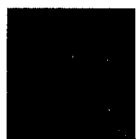


1993 TAPPI salary survey

by Douglas J. Burke

The economic recovery of 1993 was not vigorous enough to boost wages.

Median salary increased a meager 0.8%, well below the rate of inflation, which was at a seven-year low of 2.7%.



TAPPI conducted its first salary survey in 1974. A second survey in 1976 established the practice as a biennial event. That changed in 1980, and the salary survey has been an annual tradition since that time, with the exception of

1984.

Each January, TAPPI mails a questionnaire to 10,000 U.S. members selected at random. The survey form has expanded from 16 to 27 questions in recent years, but the response rate has remained quite high, typically hovering around 30%. The response to the 1993 salary survey was once again gratifyingly high, with 3106 members returning completed questionnaires.

Salaries for this year's batch of respondents ranged from \$9000* for a self-employed environmental consultant to \$1.75 million for a corporate employee who has worked for three companies in the past ten years. Seven respondents (0.2%) reported earning salaries of \$1 million or more, the same as last year. The percentage of members reporting incomes of \$200,000 or more also held steady at 2.3%. Given these statistics, it should not be surprising to learn that salaries for the rest of us also remained flat, with the median increasing a mere 0.8%, from \$65,000 to \$65,550. In a year when the Consumer Price Index (CPI) increased by 2.7%—the smallest increase since 1986—this represents another net loss for TAPPI members. The most recent loss occurred in 1991, when the 2.5% increase in median income failed to match the 3.1% rate of inflation.

*Salary is defined as gross income, including bonuses. All monetary amounts are U.S. dollars.



Even worse was 1988, when the median held steady despite a 4.4% increase in the CPI.

Income distribution

Figure 1 shows the distribution of salaries for all respondents. Curves for 1990–92 are provided as a reference. The percentage of respondents reporting salaries higher than \$130,000 dropped to 6.7% from the high-water mark of 7.6% established in 1992. This change is reflected in the \$3600 drop in

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mean salary from 1992 to 1993. The percentage of respondents earning very low salaries also fell to its lowest level ever. The curve for 1993 closely tracks the 1992 curve up to about \$55,000, indicating only marginal increases within this range. However, from \$55,000 to \$72,500, the 1993 curve bulges above the 1992 curve, pushing the mode—the salary reported by the greatest number of respondents—to \$61,000, a substantial increase of 6.1% from \$57,500 in 1992. This year's curve also shows a notable increase in the percentage of respondents earning between \$85,000 and \$105,000.

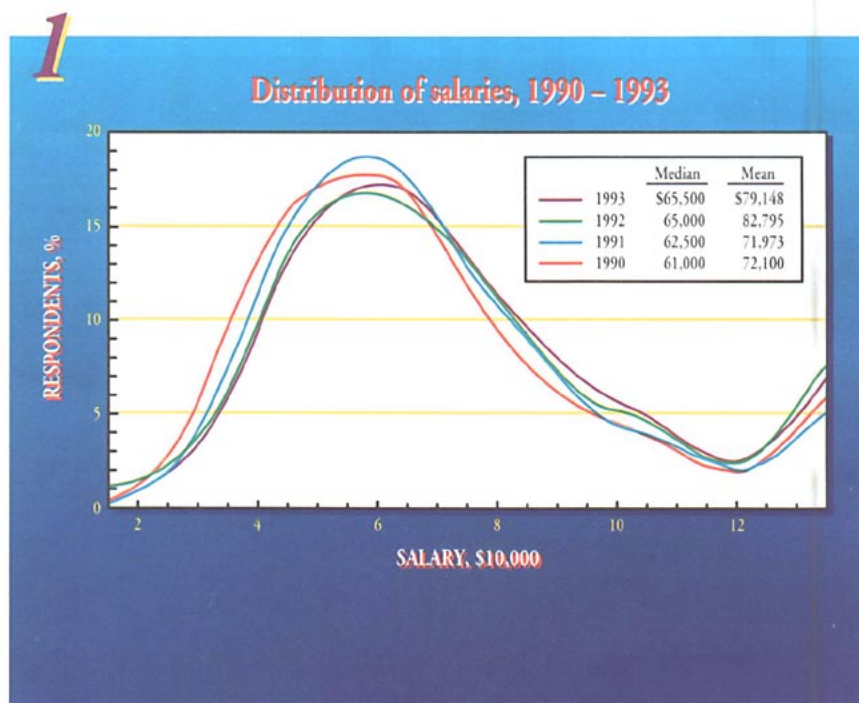
Table I shows the distribution of income by age. Median salary for respondents in their 20s, 30s, and 40s was the same as in 1992. The median for older respondents increased by 5% or more. The right-hand column confirms the drop in the number of respondents reporting very high and very low salaries. It also shows a large increase in the percentage of respondents earning between \$90,000 and \$100,000.

Figure 2 shows the distribution of reported changes in annual salary. The figure does not include salary reductions greater than 20% (0.1% of respondents) or increases greater than 30% (2.5% of respondents). More than 78% of the respondents reported an increase in salary in 1993, with a median increase of 4%. The percentage of respondents reporting no change in salary was 15.75%, capping a five-year upward trend in stagnant salaries. In 1989, only about 4% of the respondents reported no change in salary. This jumped to 6.5% in 1990, 11.4% in 1991, and 15.75% in 1992. The figure did not increase in 1993, perhaps marking a turning point in this gloomy trend. On the other hand, while more and more respondents were reporting no change in salary, the modal response of a "5% salary increase" held steady from 1989 to 1992. In 1993, the modal response dropped dramatically to a "3% salary increase."

