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# PRINCIPLES OF RISK CONTROL AND OCCUPATIONAL SAFETY AND HEALTH SYSTEMS

## *PRINCÍPIOS DE CONTROLE DE RISCOS E SISTEMAS DE SEGURANÇA E SAÚDE OCUPACIONAL*

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**Siniša Dodić***
*Faculty of Technology Novi Sad (FoT NS)
Novi Sad, Serbia
Orcid: https://orcid.org/0000-0002-3072-0549
dod@uns.ac.rs

**Bojana Bajić***
*Faculty of Technology Novi Sad (FoT NS)
Novi Sad, Serbia
Orcid: https://orcid.org/0000-0001-9786-2376
baj@uns.ac.rs

**Damjan Vučurović***
*Faculty of Technology Novi Sad (FoT NS)
Novi Sad, Serbia
Orcid: https://orcid.org/0000-0002-0555-6089
dvdamjan@uns.ac.rs

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**Abstract**
The paper includes a discussion of the role of managers in the occupational health and safety system of employers, with an emphasis on clear responsibilities and lines of communication for all subjects. The occupational health and safety system must ensure clear communication between its subjects in order to make them aware of their responsibility in everyday business. There is no equality of responsibility between those who provide guidelines and create occupational health and safety policy and those who are employed to follow it. The introduction of occupational health and safety management systems and the more active involvement of employees in such systems is essential for achieving the ideal of self-regulation of occupational health and safety. Self-regulation and the implicit need for management systems, as well as the active involvement of employees, have been recognized and to a significant extent legally regulated. Since the introduction of legal solutions, safety standards have improved significantly, but practice has shown that their further improvement is necessary.

***Resumo***
*Este artigo aborda o papel dos gestores no sistema de saúde e segurança ocupacional dos empregadores, com ênfase na clareza das responsabilidades e na comunicação entre todos os envolvidos. O sistema de saúde e segurança ocupacional deve assegurar uma comunicação clara entre os seus participantes, a fim de conscientizá-los sobre suas responsabilidades no dia a dia. Não há igualdade de responsabilidades entre aqueles que definem as diretrizes e criam as políticas de saúde e segurança ocupacional e aqueles que são contratados para segui-las. A implementação de sistemas de gestão de saúde e segurança ocupacional e o envolvimento mais ativo dos colaboradores nesses sistemas são essenciais para alcançar o ideal de autorregulação em saúde e segurança ocupacional. A autorregulação e a necessidade implícita de sistemas de gestão, bem como o envolvimento ativo dos colaboradores, são reconhecidos e, em grande medida, regulamentados por lei. Desde a introdução de soluções legais, os padrões de segurança melhoraram significativamente, mas a prática demonstra que ainda é necessário aprimorá-los.*

**Keywords:** Risk Assessment. Workplace. Safe And Healthy Work. Control. Prevention.

***Palavras-chave:*** *Avaliação de Risco. Local de Trabalho. Trabalho Seguro e Saudável. Controle. Prevenção.*

## 1 GENERAL PRINCIPLES OF RISK CONTROL

The general principles of prevention for improving occupational safety and health have been formalized through international directives and standards, which has created an imperative for them to be an integral part of national regulations governing the field of occupational safety and health (SRPS ISO 45001:2018).

The principles of prevention, or preventive measures that employers should apply to control risks in the workplace, include:

- avoiding risks (e.g., performing work using different processes or performing it in a safer way),
- assessing risks that cannot be avoided (a risk assessment is necessary),
- considering risks at source (e.g., the risk of a dusty working atmosphere is controlled by removing the cause that generates dust, rather than by providing special protection against dust, or e.g., treating or replacing slippery floors, rather than putting up a warning that the floor is slippery, etc.),
- adapting work to the individual (including the design of the workplace, the choice of work equipment and the choice of work and production methods, in particular with the aim of alleviating monotonous work and reducing their impact on health),
- adapting to technical progress (using technical and technological progress that often gives designers and employers the opportunity to improve safety and work methods),
- replacing the dangerous with the non-dangerous or less dangerous (e.g., replacing and using non-dangerous or less dangerous equipment or materials),
- developing a coherent overall prevention policy (covering technology, work organization, working conditions, social relations and the influence of factors related to the working environment),
- giving priority to collective over individual protective measures (implementing measures that make the workplace safe for everyone working in that place, e.g.,

removing dangerous dust by exhaust ventilation, instead of using a protective mask with respiratory filtration for an individual worker), and

- providing appropriate instructions to employees (ensuring that employees are fully aware of company policy, legal requirements, safety procedures and instructions, good practice, results of workplace testing).

