Management of occupational safety by motivating employees to work safely

Snežana Živković

Faculty of Occupational Safety in Niš, Republic of Serbia.

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Occupational safety is one of the central and most important factors of work behavior, and it is not only important for efficiency, workers' productivity and their behavior in general, but also for workers' safety. As recent studies have shown, occupational safety motivation more or less indirectly affects and contributes to overall satisfaction and psycho-physical health of workers. The topic of this study is motivation for occupational safety, more precisely the influence of biological, social, psychological and work management factors on motivation for occupational safety in real working conditions and real individuals. By researching the complex phenomena of motivation for occupational safety we shall determine the hierarchy of motives and the factors in our social and organizational conditions which affect employee's motivation for occupational safety.

Key words: Employee's motivation, hierarchy of motives, management factors, occupational safety motivation.

INTRODUCTION

In the first part of the 21st century, technological development and modernization brought negative as well as positive consequences on the quality of work 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 people and their working and living environment (Živković, 2010b). Nowadays, attention given to health management, safety, and environment systems and their subdivisions in organizations has increased (Sadoughi et al., 2012)

Solving problems of safety in working environment and improving the quality of living environment is a dynamic process which deals with cause, and also values its success by reducing negative consequences (Živković, 2010). By applying safety preventive measures in working and living environment, the occurrence of dangerous events is reduced, which directly influences risk reduction (Markič et al., 2010a). One very important measure for living and working environment safety is workers' occupational safety motivation (Živković, 2008).

Motivation is the psychological process that causes the arousal, direction, intensity and persistence of behavior (Mawoli and Babandako, 2011). The role of motivation in the work environment has great value (Iguisi, 2009). 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 (Živković, 2010a). In order to be adequately applied, it is necessary for workers to know the elements of the risk in their work place and accordingly to respect work procedure and apply specific safety measures (Markič et al., 2010b).

One of the most important factors for 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 (Todorović and Živković, 2010b). 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. Motivation is almost analogously studied by scientific disciplines like work management, occupational psychology, occupational sociology, ergonomics etc. Employees’ motivation is one aspect of a human resource management development strategy (Ukandu and Ukpere, 2011). Motivation for occupational safety is only one of many aspects of occupational motivation (Stojanović et al., 2003).

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 (Todorović and Živković, 2010b). In contemporary theory, which deals with motivation problems, there is a 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 the work of each person; however, the environment the person lives and works in, as well as on the individuals themselves who possess their own motive hierarchy depend on what the motive hierarchy would be (Todorović and Živković, 2010a; Todorović et al., 2013).

From this aspect of 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. We shall start form 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 (Živković, 2008).

The aim of this study is to determine the degree of occupational safety motivation depending on a number of factors - variables in the concrete work conditions where certain procedures and work safety measures are implemented. The specific objectives, among others, are identifying and testing of:

1. The most important incentives for occupational safety;
2. The relationship of occupational safety motivation and gender, age, length of service and qualifications of the examinees;
3. The relationship of occupational safety motivation and type of job in the workplace;
4. The relationship of occupational safety motivation and satisfaction level of other motivators (salary, job security, interpersonal relationships, etc.);
5. The relationship of occupational safety motivation and use of personal protective equipment;
6. The relationship of occupational safety motivation and threatening factors that are individually ranked, etc.

In order to study this subject of research in an appropriate manner, and to achieve the set goals, we start from the general hypothesis that, biological, psychosocial and work management factors have effect on motivation for occupational safety.

As a review of literature shows that there are no instruments for measuring the motivation for occupational safety in Serbia, we decided to construct a scale that will measure this motivation. The scale is adapted to conditions where production work is done. Five-level Likert-scale was constructed, whose final version contains 34 items. Data on demographic characteristics of respondents and the workplace will be obtained from the answers to the first 7 items while 27 other items measure motivation for occupational safety.

