

Chapter 13

Preventing Occupational Diseases and Injuries in Ukraine: The Socio-Economic Perspective

Natalia Berezutskaya¹, Tetiana Stytsenko², Viacheslav Berezutskyi³

1. Introduction

The transition of the Ukrainian economy to market conditions is related to the fact that there is frequently a restriction of the funds allocated for labour protection. Therefore, the main task of improving the safety management system in an enterprise in the context of economic reform is to ensure maximum efficiency, given the existing levels of restrictions on management actions. These tasks can be achieved through the optimal allocation of available human and financial management resources, the correct selection of the number and quality of management personnel, making sound, management decisions which are close to optimal. What is of utmost importance is the availability of complete, objective information about the state of the object of management, the state of injury and occupational diseases in the enterprise and developed and scientifically sound methods of its processing and management decisions. This is impossible without the creation of modern information systems in the field of occupational safety.

The purpose of this article is to assess the socio-economic effectiveness of prevention of occupational diseases and injuries in Ukraine. In order to improve the assessment of the workers' injury hazards in enterprises or technological processes, a proposal was made to implement actions which reduce injuries and oc-

¹ Kharkiv National University of Radio Electronics, Kharkiv (Ukraine), ORCID: 0000-0003-2573-9031, e-mail: natalia.berezutskaya@nure.ua

² Kharkiv National University of Radio Electronics, Kharkiv (Ukraine), ORCID: 0000-0003-4530-0253, e-mail: tatiana.stytsenko@nure.ua

³ National Technical University «Kharkiv Polytechnic Institute», Kharkiv (Ukraine), ORCID: 0000-0002-7318-1039, e-mail: viaberezuc@gmail.com

cupational diseases in enterprises. To assess the effectiveness of the prevention of injuries and occupational diseases, the Social Insurance Fund's reporting data on occupational injury and occupational health surveillance were used. Formation of indicators of supervisory activity and occupational traumatism was carried out by types of supervision, which allowed one to analyse quantitative and qualitative indicators of supervisory activity of industrial traumatism over a certain period of time and to use these data to evaluate the effectiveness of the prevention of injuries and occupational diseases.

This paper is structured as follows: in the next section, a comprehensive review of literature is performed to identify international activities on occupational accident prevention. The subsequent section introduces the methodology followed by exemplary results based on data from the Social Insurance Fund on Injury and Occupational Diseases in Ukraine. Finally, an assessment of the socio-economic effects of injury and occupational disease prevention and conclusions were provided.

2. Literature Review

Occupational injuries and occupational diseases have a significant impact on health or they cause the death, disability of the worker, and they also influence the economic performance of the enterprise, and the social security system. From the economic point of view, the losses are increased when the indirect costs are taken into account, i.e. all costs which accompany the direct costs of an industrial injury. These expenditures include reduced labour productivity, economic impact, employee stress, replacement training costs, medical and legal costs. The total costs of one case of injury in Europe are twice, and in the USA three times, the costs of insurance. From the first year of its activity, the International Labour Organization (ILO) has paid great attention to the problem of occupational injuries. Thus, as early as in 1923, the ILO adopted a recommendation on general principles for the organization of an inspection system that should be aimed 'at ensuring the application of the most effective safety practices to prevent accidents' (*Rekomendatsiya shchodo zahalnykh...* 1923). More specific was ILO Recommendation No. 31 'On Industrial Accident Prevention', which was adopted in 1929 (*Rekomendatsiya 31...* 1929). A year earlier, the ILO adopted a resolution on combating injury under the slogan 'Safety Above All'. Recommendation No. 31 identified the industries most dangerous in terms of occupational injuries. Attention was also drawn to the importance of investigating the causes of accidents in each industry, not only their technical and organisational aspects, but also their physiological and psychological factors. However, the ILO's recommendations do not have the status of a legislative international document that is inherent in the Conventions. Therefore, in 1981, the International Labour Organiza-

tion adopted Convention No. 155 on Occupational Safety and Health and Industrial Environment, which sets out the principles of national labour safety policy, and how to prevent accidents which occur during work (*Konventsiya No. 155 ... 2011*).

