1992 TAPPI salary survey

With inflation at a six-year low of 2.9%, the modest 4% rise in median salary is the first real growth in income since 1990.

by Douglas J. Burke

Since 1985, the response rate to the annual TAPPI salary survey has hovered around 30%, ranging from 26.2% to 35%. This year, the response rate was surprisingly high, with 4183 of 10,000 randomly chosen TAPPI members returning their questionnaires before the April 1 deadline. Given the high rate of response, we expected to see a somewhat broader range of salaries than last year, when the span was $20,000 to $1.5 million. ("Salary" is defined as gross income, including bonuses[1].) The low end in this year's survey was $8000, a reasonable response for a part-time worker. The high end was an astounding $12 million, which translates into a weekly paycheck of more than $230,000. The 1991 top salary of $1.5 million was only good enough for fourth place this year, with nine respondents reporting earnings of $1 million or more. A substantial 2.3% of the membership reported hefty salaries of $200,000 or more.

Most of us earned considerably less than these stalwarts, but as a group we did better than last year, when the small increase in median salary was gobbled up by inflation. Median salary in 1992 ratcheted upward from $62,500 to $65,000, an increase of 4%. In a year when the Consumer Price Index (CPI) increased by a mere 2.9%—the smallest increase since 1986—this represents the first real growth in income in two years.

Income distribution

Figure 1 shows the distribution of salaries for all respondents. Curves for 1990 and 1991 are provided as a reference. The percentage of respondents earning more than $130,000 increased sharply, from about 5.6% to 7.5%. The effect of this increase is apparent in the wide discrepancy between median and mean salaries for 1992. At the same time, Fig. 1 shows that the percentage of respondents earning very low salaries increased modestly. The curve for 1992 is shifted to the right, reflecting the upward trend in salaries from year to year. It is also flatter at the peak, indicating a broader distribution of salaries. For example, note that the median salary for 1992 corresponds to only about 16% of the respondents, whereas the medians for 1990 and 1991 correspond to 17.5% and 18.3% of their respective populations.

Data for the reported changes in salary from 1991 to 1992 are presented in **Fig. 2**. More than 15% of the respondents reported no change in their 1992 salaries, while 47% reported modest increases of 1–5%. Figure 2 does not include responses from those reporting salary reductions greater than 20% (0.4% of respondents) or increases greater than 30% (5.6% of respondents).

Income and age

Statistical analysis of the database confirmed what we have learned in earlier studies—that four factors have a statistically significant effect on income. These "big four" variables are age, industry experience, supervisory responsibility, and management experience. Other factors such as education, job function, race, gender, geographic region, and company size also exert an influence on income, but their effect is much less than that of the big four.

Interestingly, we tested a new variable this year and found that length of TAPPI membership also had a statistically significant effect on income. While this variable does not quite pack the punch of the big four, it clearly leads all other variables in its effect on income. We strongly suspect that its potency derives from its close association with each of the big four. Length of TAPPI membership showed statistically significant correlations with increasing industry experience, age, management experience, and supervisory responsibility.

The time-based variables—experience and age—are of greatest interest because they affect everyone regardless of talent, tenacity, or training. Everyone occupies a position on the time scale. We examined the effect of industry experience on income in 1991. This year, we shift the focus to that great common denominator—age.

The age distribution of the survey respondents has a gigantic effect on salary statistics. Some readers may recall the 1989 salary survey, when the median salary was skewed upward by a preponderance of respondents aged 50 or more (and a corresponding dearth of respondents less than 30 years of age). The age distribution of the respondents has returned to its pre-1989 level in recent years, as seen in **Fig. 3**.

[1]All monetary amounts are given in U.S. dollars.

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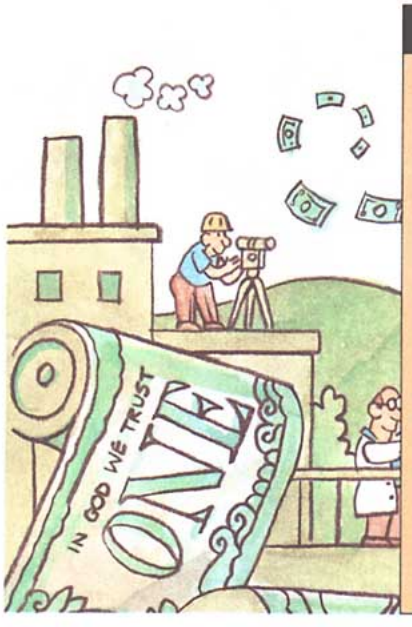

