

INFLUENCE OF BIOLOGICAL, PSYCHO-SOCIAL AND ORGANISATIONAL WORK FACTORS ON OCCUPATIONAL SAFETY MOTIVATION

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Abstract. *Motivation for work is one of the central and most important factors of work behaviour, which is important not only from the point of view of efficiency, productivity of workers and their behaviour at work in general, but from the point of view of safety of workers. As recent studies have shown, work motivation more or less indirectly affects and contributes to overall satisfaction and psycho-physical health of workers. Motivation is almost analogously studied by scientific disciplines like work management, occupational psychology, occupational sociology, ergonomics, etc. The motivation for occupational safety is just one of the aspects of occupational motivation.*

Understanding safe working conditions is a complex process which includes specific individual motivation for occupational safety, management of a working process and wider work culture.

The topic of the research that we present in this paper is motivation for occupational safety, or the influence of biological, social, psychological and work management factors on motivation for occupational safety in real working conditions and on real individuals. By researching complex phenomena of motivation for occupational safety we shall determine motive hierarchy and factors in our social and organizational conditions which affect worker motivation for occupational safety.

Key Words: *occupational safety, functional autonomy, occupational safety motivation, occupational safety motivation measurement scale.*

INTRODUCTION

Technological development and modernization in the first part of 21st century have also brought negative, as well as positive, consequences on the quality of working and living environment. There are many risks from potential laying off and also many dangers

which can in many ways imperil safety, physical and mental integrity of a person and their working and living environment. [10]

Solving problems of safety in working environment and improving the quality of living environment, is a dynamic process which deals with a cause, and also values its success by reducing negative consequences. [14] By applying safety preventive measures in working and living environment, the occurrence of dangerous events is reduced, which directly influences risk reduction. [1] One very important measure for living and working environment safety is workers' occupational safety motivation. [11]

In motivation for occupational safety, it is very important for the workers to apply safety measures on their positions, and those measures must be adequate for the existing danger or harm. [9] In order to be adequately applied, it is necessary for the workers to know what the elements of work place risks are and accordingly to respect work procedure and apply specific safety measures. [2]

One of the most important factors for the application of occupational safety measures is workers' motivation for this area, that is, the motivation for consistent respect of rights and obligations they have in the area of safety. [8] In order to reduce problems with application of occupational safety measures, there are, among other actions (informing and educating), many other stimulations which are based on changing wrong attitudes about safety and increasing the level of individual and group motivation. [12]

Occupational safety is one of the central and most important factors of work behavior, and it is important not only from the point of view of efficiency, workers' productivity and their behavior in general, but also from the point of view of workers' safety. [4] As some recent studies have shown, work motivation, more or less indirectly influences and contributes to overall pleasure and psycho-physical health of workers. Motivation is almost analogously studied by scientific disciplines like work management, occupational psychology, occupational sociology, ergonomics etc. Motivation for occupational safety is only one of many aspects of occupational motivation. [5]

Understanding safe working conditions is a complex process which includes specific individual motivation for occupational safety, management of a working process and wider work culture. [8]

In contemporary theory, which deals with motivation problems, there is consent that working activity is determined by five main motives: motives of benefit, safety, comfort, pleasure and leveling. All these motives can be found in working activity of each person; however, according to the environment the person lives and works in, as well as on the individuals themselves who possess their own motive hierarchy, it depends what the motive hierarchy would be. [7]

From this point of view on work motivation, the question of occupational safety will be raised and in that way connected not only to motive of safety but also to other motives related to work. [13]

We shall start from the point of view that motivation for occupational safety represents autochthonous complex based on biological instinct for safety; this complex is determined by social conditions of development which are subordinated to personal characteristics; instrumentality principles lay in the basis of work motivation. [11]

DEFINING OCCUPATIONAL SAFETY MOTIVATION

A system of different measures has been used to help create motives for working activity and occupational safety with workers, in order to increase work success and protect all production process elements. [15]