## 2 SOURCES OF INFORMATION FOR SAFE AND HEALTHY WORK

When a manager or employee in a company is faced with occupational health and safety problems, they should consult various sources of information to understand the scope of the problem and its possible solutions. The sources of this information for managers and employees in a company can be internal and/or external to the company (Cheng *et al.*, 2019).

Internal sources that should be available within the enterprise include:

- employee injury records,
- absence records,
- inspection and audit reports carried out by the enterprise itself or by another organization,
- employee training records,
- documents providing information to workers, and
- equipment test reports.

External sources available outside the enterprise are numerous and include:

- occupational safety and health legislation,
- publications (approved codes of practice, guidelines, journals, books),
- international and European standards,
- occupational safety and health journals,
- information published by trade unions, employers' organizations and trade unions,
- technical and legal publications,
- information and data from manufacturers and suppliers, and
- the internet and encyclopedias.

# 3 SAFE WORK SYSTEM FACTORS

## 3.1 The importance and assessment of a safe work system

A safe work system is defined as the integrative function of employees, materials and work equipment into a considered and established way of working that takes into account the assessed risks to employees and other persons (visitors and contractors) in an appropriate manner and provides a formal framework to implement the prescribed procedure necessary for safe work. Simply put, a safe work system is a defined method of performing work safely, which takes into account all foreseeable hazards to safety and health at work and seeks to eliminate or minimize them. Safe work systems are usually formal and documented, through written operating procedures, although in some cases they may also be oral.

The particular importance of a safe work system stems from the recognition that most accidents are caused by a combination of factors (plant, materials, lack of training and/or supervision, etc.). Therefore, prevention must be based on an integrated approach, rather than one that only addresses individual factors (Kalteh, 2019). This integrated approach provides for the adoption of an effective safe work system based on:

- viewing the work as a whole,
- analyzing all foreseeable hazards, and
- bringing together all necessary safety measures, including design, physical precautions, training, supervision, procedures and the use of personal protective equipment.

The application of a safe system of work is in no way a substitute for other safety measures, such as good equipment design, safe construction and the use of physical safeguards. However, there are many situations where these alone, will not provide adequate protection, and a carefully designed and properly implemented safe system of work is particularly important. The best example is equipment maintenance and repair work, which involves, as a first step, removing guards/buffers or disabling automatic interlocks, etc., that are in place to protect workers/operators. In some of these operations, a permit to work procedure is the most appropriate type of safe system of work (Oliver, 2010).

The operations described may be simple or complex, routine or unusual. Regardless of whether the system is verbal or written and whether the operation it covers is simple or complex, routine or unusual, the essential features are thought and planning, to ensure that all foreseeable hazards are identified and controlled (Dźwiarek, 2015). This includes in particular:

- the sequence of operations to be carried out,
- the equipment, plant, machinery and tools used,
- the chemicals to which employees may be exposed during work,
- the skills and experience of employees,
- the foreseeable hazards (safety, health, environment),
- practical precautions that will eliminate or reduce the hazards,
- the training needs of those who will manage and operate in accordance with the procedure, and
- monitoring systems to ensure the effective implementation of the defined precautions.

Legislation requires employers to provide safe facilities and systems of work. In addition, many regulations issued under the law require that employees be provided with information and instructions for safe and healthy work, which is also a more specific requirement to provide a safe work system. Many of these safe work systems, information and instructions need to be in writing. There is also a need for employers to provide a safe work system in order to meet their legal obligation.

It is the responsibility of the management of the enterprise to ensure that its operations are assessed to determine where safe work systems need to be developed. This assessment must also provide a decision on the most appropriate form for the safe work system, namely:

- is a written procedure required?
- must the operation be carried out only with a work permit?
- is an informal system sufficient?

