

The effect of Artistic Creation and technical development on Glass products Blowing in mold

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Submit Date: 2020-05-18 05:56:23 | Revise Date: 2021-01-01 15:24:09 | Accept Date: 2021-01-02 01:49:36

DOI: 10.21608/jdsaa.2021.30523.1057

Keywords:

Glass product – Blown glass
- Artistic Creation - Technical
development

Abstract:

Creativity is a process that helps a person to feel and perceive the problem and weaknesses, seeking solutions and testing their validity, and making adjustments to the results.

The research revolves around : Artistic Creation (Creativity in product design) to be done by offering a new product or improving an existing product in order to improve services and meet the customer's requirement, Technical development (production methods development) to be done by designing a new production process or improving an existing one.

As the glass industry is one of the important industries in Egypt, which requires continuous development to keep pace with global development and achieve the highest level of production at the lowest cost with high quality that achieves products sustainability in the domestic and foreign market, the research has tended to show the effect of Artistic Creation and technical development on Glass products Blowing in mold .

Research Problem:

Poor awareness of the link between Artistic Creation and technical development in glass product and its production methods, and its effect on improving and sustaining blown glass product.

Research Objective:

To improve, quality, and sustainability of the blown glass product through Artistic Creation and technical development

The Importance of the Research:

- Contributes to increasing the ability of local glass products to compete internally and externally
- Clarify the importance of the research and development role in the creativity process.

Research Hypothesis:

The artistic creativity and technical development of the glass product formed by the blowing method in mold has a great impact on improving its quality and achieving a competitive advantage for the product.

Research Methodology: Analytical / experimental

Introduction:

Change is the hallmark of organizations today. Technique is evolving and products become obsolescence Therefore the glass factories must respond to these changes in a creative way that guarantees their survival and continuity. Creativity and technical development are critical factors to the ability of glass factories to survive and grow. Distinguished factories are those that able to innovate and renew on a permanent and continuous basis that allows them to invent glass products or new production methods, or develop existing glass products and current production methods which meet the multiple and renewable consumer needs and desires. Whereas most organizations and factories need to increase their creative and technical performance and look to the future with a deep vision, it has become necessary for them to take care of creativity and creators to improve the quality of the glass product and to achieve a competitive advantage for themselves.

1- Artistic creativity in the glass product

Creativity is the ability of an individual to create extraordinary connections between ideas, and to collect ideas in a new and unconventional

way. The creativity process is affected by the social and cultural environment in which it occurs, which helps to the long-term success of the organization. One of the Arab researchers defined creativity: (As the individual’s ability to produce a product characterized by the greatest intellectual fluency, automatic flexibility, and originality). (R 13) Creativity is not the individual’s view of a phenomenon in a new way, but creativity requires the ability to feel the existence of a problem that requires treatment and then the ability to think differently and creatively to find the appropriate solution.

Creativity is divided in glass product into:

- Artistic creativity: represented by the aesthetic aspect of the glass product.
- Productive creativity: It is linked to the development of the glass product.
- Invention creativity: It is related to introducing new methods.

Creativity is achieved by three main elements: innovation, quality, and design aesthetics of the product, Figure No. (1) illustrates these elements. We will review each element separately as follows:

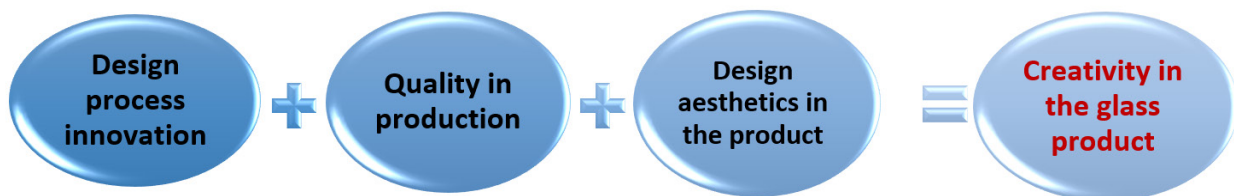


Figure (1) Creativity elements in glass product

1-1- Innovating the design process:

Innovation is a dynamic mental process requires that innovative thinking to be one of its inputs to develop new ideas or create new uses for existing products (R9 – P3). Innovation is also defined as the tangible application of creativity “or is the process of converting ideas into tangible products” (R2 – P17).

