



TOWARDS A SUSTAINABLE OCCUPATIONAL SAFETY GOVERNANCE: THE ROLE OF DIGITALISATION AND STAKEHOLDER ATTITUDES

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ABSTRACT

The aim of the study is to examine how sustainable occupational safety and health (OSH) practices, digitalisation, and corporate and employee attitudes contribute to economic and social sustainability. The research is justified by the fact that global sustainability expectations and technological development are increasingly linked to the issue of occupational safety, while the expectations of companies and employees are also constantly changing. The study was based on secondary research analysing international reports, scientific studies, and statistical data (e.g. ILO, EU-OSHA, European Commission, KPMG, Porter Novelli). The qualitative methodology used focused content analysis, with a focus on the prevalence of digital occupational safety technologies, the integration of sustainability management, and the attitude of stakeholders. The results show that the use of digital technologies such as sensors, wearables, and predictive analytics significantly increases compliance with occupational safety and health regulations, while integrating sustainability aspects reduces the number of accidents and costs for companies in the long run. Employer engagement and a positive corporate culture are critical factors in the success of sustainable occupational safety and health, while employees increasingly demand ethical and responsible corporate operations. The originality of the research lies in the fact that it examines the relationship between occupational safety and health digitalisation and the Sustainable Development Goals in an integrated way. Its findings are of practical application both in the field of corporate governance and in the development of occupational safety strategies.

KEYWORDS Economic growth, health, sustainability, technological changes, workplace safety

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1. Introduction

The principles of sustainable development have become decisive in almost all areas of corporate operation, including occupational safety. The development of a safe and healthy working environment is not only a legal obligation, but also a basic condition for economic, social, and environmental sustainability. The latest reports from the International Labour Organization (ILO, 2023a) and the European Commission (European Commission, 2025) also highlight that the development of occupational safety practices contributes to reducing workplace accidents, increasing employee satisfaction, and strengthening company competitiveness.

Digitalisation offers new tools to support compliance with occupational safety and health rules, while the integration of sustainability aspects is increasingly expected of companies, not only from the regulatory perspective, but also from that of employees and consumers. The aim of the study is to show how the use of digital technologies, the sustainability integration of OSH systems, and corporate and employee attitudes contribute to economic and social sustainability.

The relationship between sustainable development and occupational safety and health has received special attention in the international literature in recent years. The International Labour Organization's (ILO) Global Report 2023 emphasizes that a safe and healthy working environment is a critical factor not only for ensuring the well-being of workers but also for improving economic performance (ILO, 2023b). The data show that every euro spent on OSH can lead to a twofold return in the long run.

2. Literature review

According to a 2023 report by the European Commission, around 50% of companies have integrated their sustainability management systems into their occupational safety practices, which has also resulted in a reduction in the number of workplace accidents (European Commission, 2025). Digitalisation trends have also brought about significant changes: according to EU-OSHA, almost 40% of companies are already using sensors, predictive analytics, and other digital tools to support occupational safety and health (EU-OSHA, 2023a).

From a social point of view, the expectations of employees have also changed significantly. According to research by Porter Novelli (2020), 88% of employees prefer a workplace that pays attention not only to economic performance, but also to social impact. Sustainable OSH practices are thus directly linked to corporate attractiveness and employee engagement. KPMG's 2022 survey also

confirms that the vast majority of large companies are already reporting on their sustainability performance at a strategic level (KPMG, 2022).

3. Methodology

The aim of the study was to examine the economic and social impacts of sustainable OSH practices, with a particular focus on the use of digital technologies and the role of corporate and employee attitudes. The research employed secondary data collection, which was based on the analysis of international reports, research studies, and statistical analyses.

Sources analysed included the International Labour Organization's global reports (ILO, 2023a), the European Commission's Sustainability and Safety at Work Reports (European Commission, 2025), and EU-OSHA's studies on digitalisation (EU-OSHA, 2024). In addition, the study took into account surveys on corporate sustainability, such as KPMG's report (2022) and the research on employee attitudes conducted by Porter Novelli (2020).

