

Designing taking into account the factor reducing stress in the workplace

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JOANNA KRAJEWSKA

JKK Studio

ORCID: 0000-0002-1449-8132

The aim of the article is to review the solutions used in the architecture of public and commercial (office) buildings, as well as in interior designs and landscape projects, helpful to reduce the level of stress that may arise in the workplace.

Long-term stress in the workplace can result in various diseases¹. It can be caused by pressure or demands related to professional duties and it is often unavoidable. But feeling stressed can be also influenced on unfavorable stimuli coming from the environment, perceived both consciously and subconsciously and related to staying in one room for many hours. Bearing in mind that man experiences architecture in a multi-sensory way, and the positive classification of the elements of the environment allows him to find existential support [3, 4], it is important to provide regular users with the maximum possible comfort in the building. Positive signals coming from the environment can help to reduce work-related stress. Therefore the role of designers is extremely important in shaping a work environment that is beneficial for mental health, and thus also physical health.

The article will present solutions used within the architecture of public and commercial (office) buildings, which can be helpful in reduction of stress of the employees. The starting point for the identified categories was the author's anthropological (qualitative) research conducted among people working in these types of buildings².

Landscape architecture, greenery and biophilic design

The first factor worth mentioning is the land development around the workplace. The view of nature makes one feel good before entering the building, creating a more positive image of the place. An attractive recreational zone, which consists of a composition of greenery (e.g. public accessible lawns), water reservoirs (ponds, streams, cascades, fountains), intimate squares and comfortable urban furniture, allows to spend a break surrounded by nature, eat lunch and have private talks³. This is how the Wiśniowy Business Garden was designed a multifunctional complex in Warsaw (general project: JSK Architekci, landscape architecture: RS

Architektura Krajobrazu, completion: 2012 r.), where soft, undulating forms of tall grass, water reservoirs and various seats have been introduced (Fig. 1). Experiencing nature is relaxing and enjoyable. The analysis of buildings with an office and mixed-use function from recent years shows a tendency of implementation of greenery to architecture both on terraces, courtyards and walls. An example is the innovative projects in Singapore the 18 Robinson commercial building, whose structure is crossed by terraces with trees planted on them (KPF, 2018) or the CapitaGreen office tower, the facades of which were supplemented with plantings (Toyoto, 2014). The other example is realization in the Posejdon mixed-use complex in Szczecin (FBA, 2019) the largest green wall in Poland (150 sqm, 15 m high) consisting of approx. 20 species of plants [5]. Furthermore, the greenery in the interiors "softens" their rawness and is conducive to calm down (both mentally and acoustically). Many people like to grow plants themselves in the workplace⁴. A design trend that is developing today (or rather: a new paradigm in architecture) biophilic design is based on the principle of combining architecture and nature in order to restore a man closeness to nature in the era of progressive urbanization, and is of key importance for physical and mental health [6].

Relationship between the interior and the exterior

Significant for the feeling of comfort in the workplace is the type of relationship with the exterior, manifested in several ways. The view from the window turns out to be an important component of the workplace, where regular users spend many hours a day⁵. Interesting (diverse), soothing (nature), one that one can "get close to" it allows to take one's eyes off the computer, distract thoughts from work. Although designers do not have a large influence on this factor, they can take it into account when the situation requires it, e.g. by introducing a "buffer zone" be-

tween the viewer and the outside space this is the implementation of greenery in the aforementioned CapitaGreen project (Fig. 2.) or by using other solutions (e.g. green walls) intended for the eyesight of building user. Furthermore, the opportunity to go outside (from the building, to the terrace), the opportunity to open the window, as well as control over the amount of natural light, the inflow of fresh air or control over the view inside from the outside these are important aspects in the workplace. Architecture eliminating the feeling of being closed or squeezed in walls, increases the comfort of staying in it.

Acoustics

The acoustic conditions in the workplace have a significant impact on the well-being of the employees. Noise pollution is a growing problem in heavily urbanized areas, affecting human health. By generating stress, noise at work also reduces creativity and productivity.

