# Improvement of Operational Processes by Ensuring Work Safety in Production

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other manufacturing companies that seek to improve operational processes by ensuring work safety.

Keywords: operational processes, work safety, production.

## I. INTRODUCTION

**Relevance of the topic**. Every year, accidents at work cause staggering costs in terms of loss of life, pain and suffering, lost wages for injured workers, damage to production facilities and equipment, and lost production opportunities. Accidents at work result death, injury and many lost days of work and huge costs to the company, including lost wages, medical and rehabilitation benefits, insurance administration costs, loss of property, lost production and other indirect costs. For these reasons, the safety of industrial works remains one of the most important priorities of the company's operations.

The extent of the problem can be seen in the number of accidents. More than 40 accidents<sup>1</sup> occur in Lithuania every year. The consequences of accidents at work are often complex. Since almost a third of the causes of absenteeism are factors related to the work environment, improving the work environment could reduce absenteeism.

Accidents at work are a heavy social and economic burden. Many authors [12], [7], [4] analyze the economic aspects of accidents at work, while the social aspect of accidents is highlighted by [2], [8], [3], [1], [13] and others. in their works. The consequences of an irresponsible approach to safety at work are often disastrous for both parties: employers must pay considerable compensation if an employee is injured or

processes by ensuring the safety of work in production. The problem raised in the research: how to ensure work safety by improving the company's operational processes in production? The object of work is the possibilities of improving operational processes by ensuring work safety. The aim of the work is to analyze the possibilities of improving operational processes by ensuring work safety in production. Job objectives: to analyze the possibilities of improving operational processes by ensuring work safety from a theoretical aspect; to investigate the possibilities of improving operational processes by ensuring work safety in the production company; prepare a plan for the improvement of operational processes by ensuring work safety in production. Research methods: analysis of scientific literature and other informational sources; data collection and systematization method; descriptive analysis method used to report research data; the summarization method is used to evaluate the results of the analysis; the research uses data analysis and observation method.

Abstract. the article analyzes the improvement of operational

After conducting the research and analyzing the measures applied in the operational processes, ensuring the safety of work in production, a plan for improving the operational processes was prepared and presented, which offers specific measures for increasing the efficiency of the processes and reducing the risk of accidents. The measures implementation plan is designed to solve existing problems in the company's operational processes, offering recommendations on how to reduce or completely eliminate accidents by ensuring work safety. The proposed plan will help minimize the risk of accidents at work by ensuring work safety in operational processes. The created plan for improving operational processes with measures by ensuring work safety and reducing the risk of accidents at work is universal and can be applied in

<sup>1</sup> Accident statistics in Lithuania. [Looked 09-05-2022]. https://www.vdi.lt/PdfUploads/NAprognozeVeikla2022.pdf

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killed, and employees lose their most valuable asset health or even life. Work safety in the company's operational processes is an important area, the purpose of which is to ensure safe and healthy working conditions. Therefore, **the scientific problem** is expressed in the question - how to ensure work safety while improving the company's operational processes in production?

The object of work is the possibilities of improving operational processes by ensuring work safety.

The aim of the work is to analyze the possibilities of improving operational processes by ensuring work safety in production.

# The objectives:

1. To analyze the possibilities of improving operational processes by ensuring work safety from a theoretical perspective.

2. To investigate the possibilities of improving operational processes by ensuring work safety in a production company.

3. To prepare a plan for the improvement of operational processes by ensuring work safety in production.

The research methods: analysis of scientific literature and other informational sources; data collection and systematization method; descriptive analysis method used to report research data; the summarization method used to evaluate the results of the analysis; the research uses data analysis and observation method.

## II. MATERIALS AND METHODS

The concept of occupational safety in the company's operational processes. Occupational safety is one of the most important conditions for work organization in the operational processes of every company. All workers have the right to work in decent and healthy conditions. Sufficient attention must be paid to the safety and health of employees, especially in high-risk production companies. The Occupational Safety and Health Act of the Republic of Lithuania requires that employers in every company, regardless of its form of ownership and lines of activity, create safe and healthy working conditions for employees.

