

**SUSTAINABLE ERGONOMIC PROGRAM – BASIC CONDITION FOR  
IMPLEMENTATION OF CORPORATE SOCIAL RESPONSIBILITY**

Petra MARKOVÁ, Rastislav BEŇO, Karol HATJAR<sup>1</sup>

**Abstract**

*Gradually increasing pressure on companies to start to behave socially responsible is a response to social, environmental and economic requirements. The society faces a period of changes that have occurred since the beginning of the crisis and revealing weaknesses in the economy. We become witnesses of rapid changes and challenges posed by globalization, lack of resources, demographic structure and innovation. Objective necessity becomes a corporate social responsibility (CSR) already at the companies' level, which is supported by the approach of the EU institutions and the Slovak Republic. One of the possible appliance through which we can contribute to the sustainability of CSR are sustainable ergonomic programs. When we want to talk about sustainable ergonomic program is important to focus on three key areas. The first area is the Impact of technic and technology to employees at work, the second area is the Importance and impact of socially responsible HR in ergonomics and last area is the Creation of the work environment in relation to environmental sustainability. Ergonomic programs sustainability requires to apply appropriate methods for evaluation of their cost benefit and health effect.*

**Key words**

*sustainable ergonomic program, corporate social responsibility, sustainable development, health effect evaluation*

**Introduction**

The theme of corporate social responsibility becomes one of the key apparatus of company policy in EU countries, including the Slovakia in recent years. From companies that want develop their activities long in term and sustainable at European level are expected to be increasingly engaging in corporate social responsibility in whole the supply chain. Talking about the involvement of the supply chain, then is need to take all of its constituents, i.e. suppliers, all the segments of the manufacturing process, providing the high quality products,

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care for employees (ergonomics), ethical approach to customers, and ultimately managing the company with regard to the environment in cooperation with local communities. To achieve these objectives, it is important to have loyal employees. One of the apparatus to get the loyalty of employees is making appropriate ergonomic acceptable working conditions, with using of participatory ergonomics principles in ergonomics program. Very important is evaluation of health effect and cost benefit. In this article we will describe our proposal of modification method for health effect evaluation.

### **Sustainable ergonomic program**

If we want to define the sustainable ergonomic program, it is appropriate to introduce the fundamental concepts that form the collocation, i.e. ergonomics, corporate social responsibility and sustainable development.

#### ***Ergonomics***

The IEA defines ergonomics like [2, 4]:

*„Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well being and overall system. Practitioners of ergonomics, ergonomists, contribute to the planning, design and evaluation of tasks, jobs, products, organizations, environments and systems in order to make them compatible with the needs, abilities and limitations of people.“*

*Ergonomic program focuses in applying of ergonomics principles in the practice. The result depends on conditions created for ergonomics solution in specific enterprise.*

#### ***Corporate Social Responsibility***

Corporate social responsibility is defined by the XY institution like [1]:

*“Integration of companies’ practices and values in such a way that they are in the inclusion the interests of all stakeholders, including consumers, employees, investors and the environment.”*

#### ***Sustainable development***

Sustainable development has been defined in many ways, but the most frequently quoted definition is from *Our Common Future*, also known as the Brundtland Report [3, 5]:

*"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:*

- *the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs."*

#### ***Sustainable ergonomic program***

*Sustainable ergonomic program can be understood as a comprehensive approach contributing to the development and optimization of organizational, work and technical systems that considering and integrating business practices and values in such a way that they are included the interests of all relevant subjects in their current and future changes and interactions.*

### *Scope of Sustainable Ergonomic Program Interest*

According to the above definition, the sustainable ergonomic program should focus on the study and improvement of the following areas:

