

Considerations on Prevention and Protections Measures Against Occupational Risks

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Abstract. A general trend, manifested at the European and international level, is to promote the use of scientific methods in preventive activity, both in terms of the design of work security measures, and the motivation of employers for the application of these measures. The argument to which any entrepreneur reacts positively is profit. As a result, prevention specialists have tried to demonstrate that efforts to reduce the number of occupational accidents and illnesses ultimately bring financial benefits to the company. The paper presents the classification, prioritization and distribution of prevention and protection measures on the 4 components of the work system: the worker, the workload, the means of production, the work environment. Also, a case study on taking measures for a job is presented.

Keywords: *occupational safety and health, prevention and protection measures, identification of professional risks, assessment of risks*

1.Introduction

Protection at the workplace aims to improve working conditions and prevent work accidents and occupational diseases. Consequently, Community legislation requires Member States to adopt measures to compel employers to create safe and healthy working conditions. The way in which the European Union seeks to achieve social objectives in the field of work is the tripartite consensus: legislator - employer - employees. For dialogue to be fruitful, appropriate arguments are needed for all parties involved.

According to the International Labour Organization (ILO), work-related accidents are still far too frequently. Globally, work-related mortality accounts for 5% of all deaths; but this percentage has increased dramatically in last few years due to the COVID-19 pandemic. However, in the context of COVID-19, new requirements on the labour market, such as remote working, appropriate protective measures and the appropriate use of personal protective equipment when physical presence cannot be avoided, require new approaches to ensure health and safety. The modern approach to preventive activity, which requires its organization according to the principles of scientific management, as well as the integration of occupational safety management into the general management of industrial organizations, necessarily requires the design of tools to measure the economic efficiency of preventive

activity [4]. Directive 89/391/EEC regarding the implementation of measures aimed at improving the safety and health at work of workers clearly establishes the relationship between the risks of occupational injury and disease and preventive measures, as well as the obligations of employers in this regard. [16]. The employer must ensure that a risk assessment is carried out for the safety and health of workers, including regarding the choice of technical equipment, chemical substances or preparations and the layout of workplaces. Evaluation is one of the fundamental principles of prevention. It is a fundamental element for the companies preventive strategy, because based on its results, the employer can establish those measures that must be implemented to guarantee the improvement of the level of protection of workers' safety and health.

Specifically, the Directive establishes the following essential elements for the foundation of prevention programs:

- the achievement of safety at work requires the completion of two mandatory stages:
 - assessing risks for the security and health of employees and identifying those that cannot be avoided;
 - establishing, based on the assessment, preventive measures appropriate to the risks that cannot be avoided;
- the adopted measures must ensure a better level of protection of safety and health at work;
- the measures for occupational safety and health of workers must cover all activities and all organizational levels, including situations where employees from several companies work in the same unit. [4, 16].

The development of a Prevention and Protection Plan must start from establishing workplace risks, estimating their size and establishing the necessary steps to control them.

The psychological and mental state of workers is of particular importance, even decisive for the productivity and economic results of companies. It is directly influenced by the psychosocial climate provided by appropriate measures. Signs of an appropriate climate are low absenteeism, tolerance for conflict and uncertainty, a reasonable fluctuation. They are favoured by the positive motivation of the workers, by the ability of the organization to ensure good working conditions, by good management.

2.Method

The general methodology is complex [1,11,12] and includes two main stages:

- A. Assessing the risks of occupational injury and illness through an assessment method that complies with the requirements of the legislation; the assessment will be carried out on the four components of the work system - means of production, work load, work environment and worker.

In our country, the most known and used evaluation method is the INCDPM ALEXANDRU DARABONT method [12]. Other methods used: the ENDESA method [11], the EVA-RISK method [1] - is a new method, developed in the doctoral thesis by the doctoral student Eduard Smidu.

