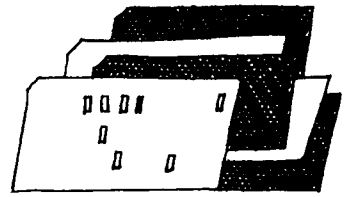
Research Summaries



Labor pool for antibias program varies by occupation and job market

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Increasing specialization of labor has narrowed the field of potential employees for many of today's highly skilled jobs. Therefore, it may be said that employees often are hired not from the general labor force, but from a specific labor force for a particular job category.

This report deals with the establishment of a comprehensive model of an actual or relevant labor force for certain civilian occupations in the U.S. Department of the Navy. However, the basic method, with some variation, is already in use in many places. Defining the relevant labor force for any category of job can reduce unemployment by more easily matching people to jobs. But in this case it is also being used to understand the demographics of the relevant labor force in question, in order to aid in the formulation of equal employment opportunity policies. This is done by estimating the population distribution of relevant labor markets outside the Department of the Navy, by race, national origin, and sex groups.[1]

The initial step in the process is to specify the key characteristics of jobs. Population data for the relevant geographic areas are then evaluated to identify people available for the work.

The jobs are grouped into occupational and pay level categories. The initial version of the analysis uses major occupational groups that are consistent with the professional, administrative, technical, clerical, and other General Schedule (GS) coding schemes of the U.S. Office of Personnel Management. Because more than 90 percent of the Navy's professional persons in jobs normally requiring a bachelor's or professional degree for entry are scientists and engineers, the professional category is further divided into two groups: scientists and engineers; and other professionals. The Navy has also established two additional major occupational groups: craftworkers and operatives; and laborers, to cover its 130,000-strong blue-collar civilian work force. Grouping the wage or pay level was done by using five wage bands for each GS (white-collar) and blue-collar major occupational group.

Geographic and educational criteria were determined for each of the major occupational groups, and for grade and level groupings. For the initial development data, the scientist and engineer, other professional, and high GS grade (13 and above) groups were considered to be recruited from a national labor market. The remainder of the white-collar as well as all the blue-collar occupations were considered to be part of local labor markets.

Considerable effort was expended to define precisely the geographic areas of the local labor markets for each Navy installation with more than 250 civilian employees. The specification of geographic area is of particular concern to the Navy because in many cases the installations are at the edges of Standard Metropolitan Statistical Areas (SMSA's) or in isolated locations. For example, Mare Island Naval Shipyard draws its workforce from a combination of counties from the Vallejo-Fairfield-Napa and San Francisco-Oakland SMSA's. A sample of new-hire or accession data for fiscal year 1978 was collected by postal zip code. At least 500 records were collected for each Navy local labor market. For local labor markets where there were significantly fewer than 500 new hires, a percentage—35, 50, or 100 percent, depending on required sample size—of the total Navy work force in the area was included in the data collection. Zip code data on 35,000 of the Navy's 280,000 civilian employees in the United States were eventually collected.

The zip code data were then matched with the counties of the local areas. The matches were reviewed using a road atlas coupled with a Department of Defense map of major installations. Anomalies in the local recruitment data were corrected so that equidistant areas would be accorded equal treatment.[2] For very lo-

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cal jobs such as the clerical and blue-collar occupations, the recruitment area usually dropped off at 15 to 20 miles.

The relevant labor pool consists of qualified and qualifiable applicants who are: (1) workers in comparable jobs; (2) unemployed or part-time workers in comparable jobs; and (3) persons not in the labor force, such as discouraged workers and those who had jobs in the past 5 years with qualifiable skills. It is noteworthy that for some job categories, the inclusion of non-worker data adds as much as 50 percent to the representation of minorities and women.

Measurement of those who are to be included in the relevant labor pool is done using data from: the Public Use Sample of the 1970 Census; the 1976 Department of Health, Education, and Welfare Survey of Income and Education; and the 1978 Current Population Survey. (In 1982, these data sources will be replaced by the 1980 Census.) For those in the civilian labor force, the data on persons can be matched directly to the jobs, using an economic analysis technique called the reservation wage determination, first developed in the 1930's, and recently extended by the Rand Corporation and various universities.

Workers who have earned wages that fall within a defined Navy job wage band are said to be wage-available. For persons who are not currently working, an "expected" or reservation wage is calculated and used to match up with the Navy's offered wage band. The reservation wage is defined as the minimum wage needed to attract a person to begin work in a defined job. This method says that: an employed person will not change jobs if what is perceived as the "expected wage" is less than he or she is earning; and a person without a job will not take one that offers a lower expected wage than what he or she gives up and expends by working.