Big bucks

In a year when salaries were flat, we thought it might be diverting to take a closer look at the respondents at the very top range of income.

Seven respondents reported salaries of \$1 million or more. Apparently, their salaries remained fairly flat too. The largest salary increase reported within this elite group was 15%. One reported no change in salary from last year, and the others reported modest increases of 3–9%.



All were corporate employees, but only one described himself (there were no women in this group) as a corporate officer. Two respondents gave "other" as their principal job functions, bypassing the 11 conventional categories listed on the questionnaire. One works in engineering, and the other three listed "production" as their principal job functions. Indeed, five of the seven top wage earners reported working on-site at a pulp or paper mill. Five are located in the Southeast, and the other two are from the Midwest. Four have worked for the same company for the past 10 years, but the other three have worked for two or three companies in the past decade.

The educational backgrounds within this group were surprisingly diverse. Only 70 respondents (2.3%) reported high school as their highest level of education, but one of these made it into the top 0.2% of wage earners. Similarly, one of the millionaire respondents was among the 78 members (2.5% of respondents) who listed an associates degree as their highest educational achievement. The other top earners hold M.B.A. or B.S. degrees.

Income and education

The central pie chart in Fig. 3 shows the educational makeup of the TAPPI membership. There are no surprises here. Every year the survey shows that the membership consists of about 9% Ph.D.s, 23% masters degrees, and 56% bachelors degrees. This year, we decided to break the educational levels into individual disciplines to identify the fields of study that are in demand.

I. Income bands by age*

Income band, \$1000	Age range						Number of respondents	Percent of all respondents, %		Percent change since 1992, %
	<30	30-39	40-49	50-59	60-69	70+		1993	1992	
<20	1	1	...	1	2	...	5	0.2	0.9	-78
20-<30	18	8	8	...	...	...	34	1.1	1.6	-31
30-<40	82	59	19	5	1	...	166	5.4	5.6	-3.6
40-<50	166	153	66	26	5	2	418	13.6	14.0	-2.9
50-<60	46	281	130	45	18	1	521	17.0	17.1	-0.6
60-<70	3	232	182	105	14	...	536	17.5	16.3	+7.4
70-<80	3	123	150	109	18	2	405	13.2	13.3	-0.8
80-<90	1	44	103	114	28	1	291	9.5	9.1	+4.4
90-<100	3	33	71	70	17	...	194	6.3	5.4	+16.7
100-<110	...	17	53	56	19	1	146	4.8	4.7	+2.1
110-<120	...	5	21	39	9	...	74	2.4	2.2	+9.1
120-<130	...	8	28	29	3	1	69	2.3	2.2	+4.5
130+	...	12	71	88	30	4	205	6.7	7.6	-11.8
	323	976	902	687	164	12	3064	100.0	100.0	

*Bold-faced numbers indicate location of median income in each age range. Median salaries for the six age categories are \$42,000, \$59,000, \$72,000, \$84,000, \$88,575, and \$90,000.

2

Distribution of reported changes in annual salary



At the Ph.D. level, chemistry is the most widely studied subject, with pulp and paper science and chemical engineering distant seconds. This contrasts sharply with the bachelors level, where chemical engineering and mechanical engineering occupy the one and two positions, followed closely by pulp and paper science and chemistry. At the masters level, business administration dominates the other fields of study, followed by pulp and paper science, chemical engineering, and chemistry.

The salaries commanded by the dominant fields of study are illustrated in Fig. 4, which is a quantile plot showing the upper and lower deciles and quartiles as well as the median income at

the bachelor, master, and Ph.D. levels. The category with the highest median salary (\$82,000) is pulp and paper science at the Ph.D. level. Medians at the bachelor and masters levels for this field are considerably lower. Median salary for a Ph.D. in chemistry (\$80,000) is much higher than for a Ph.D. in chemical engineering (\$65,000), which is not much higher than for a bachelors degree in the same field (\$60,000). The bachelors degree with the highest median was business administration (\$72,100), slightly higher than a Ph.D. in mechanical engineering and much higher than a Ph.D. in chemical engineering or a masters degree in pulp and paper science (\$65,000).

