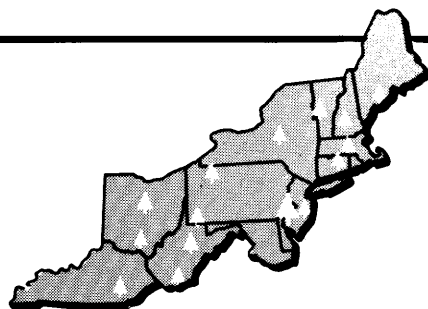


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# Northeastern Forest Experiment Station



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## PREDICTORS OF JOB TENURE IN A LUMBER-PLYWOOD MILL

*Abstract.*—Multiple discriminant analysis was used to identify biographic and employment history variables associated with job tenure in a lumber-plywood mill. Several variables—friends and relatives, type of housing, commuting distance, and prior work experience in the wood industry—were found to be significant.

Recruiting workers and holding them on the job is a serious and persistent problem for many firms in the wood industry. Many new employees quit after working only a few weeks or months. This not only disrupts production but also results in higher operating and administrative costs.

Employee turnover involves the extra expense of recruiting, hiring, and training new workers and releasing those who have quit. It results in lost production, increased machinery maintenance, higher accident rates, and intangible problems such as poor employee morale, reduced supervisory efficiency, and loss of goodwill. The cost of turnover in production and maintenance jobs has been estimated to be as high as \$1,072 per worker (*Merchants and Manufacturers Association 1970*).

The purpose of our pilot study was to determine if items commonly found on employment application forms can be used to predict the tenure of job applicants. Once identified, such items can be used by employers for screening applicants who are likely to quit within a short time after being

hired. They can also help to indicate which applicants will have a reasonable chance of developing into long-term employees.

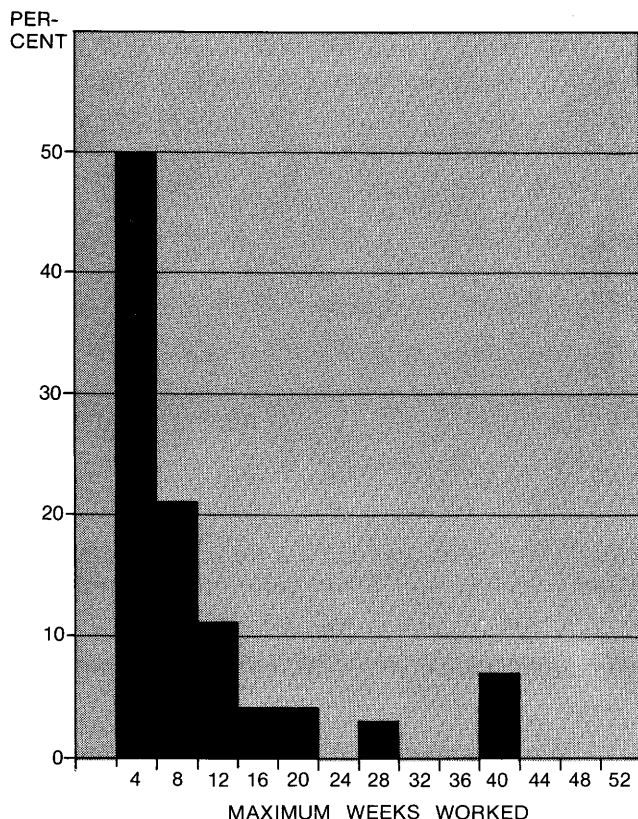
### Methods

A lumber-plywood mill located in a rural section of the Southeast was selected for the study. The subjects were permanent full-time production and maintenance workers hired between July 1969 and July 1971. Most were employed to fill entry-level jobs in the firm's plywood plant and adjoining sawmill.

Two groups of these workers were selected for study. The first consisted of 34 employees who had worked 1 year or longer as of July 1971. The second included 62 employees who had quit before completing 1 year of service. Involuntary terminations such as lay-offs, discharges, and resignations due to poor health and military obligations were not considered.

One-half of those who quit during their first year of employment did so within 4 weeks of being hired (fig. 1). Reasons employees gave for quitting included marital problems, moving to another town, returning to farm

Figure 1.—Length of service for workers who quit during their first year of employment.



work, and accepting a job with another company.

The following biographic and employment items found on the company's job-application form were examined to test their effectiveness in predicting job tenure.

1. Age.
2. Education.
3. Marital status.
4. Race.
5. Housing accommodations.
6. Weight-height ratio.
7. Months of military service.
8. Telephone service.
9. Number of job references.
10. Number of friends and relatives employed by the company.
11. Number of times previously hired by the company.
12. Commuting distance.

13. Car ownership.
14. Length of service on last job.
15. Difference between starting wage and wage on last job.
16. Previous employment in the wood industry.

