

PROPORTION OF ERGONOMICS IN DISCOVERED PENDANTS OF MARLIK HILL

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ABSTRACT

Recent interest to proportion and ergonomics root from that technology progresses in recent eras require to consideration of human existence in these progresses. And in some cases this consideration is brilliant and admirable. Does it happen so far to use from ornaments and think with you which how poor it is designed? Using of that is so difficult! It was enough to build that till to use much simpler from that if you had thought about consideration of human elements or ergonomics in design of consumed tools of people. In this article, the sense of proportion in discovered pendants from Marlik area has intention to express that ornaments of this area must be considered or designed in order to use of human. The goal of this research is that shape and dimensions of discovered ornaments of Marlik area follow from shape and dimensions of human body, characteristics of human senses and approved information human experiences. In other words, this research provides texts about human space for use of ornaments of Marlik area. Ornaments of Marlik area is not made and designed from dimensions and size of human body. But it has been built with some ideas of people of that area. And these discovered ornaments make problem for user from point of view of proportions and ergonomics.

KEYWORDS: Gilan, Proportions, ergonomics, ornaments, Marlik hill, excavation, human, design, Anthropometry.

INTRODUCTION

Studying of ergonomics and proportion issue in ornaments of one area requires study about human, standards of size of human body proportion and recognition of machine and tools of making. Ergonomics is a young knowledge that speeds in increase of development and level of health of user to human. From historical point of view, from first time, ergonomics was important in World War 2 since used technology in military aircrafts advanced from human abilities was brilliant importance. Ergonomics searches mutual relation of human, environment and machine and tools and optimize one another proportions. Human have a different characteristics, in general it can be said that successful or harmful element of ergonomics exist when job requirements exceed from individual abilities and must be attempted as a general role that abilities advance from job requirements and be superior to it. This article is about sense of proportion from ergonomics point of view and assessment of human abilities in ornaments of Marlik area. In general, philosophy of ergonomics is base of this assumption that ((design must be started from human)). With use of this science in this article can design and think ornaments of Marlik are that human uses it from physic point of view which is appropriate with individual users and from this way achieve to increase job force optimization, decrease of body harms, decrease of health costs and other positive outcomes.

Express of issue

Meaning of proportion in discovered ornaments from Marlik hill is usage of jewelries and or ability of use from those which although consideration of corporal relation (human body) is so important.

Always for ornaments and jewelries, standard dimensions are considered corresponding to proportion size. According to definition of ornaments standards, convenience and comparing with form of human and safety are important aspects. Which this proportion to some extent is seen in discovered ornaments from Marlik area. Therefore this is necessary that sense of proportion in pendants of this area is discussed from science of ergonomics. In definition of ergonomic science must be said this science is the science of design of compatibility with products with users. This article is in search of level of success and lack of success of artists that era and understanding of proportion sense in pendants of Marlik hill and level of products goal such as designing of ornaments in base of dimensions and size of body with use of ergonomic science and proportion. According to ergonomic science and its definition about proportions and that applied object in relation with human must be compatible with body. And it is obvious that from this way it reflects its beauties. In art well known gold making works can be seen. From this point of view it is appropriate in this research to mention about less known samples that adjacent to quality of design and art of hand which give them special brilliance. According to this base, gold and jewelry making technique has not been changed in centuries.

The history of ornaments can be followed till era of prehistory till before 20000 years which no worked natural product as thing now a day is called ornament was not used. Although it is possible aspects of beauty and enjoying of ornament have a role. But in difficult struggle for life and in contact with nature forces there was no alternative but contentment which is necessary for life. Therefore what is called today as an ornament was corresponding to point of view of each era with unique action of individual to necessity of life.

