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THE RELATIONSHIP BETWEEN HEALTH STATUS, MOTIVATION AND WORK EFFICIENCY OF FOREST WORKERS

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The influence of psychological factors on the health status and work efficiency was investigated in a sample of 909 forest workers whose typical diseases had been previously defined. Data concerning the motivation for work were taken during obligatory medical tests. Medical variables (health status, diagnoses, number of diagnoses per worker), psychological variables (job satisfaction, wish to change the job), and work-related variables (fulfillment of job norms) were used. Hypotheses of the relationship between the selected pairs of variables were tested by contingency tables. The lifetime trends of each variable were modelled by means of linear functions. The presumed influence was confirmed by the results obtained. Negative motivation appeared to be a very significant factor of the forest workers' health status and their work efficiency.

Key terms:
annual medical tests, psychosomatic disturbances,
regression analyses, work motivation

Analysis of motivation presented in this paper is part of a broader investigation into social and psychological influences on forest workers' health status and work efficiency.*

Negative motivation, if present over a longer period, often causes various psychosomatic disturbances which can further induce diseases like high blood pressure, stomach ulcers, heart and nerve diseases, etc.

*The investigation was carried out within the project "Researching of Forest Organization, Economics and Sociology" by the Faculty of Forestry in Zagreb and the Forest Research Institute at Jastrebarsko.

The main objective of this work was to establish the relationship between work motivation, health status and work efficiency. This was done by investigating motivation in a sample of forest workers for whom some characteristic diseases, caused by forest work and way of life, had been previously defined (1).

METHODS

The motivation and health status of forest workers were examined by physicians in the medical centres in Rijeka, Tršće, Delnice, Križevci, Koprivnica, Virovitica, Vinkovci, Županja and Vukovar. Data on some of the social and work characteristics were collected by the workers' supervisors who were also in charge of safety at work.

The sample in the study consisted of the 909 forest workers from the Forest Management Areas of Delnice, Bjelovar and Vinkovci who underwent special annual medical tests and also completed a questionnaire. The tests are obligatory for the forest workers whose job implies the use of machinery. The workers included in the study were aged from 18 to 65 years. They had different professional experiences and mostly held tree cutting and tractor driving jobs or worked on other forest jobs.

The results obtained represent the average values of the Forest Management Areas and, therefore can be used for these areas only.

For this work, nine variables were selected out of the 48 tested (health status and fulfillment of job norm as the dependent ones). These were: health status (no changes, slight changes, substantial changes), work norm fulfillment (do not work by norm, underachieve, fulfill, overfulfill), the number of diagnoses per worker (one, two, three or more) and the diagnoses - alcohol abuse, spinal damages, diseases of the locomotor system, with two categories (yes, no).

The workers' motivation for work was tested by means of the following questions in the questionnaire: "Are you satisfied with your job?" and "Would you like to change your job?".

Work hypotheses were tested by analysing the above listed variables by the CONTAB program (2-5). Trends of some variables during a lifetime were modelled by the linear function $Y = a + bx$.

RESULTS

Satisfaction with job and health status of forest workers showed a high degree of correspondence (Table 1). Of the total number of workers 11% were dissatisfied with their job. Among these 32% showed an unchanged health status, 24% showed

slight changes and 41% showed substantial changes of the health status. There were five times more workers with substantial health changes among dissatisfied workers than among the satisfied ones.

Table 1 Job satisfaction and health status

| Job satisfaction | | Health status changes | | | | Total |
|------------------|----------------|-----------------------|--------|-------------|---------------|-------|
| | | None | Slight | Substantial | Not evaluated | |
| Satisfied | n | 449 | 224 | 60 | 2 | 735 |
| | t _p | 54.36 | 27.12 | 7.26 | 0.24 | 88.98 |
| | v _p | 93.74 | 91.06 | 61.86 | 50.00 | |
| | h _p | 61.09 | 30.48 | 8.16 | 0.27 | |
| Dissatisfied | n | 30 | 22 | 37 | 2 | 91 |
| | t _p | 3.63 | 2.66 | 4.48 | 0.24 | 11.02 |
| | v _p | 6.26 | 8.94 | 38.14 | 50.00 | |
| | h _p | 32.97 | 24.18 | 40.66 | 2.20 | |
| Total | n | 479 | 246 | 97 | 4 | 826 |
| | t _p | 57.99 | 29.78 | 11.74 | 0.48 | |

$\chi^2 = 84.9364$, $df = 1$, $P < 0.01$
 n - number of entities, t_p - total percentage, v_p - vertical percentage, h_p - horizontal percentage

Regression analyses were carried out separately for the satisfied and dissatisfied workers, according to the number of diagnoses per worker and age. The average age of satisfied workers was 37 years and their mean number of diagnoses was 0.98. The average dissatisfied worker was 40 years old and had 2.18 diagnoses. The number of diagnoses doubled in three years age difference between the average satisfied and dissatisfied workers (Table 2).

