 35 percent of all pulp in 1899, moved so slowly that its 1937 output was no greater

than that of sulphate pulp—2,140,000 tons. The output of the unbleached variety of sulphite-fiber pulp was 770,000 tons in 1914 (the first year for which separate data are avail-

TABLE 34

PAPER PRODUCTS^aPhysical Output: Indexes and Percentage Changes^b

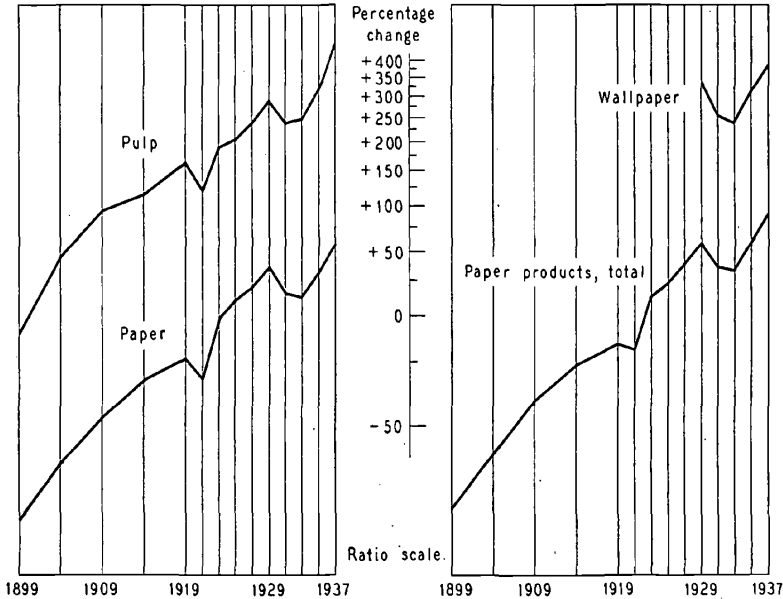
YEAR	Pulp	Paper	Wall Paper	Total	
				Unadjusted	Adjusted
	INDEX OF PHYSICAL OUTPUT (1929:100)				
1899	23	20	..	19	18
1904	38	29	..	28	26
1909	50	39	..	36	37
1914	55	49	..	44	46
1919	68	57	..	53	53
1921	56	50	..	44	50
1923	74	73	..	66	70
1925	78	82	..	75	77
1927	86	88	..	88	89
1929	100	100	100	100	100
1931	88	85	81	86	86
1933	89	83	77	84	84
1935	107	96	93	98	102
1937	141	115	110	120	122
	NET PERCENTAGE CHANGE IN PHYSICAL OUTPUT				
PERIOD					
1899-1937	+505	+465	..	+516	+567
1899-1909	+116	+92	..	+88	+100
1909-1919	+36	+45	..	+44	+44
1919-1929	+46	+76	..	+90	+89
1929-1937	+41	+15	+10	+20	+22

^a Industries for which there are no adequate quantity data for any period listed above are: bags, paper, not elsewhere made; boxes, paper, not elsewhere classified; cardboard, not elsewhere made; card cutting and designing; envelopes; labels and tags; paper goods, not elsewhere classified; and stationery goods, not elsewhere classified. These industries are covered by the adjusted total.

^b The indexes have been constructed from basic data in the U.S. Census of Manufactures, by methods described briefly in Chapter 2 and in detail in Appendix A. Appendix B presents these data, together with the indexes derived from them. The indexes cited here for individual industries have been adjusted to take account of changes in the coverage of the respective samples, except when such adjustment was impossible.

The percentage changes are not always entirely consistent with the indexes given above because the changes were computed from the indexes in Appendix B, which are carried to one decimal place.