Necessity and importance of subject

When you face of piece of ornament by Paleolithic human such as necklace which is made by pieces of bones and stone and nacre, it seems you face with birth certificate of human from decades ago. Although that old human had no resemblance with today human about height, body, anatomy and skull but their amusement was that old human and creation of beauty. And in next times, such as living in cave when their hands is rubbed with paint and trace of their hand palm itself from wall of cave. They say with doing this: This is who I am! Different region of body have a principal that must be considered in making of ornaments and body standards. For example, for making a bracelet is necessary that is made with standard of design. Importance and necessity of this research are important only for awareness from left ornaments from Marlik area and studying of sense of proportion about ergonomics in ornaments of this area.

Main goal

The sense of proportion in discovered products from Marlik hill is considered base of ergonomic science.

Main question

- How does it study level of use from definition of proportion according to ergonomic science in discovered pendants from Marlik archaeology area?
- How was successful proportion of aesthetics and usage of discovered pendants from Marlik area according to human body form?

Limit and concentration point

Recent Iran country, Gilan area (Gilan province, north of Iran).

Assumptions

- Level of use from definition of proportion according to ergonomic science in discovered pendants in archaeological area of Marlik can be studied.
- Proportion of aesthetics and usage discovered pendants from Marlik area was successful according to form of human body.

MATERIALS AND METHODS

Research method

The descriptive and analytical. And style of library information gathering.

Definitions

Definition of ergonomics

Ergonomics is a design science compatible with environment and products with users. Ergonomic word is from Greek vocabulary ((Ergon)) meaning work and ((Nomous)) meaning law and means conformity for individuals, from design of duty and methods and conformity of individuals with work from way of appropriate use from putting correct styles. (Phyznet, 1387:403). It must notice what is suitable for one person can't be suitable for another person. Therefore separate methods must be considered. Ergonomics in first view may mean awareness and science of prevention from damages and unforeseen concerns while main subject of that before studying of harm happening is boosting convenience and psychological of action. It must not forget that humans have limit and for having appropriate activity with this limit, condition of environment must be prepared good.

Ergonomics at the end World War 2 entered to existence. This science was established with base of analysis of military and warlike and successes and its faults. In the end, scientists according to needs of human and about it to compute and study way of design in machines, tools and pieces used this science so much. Because of need of human being developed and at present is used in different sciences for standardization of tools and object and made pieces by human and ultimately in furniture and standards of interior space of architecture.

Physical characteristics such as size, volume, height, stability, speed, ability of sense like heat and comfort, movement, vibration, resistance, transportation. This action does for improvement of stability and decrease of faults. These principals are extracted with help of this science including subject of assessment of human body, science of biology, engineering, environmental physic, body systems, physiology, applied and social psychology. The damages of this

work and activities of workplace are including lifting, carrying, drag, pulling and bent and are done better with ergonomics. Ergonomic specialists effort for improving the life of human and increase security and action with preparing solutions for workshops, tools, devices, work clothes and quality of life. Ergonomic programs help to management of dangerous situations and preparing teach of usage of tools and analysis and analyzing information, creation of new rules for sizes. (Shahriyari Ahmadi, 1386:2)

Definition of proportion

Definition of proportion and similarity has a connection with goodness and in most cases it has good meaning. Being good is a tool for one goal meaning being appropriate of that tool for achieving of that goal and goodness is a one thing for human, meaning being appropriate for that human. It seems for recognition of worthy goodness and moral goodness can use from definition of proportion. Of course there are some hypothesizes that moral worth is transpired from a sense of proportion but there was not a broad meaning in their mind, they failed to transpire in smallest stage.

The proportion which is meaning here is a broad and absolute proportion which is connected between whole creatures and in God and creatures. It must be considered that each harmony can't be declared and worthy proportion and even some harmonies are against worth. The proportion which is declared here and can be called origin of worth is sort of proportion of being. It means each creature in the world has its place so that its being would not be in density with other creatures. In other words, relation of creatures with each others must be the way that each one of them can play a being role to others goodly and also accept others role to themselves. When we have accepted the existence of God about the world and know which the God is a creator of all creatures, proportion and harmony with God finds fundamental importance in doing of worth. God is a real cause for creating of harmonious world and he has given special role in any creature. (Faramarzi, 2011)

Situation of Marlik geography

Marlik hill is situated in Gohar roud valley, in eastern 14 kilometers of Roudbar zeytoun city, in right direction of Sepidroud river and 800 meters of southern village with height about 500 meters from level of sea. This hill which is called "Cheragh Ali Tapeh" as its owner is a strong hill which is comprised of iron sulfate. The village which Marlik is situated in it is part of Rahmatabad in Roudbar Zeytoun city in Gilan province. (Oryani, 1380: 32).