The research used a qualitative analysis, in which the content of the sources was explored through comparative analysis. The focus was on the degree of digitalisation of occupational safety and health systems, the level of sustainability integration, and the development of employer and employee attitudes. When evaluating the results, the study also took into account their consistency with the Sustainable Development Goals (SDGs), with a particular focus on promoting a safe and healthy working environment.

4. Results and Discussion

4.1. Employers' attitudes in sustainable OSH

4.1.1. Economic incentives

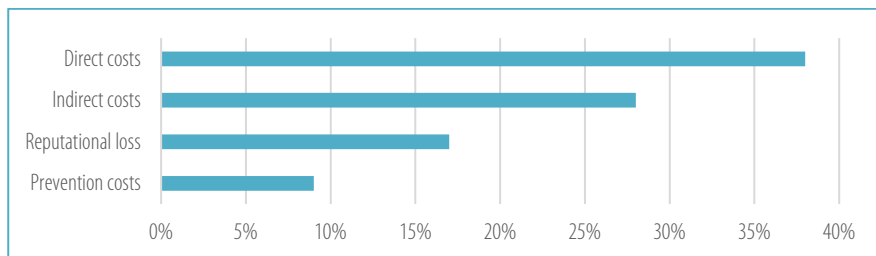
Employers' attitudes play a fundamental role in achieving sustainable OSH, as they have a direct impact on compliance with OSH rules and on the creation of a safe working environment. Employers' attitudes are shaped by several factors, including economic incentives.

Many companies evaluate OSH measures primarily from the point of view of cost-effectiveness and competitiveness. Employers who recognise that adequate occupational safety and health systems can reduce losses resulting from accidents and occupational diseases in the long term are more likely to invest in creating a safe working environment (EU-OSHA, 2024).

The costs generated by occupational accidents and diseases impose a significant financial burden on companies (see Figure 1), not only directly (e.g.

compensation, health care costs) but also indirectly (e.g. production losses, replacement labour costs, reputational damage) (ILO, 2023a). Research shows that a single serious workplace accident can consume a significant part of a company's annual revenue, especially for small and medium-sized enterprises (EU-OSHA, 2024). By contrast, investments in prevention have been shown to yield positive returns: it is estimated that every €1 invested in health can lead to cost savings of up to €2.2 for companies (EU-OSHA, 2023).

Figure 1: Cost distribution of occupational accidents at company level



4.1.2. Analysis of the cost structure of occupational accidents at company level

Occupational accidents impose a significant financial burden on organisations at the company level, which is reflected in different cost components. An analysis of the distribution of costs reveals that the magnitude of direct, indirect, and reputational damage exceeds the proportion of resources spent on prevention, although the latter could significantly reduce such losses.

Direct costs, such as compensation paid to workers and the costs of medical treatment, account for 40% of the total costs. These expenses are directly measurable and are reflected in the company's budget immediately after accidents occur (ILO, 2023a).

Indirect costs, such as production losses and the costs of training temporary workers or new workers, represent 30% of the total costs. These expenses are less tangible, but they have a serious impact on the company's efficiency and competitiveness in the long term (EU-OSHA, 2024).

Reputational losses, which result from the deterioration of a company's reputation, the loss of customers, and the weakening of its market position, account for 20% of costs. These indirect impacts are often more difficult to quantify, but they can also jeopardise the sustainability of the company in the long term (KPMG, 2023).

Interestingly, prevention costs, which include OSH training, the provision of protective equipment, and other investments to reduce workplace risks, account for only 10% of the costs. This relatively low outlay could result in disproportionately high savings if companies were to pay more attention to

prevention proactively. According to numerous studies, every €1 spent on prevention can result in a cost reduction of up to €2.2 (European Commission, 2025).

