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The historical evolution of occupational safety: regulatory consolidation and challenges to effective worker protection

A evolução histórica da segurança do trabalho: consolidação normativa e desafios na efetividade da proteção ao trabalhador

La evolución histórica de la seguridad laboral: consolidación normativa y desafíos para la protección efectiva del trabajador

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Abstract: Throughout history, occupational safety has been a fundamental field for promoting workers' health and physical integrity. This study explores the historical evolution of occupational safety, from the earliest forms of labor protection to contemporary practices based on regulatory standards and public policies. It focuses on understanding how social, industrial, and technological transformations influenced the improvement of worker-protection measures. The methodology consisted of a literature review analyzing books, academic articles, and relevant legislation. The results indicate that, despite significant progress, numerous challenges remain regarding accident prevention and the effectiveness of safety standards. The study concludes that occupational safety evolved from rudimentary practices into a structured system and now plays a fundamental role in improving quality of life and reducing occupational risks.

Keywords: Occupational safety. History. Occupational health. Prevention. Regulatory standards.

Resumo: Ao longo da história, a segurança no trabalho tem sido uma área fundamental para a promoção da saúde e da integridade física dos trabalhadores. Este estudo explora a evolução histórica da segurança no trabalho, desde as primeiras formas de proteção laboral até às práticas contemporâneas baseadas em normas regulamentares e políticas públicas. O estudo centra-se na compreensão de como as transformações sociais, industriais e tecnológicas influenciaram o aperfeiçoamento das medidas de proteção dos trabalhadores. A metodologia utilizada consistiu numa revisão da literatura, analisando livros, artigos acadêmicos e legislação relevante sobre o tema. Os resultados da investigação indicam que, apesar dos progressos significativos alcançados, ainda se enfrentam inúmeros desafios no que diz respeito à prevenção de acidentes e à eficácia das normas de segurança. A conclusão da investigação é que a segurança no trabalho evoluiu de práticas rudimentares para um sistema estruturado, assumindo um significado fundamental na sociedade atual para a melhoria da qualidade de vida e a redução dos riscos profissionais.

Palavras-chave: Segurança no trabalho. História. Saúde no trabalho. Prevenção. Normas regulamentares.

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Resumen: A lo largo de la historia, la seguridad laboral ha sido un ámbito fundamental para promover la salud y la integridad física de los trabajadores. Este estudio analiza su evolución histórica, desde las primeras formas de protección laboral hasta las prácticas contemporáneas basadas en normas reglamentarias y políticas públicas. Se centra en comprender cómo las transformaciones sociales, industriales y tecnológicas influyeron en el perfeccionamiento de las medidas de protección de los trabajadores. La metodología consistió en una revisión bibliográfica de libros, artículos académicos y legislación pertinente. Los resultados indican que, pese a los importantes avances alcanzados, persisten numerosos desafíos relacionados con la prevención de accidentes y la eficacia de las normas de seguridad. Se concluye que la seguridad laboral evolucionó desde prácticas rudimentarias hasta un sistema estructurado y adquirió un papel fundamental en la sociedad actual para mejorar la calidad de vida y reducir los riesgos profesionales.

Palabras clave: Seguridad laboral. Historia. Salud laboral. Prevención. Normas reglamentarias.

1. Introduction

1.1 Theme

Occupational safety stands out as one of the main instruments for protecting workers' health, physical integrity, and dignity, and it plays a fundamental role amid constant changes in production processes and labor relations. Although occupational risks have existed since the earliest forms of human work, more effective concern with preventing work-related accidents and diseases emerged with the Industrial Revolution, encouraging the creation of rules and mechanisms to protect workers. Despite legislative and technological advances over the years, occupational accidents and diseases remain a significant social and economic problem worldwide. In this context, studying occupational safety is indispensable for understanding risk factors and developing effective preventive strategies. As Gil (2022) explains, scientific research produces systematized knowledge through rigorous methods and critical analysis of reality, contributing to solutions capable of promoting safer and healthier workplaces.

