“RISKS AND OPPORTUNITIES OF THE DIGITAL TRANSFORMATION OF OCCUPATIONAL HEALTH AND SAFETY IN THE REPUBLIC OF CROATIA - IMPACT ON COMPANY OPERATIONS”

Research Paper

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“Abstract”

Occupational health and safety management (OHS), as a secondary business process, is part of all work processes of a business organization. If a company implements a digital transformation of its business, an integral part of this must be the digitalization of OHS management process. Although at first glance it can be concluded that companies in the Republic of Croatia lag behind European and global companies in terms of the digitalization of OHS processes, there are certainly positive examples. The first part of the paper presents the theoretical assumptions of digitalization and OHS and the previous research in this area. The second part of the paper provides an overview of the results of the most significant analyses and research on the impact of digital transformation on the OHS management system in the Republic of Croatia. The risks and opportunities of the digital transformation of this process are analyzed. The discussion and conclusion provide recommendations for improving the management of risks and opportunities of the digitalization of the occupational health and safety management system and its impact on company operations.

Keywords: digital transformation, impact, OHS, opportunities, risk.

1 Introduction

1.1 Digitalization

Today, digitalization is not just a trend, but a powerful driver of change. Digital technologies are changing the way people live, work and communicate. This is reflected in our individual daily activities but also at the level of global economic systems. Technological progress requires adaptation in order to take advantage of all the opportunities that digitalization brings, but also to adequately manage the risks that may arise from such changes. “Digitalization has the potential to make occupational safety and health more efficient and of higher quality” (Sergeenko at al., 2020).

In the business sector, digitalization has become a key factor of competitiveness. Business organizations recognize the importance of digital transformation in order to improve their processes, increase efficiency and achieve greater value for their customers and stakeholders. However, it has been shown that with these advantages come several challenges and risks, especially when it comes to occupational health and safety (OHS) management.

In the context of OHS management systems, digitalization brings numerous benefits. The application of digital tools and technologies can facilitate the monitoring of working conditions, the identification of potential hazards and the implementation of preventive measures. Real-time data monitoring can enable rapid intervention in case of problems and reduce the risk of injuries at work. Digitalization can improve the efficiency of employee training programs, providing interactive and customized materials that are more easily accessible to employees.

However, it is important to recognize the potential risks and opportunities brought by the digitalization of OHS management systems. Automation and the use of smart technologies can lead to a reduction in human interaction and supervision, which can increase the risk of accidents or technical failures. Digitalization can also require new knowledge and skills from employees, which can pose an additional challenge for organizations.

A detailed analysis of the risks and opportunities brought about by the digitalization of OH&S management is essential. Based on the results of this analysis, it is necessary to develop strategies for the effective management of this process, especially in terms of their impact on the company's operations.

1.2 Purpose, aim and research objective

The OHS management system is based on legal requirements and requirements of international standards. OHS management, as a secondary business process, is part of all work processes and activities, i.e. company operations. Therefore, it is necessary to clearly define the risks and opportunities brought by the digitalization of the OHS management system.

The primary goal of this research is to analyze the existing knowledge about the risks and opportunities of the digitalization of the OHS management system in the Republic of Croatia, especially from the point of view of the impact on the company's operations. The goal will be achieved by researching the available literature and studying case studies.

In accordance with the defined goal of this research project, the following research objectives have been set:

- to analyze and present the basic theoretical concepts of OHS
- to analyze and present the basic theoretical concept of digitalization
- to analyze and present the basic theoretical concept of risks and opportunities
- to identify the fundamental risks and opportunities of the digitalization of the OHS management system in the Republic of Croatia in the area of company operations
- to propose a method for effectively managing the identified risks and opportunities.

2 Research Methods

Given the identified problem, set goals and tasks of this scientific research, appropriate scientific methods were selected. The research methodology uses methods that, with their combination and sequence, meet the requirements of the planned research.

The basic concepts of occupational safety, digitalization, risks and opportunities are investigated using the method of document study and content analysis. The basic concepts are analyzed from selected scientific literature. A combination of deductive and inductive analysis is used to classify and summarize the theoretical foundations of the research subject. The content analysis method is used to analyze theoretical claims. The essential features are described using descriptive methods. After analysis and comparison, the essential features are synthesized and conclusions are drawn.