The accuracy of analysis based on the reservation wage principle requires only that persons act as though they consciously calculate expected wages. The statistical procedure used is a refined version of regression analysis. It begins with the public data files excluding no potential workers. A first regression analysis is made using education, experience, and wage data to estimate market wages. These results in turn are combined with additional data on hours of work, wages, numbers of children, alternative wages, and education, in order to estimate annual hours of work. This second set of results is then compared with Navy data to estimate the value of time for the relevant labor markets by race, national origin, and sex groups. These data are then multiplied by Bureau of the Census population weights to obtain the number of potential workers available for a specific job category.[3]

Other pertinent data such as increased college enrollments of minorities and women are also factored into the calculation of future relevant labor force standards. For example, because engineering school graduates are becoming increasingly represented among women and minorities, larger proportions are factored into the projected 1983 labor supply ratios.

An example of the results of the analysis is provided in table 1. It should be noted that these data are characteristic of the wage bands for Navy civilian jobs and might not apply to organizations with different occupation and wage distributions. In almost all of the projected relevant labor force data, at least some shift toward minorities and women is shown over time. This indicates increased availability for participation in the complete spectrum of Navy jobs (table 1). These data for the external wage bands are equivalent to the wage bands of GS 5–8, 9–12, and 13–15 levels, respectively, representing the entry, middle, and senior career levels. The 1978 data are actual and the 1983 data are projected. During this 5-year period a strong shift toward minorities and women is expected. For example, in the GS 5–8 category the availability of white men will shift on a proportionate basis from 82.7 percent to 74.2 percent as the other relevant external labor markets by race, national origin, and sex categories increase. Similar shifts towards minorities and women can be seen in the projected local labor force data. Clearly, the dynamics of increased opportunities are beginning to be reflected in the composition of the work force.[4]

The use of the relevant labor force data is only part of an affirmative action and equal employment opportunity system. Data on the civilian labor force that are not skill or wage specific are also needed to meet out-of-department reporting requirements of the Equal Employment Opportunity Commission and the Office of Personnel Management. This concern and how it fits into an equal employment opportunity accountability

Table 1. Demographic composition of the relevant labor market for Navy civilian scientists and engineers, 1978, and projections for 1983

[In percent]

GS grade	Men					Women				
	Total	White	Black	Hispanic	Other[1]	Total	White	Black	Hispanic	Other[1]
5–8:										
1978	91.9	82.7	1.5	1.2	6.5	8.1	6.5	1.2	. . .	0.6
1983	87.0	74.0	2.5	2.0	8.5	13.0	8.0	2.5	1.0	1.5
9–12:										
1978	93.8	85.7	1.4	.8	5.9	6.2	4.5	1.1	.3	.3
1983	90.2	78.8	2.1	1.9	7.4	9.8	5.5	2.1	1.2	1.0
13–15:										
1978	97.9	89.4	2.1	. . .	6.4	2.1	2.1	. . .	. . .	. . .
1983	93.0	81.3	2.8	1.0	7.9	7.0	3.3	1.3	1.4	1.0

[1] Includes Asian and Native American.

system extend well beyond the technical computation of the labor force data in question.

Considerable opportunities remain for improvement of the relevant labor force data. Further occupational detail would be useful. Also, issues such as regional recruitment areas, the relationship of the Federal labor force, and the impact of general economic conditions are all candidates for further study. Further technical work remains in the refinement of the relevant labor force data estimation process. For example, it would be useful to separate the professional occupations into scientists, engineers, mathmaticians, accountants, and so forth. Further specificity also appears to be needed for the technician occupations, because the Navy employs a considerable number of engineering technicians who exhibit different out-of-department relevant labor markets by race, national origin, and sex profiles than do management technicians. These extensions to the analysis are underway.

An area of technical concern is consideration of regional recruitment areas. Examples of these would be higher graded engineering technicians, mid-level administrative personnel, and highly skilled craftworkers. Research to better understand the demographic characteristics of these jobs within a regional recruitment area is in process.

The relationship between the non-Federal labor market and the Federal labor market is being studied. This is particularly important for upper-level jobs because these applicants usually come from Federal agencies. The zip code data will be used to obtain the percentages of new hires or accessions which come from the Federal agencies. These percentages will be used with data obtained from the Office of Personnel Management, to obtain supply ratios for the Federal work force. The resulting data will then be combined on a proportionate basis with non-Federal supply ratios to obtain a better estimate of the Navy's real labor force.

General economic considerations which extend beyond the present analysis include the impact of unemployment, inflation, transportation, and housing costs. Studies are being conducted on the projected impact of these factors, on changes in wages of different, non-Navy, relevant labor markets by race, national origin, and sex groups as they relate to Navy jobs.