Originally constructed measuring scale for occupational safety motivation is the main scientific contribution of this study. The study has theoretically contributed to the knowledge of hierarchy of motives that are, in our social conditions, work organization and occupational safety, affecting the workers’ motivation for occupational safety; it also has practical importance by influencing those aspects of the working environment, like motivating workers to have occupational safety.

This paper represents an original scientific study where 352 examinees of battery producer factory were tested by using measuring scale for occupational safety motivation. The scale was adapted to conditions where production work is done; so we assume that the results can be generalized for enterprises that have similar conditions of production.

RESEARCH METHODOLOGY

The basic goal of this research is to examine occupational motivation. For this purpose, the general research hypothesis is: There is a connection between biological, psychosocial and work management factors and motivation for occupational safety.

Based on the hypothesis, expectations of researchers were focused on confirming the existence of a positive correlation between the biological, psychosocial and organizational factors and motivation for occupational safety. On the other hand, practical application of certain procedures and measures in order to increase the level of awareness of the need for occupational safety is expected as well as reducing the negative consequences of work and overall increase of general and personal safety of the workers.

Specific hypotheses have been deduced from the general hypothesis:

H1: Material stimulation is the most important work stimulation among the examinees;
H2: There is a connection between occupational safety motivation and the examinee gender;
H3: There is a connection between occupational safety motivation and the examinee age;
H4: There is a connection between occupational safety motivation and length of service;
H5: There is a connection between occupational safety motivation and qualifications of the examinees;
H6: There is a connection between occupational safety motivation
and type of job;
H₄ There is a connection between occupational safety motivation and the number of safety equipment used;
H₅ There is a connection between occupational safety motivation and the type of protective equipment used;
H₆ There is a connection between occupational safety motivation and the usage of safety equipment in production process;
H₇ There is a connection between occupational safety motivation and other motivators (salary, job security, interpersonal relationships, personal needs, work structure, taking part in decision-making);
H₈ There is a connection between occupational safety motivation and the regular use of safety equipment.

Measuring scale for occupational safety motivation, constructed for this research was used (see appendix). For statistical data processing, the following methods were used: Frequencies and percentages; ranks; arithmetic means; standard deviations; importance of differences between arithmetic means; variance analysis; linear correlation coefficients and their importance; hierarchy and its importance; Spearman coefficient.

For data analysis, a comprehensive statistical software SPSS for Windows (ver. 19) was used. This software package for analysis and data management is the researcher’s tool of choice in studying the business and research problems with the above stated methods; and a large variety of statistical tests provide contentment for all the needs of the data analysis.

The research sample consists of 352 workers employed in “Black Horse” Battery Producer in Sombor. The sample has been formed according to the method of random choice. The sample consisted of the examinees from different business units, different gender, age and length of service.

This particular battery plant was chosen because it is a long-term successful company that uses modern methods and means of protection at work; there is this assumption that the work in the chemical industry motivates workers to work safely.

The total sample of 352 employees included 339 men and only 13 women, aged 20 to 64 years (average age being 39 years).

There are 11.4% of workers with low motivation, 24.7% of workers with medium level motivation, while 63.9% is highly motivated to use occupational safety measures.

RESULTS AND DISCUSSION

Regarding Work stimulation, out of seven different stimulations for work, the examinees have evaluated “SALARY” as the most important, where 62.8% ranked it with the highest grade. The second most important stimulation is “JOB SECURITY” (49.4% of the examinees ranked it as the highest), “OCCUPATIONAL SAFETY” has been ranked as the third most important in 36.9% of the cases.

“INTERPERSONAL RELATIONSHIPS” is not among the top three most important stimulations for work. We conclude that “SPENDING TIME WITH PEOPLE FROM THE SAME WORKING GROUP” has a much greater stimulating value than “PERSONAL NEEDS”, “WORK STRUCTURE” and “PARTICIPATION IN DECISION-MAKING”. “INTERPERSONAL RELATIONS” is in the fourth position according to its importance.

“PERSONAL NEEDS” have a much greater stimulating value for work than “WORK STRUCTURE” and “PARTICIPATION IN DECISION-MAKING”, so we can conclude that “PERSONAL NEEDS” are in fifth place according to its importance.