3 Theoretical Framework

3.1 Occupational health and safety management

Occupational health and safety (OHS) is in practice terminologically identified with occupational safety. Since safety is a superior concept to the concept of protection, it can be concluded that terminologically these two concepts cannot represent and mean the same thing (Palačić, 2021). However, in practice there is a misunderstanding of the difference between these concepts.

OHS is generally defined as the science of predicting, identifying, assessing and controlling hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment. This field is very broad, encompassing many disciplines and numerous hazards in the workplace and in the environment. A wide range of structures, skills, knowledge and analytical capacities are needed to coordinate and implement everything that makes up national OHS systems in order to extend protection to both workers and the environment (Alli, 2008).

Also, OHS is an interdisciplinary scientific and professional field (it comes out of the domain of the existing structure of basic sciences and scientific disciplines) as well as a multidisciplinary field (because it forms a new field in which there are many scientific disciplines that touch and overlap) (Kacian, 1998). This multidisciplinary field is characterized by: work organization, technique, technology, occupational medicine, ergonomics, anthropology, occupational safety law, pedagogy and andragogy, psychology, ecology, sociology, economics, etc.

In the theoretical definition of the term OHS, there is no single position on what OHS is. Although different authors define it differently, it can be said that no definition contradicts the other, so they essentially complement each other.

The science of OHS aims to find measures and procedures that will eliminate the causes that lead to injuries and occupational diseases at work. Injuries and occupational diseases in modern society lead to major harmful consequences, which are manifested primarily in the suffering experienced by injured workers or the families of deceased workers, and then through the large economic losses suffered by society due to lost working days, medical treatment costs, recovery, etc. (Carter, 1979).

Therefore, OHS can be defined as a system of technical, health, legal, psychological, pedagogical and other activities that detect and eliminate hazards and harms that can threaten the life and health of people at work (Palačić, 2020). Based on this, it is concluded that the purpose of OHS is to create safe conditions to prevent injuries at work, occupational diseases and accidents at work (Katić at al. 2024).

OHS is part of the organization of work and the performance of the work process, and is achieved by implementing OHS activities and applying prescribed, agreed, and recognized occupational safety rules and measures ordered and instructions from the employer (Božajić at al, 2010). The employer is responsible for organizing and implementing occupational safety on the basis of objective liability, regardless of whether he has hired an occupational safety expert, organized an occupational safety service or contracted cooperation with an authorized occupational safety person, institution or company for occupational safety. OHS management goes beyond the minimum requirements defined by regulations in this area (Palačić, 2011).

The OHS management system is part of the overall business system of a company that manages health risks inherent in the organization's business activities. Risks arise in the company's operations. The system includes the organizational structure, planning, responsibility, practices, procedures, processes, resources for developing, implementing, enforcing, reviewing and maintaining the organization's OHS policy (Palačić, Mudri, 2014). Therefore, the occupational health and safety management system differs between organizations and between countries (Lalić at al. 2019).

The OHS management system is a continuous, adaptive process consisting of a series of related activities, phases, elements and procedures that enable the normal flow and functioning of business processes and operations. All relevant persons must be involved in this process. Due to the possible consequences, OHS management is one of the more complex and responsible jobs that requires a lot

of activity, attention and thought. Optimal processes are created through an OHS management system through continuous improvement, in which all factors that can contribute participate (Katić, Palačić, 2022). Therefore, the digital transformation of OHS in company operations is of utmost importance.

Previous research on individual elements of an OHS management system was based on the defined elements of an effective OHS management system (Katić. Palačić, 2024).

Economically, morally and legally, OHS has become an important issue. Companies are trying to remain profitable in an increasingly competitive global economy. For these companies, addressing safety, health and environmental issues can mean more than good business practice. For many companies, strong safety, health and environmental programs can mean survival (Friend and Kohn, 2007). Digital transformation is therefore essential. The benefits of digital transformation are numerous.

The management systems and characteristics required for success in OHS are the same as those required for success in any other area of industrial or commercial activity. Organizations that are successful in business tend to be those that have high OHS standards (Cox and Tait, 1998).

3.2 Risks and opportunities

Today, there are risks that we encounter in all activities, private and business (The Orange Book: Management of Risk - Principles and Concepts, 2020). Risk develops over time and human activities have become increasingly uncertain. So there are also risks of digital transformation.