Chart 14
PAPER PRODUCTS
Indexes of Physical Output



able) and 790,000 tons in 1937, while bleached sulphite-fiber pulp rose from 380,000 to 1,350,000 tons.¹ Soda-fiber pulp rose from 180,000 to 510,000 tons between 1899 and 1937. The increase in mechanical pulp was the smallest: in 1899 the output of this product amounted to 590,000 tons, 50 percent of the total, and in 1937, to 1,600,000 tons.² The slow growth of mechanical pulp, as well as of unbleached sulphite-fiber pulp, reflects the relative decline in the domestic production of newsprint, one of the principal types of paper made from these pulps.³ Since each of these types of

¹ In 1937 this product included 354,000 tons of superpurified pulp intended for use in rayon and other special chemical products.

² The 1899 figures are taken from J. D. Studley, *United States Pulp and Paper Industry*, U.S. Bureau of Foreign and Domestic Commerce, Trade Promotion Series No. 182 (1938), Table 9.

³ Studley, *op. cit.*, p. 28.

pulp is the product of a special manufacturing process, the marked shifts in the industry's output reflect corresponding changes in its techniques, equipment and labor skills.⁴

Paper. The paper industry's output followed fairly closely the trend in pulp production. Paper production rose 465 percent from 1899 to 1937 as compared with 506 percent for pulp. In the last period, however, paper production increased by only 15 percent, whereas pulp output rose 41 percent.

The growth in paper output resulted from diverse changes in the output of many different types of paper. The shifting composition of paper output is summarized in the figures below:

Type of Paper	Output (thousand short tons)			Percentage Distribution		
	1899	1919	1937	1899	1919	1937
Newsprint	624	1,474	1,494	30	25	12
Book	304	961	1,520	14	16	12
Cover	19	22	24	1	*	*
Writing	113	325	578	5	6	5
Wrapping	535	858	2,053	25	15	16
Tissue	28	191	540	1	3	4
Building	97	195	608	5	3	5
Paperboard	394	1,867	5,802	19	32	46
TOTAL	2,114	5,893	12,619	100	100	100

* Less than half of one percent.

The most striking facts to be noted in the tabulation are the relative decline of newsprint and wrapping paper as contributors to the total, and the huge rise in the contribution of tissue paper and paperboard. The failure of newsprint to

⁴ Perhaps a more vivid illustration of the transformation in the industry's output is to be found in the profit and loss statements of paper manufacturers. The "displacement of sulphite pulp by the cheap and strong sulphate pulp for the manufacture of coarse wrapping papers and paper bags" was accompanied by profits in sulphate pulp manufacture and losses in sulphite pulp manufacture: "The difficulties of the Union Bag and Paper Corporation and of the Continental Paper and Bag Corporation can be ascribed mostly to the displacement of sulphite paper by sulphate paper." See C. E. Fraser and G. F. Doriot, *Analyzing Our Industries* (McGraw-Hill, 1932), p. 325.

increase rapidly in output is accounted for by the great rise in the quantity of newsprint imported. In 1914 about 15 percent of our domestic requirements were met by imports, but in 1936 the proportion was as high as 75 percent.⁵

Summary. The output of the entire paper products group rose 516 percent, according to the index based on the three industries for which we have data, and 567 percent if we adjust this index for changes in the relative importance of the sample. In the first decade, according to the adjusted index, output doubled; in the second decade it rose by almost one half; in the third decade it nearly doubled; and in the last period it increased almost a fourth. Similar changes are shown by the unadjusted index.

The group index rose more rapidly than total manufacturing in three of the four subperiods. The exception was the decade 1909-19, during which paper products output merely kept pace with the grand total. In relation to population, the output of paper products forged ahead in each of the four subperiods.

CHANGES IN THE INDUSTRIAL PATTERN OF PAPER PRODUCTS MANUFACTURE

The pulp and paper industries are not closely related technically, since much of the pulp consumed in the paper industry is imported, and since the paper industry uses a considerable amount of rags and old or waste paper as well as pulp. In 1929 the tonnage of various materials consumed by the paper industry, expressed as percentages of the total quantity, stood approximately as follows:⁶

⁵ Studley, *op. cit.*, p. 85.

