

Empirical verification of worksafety evolution

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Abstract

Work safety is an ambiguous concept and it has historically evolved along with the development of anthropogenic objects and satisfied human needs in the analyzed period. In most cases it was associated with technology in the area of management. The article attempts to systematize the process of the evolution of occupational safety using the directions of development of organization and management.

Keywords: work safety, management, directions of the organization's development and management

1 Admission

Occupational safety is an ambiguous concept and depending on the area or field of research, it has been and is interpreted differently in the literature. In most cases, it is associated with the area of management [10]. The EU policy prefers shaping and maintaining OSH at the national level (Global Strategy on Occupational Safety and Health, 2004) [9]. Despite this, BIOZ issues are not among the largest research sectors [1]. The subject of research carried out in this area amounts to approx. 1% of all European research [11].

The simplest meaning of the term "security" can be found in the etymology of the word. In Latin, the term "security - securitas" consists of two parts: sine (without) and cura (worry, fear, anxiety) and denotes a state of non-threatening, calm, certain, no worries and fear, a sense of certainty and protection against dangers [5, 18]. Historically, work safety has been equated with technology. From ancient times to the industrial revolution in Great Britain (1750-1840), the development of technology was small and the issues of work safety and health protection were invisible [22]. Changes in the approach to the issue of occupational safety began with the first technical revolution [20, 21]. Mass production scale, a large number of technical facilities and a large number of employees required a new safe "work organization" that had to be learned. The production process was becoming technically more complex and generated accidents. The first provisions of the law on occupational safety began to be created to prevent accidents. At the same time, research on work processes and its safe organization began, as well as the search for regularities in the behavior of employees, which over time formed a specific sequence of trends and principles of directions of organizational thought and supplemented four main directions: technical-physiological, administrative, psychological-sociological and contemporary [20, 21]. Supplementing the directions of organization and management with the issues of work safety was in line with A. Maslow's considerations on the basic human needs and became the basis for the development of work safety sciences [13, 14].

2 Directions of organization and management

The basic directions of the development of organization and management sciences include: technical-physiological, administrative and psychological-sociological [20, 21]. Researchers of these directions analyzed people in the process of work.

Thanks to the researchers of the technical-physiological field (Ford, Taylor, Le Chatelier, Emerson, Adamiecki), a technical division of labor was made (Adam Smith), the first principles of the scientific organization of work were formulated (Charles Babbage). The first physical work algorithms were prepared along with the analysis of tools (Winslow Taylor). An organized action cycle (Henry Louis Le Chatelier) was developed which allowed the work

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process to be presented graphically (Henry Lawrence Gantt). The first book on the principles of collective work organization was published (Karol Adamiecki). Timing was developed which was the basis of the temporary work standards (Frank and Lilian Gilbreth) and then - the first production line (Henry Ford) and the first principles of work efficiency (Harrington Emerson).

Researchers of the administrative faculty created the so-called The "scientific administration" that gave rise to management science. The basic achievements of this direction include: publishing the principles of management theory in book form - Industrial and general administration (Henry Fayol) and the classification of power, in which three main types are distinguished: charismatic, traditional, legal with the division of labor, organizational continuity, forms of communication and the staffing according to the qualifications (Max Weber).

In the psychological and sociological direction [4], the influence of the working environment, including lighting, humidity, breaks at work and social conditions, on workers' productivity and (Elton Mayo) was noticed. The concept of "Human Relations" (Ch., I, Barnard) was created, in which the main role in the organization of work was assigned to the human factor (Mary Follet).

3 Labor protection issues in the directions of development of organization and management

Along with the development of directions of organization and management supplemented with the issues of work safety, the idea of labor protection appeared. In the initial period, this idea meant protection of the interests of the workforce in functional terms, understood according to Kotarbiński as all activities aimed at overcoming difficulties in satisfying the basic needs of the workforce. Research on work processes until the 1970s focused mainly on the improvement of workplace equipment, the selection of equipment, machines and devices, and increasing work efficiency. This period was characterized by a low level of occupational safety and the measure of this level was the number of accidents at work [7, 8].

There were two main views in the literature regarding the advisability of actions in the area of labor protection. Some authors believed that the purpose of labor protection is to protect the health and life of employees in the working environment, to protect their ability to work. Others, in turn, claimed that the primary goal of labor protection is to protect the health and life of the employee, and the fact that the employee is healthy guarantees his ability to work.

