DESIGN PRINCIPLES OF SEATING FURNITURE IN THE HISTORICAL PROCESS

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Abstract: People display various postures while doing activities in daily life. The most common one among these is seating posture. There are quite different styles of seating posture according to function, culture and traditions. Various health problems are experienced when seating posture is not correct. Therefore seating is an important study and research field for Modern ergonomics and design. It is seen that design and manufacture of seating furniture designed for seating posture are exposed to various standards especially in the sense of ergonomics. There are many factors in design and manufacture of seating furniture and standardization is only one of them. However standardization factor has emerged as the result of interaction of other factors which were effective throughout history. Therefore in this study factors which have effect on seating furniture design will be analyzed within historical scope. It will also be analyzed within the scope of study how standardization which is one of the principles of modern furniture design has developed, what is the place and importance of it.

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1. INTRODUCTION

Furniture Human body takes various positions in order to do actions necessary in daily life. Basic body positions are standing, sitting, crouching, laying, kneeling etc. One of the most important basic body positions is sitting. Sitting is a rest position supported in humans by the buttocks or thighs where the torso is more or less upright. Sitting for much of the day may pose significant health risks, and people who sit regularly for prolonged periods have higher mortality rates than those who do not (Biswas, 2015). The form of seating action varies according to culture, society and gender. There are various seating styles specific to societies such as Oriental style (Tailor-style), Turkish style, Japanese style (agura), Hindu style and various seating elements such as cushion, couch, chair, stool are used together with these seating styles. According to famous anthropologist Hewes (1995), there are nearly 100 resting posture throughout the world and the most diversified one among them is in seating posture. (Hewes, 1995).

Seating is not only resting action. Seating is a basic posture for most of the actions and it is a body language which reflects mood of person. We use seating posture in doing most of the activities during daytime. Moreover all sizes of seating furniture vary according to seating style. The type of seating furniture is various according to the action such as chair, stool, arm stool, sofa, sun-bed, dental chair, birth stool etc. Today anthropometric measurement is the
basic factor in design of seating furniture in order to enhance healthy development of people
and prevent most of the diseases and ergonomic conditions were standardized according to
the type of seating furniture and seating posture. These conditions are standard the same
throughout the world. However within historical process, various factors were effective
according to periods in determining type and size of seating furniture. Interaction of these
factors brought together the factor of standardization today. Therefore we should first of all
mention these factors in historical development of seating furniture.

2. HISTORICAL DEVELOPMENT OF SEATING FURNITURE AND
FACTORS EFFECTING DESIGN FROM ANCIENT TIMES TO THE 20th
CENTURY

From the day it was first created till the second half of 19th century – the beginning of 20th
century; factors such as hierarchy-status, superstitious beliefs, beliefs, power and dominance,
function, gender, material and technology, clothing, traditions, customs, life style, fashion
were effective in design of seating furniture. Design of furniture for seating dates back to very
ancient ages. Archeological proofs show that there are banks and equipments like chair in
settlements areas which belong to Neolthic age. From the end of glacial age till 10.000 BC,
totally functional equipments like stool were used (Crantz, 1998). In 2000’s BC, Chinese
people used to use furniture to support their back when they kneel and sit on the ground.
Tradition, life style and religious philosophy being effective in Chinese, Japanese and Korean
seating furniture (zaisu, Zabuton etc.) dates go back to very old times of history.

Chair and stools made in 2680 BC in Ancient Egyptian civilization could reach up to now.
Egyptians made chair with high backrest in 2800 BC (Academia, internet).Egyptian artists
have made all kinds of seating furniture including foldaway stool with great skill. While
seating furniture such as throne indicated power, hierarchy in Egypt, pharaoh thrones within
graves were made for the life after death. Therefore belief factor was effective in design.
Seating furniture whose size is totally different from normal sofa in ergonomic sense can be
observed in this civilization. In design of these Egyptian sofas which are broader and deeper
on the surface and which is lower than normal seating position was effective. In
Mesopotamia, seating furniture is an object which indicated power, hierarchy and status.
Ornaments on furniture which has no ergonomic sense were made in order to state power and
protect from evil soul (Demirarslan, 2011).