It is recognized that each company should have the freedom to design systems that are appropriate to the potential risks of their business and that are applicable to their situation (Podgórski, 2005). However, when making a decision, they should consider the following factors:

- the types of risks involved in the operation,

- the magnitude of the risk, including the worst-case foreseeable loss,
- the complexity of the operation,
- past accident experience,
- the requirements and recommendations of the competent health and safety authorities,
- the type of documentation required, and
- the resources needed to implement the safety system (including training and supervision).

### 3.2 Development of a safe work system

The management of the company is primarily responsible for creating a safe work system, as they need to know the detailed way of carrying out work tasks. Management is responsible for ensuring that employees are adequately trained in the specific safe work system and are competent to perform safety tasks at work. Managers must provide sufficient supervision to ensure that the work system is followed and that the work is performed safely. The level of supervision depends on the experience of the employee and the complexity and risk of the tasks.

For example, when it comes to construction work, the main contractor should supervise subcontractors to check that they provide an appropriate system of safe work, train their employees, and perform tasks in accordance with the systems of safe work.

Employees who operate the plant/equipment or production process are best placed to assist in the preparation of a safe work system. Consultation with employees who will be exposed to risks, either directly or through their representatives, is also a legal obligation for employers. The importance of consulting on the proposed system with those who will have to work under it and those who will have to supervise its operation cannot be overemphasized, with employees being responsible for monitoring the safe work system (Gyekye, 2005).

A safe work system should be based on a thorough analysis of the jobs/operations covered by the system. The way in which this analysis is carried out will depend on the nature of the job/operation. If the inclusion of a new operation/method of work is being considered that involves a high potential for risk, the use of formal hazard analysis techniques, such as hazard and operability studies, fault tree analysis or failure mode and

effects analysis, should be considered. However, where the potential for risk is lower, a simpler approach, such as a job safety analysis, is usually sufficient (Grzybowski, 2015). This involves three key phases:

- identification of the key steps in the job/operation – what activities will be carried out?
- analysis and assessment of the risks associated with each phase – what problems could arise?
- definition of the precautions or controls to be taken – what steps should be taken to ensure that the operation is safe?

The results of this analysis are then used to develop a safety operating procedure or method statement.

There are various controls that can be used in safe work systems and can be divided into the following three basic categories:

1. technical – engineering or process controls of work with acceptable risks (e.g., exhaust ventilation, machine guards, dust respirators),
2. procedural – control of work to ensure that it is performed in accordance with the procedure, legislation or cultural requirements of the organization (e.g., supervisor must be involved in worker training that must be done before work begins, employee names must be recorded, etc.), and
3. behavioral – controls that require a certain standard of behavior from employees or groups of employees (e.g., smoking is not allowed during work, hard hats must be worn, etc.).

A checklist for developing a safe work system can be set up as follows:

- What needs to be done?
- What are the potential hazards?
- Is the work covered by any existing instructions or procedures? If so, to what extent (if any) do they need to be modified?
- Who needs to do the work?
- What are their skills and abilities – is there any special training required?
- Under whose control and supervision will the work be performed?
- Will any special tools, protective clothing or equipment be required? Are they ready and available for use?

- Are the employees who need to perform the work adequately trained in the use of the above?
- Is a work permit required for any aspect of the work?
- Will the work interfere with other activities? Will the other activities create a hazard for the employees performing the work?
- Are other departments notified of the work to be done, where necessary?
- How will employees performing the work communicate with each other?
- Have possible emergencies been considered and the actions to be taken?
- Should emergency services be notified?
- What is the procedure for handing over plant/equipment at the end of a shift?
- Do the planned precautions take into account all foreseeable hazards?
- Who should be notified of receiving a copy of the safe system of work or receive copies?
- What is the procedure for seeing that the agreed system is being followed and is functioning in practice?
- What mechanism ensures that the safe system of work remains relevant and up to date?

### 3.3 Documentation, communication and training

Safety systems must be properly documented and, wherever possible, incorporated into standard operating procedures so that:

- safety and health are seen as an integral part of, and not an add-on to, standard manufacturing practices, and
- the need for workers/operators and supervisors to refer to separate manuals is minimized.