When conducting national policy, safe workplaces are developed and implemented in production, equipment is adapted to the physical and mental characteristics of workers, and professional training is carried out. In recent years, the ILO has adopted a number of recommendations which address occupational accidents and their reporting. In doing so, each ILO member state must annually submit full statistics on industrial accidents to the International Labour Office in order to facilitate the international exchange of these data. What is particularly important here is Convention No. 187 of 2006 on the Basics of Promoting Safety and Health at Work. This Convention defines different terms, e.g. ‘National Labour Safety Policy’, ‘National Occupational Safety System’, ‘National Occupational Safety Programme’, ‘National Occupational Safety Prevention Culture’ (*Konventsiya pro osnovy... 2006*). Although the ILO has made significant efforts internationally and nationally to address occupational injuries, it is estimated that more than 1.2 million workers die every year due to accidents. However, for various reasons, it is not always possible to obtain accurate statistics on the number of accidents. In some countries, statistical reports are prepared by incompetent authorities or institutions which hide the true state of affairs. Other countries do not have government departments of labour statistics. Among the most serious problems in this regard is the international comparison of accident statistics.

When analysing real statistics, it is common to create safe jobs through targeted action plans under national job security programmes. The ILO’s Global Workplace Safety Strategy, adopted in 2003, underlines the importance of creating a preventive safety culture and management systems. In 2001, the ILO developed guidelines for workplace safety management (ILO-OSH 2001), which are a fundamental international standard. They indicate how systems based on the concept of the permanent improvement of workplace safety through the introduction of a plan-do-check-act cycle at the enterprise level should be developed (ILO 2001). Convention 187 and Recommendation 196, cited above, constitute a further development of the Global Strategy.

3. Research Methodology

To evaluate the effectiveness of preventing occupational diseases and injuries, we used the reporting data from the Social Insurance Fund for nine months of 2019, including:

- Distribution of the number of accident victims according to the production-related H-1 acts for the most traumatic causes of accidents

- Distribution of the number of victims of accidents according to the production-related H-1 acts by the most traumatic sectors of the economy of the enterprises in which the accidents occurred
- Distribution of industrial accidents according to production-related H-1 acts by regions of Ukraine
- Distribution of occupational diseases according to P-4 acts by sectors of the economy of enterprises where victims were employed
- Distribution of occupational diseases according to P-4 acts by regions of Ukraine.

The main tasks of social insurance against accidents are:

- Preventive measures aimed at eliminating harmful and dangerous factors of production, the prevention of accidents at work, occupational diseases and other cases of threats to the health of the insured caused by working conditions are entrusted to insurance experts on labour protection
- Promoting the creation of conditions for the recovery of the health of the victims of the industrial accidents
- Indemnification for damages related to the loss of the insured persons' wages or their corresponding part during the performance of their duties, provision of social services in connection with their damage to health, as well as insurance payments to disabled members of their families in case of the workers' deaths (*Zakon ukrayiny... 1999*).

The effectiveness of any structure depends on how well it is organised in terms of accounting and control. To evaluate the effectiveness of prevention requires the effective management of occupational safety to analyse occupational diseases and injuries in enterprises and other organisations.

4. Findings

4.1. Accident Analysis

According to the report of the Social Insurance Fund (*Fond sotsialnoho... 2020*) for nine months of 2019, working agents of the Executive Directorate of the Fund registered 3,270 victims of industrial accidents (including 286 fatal), which acts in the form of H-1, related to the production.

