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MANAGEMENT AND MODEL OF THE SAFETY AND HEALTH SYSTEM AT WORK

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Abstract

The occupational health and safety management system is an important factor in sustainable business and employee protection in modern organizations. Effective OSH management requires a systemic approach that integrates risk assessment, compliance with regulatory requirements and the application of modern methods for continuous improvement of the work environment. This paper analyzes existing OSH management systems, with a special focus on identifying factors that influence their effectiveness. By using scientific methods and best practices from relevant norms, strategies and organizational models, the research indicates the need for an adaptive and dynamic approach that allows foresight, to a certain extent, for the prevention of occupational risks. The paper explores the approaches and specifics of the conceptual definition, as well as the practical implementation of the safety and protection management system at work, and their role in reducing incidents, increasing productivity and improving the organizational culture of safety.

Key words: *Safety and health at work, management system, risk assessment, organizational culture, regulatory framework.*

Introduction

Safety and health at work (hereinafter: OSH) represent one of the key factors of sustainable development of modern organizations, directly affecting productivity, work efficiency and the quality of the work environment. An effective OSH management system not only reduces the risk of injuries and occupational diseases, but also contributes to improving organizational culture and compliance with regulatory requirements (ISO 45001:2018).

Contemporary trends in this area emphasize the need for an integrated approach to risk management, which includes predictive analytics, process automation and continuous monitoring of system performance (Jørgensen, 2016; Hale et al., 2019). Adopting such an integrated approach is important for improving the efficiency and resilience of organizations in the modern business environment.

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An integrated approach to risk management, which includes predictive analytics, process automation and continuous monitoring of system performance, is key to improving occupational safety and health. This approach enables proactive identification and management of potential risks before they manifest, thus increasing the efficiency and effectiveness of preventive measures. Contemporary trends in this area emphasize the need for an integrated approach to risk management, which includes predictive analytics, process automation and continuous monitoring of system performance (Jørgensen, 2016; Hale et al., 2019). By introducing these modern methods, organizations can more effectively respond to dynamic changes in the work environment and ensure the long-term sustainability of their operations.

Traditional models of occupational safety and health management are often not sufficiently adaptable to dynamic changes in the work environment, which requires the development of more advanced approaches (Reason, 1997; Manuele, 2014). The integration of risk management strategies with the active participation of employees and management is crucial for a successful occupational safety and health system (DeJoy, 2005; Fernández-Muñiza et al., 2012). In addition, the introduction of standardized methods for risk assessment and management can significantly improve the effectiveness of security systems (Robson et al., 2007). These findings indicate the need for a holistic approach that includes technological innovation, organizational strategies and safety culture in order to achieve optimal results in risk prevention and improvement of the work environment.

The concept of model and management

Management and modeling of occupational health and safety systems are important factors in defining employee protection strategies, optimizing work processes and reducing professional risks. Modern approaches in this area are based on the integration of theoretical management models with practical implementation methodologies, which ensures effective decision-making and risk control (Pušić, 1973; Jovanović, 2010). The integration of theoretical management models with practical implementation methodologies is key to improving occupational health and safety systems. This approach enables more efficient decision-making and better risk control, which is essential for employee protection and optimization of work processes. By combining theoretical frameworks with practical tools, organizations can develop strategies that not only meet legal requirements, but also promote a culture of continuous improvement and proactive risk management. Such integration contributes to the creation of a safer and more productive work environment, reducing the incidence of injuries and occupational diseases.

Definition of models in the context of OSH: Models are defined in scientific and professional literature as simplified representations of complex systems, which enable the analysis and prediction of system behavior in different conditions (Sterman, 2000). In the context of OSH, models represent structured approaches to assess risks, optimize safety measures and define strategies to protect the working environment.

It is crucial to test different scenarios in advance to ensure the efficiency and safety of work processes. Gordić (2011) emphasizes the importance of a modal experiment in the creation of a security system model, pointing out that models enable testing of different

scenarios and their impact on work processes. The application of such models can significantly contribute to the identification of potential risks and the optimization of procedures before their implementation in the real environment. In his work, Gordić (2011) emphasizes the importance of the modal experiment in the creation of security system models, pointing out that models enable testing of different scenarios and their impact on work processes. This approach enables decisions to be made based on empirical data, thereby reducing uncertainties and improving the effectiveness of protective measures.

