

Maintenance of Labor Resources as Fundamentals of Sustainable Manufacturing Development

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Abstract. It is impossible to ensure sustainable business development without solving the maintenance of labor resources issues that are included in the manufacturing process, as well as involving new employees to increase labor potential. The company can effectively confront the new challenges by attracting highly qualified employees for whom a high level of safety is important. Therefore, an important direction of sustainable business development is to increase the level of safety and create a comfortable working environment and optimize working processes to increase the efficiency of production activities, as well as prepare for the challenges that may arise in the process of company development. The article analyzes the statistics and structure of the socio-economic damage to business due to unsatisfactory working conditions and a high level of injuries on the example of the machine-building sector, and also considers aspects of maintenance of labor resources and ways to involve additional labor resources to ensure sustainable manufacturing development. Based on conducted analysis, an algorithm of implementation of managerial decisions was developed, aimed at ensuring the safety of personnel who carry out the work activities at the workplace, taking into account the modern concept of the “green workplace”. Involvement in the working process of additional labor reserves is carried out by creating favorable working conditions, assessing the special needs and level of ability of workers for optimization of working processes and increasing their efficiency.

Keywords: Labor Resources, Sustainable Development, Safety, Disability.

1. Introduction

Achieving the goals of sustainable business development is ensured by an effective solution of issues in the following key areas: maintenance of the environment and rational use of the resource base, including labor resources. At the same time, the company's policy in solving environmental issues and social responsibility with concerning to the maintenance of personnel assumes ever greater importance and to a considerable measure ensures the competitiveness and investment attractiveness of the business.

Personnel policy and creation of conditions that ensure an effective response to external threats caused by changes in socio-economic situation significantly affect the sustainable company development. Employees with the necessary knowledge, skills, and experience are a valuable resource that ensures stable income growth. Therefore, companies pay great attention to developing the strategy of effective personnel policy.

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Lack of attention to solving this issue may lead to decreasing of financial indicators and competitiveness in the market.

At the same time, the process of labor resource formation is also influenced by several factors that, in the final analysis, negatively affect working efficiency, reduce the efficiency of the manufacturing process and lead to losses of companies. At the state level, these challenges include aging of population; unstable socio-political situation; labor migration; environmental degradation which affects the health state of population and working conditions; an increase in the number of people with chronic diseases and disabilities, as well as other factors.

In consideration of the level of the enterprise or organization, challenges are local and include a decrease of motivation and employee turnover due to an ineffective personnel policy, a high level of injuries and occupational diseases, etc. For the involving of highly qualified personnel to the company, it is necessary to provide comfortable and safe working conditions; otherwise, the company will suffer financial losses.

Therefore, the formation of labor resources in the enterprise is liable to external and internal challenges that must be taken into account to achieve sustainable business development. At the same time, a reliable method of managing the maintenance of labor resources at the enterprise is to ensure the appropriate level of work safety.

2. Literature Review

2.1 Analysis of the Structure of Costs Associated with Improper Work Conditions

Machine-building enterprises form one of the most important sectors of the processing industry. At the same time, issues related to ensuring safety at workplaces are not being resolved with the necessary efficiency: the machine-building industry is one of the five most traumatic areas of economic activity.

The need to solve the issues of ensuring the safety of personnel at workplaces, due to the requirements of the legislation, is not fully accepted by the heads of enterprises, which is caused by the lack of a clear understanding in the business environment of the important role of occupational safety in ensuring the sustainable development of each organization. At the same time, the business incurs significant financial losses associated with inappropriate working conditions. In the table 1, some approaches to the classification of types of business losses due to accidents and occupational diseases at the workplaces are analyzed.

The main arguments in favor of the need to take occupational safety issues into account at the developing of the strategy for sustainable business development are increasing working efficiency and reducing the costs of payments related to injuries and occupational diseases, as well as in terms of increasing the efficient use of the labor resources. Thus, ensuring safety at the workplace solves the issues of maintenance of the human capital, which is in line with the general trend of sustainable engineering (Zohreh, 2014).