When one analyses and compares the data from nine months of 2019 to the data from nine months of 2018, the number of cases of accident insurance decreased by 7.9% (from 3,549 to 3,270), the number of fatalities increased by 10.0% (from 260 to 286). The number of accidents at work increased: in Kiev by 52 cases (16.4%), in the Poltava region – by 20 cases (17.5%), in the Dnipropetrovsk region – by 18 cases (3.6%), Sumy region – by 16 cases (25.4%), Odessa region – by 11 cases (9.6%), Khmelnytsky region – by 9 cases (11.5%), Chernivtsi region – by 5 cases (17.2%), Ternopil region – by 2 cases (3.8%). The number of fatal accidents has significant-

ly increased in the Kiev region by 14 cases, or 3.3 times (from 6 to 20), the Volyn region – by 7 cases, or 2 times (from 7 to 14), in the Mykolaiv and Kharkiv regions – by 6 cases, or 1.8 times (from 8 to 14) and 2 times (from 6 to 12), respectively. Significant reduction of cases of accident insurance was observed in: the Rivne region – by 34.9% (from 83 to 54), Ivano-Frankivsk region – by 34.5% (from 87 to 57), Transcarpathian region – by 27.5% (from 40 to 29), Kharkiv region – by 27.2% (from 151 to 110) and Zaporizhzhian region – by 23.6% (from 220 to 168).

During nine months of 2019, the number of accidents at the enterprises with the highest level of injuries occurred at the following enterprises: PJSC DTEK Pavlogradugol (127 accidents) in Dnipropetrovsk region, PJSC Mine Management Pokrovske (29) in Donetsk region, DTEK Dobropillyugol LLC (26) in Donetsk region, a company with foreign investments, McDonald's Ukraine Ltd (24), in Kiev. A significant increase in the number of insured accidents for nine months of 2019 compared to nine months of 2018 occurred at PJSC DTEK Pavlogradugol – by 28 cases, or by 28.3% (from 99 to 127). 72.2% (2,362) of men and 27.8% (908) of the total number of injured people in Ukraine were injured at Ukrainian enterprises.

Alcoholic intoxication injuries were sustained by 87 people (2.7% of the total number of people injured in Ukraine), which is 10 people less than in the first nine months of 2018. At the same time, 30 people died. When it comes to professions, most of the injured workers were drivers of vehicles (147), miners (132), sinkers (83). The highest rate of occupational injuries was observed among workers aged 50–59 years (875 people, representing 26.8% of the total number of injuries in Ukraine for nine months of 2019). Among the causes, 64.9% (2,121) of the accidents were organisational. For psychophysiological reasons, 20.7% (679) of accidents occurred for technical reasons – 13.2% (432) of accidents. Man-made, natural, environmental, and social reasons related only to 0.6% (19) of the accidents, and other causes – 0.6% (19) of the accidents. The most common organisational, psychophysiological and technical causes are depicted in Table 1.

The most common organisational reasons were non-compliance with the requirements of the instructions on labour protection with 36.1% of the total number of injured people in Ukraine (1,179 injured people). The most common psychophysiological causes, in turn, were personal negligence of the victim with 12.0% of the total number of injured people in Ukraine (392 injured people). Among the most common technical reasons, one can indicate the poor technical condition of production facilities, buildings, structures, utilities, territories with 4.0% of the total number of the injured in Ukraine (132 injured people).

The next analysed issue was the main events that led to the accidents which include:

- Fall of the victim during movement – 22.0% (720 injured people from the total number of the injured in Ukraine)
- Act of moving and rotating parts of equipment, machines and mechanisms – 12.4% (405 people)

- Victim's fall from height – 8.2% (268 people)
- Road accidents on public roads – 7.9% (257 people)
- Intentional homicide or trauma caused by another person – 5.2% (170 people)
- Drop of equipment or their structural elements – 4.5% (148 people).