By analyzing main motives in a working activity, Tomaševski has come to a conclusion that working activity is determined by five main motives: benefit motive (consists of getting a reward for work); safety motive (satisfying needs for avoiding danger which appears in working environment); comfort motive (aspiration to choose easier way of performing tasks); pleasure motive (pleasure in work results) and "leveling" motive (satisfying needs to act according to accepted ways in a work group, aspiring not to be worse than others). All these motives are present in every working activity of an individual. However, what their hierarchy will be like depends both on the environment a person lives and works in, and on the persons themselves, because they possess or might possess their own motive hierarchy which represents a dynamic core of their own personality. [11]

In the context of this approach to work motivation, the issue of motivation for occupational safety will also be discussed, and this is not only connected to safety motive but also to satisfying other motives. In the present conditions when salaries are low, it is highly unlikely that motivation for occupational safety will grow, that is, the motivation for satisfying the safety motive. And yet, even low salaries cannot completely suppress safety motive at work. That is why the following point of view should be accepted: "occupational safety motivation represents autochthonous motivation... based on biologically similar safety motive, and it is determined by social progress conditions and instrumentality principles which lay in the basis of work motivation".

RESEARCH GOAL

Studying occupational motivation is the basic goal of this research.

As it has already been mentioned, by reviewing references we have determined that there are no valid instruments for measuring this variable. That is why we have decided to construct a scale for measuring motivation for occupational safety. [6]

Variable classification

Dependent variable: Occupational safety motivation

Dependent variable indicators are implicit in items on Licker scale, and they can be defined as positive and negative.

Positive items:

- (1) increase efficiency and productivity;
- (2) prevent injuries at work;
- (3) protect health;
- (4) show interest for the area (talk with colleagues about it);
- (5) want union to take more care (and/or any other organizations);
- (6) stimulate workers;
- (7) worry about workers;
- (8) feel better and safer.

Negative items:

- (1) make work process difficult;
- (2) cause injuries at work despite being used;
- (3) work conditions are useless;
- (4) they are only "empty words" and there is no use wasting money on it;
- (5) most production workers do not need it;
- (6) negatively stimulate workers in the production process;
- (7) it is only a mask to be careless of workers;
- (8) it feels the same as if they were not used.

Independent variables

- (1) age;
- (2) length of service;
- (3) length of service in the battery plant;
- (4) qualifications for productive position;
- (5) type of work, that is, type of productive position;
- (6) number of protective measures used (...);
- (7) type of protective measures used (degree of danger or protection);
- (8) whether protective measures for occupational safety are provided;
- (9) degree of satisfaction with other motivators (6 motivators and satisfaction degree from 1 to 5);
- (10) reply to the question: "What troubles me the most at work?" and similar. Purpose of the question is to determine:
 - (1) what is the percentage of production workers who will mention occupational safety as something that worries them the most;
 - (2) whether this field will take 1st, 2nd, 3rd or even 4th or 5th place;
 - (3) to determine what kind of motivation for occupational safety it is, depending on the workers' replies.
- (11) regularity of use of protective occupational safety resources → five-degree evaluation scale with given answers from 1 (incorrect) to 5 (correct), and the statements are:
 - a) I regularly use occupational safety resources;
 - b) I often forget and I do not use occupational safety resources;
 - c) I often use occupational safety resources because there is control and punishment;

A general question is also asked: "There are 7 (seven) different work incentives. We are interested how much each of them influence your work enthusiasm". The seven given replies need to be ranked. After this, it will be possible to determine the position of motivation for occupational safety in terms of *seven motivators*.

Instruments for collecting data

By reviewing bibliography, we have determined that there are no measuring instruments for this variable in our country. Bibliographical data mostly relate to occupational motivation within the framework of which mutual relations between the individuals, the type of work and working conditions in the immediate work environment-company are discussed, primarily in terms of human relations, ergonomics and work management. However, phenomena such as adaptability, satisfaction-dissatisfaction of an individual and of groups of

workers with the work itself or working conditions (hazards, risks, inadequate safety measures, inadequate protective equipment), as well as providing conditions that lead to optimal work efficiency and at the same time to its security are not studied enough.

That is why we have decided to design occupational safety motivation scale. We have also tried to adjust it to work areas and conditions where production process in our research is being carried out. [6]

Research sample

The sample consists of 352 workers employed in "Black Horse" battery plant in Sombor. The sample has been formed according to the method of random choice. The sample consisted of examinees from different business units, than of different sex, age and length of service.

