

## THE ROLE AND IMPORTANCE OF IMPROVEMENT ACTIVITIES IN FUNCTIONING OF THE COMPANY IN THE AREA OF SAFE AND HEALTHY

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**Abstract:** In the article there were presented issues related to the improvement of the occupational health and safety (OHS) management system in a selected energy industry company. The research entity belongs to the leading producers of electricity and heat in Poland. In the paper there were analyzed data on accidents in the research period covering the years 2012-2017. There was also made a short description of the company's activities regarding internal health and safety inspections carried out periodically. Furthermore, there were analyzed the activities improving the occupational health and safety management system in a selected research entity. In the paper there were also presented the sizes and types of activities (projects), that were aimed at improving the health and safety area and included in the company's business strategy. On the basis of the data and the analyzes carried out, it was possible to make a comprehensive assessment of the health and safety management system of the company and to indicate that corrective actions are continuous.

**Keywords:** improvement, occupational health and safety (OHS), quality, management

### 1. INTRODUCTION

Every business entity employing employees must comply with specific rules in the field of occupational safety and health (OHS). The employer is obliged to provide such working conditions that meet the requirements specified in health and safety regulations. The more employees are employed in a given entity, the greater the organizational burden lies with the Health and Safety Department. What is more, depending on the business activity, as well as on a given job position, there may be various threats of different scales. Determining the risk of a threat is the responsibility of a given economic entity. Therefore, in large industrial entities, a system of occupational safety and health management is implemented, including the organizational structure, planning, responsibility, rules of conduct, procedures, processes and principles enabling the implementation of health and safety policy. The basis for the smooth functioning of this system is the implementation of a method

called the Deming cycle. Within this approach, such phase as planning, execution, checking and operation are repeated, which enables continuous improvement of the health and safety area. The aim of the article was to assess the functioning of the health and safety management system in a selected company and indicate the directions of improvement in this area. In the article there were presented selected aspects related to OSH on the example of a specific company operating in the area of electricity production. The analysis of accident data of the last 6 years was conducted, and there were analyzed the company's activities in the area of internal health and safety inspections carried out periodically and selected improving activities in this area.

## 1. METHODOLOGY OF RESEARCH

Source materials from one of the leading energy companies on the Polish market were used for research. The data obtained let to present an overview of the health and safety management system, to analyze the accident rate in 2012-2017 and to compare them with data on this issue for the entire electricity generation sector in Poland. The number of accidents were examined, the causes of accidents were verified and the age of the victims was determined. This enabled the verification of the first research hypothesis of the work:

*H1: Activities undertaken as part of the health and safety management system in the examined enterprise affect the level of accident rate.*

Additionally, the company's activities in the field of internal health and safety inspections were presented and some activities improving the management system were presented. Selected issues were presented based on the Deming cycle. This enabled verification of the second work hypothesis:

*H2: The occupational health and safety management system introduced in the examined enterprise shows the features of continuous improvement.*

## 2. RESULTS

There is no doubt that the methods of occupational safety and health management introduced in the examined enterprise give measurable results in the form of a decreasing number of light accidents and improved health and safety conditions (Fig.1).

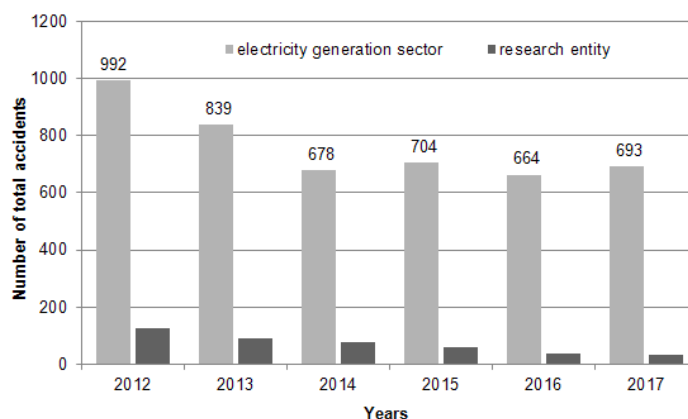


Fig. 1. Number of accidents in research entity and in electricity generation sector  
Source: own study and study based on CSO

It should be noted that there were no serious or fatal accidents in the examined company in the period 2012-2017, which unfortunately was noted in the electricity generation sector. Analyzing statistical data, there is a decrease in the share of accidents recorded in the surveyed enterprise in the context of the entire sector. For example, in 2012, the share of accidents in the examined entity amounted to almost 13% of all accidents for the electricity generation sector (CSO). By contrast, in 2017, this share was already at the level of less than 5% (CSO).