Models in BZR can be classified according to various criteria, including:

- Statistical models – based on analysis of injury and incident data to identify key risk factors.
- System dynamics - which enables modeling of interactions between people, technology and organization in order to improve OSH strategies (Sterman, 2000).
- Organizational models - which focus on the integration of safety culture into the overall management system of the company (Reason, 1997).

Definition of management in OSH systems: Management is defined as the process of planning, organizing, leading and controlling activities with the aim of achieving the defined goals of the organization (Pušić, 1973). In the context of OSH, management includes the creation of occupational safety policies, the implementation of measures to minimize risks and the monitoring of their effectiveness in order to constantly improve the safety of employees.Diagram 1. Flowchart illustrating modal experiment-based OHS system modeling according to Gordić (2011)

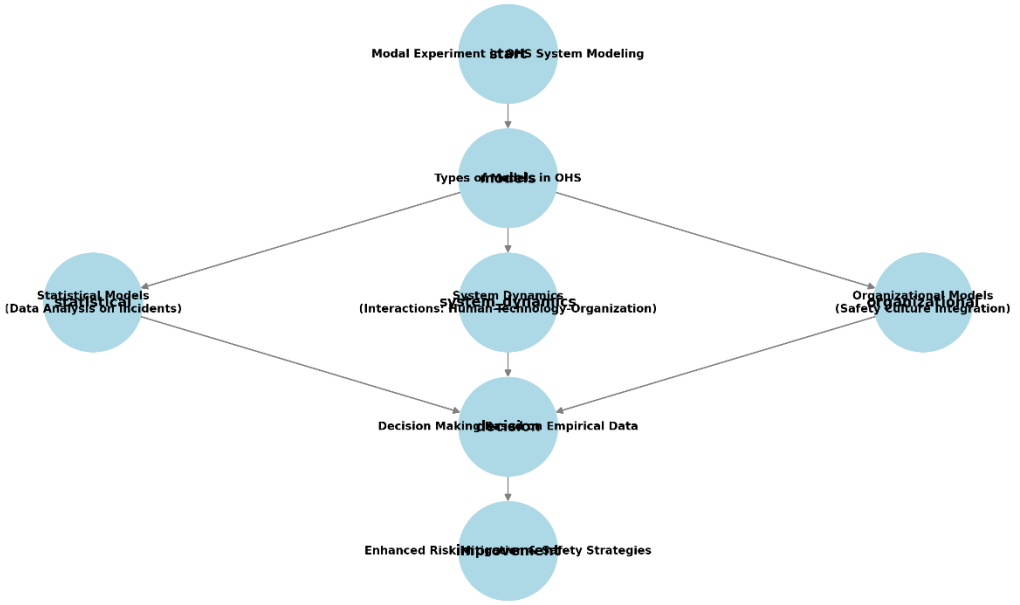

Diagram 1. Modal experiment-based OHS system

Jovanović (2010) emphasizes the importance of a project-oriented approach in the management of OSH systems, indicating that proper management of projects can significantly contribute to the successful implementation of protection measures. This approach enables precise planning, organization and control of activities aimed at identifying and mitigating professional risks, thereby improving the overall safety of the work environment. Namely, strategic planning and evaluation of investments in OSH enable more efficient use of resources and long-term sustainability of protective systems.

OSH management includes the following key components:

- Risk identification – recognition of potential hazards in the work environment.
- Risk assessment and control – application of risk minimization strategies, including technical and organizational safeguards.
- Performance monitoring and analysis – continuous evaluation of the OSH system through incident analysis, inspection checks and employee feedback (ISO 45001:2018).

Diagram 2. Flowchart illustrating project-oriented management of Occupational Health and Safety (OHS) systems based on Jovanović (2010)