The sixth position is occupied by “WORK STRUCTURE” and it has higher stimulating value than “PARTICIPATION IN DECISION-MAKING” which is at the last (seventh) position.

By analyzing The correlation between occupational safety motivation and the examinees’ age, a response to the question: “Who is more motivated for occupational safety - a young man of 25 or a worker in his 60s (51 – 64)?” shows that there is no difference between these two extremely different categories, because workers in both groups are highly motivated for occupational safety; younger workers due to lack of experience and older workers due to the decline of psycho-physical properties that are related to time and reaction rate. The only significant difference of 0.08 is the one between the workers from 41 – 50 years group and those in the group above 50 years of age. The workers in the 41 – 50 years group consider themselves as sufficiently experienced and confident in performing work assignments, and therefore, they are not very motivated for occupational safety.

Regarding The correlation between occupational safety motivation and total length of service, in this research we have determined that there is a statistically significant difference between the groups of workers with different years of service and levels of motivation for occupational safety.

There has been a significant difference at 0.001 level between the groups “1 – 10” and “11 – 20” years of service, as well as between the groups “1 – 10” and “21 – 30” years of service.

The results show that “young” workers have higher level of motivation for occupational safety than those whose length of service is ten or twenty years longer.

Statistically significant difference at 0.003 level has been determined between the groups “11 – 20” and “31 - 40” years of service and the groups “21 – 30” and “31 – 40” years of service.

Contrary to the previous result where 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 the group of workers whose length of service is 30 – 40 years is more motivated for improved occupational safety than those in the medium groups. Workers whose length of service is between 11 and 30 years show lower level of motivation for occupational safety.

In the correlation between occupational safety motivation and length of service in chemical industry, taking into account the length of service of workers in the Battery Producer in Sombor, the results obtained did not differ to a great extent. There has been a significant difference at 0.02 level between the groups in which workers have had up to ten years of service in chemical industry and 11–20 years of service group. The
Table 1. The correlation between work motivators and occupational safety motivation.

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Pearson Correlation</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTIVATION</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>EARNINGS</td>
<td></td>
<td>0.270**</td>
</tr>
<tr>
<td>JOB SAFETY</td>
<td></td>
<td>0.207**</td>
</tr>
<tr>
<td>INTERPERSONAL RELATIONSHIPS</td>
<td></td>
<td>0.138**</td>
</tr>
<tr>
<td>PERSONAL NEEDS</td>
<td></td>
<td>0.071</td>
</tr>
<tr>
<td>OCCUPATIONAL SAFETY</td>
<td></td>
<td>0.325**</td>
</tr>
<tr>
<td>WORK STRUCTURE</td>
<td></td>
<td>0.166**</td>
</tr>
<tr>
<td>PARTICIPATION IN DECISION-MAKING</td>
<td></td>
<td>0.203**</td>
</tr>
</tbody>
</table>

** Significant correlation at 0.01 level.

significant difference between the groups “11 – 20” and “21 – 30” years of service in chemical industry is at 0.094 level.

As for the correlation between occupational safety motivation and the educational level of the examinees, Everyone is fond of life, no matter how educated he is. There has been no statistically significant difference between the categories of workers with different educational level and occupational safety motivation.

Examining the correlation between occupational safety motivation and the quantity of safety equipment, considering the number of safety equipment used in the work process, there has been a low negative correlation with occupational safety motivation (p=−0.036).

As for the correlation between occupational safety motivation and the type of safety equipment, the only positive connection between the type of protective measures and occupational safety motivation is the correlation p=0.118, at 0.05 level of significance, in the case of “SAFETY CAPE”.

Regarding the correlation between occupational safety motivation and the usage of safety equipment in production process, there has been a correlation p=0.233, at 0.01 level of significance, between occupational safety motivation and the usage of safety equipment in production process.

In the correlation between occupational safety motivation and work motivators, determining the connection between occupational safety motivation and work motivators, the result is seen in Table 1.

