



ERGONOMICS BIRTH OF SCIENCE AND ERGONOMIC FACTORS IN OFFICE INTERIOR DESIGN

Assoc. Prof. Cem DOGAN

Mimar Sinan Fine Arts University, E-mail:cemdogan67@yahoo.com

ABSTRACT

Ergonomics is defined as the process of adapting the human and the environment in physical and psychological terms to each other in the most comfortable way without forcing them physically and spiritually. There are characteristics, trends, capabilities, and limitations of various business and environmental conditions on people and machines.

With the development of the industry, companies grew and large factories of complex machinery systems were established. Over time, the working conditions of the people working here were ignored, people were forced to work in more difficult conditions between machine systems, even compared to machines were asked to work more. Nowadays, the error of this situation has been revealed, the importance of the human factor has been understood and it has been seen that business should be created according to its capacity and condition. Despite the development of machine systems, it has been understood that human beings are the most important factor in the working environment and ergonomics science has been developed in order to make the working environment suitable for human beings.

The design of the interior organization in line with the ergonomic and anthropometric data, which will ensure that human beings are affected at minimum value against organic and psychological stresses, is very important. The aim of this study is to investigate the history of ergonomics and to define its usage areas by definition. The aim of this course is to investigate the effect of indoor ergonomics on human psychology and efficiency. In this study, literature review and articles published on this subject and other scientific sources were used.

KeyWords: Definition of Ergonomics, History of Ergonomics, Ergonomic Design, Interior Design

1.INTRODUCTION

Studies on ergonomics are of economic origin. It is mainly aimed at increasing productivity. Increase human productivity; research has been made on human characteristics and capabilities to keep pace with them a chine pace, more production, more profit. Human movements during the study are examined to the finest details; people were looked at with the eyes of a machine, this machine is able to make more production. However, later on, it was wrong to see a person as a machine. One can perform a certain job in a certain period of time and fatigue may cause accidents. The increase in production at the expense of human health and happiness has gained weight and ergonomic studies have developed in a humanistic direction.

2. DEFINITION OF ERGONOMICS

Ergonomics is a Greek word that means "labor law". The word "Ergonomics was obtained by combining the Greek words meaning" Ergon = work, "and" nomos = law ".Ergonomics; is a

discipline that examines the relationship between the worker and the environment in which he works and seeks solutions to the problems that arise in the light of anatomical, physiological and psychological information. Ergonomics; is a multidisciplinary science which sets out the basic rules of human, technical and environmental harmony. Ergonomics; It is a branch of science that aims to increase worker comfort and job success and tries to provide optimum harmony between working conditions and human abilities [Sabancı, 1977,]. Ergonomics is with a more comprehensive definition; human anatomical features, anthropometric characteristics, physiological capacity and tolerances in mind. Taking into account the effects of all factors in the industrial work environment, organic and psychosocial stress in the face of system efficiency and human-machine-environment harmony tries to put forward the basic laws. It is a multidisciplinary field of research and development (Erkan, 1988).

3. SCIENCE OF ERGONOMICS

In the early and middle ages of industrial development, human existence has been neglected significantly among the priorities such as producing more goods, earning more, and performing the required quality and quantity of the market. Whether qualified or unqualified, seeking a job in order to meet the living needs of people has been largely exploited and the human factor has not been given the necessary attention. However, in the industrial environment, people, by putting all their capacity; The Company is constantly striving to remove raw materials from the mines, to make them workable, to design, manufacture, operate and develop all kinds of tools, equipment and machinery. However, people have certain structural features and dimensions. As biological beings, the central nervous system of human beings operates on unique grounds.

People's intelligence, skills and physiological abilities have individual dimensions. Perception organs of human organism are sensitive within certain limits. Biomechanics of the skeletal-muscular system, the biochemical energy requirement of muscles and supporting them for the physical work efficiency and mechanical activity of humans; The healthy functioning of respiratory and circulatory systems are important factors. When examined in terms of sociological; Alar Studies in the field of sociology, a science working on the interaction of society and human, contribute to ergonomics. It can be argued that ergonomics has benefited from sociological studies and as a result solved some social problems "(Yararel, 2019, sf:3). Design material is also takes important place in ergonomics. In furniture design a return to traditional production has been achieved with the increase of environmental problems and the damage of industrial materials. The production of traditional furniture does not contain harmful materials and the materials used while being of natural origin ensures that the furniture is long-lasting and robust while its design also brought new searches (Online Journal of Art and Design, sf:44) Intellectuals and artists who previously excluded the industry they respectively turned to biology and nature, traditional design and crafts, so these ideas and designs were started to be used in the field of industry (Aytar sever, Sögüt, 2019, sf:43). A person performs all kinds of work by performing a physical job that can be expressed at measurable levels and with business formulas. Compared to machines, people's work capacity appears to be significantly limited. Therefore, the jobs to be given to people must remain at a level that they can perform through out the day. People who are forced to do business above their power get tired. Tiredness; it may have negative effects on the employee's productivity, health, safety and psychological balance. While people work; they use a variety of handtools, mechanical tools and equipment, work machines, and certain work-programmed systems. The aim of this cooperation is to support people's physical and mental abilities. The most effective use of all kinds of tools and equipment used by people, the users of them; posture, sitting, general health, safety and compliance with the system. Therefore, it is necessary to take into consideration the physical and mental requirements of

human existence, to define their behavior, and to think of all systems designed for human use as systems that are suitable and superior to them.