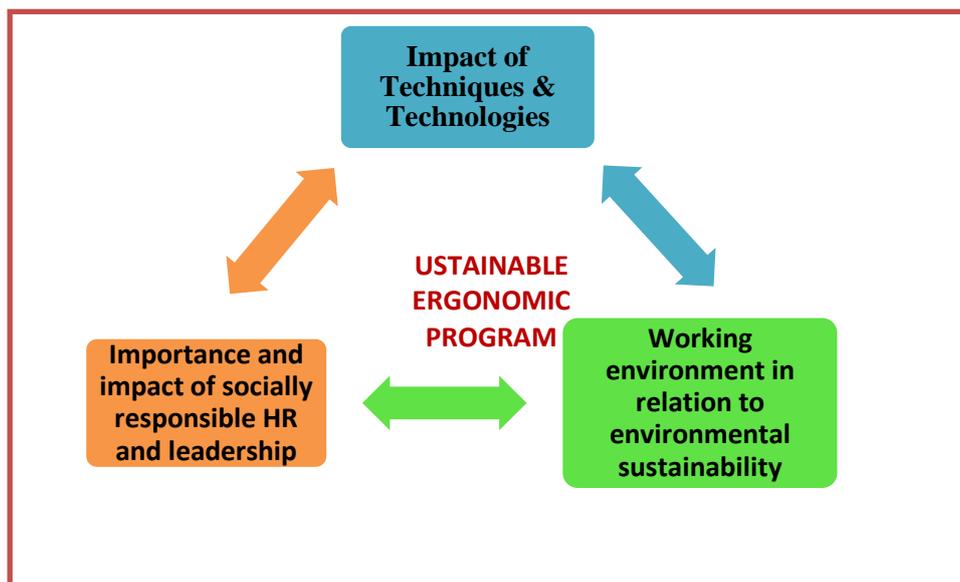
- impact of techniques and technologies to the employees at work,
- importance and impact of socially responsible HR and leadership in ergonomics,
- creating the working environment in relation to environmental sustainability.

Particular areas, i.e., impact of techniques and technologies to the employees at work, the importance and impact of socially responsible HR and leadership in ergonomics, creating the working environment in relation to environmental sustainability cannot be perceived separately. Their mutual effect and interaction are essential to employees at work process, as schematically shown in Fig. no.1.

### *Impact of techniques and technologies to the employees at work*

The impact of techniques and technologies to the employees at work in current development and progress can project especially in followed areas:

- ***Ergonomics aspects of relation human – machine*** – in this area should be explore the parameters for securing ergonomics sustainability of human – machine system, clarify the factors influence which the limiting ergonomic sustainability of human – machine system,
- ***Ergonomic principles of rationalization techniques and technology to ensure sustainable production*** - in this case should ergonomic principles serve to express the importance and benefits of rationalization techniques and technologies to ensure sustainable production and to clarify the interaction and adaptation of sustainable techniques and technologies for the man at work process,
- ***Ergonomic principles of selection and use of tools and machinery*** – should clarify the importance of using ergonomic instruments and tools for people in the work process in terms of sustainable work performance, and also to express the benefits of using ergonomically acceptable instruments and tools for corporate social responsibility.



*Fig. 1 Interaction of sustainable ergonomic program areas*

### ***The importance and impact of socially responsible HR and leadership in ergonomics***

Human Resources Management is an essential part of the modern understanding of the ergonomics. In terms of the sustainable ergonomic program is needed to pay attention to the following areas:

- ***Ensuring and maintaining employees in terms of the ergonomics*** - in this area should be described in various managerial HR activities in accordance with ergonomic requirements (*planning, acquisition, selection, deployment, training, adaptation, evaluation, motivation, retraining*)
- ***Achieving sustainable work and productivity*** - with defining of the basic parameters for evaluating sustainable productivity of the employee with respect to its physical and psychological realities would lead to the efficient functioning of the system: man - work organisation.

### ***Creation of the working environment in relation to environmental sustainability***

The working environment is an important subsystem of the environment, because the human work influences the environment in a positive as well as in negative term. Therefore, it is necessary to give this issue proper attention.