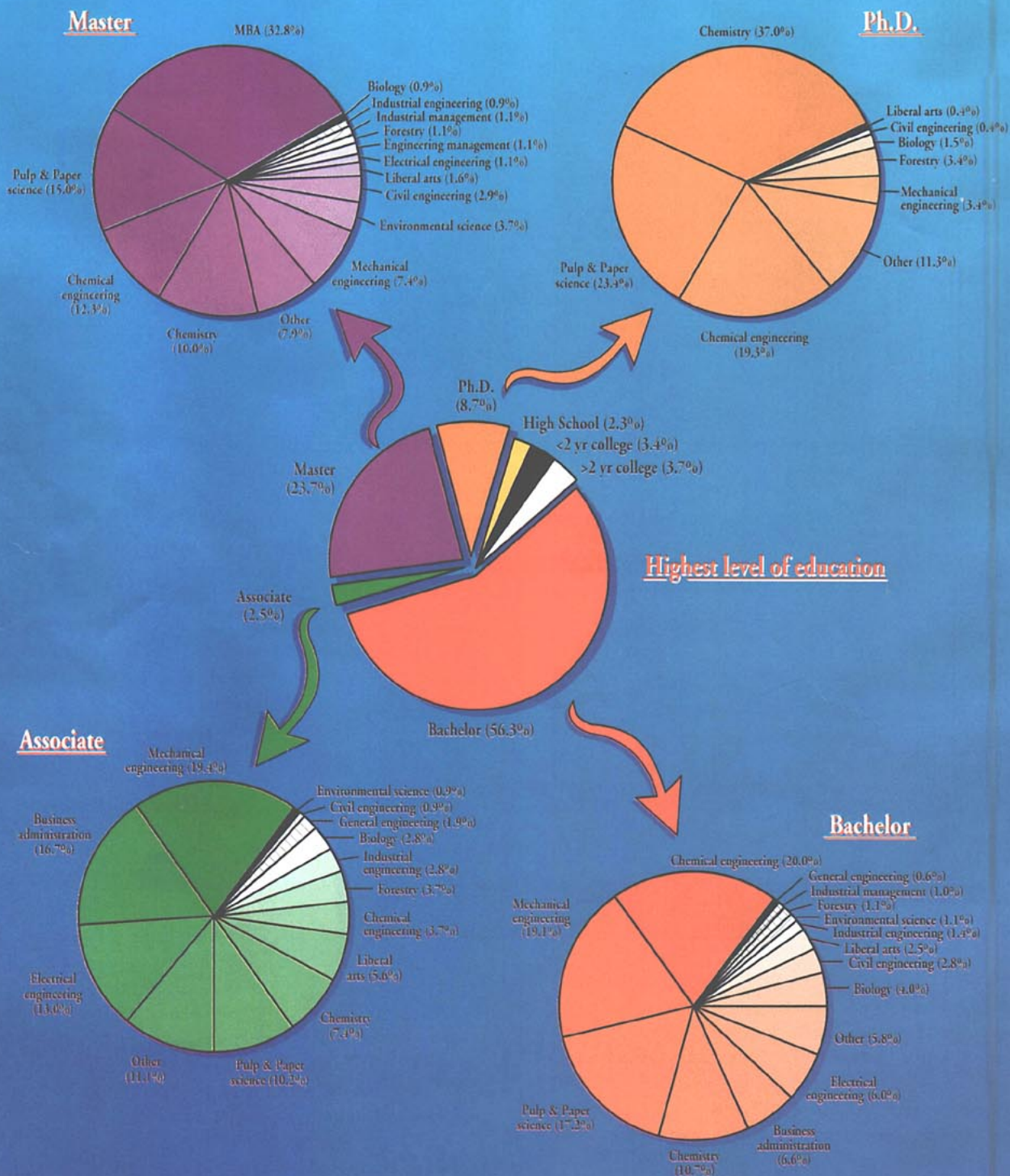
As expected, median salary increased with the level of education. The median for a bachelors degree is \$8000 higher than the median for an associates degree. Similarly, the median for a masters degree is \$7000 higher than for a bachelors degree, while a Ph.D. commands a premium of \$5000 over a masters degree.

Income in industry sectors

Figure 5 is a quantile plot of the salary distribution in 11 key sectors of the pulp and paper industry. The categories are arranged in descending order of median salary.

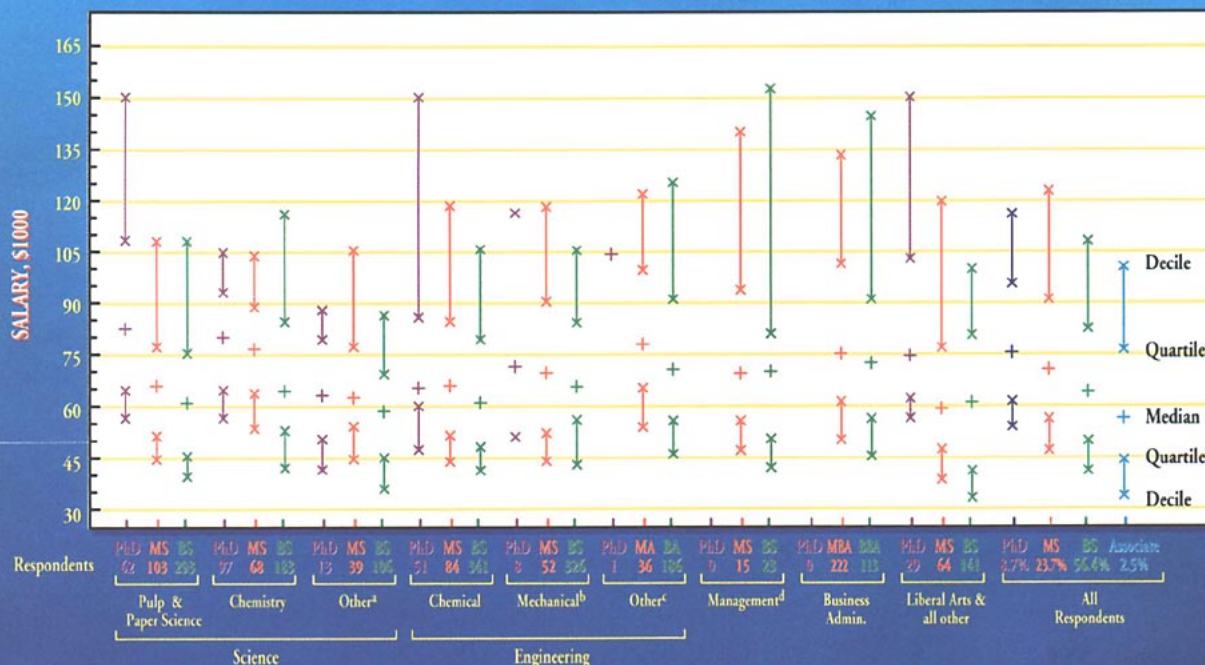
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Highest level of education and fields of study at each level



4

Income distribution at highest level of education in various disciplines



^a Other science fields include Environmental Science, Forestry, and Biology.