The argumentation of the importance of solving the issue of ensuring safety at workplaces of workers in the machine-building sector is confirmed by relevant statistics. In 2015, 311 accidents occurred at the enterprises of the machine-building industry in

Ukraine, including 21 fatal accidents, which, according to the results of the investigation, were identified as associated with production (State Service of Ukraine on Labor, 2019).

Considering the fact that about 30% of workers at the enterprises of machine-building sector do their work in hazardous work conditions, the high morbidity level is observed in the sector, and, as a consequence, a low level of use of the working time fund (about 75% (State Statistics Service of Ukraine, 2019)), which leads to significant financial losses: a high percentage of the number of workplaces in which working conditions do not satisfy the requirements of hygienic standards determines a significant number of workers who are entitled to benefits and compensation for work in hazardous conditions (additional leave, shortened working day, additional payment for working conditions, obtaining specialized medical and preventive nutrition, milk).

Table 1: The Approaches to the Costs Classification

Type of costs	Cost content	Researcher
Healthcare costs	Overall health spending; medical costs for workers in disability schemes.	Swenneke, 2017
Productivity costs	Gross salary: number of working days lost; friction period; overall costs of sick pay/sickness benefits; overall costs of incapacity/disability benefits.	
Additional costs	Cost of temporary worker replacement; recruitment costs; rehabilitation costs	
Quality-of-life losses	Cost of quality of life; cost of life itself.	
Direct costs	Workers' compensation payments; medical expenditures and legal costs.	Loke, 2013
Indirect costs	Training replacement employees; lost productivity and costs associated with lower employee morale and absenteeism.	
Direct costs	Medical costs; companies' property damage; emergency services; funeral costs.	Badun, 2017
Indirect costs	Productivity losses; administrative costs; legal costs; costs of household work that cannot be performed after the injury or during illness.	
Human costs	Gross domestic product; quality of life costs.	
Type of costs	Cost content	Researcher
Direct tangible costs	Restricted duties; sick pay; disability pension; fines; legal costs; compensation	Occupational health: the value proposition. A report from the Society of Occupational Medicine, 2017
Indirect tangible costs	Overtime cover ; temporary agency staff; management time; HR / payroll time; recruitment fees; training of replacements	
Intangible costs	Presenteeism; lost productivity; engagement; staff turnover; lost productivity; employee relations; corporate image	
Production disturbance costs	Costs incurred in the short term until the product reaches its pre-accident level.	Vatani, 2017
Human capital costs	Long-term costs and the potential reduction of production after a restructuring of the production	

Medical costs	level that existed before the accident occurred. Costs incurred by the workers and the community during the medical treatment for workers injured in work-related accidents.	
Administrative costs	Costs incurred in the implementation of indemnification projects, accident investigations, and legal fees. Deadweight losses associated with the administration of tax and welfare.	
Transfer costs	Includes costs not classified elsewhere, such as costs related to employees' careers, assistance changes, and renovations	
Other costs		

Thus, the high level of injuries and occupational diseases at the enterprises of the machine-building sector necessitates the payment of compensation due to the inadequacy of working conditions with the requirements of regulatory documents and leads to the fact that business losses associated with disability benefits are significant.

There is another aspect of the structure of the financial losses of the enterprise that has a social orientation. The low level of technical equipment, the tear and wear of production assets, work conditions that are inadequate to the requirements of regulatory documents, the absence or insufficient effectiveness of collective protection means not only a decrease the performance level, but also the prestige of work in general, which, in turn, causes an outflow of skilled personnel from enterprises related to the field of machine-building. As a result, this leads to a decrease in the competitiveness and reputation of machine-building enterprises and endangers the efficiency of the entire sector.