- ***Ergonomic principles creation of the optimum working environment*** - describing their using in rationalisation the working environment in the context of corporate social responsibility and to clarify the impact of their using on job performance of the employee,
- ***Criteria for rationalisation the working environment*** - to express meaning, benefits and to explain the interaction and adaptation of sustainable working environment to the man,
- ***Methods and methodology of the review and evaluation of the work environment*** - should be used for defining the basic parameters needed for the evaluation and exploration of sustainable working environment,
- ***Ergonomic aspects of the system "man - working environment"*** - should serve to define the parameters to ensure the ergonomic sustainability of the system "man - working environment" and to clarify the effect of limiting factors of sustainability of the system,
- ***Factors of the working environment*** - defining the factors applicable to the field of sustainable working environment in terms of laws, regulations, standards and other recommendations that go beyond the legal requirements.

### **Methods for evaluation of impact work and working conditions on employees health**

Modified epidemiological methods are used in assessing impact of work and working conditions on employee, and also in assessing the impact of ergonomic solution implemented to rationalize employee health.

Epidemiology through its methods focuses on evaluation causes of diseases and belongs to medical sciences. Occupational medicine focuses on occurrence syndromes of cumulative trauma disorders (CTDs) associated with long-term, unilateral overload at work.

Ergonomic solution in framework of ergonomics program, in difference from epidemiology, focuses on prevention of symptoms related to work related diseases in employees affecting quality of their work and quality of their life as well. Location and intensity of painful symptoms localized in musculoskeletal system (MSS), represents in framework of ergonomic programs indicator of work and working environment shortcomings.

In initiation of ergonomic program is applied retrospective cohort study design.

Data for this study conducted within ergonomic programs are obtained by a "Nordic Questionnaire" [6] which is specially treated for this purpose. Additional data are obtained by analyzing the video records of work and workplaces and by interviews with employees from the company's top management to employees on analyzed workplaces.

**Methods Applied for Ergonomic Analyzes in Framework of Initiation Ergonomic Program**

In an ergonomic analysis of the initiation of the program apply ergonomic study of the "Case-Control" and retrospective cohort studies design (Table 1), which allow to assess the expected impact of risk factors on the incidence of musculoskeletal system (MSS) disorders and diseases [7, 8 and 9].

These include factors that denote according to how we can influence them as un-modifiable and modifiable factors.

Un-modifiable factors we cannot influence. These include factors such as e.g.: age of employees, their occupational exposure, body height, weight, sex and weight - height indices.

Modifiable factors are such a factors of work and working environment that can be influenced. As the base is used by 15 general operating modifiable factors of the "Nordic Questionnaire", which may be complemented by other factors that are identified in the ergonomic analysis of the company.

ARRANGEMENT OF FREQUENCIES OBSERVED CHARACTERS IN THE STUDY OF THE "CASE CONTROL" AND RETROSPECTIVE COHORT STUDIES DESIGN FOR ERGONOMIC ANALYSIS Table 1

Arrangement of frequencies evaluated characteristics		Occurrence of diseases (in epidemiological study) (in ergonomics - occurrence of MSS problems)	
		Ill (Cases); <i>in ergonomics: persons with MSS problems</i>	Healthy (Controls); <i>in ergonomics: persons without MSS problems</i>
Exposed	YES	A	B
	NO	C	D

We calculate "Odds ratio" – what means the relative chance or relative likelihood (abbreviation OR) as follows:

$$OR = \frac{A/B}{C/D} = \frac{AD}{BC} \tag{1}$$

$$Odds\ Ratio = \frac{Ill\ exposed \times (Health \square y\ unexposed)}{Ill\ unexposed \times (Health \square y\ exposed)} \tag{2}$$

Odds ratio is interpreted as follows:

- If the result is equal to one, the risk is the same for exposed and unexposed workers.
- If the result is less than one, then the observed factor is protective and not a risk factor for the observed disease.

- How many times the result is greater than one, so many times are employees exposed to a greater risk of developing health problems compared to non-exposed employees.