Regardless of the method, all written safety systems should be signed off by relevant managers to indicate approval or authorization, and version numbers should be included to allow for quick verification that the most up-to-date version is being used. Documentation should be maintained in a way that, after changes and revisions, it is updated and the latest version is retained in a clear text format. As far as possible, systems should be written in a non-technical style and in particular should be as understandable

and user-friendly as possible, sometimes providing simple short summaries that contain all the key points in an easy-to-read format (Quintana & Nair, 1997).

Employees performing or supervising work must be fully aware of the safety systems in place and in operation. The preparation of a safety system will often identify training needs that must be met before the system can be effectively implemented. In addition, employees should receive training on how the system works, not only for those directly involved in the work, but also for supervisors/managers who oversee the work process. Specifically, training includes familiarization with:

- why a safety system is needed,
- what is involved in the work,
- the identified hazards, and
- the precautions.

### 3.4 Control of the safe work system

Control of safety systems should ensure their effectiveness in practice, which includes:

- review and audit of the systems themselves to ensure they are up-to-date, and
- inspection to determine how fully they have been implemented.

In practice, the two activities are integrated, as it is likely that an outdated system will not be fully implemented by the people who intend to manage it. Companies are responsible for ensuring that their safety systems are reviewed and revised as necessary. Monitoring the implementation of the safety system is part of the normal operational responsibilities of managers and should also take place during the safety system audit (Targoutzidis & Antonopoulou, 2009).

### 3.5 Occupational health and safety system control

As with all management functions in companies, establishing and maintaining control is crucial for the effective management of the occupational health and safety system, in which company managers (directors, senior and middle managers, line managers) play a crucial role. Managers, especially at hierarchically higher levels in the company, must take proactive responsibility for problems that may lead to violations of

the safety and health of employees. Managers must monitor the implementation of the safety policy, and must have feedback and be reported in a timely manner by the designated persons in the occupational health and safety system.

Responsibilities for the occupational health and safety system should be assigned to line managers, with expertise available to them, either within or outside the company, to help them comply with the prescribed occupational health and safety provisions. The purpose of organizing an occupational health and safety system is to harness the collective enthusiasm, skills and effort of all employees, with managers taking the key responsibility and providing a clear direction for activities to achieve this goal. Through management systems in the company, the focus of activities should be on preventing injuries and impairment of the health of employees at work, and not just on finding fault with the individual after the incident has already occurred.

The procedures for monitoring the occupational health and safety system should be part of a written safety policy, and it is necessary to harmonize standards and set goals that link the required results to the specific tasks and activities for which individuals in the company are responsible. For example, a goal can be set to inspect/control the workplace once a week, using a previously established checklist, and then eliminate any irregularities in the workplace within three working days, and then check through a periodic or annual audit whether the defined goal has been met, and if not, to determine the causes of the same. Employees should be held accountable for achieving agreed goals through various procedures, such as:

- job descriptions, which include responsibilities for occupational safety and health,
- performance appraisal systems, which take into account the contribution of each employee,
- procedures for addressing poor system performance, and
- where appropriate, disciplinary action.

The above procedures are effective only if occupational health and safety issues achieve the same level of importance as other key management issues in the company's operations, bearing in mind the fact that safe and healthy work is a very important part of the career and personal development of every employee (Masso, 2015).

### 3.6 The role of responsible persons in the occupational health and safety system

There is an absence of explicit legal obligations relating to the responsibilities of directors for the safety and health of employees at work, but if a company as an employer fails to meet its legal obligations, then directors, as responsible persons, can be held personally liable for the resulting failures.

There are numerous brochures and manuals on the market in the field of occupational safety and health, which represent a kind of guide and provide voluntary advice to inform directors/responsible persons about the requirements for good management of the occupational safety and health system in the company. Occupational safety and health is an integral part of the success of the company, and thus of the directors and members of the management boards, who, through the fulfillment of their professional and moral duties, ensure the status of a leader in the field of occupational safety and health for the company and for themselves personally. A company cannot achieve the highest standards of occupational safety and health management without the active participation and commitment of the directors.

For many businesses and companies, the occupational health and safety system is a corporate governance issue, with the CEO and boards of directors needing to integrate occupational health and safety into their core governance structures, including subcommittees on risk, quality, compensation and audit. It is therefore essential that the governance structure of the business or company provides internal control systems that cover not only business and financial risks, but also risks related to the occupational health and safety of employees (Jilcha, 2016).