Table 2 The relationship between the number of diagnoses and age and job satisfaction

| Job satisfaction | Variables | Arithmetic mean | Regression coefficients | Partial correlation coefficient | P | Determination coefficient | p |
|------------------|---------------|-----------------|-------------------------|---------------------------------|--------|---------------------------|--------|
| Satisfied | No. diagnoses | 0.986 | a=1.241 | 0.301 | < 0.01 | R ² =0.254 | < 0.01 |
| | Age | 36.819 | b=0.060 | 0.504 | < 0.01 | | |
| Dissatisfied | No. diagnoses | 2.185 | a=2.606 | 0.450 | < 0.01 | R ² =0.476 | < 0.01 |
| | Age | 40.391 | b=0.118 | 0.690 | < 0.01 | | |

The fact that in many cases alcoholism was related to dissatisfaction, was confirmed in this work. The percentage of alcoholics was three times higher in the group of dissatisfied workers (Table 3).

Table 3 Job satisfaction and diagnoses

| Job satisfaction | | Alcohol abuse | | Spinal damage | | Disease of locomotor system | |
|------------------|----------|---------------|-------|---------------|-------|-----------------------------|-------|
| | | yes | no | yes | no | yes | no |
| Satisfied | % | 9.50 | 90.50 | 10.58 | 89.42 | 14.11 | 85.89 |
| | n | 70 | 667 | 78 | 659 | 104 | 633 |
| Dissatisfied | % | 28.26 | 71.74 | 33.70 | 66.30 | 32.39 | 67.39 |
| | n | 26 | 66 | 31 | 61 | 30 | 62 |
| Total | % | 11.58 | 88.42 | 1.58 | 88.42 | 16.16 | 83.84 |
| | n | 96 | 733 | 109 | 720 | 134 | 695 |
| | χ^2 | 28.1213 | | 38.259 | | 20.651 | |
| | df | 1 | | 1 | | 1 | |
| | P | < 0.001 | | < 0.001 | | < 0.001 | |

Significant correspondence was found between work dissatisfaction and spinal diseases (34% of dissatisfied and 11% of satisfied workers had spinal diseases).

Testing the relationship between work satisfaction and locomotor diseases also showed that there were twice as many workers with locomotor diseases among those who were dissatisfied.

The impact of job satisfaction on fulfillment of job norms was significant: 27% of dissatisfied workers failed to fulfill the job norm, 31% fulfilled it and 16% overfulfilled it. The trend of fulfilling the job norm was opposite in the group of satisfied workers (Table 4).

Table 4 Job satisfaction and fulfilment of job norm

| Job satisfaction | | Not working by norm | Not fulfilling | Fulfilling | Overfulfilling | Total |
|------------------|-------|---------------------|----------------|------------|----------------|-------|
| Satisfied | n | 57 | 52 | 228 | 375 | 712 |
| | t_p | 7.14 | 6.52 | 28.57 | 46.99 | 89.22 |
| | v_p | 72.15 | 69.33 | 89.41 | 96.40 | |
| | h_p | 8.01 | 7.30 | 32.02 | 52.67 | |
| Dissatisfied | n | 22 | 23 | 27 | 14 | 86 |
| | t_p | 2.76 | 2.88 | 3.38 | 1.75 | |
| | v_p | 27.85 | 30.67 | 10.59 | 3.60 | 10.78 |
| | h_p | 25.58 | 26.74 | 31.40 | 16.28 | |
| Total | n | 79 | 75 | 255 | 389 | 798 |
| | t_p | 9.90 | 9.40 | 31.95 | 48.75 | |

$\chi^2=75.653$, $df=3$, $P\%$

n - number of entities, t_p - total percentage, v_p - vertical percentage, h_p - horizontal percentage

Answers to the question "Would you like to change your job?" were very similar to those relating to the question "Are you satisfied with your job?". In

total, there were 5 per cent more workers who wanted to change their job than those who were dissatisfied with it. This may have been due to other reasons besides work.