Statistical data processing

Frequencies and percentages; ranks; arithmetic means; standard deviations; importance of differences between arithmetic means; variance analysis; linear correlation coefficients and their importance; hi-square and its importance; Spearman coefficient.

Research hypothesis

General hypothesis

H₀ There is a connection between biological, psycho-social and work management factors and motivation for occupational safety.

Specific hypotheses

Specific hypotheses have been deduced from the general hypothesis:

- H₁ Material stimulation represents the most important work incentive with examinees;
- H₂ There is a connection between occupational safety motivation and the sex of the examinees;
- H₃ There is a connection between occupational safety motivation and the age of the examinees;
- H₄ There is a connection between occupational safety motivation and the length of service altogether;
- H₅ There is a connection between occupational safety motivation and the length of service in chemical industry;
- H₆ There is a connection between occupational safety motivation and the qualifications of the examinees;
- H₇ There is a connection between occupational safety motivation and the type of job;
- H₈ There is a connection between occupational safety motivation and the number of protective measures used;
- H₉ There is a connection between occupational safety motivation and the type of protective measures used;
- H₁₀ There is a connection between occupational safety motivation and the usage of protective measures in production process;

- H₁₁ There is a connection between occupational safety motivation and other motivators (salary, employment security, interpersonal relationships, personal needs, work content, taking part in decision-making);
- H₁₂ There is a connection between occupational safety motivation and regularity in using protective measures.

RESULTS

Basic research results have been reported within several smaller areas. Firstly, workers' categories have been presented in terms of motivation for occupational safety.

There are 11,4% of workers with low motivation, 24,7% of workers with medium level motivation, while 63,9% are highly motivated for using occupational safety measures.

From seven offered work incentives, the examinees have evaluated "EARNINGS" as the most important incentive, where 62,8% ranked it with the highest grade. The second most important incentive is "SAFETY OF EMPLOYMENT", which 49,4% of examinees ranked with the highest grade. Incentive "OCCUPATIONAL SAFETY" has been ranked as the third most important with 36,9% of responses in the highest category. These results confirm the first specific hypothesis of our research H₁.

Considering that the whole sample consisted of 352 employees, and 339 out of them were men and only 13 were women, we could not test the second specific hypothesis of our research H₂ and determine connection between occupational safety motivation and the examinees' sex.

A response to the question: "Who is more motivated for occupational safety, a young man of about 25 or a worker in his 60s (51 – 64)?" shows that there is no difference between these two extremely different categories. The only stated difference of 0,08 is the one between categories of workers from 41 – 50 and those above 50 years of age. That is how we have confirmed the third hypothesis of our research H₃.

In this research we have determined that there is statistically significant difference between worker groups with different lengths of service altogether and levels of motivation for occupational safety.

There is a significant difference on the level of 0,001 between categories "1 – 10" and "11 – 20", as well as "1 – 10" and "21 – 30".

The results show that "young" workers have higher level of motivation for occupational safety from those whose length of service is from ten to twenty years longer.

Statistically significant difference on the level of 0,003 has been determined between groups "11 – 20" and "31 -40" and groups "21 – 30" and "31 – 40" years of service.

Contrary to the previous result, which has shown that the workers whose length of service is up to 10 years long show higher level of motivation for occupational safety, the above mentioned result shows that another extreme worker category, from 30 – 40 years of service, is more motivated for better occupational safety than both medium categories. Workers whose length of service is from 11 to 30 years show lower level of motivation for occupational safety. The obtained results confirm the fourth specific hypothesis of our research H₄.

Considering length of service of workers in the battery plant in Sombor, we did not get very different results. Namely, we have determined difference on 0,02 level of importance

between groups of up to ten years of service in chemical industry and groups of between 11 – 20 years of service:

We have determined a difference between groups "11 – 20" and "21 – 30" years of service in chemical industry and by it confirmed the fifth specific hypothesis of our research H_5 .

We did not find statistically significant difference between worker categories of different educational level and occupational safety motivation level, which means that we have not confirmed the sixth specific hypothesis H_6 .