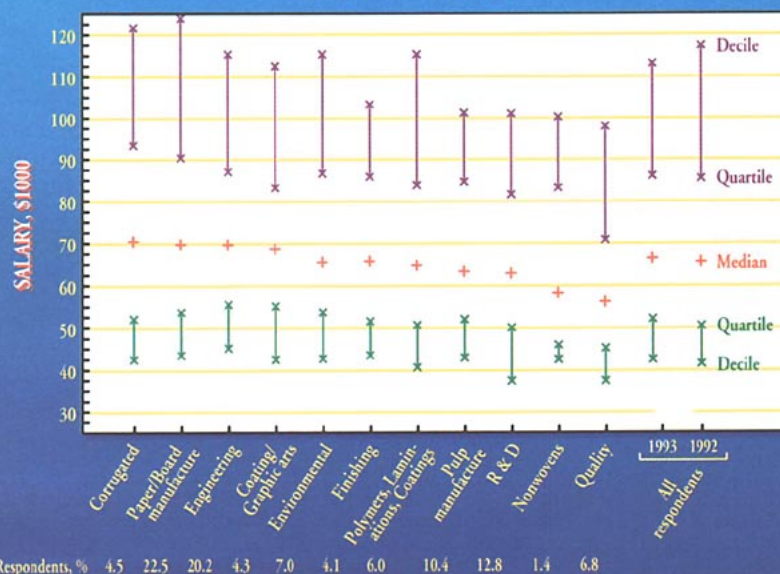
^b Insufficient data to compute deciles for the PhD category. The upper and lower figures represent the highest and lowest salaries reported in this category.

^c Other engineering fields include Civil, Electrical, Industrial, and General Engineering. Only one salary reported at the PhD level.

^d Management fields are Engineering Management and Industrial Management.

5

Income distribution within industry sectors



Corrugated once again led the way with the highest median, although this year it was \$1000 less than in 1992. Paper and board manufacturing jumped from fourth position to second, while environmental tumbled from the second position to fifth, with a slight drop in median salary. The nonwovens sector dropped from fifth position to the tenth spot, and the median salary in this category plummeted from \$62,500 to \$58,000. The small number of respondents in this field probably explains its volatility. A \$3000 increase in median salary for coating/graphic arts (to \$68,000) propelled this category from the sixth position to the fourth position.

The performance of the other sectors was close to that of past years, with R&D and quality again at the low end of the scale. Youth may partly explain the lower salaries for process/product qual-

ity. Only 6.1% of respondents older than 30 are involved in quality. In contrast, 12.5% of respondents under 30 years of age work in this field. Interestingly, most respondents who select "process/product quality" as their *principal area of involvement* choose to describe their *principal job function* as "technical," even though "quality control" is available as a choice.

Income and job function

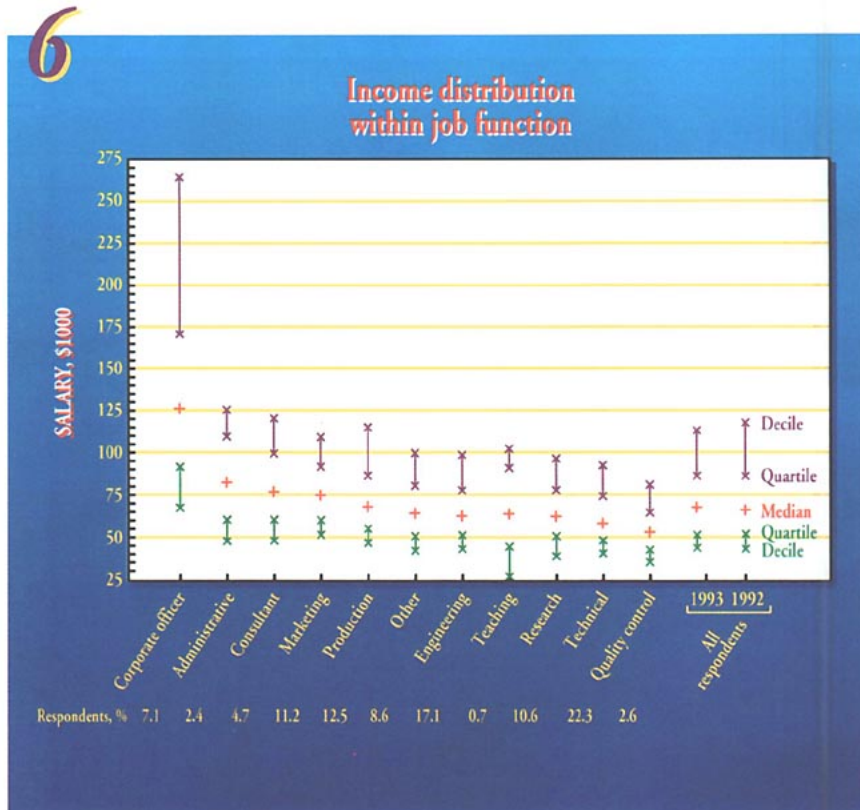
Figure 6 is a quantile plot of the salary distribution in 11 key job functions. As in Fig. 5, the categories are arranged in descending order of median salary.