Risk is a complex concept that constantly accompanies all human activities. The concept of risk, due to its ambiguity and complexity, has always attracted the attention of scientists from various fields and branches of science (Palačić, 2021).

Risk has been approached from different aspects, so even today there is no single definition of risk. Risk is defined in many ways, the most important of which are listed below:

- risk is the effect of uncertainty on objectives (the effect is a deviation from the expected - positive and/or negative) (ISO 31073, 2022)
- risk is the effect of uncertainty (ISO 9000, 2015)
- risk is a degree of uncertainty (Mowbray at al, 1979)
- risk is the uncertainty of the outcome within a range of exposure, resulting from the combination of the impact and probability of potential events (Dickinson, 2011)
- risk is the uncertainty of an event that could affect the achievement of objectives, risk is measured in terms of consequences and probability (Borghesi and Gaudenzi, 2013)
- risk is a state in which there is a possibility of a negative deviation from the desired outcome that we expect or hope for (Palačić, 2008).

In order to discover the different aspects and forms in which risks appear, it is necessary to observe them simultaneously from several different perspectives (Borghesi and Gaudenzi, 2013).

Although the negative connotation of risk has long prevailed, some authors (Mowbray et al. 1979; Dickinson, 2011; Bannister et al. 1981; Carter, 1979) have defined risk by emphasizing the dual character of risk that can alternately produce losses or gains. So, here we are talking about both risks and opportunities, or the negative and positive aspects of an event. We can conclude that, depending on the situation, a favorable event can turn into an unfavorable one and vice versa.

The consequences of risk can be negative and positive, or they can lead to uncertainty. An unfavorable event can be described as a negative deviation from an expected positive situation, and on the contrary, a favorable event is described as a positive deviation from an expected negative situation (Risk Management, 2013).

A negative event includes a dangerous event and its negative consequences, as well as the causes behind that event, and an opportunity includes the possibility of improvement (Pidgeon at al, 1992).

Thus, opportunities are positive risks. Whereas a risk is an event with a potentially negative outcome, an opportunity is an event with a potentially positive outcome.

3.3 Digital transformation

In the rapid technological development that brings with it significant technological progress, the digitalization of all business processes has become more than a reality, it has become a necessity. In this sense, digitalization implies the integration of various digital technologies into all business processes and aspects of business. Artificial intelligence has a special place in the context of digital transformation. Under this influence, new risks are created, but also numerous opportunities for the improvement and development of the company.

Business organizations recognize the importance of digital transformation to improve their processes, increase efficiency and achieve greater value for their clients and stakeholders. However, with these benefits come several challenges and risks, especially when it comes to occupational health and safety management. OHS is part of the organization of work and performance of the work process, and is achieved by performing occupational safety and applying the prescribed, agreed, as well as recognized rules of occupational safety and ordered measures and instructions of the employer. Therefore, the digitalization of business processes includes the digitalization of OHS management (Katić and Palačić, 2024).

4 Result and Discussion

In his research, Akyildiz (2023) highlights "how new technologies and smart devices are developing digital applications targeting occupational risks, including digital task analysis, dynamic risk assessment, real-time employee monitoring and protection against unauthorized access." This allows companies to respond quickly to potential threats and changes in working conditions and to take appropriate measures to ensure the health and safety of workers. For example, various sensors in work processes can monitor noise, temperature or the presence of hazardous substances, allowing employers to identify potential risks and take steps to reduce or eliminate them. Furthermore, digitalization facilitates the automation of safety procedures such as reporting accidents or injuries at work. This simplifies these procedures, reduces the possibility of errors or delays, and ensures consistent adherence to workplace safety protocols. Digitalization also enables the collection and analysis of large amounts of data, which helps companies obtain important information about trends related to the safety management system. By analyzing this information, companies can identify areas for improvement and implement targeted actions to prevent accidents and injuries in the workplace and promote a safer work environment.

