THE VALUE OF THE ASSESSMENT OF OCCUPATIONAL RISKS IN THE SYSTEM OF OCCUPATIONAL SAFETY MANAGEMENT

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The article deals with the assessment of risks associated with safety. A study on the materials of a special assessment of working conditions (SOUT) in the processing industry. The risk factors affecting the health of workers are described.

The calculation of the risk assessment of the impact of classes of working conditions and harmful production factors in the workplace and workers according to a special assessment of working conditions. According to the results of the study and assessment of risks of labor protection revealed that the largest number of jobs and workers are affected by noise and the severity of labor, for which the risk values are among the largest and correspond to high (intolerable) risk.

Recommendations on risk management strategy are given.

Keywords: occupational safety, occupational risk, harmful factors, special assessment of working conditions.

ЗНАЧЕНИЕ ОЦЕНКИ ПРОФЕССИОНАЛЬНЫХ РИСКОВ В СИСТЕМЕ УПРАВЛЕНИЯ ОХРАНОЙ ТРУДА

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Рассмотрены вопросы оценки рисков, связанных с безопасностью труда. Проведено исследование по материалам специальной оценки условий труда (СОУТ) на предприятии перерабатывающей промышленности. Описаны факторы риска, влияющие на состояние здоровья работников. Проведен расчет оценки рисков влияния классов условий труда и вредных производственных факторов на рабочих местах и работников по данным специальной оценки условий труда. По результатам исследования и оценки рисков охраны труда выявлено, что наибольшее количество работников подвергается влиянию факторов, соответствующих классу высокого (непереносимого) риска. Сформулированы рекомендации по стратегии управления рисками.

Ключевые слова: охрана труда, профессиональный риск, вредные факторы, специальная оценка условий труда.

Introduction. There are various methods of assessment of occupational risk from constantly operating factors of production activity, approved by the labor protection norms. They are designed to determine the degree of exposure to harmful factors on health of workers and risk category [1-2]. The occupational health and safety management system has several tools at its disposal to generate the information flows necessary to assess and make decisions on improving working conditions or the acceptability of existing residual risks. Each data collection mechanism is unique in its own way, but not universal, and each has its own drawbacks. Therefore, in these conditions, an integrated approach is needed that would improve the system of assessment of safety and comfort of work. One of the tools (with some limitations) may be occupational risks calculation [3-6].

Problem statement. Basically, occupational risk assessment is carried out only on occupational diseases indicator, which leads to incorrect results. There are good reasons to believe that the official statistics of the identified occupational diseases in Russia do not reflect the real situation, which means that only a small part of the diseases resulting from the impact of production factors is diagnosed and recorded [2, 7-8].

Theoretical part. Risk assessment is usually carried out in accordance with the following stages: hazard identification, exposure assessment, dose — response assessment, risk characterization. Initial data for carrying out occupational risk assessment calculations are results of:

- production control carried out in accordance with SP 1.1.1058-01;

- state sanitary and epidemiological supervision;

- sanitary and epidemiological assessment of production equipment and products for production purposes;

- special assessment of working conditions carried out in accordance with Federal law No. 426-FZ of 28.12.2013.;

- periodic medical examinations of employees carried out in accordance with article 213 of the Labor code of the Russian Federation [9-12].

In the framework of this study, the working conditions at LLC "Mariinsky Distillery" were considered. The work is based on the results of special assessment of working conditions (SAWC) [1-3, 13]. The company has 194 workplaces, which involve 219 people. 32.4% of employees work in hazardous working conditions (working conditions classification (KUT) 3.1 and 3.2).

According to the method [5] we carry out risk calculations.

Calculation of the risk of KUT impact in the workplace

Given:

$N_{общ}$ = 20 workplaces;

$N_{кут\,2.0}$ = 3 workplaces;

$N_{кут\,3.1}$ = 0 workplaces;

$N_{кут\,3.2}$ = 17 workplaces.