Table 1. Total number of injured people in Ukraine by different types of causes

Types of causes		Percentage of injured people	Number of injured people
Organisational causes	non-compliance with the requirements of the instructions on labour protection	36.1%	1,179
	failure to perform official duties	8.3%	272
	violation of safety requirements during the operation of public transport (road, water, rail, air)	8.3%	270
	technological process disruption	3.3%	109
	violation of safety requirements during the operation of equipment, machines, mechanisms, etc.	2.2%	72
	other organisational reasons	1.1%	37
Psychophysiological causes	personal negligence of the victim – of the total number of injured people in Ukraine (injured people)	12.0%	392
	injury (death) as a result of the illegal actions of others	5.7%	185
	other reasons	2.3%	74
Technical reasons	poor technical condition of production facilities, buildings, structures, utilities, territories	4.0%	132
	poor technical condition of the means of production	1.7%	56
	other technical reasons	1.6%	53
	imperfection of the technological process, its non-compliance with safety requirements	1.4%	46
	structural defects, imperfections, insufficient reliability of the means of production	1.3%	44

Source: own study.

During the nine months of 2019, the number of production-related accidents which resulted from the operation of equipment, machinery, and mechanisms is 875, including 109 fatalities, accounting for 26.8% of the total number of injuries in Ukraine. The equipment which most frequently leads to accidents is:

- Cars – 5.5% of the total number of those injured in Ukraine (181 injured people)
- Mining equipment – 3.3% (109 people)
- Specialised cars, trains, tractors, vans, trailers, trolleybuses, forklifts, motorcycles, bicycles – 3.2% (106 people).

Given the main traumatic sectors of the economy and types of work, the following sectors can be indicated:

- Mining and quarrying – the percentage of injured is 17.6% of the total number of the injured in Ukraine (577 people, including 21 fatalities)
- Transport, warehousing, postal and courier activities – 9.2% (301 injured, including 45 fatalities)
- Agriculture, forestry and fisheries – 7.2% (234 injured people, including 40 fatalities).

The percentage of injured persons in these sectors is 34.0% of the total number of injured persons in Ukraine.

4.2. Analysis of Occupational Diseases

Over the nine months of 2019, with the data compared to the data from the nine months of 2018, the number of occupational diseases increased by 26.5%, or by 348 diseases (from 1,314 to 1,662). The main circumstances leading to occupational diseases over 2019 were: imperfection of mechanisms and working tools – 21.9%, imperfection of technological process – 20.1% and non-use of personal protective equipment – 10.1% of their total.

In the structure of occupational diseases, the first place belongs to respiratory diseases – 45.4% of the total number of diagnoses in Ukraine (1,314 cases). In second place – diseases of the musculoskeletal system (radiculopathy, osteochondrosis, arthritis, arthrosis) – 25.1% (728 cases). The third place for hearing-related diseases is 14.9% (430 cases), the fourth place for hand-arm vibration syndrome is 7.3% (211 cases). The highest percentage of occupational diseases occurred in the field of mining and quarrying – 83.5% of the total number of occupational diseases in Ukraine (1,388 people), which is 28.4% (307 people) more than in the nine months of last year.

One of the effective measures for accident prevention is the process of investigation, the purpose of which is to identify the specific causes which led to the accident or occupational disease, in order to prevent the latter. In order to take measures aimed at preventing accidents, eliminating health threats to workers caused by working conditions, it is necessary to carry out checks on the state of preventive work on creating healthy and safe working conditions in enterprises. In carrying out inspections, in order to prevent the occupational diseases, special attention should be paid to the organisation of the employer and the timely passage of legally prescribed medical examinations of employees and the implementation of health measures in accordance with the results of medical examinations.

In order to improve the working conditions and preventive work against industrial accidents and occupational diseases, and to ensure the implementation of measures for the prevention of occupational injuries and occupational diseases on the basis of co-operation with employers, it is necessary to train workers with safe

working practices. Promoting safe and harmless working conditions is an important part of prevention work. Insurance experts on labour protection promote the positive experience of the functioning of specific elements of the management system of labour protection for practical application in any enterprises. The employers are provided ongoing assistance in addressing human health and safety issues.