## Analysis

Multiple discriminant analysis was used to distinguish between employees in the short-tenure group (less than 1 year) and long-tenure group (greater than 1 year) (*Tintner 1952; Williams 1959*). This technique is derived from the general linear model, with the criterion that the between-group sum of squares is maximized. It constructs a linear discriminant function of the form

$$Z = a_1x_1 + a_2x_2 \dots a_nx_n$$

where  $x_1, x_2 \dots x_n$  are the independent variables measured, and  $a_1, a_2 \dots a_n$  are discriminant weights assigned so as to obtain a value of  $Z$  that will indicate group membership. In this study, long-tenure employees tended to have low values of  $Z$  and short-tenure employees high values.

The biomedical computer program for stepwise discriminant analysis (BMD07M) was used to answer two questions (*Dixon 1968*). First, which variables, when considered by themselves, best discriminate between the job-tenure groups? And second, which variables, when entered into the function in a stepwise fashion, will best separate the tenure groups?

The program provided the information for answering the first question by calculating an  $F$  statistic for each variable. The statistic serves to indicate the distance between groups. The program then identifies the best discriminant function by adding in successive steps those variables that result in the greatest increase in the between-group sum of squares.

## Results

The following four variables, when taken individually, best discriminate between the job-tenure groups.

| <i>Variable</i>                                            | <i>F ratio</i> |
|------------------------------------------------------------|----------------|
| 1. Number of friends and relatives employed by the company | 23.09          |
| 2. Housing accommodations                                  | 4.58           |
| 3. Commuting distance                                      | 3.06           |
| 4. Previous employment in the wood industry                | 3.01           |

A study by Rees (1966) suggested that friends and relatives are important because they provide information and advice about the fairness of supervision, working conditions, and other aspects of employment in a firm. This information enables the worker to better decide if the job will be to his liking. Once a new man is hired, friends and relatives help him to adjust to the job by explaining company policies, introducing him to other workers, and generally helping him to become better accustomed to the work environment.

Housing accommodations, the second most significant variable, may reflect an individual's social and economic ties to a particular town or labor market. Job applicants who either owned their own homes or lived with their parents tended to have longer tenure than those who rented.

The inverse relationship between commuting distance and tenure probably reflects increasing costs in both time and money of traveling to and from work.

The last variable—previous employment in the wood industry—may indicate an individual's prior knowledge of job requirements and his satisfaction with this type of work.

In addition to testing the significance of individual variables, a linear discriminant function was calculated in a stepwise manner. The first variable included in the discriminant function was number of friends and relatives ( $x_1$ ). The F ratios for each of the remaining variables were recalculated and the variable with the largest F ratio—previous employ-

ment in the wood industry ( $x_2$ )—was added to the function. The F ratios were again recalculated, but none was sufficiently large to be entered, so the program was terminated.

Commuting distance and housing accommodations did not enter the discriminant function because their F ratios quickly decreased when the first two variables were included. This indicated that these variables were highly related to the number of friends and relatives. Consequently, adding them to the function would have done little to increase its ability to discriminate between the two groups.

The resulting function, which separated the short-tenure from long tenure workers, was:

$$Z = (-.01150)X_1 + (-.01268)X_2$$

An individual with a Z score of less than  $-.01982$  was classified as a long-tenure worker and an individual with a Z score of greater than  $-.01982$  was classified as a short-tenure worker. The function correctly classified 36 of the 62 short-tenure workers and 28 of the 34 long-tenure workers for an overall correct classification of 67 percent.

## Conclusion

This analysis suggested that, to reduce employee turnover, the case-study firm should favor applicants who:

1. Have friends or relatives already employed by the firm.
  2. Either own their own home or live with their parents.
  3. Have previous work experience in the wood industry.
  4. Live within a short commuting distance.
- Age, marital status, length of service on last job, and other variables commonly used in making hiring decisions were *not* found to be useful in determining an applicant's tenure.

## Literature Cited

- Dixon, W. J. (editor).  
1968. BMD BIOMEDICAL COMPUTER PROGRAMS.  
p. 214a-214t. Univ. Calif. Press, Berkeley.
- Merchants and Manufacturers Association.  
1970. LABOR TURNOVER HANDBOOK. 38 p., illus.  
Merchants and Manufacturers Assoc., Los Angeles, Calif.
- Rees, A.  
1966. INFORMATION NETWORKS IN LABOR MARKETS.  
Amer. Econ. Rev. 56(2): 559-566.
- Tintner, G.  
1952. ECONOMETRICS. p. 96-102, illus. John Wiley and Sons, Inc., New York.
- Williams, E. J.  
1959. REGRESSION ANALYSIS. p. 175-194, illus. John Wiley and Sons, Inc., New York.

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