¹ The seriousness of the problem can be proved by the guide issued in 2015 in Poland by the National Labor Inspectorate on stress at work, available on the government website; it includes the list of diseases, among others: hypertension, stroke, depression and neurosis [1]. In October 2020, the World Health Organization raises the issue of stress at the workplace in the Newsroom section of its website [2].

² The research was carried out using a structured interview method with elements of an unstructured interview. The author relies on interviews (each lasting about an hour) conducted in November 2020 among five employees of various corporations, and on the conclusions of the research conducted in 2018 among several users of the new building of the Academy of Fine Arts in Wrocław (designed by PAG, opened in 2012). Interviews with corporate employees concerned mainly the issue of experiencing stress at work, reception of the workplace and the ways to relax. Interviews with the employees of the Academy of Fine Arts concerned experiencing glass in architecture and were conducted according to questions from a separate questionnaire, but their results turned out to be very helpful in further analysis of issues related to the phenomenon of the workplace.

³ The respondents often mentioned these activities as important for relaxation during a break at work.

⁴ In the raw interiors of the Academy's studio there are magnificent exotic plants brought by users, e.g. a few meters tall banana tree.

⁵ It was emphasized by both some users of the new building of the Academy of Fine Arts in Wrocław, as well as corporate employees.



Fig. 1. Publicly accessible green area within the Wiśniowy Business Garden complex / Fot. J. Krajewska

Effective blocking of noise coming from the outside is especially important when buildings are located in busy city centers, near communication junctions, airports and other constant sources of noise⁶. In order to protect the interior from external noise, one not only implements partitions compliant with the acoustic insulation standard⁷, but seeks solutions additional, such as, for example, sculpting the facade through horizontal partitions (overhangs, protrusions) [8] or creating vertical gardens (especially: module-based green walls) [9, 10].

People working in open spaces or in rooms with smooth, hard surfaces (glass, concrete) complain about the noise generated inside the building⁸. In order to prevent this problem, adequate acoustic absorption of the interior must be ensured⁹. For this purpose, acoustic foams or acoustic panels (also to use on glass) can be used on vertical partitions, often with high aesthetic values (e.g. in a 3D version or with a decorative print). Sound-absorbing ceilings, acoustic islands or acoustics baffles are the office design standard. Materials technologies in this field are constantly developing¹⁰. Increasingly popular in interior design for rooms' silencing is the use of plants covering the walls – green walls (living walls) and moss walls. The use of traditional sound-absorbing materials such as felt or wood and soft coverings on the floor is also helpful. Acoustic comfort can also be increased by additional equipment – curtains, sound absorbing lamps or acoustic screens [11]. The market is expanding in this field, offering many products. These include acoustic office furniture dedicated to intimate conversations – e.g. soft upholstered seats in various types of recesses padded with sound-absorbing material. Many of the above-mentioned elements improving the acoustics of the interior were used by architects



Fig. 2. Plants visible outside the window from the high floor of the CapitaGreen office building / Fot. Jonathan Choe, archigardener.com

from the mode: lina™ studio in their office interior designs, e.g. ING Tech Poland within a space of Elektrownia Powiśle (curtains, coverings on the floor, acoustics baffles, acoustic partitions between desks, acoustic furniture) (Fot. 3).

Color and light

In the context of influencing users, it is important to decide proper colors for the rooms¹¹. Corporate interiors are often accentuated by intense, bright colors that can make recipients feel irritated or stimulate aggression. Whereas the colors that have a positive effect on reducing the stress level while stimulating concentration are: green (associated with nature; soothing emotions, comfort) and light blue (relaxation and calmness). It is also beneficial to use in moderate doses of yellow and orange (e.g. they increase optimism) [12, 13].

In addition, it is worth recalling the positive impact on well-being of good lighting of the in-

terior with natural light, which was emphasized by the users of the glass building of the Academy of Fine Arts in Wrocław. The proper orientation of the rooms in relation to the sun adapted to their function, the use of large windows and the right proportions of the room are the basics design methods used to ensure favorable

⁶ WHO considers noise to be an important factor affecting public health; in 2018 it has published Environmental Noise Guidelines for the European Region, including among others recommendations for road traffic noise [7].