2.2 Ways to Solve the Problem of Rational Use of Labor Resources. European Union Strategy

In 2010, the European Agency for Safety and Health at Work, analyzing the situation on the labor market and anticipating the main problems in the economy, proposed a strategy of reasonable, sustainable and inclusive growth as an aid to protect the business from the economic crisis. Among the key areas to achieve the goals of overcoming the crisis, increasing economic growth and market development, the creation of an inclusive economy, which is based on three main components, was determined (fig. no. 1) (A strategy for smart, sustainable and inclusive growth. Communication From The Commission Europe 2020, 2010).

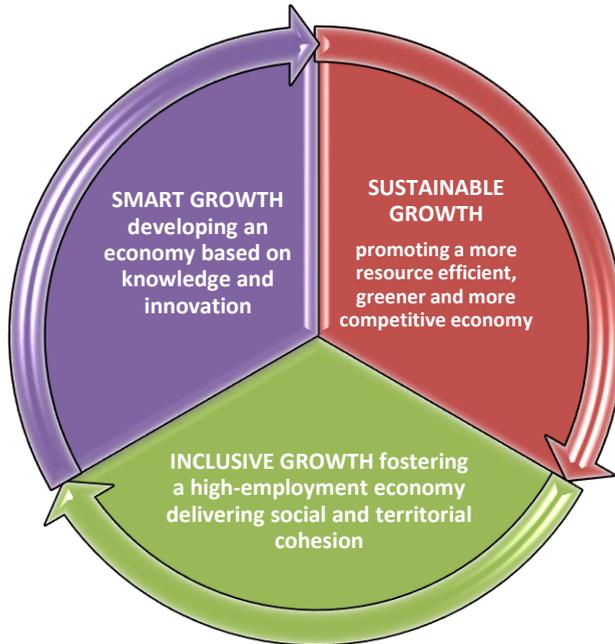


Fig. no. 1: The main priorities of European economy development by 2020 [9]

Source: A strategy for smart, sustainable and inclusive growth. Communication from the Commission Europe 2020

One of the main goals of this strategy is that by 2020, 75% of the population aged from 20 to 64 should be employed (A strategy for smart, sustainable and inclusive growth. Communication From The Commission Europe 2020, 2010).

To achieve this goal, in 2012 it was proposed a package of programs devoted to the measures of increasing the level of population employment, which focuses on the development of employment policy, which is ensured including the elimination of any discrimination, prolongation of labor experience and ensuring the safety at work to achieve maximum effect (Towards a job-rich recovery. Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee of the Regions. COM(2012)173).

The implementation of economic and socio-political programs to revitalize the employment market allowed to obtain a significant positive effect: as of 2018, the percentage of employed people aged from 20 to 64 years is, according to Eurostat, about 73.2% (Eurostat. Statistic Explained Homepage, 2019). For comparison, in Ukraine, the percentage of employment of the population aged from 15 to 70 years in the first quarter of 2018 amounted to 55.9% (Osipova, 2018), which is not enough to provide the necessary economic growth rates in our country. The main problems are the high unemployment rate and the lack of proper attention to the problem of employment of persons with disabilities, as the main source of labor reserve.

3. Methodology of Research

The goal of retaining qualified personnel and involvement additional labor resources (about 1.5 million people throughout Ukraine) to production can be achieved by creating an inclusive work environment. The main categories of people who can be involved in workplaces if appropriate conditions are created are older people, people with chronic illnesses and those people who have been injured at the workplace, and who may be involved in the production process, as well as other people with disabilities. In the first case, it is a question of creating conditions for the continuation of the period of work activity of elderly people. In the second case, this refers to both the return to workplaces of people who have been injured or have got an occupational disease at the workplace, as well as people with disabilities acquired since childhood, who can perform certain production functions taking into account the functional state of their body.