Considering that all examinees were production workers, we could not check the seventh specific hypothesis of our research H_7 and determine connection between occupational safety motivation and type of job.

Considering number of protective measures used in working process, we have determined low negative connection with occupational safety motivation: $p=-0,036$, by which we have confirmed the eighth specific hypothesis of our research H_8 .

The only positive connection between type of protective measures and occupational safety motivation, where the connection is $p= 0,118$ at level of significance 0,05, is "RAIN CAPE" as a protective measure. By this we have confirmed the ninth specific hypothesis of our research H_9 .

We have determined connection $p=0,233$, significant on the level of 0,01, between occupational safety motivation and usage of protective measures in production process. These results have confirmed the tenth specific hypothesis of our research H_{10} .

By confirming connection between occupational safety motivation and work motivators, we have obtained correlations statistically significant at level of 0,01. What is the most important is that connection between work motivation and occupational safety is $p= 0,325$.

Based on the presented results we can conclude that we have confirmed the eleventh specific hypothesis of our research H_{11} .

Occupational safety motivation is highly connected to regular use of the existing means, $p=0,351$. Workers use protective measures because they want to, and not because they are frightened of control and punishment, $p=0,238$. Occupational safety motivation is also highly connected to regularity of protective measure usage, $p=0,375$. By this we have confirmed the twelfth specific hypothesis of our research H_{12} .

Based on the research results, we can conclude that general hypothesis of our research H_0 has been confirmed. This allows us to draw a basic conclusion that there is a great influence of biological, psycho-social and work management factors on motivation for occupational safety.

CONCLUSIONS

By this research we have achieved the following:

- Theoretical contribution to understanding motive hierarchy which, in our social conditions and work and occupational safety organization, influences workers' occupational safety motivation; the first place in the motive hierarchy is taken by benefit motive – salary, then safety motive and the third place is occupational safety motive

- Originally designed scale for measuring occupational safety motivation with good metric characteristics which can be applied in many areas of productive process and is adaptable to special work characteristics;
- Practical importance is seen in the ability to influence those aspects of working environment which, according to the research results, have the greatest importance in occupational safety motivation of workers, and those are bad working conditions, injustice, bad interpersonal relationships etc.
- Based on the research results, more intense application of certain procedures and measures is possible, in order to increase awareness level of the need for occupational safety. By this we mainly think of safety training and qualifying workers for safe work, improving work organization and working environment, taking care of worker's "private" circumstances, stimulating occupational safety (reward or punishment) etc. On the other hand, practical effect would be increasing general and personal safety of workers and in that way decreasing negative work consequences like injuries, occupational illnesses, professional illnesses and invalidity.

Generally speaking, according to the discovered motivation level and motivator rank, persons and teams having expert positions in occupational safety will be able to determine stimulating measures for increasing safety level. This is important because companies are required to carry out risk assessment in the workplace. It includes, by the rule, determination of new or extra safety measures or adaptation of the existing ones to the established level of danger and risk, in order to achieve a higher level of occupational safety. Application of safety measures in everyday practice cannot be achieved by force but by stimulation, i.e. motivation of workers to change their behavior through adopting new work practices related to occupational safety.

