



## IMPACT OF EXTERNAL FACTORS ON HEALTH AND WORKING ENVIRONMENT

Miriám Jankalová\*

**Abstract:** Employees are affected by various factors of the working environment. Examples are noise, lighting, microclimate (temperature, airflow and humidity, dustiness, radiant heat). However, these are not the only indicators indicating the quality of the working environment in today's busy times. High workloads with low appreciation, bad atmosphere, ambiguously defined goals and powers accumulate until they gradually transform into a state of complete exhaustion, apathy, dislike, disinterest in society and people. And it is the role of employers to create conditions that ensure employees work in healthy and safe working environment while maintaining the principles of mental, physical and social well-being.

**Keywords:** factor, health, workplace, environment.

### Introduction

As a result of the continuous modernization and improvement of working procedures, the requirements for creating and modifying the working environment, consisting of a set of tangible and intangible external factors directly affecting the employee and his/her work, are increasing. The scientific discipline that deals with the performance of a working person and adapting work equipment and working environment to the characteristics and needs of a person is called ergonomics. [1]

Definition of ergonomics according to the International Ergonomic Association [2]: *Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. Practitioners of ergonomics and ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people. Ergonomics is a systems-oriented discipline which now extends across all aspects of human activity. Ergonomics promotes a holistic approach in which considerations of physical, cognitive, social, organizational, environmental and other relevant factors are taken into account.* The research subjects of ergonomics are [2]:

- determinants of performance, respectively working capacity of a person, for example physical dimensions, range of motion of the trunk and limbs, forces muscle groups, capacity sight, hearing, mental capacity,

---

\* doc. Ing. Miriám Jankalová, PhD., DipIFR, University of Žilina, Faculty of Operation and Economics of Transport and Communications, Univerzitná 1, 010 26 Žilina  
tel.: +421415133134  
e-mail: miriam.jankalova@fpedas.uniza.sk

- the issue of adaptation and response to human working conditions, for example change and night work, monotony, internal pace of work including the body's response to physical, chemical and biological factors of the working environment (noise, vibration, dust, microclimatic conditions).

Positive and negative factors of the working environment influence the employee's behaviour, moods, feelings and are mainly reflected in his/her work and health. For this reason, it is extremely important that employers create a suitable working environment for their employees and pay attention to the physical, organizational, hygienic, aesthetic, socio-psychological, occupational health and safety (OHS), spatial and functional workplace design. Employers should also consider considerably the factors of noise, lighting, microclimate (temperature, airflow and humidity, dustiness, radiant heat) and so on. [1]

### Factors of working environment

When evaluating the working environment, we focus on noise, lighting, microclimate, and size of working environment.

**Noise** is one of the most widespread harmful factors in the working environment. It is any unpleasant, disturbing, undesirable, disproportionate sound. The noise pollution of the population generally comes from the working (40%) and non-working environment (60%). Noise in the working environment is disturbing, makes nervous, makes communication difficult and causes eg. loss of concentration, or increased employee error rate. [1] Therefore, the employer is obliged to ensure the protection of employees from the disturbing or annoying effects of noise and to create an environment for them that respects the noise exposure values for the type of work (see Government Regulation No. 115/2006 Coll., on minimum health and safety requirements for the protection of employees from the risks related to exposure to noise; Table 1). This law stipulates that workplace noise should not exceed 40 decibels (dB) if it is an activity that requires continuous concentration and uninterrupted communication, respectively, is a creative activity. [4]

**Table 1 Noise perception.**

dB value	Characteristics	Example
20 db	deep silence	
30 db	silence	leaf noise, clock beat
40–50 dB	natural noise	birds singing, noise of trees, running refrigerators
from 65 dB	adverse effects	small fan
85 dB	hearing disorders occur	construction and production machines
130 dB	auditory organ pain	
160 dB	rupture of the eardrum	

Source: Krišťák, J.: Pracovné prostredie. [online]. [cit. 2019-11-20]. Dostupné na internete: <<https://www.ipaslovakia.sk/sk/ipa-slovník/pracovne-prostredie>>.

**Light**, its quality, glare and reflections also affect work efficiency or mental state of employee. The uniformity and appropriate intensity of lighting and coloring of the light creates a visual well-being for the employee at work, prevents his / her eye fatigue, increases productivity and quality of work. Appropriate lighting also ensures sufficient visibility and safe orientation in the space. [1] Lighting at work is regulated by Act no. 355/2007 Coll. on protection, promotion and development of public health and on amendments to certain acts [5] and requirements for lighting at work are set out in the Decree of the Ministry of Health of the Slovak Republic No. 541/2007 Coll. on details of lighting requirements at work [6].

**Microclimate** ensures a feeling of thermal comfort of employees. It is important for maintaining their health, ability to work and performance. Most often, the microclimate is defined by factors that result in a human's thermal state [3]:

- temperature - for normal work the temperature should be in the range of 20-24 ° C,
- speed of air flow - the higher the air flow, the greater the heat transfer to the employee's organism,
- humidity - the optimum relative humidity ranges from 30 to 70% of the air saturation by water vapour.

**The size of the workplace** should be at least 2 m<sup>2</sup> of open space with 25 m<sup>3</sup> of airspace. Windows and transparent walls must not dazzle the workplace to avoid screen glare on the computer, which should not be placed near a window. Adjustable blinds are suitable for windows. An office employee should have a desk size that provides ample space for a monitor, computer, keyboard, and other technical devices. The optimum work table height is approx. 65 cm for women and 75 cm for men, eye distance from floor approx. 119 cm, eye distance from monitor min. 40 cm, 60° viewing angle is suitable. The working chair must be stable, with an adjustable seat as well as a backrest. The height of the chair depends on the height of the table and the location of the monitor. The hands should lie freely on the worktop at approximately 90°. [1]

To work in offices, where they are currently working with computers, is under Regulation of the Slovak Government no. 276/2006 Coll. on minimum safety and health requirements for work with displays [7], which requires the employer to create appropriate conditions for the employee in respect of the screen, work desk, workstation, keyboard, work environment and software requirements.