It is noted that the age structure of the victims is very similar in the period considered. On the Fig. 2 it can be seen the age of the injured in the surveyed enterprise in 2017. For comparative purposes, data for the entire electricity generation sector in the same year were also presented (Fig. 3).

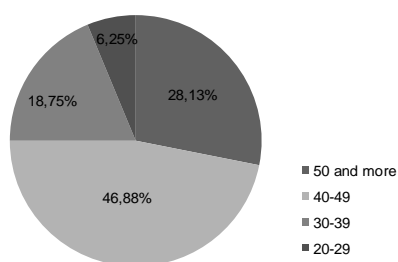


Fig. 2. Age of injured persons in research entity in 2017

Source: own study

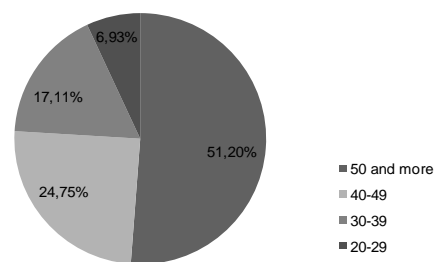


Fig. 3. Age of injured persons in electricity sector in 2017

Source: own study based on CSO

Comparing the data, convergences are recorded, e.g. in the lowest age group and in the 30-39 age group the shares of the indicator are almost identical. However, in subsequent age groups, the shares differ significantly, which is related to the structure of employment - the largest group of employees consists of people between 40-49 years of age. For years, the most frequent cause of accidents in the surveyed enterprise is incorrect behavior of the employee. In this case, the accident statistics for the previous year show that as much as 64.3% of accidents at work occurred due to staff errors (Fig.4). These reasons coincide with data regarding the entire sector (Fig.5) in which the examined enterprise operates.

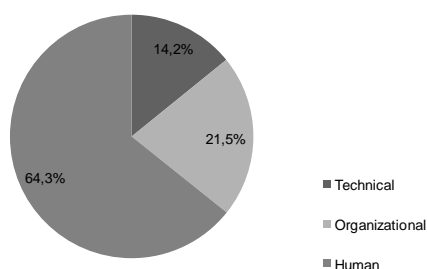


Fig. 4. Causes of accidents in research entity in 2017

Source: own study

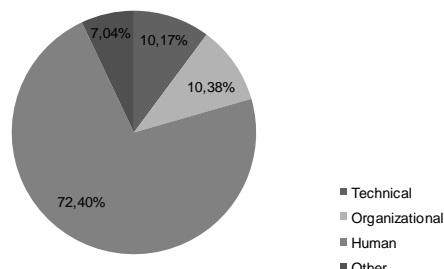


Fig. 5. Causes of accidents in electricity sector in 2017

Source: own study based on CSO

Of course, there are many causes of accidents, but general they can be grouped into these listed in Figures 4 and 5. In the surveyed enterprise, the most frequent errors noted in the surveyed enterprise include: non-use of protective equipment, inappropriate behavior and surprise situation, as well as neglecting the threat and

insufficient concentration on the activity performed. The priority treatment of occupational health and safety in every establishment, and therefore in the examined, involves many aspects. One of them is the ongoing supervision of the state of health and safety by increasing discipline and compliance with applicable health and safety regulations. Number of incompatibilities in research entity indicated in health and safety reviews in 2012-2017 period is presented on Fig. 6. The most frequent occurrences of these incompatibilities in the analyzed period were failure to meet the requirements of: work organization, training principles in the field of occupational safety and health, completion of occupational risk assessment cards, organization of safe work by external employees, performance of works, instructions for proper conduct entries in written orders.

