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Problems of Occupational Injuries and Ways of Its Reduction on Example of Ukraine

Masalah Cedera Kerja dan Caranya Penganggulangan pada Contoh Kasus di Ukraina

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Abstract
Manuscript presents a study of the causes of accidents on the example of Ukraine in recent years, considering the peculiarities of the modern period. The relevance of this study is due to the high level of industrial injuries in Ukraine compared to the industrialized countries of the European Union. Data on the dynamics of the causes of accidents for the period from 2015 to 2022 are presented. Data for the study were taken from open sources of information. The most trauma-dangerous industries of the national economy are considered. Proposed measures to reduce the level of injury in Ukraine. The analysis of the obtained results showed a certain dependence of the causes of accidents on the coronavirus infection. An unchanging leading position in the organizational causes of accidents has been established. According to the results of the study, regularities were established regarding the most traumatic sectors of the economy in the presented years. The predominance of organizational causes of industrial injuries due to the low motivational component of occupational safety is shown. The need to improve training on occupational health and safety issues for employees at all levels was noted. It was established that the reduction of industrial injuries is impossible without the teaching of labor protection issues in institutions of higher education by future heads of structural divisions and leading specialists. Mandatory review and re-approval of the instructions, the violation of which led to an accident, is proposed. It is recommended to apply mandatory professional selection and more thorough control over periodic preventive medical examinations.

Abstrak
Naskah menyajikan studi tentang penyebab kecelakaan pada contoh Ukraina dalam beberapa tahun terakhir, dengan mempertimbangkan kekhasan periode modern. Relevansi penelitian ini disebabkan oleh tingginya tingkat cedera industri di Ukraina dibandingkan dengan negara-negara industri Uni Eropa. Disajikan data dinamika penyebab kecelakaan periode 2015 hingga 2022. Data untuk penelitian ini diambil dari sumber informasi terbuka. Industri yang paling menimbulkan trauma bagi perekonomian nasional dipertimbangkan. Usulan langkah-langkah untuk mengurangi tingkat cedera di Ukraina. Analisis terhadap hasil yang diperoleh menunjukkan adanya ketergantungan tertentu antara penyebab kecelakaan terhadap infeksi virus corona. Posisi terdepan yang tidak berubah dalam penyebab kecelakaan organisasi telah ditetapkan. Berdasarkan hasil penelitian, ditemukan keteraturan mengenai sektor ekonomi yang paling traumatis pada tahun-tahun ini. Dominasi penyebab organisasi dari cedera industri ditunjukkan karena rendahnya komponen motivasi keselamatan kerja. Perlunya meningkatkan pelatihan mengenai masalah kesehatan dan keselamatan kerja bagi karyawan di semua tingkatan telah dicatat. Telah ditetapkan bahwa pengurangan cedera industri tidak mungkin terjadi tanpa pengajaran masalah perlindungan tenaga kerja di lembaga pendidikan tinggi oleh calon kepala divisi struktural dan spesialis terkemuka. Peninjauan wajib dan persetujuan ulang atas instruksi, pelanggaran yang menyebabkan kecelakaan, diusulkan. Disarankan untuk menerapkan seleksi profesional wajib dan kontrol yang lebih menyeluruh terhadap pemeriksaan kesehatan preventif berkala.

Graphical Abstract

Keyword
accidents; industrial injuries; causes of accidents; occupational health; ukraine

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INTRODUCTION

The modern stage of industrial development is characterized by high-tech processes. The most valuable thing for a person is the preservation of his health, including professional health. Professional activity puts increased demands on human health: endurance, work capacity, emotional stability, and others. Professional health becomes one of the basic values of a worker, an integrated indicator of a specialist's professionalism, an important resource for successful activity and high labor productivity. Creation of safe and harmless working conditions at workplaces is one of the important areas of activity of specialists in various areas, including occupational safety specialists (Hunegnaw et al., 2021).