In the table it can be seen that the obtained correlations are statistically significant. What is most important is the
The correlation between occupational safety motivation and the regular use of occupational safety equipment is $p=0.325$.

As for what bothers the workers most at work, the workers who gave an answer to this question said that the following issues bother them most:

1. poor working conditions (frequency = 84 or 23.9%);
2. injustice (frequency = 44 or 12.5%);
3. poor interpersonal relations (frequency = 40 or 11.4%);
4. low salary (frequency = 36 or 10.2%);
5. evaluation system ... (frequency = 34 or 9.7%);
6. employer – employee relationship (frequency = 34 or 9.7%);

Regarding what bothers the workers least at work, the issues that bother the workers least at work are shown in Table 2.

Occupational safety motivation is highly connected to the regular use of the existing safety equipment ($p=0.351$) (Table 3). Workers use protective equipment because they want to and not because they are afraid of control and punishment ($p=0.238$). Occupational safety motivation is also highly connected to the regular use of occupational safety equipment ($p=0.375$).

Conditions in the area of safety, that is safety and occupational health, in Serbia are not rightly met. This is because some employers are unaware of the fact that their employees stand behind profit and good results. Punishment is more common than stimulation of workers in terms of respecting employees’ rights and obligations in the area of occupational safety. Therefore, the results of this study are significant because they show a positive correlation between motivation for occupational safety motivation and regularity in the use of protective equipment.

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

Conclusion

This research has provided the following conclusions:

1. There has been a theoretical contribution to understanding the hierarchy of motives which, in our social conditions and work and occupational safety organization, influences workers’ occupational safety motivation. In the first position of the hierarchy, there is a motive of profit – salary; the second place - safety motive, and the third place - occupational safety motive;
2. Originally designed scale with good metric characteristics for measuring occupational safety motivation can be applied in many areas of productive process and is adaptable to special work characteristics;
3. 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 motivating workers for occupational safety. Those are usually bad working conditions, injustice, bad interpersonal relationships, etc.;
4. Based on the research results, it is possible to apply certain procedures and measures in a more intensive manner, in order to increase the awareness level of the need for occupational safety. This implies safety training and qualifying workers for safe work, improving work organization and working environment, taking care of worker’s “private” issues, stimulating occupational safety (reward or punishment), etc. On the other hand, a practical improvement would be increasing general and personal safety of workers, thus reducing negative consequences of labour such as injuries, occupational illnesses, professional illnesses and invalidity.

The findings of this study provide clear guidelines, according to the obtained motivation level and motivator rank, to persons and teams who have expert positions in occupational safety in the definition and selection of specific measures to increase 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, that is motivation of workers to change their behavior through adopting new work practices related to occupational safety.

Measuring scale for occupational safety motivation is forwarded to colleagues in Croatia, Slovenia and Russia, where similar researches as described in this study are in progress. After obtaining the results of these studies, a comparison will be made to determine the existence of possibilities of their generalization for enterprises that have similar conditions of production.

REFERENCES
Appendix

MEASURING SCALE FOR OCCUPATIONAL HEALTH MOTIVATION

We are doing a scientific research project which requires participation of a certain number of workers. We would kindly ask you to answer the questions from this questionnaire. Your participation is VOLUNTARY and ANONYMOUS. All received data will be used for scientific purposes exclusively. Thank you for your cooperation.

Please do not skip certain questions; answer each question in the order of appearance.

1. Factory (company) where you work _____________________________________

2. Gender (circle one of the answers) female male

3. Age __________ (write in your answer)

4. Years of work experience __________ (write in your answer)

5. How long have you been working in Battery Factory AD in Sombor ______ (write in your answer)

6. Your educational background (circle one of the given answers)
   - Semi–skilled training (SST)
   - Skilled training (ST)
   - Highly skilled training (HST)
   - Secondary school qualifications (SSQ)
   - Post–secondary school qualifications (PSSQ)
   - University education (UE)

7. What is your position in the production process?
   __________________________________________________________________________