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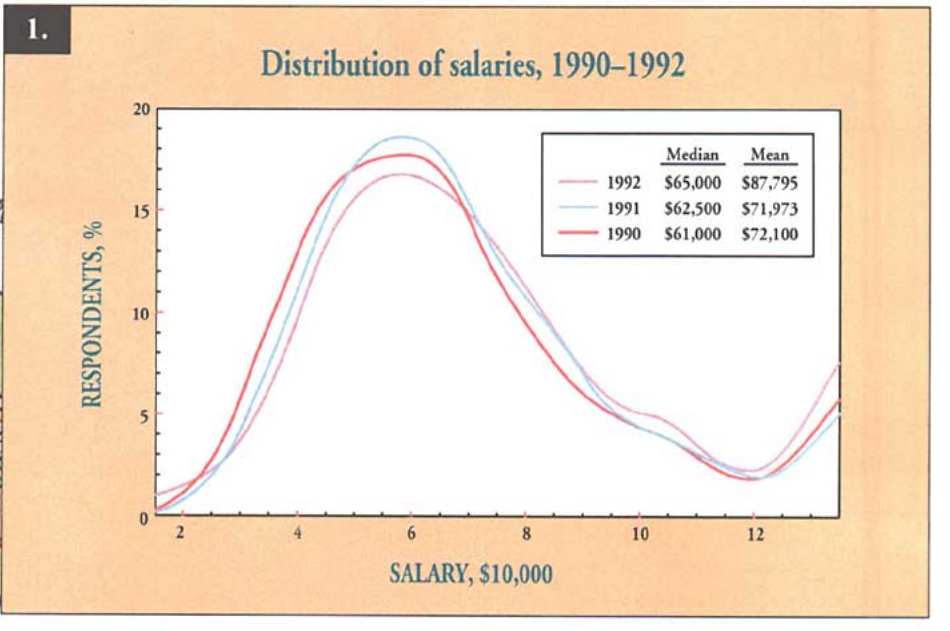

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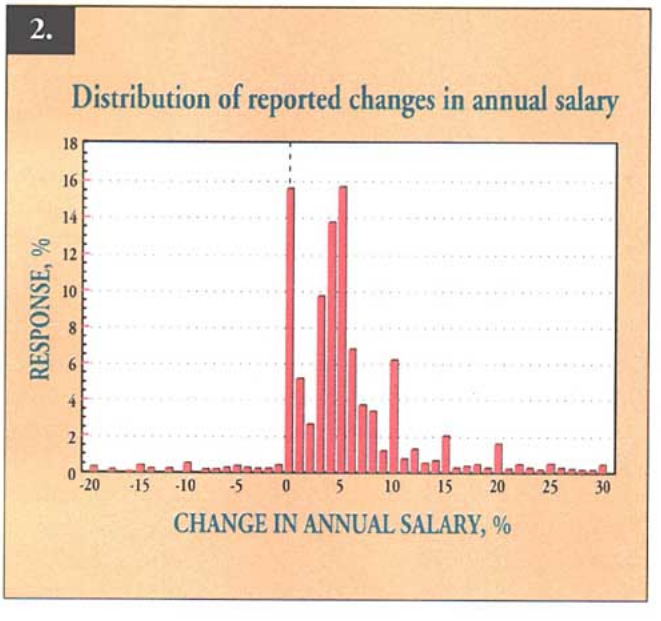

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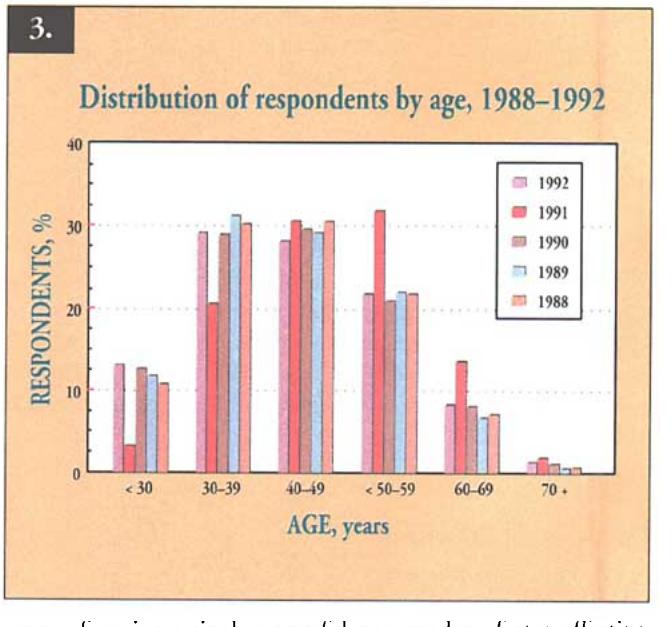
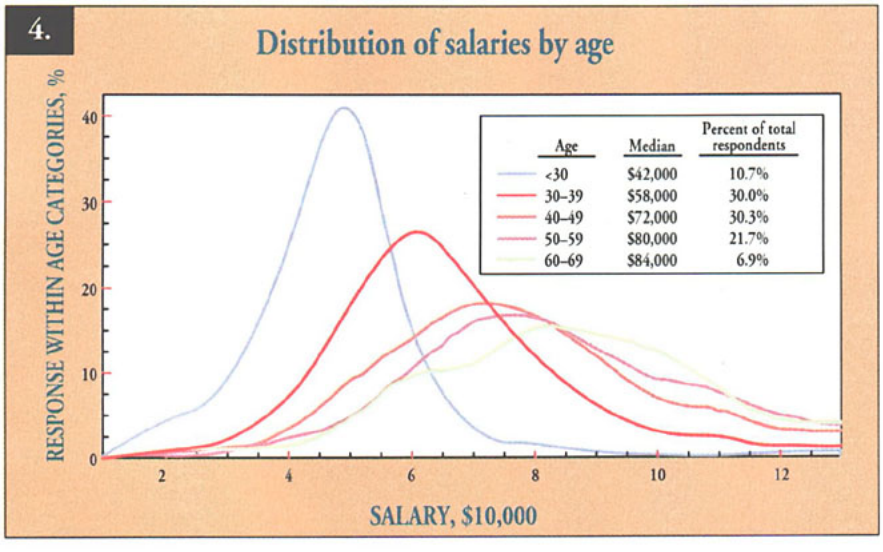


Figure 4 is a breakdown of the overall salary-distribution curve (Fig. 1) for five age categories. Two trends are apparent. The curves for each successive age group shift inexorably to the right while progressively flattening as age increases. The rightward shift is predictable, since people tend to command higher incomes as they get older. More interesting is the flattening effect, which shows that the range of incomes becomes broader in each successive age category.