At the same time, data on injuries and occupational diseases at work remain high. According to estimates of the International Labor Organization, every year in the world about 2.78 workers die from work-related accidents or diseases. More than 380,000 (13.7%) deaths due to accidents at work (European Commission, 2023; Baharuddin, 2023). Economic losses related to the payment of compensations, loss of working hours, costs of medical care and other costs amount to 1.25 trillion. USD (4% of global gross domestic product) (Nipialidi & Vasylchyshyn, 2020; El-Menyar et al., 2016).

In Ukraine, according to the Social Insurance Fund of Ukraine (SIFU), the probability of industrial injuries and occupational diseases is 5-8 times higher than in other industrialized countries of the European Union. Every year in Ukraine, more than 3.5 thousand workers get occupational diseases, about 50 thousand people are injured, 1.5 thousand of them die (The State of Industrial Injuries, 2023; Zygmunt, 2020). The analysis of the state of industrial injuries and occupational diseases in Ukraine in recent years showed that the level of industrial injuries and occupational diseases is still quite high (Ruslan et al., 2020).

A lot of attention is paid to the problem of industrial injuries in the scientific research of occupational safety specialists. Most authors note the difficulty of solving this issue. Thus, the authors of the works (Vambol, 2021; Didur & Dmitryuk, 2023; Tairova et al., 2020); draw attention to the fact that in order to ensure occupational health and safety at work, it is necessary to consider various aspects of enterprise activity at all stages of production processes. The physical parameters of the workplace environment are clearly one of the important factors in ensuring normal working conditions. Therefore, in their works, researchers paid great attention to this problem (Kruzhilko et al., 2020; Ragimov et al., 2018; Sharma et al., 2023).

Analysis of accidents at Ukrainian factories is one of the main and necessary ways of developing mechanisms for the prevention and prevention of injuries (Tairova et al., 2020; Mezentseva, 2023; Berezovskyi, 2021). The investigation and accounting of accidents, occupational diseases and accidents at work in Ukraine until 2019 was carried out in accordance with the state regulatory document NPAOP 0.00-6.02 -11 (Cabinet of Ukraine Ministers, 2011). In this document, three groups of causes of accidents were provided: technical, organizational and psychophysiological. In 2019, a new "Procedure for investigating and recording accidents, occupational diseases and accidents at work" (hereinafter referred to as the Procedure) was approved (Cabinet of Ukraine Ministers, 2019). Certain changes have taken place in the Procedure, namely, a fourth group of causes of accidents has appeared - technogenic, natural, ecological and social causes (hereinafter - technogenic causes). It was of interest to investigate how new changes affected the results of the analysis of the causes of injuries in various branches of the national economy of Ukraine in recent years.

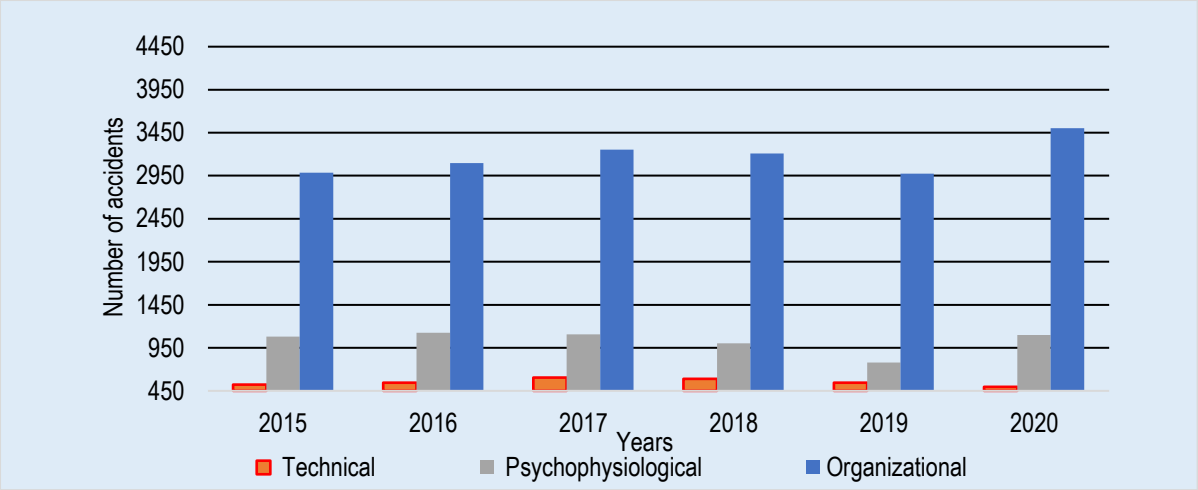
The purpose of the study is to establish the relationship between the number of victims of accidents at work in different periods, the causes of industrial injuries (taking into account the changes in the Procedure) and the most injury-prone sectors of the economy of Ukraine and determine ways of developing recommendations for reducing the number of injuries and increasing the effectiveness of labor protection measures.