In the history of ergonomics, F.W.Taylor is mentioned first. In the second half of the 18th century, Taylor improved his understanding of business order and worked on how employees could work more efficiently and orderly. In order to increase the productivity of the work force, Taylor designed some changes in the tools and equipment used by the worker, work studies were done, and he focused on the benefits of choosing suitable workers, educating the workers on the job and paying more to the productive workers [İncir G., 1983,]. In the 1910s, two new method initiatives leading to ergonomic approaches were noted. In 1912, the first scientific application for anthropometry engineering was the “movement study by Gilberth to improve work efficiency. With these studies, the importance of having the equipment to be used for the work to be carried out within easy reach of the employee was understood and as a result, scientific design of the work place and work shops was started (Kahraman, 2013). The first steps in the field of ergonomics were taken by applied psychologists. Munsterberg's *Psychology in Industrial Activities* published in 1913 was a pioneering work in this field. In 1921, the first experimental psychology laboratory was established at the University of Cambridge. After the First World War, the Research Council was established in England and until the establishment of the Endustry National Institute of Industrial Psychology, it supported experimental studies and applied research [Erkan, 1988,]. As a branch of science, “Ergonomics as a branch of science is composed of studies on the adaptation of human dimensions and mechanization to human beings, consisting of different disciplines; “Anatomy”, “Anthropology”, “Psychology”, “Engineering Sciences” and “Design” collected under a single main title (Kirac, 2005).

Since 1949, the development of ergonomics has reached different dimensions. In the early days, a multidisciplinary scope was adopted, considering that only applied psychology approach would not be sufficient in equipment design research. Up until that time, issues such as buttons, controls, gauges, machine dimensions and panels have been dealt with, but after the Oxford meeting the issue has been dealt with in a wider perspective. The first step in the realization of the ‘Ergonomics Research Council’ was established. Although the work of this organizational so aimed at international cooperation, such a merger could only be achieved at an international meeting in Stockholm, 1961. As a result of this meeting, the “International Ergonomics Community” was established and this international community, head quartered in England, had an important unifying effect.

3.1. AREAS COVERED BY ERGONOMİCS

The subject of ergonomics; business and human relations and environmental factors affecting these relations. Human characteristics, human-machine relationship, working conditions, environmental conditions as a whole enters the field of ergonomics. In other words, the height of your desk, the comfort of your chair, the humidity of the air where you work, the noise level, rest breaks, the position of the work bench, the layout of the indicator, the suitability of the indicator-control relationship, the size of the work area, the use of colors, adequacy of lighting and so on. All these topics are the study of ergonomics. The fields of activity of ergonomics can be stated as follows;

- **Sensory Properties:** Physical properties, rational features, sensory, physical, and intellectual capacity limits.
- **Working Conditions:** Posture and movements, tiredness, voltage, monotony, work safety, accidents, motivation, shift work, operating times, authority, authority, responsibility, group behavior, wage structure.

- **Human-Machine Relationship:** Display-control pattern, size issues, mechanical problems.
- **Environmental Conditions:** lighting, noise, vibration, temperature, moisture, air flow (Efficiency Increasing Approaches and Techniques, 2005).

4. IMPORTANCE OF ERGONOMIC DESIGN

The aim of ergonomics is to provide a good harmony between the employee and the job, to prevent the wear and tear of the people due to excessive difficulties while working, and to improve the business performance thanks to this harmony.

In order to achieve the desired harmony between the employee and his / her job, ergonomics aims first to place a job in which one can best use his / her abilities. In order to provide the most suitable settlement, he examines the human in all dimensions. Ergonomics examines the characteristics, abilities, capabilities of the human being and the limits of this power and determines the frame work of the tasks that can be requested from the human being. After that, it provides a good harmony between the employee and the job, prevents the wear of the person due to excessive difficulties while working and thanks to this harmony, it increases the job performance. Ergonomics aims to strike a balance between achieving higher business performance and the desired strain of the employee while studying human in the business system. Ergonomic research has proven for the first time that business performance will increase without increasing the strain. Today, with ergonomic studies, the work environment to be reached, beyond a certain danger and accidents that may come to human beings, this work environment, people will enjoy and make it happy to turn into an environment. With the successful implementation of ergonomic applications, work time is shortened; fatigue, workstress, accidents, absenteeism, loss of workforce, material degradation, material waste is reduced; quality, productivity, efficiency and profit rises.