Median salary for corporate officers was more than 50% higher than the closest competitor, administration. Still, corporate officers were not immune to the economic forces of 1993. Their median salary of \$125,000 was the same as in 1992 (when the median increased by 13.6% over 1991). The relative positions of all 11 categories are the same as last year, with one exception. Teaching leapfrogged two positions to the eighth spot, passing the "research" and "technical" categories. Median salary for teaching also increased by more than \$3000. The median for research edged up somewhat to \$61,400 and held steady or moved only slightly for the other categories.

Youth, gender, and race

Table II breaks down the respondents into two categories by age and by gender. The female population in the overall membership increased from 7.1% in 1992 to 8.4% in 1993. Most of that increase is due to the growing proportion of females under age 30, which rose from 21.4% in 1992 to 23.2% in 1993. The most striking statistic in this table is the near parity in salaries for men and women under the age of 30. The median for males is only 1.4% higher than for females. This gap has been closing steadily over the past five years for young workers (<30 years). Last year, the male median for this age group was 7.5% higher than the female median.

Table III breaks down the membership into two categories by age and race. About 5% of the respondents identified



II. Median income by gender, 1993 and 1992

	<i>Median income, \$</i>		<i>Change in median income, %</i>	<i>Respondents in each category, %</i>
	<i>1993</i>	<i>1992</i>		
All respondents				
Male	68,000	67,000	+1.5	91.6
Female	48,875	46,000	+6.3	8.4
<30 years old				
Male	42,100	43,000	-2.1	76.8
Female	41,500	40,000	+3.8	23.2
30+ years of age				
Male	70,000	70,000	0	93.3
Female	53,000	52,900	+0.2	6.7

themselves as non-Caucasian. The ratio was the same in both age groups. Median salary within each group is about the same for both race categories.

A model for calculating annual income

A correlation matrix of 18 variables showed that the four factors with the greatest impact on salary were

- Age
- Responsibility level
- Industry experience
- Management experience.

We used these four variables to develop a multiple regression model based on responses from the 2494 conscientious respondents who provided data in all of these categories. We also limited the model to salaries ranging from \$30,000 to \$100,000. This salary range includes 82.6% of the total respondents. Only 1.3% of the respondents earned less than \$30,000, while 16.1% earned more than \$100,000.

The model we developed had a correlation coefficient (r) of 0.60. (r is a measure of the strength of correlation, with a perfect positive correlation = +1, a perfect negative correlation = -1, and no correlation = 0.) The coefficient of determination for this equation (r^2) is 0.36. (r^2 is a measure of how much variability the model explains. In this case, the four variables in the model account for 36% of the variability in salary.)

$$\text{Salary} = \$27,757 + \$3664A + \$2162R + \$1987I + \$1929M$$

where

$$A = \text{age, } 1 \leq A \leq 7$$



$$R = \text{responsibility level, } 1 \leq R \leq 6$$

$$I = \text{industry experience, } 1 \leq I \leq 6$$

$$M = \text{management experience, } 1 \leq M \leq 6.$$

Table IV lists the corresponding scores for A , R , I , and M . For instance, for a 40-year-old (40–49 years, $A = 4$) engineer (professional staff, $R = 4$) with 7 years of management experience (6–10 years, $M = 4$) and 13 years of industry experience (10–14 years, $I = 4$), the model predicts an annual income of \$66,725.

One of the weaknesses of the model is the breadth of the categories involving time. The model does not distinguish between someone with five years of management experience and someone with one year of experience. One way to mitigate this effect is to consider the scores in Table IV as the midpoint of a range. Using this approach, a 45-year-old would insert $A = 4.5$, while a 40-year-old would use $A = 4.0$ and a 49-year-old might try $A = 4.9$.

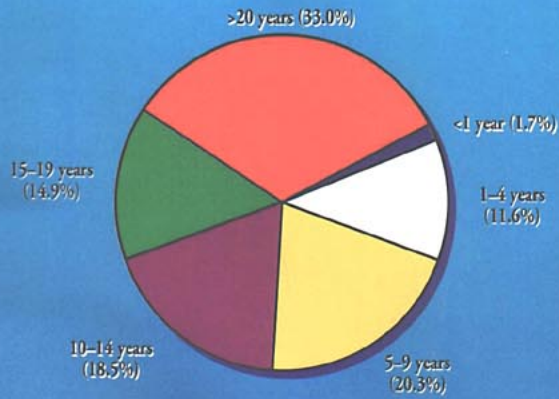
IV. Values for A , R , I , and M in regression model for predicting annual salary

Score	A (age)	R (responsibility level)	I (industry experience)	M (management experience)
1	<20 years	None	<1 year	None
2	20–29 years	Unit/team supervision	1–4 years	<1 year
3	30–39 years	Section/project supervision	5–9 years	1–5 years
4	40–49 years	Professional staff	10–14 years	6–10 years
5	50–59 years	Division/major dept.	15–19 years	11–14 years
6	60–69 years	General management	20+ years	15+ years
7	70+ years	...	...	...