Figure 1. Selection of discovered objects in Marlik hill (Ibrahimi loyeh, 1384:19)

Works and discovered findings of Marlik hill:

There are worthy whether artistic or spiritual or monetary is discovered in this exaction including golden, silver, admiralty-metal, mosaic, porcelain and fake porcelain containers. These objects are made in skill and masterful which show talent and artistic genius of artist of that era.

Existence of discovered objects in Marlik excavation show that resident people of the region in funeral ceremony buried whole worthy objects, warlike and historical honors of the dead persons. What is much more wonderful is that the whole drawings on containers are shown in moving style and no object are still. Deer is about jump and moving. Winged cow and flying Simorgh (a kind of bird), unicorn in moving, hunter in state of hunting, flying eagle and other words the life is running. (Ibrahimi loyeh, 1384: 58)

Findings and characteristics of discovered pendants arrays in Marlik hill

Pendants arrays in Marlik hill

Marlik hill has attracted notice of kings due to good climate. Therefore discovered arrays and ornaments were available in graves of these kings including worthy ornaments. Ornament like bracelet which is designed with animals in sides, necklace, earrings, pendants, ornamental pins made of gold, silver and bronze, different woven chains and long ornamental pins and golden stamp that contain dotted lines from resident graves and discovered objects from other ancient are comparable. (Abyar ,1373: 62) As it was said different style of necklace is ornament that is discovered from resting place of people of this hill. Necklaces from chalk, gem, gold, fake porcelain, shale, nacre, snail in different shapes and colors, and pendants from gold are made in circle. Mr. Ezatollah Negahban writes about necklace pendants ((For adorning of necklace, generally the center bead of necklace is made bigger or in different shapes. In carnelian

necklaces, middle beads are bigger with excellent trim and in golden necklaces, central pendants are so various. The pendants such as bunch of little pomegranate that are welded with skill or in shape of skill)).



Figure 2. Golden earring with Marlik bunch of pendant (Ibrahimi loyeh,1384:19)

In general, discovered works in Marlik hill show that people of this area believe in life after death. This era in this place is concurrent with second and first thousand years that is so deep. (Gheybi,1391:140)

Characteristics of discovered ornaments in Marlik hill

According to traditional texture of societies in ancient era, generally workshops and center of ornamental object products and artistic makings in next to political center or capital of eras and powerful governments or gorgeous empire that financial power and ability for purchase or order of these artistic sorts were created. And artist achieved better market for giving their artistic masterpiece in these political centers. (Negahban,1378:366).

In result with concentration of talented artists and individual and artistic workshops in these political centers gradually created style and special texture in these centers that gradually were impressed under ideas and religious beliefs and also traditional texture and special school created with obvious and different characteristics that region. In addition, animal ornaments are more appropriate and exact those human statues. Even much time quality of whole different objects that are in resting place differs from quality of object collection which is discovered in other resting places. While in general, they have followed from one same and artistic texture and resemble with each other. This situation expresses this point that probably made object in each resting place by one master and special artist is made that presents products of one special workshop with one special master with living it that area of the king. What is certain is that because this hill and cemetery are used for 2 or 3 centuries as king resting place of this era and without any doubt best artists and masters in kingdom of each king have produced objects and works which is buried with the king and it's absolutely reasonable that details of each object differ from made group object created by the artist. While in general is made from one texture and pattern of one civilization and artistic school as it was mentioned collection of Marlik ornaments, generally are in shape of animal and human and overall animal ornaments are made so much appropriate and beautiful than human pendants. These ornaments of human generally are made empty and their mouths are open and it seems they call something with shout. (Negahban, 1378:338).