Failure to ensure occupational safety leads to accidents at work. Accidents at work are unexpected and unplanned events, including acts of violence, arising out of or related to work, which may result in the injury, illness or death of one or more workers [6]. Since occupational accidents are considered to be travel, transport or road traffic incidents in which workers are injured and which arise out of or in the course of work, i.e. when they are engaged in economic activity, work or business activities. Accidents at work are considered to be accidents that occur not only at the workplace, but also when going to work or from work on a regular route, to places of work-related training, where they can cause death or injuries [14].

The notification of the accident and the procedure for its investigation depend on the degree of severity of the accident. According to their consequences, accidents at work are divided into:

- deadly accidents events that cause an employee to suffer a health and life-threatening injury and die immediately or after some time as a result;
- serious accidents events that result in an injury to the employee's health and life;
- minor accidents events due to which the employee suffers an injury and loses his ability to work for at least one day and which is not classified as a serious accident at work;
- incidents this is a work-related event, as a result of which the employee does not suffer health damage or does not lose working capacity due to the health damage suffered (see Table 1).

Grade of severity of the accident	Description of the accident	Investigation procedure
Deadly accident	an event that results in an injury to the worker's health and life, resulting in immediate or delayed death	The investigation is carried out by an inspector appointed by State Labour Inspection, with the participation of the employer's representative and the employee's safety and health representative.
Serious accident	an event that results in an injury to the employee's health and life	The investigation is carried out by an inspector appointed by State Labour Inspection, with the participation of the employer's representative and the employee's safety and health representative.
Minor accident	an event resulting in an injury to an employee and loss of working capacity for at least one day and which is not classified as a serious accident at work	After the investigation, a bilateral commission approved by the employer is composed of a representative of the employer, who is appointed by the company manager and a representative of the employees for safety and health.
Incidents	it is a work- related event that does not result in the employee suffering health damage or loss of working capacity due to the health damage suffered	After the investigation, a bilateral commission approved by the employer is composed of a representative of the employer, who is appointed by the company manager and a representative of the employees for safety and health.

TABLE 1 ACCIDENT ASSESSMENT AND INVESTIGATION PROCEDURE

An occupational injury is any bodily injury, damage to body tissue or death resulting from an accident at work. Occupational injuries result in more time lost from work, productivity and working years than any other health condition [14]. Injuries are a leading cause of worker morbidity and mortality. Thousands of people die every year due to industrial accidents and the number of disabled people is also staggering. Many workers experience workrelated injuries that result in lost work time, treatment, loss of consciousness, work or movement limitation, or transfer to another job. Injuries at work continue to take lives, harm physical and psychological well-being and drain resources of workers and their families when occupational safety is not followed. The total human, social, and financial toll of injuries at work is enormous, matching the burden of health care products such as cancer and cardiovascular disease.

It is very important to take the necessary measures to protect the safety and health of employees, including the prevention of types of occupational risk, information and professional training, as well as the necessary organizational measures to prevent accidents in the company's operational processes. Safe work is a relevant practical, theoretical and scientific problem, therefore it is necessary to analyze the existing organizational, technical and other causes of industrial injuries in the work processes that prevent the work environment from being made harmless and safe, to assess their economic damage and to provide ways to reduce them. Causes of occupational safety violations in the company's operational processes. When analyzing work safety violations in the company's operational processes, it is first necessary to clearly define the processes taking place in the company and the most common accidents in those processes.

In a production company, all processes begin with the acceptance of orders, i.e. stage of production planning according to customer demand. Service or production of goods is planned according to the number of orders. After that, the need and quantity of materials is assessed. If there is a need, materials are ordered. When the preparatory work is completed, the production phase begins, the production of the ordered quantity of goods, i.e. performing the requested service. Later, everything goes to the customer, i.e. the final process takes place - satisfaction of the customer's need.

Violations of occupational safety are observed in all processes, but in manufacturing companies they mostly occur in the stages of the production process. Therefore, it is necessary to create safe conditions and comply with work safety requirements, which could reduce the number of accidents due to work safety violations in the company's operational processes.

