

Productivity model depending on security environment

DALIBOR MISIRAČA¹, MIRELA ABIDOVIĆ², DRAGAN GNJATIĆ³

¹ FACULTY OF EDUCATION, UNIVERSITY OF TRAVNIK, BOSNIA AND HERZEGOVINA

² FACULTY OF TECHNICAL STUDIES, UNIVERSITY OF TRAVNIK, BOSNIA AND HERZEGOVINA

³ SYNDICATE OF EDUCATION OF THE REPUBLIC OF SERBIAN, BANJA LUKA, BOSNIA AND HERZEGOVINA

It is generally known that investments in Health and Safety at work represent an economic cost effectiveness in a company's business. As determined, investments in safety at work, although they represent a cost, contribute to increase the productivity which finally increases profit. A decrease in the number of injuries at work is directly connected with the main economical indexes of efficacy like productivity, cost-effectiveness and profitability. An interest of every employer is to gain maximum profit with minimal costs (costs due to injuries and professional occupational diseases). Better productivity = Better health and safety at work. Keywords: cost – effectiveness of health and safety at work, productivity, profitability, efficiency.

Introduction

In this paper, we will show the extent of the workers optimum safety during the work process (with the application of certain standards of safety at work), that can affect the productivity of labour itself, or increase the profitability of the company. A safe work environment and a high-quality training for workers reduce the risk of accidents at work. The application of the basic rules of safety at work is actually the application of preventive safety measures.

The realization of a large income with an optimal utilization of the system man-machine-environment, with minimum investments and a tendency for maximum security is the mode of production. Any injury represents direct and indirect costs which depend on the branch of activity and severity of

physical disability. Operating losses and increased tax debt are just some of the consequence's generated damage (occupational injury).

A capable worker represents a common interest of the employers and the state. Business success is based on the application of the principle of maximum rationality. From the point of view of safety at work, the essence of this principle is that with a certain amount of investment in occupational health and safety, a company can achieve the maximum business results.

In that regard, the success of the business depends on the number of work-related injuries and sick days (absence from work) as a consequence of the injury at work.

The interest of employers is that with minimal investment (the Occupational Safety and Health) they achieve maximum business results, regardless of the possible consequences of such work (injuries and occupational diseases), if the consequences are not charged to the business. On the other hand, the interest of society is that with minimal consequences (injuries and occupational diseases) employers achieve maximum business results.

Increasing productivity and company's business performance is the mutual interest to both employers and workers. The creation of a safe working environment ultimately leads to a more competitive economy. Economies with lower standards of safety at work are not competitive, but investment in occupational health and safety was never at the expense of competitiveness.

The role of safety at work

The goal of occupational safety and its measure is an attempt to avoid possible accidents and injuries to workers. To achieve this goal, it is necessary to know certain rules and regulations that affect it. The basic safety rules are applied before all other safety rules. These rules completely eliminate or reduce hazards that could damage the work. The problems in the application of basic safety rules are related to the maintenance of capital, investing in the equipment, and implementation of regulations as the basic safety rules.

Today, injuries continue to take lives, inflict physical, mental and material damage to the individual, the family and the entire society. Statistics show that each year in the EU industry around 50 million workers are injured, around 100,000 die, and this also forms a new 1.5 million invalids who work.

Countries with a less developed system of occupational safety spend a higher percentage of GDP on diseases and injuries incurred at work, allocating resources from productive activities. Governments, their regulatory bodies and agencies seek to improve safety at work in order to reduce the costs that the company would pay as a result of injuries and disease, and to simultaneously improve competitiveness and national efficiency.

The productivity may be increased through safety at work so as to:

- Reduce the number of people who retire early or who are unable to work due to injury or illness,
- Reduce the cost of social and health care benefits for injuries and illnesses,

- Increase the work capacity of people by improving their health and
- Maximize productivity by encouraging more efficient working methods and technologies.

We conclude that healthy individuals and a healthy society are, as a whole, more productive. A German study on the labour market has found that poor health reduces the likelihood of a person to remain employed permanently by 6% and doubles the chances that he or she will no longer be a part of the labor force.

There are a lot of research and business studies which have shown that safety at work can stimulate productivity :

- By reducing the damage caused by negligence, through the elimination of unproductive work machines, improving the production process and so on,
- Through the production of quality products,
- By encouraging companies to disclose more productive methods due to the need to put an end to the old practices and,
- Committing to replace older and less productive technologies and equipment.

Businesses act rationally when considering security and safety at work as a "career move". There is little evidence to require a numerical analysis as the primary evidence for the consideration of the safety and protection.

Consequently, a number of initiatives is designed to highlight business success factors related to safety and protection, such as reputation, supply chain requirements, cost control (e.g. insurance costs) and staff motivation.