⁷ In Poland, these rules are defined by the Polish Standard PN-B-02151-3:2015-10 Requirements for acoustic insulation of partitions in buildings and construction elements (self-translation).

⁸ Conclusion based on the interviews conducted by author.

⁹ In Poland, the requirements for interior acoustics are defined by the Polish Standard PN-B-02151-4:2015-06 Requirements for reverberation conditions and speech intelligibility in rooms and research guidelines, and the Polish Standard PN-B-02151-2:2018-01 Requirements on the permissible sound level in rooms (self-translation).

¹⁰ For example, architectural felt textile ceilings made of fiberglass or wood-wool acoustic panels.

¹¹ The influence of different shades and color saturation on emotions is confirmed by research from recent years, see: [12].



Fig. 3. The ING Tech Poland office space has been designed with attention to the acoustic comfort of users / Fot. mode:lina architekci / biuro ING Tech Poland

lighting conditions. Solutions enabling the transmission of natural light inside the building can be also applicable. One method is to use materials with high reflectivity and light diffusion on walls and ceilings e.g. by finishing surfaces with light-reflective paints or covering walls with mirrored panels. The other solution that helps to achieve the effect of illuminating the interior with natural light is the use of light shelves using the reflection of direct light from the ceiling (used in side-lit spaces) [14].

Sense of touch

The visual perception of spatial forms allows them to be easily classified according to what was learned in childhood [15]. Therefore round shapes and soft lines are easily associated with comfort and relaxation (see: eyesight as an extension of touch [3, 4]). The contact with soft forms, as a multi-sensory experience, gives a general feeling of relaxation. Their presence in the workplace, e.g. in the form of armchairs or pouffes, contrasted with the orthogonal arrangement of desks, has a positive effect on the visual level, giving the opportunity to change the body position and relax during a break. Hence, relaxation zones that employees can use are becoming more and more popular. Designers from the London studio CCWS Interiors took it in consideration, creating a relaxation space within the office space of Currency Cloud, shaped in the form

of small hills and filling it with colorful pouffes and cushions. Another solution conducive to relaxation is the introduction of soft lines and curves of walls or fixed elements of interior equipment – experiencing organic forms is the way of experiencing nature in an indirect way [6].

Materials of natural origin also have a positive impact on recipients – especially wood, which has been gaining popularity in recent years in the form of plywood used in office spaces and public interiors. In addition to its acoustic qualities, plywood warms the visual perception of the interior, staying in contrast with its institutionalized character. What is more, natural materials also allow a man to experience nature (texture, aging), in line with the spirit of biophilic design [6].

Zoning of space and room arrangement

Zoning of space plays an important role in the workplace. Compared to open space, separate rooms dedicated to teams are more favorable by employees¹². It is worth emphasizing that the need for privacy, which helps to fight stress, is difficult to meet in a multi-person, anonymous interior. Team building atmosphere is more likely to be created in a room or within separated space. And the support of colleagues is extremely important when dealing with problems at work. Especially an office room that can be arranged

by the office workers themselves, which allows for identification with a place and giving a feeling of *home*¹³, can have a positive effect on the mental condition at work.

In addition, an important zone in the workplace is the kitchen – a place that allows employees to get to know each other and for informal conversations, integrating meetings, drinking coffee and providing the opportunity to eat a hot meal prepared at home¹⁴.

As mentioned above, it has become popular to create relaxation areas within the office space, filled with soft furniture and carpets, equipped¹⁵ to encourage various types of activity during a break¹⁶ e.g. by physical relieve stress (games, boxing). Several interviewees appreciated the location of the gym in the workplace, which can be used before (fitness classes) or after working hours.

¹² Conclusion based on the interviews conducted by author.

¹³ Term used by one of the interviewees. From the point of view of the anthropology of the workplace, this is an extremely important issue. I wrote about the acquisition of home features by the workplace in an article on glass architecture, see: [16].

