

PROPOSITION OF A METHOD OF VERIFICATION OCCUPATIONAL RISK ASSESSMENT

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Purpose: The aim of this article is to propose a method allowing for an objective verification method of prepared occupational risk assessment in companies.

Design/methodology/approach: The methodology of presented method consists from two steps including hazards checking according to presented unified template and counting the result of the indicator of verification according to prepared indicators presented in this article.

Findings: Proposal of method included in this article allows to ease leading the process of verification occupational risk assessment thanks to standardized way of verification process.

Practical implications: Application of the proposed method as the basic internal audit or inspection tool in the area of occupational risk management for checking propriety of functioning risk assessment in organizations.

Originality/value: Unique method of verification prepared risk assessment results.

Keywords: risk assessment, hse audits, risk assessment process.

Category of the paper: Conceptual paper.

1. Introduction

Providing safe and hygienic working conditions is the main obligation of every employer. This obligation is laid down in the most important legal act of the Republic of Poland, confirmed in article of number 66 of the Republic of Poland Constitution. Giving such a high priority to occupational health and safety issues means, that the right to work safely is one of the fundamental and inalienable rights of every employee. In addition to the official confirmation of this inalienable right, the legal system in the field of labor law in Poland regulates certain obligations, the implementation of which by the employer is to guarantee the health and life protection of employees. One of the legally required obligations of the employer is to provide information on health and life hazards occurring in the workplace, at individual workplaces and during the work performed, as well as on protective and preventive measures taken to eliminate these risks.

Besides the above facts, the employer is obliged to assess the occupational risks related to the work performed, inform employees about this risks and apply preventive measures reducing this risks. At this point, it should be noted that an incomplete (deficiencies in important components) or, even worse, an incorrectly prepared assessment may disturb the proper information process by misleading the employee and indirectly cause an accident at work.

At present time there is no objective method of verifying the correctness of the occupational risk assessment, which can be used by supervisors, internal health and safety audits or country inspectors. This makes the problem which causes in the field of verifications some gaps, which can make some problems with proper management of risk assessment. The objective method should be clearly used in order to check if the assessment is prepared well and it may be also used as an additional method of proper identification process of hazards and risks.

The process of occupational risk assessment itself should include five steps, the last of which is periodic verification of the occupational risk assessment. Periodic verification may cause the need of update the risk assessment but not always has to. Presented method is aimed only on verification process and allows to indicate the need of updating risk assessment and may help to identify properly the hazards and risks as well.

2. Management of risk assessment

2.1. Hazards during risk assessment process

Occupational risk is defined as the probability of occurrence of undesirable work-related events causing losses, in particular the occurrence of adverse health effects in employees as a result of occupational hazards occurring in the work environment or the manner of performing work.

An inseparable element of any occupational risk assessment is the identification of hazards. The concept of a hazard is understood as a working environment that may cause an accident or illnesses.

According to Polish law, hazards are divided into physical, chemical, biological hazards. Additionally, there is possibility to involve fourth category of hazards called psychophysical. They constitute the conditions of the working environment, understood as the conditions of the working place in which the work process is made. Additional to the environmental conditions, there is needed to point that hazards of the work environment causing the risk of accident or illnesses are classified as dangerous, harmful or nuisance. Distinguishing each of the factors of the material work environment is important for the proper identification of these factors for the purposes of occupational risk assessment.

A hazardous factor is a factor whose impact on a worker may lead to an injury. A harmful factor is a factor which influence on a worker can lead to an illness. On the other hand, a nuisance factor is a factor which influence on the worker may cause malaise or excessive fatigue without leading to a permanent deterioration of human health. Each group of hazards contains factors that characterize a given group.

The developed occupational risk assessment should be documented. When documenting the occupational risk assessment, it should be remembered that its content as a document is strictly defined and must include the following minimum requirements in its structure:

- description of the assessed workstation, including the specification of the machines, tools and materials used, the tasks performed, hazardous, harmful and nuisance factors in the work environment, collective and individual protections against hazards used and people working in this position;
- results of the occupational risk assessment for each of the work environment factors and the necessary preventive measures to reduce the risk;
- the date of the assessment and the assessors team.

2.2. Necessary steps which are needed to follow during risk assessment

The formal process of occupational risk assessment can be included in five steps. The first step is to identify the kind of work (and workplace) to be assessed. The workplace is understood as the working space, along with the equipment and objects of work, in which an employee or a team of employees performs work. The following workplaces can be distinguished:

- single-workplace position with constant working conditions,
- single-workplace position with variable working conditions,
- multi-workplace position with constant working conditions,
- multi-workplace position with variable working conditions.