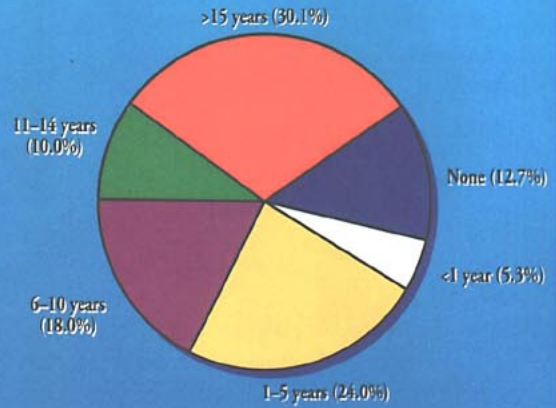
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Member demographics

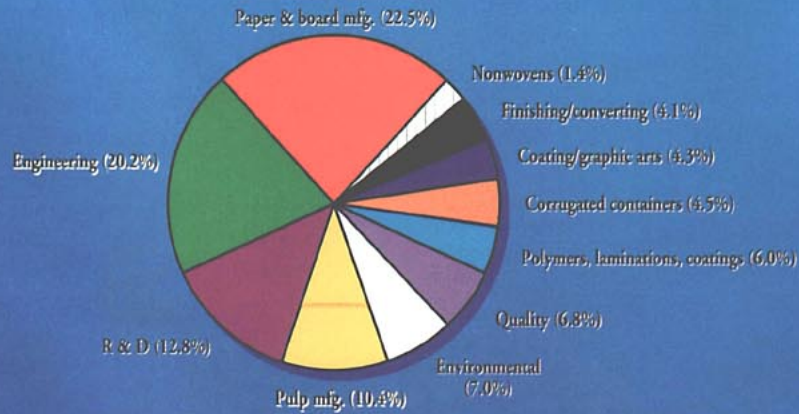
Industry experience



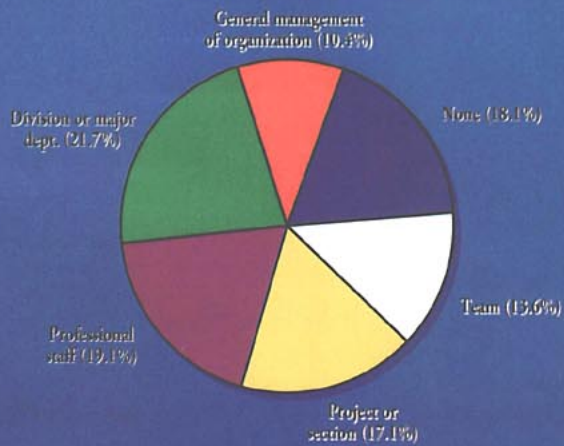
Management experience



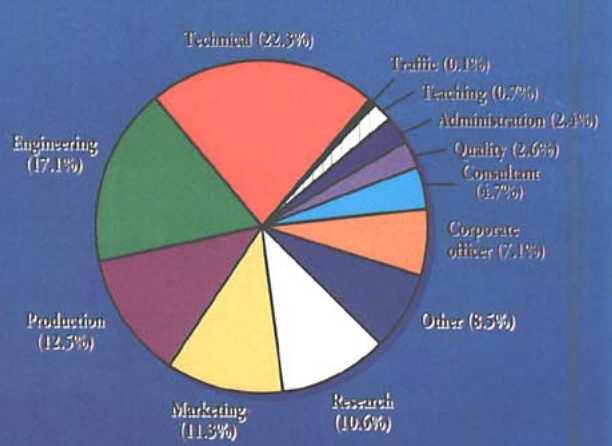
Industry sector

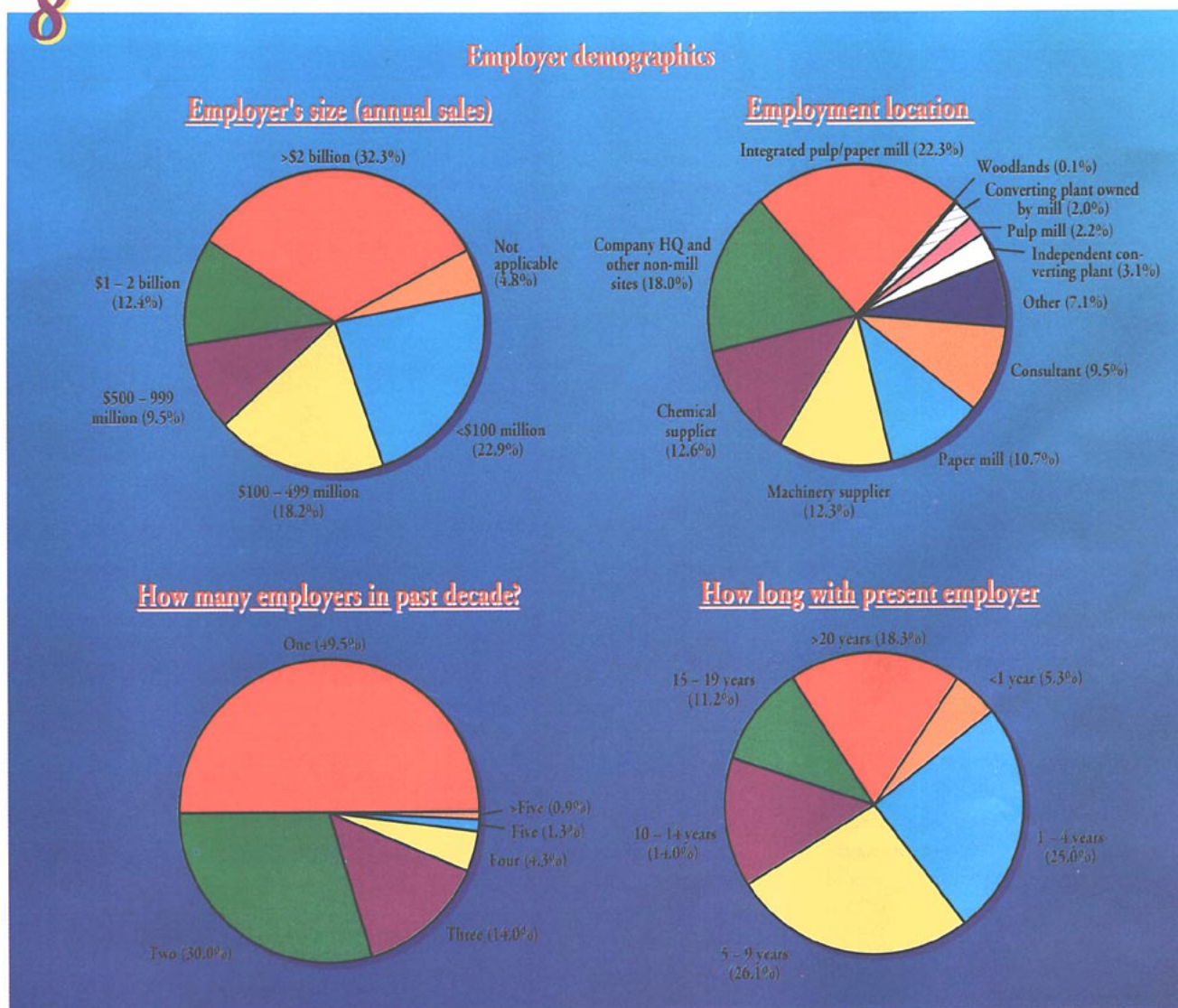


Supervisory responsibility



Job function





III. Median income by race, 1992 and 1993

	Median income, \$		Change in median income, %	Respondents in each category, %
	1993	1992		
All respondents				
Caucasian	65,275	65,000	+0.4	94.8
Non-Caucasian	65,000	59,000	+10.2	5.2
<30 years old				
Caucasian	42,000	42,000	0	94.7
Non-Caucasian	41,000	39,930	+2.7	5.3
30+ years of age				
Caucasian	70,000	69,000	+1.4	94.8
Non-Caucasian	69,000	63,900	+9.5	5.2

Demographics

Figure 7 presents demographic statistics for the TAPPI membership. These numbers remain remarkably stable from year to year. Comparison with data from 1992 and 1991 showed no major shifts in the makeup of the membership.