Innovation within an organization is a process that leads to the proposal and adoption of a new product or new idea within it, allowing it to improve its position and sustain its competitiveness.

Innovation is divided into the following types:

- Artistic innovations: They are innovations that relate to the forms of glass products that the organization produces. This innovation aims to develop the technical and aesthetic performance of the organization by creating new glass products or developing existing products that carry aesthetic values that enter the market for the first time as shown in Figure No. (2).
- Technical innovation: presenting new ideas in the form of new techniques, and the organi-

zation achieves a triple advantage (being the first to the idea, the first to the product, and the first to the market) as in Figure No. (3).

- Additive innovation: It is defined as innovation that carries added values to the glass product and is unconventional as shown in Figure No. (4).
- Administrative innovation: Administrative innovation includes rules, roles, procedures and structures related to the process of communication and exchange between individuals and the environment. (R9 – P3)



Figure (2) Artistic innovations



Figure (3) Technical innovations



Figure (4) Additive innovation

It can be said that innovation and creativity are achieving a competitive advantage, and the demand for them is increasing because they control the survival and growth of the institution.

1-2- Quality in production:

Quality in general means the organization's production of a commodity with a high level of quality through which it meets the needs and desires of customers according to their expectations and

achieving satisfaction for them. Quality is also defined as the production of a product that matches the specifications set in the design and the needs and desires of customers with the lowest percentage of defects and errors, and at the lowest possible cost in order to satisfy the customer (R7 – P9). Figure No. (5) represents the required scope for quality management in institutions, as it firstly includes the quality control scope that focuses on the product through its creativity and innovation, secondly, the scope of quality assurance, which focuses on the production processes themselves, which requires improvement and development of these processes, thirdly, the scope of quality management, which is concerned with focusing on the entire management system, including the system's interconnected processes, through continuous improvement of this system. We will address later on the improvement of the product through creativity.

The quality of the glass product can be measured by the following factors:

Performance: It means the ability of the glass product to fulfill the functions expected of it.

Conformity: Conformity of the product with the pre-established and agreed standards.

Appearance: It is the shape and dimensions of the glass product.

Aesthetic: It means the artistic aesthetics of the product and its outer appearance.

Validity: operational life of the product (R10)



Figure (5) Enterprise Quality Management Model Created by Mohamed Elbanna

1-3- Design aesthetics in the glass product:

Beauty is “satisfying the senses” by providing and producing aesthetic glass products that excite the consumer through any of the five sensory perceptions. Aesthetics in the glass product are divided into:

Shape aesthetics: It is produced among the components of the glass product’s shape

Symbolic aesthetics: It connects a design element of a product with a specific idea with meaning or significance.

Design is a creative process to innovate something new. New designs for glass products affect the achievement of a competitive advantage for the organization and that helps in its success, the appearance of the glass product has a significant effect on consumer preferences, as the consumer evaluates the glass product through appearance, when product alternatives are of a similar price and functionality, the consumer prefers the product that looks attractive, distinctive, and new; the aesthetic responses are originally emotional (R4 – P175).

The aesthetic values of the glass products design depend on:

- Artistic aspects and outstanding of the produced products.
- The zeitgeist and keeping pace with the current era.
- Design simplicity.

2- Technical Creativity in the glass product

It is one of the important and main factors to ensure the long-term success of all organizations and factories and indicate changes in the physical appearance of the product or in production processes or performance. Technical development was defined as it is the development that entered on the production processes and products to meet the needs and desires of the customer, so that the organizations become best in the competition market.

There are several factors that affect technical creativity as Figure No. (6) in follow:

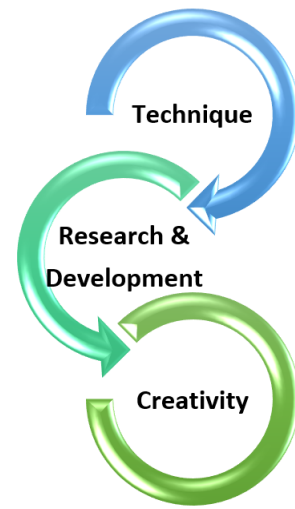


Figure No. (6) several factors that affect technical creativity

2-1- Technique:

Technique is the most important factor in the glass market, it is defined as a set of skills or steps that technical work goes through to become existing product. There are many techniques related to the glass industry that have an effective role on the shape and function of the product. The research headed towards forming glass by blowing into a mold: In this technique, forming molds are used, whether they are wooden or metal, as Figure (7), work to form the glass product in its final shape (R5 – P227):

Blow glass forming with rotation inside the forming mold: the gob of molten glass is blown with rotation and winding during the formation in the mold by the forming tube, it is for products with a regular circular sector which does not contain any relief and bas-relief, figure (8) shows the blowing formation with rotation.