Effective procedures in the occupational health and safety system must come from the "top" of the company, with directors/managers and board members having both collective and individual responsibility for the safety and health of employees. Directors/managers and board members must individually and collectively align their actions with the guidelines provided by the profession and legal regulations in the field of occupational health and safety (SRPS ISO 45001:2018).

Directors/responsible persons in the company should take action so that:

- the occupational health and safety of employees and other persons in the company can be protected,

- the management of business risks in the company also includes risks to the occupational health and safety of employees, and
- they respect the obligations and duties imposed by legal regulations in the field of occupational health and safety.

The principles that aim to help in arriving at procedures in the occupational health and safety system in the company are reflected in strong and active leadership from the "top" of the company through:

- a visible and active role of the director/responsible person,
- establishing effective "downward" communication systems and management structures, and
- integrating good management of the occupational health and safety system with business decisions.

The above principles are also reflected in the participation of employees through:

- involvement in the promotion and achievement of safe and healthy working conditions,
- effective "upward" communication in the management hierarchy of the company, and
- provision of high-quality training.

It is important to note that the assessment and audit functions in the occupational health and safety system are also significant factors in achieving good performance of the occupational health and safety system through:

- identifying and managing occupational health and safety risks,
- accepting competent expert advice, and
- monitoring, reporting and auditing the achieved performance of safety systems.

The responsibilities of the director/responsible person and the board of directors in the occupational safety and health system of the enterprise should include the following activities:

- the board should formally and publicly accept its collective role in achieving leadership in the occupational safety and health system,
- each member of the board of directors must accept his individual role in achieving leadership for occupational safety and health,
- the board must ensure that all decisions reflect its safety and health intentions, as defined in the occupational safety and health policy statement,

- the board should recognize its role in engaging the active participation of workers in improving occupational safety and health, and
- the board must ensure that it is informed about and alerted to relevant occupational safety and health risk management issues.

It is important to note that the directors/persons responsible in the company must ensure that the obligations and responsibilities of the management board for health and safety are properly carried out, whereby the board should:

- conduct an annual review of the performance of the occupational health and safety system,
- update the occupational health and safety policy statement with current priorities and review it at least annually,
- ensure effective management systems for monitoring and reporting on the performance of the occupational health and safety system,
- ensure that all significant deficiencies in the occupational health and safety system are communicated to the members of the management board,
- ensure that safety and health implications are fully taken into account when making decisions, and
- ensure that regular audits are carried out of the existing effective occupational health and safety risk management systems.

### 3.7 Organizational responsibilities of managers

The director/responsible person in the company is responsible for the safety, health and welfare of all persons working in or visiting the company. In addition to responsibility for the performance of the occupational health and safety system in the company, responsibilities also include ensuring that appropriate resources are available to meet safety and health requirements within the company, as well as, where necessary, appointing a designated person from senior management with specific responsibilities in the occupational health and safety system.

The responsibilities of the director/responsible person in the enterprise include the designation of one or more competent persons with appropriate resources to provide assistance in fulfilling the enterprise's safety and health obligations, as well as the obligation to establish, implement and maintain a formal written safety and health

program that covers all areas of safety and health risk. The director/responsible person must approve, implement and monitor all policies, rules and procedures related to the implementation of occupational safety and health, as well as to review the effectiveness of the enterprise's occupational safety and health program at least once a year and, if necessary, request a revision of the enterprise's occupational safety and health program (Beck-Krala, 2016).

Department/sector managers in the company are responsible for the safety and health performance of their department, as well as for:

- hiring and managing contractors and providing them with appropriate supervision,
- ensuring that all machinery, equipment or vehicles used in the department are maintained, properly stored and meet the prescribed safety and health standards,
- a worker training plan that includes specific job instructions for new or reassigned employees and monitoring of training by supervisors.

Supervisors/team leaders report to their department manager with duties that include responsibility for the safe and healthy work of their team, implementing work procedures issued by the department manager, educating their team on relevant occupational safety rules, and maintaining records of instructions for implementing safe and healthy work rules and procedures. Supervisors should also enforce requirements for personal protective equipment, conduct checks on the use of equipment by workers on their team, and conduct periodic assessments of the condition of protective equipment (Hass, 2020).