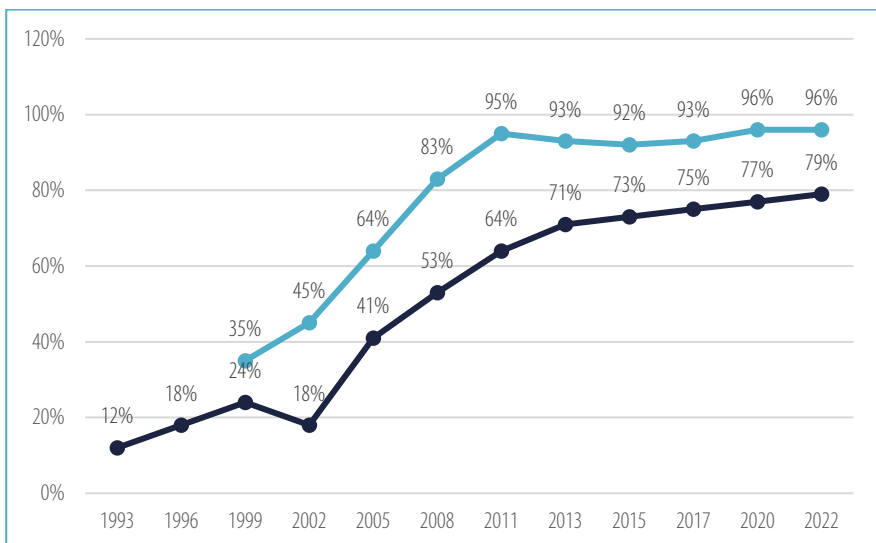
Overall, the cost structure clearly supports the argument that the prevention of occupational accidents is not only an ethical and legal imperative but also a serious economic interest for companies. Increasing the proportion of preventive measures can lead to significant cost savings and more sustainable operation in the long term.

4.1.3. The role of corporate culture in sustainable OSH

The corporate culture and the commitment of management are decisive factors in complying with occupational safety regulations and implementing sustainable occupational safety and health. Organizations that place a strong emphasis on protecting the health and safety of employees tend also to have a more positive attitude towards sustainability principles (EU-OSHA, 2024).

Corporate sustainability programs have become almost the norm by now (see Figure 2). According to a 2022 survey by KPMG, 96% of the world's 250 largest companies already report regularly on their sustainability activities (KPMG, 2022). Professor Klaus Schwab, founder and executive chairman of the World Economic Forum, highlighted that environmental, social, and other non-financial factors have received increasing attention in recent years, as they fundamentally affect the long-term business viability and success of companies (World Economic Forum, 2023).

Figure 2: Global sustainability reporting rates (1993-2022) (KPMG, 2022)