METHODS

The study is based on data from open sources of information for the period from 2015 to 2022. Data on industrial injuries in our country are recorded by the SIFU (Social Insurance Fund of Ukraine, 2023). Accidents that resulted in injuries, including fatalities, and acute occupational poisonings and illnesses were considered. Statistical and group methods were used to analyze industrial injuries.

The statistical method is the most common method of industrial injury research. This method is based on the study of data on injuries according to documents that register accidents (acts on the H-1 form, sheets of temporary incapacity for work, and the

Figure 1
Causes of industrial accidents in Ukraine for 2015-2020.



to identify the main causes of injury and develop measures to prevent it. The data is then processed to achieve the objectives of the study, namely by; 1) To analyze the causes of industrial accidents in different years of the period under investigation, taking into account changes in the Procedure; 2) Establish patterns of interrelationship between the number of victims of industrial accidents and the most traumatic sectors of the economy; 3) To propose measures to reduce the number of accidents that happened for the most important reason, taking into account the most traumatic sectors of the economy. To facilitate comparison and consideration of the dynamics of processing results, statistical data are presented in the form of bar charts and histograms.

RESULTS

In order to determine the specifics of the dynamics of occupational injuries in Ukraine over the past 8 years, the statistical information of the SIFU was studied and analyzed. The processing and arrangement of these data made it possible to construct graphs reflecting the dynamics of the causes of accidents in different periods (before and after the changes in the causes of the Procedure), as well as to determine the most traumatic sectors of the economy.

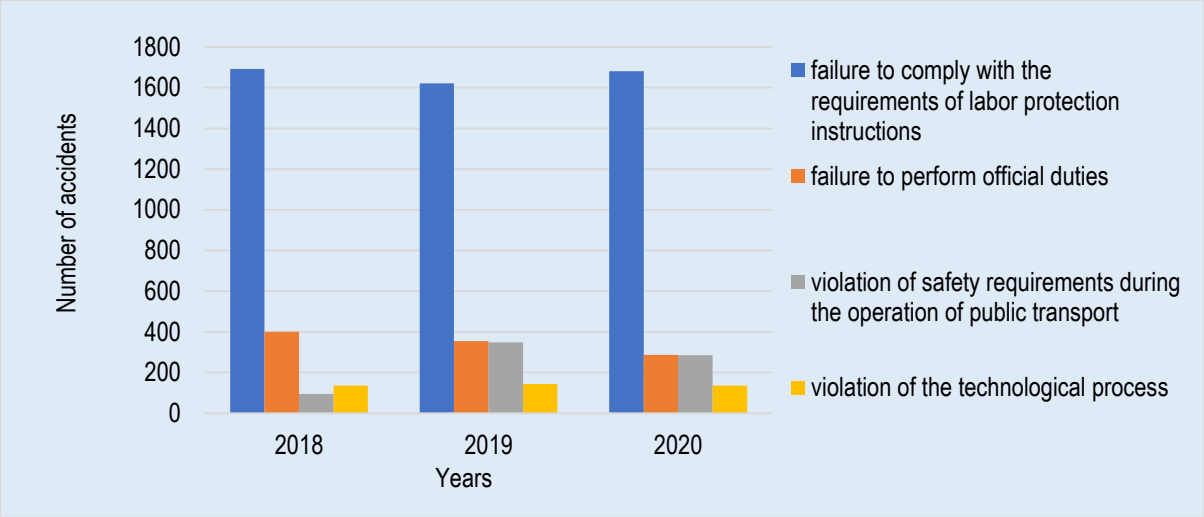
The dynamics of the number of accidents depending on their causes -technical, organizational or psychophysiological from 2015 to 2020 is presented in Figure 1. As can be seen from the above data, the largest number of injuries during the specified period occurred for organizational reasons. A noticeable increase in the number of accidents due to organizational the organizational causes of accidents in more detail. The consideration of organizational reasons is shown in Figure 2. The figure clearly shows which of the organizational reasons occupy a dominant position.