In both private and public companies, institutions and organizations, regardless of their type of activity, the type of employment contract concluded, the number of employees and the like, the principle of creating safe and healthy working conditions must be applied without any exceptions. Its operation and implementation is ensured by establishing the basic legal requirements for employee safety and health (i.e. work environment, workplaces, work organization), which establish the employer's duty to ensure the safety and health of employees, control over the implementation of this duty and responsibility for it [15]. Consequences of occupational safety violations in the company's operational processes. The consequences of accidents at work are significant. At the national level, accidents at work cause negative consequences for the labor market (people's employment) and the economic development of the country, and from the company's point of view - for a decrease in operational efficiency (making a profit). In the developed countries of the world, the consequences reach 2-4 per cent of GDP [5], [10], [11], so they are often attempted to be counted, especially in those countries that pay great attention to the prevention of accidents at work [1], [9], [13], [4]. They can be broadly divided into social and economic consequences. Table 2 below shows the consequences of accidents at work.

TABLE 2 SOCIAL AND ECONOMIC CONSEQUENCES OF ACCIDENTS AT WORK

Social implications	Economic implications	
	For government	For a company
- Early retirement due	- Health care and	- Additional costs
to disability;	rehabilitation	due to
- Absenteeism, i.e.	costs;	replacement;
absence from work	- Sickness	- Additional costs
due to injury or	benefits;	for hiring and
occupational disease;	<ul> <li>Incapacity</li> </ul>	training a new
- Unemployment due	compensations;	employee;
to reduced working	- Death benefits;	- Lost production
capacity, when the	- Declining GDP.	time;
right to pension or		- Damage to
compensation is not		equipment,
granted;		materials,
- Loss of income		products;
when family members		- Increased
are unable to work to		insurance costs;
care for the victim.		- Managers' time
		dealing with
		accidents at work.

Accidents at work, injuries at work and deaths occur for a variety of reasons. Many traditional theories about the causes of accidents at work focus on the worker. There have been many attempts to develop a predictive theory of accident causation, but none has been universally accepted to date. Researchers in various fields of science and engineering have attempted to develop a theory of accident causation to help identify, isolate, and ultimately eliminate the factors that contribute to or cause accidents.

Possibilities for improving business processes while ensuring work safety. Prevention of preventable injuries is an important task of human resource management. Intervention to reduce occupational injury should be multifaceted to be successful. In order to influence the incidence of injuries and the underlying morbidity, a combination of activities at different levels, workplace visits, risk assessment activities, development projects targeting specific risks, print and electronic media campaigns, and surveys of general public attitudes are needed. The next step in the intervention should be a thorough analysis of specific tasks and identified risks, as well as systematic collection of risk scenarios from affected workers using critical incidents and other methods. Professional and task-specific engineering, ergonomics and design solutions should be developed for the various problems listed above. In choosing such applied developmental activities, priority should be given to reducing the severity of injuries. The significant reduction in fatal injuries may reflect changes in work organization, greater automation and better safety standards. Knowledge of predictors of work-related injuries, comprehensive training of workers can contribute to injury prevention strategies, especially among newly hired workers.

Companies with different database configurations can create a standardized occupational injury surveillance database. Personal protective equipment has dramatically reduced the incidence of injuries and days off sick leave. An effective safety program results from а multidisciplinary effort that leverages the input and interaction of many groups within an organization. Establishing a plant-level safety committee to administer the program is essential to a successful program. The selection committee should consist of top managers (plant manager or designee and production unit managers) and the plant doctor or nurse, safety manager, plant level personnel managers and labor representatives. This committee should oversee the departmental safety committees that run the day-to-day safety program and deal with plant floor issues. For a safety program to be effective, it is essential that departmental committees are formed to encourage the active participation of supervisors and hourly workers.

Senior managers must develop the security policy, build it into the program, and ensure that the program is effectively implemented.

In summary, it can be said that the most important thing in every organization is the implemented safety policy, which includes the organization's obligations to ensure a safe environment, compliance with requirements, training of employees, planning of improvement of work safety systems, control of employees, etc.

#### III. BASIS OF EMPIRICAL RESEARCH

The aim of the research is to perform an analysis of accidents at work in the food production company, determining the most common causes of accidents and to prepare a plan for improving operational processes in production, ensuring work safety.

