ERGONOMICS ANALYSIS OF A WORKSTATION FROM CONTROL ROOM OPERATORS IN A COMPANY OF ELECTRICAL ENERGY SUPPLEMENT

Rafaela Q. Barros, Marcelo M. Soares, Isaura Cavalcante , Alexandre M. T. Silva,
Avenida Acadêmico Hélio Ramos, s/No, Recife, Pernambuco, Brazil, 50.670-420

[1]queirozdebarros@hotmail.com,[2]isauraupe@yahoo.com.br,
[3]alexandre_recife@hotmail.com

This article sets out the results for a control room that arise from applying the Ergonomic Method of Assessing the Built Environment (MEAC, in Portuguese), which was proposed by Villarouco (1, 2). MEAC aims at being able to adapt the environment to the user, thereby making the space more attractive and functional. The best way to solve this problem is to include ergonomics from the start of the stage for designing a physical environment, thereby taking into consideration individuals' physical, cognitive and psychological needs so that the environment may be adjusted to meet these needs.

The activities performed in a control room directly affect people's daily lives worldwide. These services which are coordinated through control centers can be found for example where electricity and gas are supplied and in subway transport lines and air traffic control rooms.

Ergonomics is a reality designed to optimize solutions to difficulties by using methods and techniques that benefit from the expertise of scientific disciplines such as anthropometry, biomechanics, environmental comfort, physiology, cognitive psychology and some aspects of the organization of work. Thus, Ergonomics is seen to be an essential discipline in design practices for control room environments.

1   Method

To evaluate the control room environment, the Method of Ergonomic Analysis of the Built Environment (MEAC, in Portuguese), proposed by Villarouco et al (1, 2), was used.

The research was conducted using the following methodological steps: (1) Global Analysis of the Environment (a questionnaire and a Walkthrough Analysis which help

the researcher to form a first view); (2) Identification of the Environmental Setting (Surveys of the physical, furniture and equipment aspects); (3) Evaluation of the Environment in use (systematic observations, using photographs, film, diagrams); (4) Environmental Perception by the User (Constellation of Attributes); and (5) Ergonomic Diagnosis of the Environment and Recommendations. This last step corresponds to the comparison between the results of observing the interactions of the subjects under study and of the users' perception and finally recommendations for improving the performance of the environment are made. In the context of perception and cognition, there are several instruments of analysis. In this study, use was made of the Constellation of Attributes (Moles 1968 apud Vasconcelos, Soares and Martins, 3).

The field research used measurements of the physical environment and data collected about equipment and workstations by means of direct analysis, interviews and questionnaires and relates these to the appropriate stage of the MEAC. The activities were conducted in the Control Room of the Electrical System of the Integrated Operations Center (IOC) of a power supply company in the State of Pernambuco.

2   Results

The analysis of noise found an oscillation between 70-74dB (A). For indoor environments, ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. (4) recommends levels of 55 dB (A) for daytime use and 40 dB (A) at night.

The noise emitted by radios operating simultaneously can be considered a source of distraction. This may cause possible deviations in operators' work. Thus, the radios used in loudspeaker mode were considered sources of decreased productivity. The use of headphones and a study for improving the acoustics of the environment is recommended.

Regarding the study of lighting, according to Brazilian standard NBR 5413 (5), which defines the lighting indices, levels suitable for offices should reach 750-1500 lux. The index found in the measurement ranged from 149-281 lux. Despite this difference, the vast majority of users did not report dissatisfaction (5). This can be credited in part to the fact that most operators' work bays operators are close to windows, thus allowing natural lighting at work stations.

As to the analysis of temperature, standard NR -17 (6) recommends that the temperature should be between 20°C and 23°C. The temperature measured in the room was 21.5°C to 22.6°C, measured by an anemometer. Although there are some variations in temperature in the same environment, these can be regulated and standardized by directing and controlling the temperature of the air conditioning system, since most respondents considered the room temperature was cold. To minimize this problem,

the users wear jackets.

Problems of various kinds, such as Postural/dimensional, Chemical and Environmental, Communication, Physical and Environment problems, etc. were identified.

Regarding dimensional problems, the bays of the staff work stations have appropriate measurements that are considered appropriate for the patterns of activities undertaken but their height cannot be adjusted. The chairs are ergonomic, but their synthetic fabric is not suitable for the user's perspiration and causes sliding. It is recommended that adaptations be made so as to be able to regulate the height and sizing of the furniture.

With respect to postural problems, it was found that the worker takes up scoliotic and kyphotic postures and torsions due to carrying out different activities done simultaneously. To conduct activities, the operator needs to concentrate on watching the monitors, on answering emergency calls over the radio and by telephone and to operate telephone extensions. These activities associated with the poor sizing of the workstation can cause unsuitable and consequently occupational ailments.

In addition to the activities mentioned, operational problems were noted: high pace and repetitiveness, short breaks, excessive need for precision and reduced tolerance in making decisions on an activity. Given this situation, a new study of the organization of work is suggested that includes the appropriate division of tasks and a system that enables monitoring the supply of energy to be fully monitored bearing in mind that currently five monitors are used for this purpose.

The carpet should be cleaned by a qualified and trained professional.

It was noticed that the disabled, especially the visually impaired, do not have access to this sector. This happens, in part, due to the specificity of the task and the use of software that has images that the visually impaired would be unable to cope with. The company has a program to take on disabled employees in other sectors.

3   Conclusions

This study showed the adequacy of the Methodology of the Ergonomic Analysis of the Built Environment (Villarouco, 2009) in control room environments. The method adopted was effective in identifying problems, analyzing how users perceive the environment and applying questionnaires. This enhanced the analysis of the research findings and suggestions for improvements to be implemented in the built environment.

4   References

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