As we can see, most accidents occurred due to violations of labor discipline. These are the following reasons: non-fulfillment of the requirements of labor protection instructions, non-fulfillment of official duties, as well as due to violation of safety requirements during the operation of public transport and violation of the technological process. The number of accidents due to non-compliance with the requirements of labor protection instructions is several times higher than other organizational reasons.

Until 2019, the investigation and record keeping of accidents, occupational diseases and accidents at work was carried out in accordance with NPAOP 0.00-6.02-11 (Cabinet of Ukraine Ministers, 2011). The classifier of the causes of accidents at work in the specified document contained 31 causes, which were divided into three main ones: technical, organizational and psychophysiological. But the previous classifier did not reflect a large group of reasons for which accidents occurred. Therefore, it became necessary to create a fourth group of causes of industrial injuries. In 2019, the updated Procedure for investigating and keeping records of accidents, occupational diseases and accidents at work, hereinafter the Procedure (Cabinet of Ukraine Ministers, 2019), was published, in which a fourth group of causes of accidents appeared: technogenic, natural, environmental and social causes (hereinafter - technogenic causes).

Figure 2

The main organizational causes of accidents in 2018-2020.



This group includes the following causes: release of dangerous chemical, radioactive, biological substances; social conflict (strike, declared and undeclared war, terrorist act, blockade, revolution, mutiny, rebellion, mass riots, public demonstration, illegal actions of third parties, etc.); natural disaster (meteorological, topological and tectonic disasters earthquakes, landslides, mudflows, snow avalanches, floods, subsidence and landslides, etc.); contact with representatives of the animal and plant world; hydrometeorological phenomena (frost, ice, sleet, blizzard, gusty wind, hail, heat, fog, downpour, lightning, etc. (Cabinet of Ukraine Ministers, 2019).

The dynamics of accidents taking into account the fourth group of causes according to SIFU data from 2020 to 2022 is shown in Figure 3. The number of accidents that happened in 2021 compared to 2020 increased. This happened due to technogenic as well as organizational and psychophysiological reasons. In 2021, man-made reasons took first place (43.8%), but organizational reasons were almost at the same level (40.4%). Analysis of the data shown in Figure 1 and Figure 3, indicates the fact that the number of accidents due to organizational reasons during 2015-2019 fluctuated at the level of approximately 3100 ± 100 cases per year. In 2020, their number increased by 13%, and in 2021 by 60%.

The distribution of the number of victims of accidents at work depending on the economic sectors in different years deserves attention. For the purpose of comparison, a corresponding sample was made for 2015 and 2022. The distribution of the number of victims according to the reports of the investigation of accidents H-1/P (related to production) for the most injury-prone sectors of the economy for 2015 and 2022 is shown in Figure 1, respectively.