Shaping via blowing the glass by pressure with fixation: the gob of molten glass is fixed in mold while blowing into the forming tube, a source is usually used to pump air into the mold, this depends on the dimensions of the product, this method is for non-rotational glass products or those contain sculptural shapes. Figure No. (9) shows the blowing formation with pressure.

The number of mold parts varies depending on the end product, either it is one-part mold or a

multi-part mold. After finishing the formation, the glass product comes out of the mold, separating it from the forming tube and enters the cooling oven.

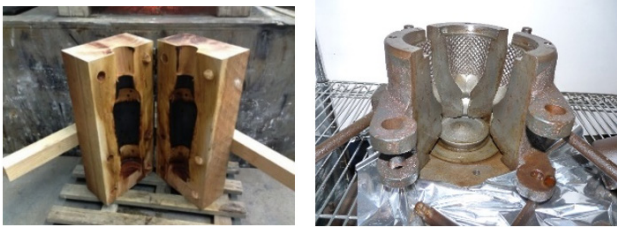


Figure (7) wooden and metal molds



Figure (8) Blow-shaping with rotation



Figure (9) Blow shaping with fixation

2-2- Research & Development (R &D)

The research and development activity is the main driver of creativity and technical development that is linked to glass products, production methods. It aims to provide and improve new products and develop the production process, it also represents an application of scientific and technological knowledge (R1-P1317)

R&D is defined as structured efforts directed towards increasing the scientific knowledge of product or pro-

cess creativity. In view of the rapid developments and changes in the local and global glass industry market, and the fierce competition that organizations and factories are facing with each other, this is what made the organizations and factories adopt and achieve a new competitive advantage over others, whether by producing a new glass product, improving an existing glass product, or developing an existing production process, all of these are related to the technical development. The research focused on developing an existing production process (using glass saws), glass saws (often called cutting wheels) are usually made of emery materials or industrial diamonds (R11). The saw is used in a regular manner, taking into account the good fixation of the product, the glass saws also use a coolant, often water, to prevent the glass from breaking due to the accumulation of heat at the point where the wheel contacts the glass, figure (10) shows the shape of the glass saw and the way to cut the product. The development process lies in this production method by using the saw in an irregular way in cutting; meaning that the cutting is done at an appropriate angle of inclination depending on the design, where the nozzles resulting from this method differ.



Figure No. (10) the shape of the electric saw and the usual cutting method

The Competitive Advantage:

It is the strategic element that achieves the organization's continued profitability compared to its competitors (R2 – P19). Organizations build a competitive advantage when they innovate and achieve steps towards this advantage, among the most important types are:

1. Creating new glass products with higher quality (meaning the organization's ability to provide a distinctive product, which has value and high quality from the consumer's point of view).
2. The lowest cost (which is the organization's ability to design, produce and promote a low cost product compared to competing organization).
3. Creativity in production methods (improving or developing an existing production process or creating new ones) (R3 – P27), which leads to the sustainability and quality of the product.

Jean Jackes Lambin defined the competitive advantage as: "the total of the characteristics or properties of the product, which makes the organization outperform its competitors. It is also defined as: reaching a new method that is more effective than the competitors use."

Product development methods:

A new product is anything that can be changed, added, or developed based on product specifications and characteristics, whether tangible or intangible specifications, the functions it performs, or current or future consumer needs that satisfies it. This product is new to the factory, the market, or consumers, meaning that the new product is the one that enters the market for the first time and may not be new to the market, but rather new for the factory, which provides a new benefit to consumers. New products are seen as every essential innovation, whether in the form of an alternative product, the addition of new ways to distinguish existing products or the occurrence of formal or substantive changes to improve the performance of these products (R6 – P115).