In legal science, the concept of labor protection has been interpreted in a broad and narrow sense. In a narrower sense, labor protection was a set of legal norms aimed at ensuring safety by employers by protecting employees' health against the harmful effects of the work environment on their health and against the threat to their life. In a broader sense, the protection of employees' health covered labor law standards and provisions regulating obligations and rules of liability for non-compliance with them, or labor law standards having a protective nature, e.g. protection of the durability of the employment relationship, remuneration for work, determination of a minimum working time or establishing a minimum vacation.

In terms of the subjective approach to labor protection, there were also two interpretations. The narrower one treated labor protection as universal protection ensuring the safety and health protection of all employees, and the broader one treated labor protection as a special protection of work for women and young people leave.

In his studies, Szubert organized the existing knowledge and defined labor protection as a system of legal, economic, organizational and technical measures to ensure safety and health protection for employees in the work process, while he treated the system as a set of structured units forming an organizational whole serving a specific purpose.

In international law, provisions for ensuring the safety and health protection of employees at work have been separated from the general labor protection and defined as provisions for the safety and health protection of employees. In Polish law, this separation is defined as occupational health and safety regulations. Despite the similarity of nomenclature adopted in international and Polish law, the term in Polish law refers to the subject of regulations and applies to work or working conditions, while in international law these provisions apply to the subject of work, which is an employee.

The term "labor protection" has not been clearly defined in Polish labor law and in many cases, the literature uses an abbreviation in which labor protection concerns the employee and not the work he performs. It is similar with the definition of security and occupational hygiene. This name appears in the Labor Code but is not legally defined. At the end of the 1980s, a trend related to organizing safe working conditions appeared in Poland. These activities were called safety management [8, 13].

For considerations in this paper, the definition developed at the Central Institute for Labor Protection (CIOP) was adopted, where labor protection is defined as the entirety of legal standards and research, organizational and technical measures aimed at protecting life and health of the employee against hazardous and harmful factors in the work environment, as well as creating optimal conditions for him from the point of view of ergonomics, physiology and work psychology are interrelated. On the other hand, occupational health and safety was treated as a set of legal norms as well as research and organizational measures and technical measures aimed at creating working conditions for the worker that enable him to perform his work in a productive manner, without exposing himself to an unjustified risk of accident or occupational disease, and excessive physical and mental strain.

Today, employers are obliged to ensure safe working conditions, resulting, inter alia, from the provisions of Polish law. The most important legal acts in this respect in force in Poland are the Constitution of the Republic of Poland (the Polish Constitution Act, 1997) and the Labor Code Act (the Labor Code Act, 1974), which treat work safety as the result of cooperation between workers, employers and employees of supervisory institutions. The results of work safety research in construction indicate a high level of risk to the life and health of employees (Final report part I - main act V 2005/03 Northern Federation of Construction and Woodworking Workers, 2005, Final report part II - the project Improving union health and safety opportunities in construction, forestry and wood processing in Estonia, Latvia, Lithuania and Poland, 2006) justify the need to conduct research in this area [13].

An analysis of the literature on the scope of organization and management, as well as occupational safety and health protection, made it possible to organize the issues of occupational safety in construction by assigning safety and health protection issues to individual development directions of organization and management sciences (Fig. 1).

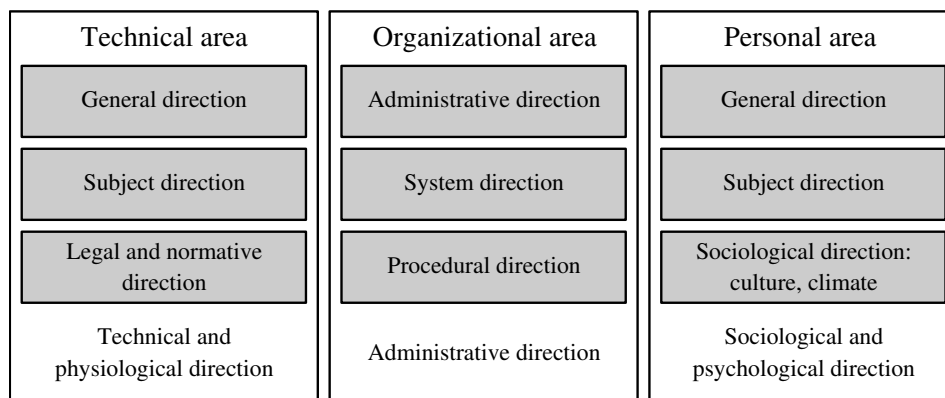


Figure 1. Work safety research areas

The first area of BIOZ research was the technical trend coinciding with the technical and physiological direction. It was possible to distinguish a general direction related to accident and occupational diseases [13]. In general, the traditional approach to health and safety at work was used, in which reports on accidents at work and information obtained from their analysis were used in preventive actions. The experience gained in the analysis of individual cases was treated as a source of knowledge for use in future preventive actions.