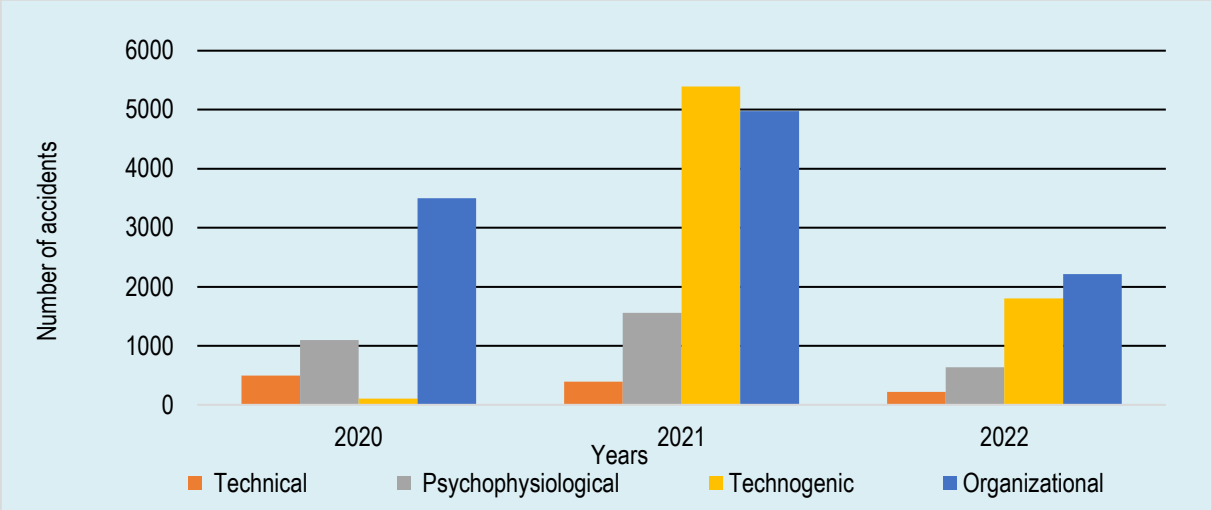
As we can see, in 2015, the largest number of workers who suffered accidents worked in such industries as the mining industry, transport, postal and courier activities, agriculture, metallurgical production, and only then - in the field of health care. During 2016-2019, these proportions almost did not change. Since 2020, the general picture has become different. The largest number of accidents in 2020-2022 were in the health care sector, followed by the mining industry and transport in the second and third places. In 2021, the number of victims in the sectors "Health care", "Mining and quarrying", "Transport, warehousing, postal and courier activities" was 80.5% of the total number of victims in Ukraine. The fact that during this period wholesale and retail trade supplanted agriculture, metallurgical production and construction is also noteworthy.

DISCUSSIONS

In order to prevent industrial injuries, it is extremely important to correctly establish the causes of the accident. Because it is the causes that serve as initial data, both for the development of measures to eliminate the consequences of a specific accident, and for the prevention of accidents in general.

Figure 3

Causes of industrial accidents in Ukraine for 2020-2022



Based on the data presented in Figure 1, it can be concluded that the leading position among the causes of accidents from 2015 to 2020 is occupied by organizational reasons. The organizational reasons for such a large number of accidents are: failure to comply with the requirements of labor protection instructions; non-performance of official duties; violation of safety requirements during the operation of public transport; violation of the technological process; violation of safety requirements during the operation of equipment, machines, mechanisms, admission to work without training and verification of knowledge on labor protection issues, etc.

The largest number of accidents that occurred for organizational reasons occurred precisely because of non-compliance with the requirements of occupational safety instructions and non-fulfillment of job duties, as shown in Figure 2. It can be concluded that workers intentionally, or due to poor occupational safety training, did not comply with labor protection requirements. The lack of professional competence among employees and supervisors regarding the safe conduct of work leads to the violation or non-fulfillment of official duties.

The significant and unexpected increase in the number of road accidents due to organizational reasons in 2020 and 2021 is noteworthy (Figure 3).

Figure 4

Distribution of the number of victims of accidents in 2015.

