

Оцінка економічного ефекту від впровадження заходів з охорони праці на підприємствах

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Анотація. Охорона праці на підприємстві визначається більшістю економістів як система, яка значною мірою дозволяє розширити можливості підприємств із досягнення результатів операційної діяльності. Водночас роль охорони праці як чинника, що може посилити виробництво, визначається подібно лише у країнах із ринковою економікою. Актуальність дослідження визначається можливостями позиціонування охорони праці як чинника, що підвищує цінність продукції, яка виробляється зокрема й для країн із перехідною економікою. Мета дослідження полягає у необхідності розробки моделей, що дозволяють оцінити економічний ефект від впроваджуваних заходів на підприємствах як промислового, так і консалтингового сектору. Методами дослідження є аналітичні та методи моделювання економічних структур. У роботі визначено, що вартість виробничого травматизму та професійних захворювань разом із економічною ефективністю заходів із охорони праці є важливим стимулом для роботодавців прийняти ці заходи. Виявлено, що вони особливо зацікавлені у тому, чи є інвестиції в програму економічно ефективними (ефект дає хорошу віддачу від вкладених грошей) або економічно вигідними (фінансові вигоди сприятливі). Авторами показано, що більшість опублікованих інтервенційних досліджень дотепер були зосереджені на ефективності інтервенцій, а не на їхній економічній ефективності. Виділення розробленої методичної структури дозволяє визначити вже за кількісними характеристиками можливості для структурування та досягнення цілей як встановлених для підприємства акціонерами, так і виробничими планами. У статті визначені межі використання інтересів охорони праці як соціальної структури в сукупності з використанням методів виробничого планування. Необхідні подальші високоякісні дослідження, що проводять повну економічну оцінку, щоб мати можливість зробити подальші висновки щодо економічної ефективності заходів із охорони праці з погляду роботодавця

Ключові слова: модернізація виробництва, організація охорони праці, короткострокова економічна вигода, кадрові ресурси, збитки

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Assessment of the Economic Effect from the Introduction of Labour Safety Measures at Enterprises

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Abstract. Labour safety at the enterprise is defined by most economists as a system that allows considerably expanding the capabilities of enterprises to achieve operational results. Moreover, the role of labour safety as a factor that can intensify production is determined in this way only in countries with market economies. The relevance of this study is determined by the possibilities of positioning labour safety as a factor that increases the value of manufactured products, including for countries with economies in transition. The purpose of the study is determined by the need to develop models that allow assessing the economic effect of the implemented measures at enterprises of both the industrial and consulting sectors. The research methods are analytical and economic structure modelling methods. The paper determines that the cost of occupational injuries and occupational diseases, together with the economic efficiency of labour safety measures, are an important incentive for employers to take these measures. It is revealed that they are particularly interested in whether investments in the programme are cost-effective (the effect gives a good return on the money invested) or economically profitable (the financial benefits are favourable). The authors demonstrate that most of the published interventional studies have so far focused on the effectiveness of interventions, and not on their economic efficiency. The allocation of the developed methodological structure allows determining the possibilities for structuring and achieving the goals set for the enterprise by shareholders and production plans according to quantitative characteristics. The study defines the limits of using the interests of labour safety as a social structure in combination with the use of production planning methods. Further high-quality studies are required, which engage in a full economic assessment, to be able to draw further conclusions about the economic effectiveness of labour safety measures from the employer's standpoint

Keywords: modernisation of production, organisation of labour protection, short-term economic benefit, human resources, losses

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Introduction

Modern scientific developments, the introduction of technologies, as well as the modernisation of production cannot guarantee the avoidance of the impact of various risk factors, accidents, occupational diseases. The main purpose of labour safety is to determine the legal basis for the implementation of socio-economic, technical, and organisational measures and, consequently, to ensure the implementation, coordination, and control of the requirements established by law. Internal supervision of the working environment is quite restrictive, and its purpose is to identify risk factors existing in the working environment as early as possible and to prevent or reduce the impact of such factors on the safety and health of employees. In their working environment, employees are exposed to dangerous situations, hazardous effects of physical, ergonomic, chemical, and biological factors, and modern scientific developments do not guarantee the prevention of the impact of various risk factors, accidents, occupational diseases; therefore, a clear and effective labour safety system at both the state and business levels provides employees with safe and healthy working conditions.