The curve for the 20-something members closely resembles the classic normal distribution or "bell curve," which is typical of random natural events. Distributions of height, weight, IQ scores, and even dice rolls assume this symmetrical shape. The curve for workers in their 20s implies a random distribution of incomes within a fairly narrow range. However, the curve for each succeeding age group shows increasing skewness, suggesting the emergence of an increasingly powerful non-random factor affecting income distribution.

Workers in their 20s are relatively inexperienced and thus are assigned tasks within a limited range of responsibility. The height and symmetry of the bell-shaped curve for these workers implies that the salaries for jobs at this level are fairly well defined. The random distribution of salaries within this range is presumably a function of a random distribution of factors affecting income—talent, tenacity, training—within the population.

As one advances in age, the opportunity for advancement to the higher-paying positions of responsibility expands. At the same time, however, the hierarchical structure of business enterprises imposes limits on the number of available opportunities. There is not enough room at the top of the pyramid for everyone. At some



point—and the similarity of the curves for 40-, 50- and 60-year olds suggests that this point occurs after age 40—some workers seeking to advance will find their progress stalled. The steady rightward progression and the successive flattening of the curves shows that their incomes will continue to increase with age, thus giving some credence to the contention that "90% of success is just showing up." However, if wealth is your definition of success, you probably won't achieve it through longevity alone. While the curves for 40-, 50-, and 60-year olds show a broad range of salaries, their skewed profiles show that there is more room at the bottom of the pyramid than at the top.

The curves in Fig. 4 are based on the data in Table I, which shows a dramatic increase in the percentage of people earning very low and very high salaries. In general, the proportion of respondents with salaries in the $30,000–$70,000 range dropped, while those with salaries of $70,000 or more increased.

Income and education

Figure 5 is a quantile plot showing the upper and lower deciles and quartiles as well as the median salary for selected educational fields at the bachelor, master, and Ph.D. levels. The data in this figure are based on the highest level of education reported by each respondent. For example, any bachelors or masters degrees reported by a respondent with a Ph.D. were temporarily eliminated from the database while we developed this figure. In cases where a respondent held two degrees at the same level, we chose the one that was listed first.

As seen in Fig. 5, median salary in each field of training increases from the bachelor to the master to the Ph.D. level. Oddly, there was a single exception to this predictable trend. Median salary for a masters degree in mechanical engineering was slightly lower than the median salary for a bachelors degree in the same field.

The lowest median salary was the $58,000 for a bachelors degree in pulp and paper science. The median for chemical engineering was slightly higher at $60,000. The highest median salary at the bachelors level was $72,000 for a degree in business administration. Among the science/technical fields, mechanical engineering and "other engineering" shared the highest median at the bachelors level, with a salary of $68,000. This was higher than the median salary for a masters degree in pulp and paper science and matched the median salary for a masters in chemistry. Median salary for all respondents with a bachelors degree was $61,800. Median salary for the 2.5% of the membership with an associates degree was $51,000.

At the masters level, the M.B.A. retained its position at the top with a median salary of $74,500. This matched or exceeded the median salary for Ph.D.s in all fields except for business administration and "other engineering." (The data in the Ph.D. column for both fields is suspect because each is based on only 10 responses.) The next closest competitor at the masters level was "other engineering" ($71,500), followed by chemical engineering ($70,000). Median salary for all respondents with a masters degree was $70,000. One odd trend apparent in the data at the masters level is the lower decile for pulp and paper science, which exceeded the lower decile for all fields and educational levels, including an associates degree.

At the Ph.D. level—if we disregard the suspect data for Ph.D.s in business administration and the "other engineering" category—chemistry and the broad "other" category were the clear winners, with median salaries of $75,000. Median salaries for the other disciplines were all pretty close, ranging from $70,000 to $72,000. Median salary for all respondents with a Ph.D. was $75,000.

Income in pulp, paper, and allied industries

Figure 6 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.

Last year's top median salary went to polymers, laminations, and coatings (PLC). This year, PLC tumbled to the ninth position, with median salary dropping from $68,000 in 1991 to $61,000 in 1992. Corrugated, number two last year, assumed its usual spot at the top with a median salary of $71,000, an increase of more than 9% over last year's median.