The occupational diseases and injuries at enterprises depend on the efficiency of the functioning of the occupational health and safety (OHS) management system. This system should be one of the links in the enterprise's overall business management system (Berezutskyi 2007). The occupational health and safety management system at the enterprise is built in such a way that all its management should receive information on the safety and health of workers in the workplace, process it, make appropriate decisions or measures and implement them in the workplace while informing the employees about the measures taken.

5. Discussion and Conclusions

The economic importance of injury prevention in occupational diseases is assessed by the results, changes in social indicators, which are expressed in the implementation of measures to improve working conditions: improving productivity; reducing unproductive costs of time and labour; increasing working time fund; reducing the costs associated with staff turnover due to working conditions, costs for improving working conditions and labour protection. An increase in working hours and the efficiency of the use of equipment is achieved by reducing downtime during a change due to the deterioration of employees' well-being through working conditions and micro-injuries. If harmful factors for a person act in a complex idle time in the workplace, they can reach 20–40% for a change due to occupational injuries and poor health.

The increase in labour productivity is also caused by the poor organisation of workplaces. Without taking into account ergonomic (anthropometric) requirements, there is a need to perform unnecessary movements and make additional physical efforts due to the inconvenient position, poor location of equipment controls and poor design of workplaces. As a result of improving working conditions, optimal conditions are created for the normalisation of the psychological climate in the workforce, increasing working capacity and increasing productivity. An increase in working time is achieved through a reduction in occupational injuries and non-attendance. Harmful working conditions significantly affect not only the occurrence of occupational diseases, but also the occurrence and duration of common diseases.

The cost savings can be achieved by cancelling benefits and compensation for adverse working conditions. Observance of sanitary and hygienic requirements and rules of workplaces makes it possible to completely or partially abolish such

privileges as: shortened working hours and additional leave; raising the tariff rate and preferential pension; therapeutic and preventive nutrition and free delivery of milk. All of these benefits are associated with significant payments of extra cash in virtually no time spent. There is a high turnover among the workers whose work is associated with heavy physical labour, unfavourable sanitary and hygienic conditions, monotonicity of the production process. The costs of improving conditions and occupational safety can be divided into:

- Expenses for the compensation paid to the victims of injuries caused by injuries and occupational diseases
- Expenses for compensation for work in unfavourable conditions which do not meet the sanitary standards (privileges for severe and harmful conditions)
- Costs for the prevention of injuries and occupational diseases
- Costs of accidents and accident management
- Costs of fines and other damages.

The studies show that businesses spend significantly more on benefits and compensation associated with hazardous working conditions than on occupational safety measures to prevent occupational injuries and morbidity, and to normalise working conditions. The ratio between the costs of improving conditions and labour protection and the cost of benefits for adverse working conditions, preferential pensions and extra holidays is 1:10 and sometimes more (Sorochnyńska 2013). In the conditions of the imperfection of market mechanisms, all these costs are attributed to the cost of production, and, as a result, it is not their managers, but society who pays for the imperfect system of labour safety management at the enterprises. The current system of benefits and compensation does not cause the desire of managers to improve working conditions, because these costs do not affect the economic performance of the company. On the other hand, the penalties paid by the company in the presence of the facts of the injuries and occupational diseases of workers are now quite considerable, and therefore make the employer (their authorised body) seriously think that it is better to suffer losses (which can sometimes lead to bankruptcy), without occupational safety or without conflict with the law, and to invest in preventive measures in a timely manner, preserving the lives and health of people.

Analysing the submitted financial statements of the enterprises (SMIDA 2020), it can be stated that there is no article that would cover the costs of improving the conditions and labour protection. There is also no open access to reliable information on the financial costs of the Social Insurance Fund for the prevention of injuries and occupational diseases. On the official site of the Foundation's Office, there is only a report on the systematic work on the preparation of information material on injury prevention.