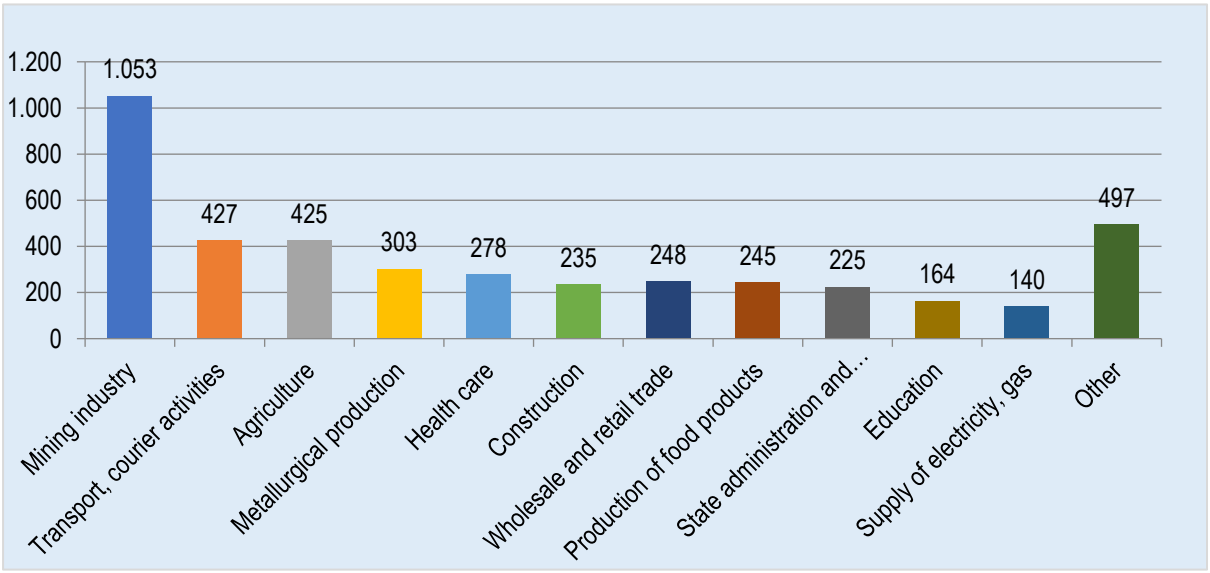
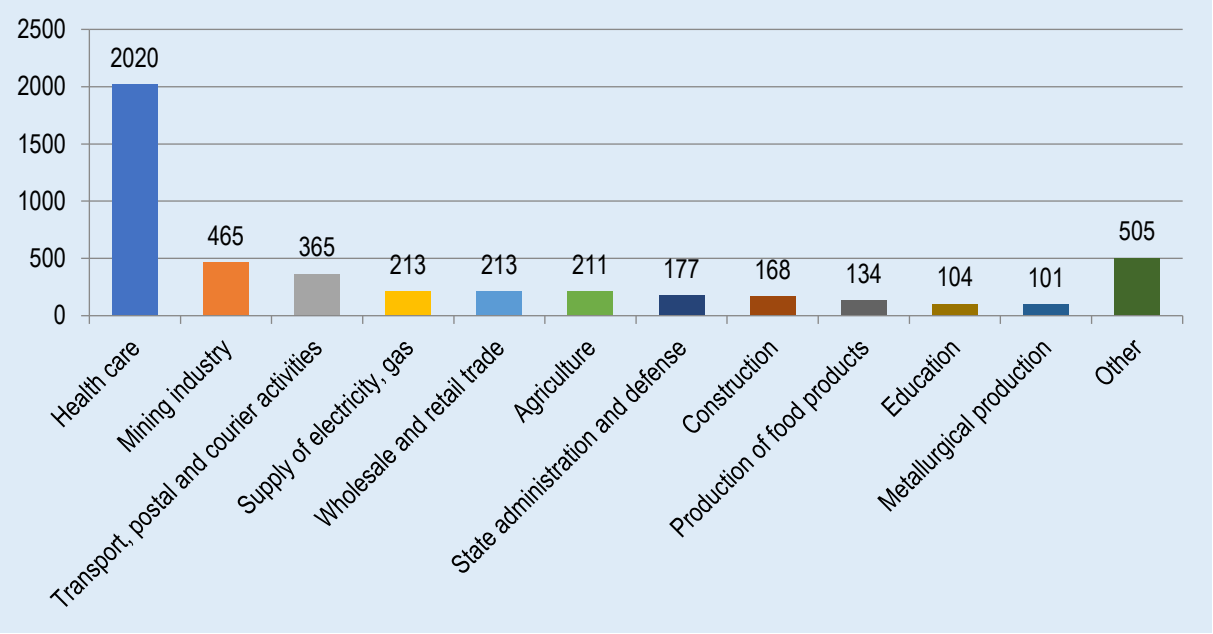


Figure 5
Distribution of the number of victims of accidents for the year 2022.



