Тематичний напрям № 1

Безпека життєдіяльності в сучасному суспільстві

AN INTEGRATED SYSTEM OF A WORKPLACE SAFETY ESTIMATION

Protasenko O.F.,
Ph.D., Associate Professor
Simon Kuznets Kharkov National University of Economics
Vovk T.O.,
an applicant for higher education in speciality 051 "Economics"
Simon Kuznets Kharkov National University of Economics

Today, the human role as unsub of labour is constantly growing. The human has a huge responsibility for the efficient operation and safety of the technical system, and his mistake can lead to accidents and catastrophes. The main reason for this is the human factor, so the problem of improving work safety remains relevant. In this case, an important role has the system of a workplace safety estimation, which allows identifying the most dangerous factors of the employee's activity; and on this basis to develop effective measures and means to prevent them.

Today, there are many methods for workplace safety estimation. However, they are not integrated, so, do not allow to take into account the three main components that ensure the required level of human safety:

– advances in technology (application of new types of equipment in the workplace);

– features of the work process organisation (duration of work shift, work monotony, psycho-emotional stress, etc.);

– employee’s characteristics (temperament type, character traits, anthropometric features, etc.).

Usually, attention is focused on one or two of these components, and others are formally taken into account, which reduces the quality of the estimation. Therefore, to increase employee safety, it is crucial to find new approaches to estimating the safety of employee’s workplace.

The most used method for workplace safety estimation is certification of workplaces under working conditions. Workplace certification provides:

– identification of harmful and dangerous factors and causes of unfavourable working conditions;

– sanitary and hygienic research of the production environment factors, the severity and intensity of the labour process in the workplace;

– definition and implementation of technical and organisational measures aimed at optimising the conditions and character of work, etc.

Disadvantages of this workplace safety evaluation system:

– selectivity of results, as certification is carried out only for work "with particularly harmful and difficult working conditions" or "with harmful and difficult working conditions";

– in most cases, the certification commission does not include employees who have practical experience and understanding of the character and consequences of the impact of hazardous factors of the production process;

– the final results of the certification are used mainly to determine the size of allowances and pensions; the comfort and safety of the employee are peripheral.

Ergonomic methods of workplace estimation are widely used [1]. The advantages of such an estimation system are:

– experts evaluate psychophysiological, physiological, morphological and biomechanical characteristics of the employee;

– the nomenklatura of system indicators is open; so, it can be supplemented with new indicators. It makes the system flexible.

An integrated approach, typical for ergonomics, allows getting a comprehensive picture of the labour process, which helps to increase human safety. However, the estimation system has disadvantages:

– the assessment takes a long time (usually from a few days to a few weeks); so it is carried out infrequently, which reduces the effectiveness of operational safety management in the workplace;

– the performance of such work requires the invitation of specialists in ergonomics without directly involving employees.

In recent years, various occupational and industrial risk estimation methods have been used to assess workplace safety. These methods include the Elmery system, the Fine-Kinney method, workplace risk assessment (according to Mervy Murtonen technology) and others [2, 3]. The main idea of hese systems is to identify existing hazards in the workplace and determine the risk magnitude of their occurrence. Based on the results of risk estimation, can be developed and implemented measures to manage them. Thus, we can conduct systematic work to improve working conditions and improve safety in the workplace, as well as ensure the professional health of staff.

Thus, the aim is to develop an integrated system of workplace safety estimation.

To achieve this goal, among the existing methods of workplace safety estimation, we will explore in detail those that can be used to develop an integrated system of workplace safety estimation, namely, the Elmery system, the Fine-Kinney method and the ergonomic assessment system.

The Elmery system is a reliable system for monitoring occupational safety in the industry [2]. This system was developed by the Finnish Institute of Occupational Health and

the Office of Occupational Safety and Health at the Ministry of Social Security and Health of Finland. The Elmery system is tested at many enterprises of various profiles. Therefore, it can be used in any industry. The Elmery system is based on observations that cover the essential components of occupational safety: the use of protective equipment, order in the workplace, safety under working with equipment, occupational health and ergonomics. The system is a means by which the company can identify opportunities to improve occupational safety and identify hazards.

A significant disadvantage of the system is that all factors, which affect occupational safety, are considered equivalent. This moment is contradictory because at any workplace there is always a differentiation of factors that affect the employee during the work to more or less significant, which, in turn, affects the prioritisation of measures to improve safety.