Within historical development, while stool was furniture that is used in every society and
civilization and by every section of society, types of chair and sofa were used for upper class
people and throne was used for the nobility. Therefore factor of determining status have been
basic factor in design of seating furniture, primarily for throne, in every period until 20th
century. Another factor which effects design is gender. Especially in ancient Greek
civilization, different chair and stool were designed for women and men. Apart from gender;
form, rhythm and ratio are other elements which were effective in design in Ancient period.
Similarly some sitting furniture designed for women in Roman civilization. Power and status
are important factors in other seating furniture. Wars and migrations were effective in design
of seating furniture in dark period of middle ages. Therefore easily portable, simple and plain
seating banks and stool were designed (Demirarslan, 2011). Factor of religion influenced
form, ornaments and function of furniture in development of seating furniture in Gothic and Romanesque period. Chair was the most common furniture used in Europe since the middle of 16th century. Design of chair and sofa made by furniture maker for wealthy and noble members of society were made in order to fulfill fashion sense of privileged class. In Renaissance seating furniture; apart from durability, delicacy, style, size and shape, men and women clothes are factors which determine design. With the effect of Renaissance, furniture became more adaptable to body structure and size of people. In Baroque and Rococo period, apart from style of period, especially women clothes effected design. Armrests were shortened and inclined to sit easily for women in their crinoline and large clothes. In 18th century, chairs and sofas were quite compatible with human body in the sense of size and shape.

![Figure 1: Timeline of Chair Design History.](image)

Industrialization period, in 19th century seating furniture was made both as workshop production and factory production. In 19th century furniture was a means of prestige. However, it was expected to bring solution to practical problems of middle class in daily life. Therefore, comfort, durability and practicality were expected features in design. Apart from style, social characteristics have influenced design in Neoclassical and Empirical periods. 1800’s are the times when upholstery works are observed in seating furniture. The period of four great styles is fairly revolution in seating furniture. Therefore, comfort is effective in design of seating furniture. 1830’s are the years when first factory production seating furniture namely “fancy chairs” were produced. Between years 1815-1848; cheap and fabrication furniture production in Biedermier style is observed for the use of bourgeois section of society in Germany and Austria.

Increasing need for furniture obliged the need for rapid production techniques. This compulsion brought together industrialization like in all other products. One of the most important characteristics of Industrialization is the use of pattern. However, natural wood which is the most important raw material of furniture was not compatible with the pattern. Therefore some technicians rather focused on easily moldable material in furniture production.

In this way they planned to make serial production and obtain more complex forms with less labor. With bending wood in steam, using wrought iron, iron and other metals in making furniture, material and technology became new elements in design of seating furniture. Thonet firm, which was founded in 1853 and famous for its chairs, still produce seating furniture today. Easy mounting and packaging factors influenced design in time in production of Thonet chairs. Seating furniture designs such as Thonet and Belter contributed greatly to furniture becoming an industrial product in the 19th century. Laminated plywood has become one of the materials which is mostly preferred by Modernist designers of 20th century in following years. Religion-sect relation was effective in design of Shaker style seating furniture which is the style of period. 19th century is also the period of patent. Inventors and designers directed their whole interest on design of seating furniture. Designs for mobility of body in seating posture with thought of ergonomics and comfort has become important factors in design of seating furniture. Barber and dental chairs, school desks, bureau seats were designed as mobile seating elements. Purification period in 20th century, like in every other fields, seating furniture design was directed with the principle of “form follows function”. Simple and functional seating furniture were produced. In fact, the sofa designed for King of Spain by Mies van der Rohe reflects effects of modernism very well. Inspiration is another factor which effects design of seating furniture in this century. For example; the Wassily chair designed by Marcel Brauer inspired by handle bar of his bicycle, canvas saddle, backrest and armbands were connected to a system composed of twisted pipes. MODULOR ratio system was used of design of some seating furniture designed by Le Corbusier. Moreover, especially metal materials (metal profiles) used in this period enabled standardization of seating furniture. In the seating furniture designed in postmodernist style of period which is opponent to modernism the element which determined design was the principle of “function follows form”. In sustainable and environmentalist approaches from the second half of 20th century until today, elements such as recycle, flexibility, modularity effected design of seating furniture. Developments in computer technology starting from the second half of 80’s caused great changes in design activities. CAD (Computer Aided Design) in design process, CAM (Computer Aided Manufacture) in manufacture process enabled complex forms that cannot be done with human skill and shortened processes. Three dimensional drawings carried out with computer removed necessity of producing prototype in some designs. CAM programs turned molding which is the most important part of cost up to then into a simple process. As a result, there was no more compulsion to produce thousands with the same mould in order to bear the cost. Manufacturing in few numbers with mould provided more options for people. In seating furniture in which metal and plastic based material is intensively used; new structure types such as tension, swelling, crust effected design as well. 20th century is the period in which standardization started in furniture. There was consumption and alteration in every field of life. Furniture design started to develop with the perception of consumption. New places were built such as bureau, restaurant, hotel, passenger lounge, theatre, cinema and new seating furniture were designed in order to use in these places. Elements apart from function such as mounting, demounting, storing, stacking, lightness, durability, transportation, maintenance-repair, cost, sales price were especially effective in the last years of 20th century. Seating furniture intended for consumption were also designed which are adaptable to artistic style of period such as Pop art.
3. HISTORICAL DEVELOPMENT OF SEATING FURNITURE AND FACTORS EFFECTING DESIGN FROM THE 20TH CENTURY TO THE PRESENT