**Data used in the study.** In order to carry out an analysis of accidents at work in the food production company, company's documents are analyzed in an empirical study and observation is carried out.

**Research period.** The study was conducted in April-May, 2022. The research was conducted in accordance with the following logical structure: the research problem is formulated, then the research is designed, research methods are selected. In the next stage, an investigation is carried out, information is collected, data is analyzed, a plan for improving operational processes is prepared, and conclusions are presented.

**Research data collection method.** The following methods were used in the research: analysis of company data, observation - with the participation of the researcher

in the observation process (observation included). Monitoring was chosen because it provides a purposeful and planned opportunity to obtain data on phenomena, processes, behavior occurring in the company's environment, i.e. to see reality as it really is.

**Research ethics.** During the research, compliance with ethical principles was ensured: privacy, anonymity, confidentiality, benevolence, justice, the right to receive accurate information about the research and the results of research use, and the company's data protection was respected. Company's name is not allowed to publish.

#### IV. RESULTS AND DISCUSSION

Analyzing the processes carried out in the food production company to ensure work safety, first of all it is determined how the working conditions and working tools in the company meet the requirements set out in the occupational safety and health regulatory acts, assessing the occupational risk in workplaces or other places of the company where the employee may be working on time.

There are many different processes in the company in different departments of the company, but accidents happen only in the production department during the production processes. 15 accidents occurred in the production department during the three years' period: 8 accidents in 2019, of which two were serious accidents, when the investigation was carried out by labour inspectors from the State Labor Inspectorate of the Republic of Lithuania, 4 accidents in 2020 and 3 accidents in 2021. Analyzing the data of the accidents in the company in 2019-2021, there is a trend of decreasing number of accidents.

When examining the circumstances and reasons given in the acts of accidents at work, the causes of all accidents at work are grouped into separate large groups. The analysis shows that in most cases of accidents at work there are 2 main groups of causes of accidents at work:

- 1) dangerous (extreme) situation;
- 2) inappropriate behavior that occurred in the course of production activities.

The further possible causes of the emergency situation or the sequence of events depend on the compliance of the work tool with all human safety and health requirements, on organizational and environmental factors, as well as hygienic, domestic, sanitary conditions. In the second group, risk-taking, non-observance of safe work methods and methods, violation of rules, regulations, production or behavioral errors would prevail.

Safety and health issues are an integral part of accident prevention. They are relevant all the time. In accordance with the provisions of the Occupational Safety and Health Act, the employer must plan and implement preventive measures at all stages of the company's activity, so that employees are protected from dangers and occupational risks, or it is reduced as much as possible. For that purpose, he organizes an accident risk assessment in accordance with the Occupational Risk Assessment Regulations:

- before starting or commencing operations;
- periodicity determined by normative legal acts;

- after changing the technological process or starting to use new dangerous substances;
- after the installation of collective protection measures or their modernization;
- if a serious or fatal accident at work occurs in the company and after its investigation it is established that a risk factor could have been the cause of the serious or fatal accident at work;
- upon detection of violations of Occupational Safety and Health Act normative legal acts at the request of labor inspectors, etc.

It is important for the company to be well aware of the hazards encountered in its activities, the risks posed by these hazards and the protective and preventive measures that must be applied to eliminate the hazards or reduce the risk to an acceptable level.

As the analysis of the documents shows, after taking preventive measures and installing additional devices, the number of accidents at work decreased significantly and in 2020 there were only four of them, the main reasons of which are non-compliance with safety rules, inattention, carelessness. Serious accidents at work were avoided.

Meanwhile, three accidents occurred in 2021, all of them in the production department, i.e. in production processes. The main reason is non-compliance with safety rules. Serious accidents at work were avoided. In all cases, additional training was organized to ensure that the same accidents do not recur in the future, and employees are required to be more attentive and comply with safety rules.

Since all accidents occurred due to non-observance of workers' safety rules, their incompetence, carelessness and inattention, after each accident, training is organized in which workers are familiarized with safety requirements, their powers and work tools. Courses on the implementation of occupational safety and health requirements in companies and general training on the principles of occupational safety and health assurance, which all employees must follow, are organized. An annual health check-up of employees is mandatory and the regime of work and rest time in the company is determined, in accordance with the laws and recommendations of the government.