REFERENCES

1. Markič, M., Nikolić V., Živković, S., Obvladovanje znanja na području varnosti in zdravlja pri delu, Varstvo pri delu, varstvo pred požari in medicina dela, Medunarodna konferencija Portorož, 2010.
2. Markič, M., Kolenc, I., Živković, S., Vršni managerji in preventivna varnost, V. Znanstveno stručna konferencija s međunarodnim sudjelovanjem Menadžment i sigurnost M&S 2010 Čakovec, 9. jun 2010. Tema konferencije: Planiranje i sigurnost, Programski ciklus: Osnovne funkcije menadžmenta i sigurnost, 2010.
3. Nikolić, V., Živković, S., Upravljanje vanrednim situacijama ekološkog karaktera sa bihevioralnog karaktera, Ekologica, Beograd, 2008.
4. Stojanović, S., Zdravković, S., Motivation for occupational safety, Facta universitatis, str. 179-189, Niš, 2002.
5. Stojanović, S., Zdravković, S., Grozdanović, M., Motivation for occupational safety I, Ergonomics Conference "Ergonomics in the Digital Age" vol.5 on CD-IEA 2003, Seul, 2003.
6. Stojanović, S., Measure of occupational health motivation, 7th International Conference Quality Management Dependability and DQM - 2004, str. 417-243, 2004.
7. Todorović, M., Živković, S., Organizaciona kultura kao jedan od glavnih činilaca za uspešno upravljanje zaštitom, 50 godina organizovane zaštite na radu u Srbiji, Nacionalna konferencija sa međunarodnim učešćem, Zbornik radova, str. 306-313, 2010.
8. Todorović, M., Živković, S., Organizational culture in the function of occupational health care at work, 13. Međunarodna konferencija "Upravljanje kvalitetom i pouzdanošću" ICDQM-2010, pp. 155-161, Belgrade, 29-30. June 2010.

9. Живкович, С., Современный концепт менеджмента качеством в защите рабочей и жизненной среды, VI международной конференции: Инноватика – 2010, стр. 161-162, Ульяновский государственный университет, Ульяновск, 2010.
10. Живкович, С., Управление защитой - интеграция на будущее, Ульяновский государственный университет, Ульяновск, Россия, 2010, предавање по позиву.
11. Živković, S., Motivacija za zaštitu na radu, Fakultet zaštite na radu Niš, 2008.
12. Živković, S., Rakić, T., Uticaj menadžmenta ljudskih resursa na motivisanost zaposlenih za rad i bezbednost i zdravlje na radu, Međunarodni naučno-stručni skup: Menadžment, inovacije, razvoj, 2009, Vrnjačka banja, 03-04. april 2009.
13. Živković, S., Savremeni koncept menadžmenta, V konferencija Dani primenjene psihologije, Univerzitet u Nišu, Filozofski fakultet, Departman za psihologiju, 2009.
14. Živković, S., Contemporary concept of quality management in living and working environment safety VI международной конференции: Инноватика – 2010, Ульяновский государственный университет, Сборник научных работ стр. 39-55, 2010.
15. Živković, S., Todorović, O., Improvements after introduction of integrated management system standards, 13. Međunarodna konferencija "Upravljanje kvalitetom i pouzdanošću" ICDQM-2010, pp. 147-154, Belgrade, 29-30. June 2010.

UTICAJ BIOLOŠKIH, PSIHOSOCIJALNIH I ORGANIZACIONIH FAKTORA RADA NA MOTIVACIJU ZA ZAŠTITU NA RADU

Snežana Živković

Motivacija za rad je jedan od centralnih i najznačajnijih faktora radnog ponašanja, važan, ne samo sa stanovišta efikasnosti, produktivnosti radnika, radnog ponašanja uopšte, već i sa stanovišta bezbednosti radnika. Kako novije studije pokazuju, motivacija za rad, manje ili više posredno deluje i doprinosi ukupnom zadovoljstvu i psihofizičkom zdravlju radnika. Motivacija se gotovo paralelno istražuje u okviru naučnih disciplina organizacije rada, psihologije rada, sociologije rada, ergonomije i dr. Motivacija za zaštitu na radu je samo jedan od aspekata motivacije za rad.

Ostvarivanje bezbednih uslova rada predstavlja kompleksan proces koji je u funkciji specifične individualne motivacije za zaštitu na radu, organizacije radnog procesa i šire kulture rada.

Predmet istraživanja koje prikazujemo u radu je motivacija za zaštitu na radu, odnosno uticaj bioloških, socijalnih, psiholoških i organizacionih faktora u konkretnim uslovima rada i kod konkretnih ličnosti na motivaciju za zaštitu na radu. Istraživanjem složenog fenomena motivacije za zaštitu na radu, utvrdiće se hijerarhija motiva i faktori koji u našim socijalnim i organizacionim uslovima utiču na motivisanost radnika za zaštitu na radu.

Ključne reči: *zaštita na radu, funkcionalna autonomija, motivacija za zaštitu na radu, skala za merenje motivacije za zaštitu na radu*