Mobility patterns are a significant factor on the availability of workers, applying to both the external and internal labor markets. Preliminary internal mobility studies indicate that minorities and women in nonprofessional Navy jobs are less mobile than white men. Further study of this phenomenon and its relationship to external demographic mobility patterns is being conducted. This involves coupling external demographic models with internal flow models and aids in policy-making. □

FOOTNOTES

[1] Discussion of the implications for the management of and accountability for equal employment opportunity goals is discussed in chapters 3 and 4 of Richard J. Niehaus, *Computer-Assisted Human Resources Planning* (New York, Wiley Interscience, 1979). Also see Richard J. Niehaus and Denise Nitterhouse, *Planning and Accountability Systems for EEO and Affirmative Action Policy*, Washington, Office of the Assistant Secretary of the Navy for Manpower and Reserve Affairs, Research Report 38, 1980, available from National Technical Information Service, Springfield, Va., Accession No. A093514.

[2] This zip code method has been used for equal employment opportunity labor supply estimation purposes in other studies. For example, see "Using Computer Mapping as an Aid to Data Analysis," *Evidentia*, October 1980, pp. 1–7.

[3] A more comprehensive discussion of the reservation wage methodology can be found in Donald M. Atwater and James A. Sheridan, "Assessing the Availability of Non-workers for Jobs," *Human Resource Planning*, December 1980, pp. 211–18.

[4] The 1979 relevant labor force data for all 65 Department of the Navy local labor markets are published in a more comprehensive version of this report. See Donald M. Atwater, Richard J. Niehaus, and James A. Sheridan, *EEO External Labor Force Analysis*, Washington, Office of the Assistant Secretary of the Navy for Manpower and Reserve Affairs, Research Report 37, 1980, available from National Technical Information Service, Springfield, Va., Accession No. A092242.

Telephone company pay hikes lead rest of communications industry

Pay levels in the Nation's principal telephone carriers rose 9.3 percent in 1979, according to a Bureau of Labor Statistics annual wage survey[1]. Following a relatively modest 6.2-percent advance during the previous year, the 1979 increase for telephone company employees was considerably larger than corresponding wage gains for international telegraph carriers (4.9 percent) and at the Western Union Telegraph Co. (6.9 percent). Over the last decade, the average annual rate of increase was about 10 percent for telephone carriers and about 9 percent for Western Union and the international telegraph carriers.

The 1979 survey covered about 903,700 employees of major telephone carriers and nearly 16,000 telegraph workers. Combined, they accounted for nine-tenths of the Nation's approximately 1 million workers in telephone and wire-telegraph communications. Bell System carriers employed more than nine-tenths of the surveyed telephone workers; Western Union employees made up seven-tenths of the telegraph workers studied.

Straight-time hourly earnings of telephone carrier employees averaged $9.21 in December 1979. Individual

earnings of just over four-fifths of the workers fell between $3.50 and $11.50 an hour; almost all of the remaining workers earned over $11.50. Hourly pay for the middle 50 percent of the work force ranged from $7.20 to $10.58. Some factors contributing to the wide dispersion of earnings were the great diversity of skills required by the communications industry, differences in pay by carrier and locality, and pay rates which vary within a given occupation by length of employee service.

In December 1979, average hourly earnings among the major occupational categories ranged from $6.87 for telephone operators to $13.89 for professional and semiprofessional staff. Construction, installation, and maintenance employees made up the largest employment group, with nearly 330,000 workers; their hourly earnings averaged $9.51. Some other heavily populated job classifications and their hourly averages were: business office and sales employees ($8.85); building, supplies, and motor vehicle employees ($8.60); and clerical employees ($7.83).

Employees of the Bell System carriers held a 23-percent average wage advantage over those of non-Bell carriers—$9.34 compared with $7.61 an hour. Similar pay relationships were also found among the various occupational groups studied; hourly averages for non-Bell workers ranged from 70 to 80 percent of those for Bell employees. The non-Bell construction, installation, and maintenance group was the exception, earning almost 90 percent as much as Bell employees. Differences between the worker groups narrowed slightly when weekly earnings were compared, reflecting the longer average workweeks of non-Bell workers in some occupational groups.

Wage rates for the nonmessenger work force of five international telegraph carriers averaged $10.16 an hour, compared with $8.38 for similar employees of the Western Union Telegraph Co. in October 1979. Messengers averaged $5.45 an hour at Western Union and $3.62 for the international carriers. At the time of the survey, hourly pay levels for construction, installation, and maintenance employees—a heavily populated group—were $9.36 at Western Union and $10.38 for the international carriers.