In an OHS management system, digital transformation can bring many benefits to a company's operations. The use of digital tools and technologies can facilitate the monitoring of working conditions, the recognition of potential hazards and the taking of preventive measures. Monitoring data in a real time frame can enable quick intervention in case of problems and reduce the risk of injuries at work. Also, digitalization can improve the effectiveness of implementing employee training programs by providing interactive and customized materials that are more easily accessible to employees. Digitalization of all process activities carried out in OHS enables their effectiveness and efficiency and can significantly facilitate the work of OHS experts. In other words, the application of digitalization creates numerous opportunities for improvement in all aspects of the implementation of OHS. Thinking about the risks and opportunities of OHS digitalization in an organization should be carried out through consideration of the context of the organization itself, identification of key stakeholders and their needs and expectations (Katić and Palačić, 2024).

Sergeenko at al (32) emphasize that the benefits of digital transformation in managing OHS in the workplace are numerous. OHS management systems have undergone significant changes over the past decades, developing from simple systems that only fulfilled legal obligations to a comprehensive and

proactive approach that integrates health and safety concerns as a fundamental part of organizational business. Digital transformation enables simple and efficient data collection and analysis, allowing organizations to manage workplace safety risks more transparently and effectively. By introducing digital technologies into the OHS process in company operations, it provides better insight, analysis and management of factors that affect the health and safety of employees. However, when making a digital transition and implementing digitalization, it is important to consider how specific risks and opportunities manifest themselves within individual operations in specific industries. A key advantage is that digital technologies enable the proactive implementation of occupational safety measures in real time.

Research conducted by Kashchena and Nesterenko (14) has shown that the latest information systems and technologies play a key role in digital transformation and the formation of a business model focused on the protection and sustainable development of the company. This confirms the importance of digital transformation of the OHS management system in improving working conditions and reducing the risk of injuries in the workplace.

It is noted that the digitalization of OHS management also improves communication and collaboration between interconnected parties. Digital platforms and applications make the process of internal monitoring, sharing employee training materials, access to safe work instructions and other important OHS information more transparent.

The use of digital tools in company operations improves communication, promotes a safety culture and encourages active participation of employees in identifying and solving safety-related problems at work. Digitalization enables the implementation of preventive measures such as predictive analysis and training of workers in simulated scenarios. Such measures can help companies to predict and prevent potential hazards before they occur, thereby reducing the risk of accidents and injuries at work.

Therefore, the digitalization of the OHS management system provides companies with improved capabilities to monitor, analyze and manage the situation in operations.

Other significant aspects of improvement are also being addressed, such as improving the efficiency of the implementation of employee training programs, taking into account the diversity of the workforce. Interactive e-learning modules and various simulations allow workers to acquire the necessary knowledge and skills in a practical and effective way.

There are certainly certain risks. The implementation of digitalization can raise concerns about employee privacy and there is a risk of technical failures or hacker attacks that could compromise data integrity and workplace security. The digitalization process can require significant investment in infrastructure and staff training, which is a deterrent especially in small and medium-sized organizations.

However, ensuring that new digital solutions can seamlessly communicate with organizations' existing software is critical to a holistic approach to OHS management. Therefore, it is important that organizations plan the implementation of digital transformation in detail and provide the necessary resources and experts for the successful implementation of this process.

Digital transformation and the introduction of digital technologies in OHS management is an important step towards improving employee well-being, preventing injuries and creating a safer working environment for all employees, including foreign workers. The digitalization of OHS management systems brings many opportunities to improve working conditions and reduce the risk of occupational injuries, which is crucial for all organizations that want to successfully integrate digital technologies.

To take full advantage of digital transformation, organizations must carefully analyze risks and implement appropriate measures. To reap the benefits of digitalization while mitigating the challenges, organizations must adopt proactive strategies that emphasize stakeholder engagement, data security, flexibility, interoperability, and adaptability. Through careful planning and strategic investment,

organizations can improve the effectiveness and resilience of their OHS management systems in the digital age.

5 Risk and Opportunities of Digital Transformation of OHS – Impact on Company Operations

The scope and level of digital transformation of OHS in the Republic of Croatia at the company's operations level is still at a low level of implementation. There are companies that have entered the process of digital transformation of these processes, but they are rare and mostly foreign-owned.

Digital transformation can bring numerous benefits to the OHS management system at the operational level. The application of digital tools and technologies makes it easier to monitor working conditions, identify potential hazards and take preventive measures. Real-time data monitoring enables rapid intervention in the event of problems and reduces the risk of occupational injuries and fatalities. In addition, it improves the efficiency of the implementation of employee training programs, provides interactive and customized materials that are more easily accessible to employees. The digitalization of all process activities carried out in OHS at the company's operations level enables their efficiency and effectiveness and can significantly facilitate the work of OHS specialists. In other words, the application of digitalization creates numerous opportunities for improvements in all aspects of OHS implementation.