The occurrence of MSS problems in the enterprise and certain period of time is expressed by **prevalence** (abbreviation - PR), which is defined as the proportion of individuals in the population, respectively e.g. working group affected by certain symptoms, respectively health damage in a certain time period. In terms of the reporting period are identified point (instantaneous - a cross-sectional) and interval prevalence – as the prevalence for a specific time period. The ergonomic studies for a better understanding expresses it in percentages in the year of data collection.

$$PR = \frac{\text{Number of employees with MSS problems in examined group/last year}}{\text{Number of all employees in examined group/last year}} \times 100 \quad (3)$$

### Methods Used in Evaluating Effectiveness of Measures Implemented

For the purpose of evaluating the effectiveness of applied ergonomic solutions by cohort study is necessary to establish a set of employees who were examined in the ergonomics program initiation and remained even after the implementation of solutions which did not report in the earlier study any MSS problems.

For these employees, are then calculated a basic indicator of the effectiveness of applied solutions ergonomic rationalization - **incidence** (abbreviation: I), which in medical field indicates disease dynamics and in ergonomics dynamics of appearing of MSS problems which indicate the persistence of deficiencies of studied system from point of view ergonomics.

It expresses the proportion of individuals in the population, respectively. e.g. working group who initially did not feel any MSS problems and diseases that they showed up only in the period following the implementation of solved preventive measures.

Incidence in framework of ergonomic programs studies is similarly as prevalence expressed as the proportion per 100 employees in e.g. one year time period (4).

$$I = \frac{\text{Number of new cases with MSS problems/ year}}{\text{Number of all employees examined in the last study without MSS problems/years}} \times 100 \quad (4)$$

Cohort study belong to long-term studies involves healthy person without any MSS problems. In this type of study are selected two groups. The first group exposed to a particular factor and the second group, which is not exposed to this factor.

This type of study is in the field of ergonomics applied to evaluate impact of the adopted measures on health in the form of multiple ergonomic impact studies. At scheduled intervals (usually annually), is then calculated relative risk (RR), which is the proportion of the occurrence diseases or MSS problems in exposed and unexposed employees. This risk is interpreted as an Odds Ratio (OR).

In the original ergonomics cohort, however, we in difference from medical cohort include also employees for whom there were indicated MSS problems.

We are convinced that in further continuation of ergonomics program efficiency evaluation is necessary calculate, as it is done in the case of incidence, at what percentage of

employees status after the implementation of ergonomic rationalization of work measures did not improved occurrence of MSS problems ( $I_0$ ) and also at what percentage of employees MSS problems improved or disappeared due to applied measures ( $I_+$ ).

$$I_0 = \frac{\text{Number of employees where MSS problems did not change/year}}{\text{Number of all employees examined in the last study with MSS problems}} \times 100 \quad (5)$$

$$I_+ = \frac{\text{Number of employees where MSS problems disappeared/year}}{\text{Number of all employees examined in the last study with MSS problems}} \times 100 \quad (6)$$

Occurrence of employees in or which health status or MSS problems were improved ( $I_+$ ) it means that the implemented solution was successful.

Persons in which nothing has changed ( $I_0$ ) is then (based on our experience) necessary to focus further analysis and especially for them to look for other measures for to improve their working conditions in continuation of ergonomics program [10].

### **Conclusion**

Sustainable ergonomic program, from our perspective, is seen as an extension of ergonomics which it enriches about the philosophy of corporate social responsibility. The expected benefit of the application of sustainable ergonomic program in company practice is creating such working conditions, where employees will be able to submit the required work performance in a long term sustainable standard. Taking into account the requirements and needs of employees, company contributes to the corporate social responsibility. At the same time, company, employees as well as society with application of the sustainable ergonomic program can get benefits, which although cannot see immediately, but rather in the long run.

We consider that successful sustainable ergonomic program based on the participating principle can on the one hand improve efficiency of human work, and on the other hand it can reduce occurrence of health problems and diseases associated with cumulative trauma disorders (CTDs). This can also contribute to savings of funds in the health sector and thus contribute to solving the problems of financing health care

Based on our research experience we believe that, it would contribute to further increase of human work effectiveness, if commonly used evaluation of incidence could take in to account especially a group of employees where applied ergonomic solution of rationalization work did not bring any improvement in their MSS problems.

We are convinced that in solution recent social problems would help more intensive focus on a group of employees whose primary job rationalization ergonomic solution did not produce a decrease of difficulties of MSS problems.

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