Below we present the evaluation stages for the three methods in comparison:

- ALEXANDRU DARABONT METHOD has the next stages:
 - description of the system to be analysed: in this stage a detailed analysis of the workplace is carried out, aiming at: the identification and description of the components of the system and its mode of operation: the description of the technological process, of the work operations, the machines and equipment used, functional parameters and characteristics , tools etc.; the express specification of the task assigned to the executor in the system (on the basis of the job description, written orders and decisions, verbal instructions currently given, etc.); description of existing environmental conditions; specifying the security requirements for each component of the system, based on work security norms and standards, as well as other relevant normative acts
 - identification of risk factors in the system: in this stage, essential for the quality of the analysis, it is established for each component of the evaluated work system (respectively workplace), based on the pre-established list, which dysfunctions it may present, in all foreseeable and probable situations operating.

- assessment of occupational injury and illness risks: quantification of severity, probability and partial level of risk; calculation of the global level of risk.

- the ranking of risks and the establishment of prevention priorities;

- proposing preventive measures.

- ENDESA METHOD has the next stages [11]:

-analysis of the work system highlighting the 4 components: work load, means of production, work environment, executor

- identification of risk factors in the system: definition of risk agents (29);

-defining the types of installations; defining the types of activities; identification of inherent risk agents for each type of facility: (defined as "General", if the person does not perform any activity; for each type of activity);

- generating the risk matrix;

- assessment of occupational injury and illness risks:

a. risk identified in the work area at each work station (from the applicable risk matrix)

b. application of ENDESA questionnaires to relevant samples from each work area (one for each factor)

c. definition of frequency and exposure time definition of exposure time

d. defining the probability of the materialization of the risk and defining the consequences of the materialization of the risk

e. risk assessment by loading on each work station/work station positions

f. ranking risks and establishing prevention priorities;

g. proposing preventive measures.

- application of preventive measures

- intervention on the positions if necessary to apply additional measures to the respective positions.

- reducing the risk to an acceptable level

- Compared to the 2 methods presented above, the EVA-RISK METHOD has the following stages:

- work is done in the electronic application from the Excel program, in five worksheets

- in the description worksheet, the Evaluation of occupational injury and disease risks of the workplace, the entity, the evaluation date is presented; a brief description of the entity in which the assessment of occupational injury and illness risks is carried out; the identification data of the workplace, the purpose of the activity and its 4 elements are presented: the means of production, the work load, the work environment, the worker; each component of the work system is described;

- in the risk identification worksheet, based on the 2 checklists, classic risk factors as well as new and emerging ones are identified, using specific Excel functions; the factors and are filtered; it is copied in the risk assessment worksheet, in the assessment sheet, which includes the assessment team component, with at least 2 assessors; working time; the identified professional risks; the severity class of the consequence and the probability class of the consequence, established by data validation, the risk level being generated automatically as well as the general risk level of the workplace; the proposed measures are completed - mitigation and elimination systems, the deadline for the implementation of the measures and the person responsible for the implementation of the measures; in the following worksheet, 4 graphs are generated with the evaluation analysis

- the last worksheet presents the job evaluation report.

Five risk levels are quantified in the EVA-RISK method, 7 risk levels are quantified in the INCDPM and 5 risk levels are quantified in the ENDESA method (Table 1):

Table 1

EVA-RISK risk level		INCDPM risk level		ENDESA risk level	
1	Minimum	1	Minimum	5	Insignificant
2	Low	2	Verz low	4	Tolerable
3	Medium	3	Low	3	Moderate
4	High	4	Medium	2	Important

5	Very high	5	High	1	Intolerable
		6	Very high		
		7	Maximum		

Although they are so different, the three methods have the following points in common:

- they are based on a matrix that includes the place/facility where the activity is carried out;
- take into account the 4 elements of the work system, namely the worker, the work load, the means of production, the work environment.
- the basic steps are the same: identification of risk factors in the system; risk assessment; proposing preventive measures.