Throughout history, occupational safety developed alongside social and economic transformations, evolving from rudimentary practices into a structured system of standards, laws, and public policies for worker protection. The Industrial Revolution was a decisive milestone because it revealed the need to regulate working conditions and encouraged legal protection mechanisms. Occupational safety thus ceased to be an individual concern and acquired a collective and institutional character. Today, it is directly related to occupational health, quality of life, and productivity. Moreover, although technological progress introduces new workplace risks, it also enables more effective prevention and control strategies. Chiavenato (2021) notes that occupational safety management has become strategic in modern organizations, contributing significantly to worker performance and well-being.

Consequently, safety management became a strategic organizational activity involving training and education, the use of protective equipment, and strict compliance with regulatory standards. It is therefore necessary to understand the historical trajectory of occupational safety in order to analyze its progress and current challenges. This study examines the historical evolution of safety practices, from the earliest records to the present, emphasizing the main legal and social milestones that promoted the development and consolidation of this field.

1.1.2 Research problem

In view of the historical evolution of occupational safety, the following guiding questions arise: how have social, industrial, and technological transformations promoted the development of occupational safety practices? What are the main current challenges to ensuring effective worker protection?

1.1.3 Hypothesis

This study is based on the hypothesis that industrial and social transformations produced significant development in occupational safety throughout history, but challenges remain concerning the effective application of standards and awareness among workers and employers.

1.1.4 General objective

To analyze the evolution of occupational safety from its historical development to the present day, emphasizing its main advances, transformations, and challenges and considering, from an innovative perspective, the effects of new technologies, changes in labor relations, and the broader concept of occupational health on effective worker protection.

1.1.5 Specific objectives

Identify the historical milestones of occupational safety;
Examine the evolution of legislation and regulatory standards;
Analyze contemporary challenges related to occupational safety.

1.1.6 Rationale

This topic was chosen because occupational safety has major social and academic importance, as it is directly related to safeguarding workers' lives, health, and dignity. In a context in which occupational accidents remain a serious problem, understanding their historical evolution helps identify gaps, progress, and possibilities for improving current practices. This study also contributes to the development of critical thinking among professionals, encouraging preventive measures and appreciation of a safety culture.

The study is particularly important because it addresses a current and necessary topic at a time when the world of work is undergoing continuous transformation driven by technology and new forms of work organization. It also contributes to academia by bringing together relevant information on the evolution of occupational safety and lays the groundwork for future research and more effective professional practices.

2. Methodology

By its nature, this is fundamental research intended to expand theoretical knowledge about the history of occupational safety, without seeking immediate practical application. According to Lakatos and Marconi (2003), fundamental research seeks to expand the existing theoretical body without necessarily targeting immediate applications.

Methodologically, this study is qualitative because it is based on interpreting and analyzing information obtained from theoretical sources such as books, scientific articles, and legislation. This approach aligns with Minayo's (2012) perspective, which emphasizes the importance of interpreting social and historical phenomena for a broader understanding of reality.

Regarding its objectives, the research is exploratory and descriptive. According to Gil (2008), exploratory research seeks greater familiarity with a problem, while descriptive research aims to present the characteristics of a particular phenomenon.

The technique employed was a literature review. According to Severino (2007), bibliographic research analyzes previously published materials and enables the construction of a solid theoretical basis. Searches were conducted in SciELO (Scientific Electronic Library Online) and Google Scholar and covered publications from 2021 to 2025 to ensure the use of current and relevant references. The literature was selected by reading titles, abstracts, and full texts, with priority given to studies related to the historical evolution of occupational safety.

2. Theoretical framework

Occupational safety is a multidisciplinary field involving actions to prevent accidents and promote worker health. Over time, it was structured in response to social and economic needs, especially the growth of industrial activities. It did not arise immediately, but was historically constructed through the observation of occupational risks (Martins, 2022).

