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EXAMINE THE ROLE OF CREATIVITY IN INDUSTRIAL DESIGN

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ABSTRACT

Today, we see comprehensive changes in different aspects of human communities more than ever. These changes have resulted in increased complexities in industrial design. Creativity is one of the effective factors in this regard. Understanding concepts such as creativity, innovation, idea and opportunity and use of creative minds in all fields of life are evident more than ever. Industrial design which is a newly emerged industry in our country not only is not an exception to this rule, but also is deeply rooted by concepts such as creation and innovation. Moreover, it should be remembered that creativity is the most important means to increase the power of a designer in industrial process. The present paper therefore reviews creativity techniques in industrial design. Therefore to compile the essentials of creation in the process of industrial designing keywords such as creativity and designing are first defined and then the status and impact of creativity in the trend of designing are examined. To achieve this research, the applied method includes a logical reasoning by using analytic and descriptive measures with a qualitative approach. Finally, the aspects of visual and applied creativities in industrial design are provided.

Keywords: *Industrial Design, Creativity, Applied Creativity, Visual Creativity*

INTRODUCTION

Modern world is constantly developing and the position of different communities in such a world depends on a factor called creativity and innovation. To continue life, each organization has to follow the changes and such changes require both creativity and innovation (Bandarpour, 2008). To provide happiness and diversity, humans need innovation and initiative to cause happiness and variation to satisfy such diversity in them. On this basis, human communities need creativity to escape from inactivity and death. Although there is no doubt on the importance of creativity and its promotion, in most cases, even in many academic organizations in the developed countries, when one talks about formulation and implementation of educational programs to apply creativity, resistance against that is declared in terms of serious hesitation on its feasibility and usefulness, availability of required grounds and even its necessity. The increasing importance and development of creativity, initiation and innovation in the highly accelerated world of industry and technology, importance of relevance of this subject to art, design and idea development issues in general and industrial design in specific are all justifiable reasons to choose and present this issue. The goal of design of this research is to review theoretical issues of creativity and innovation and their importance and role in the process of industrial design and idea development in the bed of art research (Mirghaidari, 2008). It is necessary to emphasize on this point that it has become undisputedly clear in the present time that creativity in such a postindustrial period is not only a necessity, but also a is the condition for survival and it should be understood and implemented as soon as possible.

MATERIALS AND METHODS

Methodology

A logical reasoning method was used to conduct this research by using analysis and descriptive measures. The goal of this research is to examine creativity methods and techniques and their relation and effect of the design of product which is discussed below.

Background of Creativity

Study on creativity and its elements began more than one century ago by social science scholars; however, a basic motive for more studies and researches was developed by Guilford in 1950 (Morad Chele *et al.*, 2013). In that year, when Guilford was speaking in his last lecture as the head of American Association of Psychology, he said that about 100,000 researches in the field of psychology had been

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published until that time out of which 200 researches were related to creativity (Barron, 1981). Since that time however, creativity studies have significantly increased due to the influence of cognitive revolution in psychology.

Definitions of Creativity and Innovation

As creativity is a process which may exist with different degrees and in different forms, it is a little complicated to provide a comprehensive and complete definition that covers all aspects of creativity. After several years of study and research about creativity, still psychologists and education professional have not been successful to provide a definition of creativity which is acceptable to all authorities. Thus, how will be the nature of creation or creativity and the creative thinking course? Creativity is taken from the verb To Create which means to bring something into existence (Dehkhoda, 1998). Creativity cannot be viewed by focusing on just one dimension.

Individual, environmental, procedural and product dimensions cannot individually represent the nature of creativity. Personality traits for example, have a high correlation with creativity; however, they cannot explain anything about creativity. Instead, we need to address social system as well (Afzal, 1998). Other psychologists and management scholars have also provided several definitions for creativity, innovation, change, adaptation and invention. Some of them have considered creativity and innovation to be equal to change; some of them have considered them to be equal to suitable adaption and some others have considered them something beyond change and adaptation. Here, we review some of the major definitions (Zarei, 1994).

Creativity is the application of mental capabilities to develop a new thought or concept.

Innovation is the process of perception or development of respective knowledge and its change to improved or new products and services for those who are interested in them.

Innovation is the application of modern ideas arising from creativity which may be a new product, service or solution for performing the works .

Creativity means the capability to combine ideas in a unique procedure or to make coherence between the ideas.