During this period, most enterprises did not work due to the quarantine associated with the coronavirus epidemic. Perhaps this fact is related to the psychological state of people and collective stress in society. Workers neglected safety requirements, and qualified workers did not go to work due to illness.

In 2021, the largest number of accidents occurred due to technogenic causes, which is shown in Figure 3. The growth of this group of causes is associated with the pandemic of the SARS-CoV-2 coronavirus infection. This situation was caused by cases of infection of medical and other workers with COVID-19. The work of employees is related to the performance of professional duties in conditions of increased risk of infection.

The given data indicate certain changes in modern society that did not occur before this period. First of all, this concerns the emergence of the corona virus pandemic, which led to a significant increase in technogenic accidents. The appearance of technogenic causes in the Procedure was caused precisely by changes in the natural environment and social changes in society (Mezentseva, 2023).

To confirm the above, let's look at the sectors of the industrial economy in which the most accidents occurred in recent years. Based on the data shown in Figure 5, it can be seen that the largest number of workers who had accidents were in health care, mining, transport, postal and courier activities, wholesale and retail trade, and so on. If we consider the most injury-prone sectors of the economy of enterprises in 2015 (Figure 4), it can be noted that the largest number of workers who had accidents belonged to such sectors as the mining industry, transport, postal and courier activities, rural economy, metallurgical production and even then the sphere of health care.

That is, it was the emergence of the SARS-CoV-2 coronavirus pandemic that brought the health care sector to first place in terms of the number of accidents at work. At the same time, in 2022, following the sphere of health care, such branches of the economy of enterprises, which are connected with public communication of workers due to production necessity, "pulled up".

The regularity of such a redistribution of the most traumatic sectors of the economy is explained by the spread of the infection precisely through the production environment. In the production environment, communication of employees with ordinary people is part of their professional duties. This led to a high probability of infection of workers.

The data for 2022 also had to take into account events related to active hostilities in the country. In this regard, the Resolution of the Cabinet of Ministers of Ukraine "On Amendments to the Procedure for Investigating and Recording Accidents, Occupational Diseases and Accidents at Work" (Cabinet of Ukraine Ministers, 2023) was adopted. A number of 772 workers were injured during the performance of their duties due to active hostilities, 221 of whom died. At

the same time, for 590 victims (including 158 with a fatal outcome), the investigation was completed and acts in the form of H-1 were drawn up, of which 586 were acts in the form of H-1/P, related to production (including 157 - with a fatal outcome) and 4 acts on the H-1/NP form (Social Insurance Fund of Ukraine, 2023).

It should be noted that the data on technogenic causes of industrial accidents are submitted to the FSSU only for the last three years, that is, after their introduction to the Procedure. At the same time, only during 2021 technogenic causes of industrial injuries occupied the leading position, which in all other years was occupied by organizational causes. And already in 2022 (Figure 3), organizational reasons "returned" lost positions and took the first place among the causes of industrial accidents. Among the organizational reasons, as mentioned earlier, the largest number of accidents occurs due to the "human factor". It includes: non-compliance with the requirements of labor protection instructions, non-fulfillment of official duties, violation of safety requirements during the operation of public transport, violation of the technological process, and others. At the same time, the number of accidents due to non-fulfillment of the requirements of the labor protection instructions, as can be seen from Figure 2, is several orders of magnitude higher than the other mentioned reasons.

Taking into account the above, it should be noted that the following pattern can be called a systematic violation of organizational reasons by workers. Violations occur due to a poor motivational component of labor safety. Similar violations also indicate that employees knowingly or due to lack of knowledge on labor protection take risks and do not take into account safety rules.

But, in our opinion, there was another factor. According to foreign specialists who worked in Ukraine, a large number of accidents with fatal consequences occurred, first of all, due to unsatisfactory training of workers and employers in matters of labor protection (Dushko, 2020).