Emphasis on environmental issues has been building momentum for more than a decade. This year, it was great enough to propel salaries in the environmental sector into a tie for the number two position after years of languishing in the middle or rear of the pack. The percentage of respondents identifying themselves as working in the environmental sector also increased from 7.1% in 1991 to 7.9% in 1992. Median salary for the environmental sector was $67,000, the same as for the engineering sector. However, median salary for the environmental sector increased by 11.7%

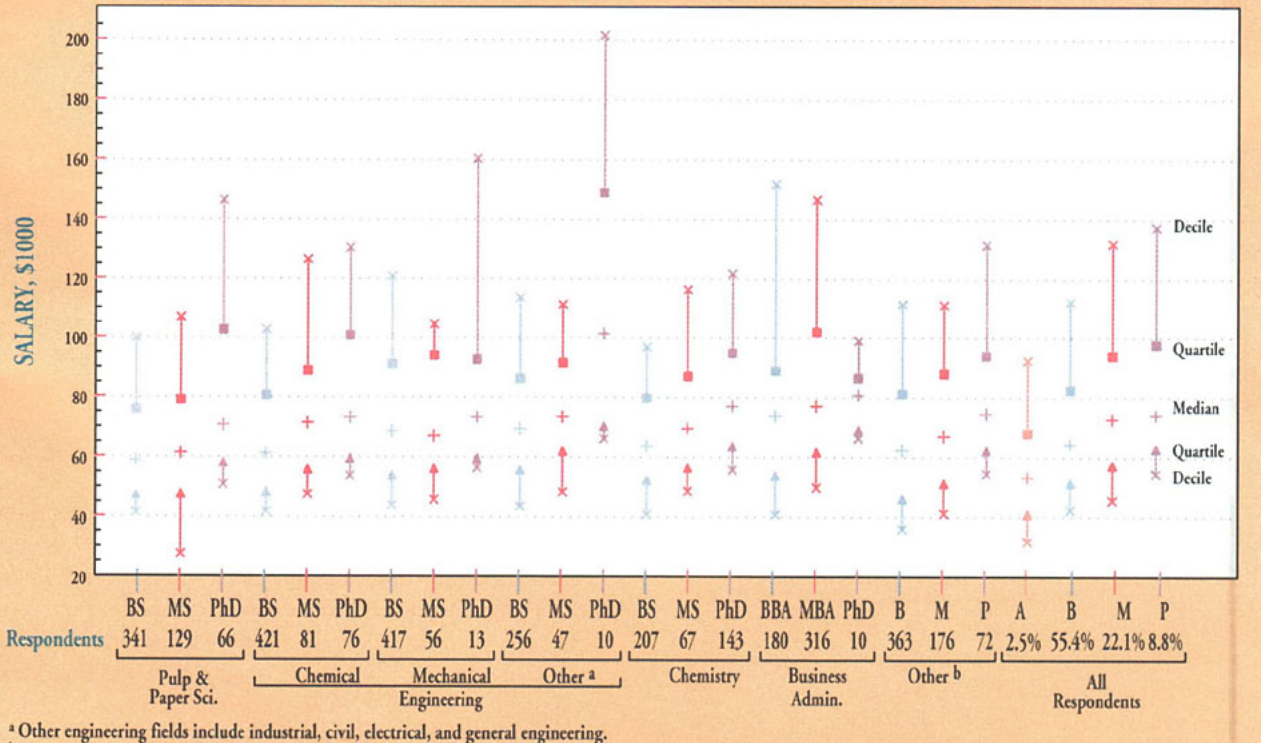
I. Income bands by age*

Income band, $1000	Age range <30	30–39	40–49	50–59	60–69	70+	Number of respondents	Percent of all respondents, % 1992	1991	Percent change since 1991, %
<20	20	8	6	...	2	...	36	0.9	0.1	+800
20–<30	31	21	9	3	3	...	67	1.6	1.0	+60
30–<40	103	74	33	19	2	2	233	5.6	7.1	–21
40–<50	**214**	214	109	36	11	1	585	14.0	15.4	–9
50–<60	57	**359**	175	91	29	3	714	17.1	19.0	–10
60–<70	10	259	237	147	29	1	683	16.3	18.3	–11
70–<80	5	142	**214**	153	45	...	556	13.3	12.5	+6.4
80–<90	1	72	150	**115**	**41**	**1**	381	9.1	9.1	0
90–<100	...	30	78	79	36	1	225	5.4	4.9	+10
100–<110	...	29	70	71	23	3	197	4.7	3.9	+21
110–<120	1	10	32	38	9	1	91	2.2	2.3	–4
120–<130	2	12	36	32	11	...	93	2.2	1.6	+38
>130	2	23	118	125	47	3	318	7.6	5.0	+52
	446	1253	1267	909	288	16	4179	100.0	100.2	