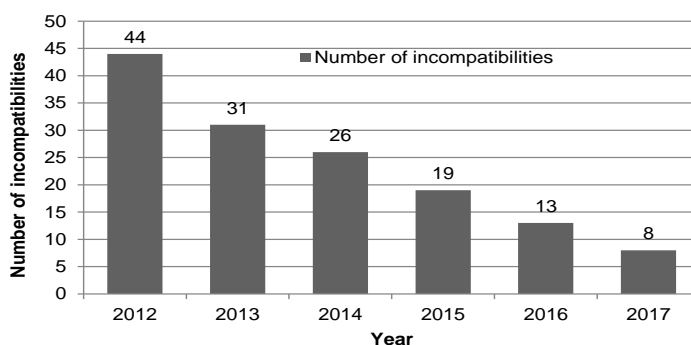


Fig. 6. Number of incompatibilities in research entity  
Source: own study

The reason for the inconsistencies in the examined enterprise was mainly: oversight of the supervisor regarding the validity of qualification certificates, non-compliance with applicable regulations by external companies, insufficient knowledge of correct completion of professional risk assessment cards, lack of training in the field of instructions, insufficient security during work at heights, lack of appropriate markings, negligence of employees' duties in the scope of proper keeping of records in the register of written orders, omission of periods of periodic training, lack of coherence in determining exposure for the same source of danger. Another important issue in limiting the number of accidental events is that employees perform activities with increased concentration, so that routine behaviors that usually carry the risk of injury do not occur.

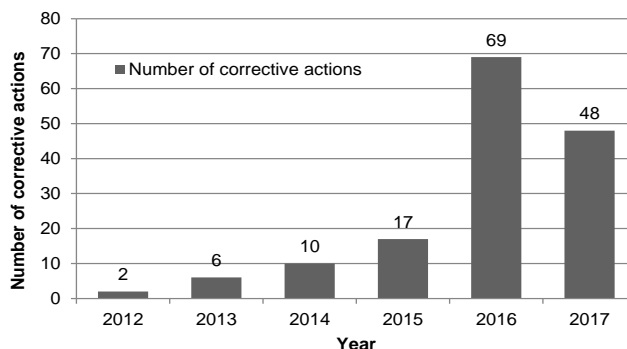


Fig. 7. Number of corrective actions in research entity  
Source: own study

An important factor from the point of view of improving the safety and healthy of the work performed are activities improving the area under examination. Planning these activities is the first stage of the Deming cycle. During the analyzed period, their number increased from 2 in 2012 to several dozen in the last two years (Fig.7).

Table 1  
Corrective actions and the time of their implementation

Action / proposed solution	Average lead time in days		Dynamics
	2012	2017	[%]
Cleaning works	49	12	408,3
Increased supervision over employees of external companies	20	9	222,2
Discussing the accident	10	1	1000,0
Removal of the defect	15	4	375,0
Providing additional protective clothing	26	2	1300
Repairing the surface	10	2	500,0
Updates of the risk assessment program by RISK.SCORE	738*	254	290,6
Trainings	18	4	450,0
Additional trainings	30	5	600,0
Updates to the instructions	154	12	1283,3
Disciplining actions towards external companies	17	2	850,0
Inspections	<b>130</b>	<b>7</b>	<b>1857,1</b>
Information on the results of the work environment measurement	40	6	666,7
Instructions on how to use the instructions	14	6	233,3
Removal of outdated personal protection equipment	23	8	287,5
Equipment, machines and instructions	34	3	1133,3
Verification and supplementation of the first aid kit marking in accordance with the applicable procedure	83	4	2075
A review of first aid kits, replacement of overdue dressing materials and filling of cavities	24	7	342,9
Update of descriptions and markings of fire protection equipment in facilities	20	2	1000,0
Conducting inspections of objects in the area of evacuation marking and marking of fire roads	30	12	250,0
Renewing of markings	34	16	212,5
Risk assessment	18	7	257,1
Updating of emergency numbers in rooms	42	6	700,0
Equipment in additional installations: lighting, ventilation	62	14	442,9

\* Updates of the risk assessment program using the RISK.SCORE method were launched in 2012 and ended after 738 days.