2-3- Innovation technical

The development in production methods on the one hand and the market conditions on the other hand have led to an escalating amount in the future that creativity becomes a decisive factor in factories and organizations, and it can be said that creativity is (looking at what is new and different).

Product creativity is achieved through introducing a new product or improving an existing product and is based on the Research and Development Department, as for creativity in production methods, it is achieved through designing a new production process or improving an existing process; the aim of the first is to introduce a new product and the aim of the second is to obtain high and continuous level of quality in performance (R1-P1320).

Technical innovation patterns

Creativity in the glass product

The glass product is the main pillar that preserves the survival, growth and continuity of glass factories, and the product is generally defined as (anything that can be offered to a market) There are 3 types of creativity, namely (R8 – P121):

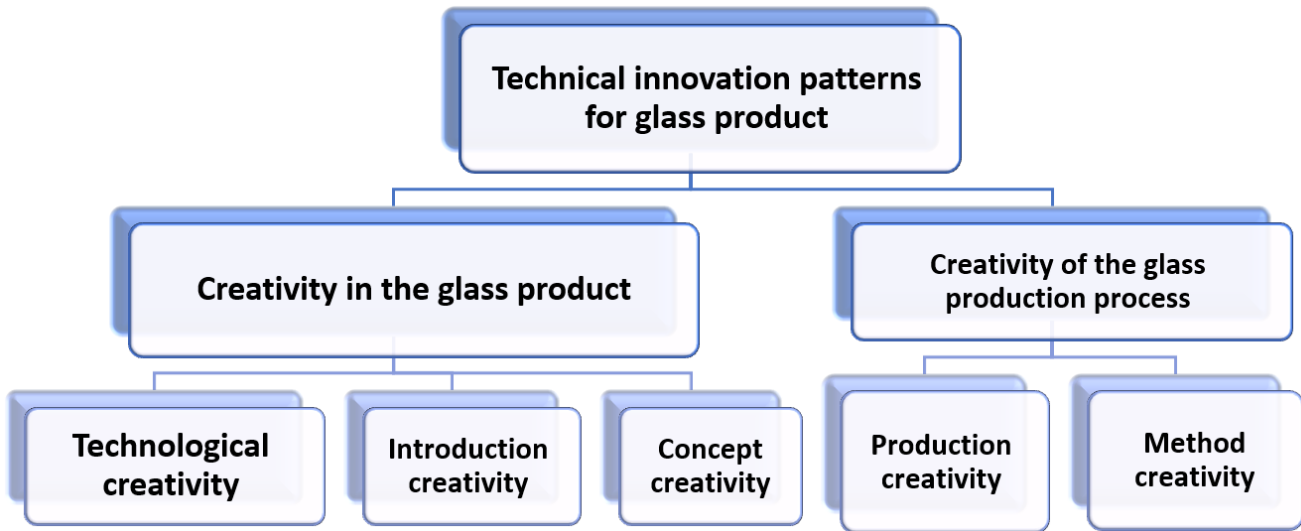
- Concept creativity: is to create new functions for the product.
- Introduction creativity: how to introduce the glass product to the market.
- Technological creativity: means the technological characteristics of product and its improvement

Creativity of the glass production process

The creativity of the production process is defined as the technical change of the production process to introduce new products or improve existing products in order to achieve consumer requirements and is divided into:

- Production creativity: means the production process of the product.
- Method creativity: means the nature of the technological method of production. (R8 – P122):

The patterns of technical creativity of the glass product can be summarized in Figure No. (11).



• Figure No. (11). Technical innovation patterns for glass product

3. Applications

The research tended to apply through different creativity patterns and through the strategies used to develop the product, namely:

3-1- Product variety

3-2- Gain a competitive advantage by the design.