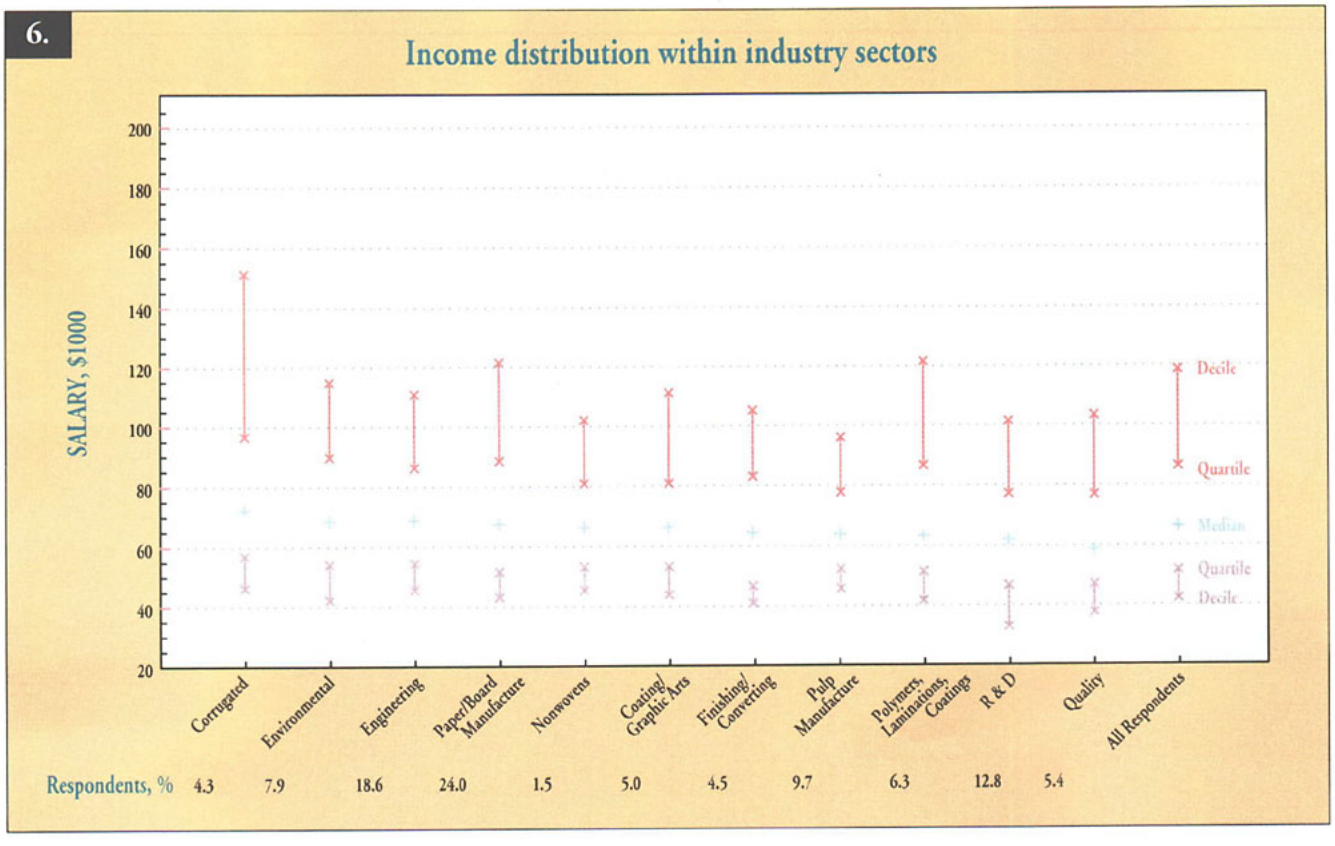
*Bold-faced numbers indicate location of median salary in each age range.

5.

Income distribution at highest level of education in a given field



[a] Other engineering fields include industrial, civil, electrical, and general engineering.
[b] Other educational fields include environmental science, engineering management, forestry, industrial management, biology, and liberal arts.



over its level in 1991, compared with an increase of 5.2% for engineering.

Those involved in R&D or process/product quality continue to toil at the bottom end of the pecking order. While median salaries for the entire industry increased by 4% in 1992, income in these two vital sectors increased by a mere 0.3% and 0.9%, respectively.

Income and job function

Figure 7 is a quantile plot of the salary distribution in 11 key job functions. As in Fig. 6, the categories are arranged in descending order of median salary.

Corporate officers are expected to be at the top of the heap, and indeed they are there again in 1992. The number of respondents identifying themselves as corporate officers increased in 1992, from 7.4% to 8.2%. Median salary for corporate officers also increased substantially, from $110,000 in 1991 to $125,000 in 1992, a rise of 13.6%. The next largest increase for all other job functions was in production, where median salaries rose by 6.3%.

Young members

The proportion of 20-something respondents has declined every year since 1988 (see Fig. 3). This is the future TAPPI membership, and a closer look at this group revealed some interesting trends.

Diversity

First, the group is more diverse than the general membership. The proportion of women is much higher—21.3% compared with 7.1% for the total membership and 5.4% for respondents aged 30 or more. Almost one third of the women who responded to the survey were under the age of 30. The group also shows greater racial diversity, with 7.6% identifying themselves as Black, Hispanic, Asian, or other. The group aged 30+, on the other hand, contains only 4.6% non-Caucasians.

There is also evidence of greater salary parity for minorities and women in the this youngest age group. Median salary for women under the age of 30 was 93% of the male median, while the median for women aged 30 or more was only 74.3% of the median for men. Median salary for non-Caucasian members under the age of 30 was 95.1% of the Caucasian median, compared with 91.3% for non-Caucasians over the age of 30.

Gender statistics are presented in Table II. Data for race are listed in Table III.

Entry-level salaries

The lowest salary reported this year was the $8000 paid to a part-time worker. This low-end figure does not provide much useful information about the continuum of salaries paid to TAPPI members. The entry-level salaries for new hires in 1992 is a more meaningful benchmark.