¹⁴ Kitchen in the workplace was mentioned by many respondents, including the Academy building users.

¹⁵ At the same time, when designing richly equipped and visually attractive office interiors, interior designers should care not to cause the effect of overstimulation of the regular space users.

¹⁶ Conversations with corporate workers showed, however, that the attractive equipment of relaxation areas does not necessarily serve the employees themselves (they often wouldn't dare to entertain during working hours), but it rather helps in creating the company's image.

It is important that the zones do not interfere with each other (e.g. when the noise from the kitchen interferes with work adjacent to the open-space without sufficient acoustic separation), so that they can be used freely.

Conclusions

The review of the design solutions applicable to create a comfortable work environment¹⁷ and lower stress level in the workplace, shows their multiplicity as well as development trends. Due to a long time the average person spend at work and due to the harmful stimuli related to intensive urbanization, architects are obliged to take them into account in the design process.

It should be emphasized that solutions increasing the comfort of work should primarily serve the employees themselves not only the image of institutions and corporations. Moreover, their use brings long-term benefits and investors who want to reduce the costs of project implementation should not abandon them.

It would be beneficial to conduct research among users of public and commercial buildings in order to verify the existing and newly introduced architectural solutions. Conclusions from research conducted in the field of anthropology of architecture and psychology may be helpful in developing and implementing new methods of shaping the healthy work environment.

References

- [1] Gólc M., Stres w miejscu pracy. Poradnik dla pracownika, Państwowa Inspekcja Pracy, Warszawa 2015, <http://www.pip.gov.pl/pl/t/d/144691/Stres%20por-pracownik%20Intern.pdf> (Access: 4.11.2020).
- [2] <https://www.who.int/news-room/q-a-detail/occupational-health-stress-at-the-workplace> (Access: 30.11.2020).
- [3] Merleau-Ponty M., Fenomenologia percepcji, Fundacja Aletheia, Warszawa 2001.
- [4] Pallasmaa J., Oczy skóry. Architektura i zmysły, Instytut Architektury, Kraków 2012.
- [5] <http://hadart.pl/realizacje/kompleks-biurowo-konferencyjno-hotelowy-posejdon-w-szczecinie/> (Access: 10.11.2020).
- [6] Kellert S.R., Calabrese E.F., The Practice of Biophilic Design, www.biophilic-design.com, 2015, https://www.researchgate.net/publication/321959928_The_Practice_of_Biophilic_Design (Access: 20.11.2020).
- [7] World Health Organization, Environmental Noise Guidelines for the European Region, World Health Organization 2018, https://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf (Access: 12.11.2020).
- [8] Busa L., Secchi S., Baldini S., Effect of Façade Shape for the Acoustic Protection of Buildings, *Building Acoustics* 17(4), pp. 317-338, 2010.
- [9] Thomazelli R., Caetano F., Bertoli S., Acoustic properties of green walls: Absorption and insulation, *Proceedings of meetings on acoustics Acoustical Society of America* 28(1), 2017.

¹⁷ Most of them serve also other purposes for example, using natural light to reduce energy consumption.

[10] Azkorra Z., Pérez G., Coma J., Cabeza L.F., Bures S., Álvaro J.E., Erkoreka A., Urrestarazu M., Evaluation of green walls as a passive acoustic insulation system for buildings, *Applied Acoustics* 89 (2015), pp. 46-56.

[11] Jabłońska J., Trocka-Leszczyńska E., Ergonomics of Architectural-Acoustic Solutions in Contemporary Offices [in:] Prof. Charytonowicz J. (ed.), *Advances in Human Factors in Architecture, Sustainable Urban Planning and Infrastructure*. Proceedings of the AHFE 2020 Virtual Conference on Human Factors in Architecture, Sustainable Urban Planning and Infrastructure, 16-20 July, 2020, USA, Springer 2020, pp. 89-96.

[12] Wilms, L., Oberfeld, D., Color and emotion: effects of hue, saturation, and brightness, *Psychological Research* 82, 2018, pp. 896-914.