### 3.8 The role of manager's advisors

One or more competent persons may be appointed to provide expert advice to assist managers in carrying out their duties in accordance with occupational safety and health regulations. The essential point is that managers should have access to and be aware of expert advice to help them meet their legal obligations, but the advisors do not assume legal responsibility for occupational safety and health matters, as this responsibility always remains with line managers and cannot be delegated to an advisor, whether appointed from within or outside the company.

Employers themselves may be appointed as advisors, which is the case in small enterprises, i.e. in low-risk activities. One or more employees may also be appointed,

provided that they have sufficient time and other resources to perform the task effectively, as well as an expert from outside the enterprise. When there is an employee in the enterprise with sufficient expertise to perform the work of an advisor to the manager, it is more efficient for them to be appointed, rather than seeking and appointing external experts. Many problems in the occupational safety and health system can be better understood and dealt with by employees who understand current practice and have the ability to judge and solve problems. Sometimes the help and advice of experts is needed on an ongoing basis, while sometimes help is needed only for a shorter period, depending on the type and extent of the current problems.

A wide range of experts are available for different types of safety and health problems, such as special ventilation or chemical process engineers; experts for assessment and practical advice on exposure to chemical (dust, gases, fumes, etc.), biological (viruses, fungi, etc.) and physical (noise, vibrations, etc.) agents; ergonomists who provide advice on the suitability of equipment, comfort, physical working environment, work organization; specialists in the prevention and treatment of musculoskeletal disorders; experts in protection against ionizing radiation; etc. (Pawlowska, 2015).

### 3.9 The importance of a culture of safe and healthy work

A safe and healthy work culture can be described as a stage in the development of an enterprise from the perspective of managing the occupational safety and health system at a given time. The safety culture of an enterprise is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment and ability to manage occupational safety and health in the enterprise. Enterprises with a positive safe and healthy work culture are characterized by communications based on mutual trust, a shared perception of the importance of safety and confidence in the effectiveness of preventive measures.

A positive culture of safe and healthy work requires the involvement of all employees, as does a successful quality system, where there must be a shared commitment in terms of attitudes and values. Employees must believe that the safety measures implemented will be effective and that they will follow them even when they may lead to financial burdens (Bahn, 2013).

Important elements of a positive occupational health and safety culture include:

- transparent management and commitment to occupational health and safety throughout the company,
- occupational health and safety objectives are taken seriously, like other corporate objectives, and have adequate financial resources,
- occupational health and safety must be the responsibility of line managers,
- acceptance that high standards of occupational health and safety are achievable, as part of a long-term corporate strategy that requires continuous commitment,
- a detailed assessment of occupational health and safety risks in the company and the development of appropriate control and monitoring systems,
- a statement of occupational health and safety policy that provides a sense of optimism and outlines the short-term and long-term objectives for occupational health and safety in the company,
- realistic and achievable objectives and performance measured against them,
- relevant employee training programs, communication and consultation procedures,
- equipment monitoring systems, processes, behaviors and procedures enable the rapid elimination of any irregularities and
- prompt investigation of all incidents and accidents and reports detailing all necessary corrective measures.

If the company adheres to the above elements, then the basis for safe and healthy work will be established. However, in order to achieve this level of performance, sufficient financial and human resources must be available at all levels of the organization of the occupational safety and health system.

Managers at all levels of the company must demonstrate their commitment to occupational safety and health by leading by example and ensuring that adequate resources in terms of time, money and people are allocated to achieving safe and healthy work. Managers at appropriate hierarchical levels in the company should visit workplaces, talk to workers about their occupational safety and health and visibly demonstrate their commitment, for example, which is not often observed in practice, by stopping the production process until a safety problem is resolved. If employees perceive that managers are not seriously committed to high safety and health standards, they will assume that they are expected to put the commercial interests of the company first, and

as a result, they will deviate from safety procedures in their work, thereby endangering their own safety and the safety of other employees.

Managers, supervisors and members of the management body should receive training on occupational safety and health and be made aware of the occupational safety and health objectives of the enterprise during the training. The depth of the training provided will depend on the level of competence required of a particular manager at a particular hierarchical level in the enterprise. Managers should be held accountable for occupational safety and health in their departments and rewarded for significant improvements in occupational safety and health, as well as discipline employees in their departments who violate safety policies and procedures.