Based on the preliminary analysis, it is necessary to implement appropriate measures and proposals to reduce the number of accidents at work, taking into account the determined patterns. Regarding the number of technogenic accidents, we can say that there has been a decrease in the number of accidents due to COVID-19 in recent years. Employers of some enterprises took responsible measures to prevent the infection of employees. An example of this is the measures taken in the Ukrainian company "Nova Poshta" (Mezentseva, 2020).

The number of accidents that occurred due to organizational reasons is a significant concern. The situation has remained unchanged for many years. In our opinion, for a conscious attitude to labor safety, it is necessary to carry out better training on labor protection for workers of all levels. For this, it is necessary to draw attention to cases of injury to workers, taking into account not only the physiological component of damage to the health of workers, but also economic losses (Didur & Dmitryuk, 2023). The most effective way to reduce industrial injuries is to train employees in safe methods of work performance. Personnel at all levels of management should be trained to make decisions to improve working conditions at workplaces and reduce potential risks.

Training of heads of structural divisions and leading specialists in labor protection issues should be carried out during their training in educational institutions. The guarantors of specialties need to pay attention, first of all, to competences related to safe methods of conducting technological processes and safe operation of production equipment (Kostikov, 2021). A conscious attitude to the fulfillment of labor protection requirements is the key to increasing motivation for safe work. It is also necessary to pay attention to professional selection, high-quality primary and periodic medical examinations, which can significantly affect the reduction of industrial injuries (Mezentsev, 2023).

High-quality training on occupational safety is a guarantee of safe and accident-free operation of the technological process. Accordingly, preserving the health and life of employees of enterprises is a fundamental basis for improving the occupational safety management system. Implementation of effective preventive work to prevent industrial injuries and occupational diseases is impossible without an awareness of the importance of occupational health and safety issues.

Efforts to prevent or reduce the risk of workplace accidents and/or work-related illnesses include early identification of hazards and occupational health and safety (K3) risk management analysis. However, all such measures require support from the industry, management, and the workers themselves. People are encouraged to constantly remind each other of goodness and to engage in preventive measures against harm, even through small actions, as stated in QS. Al-Ashr/103: 1-3, whose translation:

"*By time (1), Indeed, mankind is in loss (2), Except for those who have believed and done*

righteous deeds and advised each other to truth and advised each other to patience (3)."

Based on the interpretation of Ibn Kathir, Allah swt swears that mankind is in loss. The type of people who are exempt from this loss are those who believe sincerely, both in their hearts and in their actions – those who perform righteous deeds. They are also individuals who consistently remind and advise each other to follow the path of truth and encourage patience. By following this guidance, it is hoped that data trends can serve as a reminder for people to anticipate and prevent dangers that threaten the health and well-being of workers.

CONCLUSIONS

On the basis of statistical data, an analysis of changes among the causes of industrial accidents in Ukraine in recent years was made, which showed the appropriateness of introducing the fourth group of causes (technogenic, natural, environmental and social). The unchanging leading position of organizational reasons has been determined, despite certain features of the processes taking place in society recently. The regularities of the redistribution of the most traumatic sectors of the economy were established in recent years, which is justified by the emergence of the coronavirus infection. The regularity of the predominance of organizational causes of industrial injuries is explained by the low motivational component of occupational safety.

Based on the content analysis presented in this study and based on many years of experience in teaching "Occupational Safety" disciplines in higher education institutions of Ukraine, it is advisable to propose measures such as improving the quality of training on labor protection issues for employees at all levels and returning the study of labor safety issues by future heads of structural divisions and leading specialists at the stage of training in higher education institutions. In addition, it is necessary to recommend introducing the competencies of safe work management into the industry standards of education, introducing a requirement for mandatory revision and re-approval of instructions, the violation of which led to an accident, and also improving the control of the condition of employees through periodic preventive medical examinations and mandatory professional selection.

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AUTHORS' CONTRIBUTIONS
Iryna Mezentseva designed the study, wrote manuscript, analyzed and acquired the data. Sergij Vambol designed and formulated the consept. Olena Kuzmenko collected and analized the data, Olga Osmanova wrote manuscript and analyzed the data. All authors collected data, revised the manuscript, and performed the field work.

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COMPETING INTERESTS
The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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