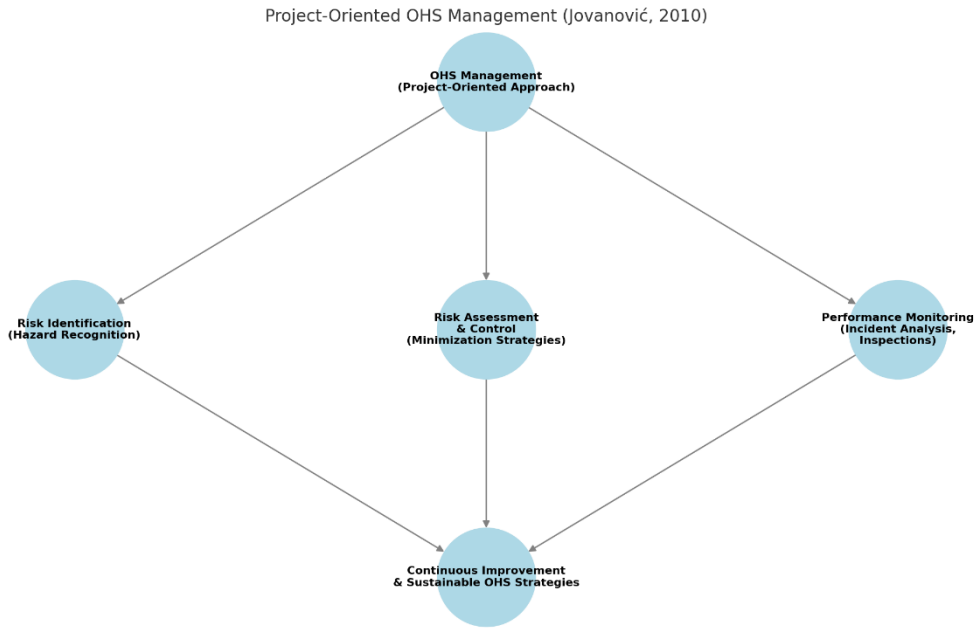

Diagram 2. Management of Occupational Health and Safety (OHS) systems

In accordance with modern management principles, it is necessary to implement integrated OSH systems, which enable better coordination between different sectors within the organization and improve the overall safety culture (Hale et al., 2019). Integrated OSH systems enable the unification of various aspects of occupational safety and health into a single framework, thereby increasing the efficiency and effectiveness of safety management by reducing the duplication of resources and processes.

Defining the OSH management model and system is the foundation for improving employee protection and optimizing work processes. The use of a modal experiment, system dynamics and project-oriented approaches enables a more precise assessment of risks and effective decision-making (Gordić, 2016; Jovanović, 2010). Further research should be focused on the integration of digital technologies and artificial intelligence in OSH management, which would enable automated risk assessment and improved predictive analytics of protective measures.

Objective of the work

The aim of this work is to evaluate and improve the occupational health and safety management system through the identification of key factors that influence its effectiveness. Effective OSH management requires an integrated approach that includes strategic planning, risk assessment, implementation of protective measures and continuous improvement of working conditions (Gordić, 2011; Pušić, 1973; Jovanović, 2010). The implementation of an integrated OSH management system includes strategic planning, identification and assessment of occupational risks, implementation of protective measures and continuous improvement of working conditions, which systematically improves the efficiency and effectiveness of OSH.

In modern business conditions, organizations face rapid changes in the work environment, which requires more flexible and agile approaches to management. Contemporary literature shows that traditional management models are often insufficiently flexible and do not allow rapid adaptation to changes in the work environment (Reason, 1997; Hale et al., 2019). Therefore, the research focuses on the development of a conceptual framework that links the organizational, technical and regulatory aspects of the OSH system. Special attention is paid to the role of management in decision-making and effective implementation of security strategies (Pušić, 1973). Effective management of occupational safety and health requires an active role of management in decision-making and implementation of safety strategies.

In addition, the paper relies on a modal experiment as a methodological approach for researching potential scenarios for the development and improvement of the OSH system (Gordić, 2011). This approach enables the analysis of possible management models through the simulation of various risk factors and the prediction of their impact on system performance. Also, the concept of project and investment management is applied in the context of the implementation of new technologies and occupational safety processes (Jovanović, 2010). The introduction of new technologies and the improvement of occupational health and safety processes are often realized through projects that integrate different management methods, thus ensuring efficient implementation and achieving the desired results.

The results of our research can contribute to the improvement of theoretical assumptions and practice in the scientific and professional community by looking at the challenges and possibilities of improving the OSH system. The results of the research can be used for the further development of OSH management strategies and their implementation in different industrial sectors.