We attempted to determine entry-level salaries by restricting

II. Gender statistics

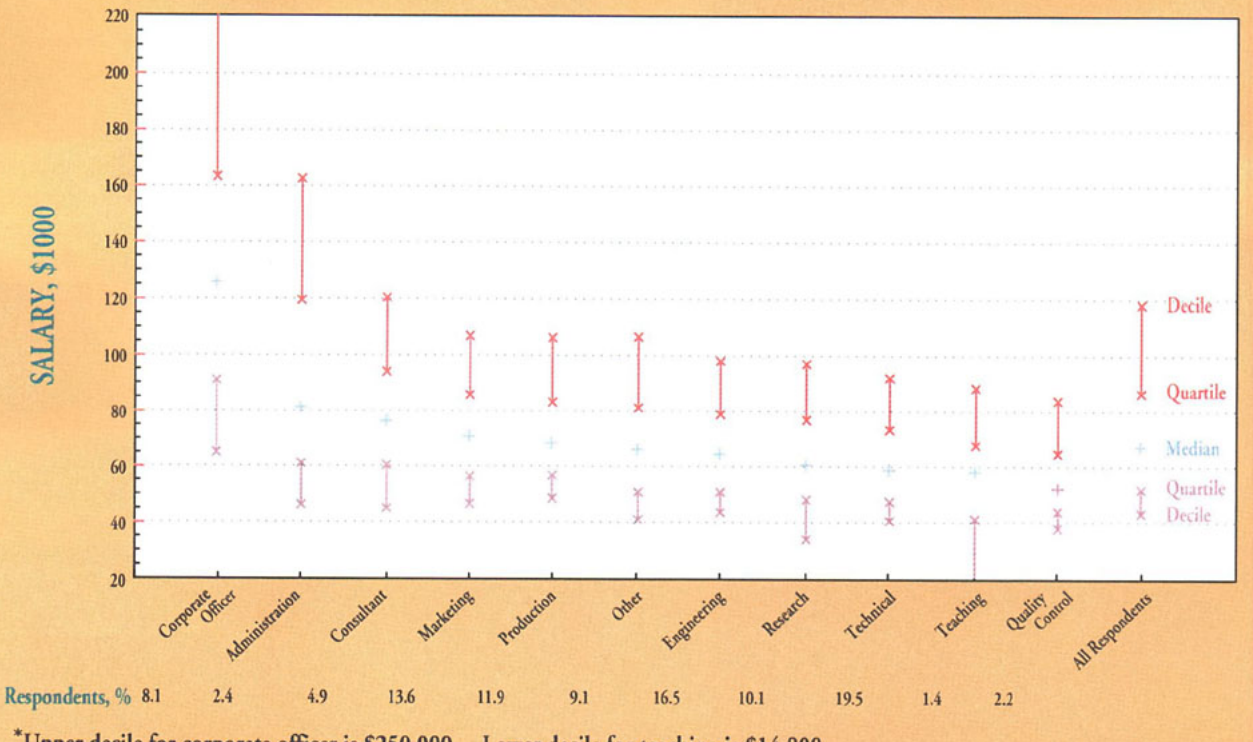
	Median salary, $ 1992	Median salary, $ 1991	Change in median salary, %	Respondents, %
		All respondents		
Male	67,000	65,000	3.1	92.9
Female	46,000	43,800	5.0	7.1
		< 30 years old		
Male	43,000	...	...	78.6
Female	40,000	...	...	21.4
		30+ years of age		
Male	70,000	...	...	94.6
Female	52,900	...	...	5.4

III. Race statistics

	Median salary, $	Respondents, %
	All respondents	
Caucasian	65,000	95.0
Non-Caucasian	59,000	5.0
	<30 years old	
Caucasian	42,000	92.4
Non-Caucasian	39,930	7.6
	30+ years of age	
Caucasian	69,000	95.4
Non-Caucasian	63,000	4.6

7.

Income distribution within various job functions*



*Upper decile for corporate officer is $250,000. Lower decile for teaching is $14,800

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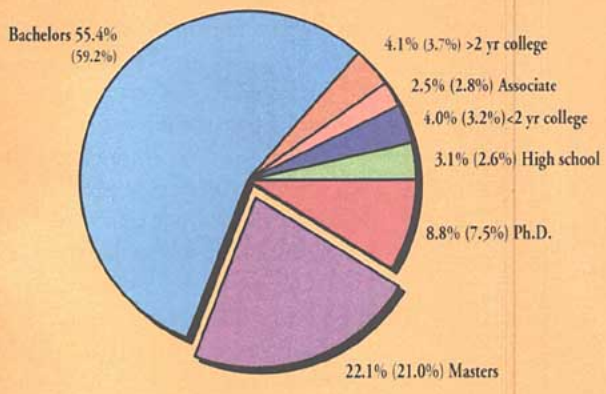
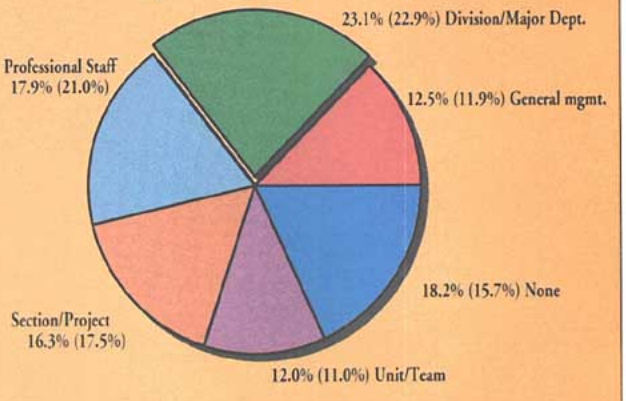
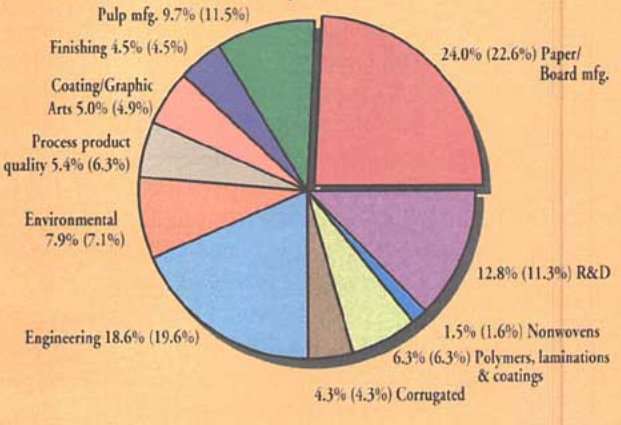
Highest level of education