The second area of research in the technical trend was the subject field related to construction processes and events resulting in injuries [20].

The third area of research in the technical trend was the law-normative direction, in which selected aspects of technical safety were analyzed in order to include them in the legal regulations or regulations of the examined enterprise [21].

There are three research directions in the organizational trend: administrative, systemic and procedural. In the administrative direction, the organization of work in the enterprise and the organization of workplaces covering the scope of public matters as well as general regulations and legal standards regarding work in the construction industry were analyzed (Obolowicz, 2018). Researchers focused on activities aimed at reducing the accident rate by introducing changes in the organization of workplaces related to personal safety.

In the systemic direction of the organizational trend, researchers treated objects related to BIOZ as open systems (sets, systems) interconnected, in which they distinguished those having a great impact on work safety in a given environment [20]). When looking for the causes of accidents, researchers built models focused on areas with factors affecting human safety in the work environment.

In the procedural direction, the main goal was to identify data and analyze the tasks and responsibilities of participants in the construction process in providing BIOZ in order to formulate new operating procedures affecting OHS.

In the personal (human) trend, researchers focused on three main directions of OSH research: general, subjective and sociological. The research of the general direction covered issues related to labor protection and identification of sources and causes of accidents on the part of the contractor. These factors were associated with behavior in the field of OSH and interpersonal cooperation [13].

The research of the subjective direction covered mainly the subject of work. Researchers focused on identifying factors that pose a threat to humans in the work process. These factors were divided into dangerous, harmful and burdensome [13].

The sociological direction of the research concerned the rules, processes and structures that influenced people's behavior and the process of their change. In this direction, with regard to work safety, two sectors can be distinguished: work safety culture [13].

The term safety culture was first used in the Summary report the past accident review meeting on the Czerbobył Accident, 1986. In the literature on the subject, safety culture has been treated from the very beginning as an element of organizational and social culture, and as a whole of collective activity combining individual protection of employees with collective protection of the entire work environment [20].

In the years 1996–1997 in Great Britain, research was carried out which clearly showed the relationship between work safety culture and accident rates and determined the impact of the human factor on the causes of accidents.

With time, the analysis of behaviors and shaping the attitudes of employees have become the key to achieving the required safety culture by following the established rules and procedures for performing work, constantly looking for better solutions and striving to develop safe behavior in employees [7]. Increasingly, people began to notice the influence of safety culture on behavioral patterns within the organization and the role of emotional communication, and to see the influence of culture on behavioral safety initiatives.

Researchers have noticed the relationship between culture and work safety in their considerations and looked for ways to measure the OSH culture. Based on the results of research over several decades in various industries, they assumed that the visible part (image) of the security culture is the security climate. According to American researchers, the safety climate was related to the subjective perception by employees of various aspects of safety in workplaces and was a visible sign of employees' attitude to occupational safety issues in a given period, and thus constituted a part of the safety culture treated as a set of basic beliefs and values of employees in relation to occupational health and safety.

Contemporary research on organizational culture covers the attitudes, values and norms of behavior common to all employees. Sociologists study the social rules and processes that connect and divide people, create or manifest bonds between people, and also influence the process of their change. In this way, new research areas of culture related to the security climate are created to health and safety.

The Zohar was the first to describe the "climate of security" [25]. Since then, safety climate research has helped to improve the level of OSH in the organization and laid the foundations for identifying areas of OSH culture and creating models of excellence. There were statements that improving safety should cover all participants of the construction project. Assessing the safety culture required "invisible" norms and assumptions and the introduction of "visible" indicators of the security climate. The most frequently used elements (issues) in the assessment of the organization's safety culture included: management involvement, training in the field of health and safety, motivation, safety rules, accident records, effectiveness of the control and communication system, technical equipment. These issues were classified in three groups including: security at the strategic level (enterprise strategy), operational security and individual needs of employees [13].

4 Integrated dive

In modern literature, a comprehensive approach to occupational safety and combining the content of research directions of technical, organizational and human trends, in which the issues of safety and health protection are recognized along with the use of the achievements of organization and management sciences [20].