The issue of the economic efficiency of labour safety measures has repeatedly been in the focus of attention of Ukrainian and foreign researchers. In particular, the assessment of the costs of an enterprise in case of an accident with an employee, depending on the severity of the damage to health, was considered by V.E. Gorshkova, Yu.V. Anishchenko, and M.A. Egorova [1]. T.M. Tairova, K.N. Tkachuk, A.A. Slipachuk [2] studied the legal framework for labour safety, the activities of relevant institutions, and reducing the level of industrial injuries. The definition of hazard factors and the impact of occupational injuries was covered by O.E. Kruzhilko, Ya.B. Storozh, I.M. Tkalich, O.I. Polukarov [3]. The assessment of the economic efficiency from the introduction of special measures for labour safety at production facilities was studied by the Ukrainian researcher O.M. Masyukevych [4]. Among foreign researchers, the labour safety system at the enterprise, the determination of factors affecting the financial component, and the reduction of labour safety costs were investigated by Yu. Kovalova, D. Atstāja [5]. The study of accidents at enterprises, the impact of economic incentives used in the labour safety system to reduce costs, was conducted by Polish researchers Z. Pawłowska and J. Rzepecki [6].

Despite the above, the present level of knowledge about the economic efficiency of labour safety measures remains unsatisfactory, since this subject area is understudied. To fill in the gaps and shortcomings identified

in the scientific literature, *the purpose of this study* is to assess the economic efficiency of primary and secondary labour safety measures from the employer's standpoint. Primary preventive measures are proactive in nature and are aimed at preventing the occurrence of diseases among healthy people, while secondary measures are of a reclamation nature and are aimed at reducing the prevalence of the disease through early detection. Thus, both primary and secondary occupational safety measures

Materials and Methods

can contribute to the general prevention of disability or control over it before the disability becomes chronic or severe [7].

The study is based on a review of literature sources on improving the efficiency of labour safety management, based on the definition of hazards and assessment of the risks of occupational injuries. The obtained results were verified using factor analysis, which allowed determining the factors that cause additional costs and losses for labour protection, as well as a correlation analysis of economic efficiency. The use of the group statistical method is aimed at processing groups of accidents (direct and indirect).

The methodology of analysing labour protection costs was used to assess labour safety and determine the economic effect of the introduction of labour protection measures at enterprises. The economic method of research was used to determine the most correct indicator, which acted as an indicator of the quality of the chosen measurement method or economic solution. In addition, the economic method of research constitutes an attempt to recreate the economic model of factors influencing the working conditions to the efficiency of the enterprise, which also indirectly affects the overall rate of profit.

The methodological framework of this paper included the studies Ukrainian and foreign researchers in the field of economic efficiency management of labour safety, aimed at improving working conditions, reducing the risk of injuries. All the methods listed above are compensatory in nature and were used to develop a certain strategy that allowed calculating probabilistic losses from industrial accidents. The authors propose the use of a combined method that gives more accurate levels of forecasting.

Results and Discussion

A well-organised work environment can have a positive impact on the quality of products or services, customer satisfaction and the company's reputation, as well as contribute to faster achievement of business goals (Fig. 1).

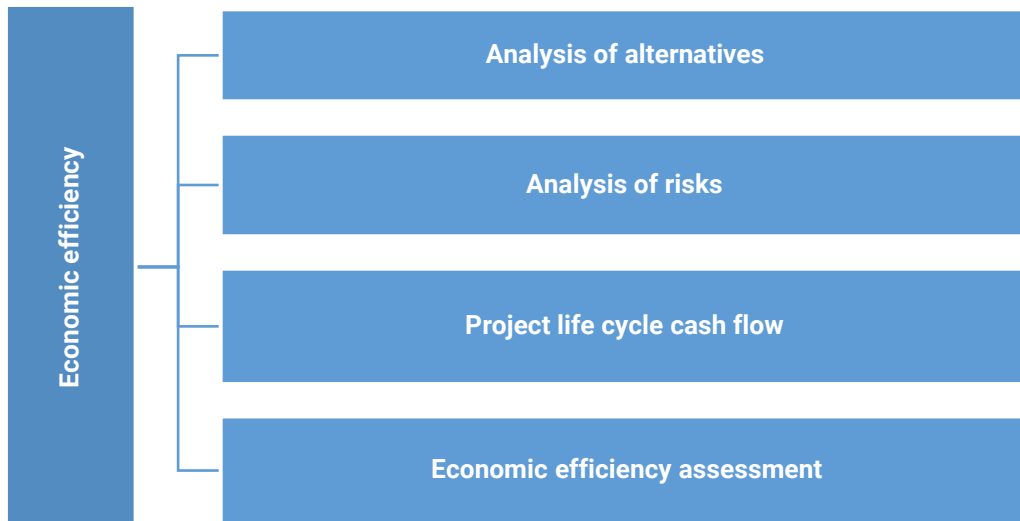


Figure 1. Correlation of economic efficiency

The calculation of costs and benefits can be expressed in simple mathematical terms according to the following equation (1):