Source: own study

In the years 2012-2017, intensive work was carried out as a part of the work environment improvement program, which resulted in the achievement of total or partial elimination of incompatibilities occurring in the area of occupational health and safety. What is more, the time of their implementation in some cases has been reduced by over 1800% (Tab.1). Corrective actions were much more than shown in

Tab. 1, therefore only those that were carried out annually in the period under examination were presented.

From 2015, the "Health and Safety leader" program has also been implemented, which has become an important element of activities improving the safety culture in the company. The aim of the program was mainly to promote the policy created by the company in the area of health and safety and to obtain feedback from employees on the effectiveness of actions that are taken in the area of occupational safety. Health and safety leaders are perfected as part of periodic training on leadership in safety. After over 3 years of operation, OSH leaders earned 100% recognition among employees responsible for work organization, while 85% of those employees praised cooperation with leaders, claiming that their presence in the team of employees increases the level of safety in the workplace. There has also been an increase in employees' awareness of the identification of the need for corrective and/or improvement of the health and safety area to ensure a safe working environment.

### 3. DISCUSSION

Managing a large business entity is a great challenge for the managerial staff. The process of managing such a unit in the energy sector is even more complicated. There are many management solutions that relate to improving the functioning of specific areas of operation of these enterprises (Włodarczyk, 2017, Pudło, Wrzałik 2017), including electricity production. At the same time it is pointed out that the method of producing electricity depends not only on technological solutions, but also on national and EU regulations (Grabowska et al. 2015). This industry is governed by specific laws and operates on the basis of restrictive regulations (Act of April 10, 1997 Energy Law, Journal of Laws of 2017, item 220), as it is a strategic sector of the economy and, besides transport, it is also an efficient functioning of every country. This probably causes that in the area of health and safety, this sector is characterized by a very low percentage of accidents at work. In the years 2015-2017, the percentage of work accidents in this sector did not exceed 1% of all these accidents in the Polish economy. For example, in 2015, it was noted that accidents at work in the energy and gas production sector accounted for 0.81% of this type of accidents in total, while in 2016 it was 0.76%, and in 2017 - 0.79% (CSO 2016, 2017, 2018).

The basic objective of the activities that contribute to the improvement of health and safety management should be increasing its effectiveness, which is related to the improvement of health and safety, as well as general functioning, which in turn influences the company's economic performance, improvement of conditions, productivity and quality of work (Bajdur W., Roman M, 2012, Niciejewska 2017). A properly functioning occupational safety management system should detect and counteract possible threats (Niciejewska, Klimecka-Tatar 2016).

There are probably many reasons for the occurrence of non-conformities (Tabor 2017), however, OHS services have many solutions available in the form of corrective actions tailored to the specific case. In the occupational safety management system, supervision over the performed work and continuous improvement based on the Deming cycle are of great importance. For example, the introduction of appropriate improvement measures in the field of monitoring and compliance with the provisions and rules of health and safety in the examined enterprise (*plan* phase according to the Deming cycle) has translated measurably into a reduction in the number of accidents (*phase act*). The supervisors were obliged to organize and supervise the work of

subordinate employees with due diligence, with particular emphasis on not tolerating deviations from safe behaviors (phase *do*). The managers of organizational units during job instructions and other ad hoc trainings were obliged to verify issues related to the proper organization of work in order to prevent unexpected situations (phase *check*). They were also obliged to make ongoing enforcement of individual and collective protection measures required for a given position. Based on the activities described in the Deming cycle and analyzing the data contained in Table 1 (although only selected data were presented in this study - for 2012 and 2017, but these were corrective actions of a repetitive nature), it can be concluded that the hypothesis H2 was proved: *The occupational health and safety management system introduced in the examined enterprise shows the features of continuous improvement*. What is more, by analyzing the data on the accident rate (Fig. 1), the number of detected non-conformities (Fig. 6) and the number of corrective actions (Fig. 7), it can be concluded that H1: *Actions taken as part of the health and safety management system in the examined company affect the level accident rate*, has been verified. In addition, the positive impact of this system on the level of accident rates was determined.