DISCUSSION

Forest work belongs to the category of the hardest works (6, 7). Analysis of job motivation showed that there were more workers with negative changes of health status in the group of non-motivated workers. Many medical studies have pointed out the negative health consequences of people's dissatisfaction with job. Comparing forest and industrial workers, Eide (8) found out that forest workers were more motivated for their work than industrial workers (forest workers find their work interesting and diverse and feel themselves independent in most work activities). Eide's results also show that forest workers communicate more easily and achieve a higher degree of self-fulfillment than industrial workers. He proved that there was correspondence between work satisfaction and mental health (forest workers who want to quit the job are not satisfied with it and show negative changes of mental health). The main cause for leaving the job was incapability to meet the job requirements. One of Eide's research results was detecting a series of changes caused by a higher level of mechanization of forest work: machines not only reduced physical load but the degree of autonomous control and decision-making of forest workers as well. Eide also found a correlation between certain diseases, work satisfaction, mental health and the feeling of work certainty of forest workers. In all groups of workers with negative changes of health status a higher degree of neurotic tendencies and psychosomatic diseases was measured (8).

Our results are in accordance with those of Eide. The shares of dissatisfied workers in the categories of the changed health status are much higher than of satisfied workers (Table 1). In addition, the share of dissatisfied workers was two or more times higher in the groups of workers with a diagnosis of alcohol abuse, spinal disease and locomotor disease (Table 3).

Correspondence between job satisfaction and fulfillment of job norms is obvious: in the groups of workers who fulfilled and overfulfilled the job norm satisfied workers were much more numerous (Table 4).

The main activators of positive work motivation, according to Eide, are good salary, the possibility of sharing in the decision-making process and self-respect. The levels of these three necessities of forest workers in Croatia are to be investigated. Health problems of forest workers are being dealt with: physicians, constructors of facilities and protective equipment, foresters and a series of other experts strive to reduce the time of exposure to harmful influences and to adjust machines and protective equipment to ergonomic requirements. The most apparent result of these activities is a major decrease in the rate of "vibration"

disease (4). The problem of motivation, however, remains to be solved. As long as consumer's mentality causes disproportion between desires and real possibilities in circumstances of the current living standards, workers will continue to look for additional income sources, exposing themselves to physical and mental overloading (9, 10).

CONCLUSIONS

Analysis of the results of investigation into the influence of motivation on the health status and efficiency of forest workers demonstrates correspondence between job satisfaction on the one hand and health status and efficiency on the other. The highest degree of association was observed between work motivation and fulfillment of job norm.

Negative work motivation is undoubtedly one of the factors contributing to the forest workers' morbidity. Actuating self-respect and participating in decision-making processes appear to be part of the solution in the circumstances of the present-day standard of life.

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Sažetak

ODNOS IZMEĐU ZDRAVSTVENOG STANJA, MOTIVACIJE I UČINKOVITOSTI ŠUMARSKIH RADNIKA

Problematika šumskog rada istražuje se već niz godina na medicinskom, ergonomsom, strojarskom, tehnološkom, sociološkom i organizacijskom području. Radni uvjeti, šira životna sredina i psihološko stanje velikim dijelom utječu na zdravlje radnika. Ovim radom željelo se na uzorku od 909 šumarskih radnika, kod kojih su ustanovljene karakteristične bolesti s obzirom na vrste poslova koje obavljaju, istražiti istodobno i utjecaj motivacije na njihovo zdravstveno stanje i učinkovitost. Područje istraživanja obuhvaća uprave šuma Delnice, Bjelovar i Vinkovci. Podaci o motivaciji prikupljeni su anketom prilikom sistematskog liječničkog pregleda koji je obavezan za sva radna mjesta s posebnim uvjetima rada (sječači, traktoristi, rukovatelji pneumatskim alatom) a obavlja se u medicinskim centrima ili domovima zdravlja. Podaci o zdravstvenom stanju snimani su tijekom desetak godina, dok je anketa o motivaciji provedena samo jednom. Upotrijebljene su medicinske varijable (zdravstveno stanje, dijagnoze, broj dijagnoza po ispitaniku i godine starosti), psihološke varijable (zadovoljstvo poslom i želja za promjenom posla) i radne varijable (izvršenje norme). Hipoteze o odnosu između parova odabranih varijabla testirane su i pomoću kontingencijskih tablica – programom CONTAB. Trendovi pojedinih varijabla tijekom života modelirani su s pomoću linearnih funkcija. Dobiveni su rezultati potvrdili povezanost motivacije za rad i bolesti šumarskih radnika. Ispitano je zadovoljstvo poslom radnika s oštećenjem kralježnice, dijagnosticiranim alkoholizmom i bolestima lokomotornog sustava. Među nezadovoljnim radnicima utvrđeno je dva i više puta oboljelih od spomenutih dijagnoza. Statistički najznačajnija povezanost utvrđena je između motiviranosti za rad i izvršenja radnih normi. Udio zadovoljnih radnika znakovito raste po kategorijama »podbacuje« – »ispunjava« – »prebacuje normu«, dok je kod nezadovoljnih radnika obrnut slučaj.

Ključne riječi:
godišnji liječnički pregled, motivacija za rad, psihosomatske smetnje, regresijska analiza

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