Also, it is important to recognize the potential risks and challenges brought by the digitalization of the OHS management system. Digitalization can require new knowledge and skills from employees, which can represent an additional challenge for organizations. Given that information technologies are applied, the risk of malicious software (viruses, etc.) and hacker attacks must not be ignored. OHS management is not exempt from information and cyber risks, as well as risks in the protection of personal data. Also, there is a risk of non-acceptance of digitalization by the people who need it most, the OHS experts. Are OHS experts in the Republic of Croatia computer-literate enough for the digitalization of occupational safety? How to overcome this gap? How to explain to employers the justification of investing in the digitalization of the OHS area?

Thinking about the risks and opportunities of digitalization of OHS in the organization should be carried out through consideration of the context of the organization itself, identification of key stakeholders and their needs and expectations.

The analysis of the organizational context involves an overview of external and internal issues that have or may have an impact on the digitalization of OHS in the company's operations. External issues, for example, may be the possibility of obtaining state or other subsidies for digitalization, the requirement that reporting and sending data to the competent ministry be carried out using digital tools, etc. Internal issues may be the organization's readiness for such changes, the readiness or resistance of OHS experts to digitalization, the possession of the necessary infrastructure, etc. Stakeholders, or interested parties in the process and application of the digitalization of occupational safety and health, may also have different expectations, but also influences on the actual implementation and application of the digitalization of OHS at the operational level.

On the basis of everything presented, it is concluded that before implementing the digitalization of occupational health and safety, it is necessary to conduct a quality analysis of the risks and opportunities of the digital transformation of OHS at the operational level of the company. Starting the digital transformation process without identifying the risks could end up with abandoning the project. By digitally transforming OHS at the level of operations, companies can ensure numerous benefits. Although the process of digital transformation of OHS at the operational level of the company in the Republic of Croatia is only at the beginning, it is inevitable. Support for the digital transformation is also provided by the competent Ministry, which has implemented the occupational health and safety information system (ISZNR). This system is still being developed and will certainly further promote

digital transformation at the level of companies and their operations. Therefore, it is expected that in the coming time, the digital transformation of OHS will have a stronger presence.

6 Conclusion

The world is changing drastically under the influence of digital technologies. Therefore, the digital transformation of business processes is more than necessary. When looking at business processes, OHS management is a secondary process. The fundamental task of this process is to ensure safe conditions and a working environment for the smooth running of the company's primary process. The primary process includes the company's operations.

The analysis conducted determined that the scope and level of digital transformation of OHS in the Republic of Croatia at the company's business level is still at a low level of implementation. Digital transformation has so far only slightly affected OHS in company operations. There are companies that have entered the process of digital transformation of these processes, but they are few and mostly foreign-owned. From this it can be concluded that this process in the Republic of Croatia has yet to cover a wider area. If we want to keep up with the development of global economies, this step is inevitable.

Based on all the above, it can be concluded that before implementing the digitalization of OHS, it is necessary to conduct a quality analysis of the risks and opportunities of the digital transformation of OHS at the operational level of the company. Starting the digital transformation process without identifying the risks could end up with the abandonment of the project. If we want to keep up with the development of global economies, this step is inevitable.

With the digital transformation of OHS in operations, companies can ensure numerous benefits. Although the process of digital transformation of OHS at the operational level of a company in the Republic of Croatia is only at its beginning, it is inevitable. Support for digital transformation is already provided by the competent Ministry, which has implemented the Occupational Safety and Health Information System (OSHIS / ISZNR). This system is still being developed and will certainly further promote digital transformation at the level of companies and their operations. Therefore, it is expected that in the coming time, the digital transformation of OHS will be much more present.

It can be concluded that the goals and objectives of this research have been achieved. The conducted research determined and analyzed the theoretical settings of OHS and the risks and opportunities of digital transformation implemented by OHS in company operations. Fundamental risks and opportunities are identified and recommendations are made on how to manage them.

After this research, it is suggested to launch case study research in a selected company that has successfully implemented the digital transformation of OHS management in its operations.

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