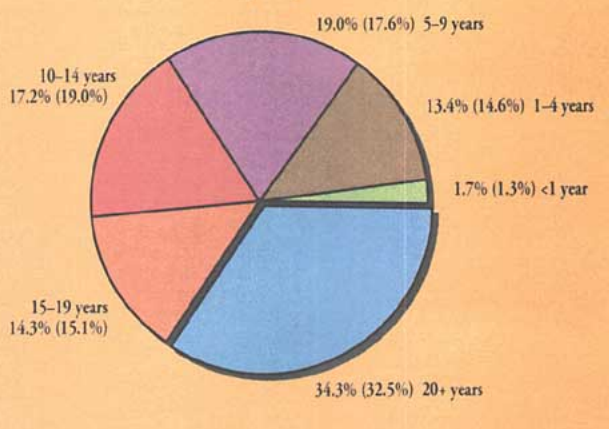
Supervisory responsibility



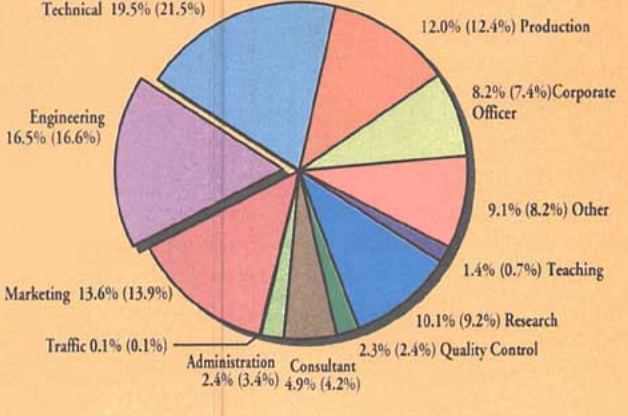
Industry sector



Industry experience



Job function



*Figures in parentheses represent data from 1991.

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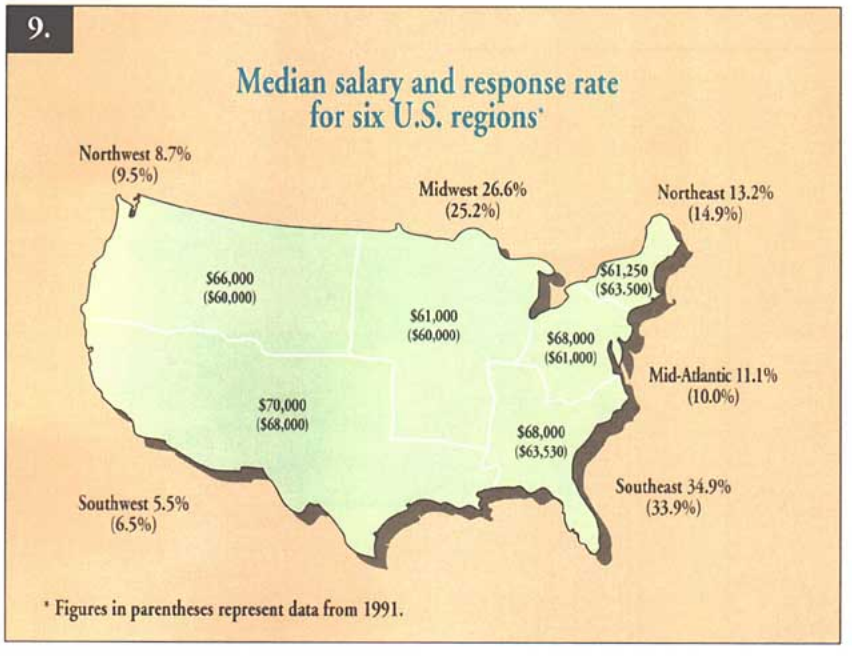

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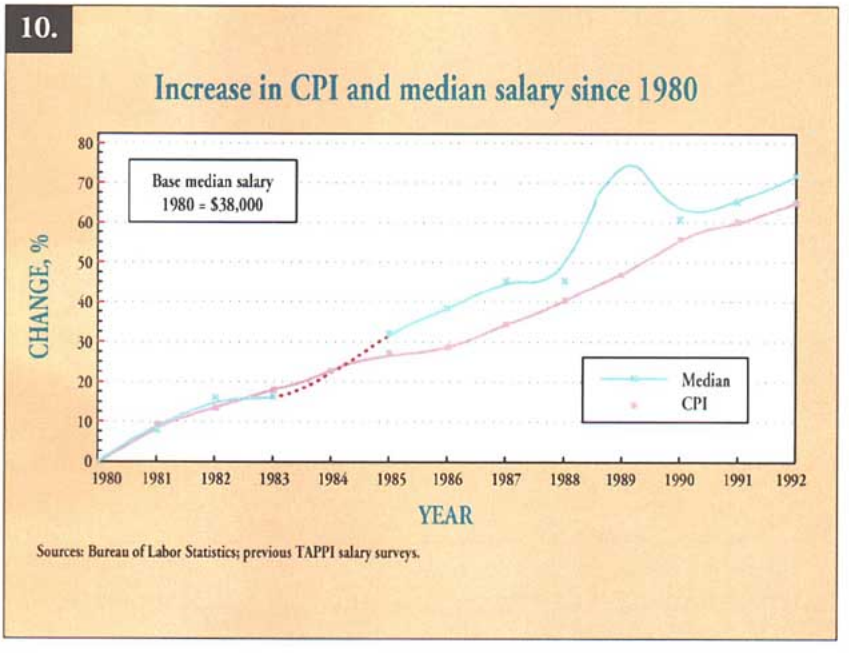