Figure 8 provides demographic statistics for the interaction between members and their employers. We found it interesting that only one in two members has stayed with the same company for the past 10 years. We checked the data from 1992 and found that the numbers were almost exactly the same last year. The numbers for length of service with current employer, company sales, and em-



9

Median salary and response rate for six U.S. regions*



* Figures in parentheses represent data from 1992.

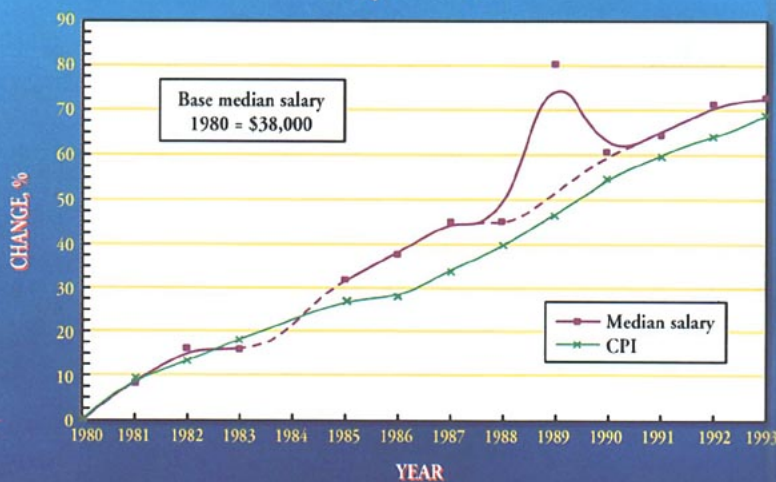
ployment location also are comparable with data from the 1992 survey, with a few possibly significant discrepancies.

The percentage of respondents working for companies with annual sales of less than \$100 million dropped from 25.1% in 1992 to 22.9% in 1993. This may reflect a shakeout of weaker, smaller companies. It is also possible that inflation is progressively rendering this category obsolete. Or it may simply be a blip. We also noted two other possibly significant trends in the data for "employment location." The percentage of respondents working in an integrated pulp/paper mill jumped from 18.2% to 22.3%, while employees working for machinery suppliers dropped from 14.2% to 12.3%. We will monitor all three categories when the 1994 data arrive and report further if any trends are apparent.