Innovation is the process of adopting a creative idea and changing that to a new product and operational procedures. Therefore, an innovator organization is specified by the capability to transfer creative essences to useful results.

Innovation is to adopt an idea or behavior which is new to the type of industry, organization, market or environment. The first organization that introduces this idea is considered as an innovator organization and the organization that intimates that has adopted a change.

Change is to develop anything which is different to the past; however, innovation is the adaptation of ideas which are new to the organization. Therefore, all innovations reflect change, but not all of changes are considered as innovation.

Innovation means to develop, to accept and to implement new ideas, processes and products or services. Therefore, innovation results in talent and capability to change or to adapt. Considering the aforesaid definitions and explanations, creativity is to develop a new idea or concept by applying mental capability. Moreover, it is the cause of innovation and without which innovation cannot be fulfilled. Innovation includes development of a new product, service or process which is resulted by new ideas. This innovation is new to the industry, market and environment and results in change and a better adaptation to environmental conditions.

Creativity Dimensions

Creativity can be divided into the three dimensions of non-cognitive, cognitive and motivational .

Non-cognitive dimensions of creativity encompass creative characteristics in movement, art and specific abilities affairs that may be seen less at the level of similar individuals.

Cognitive dimensions of creativity also supervise over aspects of divergent thinking aspects in an individual. A creative capable individual is able to generate more ideas and generating process of ideas enjoys higher mental flexibility with such person. During generating process of his ideas, such person is able to generate innovative and initiative ideas which less downs upon an individual. Motivational

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dimensions of creativity are supervising over internal motivation of an individual and cause him to constantly track his interested tasks without necessarily an exterior grant (Hosseini, 2009).

Evaluation of Creativity

In spite of complexity with creativity, it can be divided into four traits for evaluation. These four groups are namely :

A. A creative person: It comprises all elements associated with the personality of a creative person and his personal characteristics .

B. Creative process: It encompasses different stages between perceiving and creating an art work .

C. Product of creativity: It is the quality of the effect that is achieved as result of a creative process .

D. Environment: It comprises the environmental elements that have a positive effect on creativity process .

Relying on above division, certain tests and methods have been developed for evaluation of creativity .

However, since the creativity process is a complicated perceptual process, a comprehensive evaluation of creative thinking does require various measurements of stages of perception, motivation, individual attitudes and all elements associated with creativity such as the effects of mass environmental elements, function, presenting a creative product and the ones (Feldhusen, 1995).

Creativity Barriers

All human beings have levels of creativity and therefore they can be reinforced. However, no creative thinking or action is practiced by many individuals (Tabatabaee, 2011). The reason lies in the barriers of creativity. The major reasons are as follows :

1-Habit: One of the main barriers in creativity is getting used to methods, heard and seen facts and actually following a single response or responses with the same framework. Habit dissuades individuals and causes them not to think about different procedures and subjects (Rawlinson, 2002).

2-Fear of Others' Judgments: Perhaps this barrier is the biggest one in creativity. Nobody wishes to be derided by others. Self-censorship dramatically overshadows the presentation of new ideas and plans. Moreover, individuals do not like to resist the commonly accepted views by proposing new ones especially those put forward and emphasized by prominent and reliable figures and also because of the possibility of existence of mistakes in new theories. So fear of failure becomes an important factor in not proposing new ideas. But investigation of history indicates that some important theories suggested by prominent figures and accepted by the public have shown to be incorrect (Arab, 2006).

3- Hasty Evaluation: This barrier is made by the individual or other people. Virtually by instinct, a kind of hasty evaluation especially a negative one is made for every response. New theories should be given a chance to be tested and sufficiently thought over (Arab, 1969).

Models of Creativity

Creativity in art may be regarded as an internal phenomenon for an artist arising from sediment of different materials and subjects within the artist. This process is the result of experience and spending a long time. Emergence of fresh concepts from the artist, like giving birth to a child, in creating a fresh art work is considered as creativity in art. In fact, creativity in art is the result of a happening and it may be analyzed in the view of a prompt phenomenon that is the result of an era spent in the past. It is like the time when an athlete of long jump takes a three-step jump after the required run-up, it is difficult to directly study the effect of saved energy in the muscle of the said person and his exercises. Within the area of engineering activities and associated sciences, creativity cannot actually be the result of a flash or an instant happening. Here creativity is the result of a scientific maturity. Any fresh phenomenon in engineering and basic sciences is the result of studies and research on concepts for a long period. In fact, at this time creativity is not easily compared to other cases because creating fresh concepts in area is required for existing conditions not for predicting the future. An individual have actually a great mastery over what happens in near future and he precisely directs the process accordingly. Fresh concepts are stated in form of a hypothesis and notion and after completion of different stages, the same shall be changed to a theory and eventually a law. At this time, no phenomenon will be accidental and unexpected. Relying on above statements, three different models are considered for a creative process where creativity will be defined and eventually it will be regarded as final result of a creative work or product :