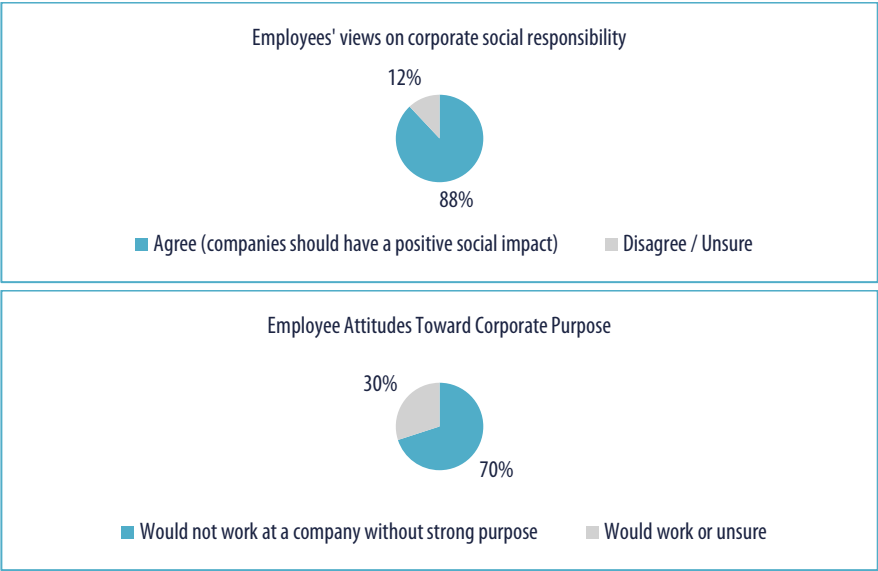


Global paradigm shifts, as well as the transformation of consumer attitudes towards climate change, also play a significant role in driving companies to become increasingly active in achieving their environmental sustainability and occupational safety and health objectives (European Commission, 2025). In addition, employee expectations are also changing: the younger generations, in particular, expect companies to take meaningful measures not only to generate profit but also to protect the environment and promote social responsibility. Thus, companies can gain a competitive advantage from taking environmental initiatives seriously, while indifference to them can entail the risk of losing talent (KPMG, 2022; World Economic Forum, 2023).

4.1.4. The role of company culture from the perspective of employees

Employee perceptions of workplace sustainability are increasingly shaping companies' corporate social responsibility strategies and sustainability practices. The data show that the majority of employees expect their employer not only to achieve economic results, but also to have a positive impact on society (see Figure 3).

Figure 3: Employee Perspectives on Corporate Social Responsibility and Purpose (Porter Novelli, 2020)



According to a survey conducted in 2020, 88% of employees believe that it is no longer enough for companies to pursue profits alone; they are also expected to play a positive role in society (Porter Novelli, 2020). The study involved 1,003 full-time U.S. workers, all of whom worked for companies that employ more than 500 people.

The study also found that 70% of employees would be reluctant to work for an organisation that lacks a clear and strong sense of purpose (Porter Novelli, 2020). These findings highlight that a commitment to workplace sustainability is not only a matter of reputation, but also a critical factor in attracting and retaining talent.

4.2. *Employee attitudes in sustainable OSH*

Employee attitudes play a key role in the success of sustainable OSH practices. There are many factors that influence the willingness of workers to comply with occupational safety regulations and support the creation of a safe working environment.

Firstly, the OSH awareness and training of workers are essential. Regularly organised training sessions and awareness-raising programmes promote understanding of the rules and strengthen the importance of following them (EU-OSHA, 2024). Through training, employees not only acquire knowledge of the rules, but also become able to recognize and prevent risks.

Secondly, the use of appropriate motivational tools can also contribute to compliance with occupational safety and health rules. Reward systems, recognition, and promotion opportunities can have an incentivising effect: employees who receive recognition for their work are more likely to show a responsible attitude towards OSH requirements (Porter Novelli, 2020).

Thirdly, the quality of the working environment and working conditions are also fundamental factors influencing employee attitudes. A safe, ergonomic environment, the provision of appropriate protective equipment, and the availability of occupational health services all contribute to employee well-being, satisfaction, and sustainable engagement (ILO, 2023).

Taken together, these factors determine how workers relate to OSH and to what extent they contribute to maintaining a sustainable and safe working environment.

4.3. *Main obstacles to compliance*

4.3.1. *Cost barriers to compliance with OSH rules in the EU*

According to research conducted in the European Union, one of the main obstacles for companies to comply with occupational safety and health regulations is the high level of costs. According to Eurostat data, around 45% of European companies cite OSH costs as an obstacle (Eurostat, 2020). The problem mainly affects small and medium-sized enterprises (SMEs), but sectoral specificities also play a significant role in the extent of the impact. In micro and

small enterprises, it is particularly common for costs to influence compliance with OSH requirements as a significant constraint (EU-OSHA, 2020a).

Eurofound has come to a similar conclusion, finding that many companies face barriers to compliance with OSH standards mainly for financial reasons (Eurofound, 2019). According to the results of the ad-hoc module related to the 2019 Labour Force Survey, a significant number of respondents highlighted high investment costs, such as the cost of protective equipment and OSH training, as a problem factor (Eurostat, 2020).