$$V = \sum_{i=1}^n \sum_{j=1}^n \frac{B_{ij} - C_{ij}}{(1+r)^j} \quad (1)$$

where B_{ij} and C_{ij} are the j^{th} type of benefits and costs of the policy, respectively, in the i^{th} year after the introduction of the policy, and B and C are expressed in monetary units; r is the corresponding discount rate; V is the (discounted) present value of the labour safety policy.

For optimal selection, complete economic assessments are necessary, such as cost-effectiveness studies and cost-benefit analysis. Economic efficiency studies measure the result in “natural units” [8]. This type of analysis is best suited for results that are difficult to translate into monetary units, such as pain reduction. Cost-benefit analysis is rarely used in the context of workplaces. The costs that affect the price of a product or service belong

to such categories as the cost of providing equipment and premises, personnel costs, the cost of purchasing production materials, etc., but, in addition, one group of economic costs is associated with ensuring labour safety at the enterprise [9].

When making a decision on the organisation of labour safety, it should be remembered that labour safety measures should be included in the planning of the enterprise's activities, since they are often associated with costs (for example, mandatory medical examinations, laboratory tests of the working environment, provision of personal protective equipment) or time that the employee will have to use not to perform their direct duties, but to implement labour safety measures (for example, training of personnel operating hazardous equipment). The structure of the company's costs for labour safety in the process of internal supervision of the production environment is as follows (Fig. 2):

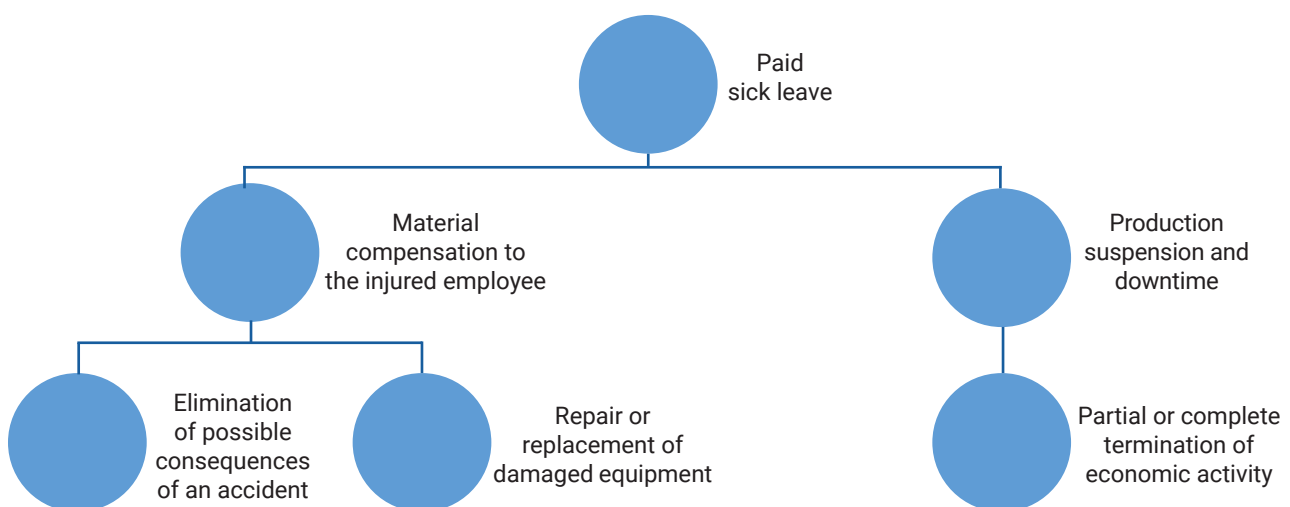


Figure 2. Consequences of accidents when attributed to costs

At enterprises, the costs of labour safety measures can be very high (especially at large enterprises), and this is one of the main factors that hinder the maintenance of an effective labour safety system. To reduce the total costs of the enterprise (and the costs of labour safety), it is necessary to pay attention to identifying factors that cause additional costs and losses. As foreign scientists S.G. Gendler, A.M. Grishina, E.A. Kochetkova point out, in 1920, the researcher H.V. Heinrich developed the so-called "Iceberg Theory", according to which he divided the business costs associated with workplace accidents into two categories: direct and indirect. In direct expenses, he included wages for the non-working period or medical expenses (for example, transportation of victims to the hospital, medical supplies, etc.). Indirect costs, according to him, are the costs of replacing employees, a drop in labour productivity, penalty costs, loss of the company's reputation, etc. [10].