B. Establishing prevention and protection measures for each identified risk factor

Preventive measures are taken into account in the following hierarchical order [12]:

1. Eliminating risks - measures must act directly on the source of the risk factors (intrinsic prevention)
2. Isolation of risks - collective protection measures that avoid or reduce the action on workers of risk factors that persist
3. Risk avoidance - organizational measures and regulations that avoid the interaction between risk factors and humans
4. Isolation of workers - measures by which the action of risk factors is limited through individual protection

Even if all the proposed preventive measures are taken, there are risk factors that cannot be eliminated, called residual risk factors in the specialized literature. These risk factors can be kept under control through organizational measures [12].

Statistics show that most accidents are related to non-compliance with OSH instructions. As a result, there is a need to put more emphasis on the professional training of workers for the formation of the safety culture at the workplace and the awareness of the risks to which they are exposed if they do not respect the work procedures.

3. Results and discussion

In the EVA-RISK method, the evaluation sheet is a form made up of 2 parts [1], (Fig. 1.):

- the actual assessment of professional risks, the left half, yellow (L_r - level of job risk - is a weighted average of the levels of risk factors identified for a job; L_p - level of risk of the risk factor - is given by the probability and severity; S – severity; P – probability).
- the mitigation-elimination system consisting of:
 - the proposed prevention measures, the time of implementation of the measures and the responsible persons, the right half, in green. In this part, technical, organizational, sanitary and other measures are taken; measures are also taken such as monitoring the conditions of the workplace, training employees in safety and health issues, measures regarding the provision of first aid in case of medical emergencies - medical kits, training.
 - the deadline for the implementation of the measures - depending on the situation, it can be monthly, quarterly, semi-annually, annually or x days after the risk assessment
 - the person responsible for taking the measure within the set deadline can be the worker, the workplace manager, the employer, the Prevention and Protection Service, other departments.

	A	B	C	D	E	F	G	H	I	J	K
3	ECONOMIC UNIT	ASSESSMENT SHEET Lr	WORKING TIME								
4	DEPARTMENT		ASSESSMENT TEAM: Risk Assessors OSH Responsible Worker Occupational Medicine Doctor								
5	WORK PLACE										
6	1	2	3	4	5	6	7	8	9	10	11
7	COMPONENTS OF THE WORK SYSTEM	RISK FACTORS	S	P	L _r	PROPOSED MEASURES				DEADLINE	RESPONSIBLE
8						technical measures	organizational measures	sanitary measures	other measures		
9	MEANS OF PRODUCTIONS										
10											
11	WORK ENVIRONMENT										
12											
13											
14	WORK TASK										
15											
16	WORKER										
17											

Figure. 1 - Evaluation sheet

This type of sheet was created in order to help OSH specialists to quickly complete the Prevention and Protection Plan, the left side of this form contains practical elements of the prevention plan - the green part. The Prevention and Protection Plan is imposed by Law 319/2006 and more precisely, by the Methodological Norms for the application of this law, in art. 15, paragraph 2, which establish the format of this plan. It is prepared annually and can be modified at any time, taking into account the events that take place during the current year.

Below are the prevention and protection measures for the OCCUPATIONAL MEDICINE PHYSICIAN workplace, which were established following the assessment of occupational injury and illness risks using the EVA-RISK assessment method.

38 risk factors were identified for which 56 preventive measures were proposed, as follows:

- 39.29% measures for the risk factors specific to the means of production
- 35.71% measures for risk factors specific to the work environment
- 10.72% measures for the risk factors specific to the work load
- 14.28% measures for the worker's own risk factors