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- 1- Art Creativity: The result of inner part and feelings of an individual, sectional and sudden, arising from experience and sediment of materials in the individual
- 2- Scientific creativity as the result of academic mastery and rooted in existing need and conditions
- 3- Creativity in design, a border between the previous two kinds, as the result of inner feelings and predicting the future through a purposeful and scientific process to guaranty achievement of result (Mehdizadeh, 2009).

Definition of Designing

The word of “Design” is both a name and an action. The said word may be applied both to mention the final product and to indicate the process of an action (Lawson, 2009). If we consider many kinds of design, not only technical ability but also having a widespread aesthetic perception is of great importance. Space, form and line are regarded as tools of an environmental and industrial designer to work with graphics the same as color and texture. Final product of this design must be put on a conspicuous place to be viewed by users. It is possible that it may move inside the work of design and/or displace that. The designer must perceive the aesthetics experience of an individual especially his experience of a visual world. In this sense, designers and artists share the area .

However, this case encounters certain obstacles that both limit and advance the limitations. This clearly guaranties that the system or object designed realizes the request functions as much as possible. Thus, it is easier to codify the functional patterns of restricts for specific areas such as architecture and interior decoration (Morad *et al.*, 2013)

Creativity and Industrial Design

Passing through history and not accepting their life environment, humans have benefitted from creativity and thinking powers, recognized their problem and presented a solution. On the whole, humans change their world by design and idea of planning and innovation changes take place. The changes that are accomplished to remove needs of humans and solve their problems are divided into main groups :

- Change of materials in consideration of properties of materials
- Change of materials with respect to human

Major part of changes of the second type is related to industrial design. Industrial design plays a role regarding change in form of material whose result humans directly benefit from. In other words, if change of material is made in consideration of human characteristics, it may be associated with industrial design. Walter Gropius, the founder of Bauhaus School states: “Our ultimate goal was to get a creative artist out of his specific world and connect him to daily works in the world (corresponding works associated with daily needs of humans) and simultaneously, to make material and retrogressive mind of tradesmen be open and more humane” (Bruno, 1999). The cycle of presenting fresh designs and ideas from the viewpoint of industrial design based on the presented process, is displayed in Figure 1.

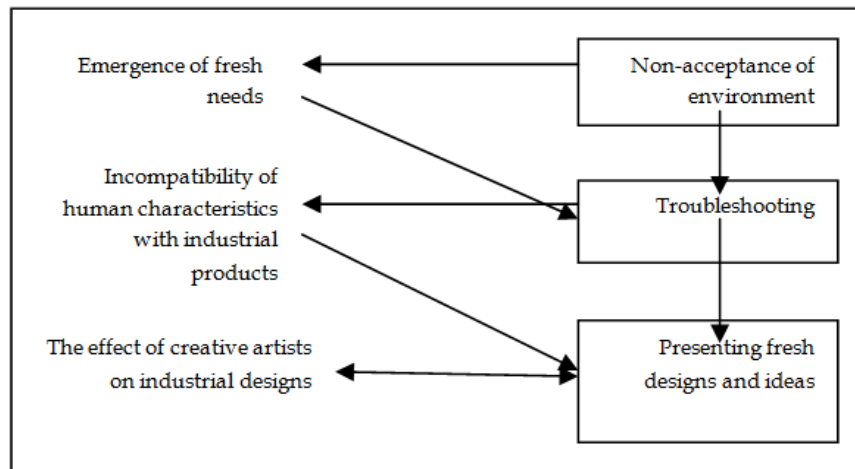


Figure 1: Presenting the fresh designs and ideas

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The subjects that are taken into consideration by industrial design to realize human's needs for use of an industrial products consists of two major parts namely visual part as a response to spiritual and mental needs and ergonomics part as a response to physical and applied needs of humans. Besides these major parts, an industrial designer presents his designs relying on commercial issues and fresh needs of market and considering creativity and innovation. From the viewpoint of an industrial designer, main elements of design are summaries in form four general elements of human, technology and visual and ergonomics ones. Human is considered as user, technology as apply and eventually visual and ergonomics elements as media respectively.