4.1. ERGONOMIC VARIABLES AFFECTING INTERIOR DESIGN

Creating a personal space within the field of environmental psychology is an issue that must be carried out by taking spatial measures to protect the physiological health of the employee and taking into consideration the psychological effects of the environment on people. People are guided by different external factors in creating the working environments they need;

- **Personal Variables**

A person's past life is effective in creating his "personal space". For example; those who live in a crowded house need anonymity and withdrawal, while those who have lived in the city for a long time want to have anonymity and close relationships (Göregenli, 2005).

Gender and age factors can also be guiding in creating a personal space. For example; it is seen that women adapt to social environment more easily and quickly than men. Therefore, they can create their own area as where they can be comfortable and peaceful.

- **The Impact of Personality**

"When the relationship between the need for privacy and personality is investigated, it is observed that those who need more privacy have less sense of happiness, less ego and have more anxiety" (Göregenli, 2005). According to Marshall, those who do not have sufficient privacy are more easily distracted. At Pedersen he explored various aspects of personality, personal space, and privacy. He argued that those who seek more loneliness and a higher level of anonymity have lower self-esteem. Inverted people tend to treat more and to be less close to their families.

- **Effects of Physical Environment**

The physical environment has an effect on the need for privacy or the need for less privacy. The phenomenon of “personal space is primarily a process of expressing self-knowledge and shared experiences of communication, and the physical environment regulates the flow of privacy. The order of places and places causes to intensify, disseminate, store, separate and locate information. In physical environments, there are architectural elements that will enable people to feel themselves in a sense of privacy. Walls, doors, dividing elements, or any other element limiting visibility may be effective within a space. There are different working groups in the office environments and these groups have a form of privacy regulation. For example; In the business areas that require a greater relationship with the outside, the residential areas within the office are positioned to emphasize the social control aspects. In working areas that require more concentration, the working environment is located in more isolated areas where there are no distractions. “Privacy is a universal phenomenon with its dialectical structure and being one of the unchanging needs of human beings and a cultural phenomenon in terms of the practices of regulating the physical world and social relations of the human” (Göregenli, 2005).

- **Effects of Social Situation**

Creating personal space is a socio-psychological concept as well as environmental. A person's life has a relationship with social behaviors and this affects his / her behavior. When the definitions and approaches related to privacy are evaluated, it can be seen as a concept that regulates the relations of people with the social world rather than with the physical world. In this context, the phenomenon of privacy is a uniting process between personal space and space determination processes.

5.CONCLUSION

Ergonomics; is an extensive research and solution area based on system efficiency and human-machine-environment harmony in the face of organic and psycho social stresses that will occur due to the factors in the industrial work environment considering the anatomical characteristics, anthropometric characteristics, physiological capacity and tolerances of human beings. The efficiency of the work force will be positively affected as long as a convenient and comfortable working environment is provided for the employees in terms of health and safety. The most important elements that need to be addressed are the fact that the work place is sufficient in terms of lighting, ventilation, temperature, cold and humidity, and the ergonomic suitability of the production system used.

Ergonomics is an important factor affecting work efficiency, but alone is not enough. Ergonomics can give positive results when used together with other techniques that increase productivity (sociological, physiological and psychological). The primary objective should be increasing efficiency. The higher the degree to achieve the objectives in the enterprise, the higher the efficiency and stability. By regulating these factors in line with ergonomic principles, work efficiency can be increased and physical and mental health of the employee can be protected.

In the interior design, the lighting level should be adjusted in consideration of ergonomic rules, clean and healthy air flow should be ensured, the working area should be protected from noise and noise-causing equipment should be re-evaluated. Considering the direct effect of the furniture on the employees and to design the furniture they will spendless effort. The employees will be able to do their jobs more comfortably and peacefully with a system that is arranged correctly and protected from external factors. A properly designed office will create a human environment for the employee to ensure that he / she remains psychologically and physiologically healthy. Particularly in closed and crowded office environments, stress factor

can be harmful and psychologically destructive and precautions should be taken with this in mind. The physical health of the employee, another factor influenced by ergonomics, should be taken into consideration in the proper design of the office and in increasing productivity. The most important factor in the studies to be conducted in this direction is the protection of “human” and “human physical health. Solution methods should be developed by considering the physical health of the person as well as the psychology.

Body sizes and proportions vary from individual to individual. However, the average values are used unless the workplace arrangement requires a very special case. The main points to be considered are that the person can be in a sitting position during the day when necessary, and may have to do some work by leaning or standing. Therefore, it is possible to design furniture that is able to do the job all day long without being tired and uncomfortable, without any decrease in performance and motivation. In this study, the undeniable effect of ergonomics on human health was emphasized and the importance of design factor was emphasized. As a result of research on human body with certain limitations, actions such as wrong posture, long-term sitting action, sudden bending and getting up cause various discomforts on human body in the long term. When designing the office furniture of the future, the problems that are experienced today, the physical and psychological problems that occur and the factors that will prevent the occupational diseases developing as a result should be taken into consideration. Design, technology and human must come together in ergonomic conditions.

RESOURCES

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