EFFORT-REWARD IMBALANCE OF THE FORESTRY EXPERTS IN CROATIA

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Abstract: *Paper presents the results of the research conducted to determine the risk of stress with the forestry experts in Croatia. At the same time the purpose was to examine the reliability of measuring instruments used in this research. The study was conducted using the Effort-reword imbalance (ERI) questionnaire and it can be observed in framework of Social Exchange Theory. For measuring of stress we used "Effort-reword index" which was analyzed in association with the demographics of respondents and the demands of employee's work functions. The examination included employees of state and public sector. Appropriate internal consistencies of the tree scales: effort, reward and overcommitment were obtained. Descriptive statistics was made by gender and the demands of work function. Statistically significant difference was obtained between the first and third age groups in relation to E/R-index. On the basis of research results it is concluded that ERI questionnaire represents applicable instrument for examining the psychological stress of forestry experts.*

1. Introduction

Almost every adult person spends half of his life in some form of work or in education for that work. In society work provides material existence and specific status for people, and it is a source of social contact and satisfaction as well as frustration i.e. stressor which makes a wide range of stimulates associated with work conditions, work procedure and work environment.
Stress at workplace represents for two last decades a global public health problem, and it is one of the biggest causes of occupational diseases and illness in the world and is ranked second biggest employees health problem described in the European Union (EU) where it is present in every third worker (Research on work-related stress, 2000). The cost of "stress related illnesses" in EU surpasses 25 billion €, and the struggle against stress has became a priority in Belgium, Denmark, France and Great Britain, where an entire specter of measures is undertaken, including financial supports, education and strengthening labor inspections[1].

Business obligations and responsibilities of personnel with an academic degree in modern environment often result with heighten mental strains and loads, for which the consequence is stress. The occurrence of stress produces at employees the following effects: lack of motivation, depression, "burn out" syndrome, and other negative consequences. All of the above reflects upon their working outputs and creative potentials, but also on the performance of the company in which they are employed.

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[1] http://www.business.hr/hr/Naslovnica/Svijet/Stres-uzrok-60-posto-izgubljenih-radnih-dana

Stress is considered as a reaction to the events that an individual with his ability to adapt cannot overcome. Schieman et al. (2006) have studied negative effects of professional on private life, and have concluded several surprising twists related to occupation and stress. Personnel with academic education, managerial staff and employees with highest salaries are most highly exposed to negative impacts of their occupation onto personal life. That connection is defined as higher status stress.

Two theoretical approaches have been studied with particular intensity and showed considerable consistency in predicting the increased risk in exposed examinee: demand-control-support model (Karasek and Theorell, 1990; Karasek et al., 1998) and effort-reward imbalance (ERI) model (Siegrist, 1996; Siegrist et al., 2004). ERI model was applied for evaluation of stress level for highly educated forestry exports in Croatia. Available publications connected to ERI model application analyze the negative effects of subjective perceptions of stress in professional environment onto the health of the employees. Ertel et al. (2005) have studied psycho-social working conditions and subjective health perception of journalists with part-time jobs. Li et al. (2005) have studied ERI index and job dissatisfaction of Chinese health professionals. Janzen et al. (2007) have studied ERI, overcommitment and psychological stress of Canadian police officers. Respective studies point out to ERI model as a reliable instrument which provides viable results related to measurement of psycho-social stress.

E/R-index thru subjective perception of the interviewees indicates a disparity between effort and reward for efforts made, expressed in quantified magnitude.

$$E/R\text{-index} = \frac{\text{Devoted effort (valuated by points through subjective perception)}}{\text{Achieved reward (valuated by points through subjective perception)}}$$

The balance point of devoted effort and achieved reword represents the value of 1.0 i.e. it marks the lowest border of stress occurrences. Higher values of E/R-index are interpreted as greater mental burden of respondents, and thereby the greater exposure to stress in the working environment.