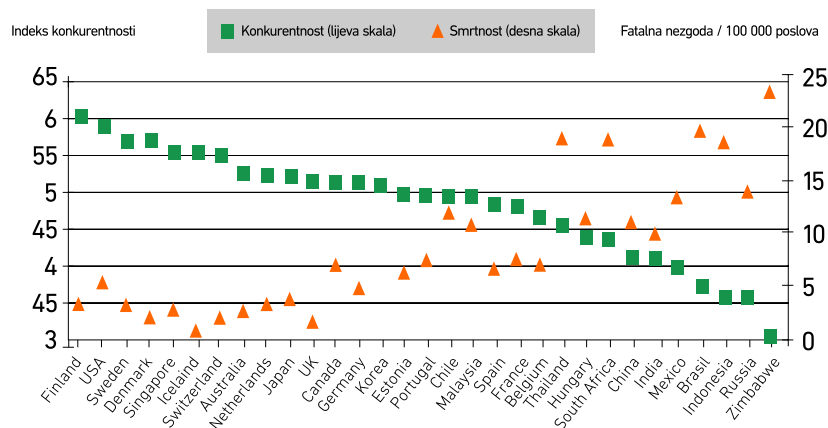


Chart 1: Competitiveness and Security (World Economic Forum)

The concept of occupational safety appears in parallel with the development of tools and attitude towards work. The task of occupational safety and health is reducing the number of accidents, occupational diseases and material losses due to downtime at work. An accident at work is an undesirable, unforeseen event that could result in a minor or a major injury (a stab, cut, break, etc.), health damage to workers or material loss due to delays in production.

Occupational diseases, unlike accidents, occur as a result of a health hazard by a repeated and long-lasting effect of abnormal working conditions, harmful substances and adverse hygienic conditions. The non-physiological conditions of work are too long working hours, gruelling posture (kneeling, bending) or overloading of certain organs of the body (lifting and transporting cargo).

Until the injury comes, one is responsible for three important factors:

- When a person does not know how to work (lack of work)
 - When a person can not work safely (influenced by disease, alcohol, drugs and the like.)
 - When a person does not want to work safely (ignoring the regulations and safety protection)
- The purpose of the occupational safety and health is to ensure working conditions without endangering the worker's life and health.

The duty of the company:

- The company is obliged to provide all protective devices and equipment for work.
- It must put a warning on performing dangerous jobs.
- It must indicate:
- The duties and rights of workers regarding safety at work
- The content and method of education and care, first aid, fire protection
- Exercising the right regarding control and inspection

The duty of workers:

- The employee has the right and an obligation to use protective devices in certain jobs.
- All workers who perform their tasks must be trained to work in a safe manner.
- Each employee is obliged to implement measures to protect the company in their scope of work.

- The employee must report to the immediate superior any faults or defects that threaten him and the environment.
- The employee must report their personal disease such as poor vision, poor hearing, dizziness, heart problems, epilepsy and the like.
- Accidents and injuries must be reported to the immediate superior.
- The employee has the right to refuse to work on a job where his life is in immediate danger
- An employee may be fined by the supervisory body or magistrate for non-compliance with the safety rules
- The employee must comply with the job provisions with special conditions on which specific requirements, such as the qualifications of medical fitness, age, sex, mode etc. are prescribed.

The Company shall not put to use working tools if they are not made in accordance with the rules of safety at work, or if they are defective.

The impact of protection at work on productivity

Productivity is defined as the quantitative expression between the volume of production, services or transport and quantity of the labour force, which we could show with the general formula:

$$P=Q/L=q$$

Where:

P is the labour productivity

Q is the volume of production

L is the number of employees

q is the lead to the fulfilment output per unit of labour

In addition, productivity can be written inversely, i.e. calculating how much is spent on labour to produce one product:

$$P = L / Q = t$$

(T = time spent per unit of product)

This definition of productivity is derived from basic economic principles: to achieve maximum results with minimal investment that can be achieved in two ways:

- Increasing the total weight of the product

or

- Increasing performance.

Factors of productivity

Factors of productivity are all the facts that affect the performance, and as such they can be grouped into:

- Objective and
- Subjective factors.

Objective factors of productivity

Objective factors of productivity can be technical and social. Technical factors of productivity are all the material and technical means of production as well as scientific and technical achievements that are not applied, but there is an economic possibility. The most important factors are:

- Technical characteristics of the product on the basis of which normative work of making products is made.
- Characteristics of technological processes that require a lower or higher utilization of the workforce in its execution.
- The characteristics of the funds required for the work, their modernity and technological sophistication, the condition and the amount of labour productivity.
- Technical characteristics of the materials used in production.
- Work environment and conditions of work in such an environment, regardless of whether they are natural or artificial ones.
- The volume of changes in production can affect productivity.
- The type of work organization, in its level, directly increases or decreases productivity.
- The level of organization, which deals with technical equipment
- Social factors of productivity can only be indirectly changed, and they include a cultural level, the market, the level of the development of transport networks, population and many other social elements.