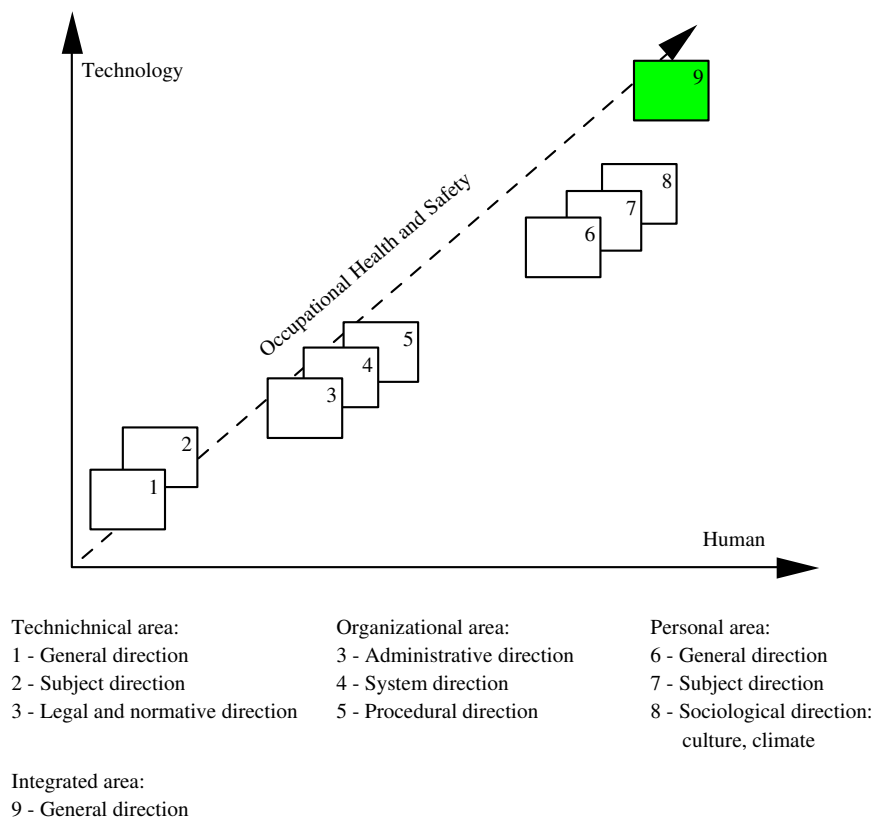


Figure 2. Model of the evolution of labor protection

The comprehensive approach results mainly from the fact that there are no clearly defined regulations or guidelines that would regulate the measurement of work safety in an organization. There are no standards or quantitative benchmarks in this respect that an organization should meet. There are also no specific legal regulations for the acceptable level of work safety. Having a high level of security is information that the organization pays great attention to issues related to the life and health of employees and that employees use the available knowledge in the area of management and create safe conditions for contractors and local communities, including them in internal regulations in the form of rules, certificates, conference studies, standards, national agreements, e.g. in the form of an Agreement for Safety in Construction, regional agreements, declarations of cooperation to ensure appropriate work safety standards or internal work regulations. The integrated approach is suggested by the EU regulations (Essential Health and Safety, HSE, 2001). EU directives on occupational safety and health protection (EU Council Directive 92/57 / EEC) indicate the need to coordinate activities throughout the entire construction investment process. They emphasize the dependence of occupational health and safety on the existing management systems. In the report of the European Agency for Safety and Health at Work entitled “Achieving a higher level of safety and health protection in construction. Construction investment management ”, attention is drawn to the necessity of a comprehensive approach to issues, ie at all stages of the investment process: preparation, implementation and operation of a building structure. This is confirmed by the results of the research, which noticed and emphasized the relationship between the perception of the safety of the investor, designer and contractor (European Agency for Safety and Health at Work, 2003) and attention was paid to the study of the perception of construction workers, as it influences the actions taken by construction management [2, 3, 6, 10, 12, 15–17, 19, 23, 24].

The analysis of the literature in the areas of occupational safety and health protection research allowed to organize and build a model of the evolution of labor protection in the human-technique system, taking into account the issues of occupational health and safety (Fig. 2).

5 Summary

The research carried out in this paper shows how important safety considerations are for employees. Both the historical background of changes in the approach to security and the current trends are described. In a world where technology

and technology are always available, safety is the highest priority. The matter concerns both the workplace and places where people spend their free time.