Result of calculation:

1. Calculation of SAWC weighting factor on KUT, $К_{вкут i}$:

$$К_{вкут i} = \frac{N_{кут i}}{N_{общ}}, \tag{1}$$

$$К_{в\,2.0} = 3/20 = 0,15,$$
$$К_{в\,3.1} = 0/20 = 0,$$
$$К_{в\,3.2} = 17/20 = 0,85;$$

2. Calculation of the weighted average values of KUT risk impact, $\overline{R_{кут}}$:

$$\overline{R_{кут}} = \sum_{i=1}^{n} К_{вкут i} \times Х_{кут i}, \tag{2}$$

$$\overline{R_{кут}} = 0,15 * 2 + 0,85 * 4 = 3,7;$$

3. Calculation of the additional value of excess of the weighted average value of KUT risk impact, $\overline{\Delta R_{кут}}$:

$$\overline{\Delta R_{кут}} = \frac{\overline{R_{кутпрев}}}{\overline{R}_{кут}}, \tag{3}$$

$$\overline{R_{кутпрев}} = \sum_{i=1}^{n} K_{вкутпрев i} \times Х_{кутпрев i}, \tag{4}$$

$$\overline{R_{кутпрев}} = 0,85 * 4 = 3,4.$$

$$\overline{\Delta R_{кут}} = 3,4 / 3,7 = 0,92;$$

4. Calculation of the total value of the labor safety risk SAWC on KUT:

$$R_{кут} = \overline{R_{кут}} + \overline{\Delta R_{кут}}, \tag{5}$$

$$R_{кут} = 3,7 + 0,92 = 4,62 \text{ (High (intolerable) risk)}.$$

Calculation of the risk of influence of workplace hazards in the wine shop.

Table 1

Initial data for calculation of SAWC occupational safety risks on the types of workplace hazards at workplaces

Workplace hazards	Working conditions classification			Total
	1 and 2	3.1	3.2	
Noise	3	-	17	20
Chemical	7	-	-	7
Srongly fibrogenic aerosols	-	-	-	-
Vibration	-	-	-	-
Non-ionizing radiation	3	-	-	3
Microclimate parameters	14	-	-	14
Light environment parameters	14	-	-	14
Severity of work process	3	14	-	17
Intensity of work process	-	-	-	-

Calculation of weighting coefficient of the influence of noise in the workplace, $К_{вовпфj}$:
$$К_{в\ шум\ 2.0} = 3/20 = 0,15,$$
$$К_{в\ шум\ 3.2} = 17/20 = 0,85.$$

The weighted average calculation of the risk value of the noise effect, $\overline{R_{шум}}$:
$$\overline{R_{шум}} = 0,65 * 2 + 0,28 * 3 + 0,07 * 4 = 2,42 = 0,15*2 + 0,85*4 = 3,7.$$

Additional value of excess of average risk value of noise effect at the workplace, $\overline{\Delta R_{шум}}$:
$$\overline{R_{превшум}} = 0,28 * 3 + 0,07 * 4 = 1,12 = 0,85*4 = 3,4,$$
$$\overline{\Delta R_{шум}} = \frac{1,12}{2,42} = 0,46 = 3,4/3,7 = 0,92.$$

The total value of risk of influence of the noise factor in the workplace:
$$\overline{R_{шум}} = 3,4 + 0,92 = 4,32 - \text{high (intolerable) risk.}$$

Let us calculate risk value of chemical factor influence in the workplace:
$$К_{в\ хим\ 2.0} = 7 / 7 = 1,$$
$$\overline{R_{хим}} = 0,95 * 2 + 0,05 * 3 = 2,05 = 1 * 2 = 2.$$

Total risk value of chemical factor influence in the workplace:
$$\overline{R_{хим}} = 2 \text{ (negligible, tolerable risk).}$$

Risk value of non-ionizing radiation in the workplace:
$$К_{в\ н.и\ 2.0} = 3 / 3 = 1,$$
$$\overline{R_{неии}} = 1 * 2 = 2,$$
$$\overline{R_{неии}} = 2 \text{ (negligible, tolerable risk).}$$

Risk value of microclimate factor influence in the workplace:
$$К_{в\ мк\ 2.0} = 14/14 = 1,$$
$$\overline{R_{мк}} = 1 * 2 = 2,$$
$$R_{мк} = 2 \text{ (negligible, tolerable risk).}$$