Most accidents happen when working with devices, so potentially dangerous devices are constantly maintained and their technical condition is checked. Personal protective equipment is constantly being purchased. All premises - household, sanitary and hygienic - are equipped to ensure the safety and health of employees. Research is being conducted on the impact of physical factors (noise, vibration. heat, electromagnetic fields, lighting, microclimate) on workers' health. Constantly conducted risk assessment studies for the identification of risks of accidents in the company's operational processes. We are looking for measures that could minimize that risk. Plans are prepared and implemented, effectiveness and adequacy of measures are studied. Penalties for noncompliance with these rules have also been introduced.

After the analysis of accidents in the company's operational processes, it was found that all accidents occurred during production processes, mostly in non-compliance with safety rules.

After carrying out a study on the operational processes ensuring work safety in the production company and determining the main causes and consequences of accidents, a plan for improving the operational processes was drawn up with measures that ensure work safety and reduce the risk of accidents at work (see Figure 1).

The results of the organization's activity do not appear by themselves - they are generated in the processual interaction of activity factors. The quality of the organization's performance results directly from the quality of these interaction processes. The quality of results is influenced by various aspects of the interaction of operational factors, but one of the most important is ensuring the optimality of process management, ensuring the safety of work in the branch. The organization's activity is a complex multi-faceted activity; therefore it functions by formulating and realizing complex integrated goals, the main of which is to minimize risks and avoid accidents at work, ensuring optimal and safe working conditions for employees.

Company processes are characterized by process content, process flow and operations and process participants. The process improvement content covers three areas: accidents (dangerous situations and inappropriate behavior), periodic training and preventive measures. The course of the processes is defined by the proposed measures: introductory training, training at the workplace, general training, protective equipment, health check, collective protective equipment, occupational risk assessment, ergonomics, communication, improvement plan. These measures are divided into smaller processes that take place at all structural levels of the organization.

The created plan for improving operational processes with measures that ensure work safety and reduce the risk of accidents at work is universal and can be applied in other manufacturing companies that seek to improve operational processes, ensuring work safety.

Summarizing the results of the research, the assumption should be formulated that, by applying the created plan for improving operational processes in production, ensuring work safety, specific measures for increasing the efficiency of processes and reducing the risk of accidents are offered. The measures implementation plan is designed to solve existing problems in the company's operational processes, offering recommendations on how to reduce or completely eliminate accidents and ensure work safety. The proposed plan will help minimize the risk of accidents at work.



Fig.1. The measures implementation plan.

## V. CONCLUSIONS

- 1. After analyzing the possibilities of improving operational processes while ensuring work safety from a theoretical point of view, it can be stated that the operational processes of the organization are the practical result of the functions it performs, which are an expression of the realization of the company's goals. This shows that the goals, functions and operational processes of the organization are elastically related. And ensuring work safety and reducing the risk of accidents allows you to achieve the most efficient desired result in operational processes.
- 2. After carrying out a study of the possibilities of improving operational processes while ensuring work safety in the food production company, it was determined that all accidents occurred in the production process. After analyzing their causes and applied measures, it was found that the number of accidents has significantly decreased in recent years, and serious accidents have been completely avoided, which allows us to conclude that the applied measures are effective and should continue to be applied in the company's operational processes.
- 3. After conducting a study and analyzing the measures applied in the operational processes, ensuring the safety of work in production, a plan for improving the operational processes was prepared and

presented, which offers specific measures for increasing the efficiency of the processes and reducing the risk of accidents. The measures implementation plan is designed to solve existing problems in the company's operational processes. The proposed plan will help minimize the risk of accidents at work, ensuring work safety in operational processes.

## VI. RECOMMENDATION

The study let form the measures implementating plan for work safety in production, ensuring the safety of work in production, improving the operational processes, which offers specific measures for increasing the efficiency of the processes and reducing the risk of accidents, is recommended to apply in any food production company. It can help to solve existing problems in the company's operational processes. The proposed plan can help minimize the risk of accidents at work, ensuring work safety in operational processes.

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