As the culture of occupational safety and health in a company develops, it is increasingly necessary to use certain indicators, as well as to set and monitor certain goals.

The main indicators for the development of an occupational health and safety system must be:

- objective and easy to measure and collect,
- relevant to the enterprise,
- provide a direct and reliable indication of the level of efficiency,
- cost-effective in terms of equipment, personnel and additional technology required to collect the information, and
- owned by the enterprise.

Objectives must be relevant and improve safety performance over a reasonable period of time and be specific to the key risks and activities of the enterprise.

There are several indicators of the state of the safety and health culture in an enterprise, the most important of which is the number of accidents at work occurring in the enterprise. Although the number of accidents can give a general indication of the safety and health culture, a detailed statistical examination of the accidents is usually required. Calculating the accident rate in a given year allows for comparison of safety and health performance between several enterprises. The simplest measure of the accident rate is called the incidence rate and is defined as the ratio of the total number of accidents to the number of employees multiplied by 1,000 or as the total number of accidents per 1,000 employees. There are four main problems with this measure that must be kept in mind when using it:

- there may be significant differences over time between part-time and full-time employees,
- the measure does not distinguish between major and minor accidents and does not take into account other incidents, such as those involving non-injury damage,
- there may be significant differences in work activity during the periods being compared, and
- underreporting of accidents may affect the accuracy of the data.

Some industries prefer the accident rate per million hours worked, expressed as the ratio of the number of accidents in a period to the total number of hours worked in a period multiplied by 1,000,000. This method, by counting working hours rather than the number of employees, avoids the distortions caused by the inclusion of part-time and full-time employees, as well as overtime.

In line with the above limitations, a company with a high accident rate has a negative or poor safety and health culture. There are other indicators of a poor safety and health culture, such as:

- high rates of illness, ill health and absenteeism,
- high employee turnover in the company,
- lack of available resources (budget, people, equipment, facilities) for effective management of the occupational safety and health system,
- management decisions that put commercial issues before considering occupational safety and health issues,
- non-compliance of safety procedures with relevant legal regulations,
- regular violations of safety procedures,
- poor levels of communication, cooperation and control,
- weak structure of the occupational safety and health system management and
- lack or low level of safety and health competencies.

A positive safety and health culture at work cannot be enforced by legislation. However, a procedure can be implemented that addresses the outcomes of a poor culture. For example, if a company is unsuccessfully relying on procedural controls to avoid major accidents, actions can be taken to ensure compliance with relevant laws or to provide appropriate protective measures. In short, poor safety and health performance in a company indicates a negative safety and health culture (Ünal, 2021).

## 4 CONCLUSION

Operating procedures or safe work systems are probably the most common risk control measures used in industry today and can be the most economical and, in some cases, the only practical way of managing individual risks. They should enable work tasks to be carried out in a methodical manner. The development of safe operating procedures should address the hazards identified in the risk assessment, with the system of work describing a safe method of carrying out the work or activity. In high and medium risk jobs, details of the safe work system should be in writing and communicated to employees during safety and health training. Details of the safe work system for low-risk jobs can also be communicated to employees orally. It is essential that there is a record that employees (or contractors) are aware of and have knowledge of the safe work system, that they understand it and that they comply with it.

The most important factor influencing a culture of safety and health at work is the commitment of managers at the "top" of the company. This commitment can be demonstrated in many different ways, and must have a formal aspect in terms of the organizational structure, job descriptions and safety and health policy, but it must also be visible during crises or other stressful periods in the company. In practice, it often happens that when production or other commercial goals are threatened, safety and health procedures are bypassed or simply forgotten. Structural reorganization or changes in market conditions can create a sense of uncertainty among employees, which in turn can affect the culture of safety and health at work. Poor levels of supervision and information on safety and health at work are very important factors in education about safety and health at work, and therefore a culture of safety and health at work. Finally, the degree of consultation and engagement with employees on occupational safety and health issues is crucial to a positive culture of safe and healthy work, with most of these factors being human factors.

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### Author participation

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### Authors' Contribution

Both authors contributed equally to the development of this article.

### Data availability

All datasets relevant to this study's findings are fully available within the article.

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