Figure 3. Golden torso of one Marlik king with crown (Negahban,1378:506)

Scenes drawing and traditional subject in discovered pendants of Marlik hill

One of the general drawings is geometrical citron and bottom of most discovered and seen ornaments in Marlik excavation are designed with this drawing. This citron of designed geometry has harmony due to regulations and details and elegance with drawing and scenes of body of discovered works. And from simple dotted line without arrange has divided a circle to several parts. (Negahban, 1378: 306) Repeat and showing of this geometrical citron drawing roughly inspires and guides over bottom of most ornaments and metal containers in Marlik resting places that probably this drawing in addition to designing aspect may have another aspect and mentions another issue. Marlik has been cemetery of kings and commanders of army and objects that were putted with these individuals at the time of death in resting place were due to their religious beliefs and were buried with them as ceremonial objects. (Haj Seyed Javadi, 1374: 222)

According to this subject also with repeating of geometrical citron drawing maybe can say that this drawing is inspired from religious beliefs of this people and it's designed at the bottom of Marlik works. Maybe theses containers are of made of this purpose and are placed in resting places. With this point of view that ancient people had important respect for sun in their texture and religious beliefs and there is no new object that they imaged sun as an important lords and goddess, especially first people of Iran and India had important religious beliefs for sun and its crescent and imaged sun as the biggest their God and this belief has continued even till first half of first thousands. Geometrical citron that is designed at the bottom of Marlik ornaments and works, in its ornamental style contain a circle of plants leaf that are shown in geometrical style completely and comprised the sun crescent which its powerful ray reflexes its environments. Probably it's base of this belief that life and permanence whole creatures are relied on to light and heat of this sun that is situated in center or whole thing. It seems that whole people who have buried their dead like this in Marlik cemetery even they didn't worship sun, at least they respected a lot for sun and its crescent in their religious beliefs. (Negahban, 1378: 307).



Figure 4: Drawing of bottom of golden cup with cucumber flower drawing at the bottom (Negahban, 1978:183)

Studying of samples from ornaments and pendants of Marlik

Metal that is first discovered samples achieving it go to sixth thousand B.C. (Before Christ) in human societies. Generally is used to human being and in second thousand B.C. were popular. About second half of second thousand admiralty-metal industries developed so much. Marlik hill which is situated in cemetery of powerful kings of Marlik era is situated in northern foot of Alborz Mountain which discovered objects in this excavation show worthy evidence and undoubted documents from progress of metal industry in this area in the end of second thousand B.C.

Marlik people which buried works and object with the dead in resting place due to religious beliefs, many metal objects such as different weapons, tools, ornaments, admiralty-metal statues were buried too which show improvement of metal industry. Many ornaments are discovered in Marlik cemetery or its suburbs which show corporeal and natural characteristics of animals goodly. Some other ornaments to some extent are programmed by stylization that in some parts of body of animal which have nature characteristics of animal itself such as hump or horn is emphasized more and are shown big tangible completely. These ornaments often have remained safe and only its surface is humidified gradually. (yasi, 1954: 78).

Body or neck most made pendants from Marlik hill which is excavated have a hole that probably had been used for hanging. Ornaments discovered from Marlik hill are so well-proportioned and are made carefully that are sample of advanced industry of this artistic school which we study here about some sample of discovered ornaments and pendants from Marlik hill.