This paper has two goals. First, to examine the internal consistency of ERI questionnaire scale which was used in the study of stress for highly educated forestry exports. Second, to conduct a valuation of psychological stress and risk of stress in the workplace as an initial research in the area of forestry profession.

1.1. Foundations of ERI model

Effort-Reward Imbalance Model (ERI) has been introduced by Seigrist et al. in 1986, and is considered to be one of the most important models in researches connected to occupational health (Siegrist, 1996; Janzen et al., 2007; van Vegchel, 2005). Model puts in relation devoted effort and achieved rewords at work.

Three components of the models are:
1) External objective effort, which is determined by professional tasks and commitments which are placed in front of the employee;
2) External objective reward which is offered or promised as an element of social exchange, in form of money, respect, job safety or job advancement;
3) Internal subjective overcommitment (van Vegchel, 2005; Siegrist and Peter, 2000). High job commitment influences the perception of both factors; high effort and low reward, and thus indirectly influence on the health of the employees (van Vegchel, 2005). It is considered that high commitment to job has direct influence on the health of the employee; all day work on longer periods can be very exhausting.

ERI model can be viewed trough Social Exchange Theory that grew out of the intersection of economics, psychology and sociology. According to Hormans (1958), the initiator of the theory, it was developed to understand the social behavior of humans in economic undertakings. Today, social exchange theory exists in many forms, but all of them are driven by the same central concept of actors exchanging resources via

a social exchange relationship, or as a framework for explicating movement of resources, in imperfect market conditions, between dyads or a network via a social process[2].

Social Exchange Theory is based on the exchange of rewards and costs to quantify the values of outcomes from different situations for an individual. This theory posits that all human relationships are formed by the use of a subjective cost-benefit analysis and the comparison of alternatives, when outcomes are perceived to be greater individuals self disclose more. Humans work with other humans in full recognition that their work achievement will be noticed and in some way (material goods but also non-material ones, such as the symbols of approval or prestige) reciprocated.

Theory of Social Exchange in framework of this research can be observed (watched) through cost-benefit analysis of work place. In this case the "cost" is devoted effort (it is scored through 5 questions) and "benefit" is the achieved reward which consists out of three sub-components: respect, job safety and job promotion (it is scored through 11 questions). E/R-index is a quantified ratio of effort and its accompanying reward in which the demarcation line (the balance point) is set to 1.00. The result higher than 1.00 points out at occurrence of stress.

Figure 1. Depiction of the key elements of the ERI model

2. Research Methods

The research included forestry exports working in the public and state forestry sector, which gained their academic degree at the Faculty of Forestry in Zagreb. The tested sample was formed from random examinees employed in the major forestry organizations in Croatia (Table 1). Testing was conducted via e-mail questionnaire.

Table 1. Sent out and returned questionnaires according to the structure of respondents

Area of work	Number of questionnaires which were:		
	Sent	Returned	Properly fulfilled
Forest extension service	10	4	4
Faculty of Forestry	6	6	6
"Hrvatske šume" Ltd	68	65	48
Total	84	75	58

For the valuation of devoted effort and achieved reward we used ERI questionnaire which consisted out of three previously mentioned components: objective effort, objective reward and subjective

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[2] http://www.fsc.yorku.ca/york/istheory/wiki/index.php/Social_exchange_theory

overcommitment, and it contains 22 questions selected and adapted for the purpose of our study. Therefore scale 'objective effort' contains 5 questions, scale ' objective reword' contains 11 questions and 'subjective overcommitment' contains 6 questions. Original version of ERI questionnaire was taken from web pages[3,4.]

In the questions related to objective effort scale and objective reword scale, respondents needed to express their agreement or disagreement with the statement or question set up and then rank their subjective experience of effort and reward i.e. stress at work. Questions related to objective effort and objective reword were scored on scale 1-5. Questions related to subjective overcommitment were scored 1-4 (1 – I strongly disagree, 2- I disagree, 3- I agree, 4- I strongly agree).