Seating furniture is closely related with human health being furniture in which the posture of human during resting and studying is enabled. As it was mentioned at the beginning of this paper, for human not to live various physical and mental disorders, specific ergonomic measures and conditions should be considered seriously in design of seating furniture. It would not be wrong to say that furniture which needs ergonomic design at utmost level among types of furniture is seating furniture. Design of seating furniture should be considered seriously according to ages, anthropometric measures and culture of society. Designer Hermann Muthesius, member of “Deutscher Werkbund” association which was founded in 1907 supported the view that standardization should be paid attention in industrial manufacture. Starting from this point, he emphasized that mass production was the only way for raising German standards and emphasized the importance of support of handicrafts for this formation. Within the scope of this perception, studies were initiated for the standardization of seating furniture as an industrial product in Germany in the beginning of 20th century. Their aim was to provide quality in industrial production. Anthropometric studies of famous American industrial designer Henry Dreyfus and German architect Ernst Neufert has been an important step for the design of seating furniture and all data obtained were used throughout the world.

With the increase of building places such as library, hospital, restaurant, school, bureau in architecture, it has become necessity to design seating furniture in favorable ergonomic sizes suitable to the functions of these places and in time international standards were formed in which standards were determined related with production and design of different seating furniture used in these places. For example many international standards contribute to the seating furniture with the standards in which measures of human body in various positions are determined such as ISO, BIFMA, BHFTI (Bureau of Home Furnishings and Thermal Insulation), CAESAR (Civilian American and European Surface Anthropometry Resource) , OSHA (Occupational Safety and Health Administration), ANSI (American National Standards Institute), DIN, EU, TSE standards and NASA data related with human ergonomics.

4. CONCLUSIONS

Throughout history, there have been many elements effective in design and manufacture of seating furniture which is numerous according to function and seating posture and used by people while great majority of their actions in daily life. The common point of these basic factors is ergonomics. Today ergonomics is an element which is not only important in formation of seating furniture but it is also important in production. Today furniture is produced by gathering all elements effective in design and production of seating furniture which is numerous for various functions, in order words by enabling standardization. There are standards related with seating furniture within standardization studies of developed and developing countries, various international standards both in design and in production. Number, type and places of these standards are quite broad and complex issue.

Elements effecting design of seating furniture are seen in below:

- Seating posture
- Culture and tradition
- Religious beliefs
- Life conditions of the era: Economy, wars and migrations; trade policies etc.
- Hierarchy, status and power
- Gender
- Durability
- Cost and economy
- Material, technology, manufacture methods, mounting, transportation, storage, packaging etc.
- Ergonomics and anthropometry
- Components of design; shape, rhythm and ratio, modularity and flexibility etc.
- Architectural and design style of the period, design philosophy
- Clothing of the period, fashion
- Function
- Comfort
- Advanced technologies; Computer Aided Design
- Development of structure
- Standardization

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