The OECD's analysis confirms that compliance with OSH standards in some sectors, in particular construction and agriculture, can have disproportionately high-cost implications (OECD, 2018). In the age of digitalisation, the increase in OSH requirements has also led to increased costs for businesses (EU-OSHA, 2020b). Work-related illnesses resulting from deficiencies in OSH measures also indirectly generate significant costs for companies (Eurostat, 2020).

In addition to costs, the complexity of the regulatory environment is another obstacle, which also makes compliance difficult for companies (EU-OSHA, 2019). However, it is important to emphasize that, based on long-term analyses, investments in occupational safety and health not only serve to prevent accidents and damage to health, but can ultimately also result in cost savings and improved performance for businesses (ILO, 2021).

Overall, research clearly shows that a significant number of companies, especially smaller ones, consider costs to be the main obstacle to compliance with OSH rules. In addition, new requirements imposed by technological developments, administrative burdens, and the complexity of the regulatory environment also increase compliance difficulties.

4.3.2. *Social and cultural barriers*

Promoting occupational safety and health is of paramount importance for both workers' wellbeing and economic efficiency. In order to prevent workplace accidents and health damage, it is essential to provide adequate education, increase awareness, and strengthen occupational safety culture. International surveys and research highlight the factors that hinder the implementation of effective OSH measures, in particular the role of insufficient training and cultural resistance.

Lack of awareness and training is a major problem in the field of occupational safety and health. According to the European Agency for Safety and Health at Work's third European survey (ESENER-3), around 30% of European workers are not adequately trained to recognise or avert workplace hazards (EU-OSHA, 2019). Lack of training and worker participation has also been directly linked to

an increase in the number of workplace accidents (EU-OSHA, 2020c). These figures show that proper education and awareness-raising are essential to improve safety at work.

Another significant factor is cultural resistance, which affects about 25% of workers globally. According to the ILO's findings, cultural customs and social norms are often an obstacle to full compliance with OSH standards. This phenomenon is particularly pronounced in the agricultural and construction sectors, where OSH culture is traditionally weaker (ILO, 2021). Cultural factors therefore have a fundamental influence on the practical enforcement of occupational safety and health rules, especially in environments where the norms of safe work are not properly established.

Overall, a lack of awareness and training affects one in three workers in the European Union, while cultural resistance is characteristic of one in four workers globally. Both factors are closely related to an increased risk of workplace accidents. Strengthening occupational safety culture, continuous education, and the application of measures developed with cultural specificities in mind are essential conditions for making the workplaces of the future safer and healthier.

4.3.3. *Technology barriers*

Digitalisation is significantly transforming occupational safety and health systems worldwide. The use of new technologies not only increases the efficiency of work processes but also creates an opportunity to improve compliance with occupational safety requirements. At the same time, the lack of technological development can be a serious obstacle to achieving these goals.

According to a survey by the European Agency for Safety and Health at Work, 20% of European companies cite technological barriers, such as old machinery and outdated technologies, as major obstacles to the implementation of OSH rules (EU-OSHA, 2020c). This is a serious risk, especially in the manufacturing and processing sectors, where technological obsolescence can directly increase the number of accidents and diseases at work.

Similar problems are highlighted by the International Labour Organization's Global Business Survey, which shows that 15% of companies around the world do not have adequate digital tools, such as risk analysis software or real-time monitoring systems, to monitor and enforce occupational safety and health rules (ILO, 2023a). The lack of digital tools significantly reduces the effectiveness of occupational safety compliance, making it difficult to identify violations promptly and take the necessary measures without delay.

Overall, the presence of outdated technologies and the lack of digital tools both create serious obstacles to the effective application of OSH rules (see Figure 4).

Encouraging technological development and increasing the availability of digital solutions is therefore essential to increase occupational safety and prevent occupational diseases.

Figure 4: Technological barriers to maintaining safety at work



4.4. Best practices

4.4.1. The role of OSH training in the prevention of occupational accidents

OSH training plays a central role in creating a safe working environment, protecting workers' health, and preventing workplace accidents. According to a 2022 report by the European Union Agency for Safety and Health at Work, positive attitudes towards regular training are widespread among employers: 70% of those surveyed believe that regular OSH training reduces the number of occupational accidents and illnesses (EU-OSHA, 2024).