Subjective factors of productivity

Organizational, subjective factors of productivity include all the elements associated with the human figure in the production and the organization of production. In line with the ways they manifest themselves, they can act through:

- The selection and decision-making on technical and social conditions of production. This selection can be found and appropriate replacement materials to some technical or technological processes

- Qualifications of manufacturers, where optimal qualifications for the work collective as a whole can be found.
- The intensity of labour through which ways to achieve optimal intensity of work can be invented, and during which workers will spend the minimum amount of the manufacturer's bio-energy per unit of product.
- Organizational measures through which the management, after analysing the entire process of technological production, tries to find ways to shorten or simplify some stages of work.
- To calculate the impact of occupational safety and health on the realized productivity, one can use methods like:
- Calculating the declining production work due to a decrease in production volume and increasing the human labour.
- Estimates of loss in production due to workers failing to work and
- The accounts decreased productivity due to lost working days.
- Regardless of the method of calculation used, it will be seen that the increase in the number and severity of accidents at work reduces productivity, and lost work results in a reduction of revenues and an increase in the operating expenses.

The impact of protection at work on the operating costs

The degree of savings in the realization of the effect falls under the cost-effectiveness. The aim of the economics is to make as much products of standard quality with as little investment as possible. When workers fall ill and become injured due to the lack of protection, material losses, which contribute to the reduction in the profitability, appear. In reality, it is difficult to implement protection measures that would exclude the the injuries that happen to workers (i.e. down to the same level).

Injuries occurred while travelling to work by a regular route are considered costs, and this cannot even be avoided by investing in the protection measures. It is necessary to monitor the dynamics of work-related injuries to determine the cost-effectiveness achieved. The occurrence of work-related injuries will depend on investments in safety at work.

The mere investment will increase the total cost of operations, but it will also increase productivity, which, in turn, will be revealed through the reduction of injuries at work. Knowing the impact the investments in occupational safety and health have on the results of operations will allow making the right decisions.

The calculation of the profitability of the company is as follows:

$$Ep = Pp/Tp \text{ or } Ep = (Pp/Tp - 1) * 100$$

Where:

Ep is business efficiency
Pp is total operating income
Tp is Operating costs

For example:

Business efficiency in 2010:

$$Ep = 12,600,000 / 7,529,255 \\ Ep = 1.6735 \text{ or } 67.35\%$$

Economy of operation in 2011:

$$Ep = 12,745,000 / 7,623,250 \\ Ep = 1.6719 \text{ or } 67.19\%$$

The results show that there has been a reduction in the profitability of the company, despite the increased investments in safety at work, which tells us that we have reached the maximum limit in which the economic population was a profitable investment in occupational health and safety.

The cost-effectiveness of protection on the basis of efficiency of operations in the reporting period can be expressed as a percentage of the difference between 2010 and 2011:

Business efficiency

$$Iz = (Eps/Epp - 1) * 100 \\ Iz = (1,67919/1,6735 - 1) * 100 \\ Iz = 0.09\%$$

From this, the unprofitability of an even greater investment in safety at work with the same number of employees is apparent.

Where, from the cost effectiveness of protection: Eps is the economy of operations of the period (2011), and Epp is the last year's business efficiency (the year 2010).

The previous considerations were based on the impact the occupational safety and health has on business productivity, depending on the investment in the health care quality. A prerequisite of any production is owning assets.

The ratio of capital invested in the means of production and the realized profit is called profitability. From this, it follows that the economic viability is the measure of success. The Company generates income if its income is greater than the expenses. If the income is less than the expenses, the company operates at a loss.

The profitability depends on many elements. One of these elements is the protection and safety. In that regard, the funds invested in occupational safety and health will ensure more efficiency but will also increase the amount of capital invested.

The lack of work due to work-related injuries affects the results of operations and, therefore, affects the unprofitable business. Investing in occupational safety apparently affects the increase in cost, but, in the end, due to the reduced number of accidents at work, it actually affects the increase in revenue.

Applied to safety at work, incomes realized, with some or no protection at all, as the cost of protection, are an indicator of its economic viability. There are two types of costs as seen from the viewpoint of protection.

The first group of costs (basic protection) covers the costs related to basic safety rules and their maintenance (work insurance funds and the work environment conditions, and their regular and periodic tests, service checks, etc.).

The second group includes the cost of fees (as a result of injuries at work and occupational diseases) that are caused by an inappropriate or partial protection. The resulting costs are added to the total cost of operations.

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Correspondence to:

Dalibor Misirača

Faculty of Education, University of Travnik
(Bosnia and Herzegovina)

markomis@yahoo.com

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Model produktivnosti u zavisnosti od zaštite na radu

SAŽETAK

Opća je spoznaja da ulaganja u zaštitu na radu predstavlja ekonomski isplative troškove poslovanja preduzeća. Utvrđeno je da ulaganja u zaštitu na radu, iako su trošak, doprinose povećanju produktivnosti što u konačnici utječe na povećanje dobiti poslodavaca. Smanjenje broja ozljeda na radu u direktnoj je vezi sa glavnim ekonomskim pokazateljima uspješnosti poslovanja kao što su produktivnost, ekonomičnost i rentabilnost. Interest svakog poslodavca je da uz minimalne troškove (troškove koji su posljedica ozljeda na radu i profesionalnih oboljenja) ostvare maksimalne poslovne rezultate. Bolja produktivnost = Bolja zaštita na radu.

Ključne riječi: Ekonomska isplativost zaštite na radu, produktivnost, rentabilnost, ekonomičnost poslovanja.