Risk value of light environment influence in the workplace:
$$К_{в\ свет\ 2.0} = 14/14 = 1,$$
$$\overline{R_{свет}} = 1 * 2 = 2,$$
$$R_{свет} = 2 \text{ (negligible, tolerable risk).}$$

Risk value of the severity of labor process influence in the workplace:

$$К_{в\;тяж\;2.0} = 3/17 = 0,18,$$
$$К_{в\;тяж\;3.1} = 14/17 = 0,82,$$
$$\overline{R_{тяж}} = 0,18 * 2 + 0,82 * 3 = 2,82,$$
$$\overline{R_{превтяж}} = 0,82 * 3 = 2,46,$$
$$\overline{\Delta R_{тяж}} = 2,46/2,82 = 0,87,$$
$$R_{тяж} = 0,87 + 2,82 = 3,69 \text{ — average (significant) risk.}$$

After calculating the occupational safety risks according to SAWC by types of hazardous and harmful production factors in the workplace, it can be concluded that the total value of occupational safety risks by classes of working conditions is 4.62 (high intolerable risk).

The calculated values of risks according to SAWC in the wine shop are shown in the diagram (Fig. 1).
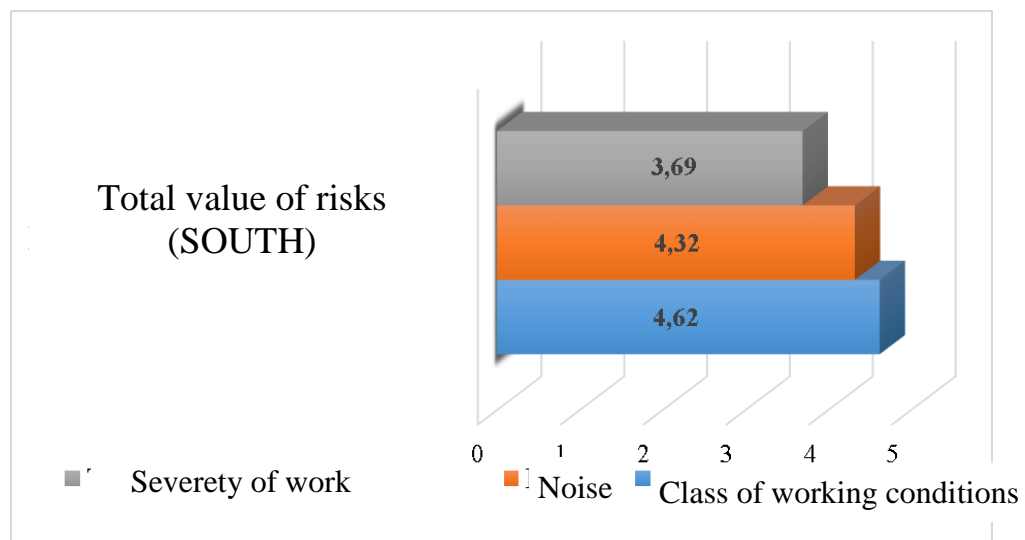

Fig.1 SAWC risk values for the wine shop

Based on the data obtained, it can be concluded that 85 % (17 out of 20) of the employees of the wine shop are exposed to high (intolerable) risk.

Conclusion. By analyzing risk assessment calculations, it can be concluded that the greatest number of employees is affected by noise and the severity of labor (noise — 4.32, the severity of labor — 3.69). The total values of risks (SAWC) for the classes of working conditions — 4.62, which corresponds to a high (intolerable) risk. These data will allow employees and directly the manager (master, shop foreman, etc.) to more often monitor the compliance with labor protection and safety rules in the shop, as well as to carry out measures to prevent professional hearing loss. This will improve working conditions in the wine shop, as well as it will have positive impact on the health and efficiency of workers. When developing recommendations for workplace health and safety risk management, a risk management strategy is needed to reduce risk by developing measures to reduce the impact of noise and the severity of the work process.

The research has revealed the fact that 85% of employees of the wine shop are exposed to the increased risk of noise in the workplace, which is the basis for a more detailed study of the impact of noise on the body and health of workers in order to predict the occurrence of occupational diseases when exposed to noise [14-15].

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