Annual BLS studies of communications, which cover the full spectrum of activities performed by employees in the telephone and telegraph industries, are based on data submitted to the Federal Communications Commission. The data are provided by those telephone carriers which are subject to the full jurisdiction of the commission and have annual operating revenues of more than $1 million, the Western Union Telegraph Co., and five international telegraph carriers with annual revenues exceeding $50,000.

A comprehensive report, *Industry Wage Survey: Communications, October–December 1979,* (BLS Bulletin 2100) is for sale by the Superintendent of Documents, Washington, D.C. 20402. □

FOOTNOTE

[1] For an account of the 1978 study, see "Communications industry records slow wage gains," *Monthly Labor Review,* November 1980, pp. 37–38.

Iron and steel foundries cast variations in regional pay

Nationwide pay levels in iron and steel foundries are greatly influenced by the regional distribution of workers, according to a September 1979 occupational wage survey by the Bureau of Labor Statistics. Nationally, production workers in these foundries averaged $7.16 an hour in straight-time pay, but by region there was considerable variation—from $5.14 in the Southwest to $7.99 in the Great Lakes States. Even within the four foundry categories studied separately—malleable iron, gray iron foundries (except pipe and fittings), steel foundries, and gray iron pipe and fittings—such variations persisted between the highest and lowest paying regions.

Table 1 indicates how the major regions in the foundry industries influenced the national averages. The relatively low-paying Southeast, for example, contributed

Table 1. Straight-time average hourly earnings of production workers in iron and steel foundries, United States and selected regions, September 1979

Foundries	United States[1]	Middle Atlantic	Southeast	Southwest	Great Lakes	Pacific
All foundries:						
Workers	177,371	21,949	19,260	10,452	96,422	10,143
Mean	$7.16	$7.07	$5.50	$5.14	$7.99	$6.49
Malleable iron:						
Workers	13,145	2,519	....	....	8,794	....
Mean	$7.49	$6.15	....	....	$8.28	....
Gray iron, except pipe and fittings:						
Workers	93,068	7,260	8,269	....	61,039	2,479
Mean	$7.32	$6.36	$4.94	....	$8.13	$6.86
Steel foundries:						
Workers	52,550	10,943	2,031	3,694	22,375	7,032
Mean	$7.01	$7.85	$5.68	$5.46	$7.37	$6.45
Gray iron pipe and fittings:						
Workers	15,204	1,063	8,799	....	....	....
Mean	$6.00	$6.26	$5.99	....	....	....

[1] Includes data for regions in addition to those shown separately.

NOTE: Dashes indicate that no data were reported or that data do not meet publication criteria.

three-fifths of the workers to the pipe and fittings' pay average—the lowest among the four categories; whereas the highest paying Great Lakes region contributed two-thirds of the workers to the averages for malleable iron and gray iron (except pipe and fittings). Pay relationships among regions are influenced, to some extent, by the mix of foundry characteristics within regions. For example, there were 2 union workers for every 1 nonunion worker in the Southeast, compared to a 12-to-1 ratio in the Great Lakes States.

Regional pay differences among foundries were generally smaller for skilled occupations than for semiskilled or unskilled occupations—a pattern commonly found in BLS occupational wage surveys. Table 2 shows that for the five skilled maintenance crafts studied separately, the wage spreads between the highest and lowest paying regions were substantially smaller than those recorded for chippers and grinders, core makers, and laborers.

Nationwide, average earnings among the production occupations studied separately covered a broad range—from $10.17 an hour for metal patternmakers to $6.25 for general foundry laborers. Chippers and grinders, the largest occupational group studied, averaged $6.97. Other numerically important occupations and their averages included: core assemblers and finishers, $7.80; molders on semiautomatic machines, $7.31; hand coremakers, $7.17; metal pourers, $6.99; and shakeout workers, $6.65. Among the five maintenance crafts studied, averages ranged from $8.91 an hour for electricians, to $7.36 an hour for general mechanics. Nationwide occupational pay relationships among foundries generally followed the pattern found in the respective averages for all production workers.

Table 2. Wage spreads between the highest and lowest paying regions

Occupation	Percent
Maintenance:	
Machinists	44
General mechanics	40
Maintenance mechanics	40
Carpenters	39
Electricians	34
Production:	
Laborers, material handling	84
Core assemblers and finishers	77
Laborers, general foundry	74
Metal patternmakers	64
Chippers and grinders	63
Molders	51
Coremakers, hand	50

Virtually all production workers were employed in foundries providing paid holidays (typically 9 to 13 days annually); paid vacations (1 to 6 weeks depending upon years of service); and at least part of the cost of life, hospitalization, surgical, and basic medical insurance. Ninety-five percent of the workers also were covered by pension plans.

A comprehensive report on the findings of the survey, Bulletin 2065, is available from the Bureau of Labor Statistics, Washington, D.C. 20212, or any of its regional offices. □