The regional map in Fig. 9 shows that the proportion of respondents from each area remained close to the levels reported in 1992. These values have varied only slightly from year to year since 1988. More interesting are the median salaries reported in each region. In a year of flat salaries, the median in the Northeast jumped 4.5% to \$64,000. The Mid-

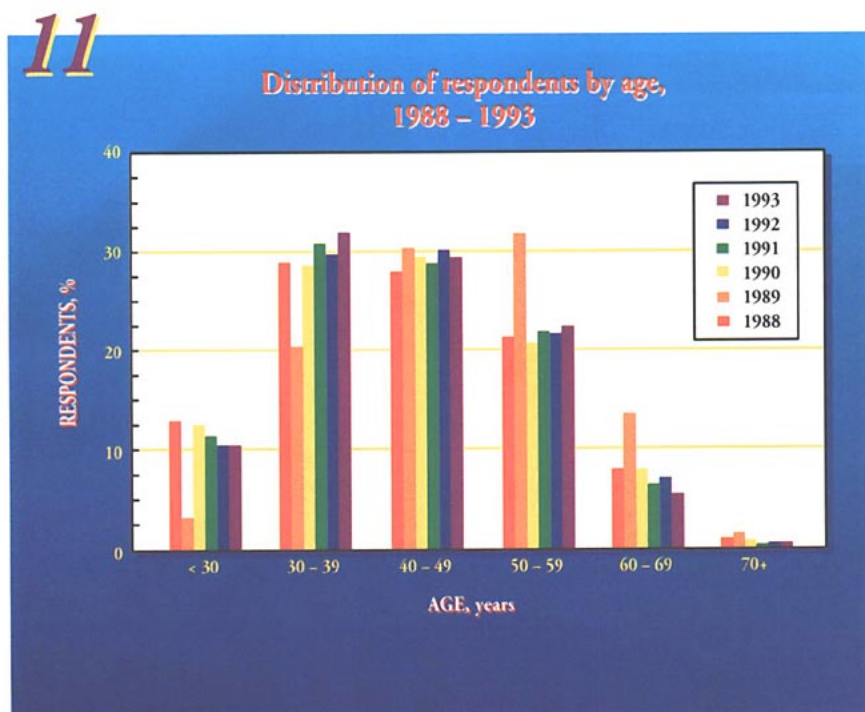
10

Increase in CPI and median salary since 1980



* Dashed lines on the curve for median salary represent projected curves to compensate for missing data in 1984 and anomalous data in 1989.

west showed a 3.3% in median salary to \$63,000. Despite this progress, median salary in both regions remains below the median of \$65,550 for the overall membership. Median salaries in the Northwest (\$66,000), Mid-Atlantic (\$68,000), and



Southwest (\$70,000) held steady at their 1992 levels. The southeastern region showed a 0.9% increase in median salary to \$68,624.

Inflation and income

Consumer prices rose 2.7% in 1993, the lowest annual increase since 1986. Unfortunately, salaries remained stagnant, with median salary edging up to \$65,550, a mere 0.8% over last year's median of \$65,000. This is the smallest salary increase since 1988, when the median held steady at \$55,000. Salaries also remained flat at \$44,000 in 1983.

Figure 10 tracks the annual growth in the CPI and median income since 1980. The CPI shows fairly uniform growth over this span of time. In contrast, median income shows a cyclic pattern of growth and stagnation. Median income grew steadily from 1980 to 1982 and then flattened out in 1983. This pattern repeats itself for 1985 through 1988 and is apparent again in the span from 1990 through 1993.

Figure 10 also suggests that income rebounds aggressively after a year of stagnation. TAPPI did not conduct a salary survey in 1984, so median income for that year is unknown. However, the trend between 1983 and 1985 suggests a sharp upswing in 1984. Similarly, incomes jumped sharply in 1989 after remaining flat in 1988. The median income reported for 1989 (\$68,500) is unreliable because it was skewed by an unusually high proportion of respondents in their 50s and 60s. Figure 11 shows that the age profile for that year was an anomaly. Nevertheless, the gap between 1988 and 1990 indi-

cates that median income jumped sharply in 1989. The trends of the past 13 years strongly suggest that salaries will increase sharply again in 1994.

Since 1980, growth in the median salary for TAPPI members has outpaced the rate of inflation. The CPI has increased by 68.75%, while median salary has increased by 72.5%. If the base median income of \$38,000 in 1980 had merely kept pace with inflation, the median salary in 1993 would have been \$64,106. The true median of \$65,550 is 2.2% higher than the inflation-adjusted median salary for 1980. This represents a "bonus" of \$1,444 in 1993 dollars. To gain some perspective on the corrosive effect of inflation, consider the fact that last year's "bonus" was \$2,600 in 1992 dollars. A repeat performance of 1993 will wipe out this "bonus" entirely, returning median income to the same level as 1980.

Indeed, if we use 1985 as a base year instead of 1980, we find that the gains of the mid to late 1980s have already vanished. In 1985, median income was \$50,000, and the CPI in December was 109.4. This year, the CPI stood at 145.8 in December, an increase of 33.3%. Adjusting the 1985 median for inflation, we arrive at \$66,650, which is \$1,100 more than the true median for 1993. In terms of purchasing power, median income in the pulp and paper industry has actually declined since 1985.

Coda

The jobless recovery of 1992 spawned the raiseless expansion of 1993, creating a pent-up demand for higher wages in 1994. If the performance of the past 13 years is a reliable guide, median income in the pulp and paper industry is likely to move up sharply this year. Moreover, there are other signs pointing to an upturn in wages. Unemployment continues to decline, and the index of leading economic indicators keeps telling us that the economy is growing.

The TAPPI membership—and, by extension, the entire pulp and paper industry—has enjoyed a net growth in income since 1980. However, if incomes remain flat in 1994, this growth will evaporate in the face of a relentlessly advancing CPI. Good times or bad, inflation never sleeps. ■

TAPPI extends its gratitude to everyone who took the time to respond to the survey. The author welcomes comments and suggestions for analyzing the data in next year's salary survey.