the database to respondents in their 20s with less than one year of experience. The 38 respondents who fit this description reported salaries ranging from $13,000 to $246,000, with a median of $39,000 and a mean of $42,591. In a fit of pique, we eliminated the top score and ran the numbers again for the 37 remaining respondents. The median remained the same, but the mean dropped to a more manageable $37,093. If the data from this small subsample are reliable, the top 10% of all new hires are earning between $60,000 and $80,000.

Demographics

Demographic statistics for the TAPPI membership are presented in the five pie charts in **Fig. 8**. Comparison of these data with those from 1991 show no major shifts or trends in the makeup of the membership.

The regional map of salaries in **Fig. 9**, however, does show some interesting trends. Median salaries increased everywhere except in the northeast, where the median dropped by 3.5%. Median salary in the Midwest increased by a mere 1.7%, which was less than the rate of inflation in 1992. Salaries in the Southwest did not fare much better, but they did manage to keep pace with the 2.9% inflation rate. The Mid-Atlantic region had the highest increase, 11.5%. The troubled Northwest showed a surprising gain of 10%, while median salary in the perennially robust southeastern region jumped 7%.

Inflation and income growth

The Consumer Price Index (CPI) is a useful way of measuring the long-term effects of inflation on income. **Figure 10** tracks growth in both the CPI and median salary since 1980. Through the early 1980s, income growth matched the rate of inflation. (TAPPI did not conduct a salary survey in 1984, so median salary for that year is unknown.) That trend ended in 1985, when income growth exceeded the inflation rate.

For the next few years, the gap between income growth and inflation continued to widen, signaling a prosperous era when the purchasing power of the TAPPI membership was on the rise. That changed in 1988, when median salary held steady at $55,000 while inflation continued to ratchet upward. The next year, 1989, is an anomaly. As we have already mentioned, there was a gross deviation in the age distribution of the respondents to that year's salary survey (see Fig. 3), which skewed the results. The reported median for that year was so high that it has not yet been matched in the three subsequent surveys. Indeed, at the present rate of growth, we won't see a median that high again until the results of the 1994 salary survey are published.

Since 1990, median income has grown at about the same rate as inflation, losing some ground in 1991 and gaining it back in 1992. Still, the results in Fig. 10 show that median income has grown faster than inflation since 1980. During that time, the CPI has increased by 64.2%, while member salaries have grown by 71.1%. If the base median income of $38,000 in 1980 had merely kept pace with inflation, median income in 1992 would

have been $62,400. Thus the true median of $65,000 is 4.2% higher than it "should" be and represents a "bonus" of $2600 in 1992 dollars.

Some might argue that this "bonus" is simply being returned to the employer in the form of increased employee contributions to cover the rising cost of health insurance. While we understand the urge to advance this argument, we should emphasize that health-care costs are included in the CPI. Last year, the cost of health care increased by 7.4%, making it the greatest contributor to the 2.9% rate of inflation.

Deja vu all over again

While searching for data from previous salary surveys, we were struck by the timeliness of the following quote from the 1982 salary survey.[2]

> "The process of the government trying to wean thousands off the federal payroll has not helped reduce the high unemployment or the giant budget deficits. But the leading economic indicators are pointing upward. Recovery in the paper industry cannot be far behind."

Shortly thereafter, the paper industry rallied and thrived through much of the 1980s. A decade later, the apparent prerequisites for prosperity are again in place—high unemployment, huge budget deficits, and upward-pointing leading indicators. Can recovery be far behind? TJ

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

[2]Robertson, S., *Tappi J.* 66(8): 38(1983).

A model for calculating annual income

A correlation matrix of 15 variables showed that the four factors with the greatest impact on salary were

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

We used these four variables to develop a multiple regression model based on a random subset of 1000 respondents, with salaries ranging from a low of $30,000 to a high of $100,000. This salary range includes 83.2% of the total respondents. Only 2.5% of the respondents earned less than $30,000, while 14.3% earned more than $100,000.

The model we developed had a correlation coefficient (r) of 0.58. (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 0.3364. (r^2 is a measure of how much variability the model explains. In this case, the four variables in the model account for 33.6% of the variability in salary.)

$$\text{Salary} = \$28{,}319 + \$2{,}278M + \$1{,}948I + \$2{,}894A + \$2{,}103R$$

where

M = management experience, $1 \le M \le 6$

I = industry experience, $1 \le I \le 6$

A = age, $1 \le A \le 7$

R = responsibility level, $1 \le R \le 6$.

Table IV lists the corresponding scores for M, I, A, and R. 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 $65,211.

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 *M, I, A,* and *R* in regression model for predicting annual salary

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