Data / answers gathered from the questionnaires were transformed into Excel data base and valuated by appropriate scoring system. Through usage of an algorithm (ER=$\sum$E/$\sum$R*c) E/R-index has been calculated, where the enumerator was the sum of points connected to devoted effort, and the denominator was the sum of points connected to achieved reward. The sum of points connected to reward was multiplied with corrective factor (0.4545), which was gained through following equation c= 5/11. The corrective factor (c) brings the sum of points connected to achieved reward to the sum of points connected to devoted effort at which their balance point (expressed through E/R index) is set to 1.00. Further data analysis has been performed in Statistica 7.1. software.

Calculation of relative frequency of the response and 95% confidence interval (95% CI) has been done for each of the three components. Internal consistency of all parts of E/R questionnaire has been done through usage of Cronbach`s α coefficient. Descriptive statistics of results has been done according to gender and job complexity, where jobs were separated as follows: 1 – Managerial working positions; 2 - Specialist working positions; 3- General working positions.

Comparison of implemented values of 'effort' and 'reword' with reference to E/R-index has been carried out according to gender, maternal age and scale internship. Furthermore, the correlation between questions related to responsibility, complexity of job and job safety (marked with E3, E6 and R13) was done with respect to E/R-index and the intensity of stress.

3. Results

Through usage of reliability analysis and on the basis of calculated Cronbach`s α a high inner consistency within all the three components of ERI model have been revealed (with α for "effort" at 0.79, for "reward" 0.78" and for "job commitment" 0.71). The values of alpha (α)>0.7 represent a satisfactory reliability of responses received to the questions within the same component.

About 44% of respondents said that they invest a low level of effort in the workplace, about 33% of respondents said that they invest an average effort in the workplace, and about 22% of respondents believe that they invest high effort at work. About 52% of respondents stated that they get a satisfactory reward for their work, approximately 26% of respondents said that they receive partial expected reward for effort, and about 22% of respondents believe that they do not get a well deserved reward for business tasks done. Calculated 95% confidence interval (CI) shows the probability of frequency response repetition with the same number of newly elected subjects (Figure 2).

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[3] ERI Questionnaire: http://www.workhealth.org/UCLA%20OHP%20class%202004/ERI%202004.pdf

[4]Effort-reward imbalance at work questionnaire: http://www.uniduesseldorf.de/medicalsociology/fileadmin /Bilder_Dateien/download /ERI_Texte_und _Grafiken/Eriquest_Psychometric_information.pdf
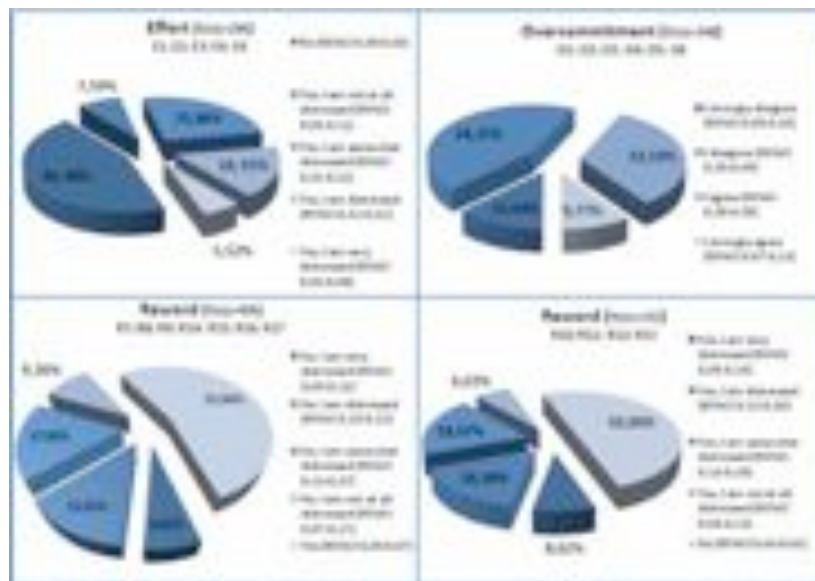
Figure 2. Relative frequency and 95% CI of the response per scales