### **The consequences of inappropriate working environment**

Difficulty of the type of work and unsuitable working environment cause health problems of employees, which are accompanied by pain in the hip and cross part (often caused by inappropriate chair or desk dimensions), cervical and neck area (due to poor posture and limbs monitor, chair), hands (unsuitable keyboard, poor mouse positioning), head or eyesight disorder (unsuitable lighting, monitor placement or poor-quality monitor) and so on. [1]

Recently, the list of these consequences has been complemented by burnout syndrome, which is a state of mental exhaustion caused by experiencing continuous stress at work. It is a mental state, accompanied by feelings of frustration, fatigue and apathy. The basis of its origin is the insufficient ability of a person to cope with the daily workload and demands placed on him in the work area. [8, 9]

The symptoms of burn-out syndrome can be observed at the psychological, physical and social levels (Table 2). On the psychological level, it is manifested mainly by feelings of anxiety, sadness, hopelessness, depressing tuning, negativism, loss of motivation, suppression of emotionality, creativity and initiative, decreased self-confidence, etc. From a physical point of view, a person may experience headaches, indigestion, heart pain or changes in heart rate, difficulty breathing, sleep disturbances and general fatigue. In the social sphere, there are manifestations of disinterest, hostility and cynicism towards people with whom one comes into contact at work (especially towards clients, customers, but also colleagues), decrease of sociability or increase of conflicts. As a result of the burn-out syndrome, the relationship of the individual to himself, to those around him, but especially to his work, changes. [8]

**Table 2 Symptoms of burnout**

Questions
Is your work rate high, but the work itself is getting less and less satisfying? Do you doubt the meaningfulness of your work?
Do you feel unappreciated at work? Do you find that you do not receive the necessary recognition for the work you have done and your efforts?
It is difficult for you to get up in the morning and go to work? Do you go to work with dislike / resistance?
Do you feel that your work is killing you and consuming you energy? Do you get tired quickly at work and at the end of the day you are exhausted as if you were working hard physically?
Does it bother you to contact clients or even colleagues? Are they able to mislead you and you do not want to come into contact with them?
Do you work more or less mechanically? Do you feel that your work can no longer bring you anything new?
Are you troubled by frequent headache, spine, muscle or joint pain? Do you have more difficulty concentrating, being apathetic, suffering from digestive problems, sleep disturbances?
Doesn't your work allow you to pursue your hobbies and interests?
Do you have no motivation to improve at work, pursue professional development or further education?
Is it increasingly difficult for you to feel sincere joy and pleasure from work?

Source: Keď pracovný zápal pomaly vyhasína. [online]. [cit. 2019-11-25]. Dostupné na internete: <<https://www.istp.sk/clanok/12204/ked-pracovny-zapal-pomaly-vyhasina>>.

In order to prevent burn-out syndrome, it is essential to consistently separate working life from personal life, observe the principles of psychohygiene, have a healthy lifestyle, positive thinking, good time management, sufficient social support and last but not least openly talk about your feelings. On burnout, however, is suffering not only the employee, but also the whole organization feels the economic impact of reduced work performance (productivity), lower employee engagement, work absenteeism and staff turnover due to burnout. Therefore, participation in preventing and addressing this negative phenomenon is in the interests of both the individual and the organization. [8]

### Grant support

The paper was conducted within the project VEGA 1/0653/18.

### References

- [1] Pracovné prostredie. [online]. [cit. 2019-11-18]. Dostupné na internete: <<https://www.istp.sk/clanok/35/pracovne-prostredie>>.
- [2] Definition and Domains of Ergonomics. [online]. [cit. 2019-11-18]. Dostupné na internete: <<https://www.iea.cc/whats/index.html>>.
- [3] Krišťak, J.: Pracovné prostredie. [online]. [cit. 2019-11-20]. Dostupné na internete: <<https://www.ipaslovakia.sk/sk/ipa-slovník/pracovne-prostredie>>.
- [4] Nariadenie vlády SR č. 115/2006 Z. z. o minimálnych zdravotných a bezpečnostných požiadavkách na ochranu zamestnancov pred rizikami súvisiacimi s expozíciou hluku.
- [5] Zákon č. 355/2007 Z. z. z 21. júna 2007 o ochrane, podpore a rozvoji verejného zdravia a o zmene a doplnení niektorých zákonov.
- [6] Vyhláška Ministerstva zdravotníctva Slovenskej republiky č. 541/2007 Z. z. zo 16. augusta 2007 o podrobnostiach o požiadavkách na osvetlenie pri práci.
- [7] Nariadenie vlády Slovenskej republiky č. 276/2006 Z. z. z 26. apríla 2006 o minimálnych bezpečnostných a zdravotných požiadavkách pri práci so zobrazovacími jednotkami.
- [8] Keď pracovný zápal pomaly vyhasína. [online]. [cit. 2019-11-25]. Dostupné na internete: <<https://www.istp.sk/clanok/12204/ked-pracovny-zapal-pomaly-vyhasina>>.
- [9] 10 príznakov syndrómu vyhorenia. [online]. [cit. 2019-11-25]. Dostupné na internete: <<http://www.istres.sk/10-priznakov-syndromu-vyhorenia/>>.