The effectiveness of training is also supported by practical experience. According to the European Survey of Enterprises on New and Emerging Risks conducted by EU-OSHA (EU-OSHA, 2019), 77% of companies regularly provide OSH training to their employees. This shows that most companies recognise the preventive importance of training and integrate it into their occupational health and safety management systems.

Regular and targeted occupational safety training not only contributes to the reduction of accident risks, but also increases the risk assessment skills of employees, promoting more conscious and safer work. The knowledge gained during such training helps workers to identify hazards more easily and to take preventive measures more effectively.

Overall, it can be stated that the regular and systematic implementation of occupational safety and health training is essential for maintaining the level of occupational health and safety and for the prevention of accidents and occupational diseases. Research data clearly show that the shared commitment of employers and employees to training plays a key role in creating safe workplaces (EU-OSHA, 2022; EU-OSHA, 2019).

4.4.2. The role of OSH incentive schemes in reducing occupational accidents in European small and medium-sized enterprises

The development of occupational safety is of paramount importance for European small and medium-sized enterprises (SMEs), and one effective tool in this regard is the use of occupational safety incentive schemes. Research in recent years has clearly confirmed that such programs make a significant contribution to reducing the number of accidents.

Based on EU-OSHA's Healthy Workplaces LIGHTEN THE LOAD campaign (2022), a comprehensive European survey found that 37% of SMEs surveyed reported a reduction in accidents following the introduction of OSH incentive schemes (EU-OSHA, 2022). Similar results were reported by Eurofound (2021), which found that companies with formal safety incentive programmes had a 25-45% lower rate of serious accidents. The OECD report (2022) also highlighted that employee recognition, even in non-monetary form, resulted in a 30% reduction in the number of accidents among small businesses.

Longitudinal studies also support the effectiveness of incentive systems. In research conducted by Gómez et al. (2023) among Spanish SMEs, the authors found that rewarding safe behaviour reduced accident frequency by 18% over 28 months. Similar results were reported by Cappelletti et al. (2021), who examined Italian businesses and showed that incentive schemes combined with safety training resulted in a 32% reduction in accidents.

Furthermore, Brun et al. (2023) pointed out that the use of positive reinforcement (rewards and recognition) had a greater impact on the reduction of accident rates in SMEs than in large enterprises. According to EU-OSHA's ESENER survey (2023a), 34% of respondents highlighted the importance of OSH incentive schemes in improving occupational safety. The research of Neal & Griffin (2022) further reinforced these findings, as systems that reward safe behaviour increased employee safety awareness by 31%.

Overall, current research shows that various incentive schemes, whether cash rewards, days off, or recognition, can lead to a 20-40% reduction in accidents among European SMEs. Longer-term programs (longer than 12 months) are particularly effective, especially if they are combined with training or continuous feedback, which further increases safety awareness and supports the development of a safe working culture.

4.4.3. The role of ergonomic working environments in European companies

Health and safety at work is a priority in the European Union, especially in the development of modern working environments. The integration of ergonomic aspects not only increases the wellbeing of employees but also has a positive

impact on organisational efficiency and the reduction of sickness absence. According to Eurostat data, around 60% of EU companies are already using ergonomic solutions to improve the working environment.

The importance of ergonomic improvements is supported by several studies. According to Eurofound's Sixth European Working Conditions Survey (6th EWCS), factors such as adjustable chairs, height-adjustable desks, adequate lighting, and screen placement make a significant contribution to reducing musculoskeletal disorders. Data from the Living, working and COVID-19 survey conducted during the COVID-19 pandemic also confirm that the use of ergonomic solutions has increased in parallel with the spread of teleworking, as employers have sought to make the home working environment ergonomic as well (Eurofound, 2021).