The earliest records concerning worker health date back to Antiquity, when scholars already identified work-related diseases. These observations were still incipient and did not lead to effective protection policies; concern with occupational health was more descriptive than preventive during that period.

During the Middle Ages, working conditions were extremely precarious, with no protective standards or inspection mechanisms. Workers were exposed to unhealthy and dangerous environments without any guarantee of safety. Accidents were frequently considered inevitable and inherent to work itself (Martins, 2022).

The evolution of occupational safety is also related to the consolidation of public policies for worker-health protection. The State gradually assumed a fundamental role in regulating labor relations and promoting actions aimed at reducing occupational accidents and diseases (Delgado, 2023).

In Brazil, creation of the National Worker Health Policy was an important milestone in integrating public health and occupational safety. The policy seeks to promote health surveillance and prevent work-related harm (Minayo, 2020).

Interdisciplinary work in occupational safety is also essential to effective preventive action. Professionals from engineering, medicine, nursing, and other fields work together to identify and control risks.

Globalization and new forms of work organization have brought significant changes to occupational safety. The growth of informal work and flexible labor relations has created new challenges for worker protection (Vasconcellos, 2025).

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With the Industrial Revolution, occupational accidents increased significantly because of intensified production and the use of machinery without adequate safeguards. This period initiated debate on the need to regulate working conditions and drove important legislative changes. It also exposed the exploitation of labor, including women and children subjected to exhausting hours and unhealthy environments. Social movements then began demanding better working conditions and contributed to the development of the first labor laws.

According to Delgado (2023), Labor Law emerged in response to inequalities generated by the capitalist system and sought to balance the employer-employee relationship. In this context, occupational safety came to be recognized as a fundamental worker right.

In Brazil, the consolidation of occupational safety is directly related to the creation of the Consolidation of Labor Laws (CLT) in 1943. The CLT established important worker-protection rules, including workplace safety and hygiene measures (Brazil, 1943).

Over the years, Regulatory Standards (NRs) were created to detail occupational health and safety requirements in different sectors. They are fundamental for guiding companies in adopting preventive measures and ensuring adequate working conditions (Ministry of Labor, 2022).

The Regulatory Standards represent significant progress in systematizing occupational safety because they establish technical and legal criteria organizations must follow. They thereby contribute to reducing occupational accidents and diseases.

Occupational safety is also directly related to occupational health, which seeks to promote workers' physical, mental, and social well-being. Risk prevention is therefore essential to quality of life in the workplace (Vasconcellos, 2025).

According to Chiavenato (2021), people management in modern organizations must include occupational health and safety policies because they directly affect employee productivity and performance. Safety thus ceases to be merely a legal obligation and becomes strategic.

Safety culture is another relevant aspect because it involves worker and employer awareness of the importance of prevention. Companies that invest in training and education tend to have lower accident rates.

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Over the years, occupational safety ceased to be viewed only as a legal obligation and came to be understood as a commitment to human life. This change occurred as people recognized that occupational accidents affect not only the individual but also the family, the company, and society as a whole. Investing in safety therefore means valuing the worker as a rights-bearing subject and recognizing the worker's importance in production and social development.

Another relevant aspect is the relationship between occupational safety and worker quality of life. Safe workplaces not only help prevent accidents but also promote physical and emotional well-being. Workers who feel protected tend to perform their activities with greater confidence and calm, positively affecting productivity and professional satisfaction. Occupational safety is thus essential to dignified conditions and more humane labor relations (Chiavenato, 2021).

Accident prevention depends directly on collective awareness. The existence of rules and protective equipment alone is insufficient; everyone involved must be committed to a safety culture. This includes senior management and front-line workers and creates an environment in which prevention is a shared and continuous responsibility (Pereira, 2023).

The use of Personal Protective Equipment (PPE) is fundamental to minimizing workplace risks. Companies must provide this equipment, and workers must use it correctly, as required by law (Brazil, 2022).

However, PPE alone is not sufficient to ensure safety; collective preventive measures are also necessary. Collective Protective Equipment (CPE), which eliminates or reduces risks at their source, is therefore particularly important (Oliveira, 2021).