Table 2. Mean (M) and standard derivation (SD) for all the respondents

Scales	M	SD	Medina	Min	Max
Age, *year*	39.33	9.35	41.00	25.00	59.00
Internship, *year*	13.49	9.19	14.00	0.70	33.00
Devoted effort, *points*	11.55	4.70	11.00	5.00	24.00
Achieved reward, *points*	42.22	7.93	41.50	28.00	55.00
E/R-index	0.64	0.34	0.60	0.21	1.57
Overcommitment, *points*	14.41	2.29	14.00	9.00	21.00

The mean value of E/R-index for the entire sample of respondents was M = 0.64 which on the global point of view indicates a low level of mental workload and the risk of stress in forestry experts. At 18.97% of the interviewees the value of E/R-index was higher than 1.00, which indicates a relative disproportion of devoted effort and achieved reward, and thus risk of stress development.

Descriptive statistic made according to the gender (Table 3) didn't show significant difference in means thought scales. Descriptive statistics made according to the job complexity (Table 4) has showed a significant difference between arithmetic mean values obtained by comparing the components of managerial and specialist as well as managerial and general working positions.

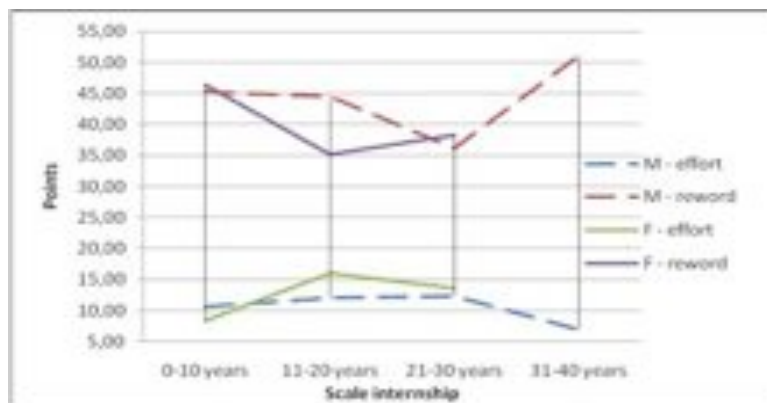**Table 3.** Descriptive statistics according to gender

Scales	Male (n=43)		Female (n=15)	
	M	SD	M	SD
Age, *year*	39.91	9.56	37.67	8.82
Internship, *year*	14.10	9.11	11.75	9.51
Devoted effort, *points*	11.42	4.61	11.93	5.09
Achieved reward, *points*	42.63	8.34	41.07	6.77
E/R-index	0.63	0.34	0.68	0.36
Overcomitmment, *points*	14.44	2.25	14.33	2.50

Table 4. Descriptive statistics according to job complexity

Indicators	Job complexity					
	General working positions (n=19)		Specialist working positions (n=29)		Managerial working positions (n=10)	
	M	SD	M	SD	M	SD
Age, *year*	35.84	10.10	39.14	8.84	46.50	4.86
Internship, *year*	9.58	9.22	13.42	8.91	21.10	4.58
Devoted effort, *points*	10.26	3.21	10.83	4.00	16.10	6.44
Achieved reward, *points*	45.11	7.42	41.93	7.69	37.60	7.92
E/R-index	0.51	0.18	0.61	0.29	1.00	0.47
Overcomitmment, *points*	14.21	2.15	14.28	2.33	15.20	2.53

T-test has shown an existence of significant difference between the specialist and managerial working positions (t=2.433; df=9; p=0.038) as well as between general and managerial working positions (t=2.836; df=9; p=0.019) in the case of E/R-index. At the testing of "overcommitment" variable according to job complexity no statistically significant differences in means was found.