Methodology used

During the realized research of the subject content, a part of quantitative and qualitative methods were applied, which enable the overview of the occupational safety and health management system. Analytical, comparative and experimental methods were primarily used, with special emphasis on the modal experiment as an important research method (Gordić, 2011). The application of analytical, comparative and experimental methods, with special emphasis on the modal experiment as a key research approach, enables a detailed examination and comparison of various aspects of the phenomenon, thus ensuring the validity and reliability of the obtained results.

The analytical method was used to review and analyze the relevant literature, standards and legal regulations related to the OSH system. Special attention is paid to the analysis of factors that influence the effectiveness of existing management models, including decision-making strategies, organizational structures and technical aspects of occupational safety (Pušić, 1973). Different national and international approaches to OSH management were analyzed using a comparative method, comparing examples from industrial sectors with high exposure to risks.

The modal experiment, as a method developed for the analysis of potential scenarios in safety systems, was applied in order to research optimal solutions for OSH management (Gordić, 2011). Using simulations and modeling, various factors affecting system efficiency were tested, including organizational, technical and regulatory changes. This method made it possible to anticipate possible challenges and evaluate the effects of different management strategies.

The application of project and investment management methodologies enables the efficient integration of new technologies and organizational strategies into occupational safety and health systems, which leads to improved performance and safety within the organization. Project and investment management methodology was used to analyze the implementation of new technologies and organizational strategies in the OSH system (Jovanović, 2010). A special focus was on evaluating the cost-effectiveness and long-term sustainability of the proposed improvement measures, with the application of risk evaluation methods and cost-benefit analysis.

The combination of these methodological approaches enabled a comprehensive analysis and formulation of recommendations for the improvement of the OSH management system, with a special emphasis on the application of innovative models and strategies that enable increasing efficiency and reducing professional risks.

Research problem

Management of occupational safety and health (OSH), in modern normative, organizational, strategic-doctrinal and action conditions, indicate that a creative scientific and professional approach is needed, primarily for the sake of sustainable business and the protection of employees in many industrial enterprises. Modern working conditions are characterized by dynamic changes, increasing automation and complex interactions between man, machine and work environment, which increases the need for effective OSH management systems (Hale et al., 2019; Robson et al., 2007). Although there are numerous regulations and standards, such as ISO 45001, many

organizations face the problems of implementing and maintaining a functional security system (Reason, 1997). For example, according to the American Society for Safety Professionals (ASSP), successful implementation of ISO 45001 requires a deep understanding of occupational health and safety management systems, which can be challenging for organizations that lack adequate resources or expertise. Also, ISO 45001 provides a framework for improving safety and health programs, but requires significant changes to existing processes, which can be difficult for organizations with entrenched practices.

Disadvantages of existing OSH management models are that traditional OSH management models generally rely on reactive approaches, where protective measures are implemented after workplace incidents or injuries occur. This way of management leads to inefficient use of resources and high economic and social costs (Pušić, 1973). Also, the organizational culture often does not support a proactive approach to safety, which results in low awareness of employees and management about the importance of preventive measures (DeJoy, 2005). The students conducted a survey in which the influence of organizational culture on the protection of health and safety at work was examined, where 56% of respondents rated that "organizational culture based on respect for the rights of employees" is the least important for this area, which indicates a lack of awareness of the importance of preventive measures.

Research has shown that there is a gap between theoretical models of OSH management and their practical application in a real work environment. Reasons for this include inadequate integration of security policies into all business processes, insufficient management support and limited financial resources (Jovanović, 2010).

In order to overcome the mentioned problems, it is necessary to use innovative methods of research and improvement of the OSH system. One of such approaches is the modal experiment, which enables the simulation of different security management scenarios and the assessment of their impact on the work process (Gordić, 2011). This methodology allows testing different strategies and their effects before implementation in a real environment, which reduces risks and improves the efficiency of decisions made.

Another key challenge in the field of OSH is the management of projects related to the improvement of safety measures. Effective implementation of new systems requires precise planning, resource allocation and cost-effectiveness assessment, which can be achieved by applying the principles of project and investment management (Jovanović, 2010). Proper management of projects in the field of OSH enables optimization of costs, increase in long-term sustainability of protection measures and better adaptability of organizations to new security challenges.

The issue of OSH management requires an integrated and multidisciplinary approach, which includes innovative research methodologies, improvement of organizational culture and effective implementation of project management strategies. Using a modal experiment and project management model can significantly improve the OSH system, reduce risks for employees and increase the efficiency of organizations.