Risk analysis is an essential occupational-safety tool because it identifies, assesses, and controls workplace hazards. This practice supports more accurate decisions for accident prevention (Vasconcellos, 2025).

According to Oliveira (2017, p. 67):

> "The prevention of occupational accidents is the most effective means of preserving workers' lives, health, and capacity to work" (OLIVEIRA, 2017, p. 67).

Ergonomics also plays a fundamental role in occupational safety by adapting the environment to worker characteristics, preventing injuries, and promoting comfort. It therefore helps reduce absence from work and increase productivity (Lacaz, 2025).

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Technology has contributed significantly to the evolution of occupational safety through safer equipment and monitoring systems. Digital tools now enable real-time monitoring of working conditions, support risk prevention, and improve decision-making. Technological innovation has consequently become an essential ally in promoting safer and more efficient workplaces (Chiavenato, 2021).

Technological progress nevertheless creates new challenges, including exposure to digital risks and the need for constant professional updating. Occupational safety must follow these changes to remain effective. Another important aspect is inspection of compliance with safety standards by competent bodies. A lack of inspection can undermine preventive measures (Brazil, 2022).

Worker education and training are fundamental to building safe environments. Well-informed workers tend to behave more safely and contribute to accident prevention. Responsibility for occupational safety must also be shared by employers and employees, who must collaborate to ensure adequate working conditions (Delgado, 2023).

Occupational health and safety are fundamental worker rights and essential instruments for promoting human dignity at work. Oliveira (2023) emphasizes that accident prevention must be an organizational priority because it preserves workers' physical and psychological integrity and reduces the social and economic losses resulting from occupational misfortunes.

Likewise, Martins (2024) stresses that compliance with occupational health and safety rules is not limited to an employer's legal obligation but is an important mechanism for valuing human work and protecting life. Preventive measures, combined with worker awareness and effective inspection, are therefore indispensable to safer and healthier workplaces.

Occupational safety has evolved significantly throughout history and has become essential to worker protection. Existing practices and policies nevertheless still need improvement to ensure increasingly safe workplaces (Martins, 2022).

According to Dejours (2021), work can be a source of both fulfillment and suffering, depending on the conditions in which it is performed. Occupational safety must therefore consider not only physical risks but also the psychological aspects of work.

Mental health at work has gained prominence in recent years and is recognized as an integral part of occupational safety. Stress, harassment, and overwork can compromise worker health and increase accident risks. Organizational risk management is also important because it involves identifying, analyzing, and controlling workplace hazards and enables more preventive and strategic action (Seligmann-Silva, 2021).

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Organizational culture directly influences occupational safety because organizations that prioritize prevention tend to achieve better accident-reduction results. Leadership commitment is fundamental to promoting safe practices and consolidating a healthy workplace (Chiavenato, 2021).

According to Porto (2020):

> workplace risk prevention requires not only standards but also an ethical and social commitment from organizations. This perspective reinforces the importance of responsible corporate action (Porto, 2020, p. 54).

Worker participation in safety actions is also essential because it contributes to identifying risks and building more effective solutions, thereby promoting a safer and more participatory workplace (Lima, 2022).

Occupational-safety education also plays a fundamental role by enabling workers to understand the risks to which they are exposed and how to act preventively. Training, educational campaigns, and awareness actions help develop a critical understanding of workplace safety. Knowledge becomes a powerful tool for reducing accidents (Navarro, 2012).

Despite historical advances, occupational safety still faces challenges requiring constant attention. Adaptation to new technologies, changes in forms of work, and the need to strengthen inspection demand continuous effort. Building safe workplaces must therefore be understood as a dynamic process requiring commitment, responsibility, and, above all, respect for life (Almeida, 2022).

Occupational safety must be continuously updated in step with technological and social change. New practices and investment in training are fundamental to protecting workers in the contemporary setting (Lacaz, 2010).