8. What bothers you most at work? (note: you can name a number of things you are not satisfied with – as much as you want, but you have to name them in the order starting from “bothers me most” … to “bothers me least”)

   bothers me most __________________________________________________________________________

   bothers me least __________________________________________________________________________

9. There are 7 different stimulations for work. We are interested in how much each of them influences your work enthusiasm. Please provide the answer by circling the number which corresponds to your opinion. →

   1) salary 1 2 3 4 5
   2) job security 1 2 3 4 5
   3) interpersonal relations 1 2 3 4 5
   4) personal needs 1 2 3 4 5
   5) work safety 1 2 3 4 5
   6) work structure (content) 1 2 3 4 5
   7) participation in decision–making 1 2 3 4 5
For questions numbered from 10 to 25 we have named different opinions on the conditions at work places. Your task is to read each of 16 statements carefully and answer to which extent you agree or disagree with each of them. You give your answer by circling one of the grades which mean the following:

1 → I completely disagree with the statement (opinion)
2 → I mainly disagree with the statement (opinion)
3 → I am indecisive, that is, I agree as much as I disagree with. …
4 → I mainly agree with the statement (opinion)
5 → I completely agree with the statement (opinion)

10. I feel a lot safer and better when I use adequate protective equipment.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

11. I give my best for the union and other workers' trade organizations, as well as our company management, to take more care of work safety.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

12. I do not like to use protective equipment at work because they only make work process more difficult.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

13. Good protective equipment contributes a lot to my engagement in the work process.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

14. One of the most important indicators of unselfish and positive care for workers which positively affects the production is an organized use of protective equipment.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

15. Despite using protective equipment, workers still get injured. that is why I use them involuntarily.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

16. I think that the whole story of work safety is only a mask which actually hides the lack of concern for workers.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

17. I strongly wish to use all protective equipment because they largely prevent injuries at work.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

18. Work conditions are such that it is rather ineffective to use protective equipment at work.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

19. All in all, occupational safety is just an empty talk on which a large amount of money is being wasted.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

20. I often gladly speak with my colleagues about occupational safety.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

21. I, as well as many other production workers, pay no attention to the so-called occupational safety – because it really does not exist.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

22. I actively plead for using safety equipment because I think they increase efficiency and productivity.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

23. Occupational safety equipment is so unnecessary and it has negative impact on workers’ engagement.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

24. Whether I use safety equipment or not, it is the same.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

25. One of the most important things at work is occupational health, and safety equipment contributes a lot to it.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

26. Name all safety equipment (measures) that you use.

________________________________________________________________________
________________________________________________________________________

27. Are you equipped with necessary safety equipment needed for doing your job? (circle one of the given answers)

1 – no, not at all
2 – mainly not
3 – partially not, partially yes
4 – mainly yes
5 – yes, completely

28. Safety equipment that you use are: (circle one of the given answers):

1 – completely out–of–date and inadequate to working conditions
2 – mainly out–of–date and inadequate to working conditions
3 – partially out–of–date and partially modernized
4 – mainly modernized and adequate to working conditions
5 – completely modernized and adequate to working conditions

Answer the following 6 questions by circling to which extent the following statements match your behaviour.

29. I regularly use safety equipment → circle one of the given answers.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
30. I often use safety equipment because there are controls and punishments.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

31. I often forget to use safety equipment.

1 – I completely disagree
2 – I mainly disagree
3 – I am indecisive (I agree as much as I disagree)
4 – I mainly agree
5 – I completely agree

32. Do you find protective equipment comfortable?

1 – no, not at all
2 – mainly not
3 – partially not, partially yes
4 – mainly yes
5 – yes, completely

33. Do you usually do your job in a safe manner?

1 – no
2 – mainly not
3 – partially not, partially yes
4 – mainly yes
5 – yes

34. Are you aware of the fact that you are obliged to inform your boss of a malfunction?

1 – no
2 – mainly not
3 – partially not, partially yes
4 – mainly yes
5 – yes

THANK YOU FOR YOUR ATTENTION!