Benefiting from these four elements, the industrial designer may design the industrial products according to human's needs and accomplish what has been assigned to him as well. In order to be successful in industrial design process i.e. compatibility of the characteristics of industrial products with human's needs and characteristics and for problem solving, a designer should enjoy a creative attitude toward the aforesaid four main elements of industrial design and such subsidiary elements as cultural, social, economic, commercial and other elements in order to be successful in presenting various and innovative ideas. For this purpose, the main and coordinating pivot is the power of creativity and innovation of the designer. These rules should essentially be considered as the most fundamental element and in other words, as a central mediator of thinking process of a creative designer. Absolutely, the designer should present a design that has comprehensively been studied from all of the aforesaid aspects. Thus, the designer should enjoy great knowledge and skills and specific power of creativity as well. Consequently, industrial design is regarded as one of the most significant resources of appearance of creativity because during this process, a useful achievement will be made by human through success in solving a problem, a work that is the result of fulfillment of creative, proper design conforming to culture of society and solves a problem in the society accordingly. Relying on above statements, industrial design may be regarded as a process where creative thinking plays a prominent role in presenting a solution as result of which a design may be achieved that is in harmony with these items: coordination with existing technology and production system, cost-effectiveness, manufacturing capacity, fulfillment of existing possibilities, individual safety, environmental protection, fulfillment of existing possibilities, full observance of ergonomics, human, beauty and the ones as it has been mentioned before, the main element for being successful in this process is thinking and creative work. In other words, creative thinking enjoys an essential importance in finding a solution. In case creativity is not hired, designers are entrapped by thinking or by design traps (Mirghaidari, 2005).

In this chapter, one may generally find the point that in industrial design, it is tried to unify creativity, art and technology so that life will become easier, more beautiful and more humane and then, innovation and ambition are generalized accordingly.

Applied and Non-applied Art

Nowadays, visual creativity is stated, our mind immediately refers to visual arts especially painting. This art is originated from different resources and it is rooted in prehistoric eras before human that are drawn on the walls of caves. The latest one is contemporary age of art with officially accepted organizations by art critics and museums that enjoy specific standards. From the beginning of civilization, creating images has been an integral part of human's life. Writing language has been derived from such creation which is included in creative activities of history of civilization in its turn. Painting on earthen dishes, tiles, tile work, decorated home appliances and colorful windows are associated with art of painting accordingly. Visual arts are a kind of refined product and they should be able to communicate with society through which realities and affairs of life are shined. When an art becomes secretive and unperceivable, it is able to communicate for achievement of its goals and at this stage, the value of art is generally questioned. If this trend is continued, art is gradually separated from society and finds marginal and subsidiary aspect accordingly. The most significant element to separate applied and beautiful arts from each other is useful and applicable aspects and only the artistic and aesthetic aspect of the said arts. There are many and various disagreements between those who believe in "Authenticity of advantage" in art works and those who believe in "only artistic aspect". The only common point with all kinds of arts is that one may

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communicate with others by the means of arts either such communication enjoy a specific form or it is abstract. Even in their ideal form, visual arts have specific duty because of which they are advantageous. In the present era and contemporary culture, such arts as industrial design are the exact application of art in industry. Graphics and photography are regarded as arts that are at the service of messaging and industry of communication. Such arts as painting and sculpture enjoys a useful application, however, their aesthetic tendency is manifested more. In this regard, the viewpoint of Bauhaus is quite different from these points of view. On the whole, he considers no different between aesthetic or applicable aspect of art. Considering this viewpoint, all fields of visual arts must keep their aesthetic aspects and enjoy applicable and useful aspects accordingly. The well-known phrase that is attributed to “Sullivan”, an American Architect stating that “Form follow function” (Dandies, 1969) which is about an artist who design aircraft, is actually true. The entire personal creativity of such designer is limited by choosing specific forms of materials and precise ratios to give the flight ability to the aircraft. Thus, in fact, the final product is formed in consideration of the specific duty that is needed to fulfill. However, considering the specific duty of the product, he considers a reason for no beauty in the said product. Most of painters or sculptors should make certain changes and adjustments in their work to fulfill the desires of the person who places an order. Since art is originated from pure initiative and the initiative is to keep out of clear and usual things or to cutoff relation with habit-based thinking, all forms and kinds of arts deserve the highest commendation as they manifest the concept of creativity. Different kinds of arts are included in premium forms of human creativity. Art of architecture is the manifestation of a creative spirit in form of soil, brick and stone. Art of painting is the manifestation of a creative spirit in form of line, color, texture and the ones. Art of poetry and literature are the manifestation of a creative spirit in form synthetics used by humans in their daily life. Art of music is the manifestation of a creative spirit in form of sounds and the ones .