H.V. Heinrich focused on the fact that indirect costs are hidden costs, and in the course of his research he calculated the correlation of direct and indirect costs: each euro of direct costs will lead to an additional 4 euros of indirect costs, which the company does not even know about [11]. This division, proposed by an American researcher, can be successfully used today. In their studies, foreign researchers K. Bhattacharyya and R.M. Gupta note that R. Brody found a ratio of 1:0.83 and came to the conclusion that the result of this ratio is influenced by the nature of the enterprise, the quality of the victims, the severity and consequences of injuries, cost definitions and the research methods used. Apart from the above-mentioned opinion of R. Brody, H.V. Heinrich also believes that the ratio of cost groups is not constant and changes depending on each particular situation [12]. The correlation proposed by H.V. Heinrich's study of the relationship between direct and indirect costs led to the general use of the iceberg metaphor. Only the tip of the iceberg, which is the direct costs, is visible. Everything else is indirect costs hidden underneath.

In the tradition of the researcher H.V. Heinrich, several authors have conducted studies to determine the ratio between direct and indirect costs. Numerous ratios were found, and most of them did not confirm the conclusions of H.V. Heinrich about the ratio of 1:4. It has been shown that the ratio between direct/insured and indirect/uninsured expenses differs considerably [13]. R. Brody found a ratio of 1:0.83 between insured and uninsured expenses [14]. The factors influencing this ratio, apparently, are the industry under study, the characteristics of the company, the victim, the severity of the consequences of injuries, the determination of the cost and the research methods used, as well as the structure of the restorative system of remuneration for health insurance workers.

Linear coefficients introduced by H.V. Heinrich cannot be maintained due to the low correlation between the frequency of accidents and the total cost of accidents. Insurance costs are determined by the cost of medical treatment and the degree of absence of the employee. Uninsured expenses are determined by the impact of the absence of staff on the rest of the organisation [13]. Instead, the authors propose a logarithmic dependence between uninsured and insured expenses. Many enterprises do not have the skills to harmonise safety issues and aspects of labour safety with the current legislation. This results in frequent situations where more attention is paid to short-term economic benefits, rather than long-term investments in the introduction of preventive measures and maintaining human resources to ensure a healthy working environment. Apart from its direct functions – production or provision of services – the company is forced to operate in an environment that affects its functioning and results in various ways [15].

Labour inspection and monitoring are the main elements of any institution and labour management system to ensure the sustainable implementation of labour policy, provide feedback and the possibility of adjusting this policy as necessary. Occupational health and safety is quite restrictive, and its purpose is to identify risk factors existing in the working environment as early as possible and to prevent or reduce the impact of such factors. The safety and health of employees can be jeopardised not only by risk factors present in the working environment, but also by working methods, labour organisation, professional training of employees and the interaction of the above factors.

The costs or losses that an enterprise may incur due to improper working conditions can be divided into two large groups: potential losses due to various accidents and incidents and potential losses due to improper labour organisation, inefficient equipment, insufficient training, workplace planning, etc. [16; 17]. They affect the employee and, consequently, the productivity of the entire enterprise. Apart from the annual costs of labour safety measures, which gradually increase every year as the enterprise grows, there are various other costs directly or indirectly relating to improper labour organisation [18; 19]. Small and medium-sized enterprises (SMEs) are a forgotten sector in research and practice in the field of labour safety, and there is no economic assessment of labour safety measures in this type of companies, despite the fact that they dominate in most economies. SMEs require special attention, since their knowledge and financial resources for conducting interventions are limited. Furthermore, it is difficult for SMEs to implement and adopt the strategies used by larger organisations [20].

Some economic estimates, for example, may not

reflect additional economic efficiency and/or resource use (for example, staff working hours, materials used, depreciation, overhead costs, business trips), or they may not include a complete identification of all important and relevant costs (for example, indirect costs such as loss of productivity, absenteeism, presenteeism) [21; 22]. The costs may not have been measured properly using a valid instrument, or they may not include any type of sensitivity analysis to assess the reliability of the results. The lack of this economic information complicates drawing reliable conclusions [16]. The efficiency of the cost part of the enterprise for the prevention of labour violations and the implementation of the model for maintaining production indicators is calculated according to the average values of investments (2):

$$E_{ent} = \frac{S_{an}}{\sum_{k=1}^i B_k} \quad (2)$$

where: S_{an} is the annual savings from improving working conditions and labour safety at the enterprise (profit or loss reduction); $\sum_{k=1}^i B_k$ is the total costs of the enterprise for labour safety.