Single-workplace positions with constant working conditions are those in which employees perform the same, repetitive activities. An example of such a position is a milling station in a large workplace, to which items are delivered for processing. The milling cutter is constantly exposed to the same risks during its work (Romanowska-Słomka, and Słomka, 2008).

Single-workplace positions with variable working conditions are those in which employees perform the same activities, but working conditions change periodically. Changing working conditions can be the result of a mobile workplace, weather conditions and progress of the work. An example of such a position is the position of a bricklayer performing bricklaying works on a construction site (Romanowska-Słomka, and Słomka, 2008).

Multi-workplace positions with constant working conditions are those where employees perform the same activities periodically for different conditions. Such a situation may take place in small workplaces. An employee who is, e.g. a turner, periodically performs activities in other professions for various reasons. He often has to prepare the blanks himself for machining on a lathe. Takes the roller from the warehouse or storage yard and transports it to the saw –

performs the activities of a transport worker; cuts the required shaft element on the frame saw – performs the activities of the saw operator; turns the cut-off element on a lathe – performs the activities of a turner (Romanowska-Słomka, and Słomka, 2008).

Multi-professional workplaces with variable working conditions are those where repetitive work is performed for various professions in changing working conditions. An example of such work organization may be work in a company, usually small, performing finishing and furnishing works in the construction industry. The employee may perform depending on periodic needs, e.g. window fitting, plastering plaster or painting rooms. In addition, depending on the facility, these works can be carried out under different conditions. Embedding windows can take place in a one-story and multi-store building. Depending on the conditions, it is exposed to other threats (Romanowska-Słomka, and Słomka, 2008).

The second step is to identify the hazards presented at the workplace. Identification can be made using generally accepted methods of hazard identification, that is:

- checklists, including sets of questions relating to the examined fact, phenomenon or process in order to check the actual state with the required pattern (e.g. a legal act, procedure, instruction),
- analysis of documents relating to the threat, consisting in the analysis of all documents constituting a source of information on the basis of which judgments about facts, phenomena or processes can be made,
- observations, through intentional, planned and systematic perception as well as collection and analysis of facts, phenomena or processes,
- surveys, including verbal data collection as a result of interviews with employees,
- surveys, consisting in an organized method of obtaining information using a form,
- interviews, i.e. conducting a planned and organized conversation,
- brainstorming.

The third step is to assess the existing threats in terms of the probability of their occurrence and their potential effects, along with the indication of preventive methods that will minimize the risk of an accident at work or an occupational illnesses. Risk assessment is performed with the use of occupational risk assessment methods, which are divided into estimation methods and advanced methods.

The fourth step is the formal documentation of the occupational risk assessment in accordance with the legal requirements in force in Poland which include:

- description of workplace,
- results of risk assessment with protection methods,
- the date of preparation and a team taking part in the risk assessment process.

Documentation of risk assessment should not cover only pointing hazards, but must include the description of hazards.

The fifth step is to review it periodically. This review is equated with the updating or verification of the occupational risk assessment. The review should take place as part of internal controls in the area of health and safety or internal audits in the field of health and safety management. The concepts of updating and verification should be clearly distinguished and appropriate methods should be used for a specific activity. In this step, however, there is a gap in the frequency, necessity and method of verifying the occupational risk assessment. It should also be mentioned that the concepts of verification and updating of the occupational risk assessment are used improperly, although they are used equally.

3. Risk assessment review

As mentioned above, the concept of occupational risk assessment review include two concepts related to appropriate occupational risk assessment review – the concept of update and the concept of verification.

The concepts of verification and updating of occupational risk are often used unambiguously, while in terms of the appropriate process of occupational risk management, they should be clearly distinguished. Updating refers to adjusting something to prevailing, current standards or conditions. The concept of verification means checking the truthfulness, suitability or correctness of something. When we talk about updating the occupational risk assessment, there is possibility to gain informations about requirement concerning the update. In terms of verification, on the other hand, a gap can be observed in the way of verification of the assessment due to the lack of guidelines regarding the control of its correctness. In other words, there is no method that would allow to verify the correctness of the obtained results of which are presented in risk assessment documentation.

3.1. Risk assessment updating

Polish law do not specify the requirements for the need to review the occupational risk assessment. More informations about the need of update the risk assessment we can find in the Polish Standard PN-N 18002:2011: Occupational health and safety management systems – General guidelines for occupational risk assessment. The standard, which is not obliged to follow, indicates "good practices" in the field of occupational risk management. This standard determinates the cases that should result in updating occupational risk assessment document. Therefore, the cases constituting good practice in occupational risk management and its updating include:

- introducing changes at work positions (e.g. technological or organizational),
- changes in the applicable requirements relating to the assessed workstations,
- a statement that the protective measures in place are not sufficiently effective in the light of new information available about them,
- determining the need to make changes to the applied protective measures.