The Fine and Kinney method is used to estimate occupational risk. The method is based on a combination of the danger influence degree, the probability of danger realization at the workplace and the consequences for the health or safety of workers if the danger occurs [3]. Based on the estimation, risks are formed into a structured system in the form of a matrix, which considers all components of risk. Further, professional risk maps are formed. These are matrix maps with which employees can independently assess risks and take the necessary actions to ensure their safety. The disadvantage of the Fine-Kinney method is the significant subjectivity of the estimation results, as the employee carries out all operations by himself. Thus, the employee relies on his experience during the estimation of factors that affect him. However, the experience is not always sufficient to choose the most effective means of protection against dangers.

The ergonomic estimation system determines the characteristics of the workplace, which are brought together to a table, and are described quantitatively using ergonomic indicators [1]. The main disadvantage of the ergonomic estimation system is that the choice of employees' protection equipment is based primarily on the opinion of invited ergonomics specialists or safety auditors, and the employee opinion is not always considered.

Each of these methods has advantages and disadvantages. However, to achieve the goal, it is necessary to combine them into an integrated estimation system. What is mean? We should take several elements in each method and apply them to create an integrated system of workplace safety estimation.

The fundamental element should be the ergonomic estimation system, as the range of indicators used for ergonomic assessment is open. Additional elements in this system should be elements from the questionnaire used in the Elmery method. In addition, except for the ergonomic indicators, it is necessary to add components for assessing individual risk using the Fine-Kinney method, which will increase the accuracy of the final estimation of workplace safety [4]. In summary, an integrated system of workplace safety estimation can be represented as follows (Fig. 1).

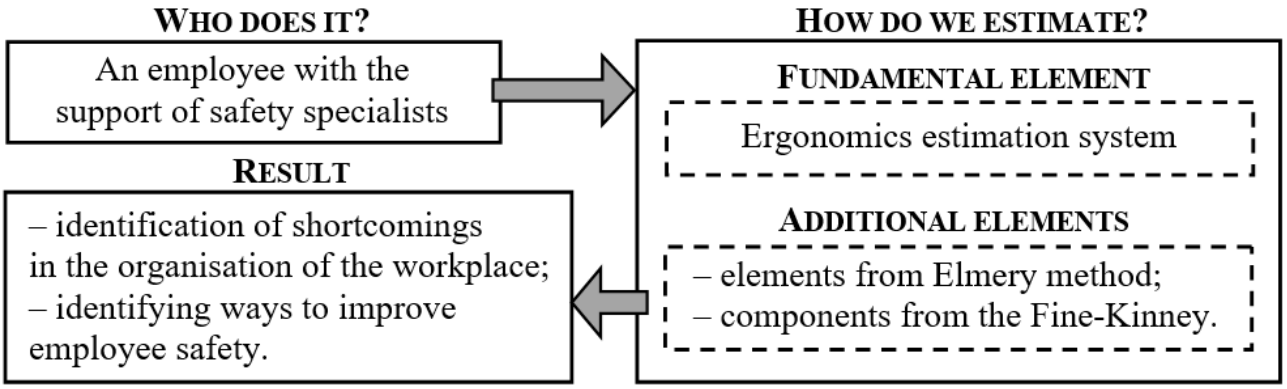

Fig. 1. Scheme of an integrated system of workplace safety estimation

An integrated system of workplace safety estimation was tested at the following workplaces:

– bank branch operators;

– employees of the personnel and accounting department of several enterprises.

Workplace safety estimation showed the following results:

– firstly, an integrated system of workplace safety estimation expanded the list of workplace characteristics;

– secondly, the use of ergonomic indicators and components of occupational risk allowed not only to determine the negative characteristics of the workplace and working conditions but also to estimate their importance for employee safety, i.e. to determine the sequence of measures to improve safety;

– thirdly, the estimation of workplace safety was conducted directly by the employee but with the participation of occupational safety specialists. This fact is important because, unlike external experts, the employee knows his activities and workplace from a practical point of view and not only from a theoretical point of view. However, he may have some hardships in the estimation, which is usually associated with a lack of professional experience.

Thus, the research results of the advantages and disadvantages of the Elmery system, the Fine-Kinney method and ergonomic estimation system showed that it is necessary to take the following informative components of these systems to create an integrated system of workplace safety estimation:

– from the system of ergonomic estimation is the table with the workplace characteristics;

– from the Elmery system is items from the questionnaire, which supplemented the table with the workplace characteristics, which expanded its informativeness;

– from the Fine-Kinney method is the principle of determining occupational risk, the application of which made it possible to identify the priority of safety measures and tools.

The combination of these components allowed us to take a step forward in increasing the informativeness of the results of workplace safety estimation. Practical testing of the integrated system of workplace safety estimation gave positive results.

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