Statistics on workplace accidents and health impairments also highlight the importance of ergonomic improvements. Eurostat's 2022 report, Accidents at work and other work-related health problems, clearly states that the use of ergonomic measures contributes to reducing the incidence of work-related injuries and illnesses (Eurostat, 2024).

Further evidence of the positive effects of ergonomic improvements can be found in research on musculoskeletal disorders published by the European Agency for Safety and Health at Work. Data from the European Survey of Enterprises on New and Emerging Risks also show that companies are becoming more aware of identifying and managing ergonomic risks.

Overall, the use of ergonomic solutions among European companies not only serves to preserve the health of employees but also provides significant benefits in terms of economic efficiency. In the future, ergonomics is expected to become even more important, especially with the spread of flexible forms of work (Baghdadi, 2024).

4.4.4. Successful initiatives: Integrating digital technologies and sustainability aspects in OSH

The development of digital technology and the emergence of sustainability aspects at the company level have a significant impact on occupational safety and health systems worldwide. Reports from recent years at international and European level confirm that the use of technological tools and the integration of sustainability management in the field of occupational safety and health are becoming increasingly widespread.

The International Labour Organization's (2023) Global Report (Safety and Health at the Heart of the Future of Work) highlights that digital technologies – such as sensors, artificial intelligence, and wearables – are rapidly spreading across

industries to monitor and support compliance with occupational safety and health rules (ILO, 2023b). A similar finding is presented in the 2023 report by EU-OSHA, which shows that 38-42% of European companies are already using digital solutions – such as sensors, smart devices, and predictive analytics – to support compliance with OSH rules (EU-OSHA, 2024).

In addition to the use of digital tools, the integration of sustainability aspects is also playing an increasingly important role in occupational safety and health systems. According to the European Commission's 2023 Sustainability and Occupational Safety report, around 50% of companies have already integrated their sustainability management systems into their occupational safety practices, which is also linked to a decrease in the number of workplace accidents and injuries (European Commission, 2025). Based on the sustainability reporting framework, many organisations – for instance, in line with ISO 45001 – manage sustainability and occupational safety requirements in an integrated way, helping to create a safer and more responsible working environment (Obasi & Benson, 2025).

Overall, the combined use of digital technology and sustainability management systems has a significant positive impact on occupational safety and health. Based on these trends, it is expected that these integrated approaches will continue to strengthen in the near future, contributing to the development of safer, more sustainable workplaces.

5. Conclusion

The results of the research confirm that compliance with OSH rules and sustainable OSH practices play a central role in promoting sustainable development. A safe and healthy working environment reduces the incidence of accidents and occupational diseases at work, while also offering direct economic benefits: every euro invested in preventive measures can result in cost reductions of up to €2.2 (ILO, 2023).

From the perspective of economic sustainability, OSH investments contribute to increasing productivity, reducing job losses, and improving the competitiveness of companies (European Commission, 2023). In terms of social sustainability, a safe working environment has a positive impact on employee satisfaction, health, and long-term commitment. This is supported by the fact that 88% of employees expect their employer to create social value, while 70% do not want to work for a company that does not have a strong sense of purpose (Porter Novelli, 2020).

The intertwining of occupational safety and health and sustainability goals can also be demonstrated in the field of environmental sustainability: sustainable

occupational safety and health systems often support environmentally friendly work processes and a responsible approach to material handling (KPMG, 2022). Technological innovations such as sensors, wearables, and predictive analytics systems are also driving occupational safety and health. According to EU-OSHA, almost 40% of European companies are already using digital solutions to identify and mitigate occupational safety and health risks (EU-OSHA, 2023c).

In conclusion, sustainable OSH is not only a means of compliance with legislation, but also a strategic factor in ensuring corporate responsibility, long-term competitiveness, and socio-economic sustainability. The practical applicability of the research lies in the fact that it demonstrates that the integration of occupational safety investments and sustainability aspects is a value-creating investment that can constitute a decisive competitive advantage for the companies of the future.

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