In terms of the professional practice, the following situations can be additionally specified, where there is the need of update of the occupational risk assessment. These situations include cases related to undesirable situations taking place at workplaces, with the proviso that the occurrence of a given type of case will not always require updating the assessment, but only confirmation of its verification e.g.:

- an accident at work,
- occupational or para-occupational disease,
- occurrence (if such a solution is introduced in the workplace) of near misses or identification of a new hazard or occurrence of an event related to a specific material loss.

Obviously, the above catalog is not a closed catalog, but only guidelines which indicate the need of the update the occupational risk assessment.

3.2. Risk assessment verification

The verification of the occupational risk assessment should be treated as an individual process during the occupational risk management review. Verification of the occupational risk assessment is obligatory at workplaces that have a formalized occupational health and safety management system in place.

The situation is different when the workplace does not have a formal health and safety management system implemented. It should be noted here that such a situation may take place both when a health and safety department is established in the workplace and when the tasks of the health and safety department are performed by the employer, a designated employee or a specialist provided by outsourcing.

As mentioned earlier, at present time there are no guidelines on how to check the reliability of the obtained results of the occupational risk assessment. The method presented below is a guideline for all persons involved in the risk assessment process, which will enable it to verify the correctness of the results of the occupational risk assessment.

4. The method of verification occupational risk assessment

4.1. Methodology

Presented method uses comparative elements derived from an objective template and assigning weight indicators to a given hazards combining with its potential effects. The results prepared in this way are the basis for verifying the correctness of the occupational risk assessment. In other words, we need only two steps in order to verify occupational risk assessment.

First step is comparison documented hazards defined in risk assessment with the template presented in this article and with assigned indicators. Of course, some hazards pointed in risk assessment document may differ from presented template. When the situation will appear, a verifier must choose the closest hazard to described in the risk assessment document (very helpful is using the description of potential negative results of the hazards – table 2). Indicators are divided according to potential danger caused by hazards and the duration of exposition of the hazards. Second step is the requirement to count the indicator of verification according to simple formula:

$$I = R \times D$$

where:

I – indicator of verification,

R – indicator of potential negative results,

D – indicator of duration of the hazards.

Given result will inform about the propriety of prepared occupational risk assessment.

4.2. Templates and indicators

The tables below present indicators which are obliged to use in order to receive the result of indicator of verification. Beside the numbers, for easier use, they represent description of potential negative results and the expositions of hazards influencing on workers which are dependent on the length of worker shift (Table 2 and Table 3).

Table 2.

Indicators depending on the negative results (R) of unified hazards, assigned to template of hazards

Item	Potential negative results	Indicator
1	First aid, injuries without the need of visiting a doctor	1
2	Individual accident required a visit to a doctor, occupational or para-occupational illnesses, sick leave caused by some hazard	2
3	Serious accident, accident with two workers (at least), cancerogenic potential of some hazards	3
4	Death because of accident or disease	4

Table 3.*Indicators depending on duration of the hazards (D)*

Item	Length of a day shift	Indicator
1	Less than 2 hours	1
2	Between 2 and 4 hours	2
3	Between 4 and 8 hours	3
4	More than 8 hours	4

Next step of presenting the assumption of the method is the template of unified hazards required to choose for proper verification of a risk assessment (Table 4).

Table 4.*The template of unified hazards required to be chosen for proper verification with assigned indicators*

Item	Factors and consisting hazards	Indicator
1	Physical hazardous factors	
	Moving parts of machines:	
	- a highly risk machines	4
	- a multi-operators machines	4
	- a machines with the need of coming inside to them	4
	- a power tools, especially designed for hard work (cutting, drilling, grinding and so on)	3
	- a power tools designed for general work (housekeeping, cleaning and so on)	2
	- caught between	3
	Electricity	
	- work near or even under voltage	4
	- every contact with electrical equipment	2
	Sharp edges	2
	Uneven and slippery surfaces	2
	Fire	
	- work with open flames	2
	- supposed situations of potential fire	1
	Explosion	
	- work in the zones with the danger of explosion	3
	- work with gas containers	2
	- electrostatic	3
	Thermal	2
	Moving vehicles, machines	4
	Falling objects	
	- falling objects up to 2 m height	2
	- falling objects falling above 2 m height	4
	Pressure	2
	Stationary objects	1
	Faulty equipment	2
	Working at height	
	- up to 2 meters	2
	- above 2 meters	4
	Confined space	3

Cont. table 2.