⁶ Data on the quantity of materials consumed are not available for the years preceding 1929. According to data on the cost of materials, rags declined in relative importance between 1899 and 1929 while old and waste paper rose; there was little change in the relative importance of the aggregate of these materials.

	<i>Percentage</i>
Wood pulp	55
Domestic	39
Imported	16
Rags	6
Old or waste paper	33
Manila stock	1
Straw	5
TOTAL	100

The trends in pulp and paper production are nevertheless surprisingly close to one another.

The relation between pulp and paper is expressed in terms of relative contributions, in Table 35, for the years 1929-37 only; no separate data on value added per unit are available for these industries for earlier years. Since the output of the paper and pulp industries rose at about the same rate as the group total, no other important change in the composition of the group's physical output is revealed by the table. Paper and pulp combined accounted for 61 percent of the total physical output of the group in 1899, and for 56 percent in 1937. This slight decline was accompanied, of course, by an increase in the combined relative importance of the other industries in the group.

TABLE 35

PAPER PRODUCTS

Relative Contributions of Component Industries to the Physical Output of the Entire Group^a

<i>Industry</i>	<i>Percentage Distribution, Comparable Pairs of Years</i>									
	1899	1937	1899	1909	1909	1919	1919	1929	1929	1937
Paper	60.8	56.3	60.8	57.0	57.0	57.3	57.3	57.4	47.3	44.7
Pulp									10.1	11.7
Wall paper	39.2	43.7	39.2	43.0	43.0	42.7	42.7	42.6	1.9	1.8
All other									40.6	41.9
TOTAL ^b	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

^a Derived from Table 34. For an explanation of the derivation of the measurements see footnote 10, Chapter 4.

^b The columns do not add up to 100.0 in every instance because they contain rounded percentages.

The data on the industrial pattern of pecuniary output of the paper products group (Table 36) add information concerning some of the industries for which we have no data on physical output. The relative contributions of the container industries (bags and boxes), and of miscellaneous pa-

TABLE 36

PAPER PRODUCTS

Relative Contributions of Component Industries to the Value Added by the Entire Group^a

Industry	Percentage Distribution					1937
	1899	1909	1919	1929 Comparable with earlier later years years		
Paper	} 60.8	57.0	57.3	{ 46.6	50.2	46.3
Pulp						
Bags, paper, n.e.m. ^b	2.5	3.0	2.5	2.5	2.7	3.4
Boxes, paper, n.e.c. ^c	16.7	16.0	18.8	16.0	17.2	20.3
Cardboard, n.e.m. ^b	0.6	0.6	0.7	0.4	0.4	0.3
Card cutting and design- ing	0.3	0.4	0.5	1.2	1.3	1.4
Envelopes	2.8	3.3	3.2	3.7	4.0	3.1
Labels and tags	0.8	1.6	2.3	2.1	^d	
Paper goods, n.e.c. ^c	7.5	9.4	7.5	9.8	10.5	12.3
Stationery goods, n.e.c. ^c	3.1	5.0	5.4	5.0	^d	
Wall paper	4.9	3.8	1.8	2.0	2.1	1.8
TOTAL ^a	100.0	100.0	100.0	100.0	100.0	100.0

^a Basic data are given in Appendix C.

^b N.e.m. denotes not elsewhere made.

^c N.e.c. denotes not elsewhere classified.

^d Distributed among paper, printing and other industries.

^e The columns do not add up to 100.0 in every instance because they contain rounded percentages.

per goods (waxed, toilet, and coated-book paper; napkins, cups, and spoons; towels; playing cards; adding machine paper, and other products) rose appreciably between 1899 and 1937. Card cutting and designing also increased. Wall paper, on the other hand, declined rather considerably, from 4.9 to 1.8 percent.