When implementing the received amount, the calculation of the total costs for the implementation of a set of measures to improve working conditions is already used (3):

$$C = C1 + C2 + C3 \quad (3)$$

where: $C1$ are the costs of labour safety measures at the expense of funding sources governed by state regulations; $C2$ are the costs of labour safety measures under collective agreements; $C3$ are the costs of labour safety measures from the enterprise's labour safety fund.

If there is a need to calculate the way to improve the efficiency of labour safety at production sites, then a generalised weighting factor (4) is used:

$$C_{ps} = \frac{C_{com} + C_s + C_{ppw}}{3} \quad (4)$$

where C_{com} is the coefficient of the level of compliance with the labour safety rules by employees; C_s – the safety factor of the equipment; C_{ppw} is the coefficient of performance of planned work on labour safety.

The most generalised indicator that describes injuries in a division is the coefficient of production losses (C_{pl}), which is defined as the product of the frequency coefficients (C_f) and the severity of injuries (C_{sev}) (5):

$$C_{pl} = C_f \times C_{sev} \quad (5)$$

However, this coefficient does not factor in the losses caused by fatal injuries. To account for the latter, they must somehow be led to losses from non-fatal injuries. For example, by establishing a certain equivalent of losses between fatal cases and cases of general injuries.

Conclusions

Difficulties in assessing the effectiveness of labour safety measures may affect the decision of employers to conduct them. Since economic incentives are important for employers to motivate them to take part in occupational safety measures, research is needed to assess the economic effectiveness of measures at the organisational level. Despite the fact that the workplace is a place that provides access to employees with work-related health issues, companies do not seem to take advantage of this by implementing activities at the organisational level. They tend to focus on interventions at the individual level.

Conducting a full economic assessment, which is the only type of economic analysis that provides reliable information about effectiveness, requires identification, measurement, and evaluation of costs and consequences, since it compares the effectiveness and benefits of two or more interventions. If it is necessary to draw conclusions about the economic efficiency of occupational safety and health, then only the results of complete economic assessments (such as the benefit-cost ratio, net benefits or savings, an incremental coefficient of economic efficiency) should be used.

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Оценка экономического эффекта от внедрения мероприятий по охране труда на предприятиях

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Аннотация. Охрана труда на предприятии определяется большинством экономистов как система, которая в значительной мере позволяет расширить возможности предприятий по достижению результатов операционной деятельности. При этом роль охраны труда как фактора, который может интенсифицировать производство, определяется подобным образом только в странах с рыночной экономикой. Актуальность исследования определяется возможностями позиционирования охраны труда как фактора, повышающего ценность производимой продукции в том числе и для стран с переходной экономикой. Цель исследования определяется необходимостью разработки моделей, которые позволяют оценить экономический эффект от внедряемых мероприятий на предприятиях как промышленного, так и консалтингового сектора. Методами исследования выступают аналитические и методы моделирования экономических структур. В работе определено, что стоимость производственного травматизма и профессиональных заболеваний вместе с экономической эффективностью мероприятий по охране труда являются важным стимулом для работодателей принять эти меры. Выявлено, что они особенно заинтересованы в том, являются ли инвестиции в программу экономически эффективными (эффект дает хорошую отдачу от вложенных денег) или экономически выгодными (финансовые выгоды благоприятны). Авторами показано, что большинство опубликованных интервенционных исследований до сих пор были сосредоточены на эффективности интервенций, а не на их экономической эффективности. Выделение разработанной методической структуры позволяет определить уже по количественным характеристикам возможности для структурирования и достижения целей как поставленных перед предприятием акционерами, так и производственными планами. В статье определены пределы использования интересов охраны труда как социальной структуры в совокупности с использованием методов производственного планирования. Необходимы дальнейшие высококачественные исследования, проводящие полную экономическую оценку, чтобы иметь возможность сделать дальнейшие выводы об экономической эффективности мероприятий по охране труда с точки зрения работодателя

Ключевые слова: модернизация производства, организация охраны труда, краткосрочная экономическая выгода, кадровые ресурсы, убытки