Henry Matis believed that creativity is the specific duty of an artist. Art does not exist where there is no creativity. It is not true to attribute this creative power to innate aptitudes (Matis, 1953)

Analysis of Visual Creativity and Applied Creativity

Considering the art concepts, the word “creativity” has been accompanied by the art world and it is always claimed by artists accordingly. On the other hand, during the recent centuries, the advancement of technology and industry and management issues has been put forth beside the aforesaid concept. The notation of creativity in solving existing problems with modern technology has been of great importance. Meanwhile, some believe that there is no relationship between art creativity and creativity that is applied for problem solving. In other words, they believe that art creativity is introvert and mental and are of this opinion that for execution, applicable aspect of art creativity is not efficient for execution. Herein this research, authors are seeking for study and analysis of the fact whether or not there is a difference between the nature of creativity in the area of art and world of technology or creativity enjoys applicable capacity .

Importance of Imagination and Visualization in Creativity Process

Relying on general concepts that have been given about art, one may point out value of art in connection with creativity and its application in the process of presenting creative ideas is that power of imagination and visualization have an impression on individuals and cause its development and growth accordingly. Moreover, it is claimed that value of art lies in the capability of fertilizing the imaginative insight of individuals and their power of imagination. In other words, it provides us with the possibility of using imagination and visualization to know about phenomena .

Visualization and/or imagination are our ability to form the abstract images. In other words, visualization is the capability of codifying and putting the objects, affairs and images together in order to create a fresh experience .

Now, this question arises: “What is the real value and use of imagination?”It is possible whenever we enjoy a powerful imagination and visualization and are able to present five different ways to perform a task for the first time and then adopt the best option; we are in more desirable position compared to those who have a weak imagination. However, the best option comes to the mind immediately .

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In order to answer this question, two points must be taken into consideration :

If we are not able to imagine various and different solutions in our imagination, we will easily be convinced that the only solution and interpretation in our mind is correct and absolute. “Imagination” promotes health and smoothness of main processes and flows of thinking to present various solutions. However, they do not automatically make them more correct or useful than what they are really are. As figures are not automatically mathematics, art visualization and art imagination are not creativity by themselves.

However, they are the constituents of materials of such creativity. Now, we return to this question: “What is relationship between art creativity and creativity”? We are in the position that we can give an answer for this question (Mirgheidari, 2005).

Discussion and Conclusion

There is creativity in every individual. It seems that when veracity finds the chance to glitter the creativity power emerges as well. Once we turn to a creator we are in need of our own lack of knowledge. There are methods and procedures in the process of designing that unlike the ordinary procedures can be helpful to the latent talents of designers to let them possess a higher level of creativity power in designing and innovation.

Meanwhile, it is necessary to deploy a creative thinking not to mention the creativity power and encouraging the designers to do practices in enriching their talents. Since we consider the expertise of an industrial design as manifestation of the spirit of a creative artist in form of synthetics used by humans in their daily life, one may accept that imagination is an optimized means and technique to arrive in the world of creativity and innovation in such a manner that by using the same, our mind is gradually prepared for thinking and at the next step, for analyzing and finally judgment and assessment. Thus, in the process of problem solving including macro or daily issues, one may establish a sequence and an arrangement in application of the right and left brain hemispheres that is to hire imagination and art to give variety to ideas and finally, to find the best ideas or use a combination of the said ideas as solution. Conscious application of art, imagination and visualization as efficient and useful means and techniques in industrial design process provides proper capabilities and opportunities in the way of thinking and presenting an idea to flee from design traps for designers. It should be mentioned that in order to achieve an innovative and to find a desirable result that is a collection of beauties of the highest quality, it is necessary to enjoy a controlled combination of an analytical thinking (engineering and logical thinking) and a creative thinking (imagination and art).

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