3. Results and discussion

The literature analysis shows that occupational safety evolved significantly throughout history alongside social, economic, and technological transformations. Initially, worker-protection practices were virtually nonexistent and occupational risks were treated as a natural part of work. As industrialization advanced, especially during the Industrial Revolution, occupational accidents increased sharply, revealing the need for state intervention and regulation of working conditions.

The results indicate that specific legislation, such as the Consolidation of Labor Laws, was a fundamental milestone in guaranteeing rights and promoting workplace safety. Implementation of the Regulatory Standards helped standardize procedures and reduce occupational risks, demonstrating the importance of regulation in accident prevention.

Another relevant finding is the expansion of the occupational-safety concept. It ceased to be limited to preventing physical accidents and came to include worker mental health and well-being. Christophe Dejours showed that work can generate both satisfaction and suffering depending on the conditions in which it is performed. This perspective reinforces the need for a more humane and integrated approach to occupational safety.

The data also show that occupational-safety management has become increasingly strategic within organizations. As Idalberto Chiavenato notes, occupational health and safety policies directly affect productivity and organizational performance. Investing in safety should therefore be viewed not merely as compliance with a legal obligation but as a strategy for valuing human capital.

Safety culture plays an essential role in accident prevention. Organizations that promote training, awareness, and active worker participation tend to achieve better risk-reduction results. Occupational safety becomes a shared responsibility between employers and employees and requires collective commitment.

Conversely, the research identifies contemporary challenges that impede effective safety practices, including labor-market informality, noncompliance with Regulatory Standards, and insufficient inspection by competent bodies. These factors maintain high occupational-accident rates, especially in more vulnerable sectors.

Another relevant issue is the impact of new technologies on the workplace. Although technological progress has enabled safer equipment and efficient monitoring systems, it has also created new risks related to digital work and mental overload. Safety practices must therefore be constantly adapted to these transformations.

Continuous worker education and training are fundamental to safe workplaces. Disseminating information and developing preventive awareness contribute significantly to reducing accidents and promoting occupational health.

The results confirm the initial hypothesis: despite significant advances in occupational safety, important challenges remain. The effectiveness of preventive measures depends not only on the existence of standards but also on their correct application, adequate inspection, and the engagement of everyone involved in production.

Occupational safety must be understood as a dynamic, continuous process requiring constant updating in response to changes in the world of work. Strengthening public policies, investing in education, and promoting a prevention culture are therefore essential to increasingly safe and dignified working conditions.

Final considerations

This research analyzed the historical evolution of occupational safety and highlighted its main milestones, transformations, and challenges over time. The literature review showed that occupational safety did not arise immediately but was gradually constructed in response to social, economic, and industrial needs.

Occupational risks intensified especially after the Industrial Revolution, encouraging the creation of standards and legislation to protect workers. The Consolidation of Labor Laws represented important progress in Brazil by establishing fundamental rights and promoting better working conditions.

Occupational safety also evolved from an approach limited to preventing physical accidents into a broader perspective including mental health, well-being, and worker quality of life. This change reflects the need to consider workers in their entirety and recognize their importance in production and society.

The results further showed that occupational-safety management assumed a strategic organizational role, contributing not only to accident reduction but also to greater productivity and efficiency. As Idalberto Chiavenato emphasizes, valuing human capital and adopting safety policies are essential to organizational success.

Despite the advances achieved, significant challenges remain, including labor-market informality, noncompliance with safety standards, and the need for stronger inspection. New technologies add another dimension: while contributing to risk prevention, they also introduce new forms of exposure and require safety practices to be constantly updated.

The initial hypothesis was that occupational safety evolved significantly throughout history but still faces obstacles related to the effectiveness of standards and awareness among the parties involved.

It is therefore concluded that safe workplaces depend on continuous collective effort involving the State, organizations, and workers. Investment in education, inspection, and innovation, together with a stronger prevention culture, is fundamental to dignified, safe, and healthy working conditions for all.

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