Male respondents with 11-20 years of internship receive higher reword and invest less effort (per achieved points) compared to female respondents who receive a smaller reword and invest greater effort to execute their work assignments. In this group the risk symptoms of stress, according to the averagely obtained E/R-index value, show a higher proportion of female respondents (13%) compared to male respondents (2%). In the class with 21-30 years of internship, there is an increase of effort and significant reduction of reward received by males respondents, while the risk symptoms of stress are shown in higher proportion at male respondents (12%) and smaller proportion at female respondents (7%). The biggest difference in average E/R-index was values obtained between the genders is in the class with 11-20 years of scale internship (Figure 3 and 4).

Figure 3. Display of achieved points for effort and reword scale with respect to internship and gender
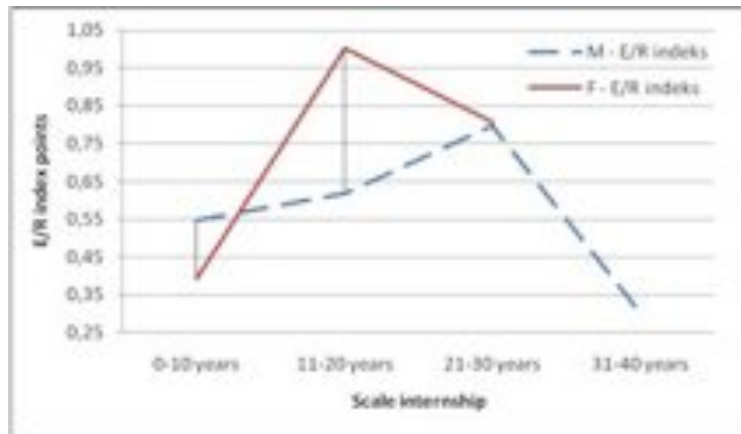
Figure 4. Display of average value of E/R-index with respect to intership and gender

By testing the differences between the means of E/R-index a significant difference has been revealed between age groups defined by the four age class with a range of 10 years ($F(3.57)=2.88$; $p<0.05$). *Turkeys' post hoc* test has shown significant difference between group 1 (21-30 years of age) and group 3 (41-50 years of age), at which the level of E/R-index is higher in group 3 (M=0.78; SD=0.35) than is in group 1 (M=0.47; SD=0.14).

By determining the relationship between measures of E/R-index and responsibilities, demands and job security a statistically significant positive correlation has been observed to the "business responsibility" (q. E3) and E/R-index ($r=0,75$; $p<0,01$) as well as between "growth of job complexity (q. E6) and E/R-index($r=0.73$; $p<0.01$). To variable „job safety" (q. R13) E/R-index shown no statistically significant correlation.

4. Discussion and Conclusions

Stress is a subjective reflection of emotions of individuals which's intensity/level can be valuated by analysis of their statements. This research represents fist of its kind to be undertaken on forestry experts in Croatia.

This type of survey is the first step towards changes i.e. intervention (measures that cause an effect) in employee stress management because it gives a person the opportunity to "pinpoint where things are worst", encourages thinking, changes perspectives and increases expectations.

Most important conclusions are:
- Almost every fifth interviewee is exposed to stress, or that there is a discrepancy between devoted effort and achieved reward at every fifth interviewee.
- According to cost-benefit analysis of work place, in framework of Social Exchange Theory, women are under stronger mental pressure at work environment.
- Women with shorter duration of internship and life age (compared to their male colleagues) perform more complex work functions, but also earlier meet with stress as a result of the discrepancy between devoted effort and achieved reward.
- Third age group, which comprises out of experienced employees on managerial positions, is more exposed to stress than it is the case of their younger colleagues who are most often placed at general working positions.
- Regardless of age and gender, stress risk grows with increasing of job complexity and responsibility.

Based on research conducted and results, it can be concluded that Effort Reward Imbalance methodology, in framework of Social Exchange Theory, represents a significant contribution and it shows to be most

suitable instrument for measuring stress at forestry experts. For more complete evaluation of the applied method a larger sample survey should be done, and it should be repeated in intervals - a time series research.

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