[13] Kaya N., Epps H., Relationship between color and emotion: a study of college students, *College student journal* 2004, pp. 396-402.

[14] Kontadakis A., Tsangrassoulis A., Doulos L., Zerefos S., A Review of Light Shelf Designs for Daylit Environments, *Sustainability* 2018, 10(1), 71; <https://doi.org/10.3390/su10010071>.

[15] Rasmussen S. E., *Odczuwanie architektury, Karakter*, Kraków 2015.

[16] Krajewska J., The experience of glass architecture a case study, [in:] Prof. Charytonowicz J. (ed.), *Advances in Human Factors in Architecture, Sustainable Urban Planning and Infrastructure*. Proceedings of the AHFE 2020 Virtual Conference on Human Factors in Architecture, Sustainable Urban Planning and Infrastructure, 16-20 July, 2020, USA, Springer 2020, pp. 3-9.

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Abstract: Workplace stress is a common cause of many diseases. It may be intensified by staying in one room for many hours and being exposed to unfavorable environmental stimuli. The role of designers may be important in shaping the work environment favorable to the mental comfort of building users. The aim of the article is to review the solutions used in the architecture of public and commercial (office) buildings, as well as in interior designs and landscape projects, helpful to reduce the level of stress that may arise in the workplace.

The adopted research methodology includes the analysis of selected examples of design solutions, literature studies and the anthropological research carried out by the author using the structured interview method.

The result of the review is the collection of a rich set of design methods, which allow to shape the work environment favorable to the mental health of users of public and commercial buildings.

The conducted research allows to conclude that designers have a wide range of measures which enables to shape a work environment that is beneficial for mental health. The range of these possibilities in the hands of architects

is constantly growing, and they should be constantly aware of it. In addition, listening to the needs of users of existing buildings may lead designers to new solutions.

Keywords: public buildings, office buildings, workplace, mental health, stress reduction, building user

Streszczenie: PROJEKTOWANIE Z UWZGLĘDNIENIEM CZYNNIKA OBNIŻAJĄCEGO POZIOMY STRESU W MIEJSCU PRACY. Stres w miejscu pracy jest częstą przyczyną wielu chorób. Może go potęgować wielogodzinne wystawienie na niekorzystne bodźce płynące z otoczenia poprzez przebywanie w jednym pomieszczeniu. Rola projektantów może być istotna w kształtowaniu środowiska pracy korzystnego dla komfortu psychicznego użytkowników budynków. Celem artykułu jest dokonanie przeglądu rozwiązań stosowanych w architekturze budynków użyteczności publicznej i komercyjnych (biurowych), jak również w obrębie projektów wnętrz tego typu obiektów i projektów zagospodarowania terenu, sprzyjających obniżaniu poziomu stresu mogącego się pojawić w miejscu pracy.

Przyjęta metodologia badań obejmuje analizę wybranych przykładów rozwiązań projektowych, studia literaturowe oraz własne badania antropologiczne autorki przeprowadzone metodą wywiadu kwestionariuszowego. Rezultatem dokonanej przeglądu jest zebranie bogatego zestawu środków, jakimi dysponuje architektura i branża pokrewne, pozwalających kształtować środowisko pracy sprzyjające zdrowiu psychicznemu użytkowników budynków biurowych, a także użyteczności publicznej.

Wnioski z przeprowadzonych badań prowadzą do stwierdzenia, iż projektanci dysponują szerokim repertuarem środków pozwalających kształtować korzystne dla zdrowia psychicznego środowisko pracy. Wachlarz tych możliwości w rękach architektów jest wciąż powiększany, a ci powinni być go stale świadomi. Ponadto wsluchanie się w potrzeby użytkowników istniejących obiektów może naprowadzić projektantów na nowe, niestosowane jeszcze rozwiązania.

Słowa kluczowe: budynki użyteczności publicznej, biurowce, środowisko pracy, zdrowie psychiczne, redukcja stresu, użytkownik budynku