The process of creating an inclusive work environment includes several areas:

- ensuring comfortable working conditions, the exclusion of dangerous and harmful factors which affect the workers during the work activity, taking into account current trends in resources maintenance;
- creation of an inclusive workplace environment that takes into account the needs of various groups of workers, including persons with disabilities, involved in the work process (Peirce, 2005).

Comfortable working conditions are formed by observing standards regarding the levels of factors affecting the employee that can cause injury or illness, taking into account the main aspects of creating the “green workplace”.

Creation an inclusive work environment includes solving the issues of ensuring the availability of working facilities and public spaces for workers and visitors with different physical abilities, as well as adapting workplaces to the employee's abilities, which enhances the comfort and safety of a person at the workplace. The process of creating an inclusive work environment includes the following stages:

- 1) disclosure of the potentials of workers, including persons with disabilities; assessment of their working capability depending on the characteristics of technological processes at the enterprise;
- 2) adaptation of public spaces, workplaces and production processes taking into account the physical and psycho-emotional capabilities of the employee;
- 3) creation of conditions for the exchange of skills within the team, the implementation of programs to reward workers for helping to adapt workplaces and increase their safety.

The motivation of an employee to new habit acquisition and knowledge allows to ensuring maximum readiness of the company for new challenges. An actively functioning non-production environment provides a selection of educational technologies that allow to specialist not only to keep the skills that he has already had in an up-to-date state, but also to identify priority ways for further growth, to acquire skills that are useful for the company, taking into account the further vector of its development.

4. Results

The proposed algorithm allows solving the main issues facing the employer to ensure sustainable business development: 1) ensuring the efficiency of production activities by saving labor resources; 2) the involvement of additional labor resources in the production process by creating an inclusive production environment that allows taking into account the special needs of certain categories of workers.

The introduced approach was implemented on the example of a metal-working enterprise in Kharkov, where people with disabilities work, as well as workers who do not have functional deviations in their state of health. In order to research the ways to increase the efficiency of work activities, the questionnaires were carried out regarding to the level of satisfaction with the working conditions of employees of both groups. For the purpose of evaluation the questions that were included in the questionnaire were divided into three groups:

- 1) level of satisfaction with working conditions and safety level;
- 2) the effectiveness of the mechanism for adaptation of workplaces taking into account needs of workers;
- 3) ways to improve working conditions, taking into account the concept of “green workplace”.

The questions of the first group were aimed at obtaining a point-based assessment of the level of satisfaction on a scale: from 0 (unsatisfactory working conditions, low safety level) to 5 (working conditions meet my expectations, high safety level). The results are presented in fig. no. 2.

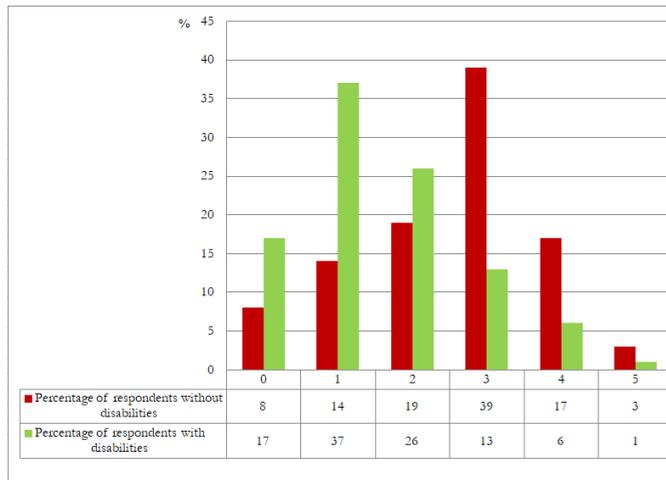


Fig. no. 2: The results of assessing the level of satisfaction of workers at the enterprise with working conditions

The questions of the second group took into account the presence and effectiveness of measures have already implemented at workplaces in order to determine the level of adaptation of workplaces to the physical and mental capabilities of workers. In addition, the degree of participation of workers in the decision-making process to

improve conditions and increase work efficiency was investigated. Workers were asked to assess using the marks from 0 (complete absence) to 5 (fully present) (fig. no. 3).