Golden bracelet with pendant with shape of head of eagle

This bracelet which is made completely from gold has pendant which head of eagle is used in both sides of it. This head of eagle is connected from neck to gether from one now. Their eyes are in shape of oval in light relief and are shown clearly and all-around of it are surrounded by oval strips which show eyelashes. And sharp beak of eagle is shown bent. And head of eagle is driven outside from body of pendant with hammer. Shape of circle which hand is putted in it, spiral form surrounded around of its circle. Ornaments in shape of bird which is discovered from excavation of Marlik are so less than ornaments which are used from shape of animals. The shape of birds has hot quality and elegance of animal ornaments. In designing of bracelet (Figure5) is not noticed to deletion corners and edges. This factor cause scratch around different area of body. Edges and corners can be made round too. With doing this happening of accidents can be decreased. The bracelet which you see in opposite figure is not proportional with structure of hand from ergonomic science. Purpose of using discovered bracelets from Marlik hill is facilitating transition of force from skeletal and muscular system of human to object which is captured in hand. Actually optimizing of transition of force requires optimizing of appropriate design of bracelet from ergonomic science and propotion. (Faramarzi, 2011).



Figure 5: Golden bracelet with pendant in shape of head of Marlik eagle (Gheybi,1391: 140)

- Golden bracelet with two heads of lion:

The head of lions are situated in both sides of golden bracelet, head of lions are shaped from thin layer of gold with hammer and its inside is filled with cone of natural tar and clay. The head of animal round and its snout is flat and mouth is shown open and teeth are made long and pointed and after that in its place are placed in high and down jaw. The eyes and ears are shown in shape of plunged circles and in sides of the ears there is a strip of engraved dotted line. Also dotted line drawings show hair of eyelashes and mustache. There is a thick and relief strip has separated face from neck and two relief strips with drawings of dotted line have distinguished head of lions from rest of necklace part. Archaeologist says that artist of Hakhamaneshi eras have followed styles that probably can be traced its origin from Marlik art school. Now we analyze about this bracelet which is designed with two heads of lion. If it is used for more than one bracelet with high volume and weight like figure 6, the user will get damage in eras of wrist, fingers, elbow, and shoulder. When he uses from this product it might be heard voice from different areas of hand. It seems that this situation occurs much when volume of bracelet is big. It must be careful that hand is not dragged very much with use of bracelet because this causes ache and inflammation in different areas of hand. (Gheybi,1391: 198)

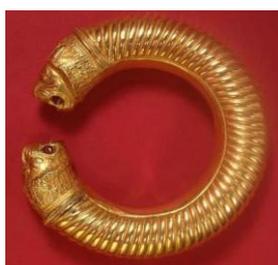


Figure 6: Golden bracelet with two heads of Marlik lion(Gheybi, 1991: 142)

- Golden pendant with filigreed work:

This pendant is hung on a ring of circle. The pendant is designed in shape of filigree. Those made generally for adorning of necklace with bigger central beads or different shapes. In golden necklaces central pendants are so various. This pendant is made in shape of circle with filigree and gold. In analyzing of this pendant of gold and filigree, being adjustable of it is one of condition of its design that must be obeyed principal of ergonomics. Use from adjustable pendants increase optimization and decrease complain about ache of neck and shoulder. Pendant of figure 7 has no movement and this cause muscular ache in neck areas. Being still of pendant increases muscle of back and shoulder that in result of it there is ache and stiff muscle and cause decrease of blood current to muscles which results in (inflation of different part of body) and it is concern. (Gheybi,1391: 202).



Figure 7: Pendant of gold with filigreed work of Marlik (Gheybi,1391: 141)

Golden earring with cluster pendant

This earring is in shape of clusters of pomegranate that pomegranates are laid to getter and are in shape of pendant and its above is connected by ring of circle. Furthermore, that wild pomegranate is from sort of trees that it's sort of discovered in shape of pendants and necklace beads from gold and silver and admiralty-metal. Wild pomegranate is still sort of trees that exist in Marlik area. In studying of this earring, one of principle which is important in design of it is height of earring which must be in appropriate size that prevents additional pressure to shoulder area. While earring figure 8 has high height and its sharp edges cause scratch in area of shoulder. A good designed earring must be safe structurally and has a good action. Bye the way must be attractive and pleasant from point of view of aesthetics. (Faramarzi, 2011).