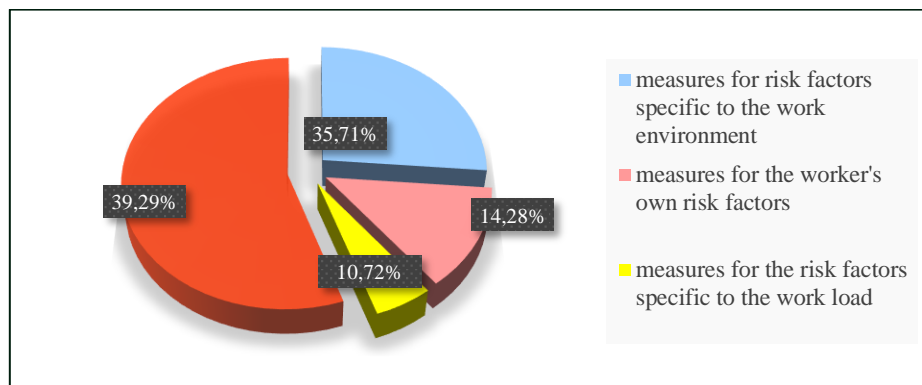


Figure 2 - Distribution of prevention and protection measures

The risk factor specific to the medical field for which most prevention and protection measures have been proposed is *Contamination with biological agents*

- *airborne, groups 2 and 3*: bacteria (*Chlamydia pneumoniae*, *Mycobacterium tuberculosis*, etc.), viruses (*Cytomegalovirus*, *Herpesvirus varicella-zoster*, etc.), fungus (*Aspergillus fumigatus*, etc.)
- *from blood and other contaminated bodily fluids group 2 and 3*: bacteria (*Streptococcus pyogenes*, *Salmonella typhi*), viruses (*Epstein-Barr virus*, *Hepatitis B virus*), parasites (*Ancylostoma duodenale*, *Echinococcus granulosus*)

The 10 prevention and protection measures necessary to mitigate/eliminate this risk are:

- correct use of personal protective equipment (mask, disposable protective gloves, etc.)
- carrying out vaccinations to prevent certain diseases
- performing medical control and supervising the health of doctors
- control regarding the way in which prevention and protection measures are respected
- the development of own security instructions regarding the establishment of biological risk prevention and control methods
- the use of special safety containers to store used hypodermic needles and scalpels until their disposal
- avoiding agglomeration of work spaces
- repeated washing of hands and other exposed skin surfaces that could come into contact with biological fluids
- the work space and the objects necessary for the activity will be regularly disinfected.

According to the legislation in force, the measures for the analyzed workplace - OCCUPATIONAL MEDICINE PHYSICIAN are presented in the Prevention and Protection Plan of the medical clinic. The plan accurately contains the measures for each risk factor, the deadline for the implementation of each measure, the persons and/or departments responsible. The plan is drawn up based on the identification and assessment of occupational risks and is finally approved by the employer, the OSH specialists and the employee representatives. Planul se întocmește pe baza identificării și evaluării riscurilor profesionale și în final este aprobat deopotrivă de angajator, specialiștii SSM și reprezentanții angajaților.

4 Conclusions and perspectives

From the considerations presented, the methods for assessing the risks of occupational injury and disease propose most of the times that the prioritization of taking preventive and protective measures should be done according to the level of risk, the risk factors with the highest level of risk have priority. In practice, employers analyse first the cost-benefit relationship for each measure and then establish the order in which the measures proposed in the evaluation are taken. According to the legislation in force, the Prevention and Protection Plan, prepared annually by the OSH specialists, contains exactly the measures that will be taken in the economic unit. The Plan is drawn up based on the identification and assessment of professional risks for each workplace and is finally approved by the employer, OSH specialists and employee representatives.

In addition to preventive and protective measures, we recommend increasing the workers ability to manage dangerous situations and emergency situations. It is also necessary to develop a safety and health culture at the workplace and to be aware of the risks to which workers are exposed through:

- organizing workshops for managers, in which will be presented practical information on how safety and health at work can be improved;
- teambuilding exercises through which people are encouraged to tell the problems they have and to propose solutions;
- increasing the degree of awareness of the dangers to which they are exposed by developing and presenting materials (e.g. posters) and thematic films that induce a state of emotion and implicitly an increase in their responsibility.

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