Results of the work with discussion

The research conducted within this work provides a scientific and professional overview of the occupational health and safety management system through the evaluation of existing models and a proposal for improvement based on empirical data and a modal experiment (Gordić, 2011). The results indicate that traditional models of OSH management, although functional to a certain extent, often do not correspond to the dynamic challenges of modern industrial and organizational environments (Pušić, 1973; Hale et al., 2019).

Important indicators of the researched content:

Diagram 3. Key aspects of OSH management system analysis. The diagram shows the connection between the efficiency of existing systems, the role of modal experiment, project and investment management, and comparative analysis of international standards.

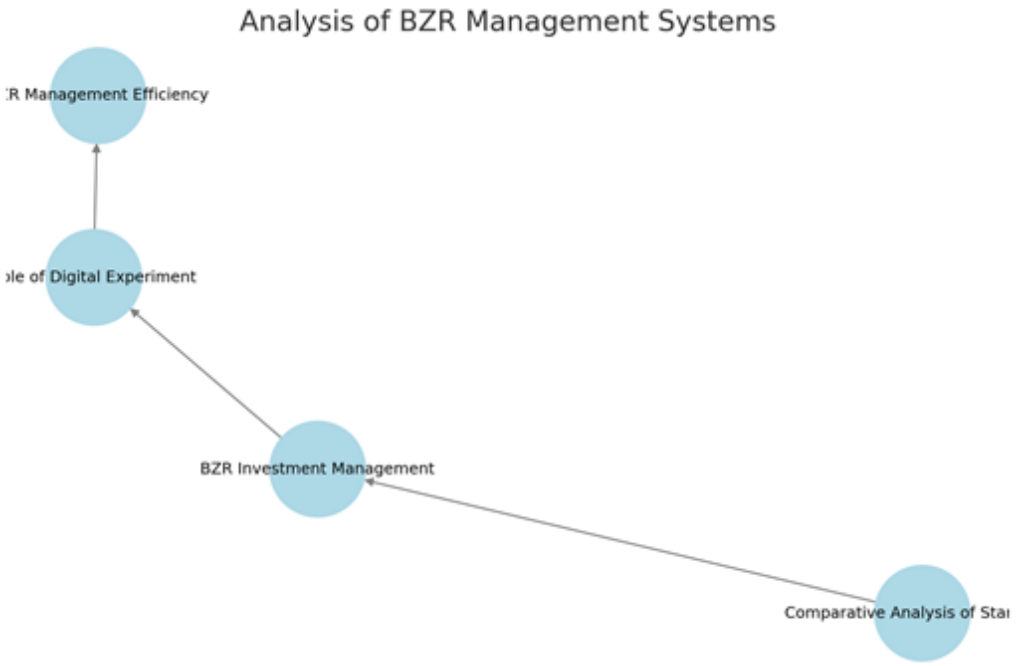

Diagram 3. Key aspects of OSH management system analysis

Effectiveness of existing OSH management systems - An analysis of existing OSH systems found that the dominant models are based on a reactive approach, where protective measures are applied only after an incident. Lack of integrated prevention mechanisms and inadequate risk assessment have been identified as key problems that reduce the effectiveness of these systems (Reason, 1997; Robson et al., 2007).

The role of the modal experiment in the evaluation of the OSH system - By using the modal experiment, it is possible to simulate different scenarios of the implementation of OSH management strategies. This method has shown that adaptive approaches, which

include continuous risk monitoring and flexible response strategies, lead to a significant reduction in incidents and an increase in work efficiency (Gordić, 2011).

Management of projects and investments in OSH systems - Research results show that the success of implementing improved OSH models increases significantly when the principles of project and investment management are applied. In particular, the methodological framework of project management enables the systematic allocation of resources and optimization of the costs of introducing new protective measures (Jovanović, 2010).

Comparative examination of international standards and practices - Comparative examination of different approaches to OSH shows that systems with integrated management models (e.g. ISO 45001) achieve superior results in risk prevention and long-term sustainability of organizations (ISO 45001:2018; Hale et al., 2019).