References

1. Barling, J., Loughlin, C. & Kelloway, E. K. Development and test of a model linking safety-specific transformational leadership and occupational safety. *Journal of Applied Psychology* **87**, 488–496. ISSN: 0021-9010 (3 2002).
2. Baryłka, A. *Poradnik rzeczoznawcy budowlanego, część I. Problemy techniczno-prawne diagnostyki obiektów budowlanych.* (CRB, Warszawa, 2018).
3. Baryłka, A. *Poradnik rzeczoznawcy budowlanego. Część II. Problemy techniczno-prawne diagnostyki posadowienia obiektów budowlanych.* (CRB, Warszawa, 2019).
4. Bednarski, A. & Szlendak, J. *Wprowadzenie do teorii organizacji i zarządzania* 28 (Toruńska Szkoła Zarządzania, Toruń, 1997).
5. Czaputowicz, J. *System czy nieład? Bezpieczeństwo europejskie u progu XXI wieku* (WNPWN, CSM, 1998).
6. *Dyrektywa 89/391/EWG w sprawie wprowadzenia środków w celu poprawy bezpieczeństwa i zdrowia pracowników w miejscu pracy z dnia 12.06.1989r.*
7. Ejdys, J. *Kształtowanie kultury bezpieczeństwa i higieny pracy w organizacji* (Oficyna Wydawnicza Politechniki Białostockiej, Białystok, 2010).
8. Ejdys, J., Lulewicz, A. & Obolewicz, J. *Zarządzanie bezpieczeństwem w przedsiębiorstwie* 287 (Wydawnictwo Politechniki Białostockiej, Białystok, 2008).
9. *Global Strategy on Occupational Safety and Health* International Labour Organization, (Genewa, 2004).
10. Klamut, R. Bezpieczeństwo jako pojęcie psychologiczne. *Zeszyty Naukowe Politechniki Rzeszowskiej, Ekonomia i nauki humanistyczne* **286** (4 2012).
11. Mullen, J. Investigating factors that influence individual safety behavior at work. *Journal of Safety Research* **35**, 275–285. ISSN: 0022-4375 (3 2004).
12. *Niezbędnik BHP dla małych firm budowlanych Health and Safety Executive – working well together* (HSE, 2001).
13. Obolewicz, J. *Demoskopia bezpieczeństwa i ochrony zdrowia przedsięwzięć budowlanych* 184 (Oficyna Wydawnicza politechniki Białostockiej, Białystok, 2018).
14. Piątkowska, B. & Dalewska-Kolan, M. Rola środków nietechnicznych w systemie zapewniania bezpieczeństwa powodziowego. *Inżynieria Bezpieczeństwa Obiektów Antropogenicznych*, 75–81. ISSN: 2450-1859 (1-2 2019).
15. *Raport Europejskiej Agencji Bezpieczeństwa i Zdrowia w Pracy pt. „Osiąganie wyższego poziomu bezpieczeństwa i ochrony zdrowia w budownictwie. Zarządzanie inwestycjami budowlanymi”*
16. *Raport finalny cz. I – akt główny V 2005/03 (2005) Północna Federacja Pracowników Budownictwa i Przetwórstwa Drzewnego (2005) Carter i Smith*
17. *Raport finalny cz. II – projektu Doskonalenie związkowych możliwości bhp w budownictwie, leśnictwie i przetwórstwie drzewnym w Estonii, Łotwie, Litwie i Polsce, (2006) Charkes Woolfson, Dace Calite*
18. Stańczyk, J. *Współczesne pojmowanie bezpieczeństwa* (ISP PAN, Warszawa, 1996).
19. *Summary report the past accident review meeting on the Czerbobył Accident* 1986.
20. Szlendak, J. & Obolewicz, J. *Podstawy organizacji, zarządzania i pracy kierowniczej* 299 (Wszechnica Mazurska, Olecko, 2002).
21. Szlendak, J. & Obolewicz, J. *Podstawy zarządzania i zachowań organizacyjnych* (Wydawnictwo Wszechnicy Mazurskiej, Olecko, 2005).
22. Tytyk, E. *Ergonomia - pojęcia podstawowe, Nauka o pracy – bezpieczeństwo, higiena, ergonomia* (ed Kordecka, D.) 53 (Centralny Instytut Ochrony Pracy, Warszawa, 2002).
23. *Ustawa Kodeks pracy z dnia 26 czerwca 1974r.*
24. *Ustawa Konstytucja RP z dnia 16 lipca 1997r*
25. Zohar, D. Safety climate in industrial organizations: theoretical and applied implication. *Journal at Applied Psychology* **65**, 96–102. ISSN: 0021-9010 (1 1980).