3-3- Creative offers

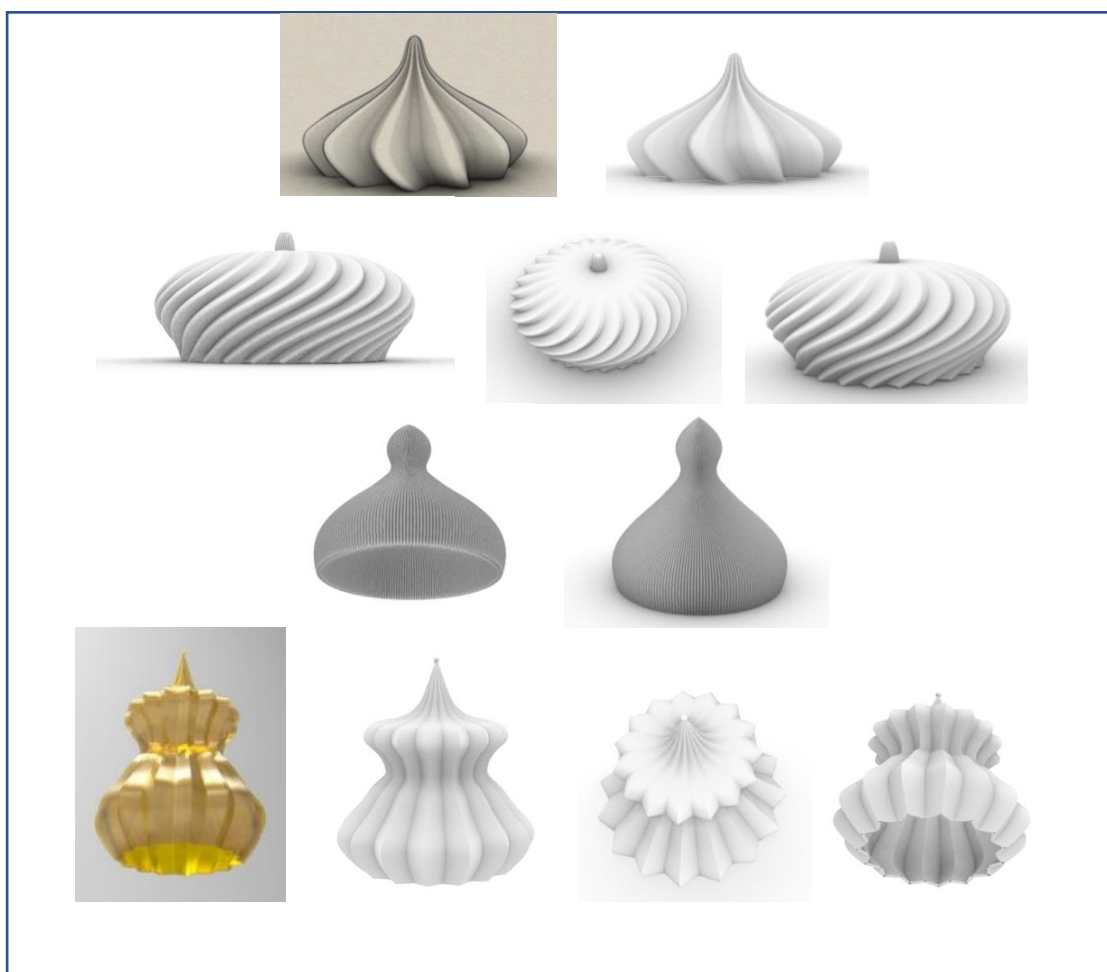
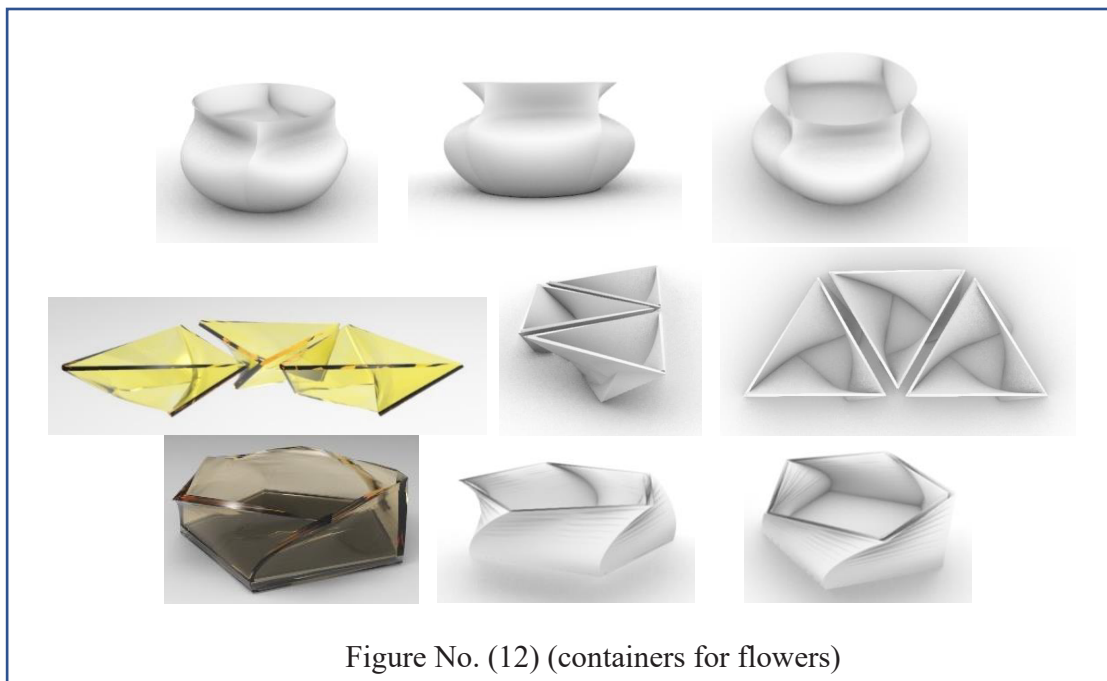
3-4- Service