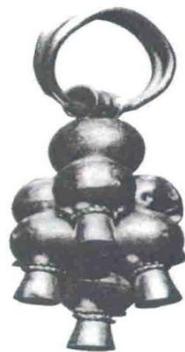


Figure 8: Golden earring with pendant of Marlik cluster (Ibrahimi loyeh, 2005)

Studying for definition of proportion in discovered pendants from Marlik area

Pendants are products that we deal with every day with them and it is necessary to aware from its appropriate design and proportion goodly. Because this tool has the most level of compatibility with human body and therefore the most optimization and less harm, it's necessary in drawing and making of it is used from sense of proportion and ergonomics. Since that sense of proportion from point of view of ergonomics in this article is about change of used pendants of Marlik area people and this work follows with goal of compatibility of abilities, limits and needs of human.

Ergonomic science in subject of proportion has two main goals in pendants of Marlik area. The first goal is increase of effectiveness and efficiency of doing of work.

And also increase of convenience of user (the user of pendants), decrease of error and increase of optimization is comprised in this subject. The second goal is boosting some approved human worth including increase of safety, decrease of tiredness and tension, increase of convenience, increase of acceptance from user and improvement of life quality. It's possible it seems so that all of these words are brought up in order to make important these goals. It can be said two factors help us in design and making of product. The first is that in each special usage usually only bunch of goods have most importance. The second is that the goals generally are connected together. For example, the ornaments that is from product technology of human factor or ergonomic science itself. Usually it is so safe its usage is so easier. In result, the user tires less and is more satisfied. (Shahriyari Ahmadi, 2007).

The sense of proportion from ergonomics in ornaments of Marlik area is not that the human put themselves as a model for design of ornament till solve problems of ornaments of proportion from ergonomics or merely due to some collection of instructions are understandable from an engineer, it can't be guaranteed that others understand all of these instructions. Merely, on this basis that one plan can approach to whole control tools of one device; it can't be guaranteed that others have ability of it. Ergonomic science, existence of separation of an individual and need to consideration of unique characteristics of user's population distinguishes in design of ornaments and proportion in them. Being only a human doesn't cause that a specialist has competence of ergonomic science. (Gheybi, 1391: 171)

CONCLUSION

Since the most part of efforts are done about ergonomic science and proportion, is related to design of a product that human uses for upgrade of action and decrease of their errors but in studying of discovered pendants from ancient Marlik area from use of proportion sense and ergonomics, there are mistakes in some discovered pendants. In other words, in pendants of this area, sense of proportion was quantity not quality. And the error that person could not fulfill in time and does it faster or slower. This kind of error exists in pendants of Marlik area. Therefore in pendants of this area are used less from definition of proportion and ergonomics. Pendants of this region have signs to harm the body during use of product. For example, discovered bracelets from this area have sharpness in its body and edges that cause scratch in area of hand, according to errors which exist in discovered products of this area. In discovered from ancient area of Marlik there are no notice to dimensions and size and lightness and heaviness of pendants, bracelets, earrings and etc. Design of one bracelet requires information about hand and anthropometric. Dimensions and sizes of hand in design of bracelet are so important. Discovered pendants from this region have much dimensions and volumes. The use of this product damages to ear, neck and shoulders. In fact, method of action and level of optimization quality in use of discovered products of Marlik ancient area are not happened according to physical dimensions of body. Discovered pendants from cemetery of Gilan region are not so much from number but in general in Gilan region, discovered pendants in Marlik cemetery allocate most shares to themselves. Also discovered pendants in Marlik excavation have interesting lines and drawings which are so important due to spiritual point of view. Because criticized signs and also different drawings and method of their engraving show improvement of civilization in this area and acquaintance of their residents with art of painting and engraving in much progressed civilization of this region and also skill of artists and masters of that region are proved. But this beauty according to form of human body was not so successful because there is no importance to dimensions and sizes, volume and weight, ergonomics and proportion.

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