Discussion of results

The analyzed results indicate that it is necessary to adopt proactive approaches in the management of OSH in order to reduce the number of injuries and occupational diseases. The key success factor is the introduction of models based on a preventive safety culture and the application of innovative risk management methodologies (DeJoy, 2005). The introduction of models based on a preventive safety culture and the application of innovative risk management methodologies are key to successfully reducing incidents and improving safety at work. Research conducted in educational institutions showed that the identification and analysis of security risks enable more efficient management and reduction of potential threats.

The modal experiment proved to be an effective tool for testing different strategies before their implementation, thereby reducing the risks associated with making managerial decisions in the field of OSH (Gordić, 2011). Using a modal experiment allows managers to pre-assess the effectiveness of different OSH strategies, thereby reducing risks when making decisions. In addition, organizations that apply the principle of project management in the process of implementing protective measures achieve better economic profitability and sustainability of the system (Jovanović, 2010). The implementation of project management principles in the process of introducing protective measures allows organizations to more efficiently allocate resources, monitor progress and ensure the achievement of desired results, which leads to better economic profitability and sustainability of the occupational safety and health system.

In conclusion, the research results confirm that the integration of innovative management methods, modal experiment and strategic planning is the key to improving the OSH system. These changes not only contribute to the reduction of professional risks, but also to the long-term increase in productivity and competitiveness of organizations.

Conclusion

An effective OSH management system is an important factor for reducing professional risks, increasing productivity and ensuring the long-term sustainability of organizations. Research has shown that traditional models of OSH management, based on reactive

approaches, are not sufficient in modern industrial conditions, which indicates the need for proactive and integrated strategies.

The use of a modal experiment as a research tool enabled the testing of different safety management scenarios, confirming that preventive measures, continuous risk monitoring and flexible management strategies significantly reduce incident rates and improve organizational resilience. This approach opens up opportunities for a more precise analysis of the impact of managerial decisions on the OSH system, thereby reducing implementation costs and increasing the effectiveness of protective measures.

In addition, the evaluation showed that the management of projects and investments is crucial for the successful implementation of OSH strategies, because a project-oriented approach enables optimization of resources, reduction of costs and provision of long-term sustainable employee protection systems.

Future research should be aimed at further integrating modern digital technologies into OSH management, including artificial intelligence, big data analytics and predictive risk assessment models. Also, it is necessary to investigate how organizational culture and managerial commitment affect the success of OSH system implementation, because the human factor and organizational dynamics are often key to the effectiveness of risk management.

Effective OSH management should be seen as a strategic imperative for improving occupational safety, protecting human resources and sustainable development of organizations, thus contributing to reducing professional risks and increasing competitiveness in the global business environment.

The results of this research confirm that an effective OSH management system is a key factor for reducing professional risks, increasing productivity and long-term sustainability of organizations. Effective management of OSH must not be understood as a regulatory obligation, but as a strategic imperative for improving occupational safety, protecting human resources and sustainable development of organizations. The integration of innovative methodologies, modal experiment and project management can enable the creation of advanced OSH systems that will contribute to reducing professional risks and increasing the competitiveness of organizations in the global business environment.

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UPRAVLJANJE I MODEL SISTEMA BEZBEDNOSTI I ZDRAVLJA NA RADU

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Apstrakt

Sistem upravljanja bezbednošću i zdravljem na radu predstavlja bitan činilac održivog poslovanja i zaštite zaposlenih u savremenim organizacijama. Efikasno upravljanje BZR-om zahteva sistemski pristup koji integriše procenu rizika, usklađenost sa regulatornim zahtevima i primenu savremenih metoda za kontinuirano unapređenje radnog okruženja. Ovaj rad analizira postojeće sisteme upravljanja BZR-om, sa posebnim fokusom na identifikaciju faktora koji utiču na njihovu efikasnost. Korišćenjem naučnih metoda i najboljih praksi iz relevantnih normi, strategija i organizacionih modela, istraživanje ukazuje na potrebu za adaptivnim i dinamičnim pristupom koji omogućava predviđanje, u određenoj meri, radi prevencije profesionalnih rizika. U radu se istražuju pristupi i specifičnosti pojmovnog određenja, kao i praktične implementacije sistema upravljanja bezbednošću i zaštitom na radu, te njihovoj ulozi u smanjenju incidenata, povećanju produktivnosti i unapređenju organizacione kulture bezbednosti.

Ključne reči: *Bezbednost i zdravlje na radu, sistem upravljanja, procena rizika, organizaciona kultura, regulatorni okvir.*

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