2	Physical harmful and nuisance factors	
	Noise	
	- above 0,5 the highest acceptable intensity	3
	- between 0,2-0,5 the highest acceptable intensity	2
	- less than 0,2 the highest acceptable intensity	1
	Vibrations	
	- above 0,5 the highest acceptable intensity	3
	- between 0,2-0,5 the highest acceptable intensity	2
	- less than 0,2 the highest acceptable intensity	1
	Ionizing radiation	3
	Electromagnetic radiation	
	- intermediate zone	1
	- hazardous or dangerous zone	3
	Laser radiation	
	- above 0,8 maximum exposure allowed	3
	- between 0,4-0,8 exposure allowed	2
	- less than 0,4 exposure allowed	1
	Visible radiation	
	- above 0,7 maximum exposure allowed	3
	- between 0,4-0,7 exposure allowed	2
	- less than 0,4 exposure allowed	1
	Dust	
	- above 0,5 maximum allowed concertation	3
	- between 0,1-0,5 maximum allowed concertation	2
	- less than 0,1 maximum allowed concertation	1
	- cancerogenic dust	3
	Asbestos	3
	Microclimate	2
3	Chemical harmful and nuisance factors	
	Allergic	2
	Irritating	2
	Toxic	3
	Mutagenic	4
	Cancerogenic	4
	Impaired reproductive functions	3
	Flammable/Highly flammable	2
	Explosive	4
	The maximum permissible threshold concertation of chemical factors	4
4	Biological harmful and nuisance factors	
	Microorganisms in general	1
	- group 2	2
	- group 3	3
	- group 4	4
	Macroorganisms in general	1
	- category 1	2
	- category 2	3
	- category 3	4
5	Psychophysical harmful and nuisance factors	
	Repetitive motions	2
	Stress causing sick leave	2
	Lifting	2
	High need of focusing	2
	Work underload or overload	2
	Some professions at risk of losing life	3
	Body position without possibility to change during work shift	2

After choosing proper hazard all we need to do is verification. An example of verification is presented in appendix but the results of verification are presented (Table 5).

Table 5.

Results of verification

Item	Results	Description
1	Less than 9	Category of risk should be low
2	9-16	Category of risk should be medium or high

Note. The results at high of 16 should be considered as high risk work and beside the fact of verification, risk assessment may require an update if the result in risk assessment document is high risk as well.

After verification process it is worthy to formally document the results of verification. Documentation of the process may be helpful to show that risk management process is well proceeded, because contains either verification or updating process when it is required and it is a part of great improvement of occupational risk management.

5. Summary

During risk assessment process we can differ five main steps which the last one is verification of the risk assessment. As it was presented in the article, verification and update processes should be differed from one another, because the purposes of the two terms are not the same. When we think about verification we should take into consideration only the fact if the occupational risk assessment is prepared well what means if identified hazards and the results of risk are counted and pointed properly. If the results of verification show the need of update, than people responsible should update the whole process or risk assessment including all last steps of risk assessment process.

Beside the fact above, improvement of the method allows to use unified standard for identifying hazards which may appear in work environment. Great advantage of the fact is that nowadays prepared standards may not cover today's knowledge and evolution of the processes of working conditions. Thanks to unified template every person which manage the risk assessment process is up to date with hazards.

Presented indicators associated with general statements guarantee simplicity and clarity of the method thanks to referring to general and measurable or visible conditions which happen in the companies during the process of working. They cover all main factors and included hazards which may appear in workstations and come from required legal conditions.

Presented method may be helpful tool for everyone who is involved in inspection process of reviewing occupational risk assessment, especially country inspectors or internal auditors. Thanks to the method there is filled a gap in the management process of risk assessment. The method shows that verification process may be easy to lead, helpful in risk management system and can be used as the way of improving whole process of identifying hazards which

may appear in work environment. Simple example of using presented method is shown in appendix.

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Appendix

Table 6.

Example of documented risk assessment referred to a hazard

Identified hazard	Description of the hazard	Probability	Exposition	Results	Protective methods
Moving parts of machines	Wood milling machine	3	6	7	126 Medium

Note. The method above is Risk Score.

Table 7.

Example of verification

Identified hazard	Description of the hazard	H	D	I	Description
Moving parts of machines	Wood milling machine	4	3	12	Risk assessment is proper

Note. The result of verification indicates that prepared risk assessment result is proper and verification is done and the update of risk assessment is not necessary. Wood milling machine is considered as a high risk machine.