The list of penalties and other economic costs for enterprises includes: penalties for every industrial accident or occupational disease; compensation for damages, lump sums and all other payments to victims in the workplace or to their

families and dependents of the victims; payments to businesses, institutions, organisations which have been harmed (for instance, due to the production of poor-quality equipment, poor design of a manufacturing facility, late performance of obligations under the agreement with a partner, etc.); compensation to hospitals, other health and medical institutions, expenses for the treatment and rehabilitation of victims, provision of sanatorium and resort services; compensation of expenses of social security bodies for the payment of pensions to disabled workers; expenses on rescue work during accidents, investigation and examination of their causes, burial of the dead, compilation of the sanitary and hygienic characteristics of the workplace of the worker who contracted the occupational disease, etc. The cost of benefits and compensation provided for by applicable law and collective agreements may be significant. Therefore, one of the main objectives of the economic feasibility of measures to improve conditions and labour protection is to determine the costs of implementing measures which include capital investment and operating costs.

In most developed countries, the so-called ‘compensation schemes’ for losses from accidents at work are currently being implemented. Under such schemes, victims of occupational injuries and occupational diseases are paid their lost income and are reimbursed for medical expenses. The main task of the compensation schemes is to provide the employee and his or her family with a guarantee of a certain income in the event that he or she becomes disabled or loses his or her ability to work as a result of an injury or occupational disease. Since the compensation payments are made by employers themselves, it is they who are primarily interested in preventing accidents, even if it requires significant physical costs.

To reduce the number of injuries and occupational diseases in accordance with ILO-OSH 2001 (ILO-OSH 2001 International Guidelines on Occupational Safety and Health Management Systems) and OHSAS 18001: 2007 ‘Occupational Health and Safety Assessment Series’ provides for the establishment of a management system based on the principle of a risk-oriented approach to safety management. Within the framework of this concept, hazard identification and risk assessment are carried out by the method of expert assessment. The risk of injury and deterioration of workers’ health is assessed in the workplace. The assessment is carried out by competent persons taking into account the opinion of employees (Berezutskyi 2020). The problem of assessing the effectiveness of the prevention of injuries and occupational diseases remains unresolved today, which negatively affects the state of occupational safety, the level of occupational injuries, and makes it impossible to improve occupational health and safety management systems. One of the promising scientific directions for improving the performance of the Occupational Safety and Health Management System is a comprehensive study of the performance of the Occupational Safety and Health System, identifying the factors which most influence its effectiveness and developing them on the basis of the results of scientifically sound management decisions.

The purpose of implementing a risk-oriented approach in the enterprise is to determine the priority of planned actions and measures to eliminate hazards and limit risks. As a result, qualitative and quantitative risk indicators are identified, which identify hazards in the workplace and provide an opportunity to manage them. Risk assessment is an important step in the management system of labour protection of the enterprise. It is a structured process that identifies ways to achieve goals and analyse the consequences and probabilities of dangerous events to decide on the need to reduce risk. Risk management is performed on the basis of the international standard ISO/IEC 31010 'Risk Management. Risk Assessment Methods' [ISO/IEC 31010: 2009 Risk management. Risk Assessment Techniques]. This standard accumulates risk assessment methods and data for reference to other international standards. To reduce the degree of risk, one of the authors of this paper developed a method of using risk indicators in 2016. It is a Ukrainian analogue of the Fine-Kinney method, but it differs from the proposed risk indicators of danger; that is, all risks are divided into groups of occupational risks and the degree of the severity of the consequences and (separated by colour, depending on the degree of consequences) they belong to different colour groups. After receiving the results of the assessment, the company must respond to certain actions and implement measures to eliminate the dangerous situation, depending on the risk-indicator (Berezutskyi, Adamenko 2016). At present, an example of the use of a risk-based approach is the division into different colour zones, according to the frequency and severity of the cases of COVID-19.

To conclude, as a result of the implementation of actions which reduce injuries and occupational diseases in enterprises, it is possible to improve the management system of labour protection in the enterprise in terms of economic reform, and thus ensure its maximum efficiency.

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