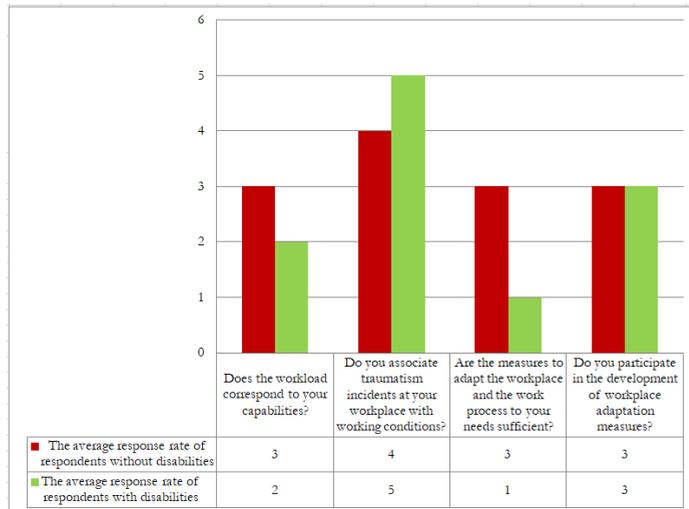


Fig. no. 3: The results of assessing the level of satisfaction of workers with measures to adapt the workplace and workload

The last group of questions is related to determining the mechanisms of implementing the innovative “green workplace” approach. The results of questionnaires that were carried out showed rather low level of satisfaction with working conditions and safety level, as well as the level of implementation of adaptation mechanisms at the workplaces. Regarding the use of resource-saving technologies, the following ways were proposed to increase the safety level at workplaces, taking into account “green workplace” approach:

- 1) the sufficient level of illumination of workplaces by using energy-saving light sources;
- 2) normative indicators of the air environment through the use of natural (where applicable) ventilation, as well as mechanical ventilation, which is powered from renewable energy sources;
- 3) acoustic comfort by using natural sound-absorbing and sound-isolating acoustic materials;
- 4) using the ergonomic furniture, that ensures a comfortable working position, using materials obtained as a result of recycling;
- 5) fire safety in the premises by organizing a process of constant collection of paper for recycling, thereby reducing the risk of fire;
- 6) electrical safety by organizing control of the disconnection of lighting, computers, industrial equipment from the network during non-working hours. This not only saves natural resources but also provides protection against emergencies.

Conclusions

Sustainable business development can be ensured at the proper level only by retaining the personnel of the enterprise and involving additional labor force in the production process. The issue of the effective use of the labor potential of each employee, as well as the increase of labor resources in the current socio-economic realities, is in the focus of scientific research and is gaining popularity from year to year.

The rational use of labor resources allows solving a number of important socio-economic issues, which, in turn, has a significant economic effect on business.

The article discusses the problem of saving work resources at the enterprise of machine-building industry and involvement additional human resources. To solve this problem, the research of the level of employee satisfaction with working conditions, the presence of adaptation mechanisms, as well as the degree of involving the employees in the process of making managerial decisions to adapt workplaces and the work process was carried out. In this case, two groups of workers were considered: with disability and without disability. A sociological questionnaire showed that 80% of workers with persistent functional deviations of their state of health tend to regard working conditions as unsatisfactory or inadequate to their expectations. Among workers without disabilities, only 41% rate their working conditions as poor or below average. Despite varying estimates, both groups of workers associate traumatism incidents with working conditions.

The numerical score of the level of employee satisfaction with measures to adapt the workplace and workload showed that the level of workload is excessive for both groups of respondents, and the degree of implementation of decisions on adaptation of workplaces and the work process is insufficient. At the same time, the involvement of employees in the process of developing solutions to improve the safety and ecological compatibility of workplaces provides a positive effect.

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