#### 4. CONCLUSION

To effectively manage the health and safety area, it is necessary to continuously identify hazards and assess the occupational risk associated with their occurrence. As the results of the research show, it can be stated, that in the examined case the knowledge of procedures and obligations resulting from health and safety is not enough, you still need to use them sensibly in practice. It is important that all employees have not only safe working conditions, but also that they are aware of their importance. Knowledge of regulations regarding accidents at work and the ability of inspectors and employees to implement appropriate procedures in the event of accident incidents are particularly important. In this area, it is necessary to know the procedures and rapid response in an emergency situation and fluent knowledge of the regulations in the field of health and safety. Therefore, the current state of knowledge regarding OSH and changing regulations in this area should be constantly monitored. Applying for obtaining certain quality certificates requires adaptation of enterprises to standards in the field of occupational safety. However, maintaining these certificates requires continuous improvement of the occupational health and safety management system. On the basis of the presented research results, there is no doubt that the corrective actions introduced in the form of the Deming cycle bring measurable effects in the form of reduced accident rates and improved working conditions. At the same time, corrective actions complement the larger projects aimed at improving the functioning of the health and safety area in the surveyed enterprise. Summing up, the actions taken by the company affect the effectiveness of the health and safety management system. What's more, the approach to improving the occupational safety management system in the company's strategy enforces concrete actions in this area.

#### REFERENCES

Bajdur W., Roman M., 2012. *Analiza wypadkowości w zakładzie produkcji i remontów urządzeń energetycznych* [in:] Tabor J., 2012. *Zarządzanie bezpieczeństwem i higieną pracy, Tom 3, Techniczne, organizacyjne i ludzkie uwarunkowania bezpieczeństwa pracy*, Wydawnictwo Wydziału Zarządzania Politechniki Częstochowskiej, Częstochowa, 92-102.

- CSO (GUS) - [www.stat.gov.pl](http://www.stat.gov.pl) (access: 11.2018).
- Deming W. E., 1996. *Out of Crisis*, Massachusetts Institute of Technology, Center for Advanced Engineering Study, Cambridge, Massachusetts.
- Grabowska M., Otolá I., Włodarczyk A., 2015. *Operating Activities of Energy Companies in the Context of Crude Oil Risk and its Impact on the Polish Power Exchange*, *Procedia - Social and Behavioral Sciences*, 213, 417-422, DOI: 10.1016/j.sbspro.2015.11.560.
- Niciejewska M., 2017. *Difficulties in Work Safety Management in a Company Producing Steel Flat Bars*, *Production Engineering Archives*, 17, 28-31, DOI: 10.30657/pea.2017.17.06.
- Niciejewska M., Klimecka-Tatar D., 2016. *The OHS Management System in the "Small-Sized" Production Company*, *Production Engineering Archives*, 13, 4, 49-52, <http://www.qpij.pl/production-engineering-archives>.
- Pudło M., Wrzałik A., 2017. *Managing Prosumer Energy in the Aspect of Low Emission Reduction*, *Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie*, 26, 51-63, DOI: 10.17512/znpcz.2017.2.05.
- Tabor J., 2017. *Using the VIKOR Method to Assess the Functioning of OHS Management System in Manufacturing Company* [in] (ed.) Selejdak J., Klimecka-tatar D., 2017. *Techniczne i materialne aspekty bezpieczeństwa*, Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji, Częstochowa, 33-44.
- Włodarczyk A., 2017. *Environmental Management Instruments in the Restructuring Process of Polish Energy Enterprises*, [in] Borowiecki R. (ed.), Kaczmarek J., 2017. *The Propensity to Changes in the Competitive and Innovative Economic Environment. Processes – Structures – Concepts*, Foundation of the Cracow University of Economics, Cracow, 215-225.