This is through new and innovative aesthetic designs that gain a competitive advantage (Artistic creativity), the design shall be loaded with added values (creativity of the concept) and new functions to achieve a customer service different than its competitors in the artistic and aesthetic aspect that is added to the glass product such as its appearance, needs that fulfill it, the functions it performs, or new product ideas (Introduction creativity). The research also focused on the technique of blowing glass inside a mold with the use of the electric chainsaw cutting method (cutting wheels), which produces innovative and unconventional forms (technological creativity). The

research also tended to develop some methods used in the blowing in the mold technique and employs them in a new way (production creativity). The research presented methods for glass finishing, such as cutting and sticking methods, the method used in the technique of blowing glass is the hot cutting with rotation, and this produces regular and circular shapes for nozzles. But with the use of the electric chainsaw cutting method or the cutting wheels this produced various, different, and unconventional shapes in the market (method creativity).

3-1- Product Variety

Providing different shapes and functions of the glass product without affecting its quality and cost of production such as (containers for flowers) Figure No. (12) Design of food keepers (glass cover for food keepers) Figure No. (13) and (Bowl for nuts) Figure No. (14)



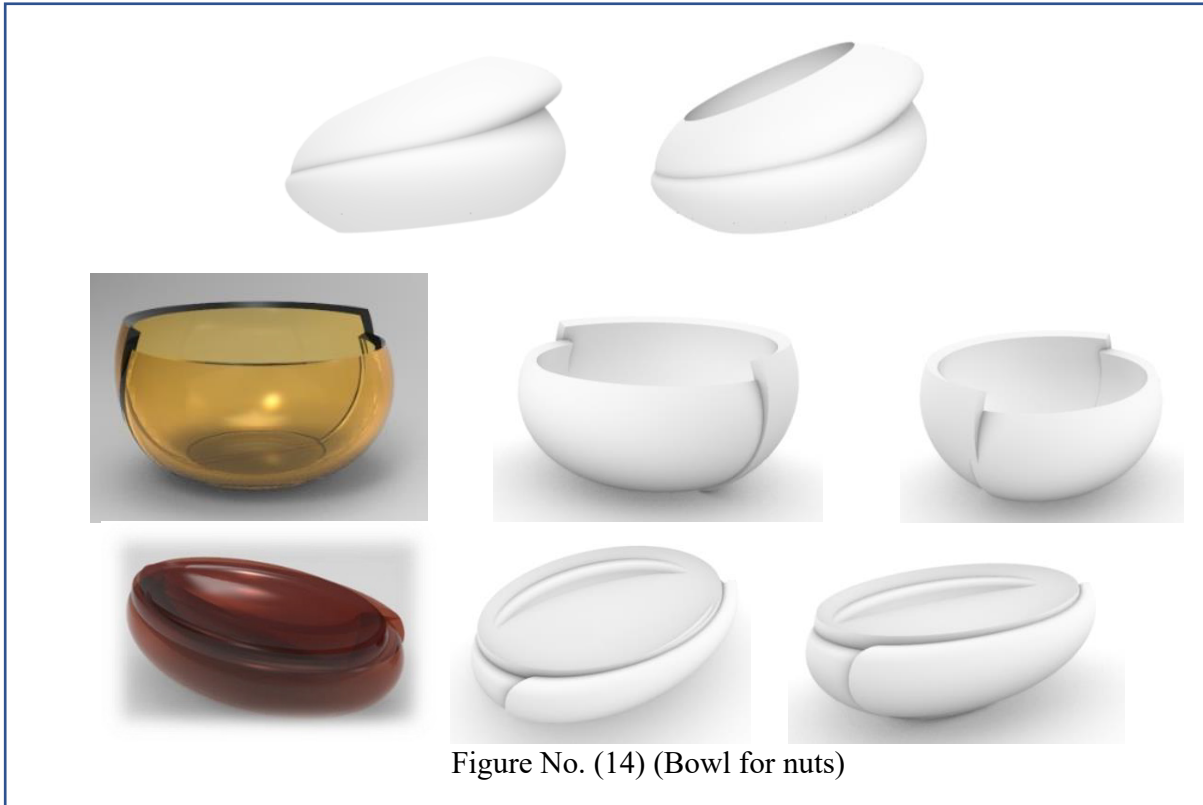


Figure No. (14) (Bowl for nuts)

3-2- Gain a competitive advantage by design:

That the design of the glass product is characterized by attractiveness, beauty, ease of use and other features that make it different from the competing products. Figure No. (15)

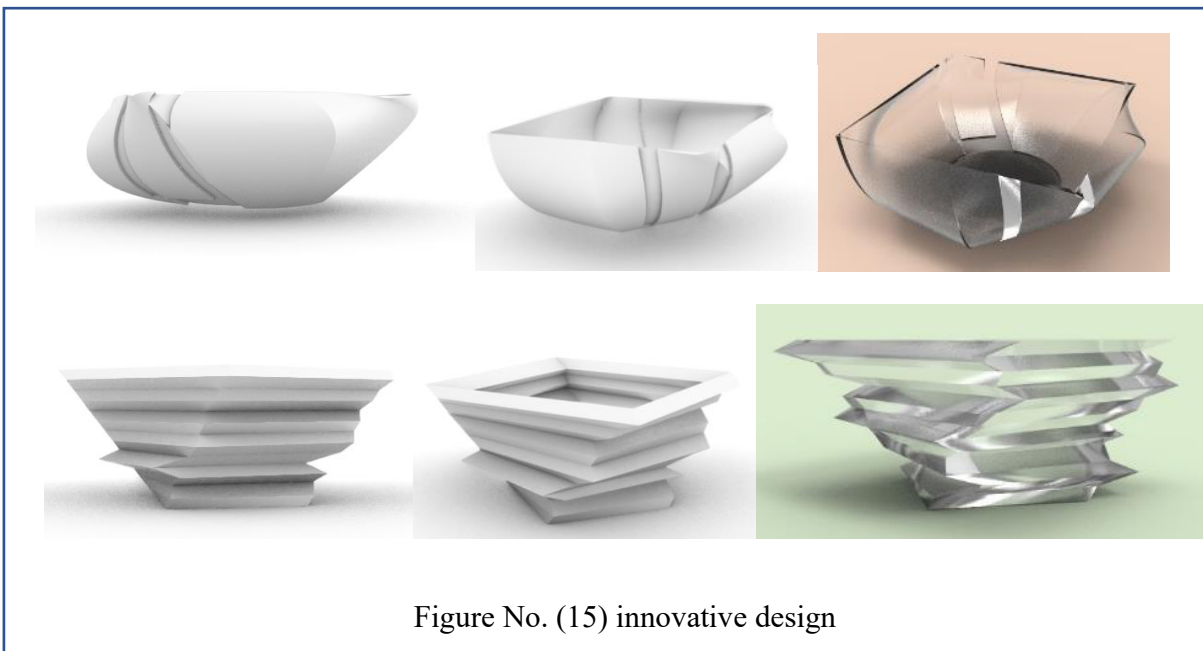
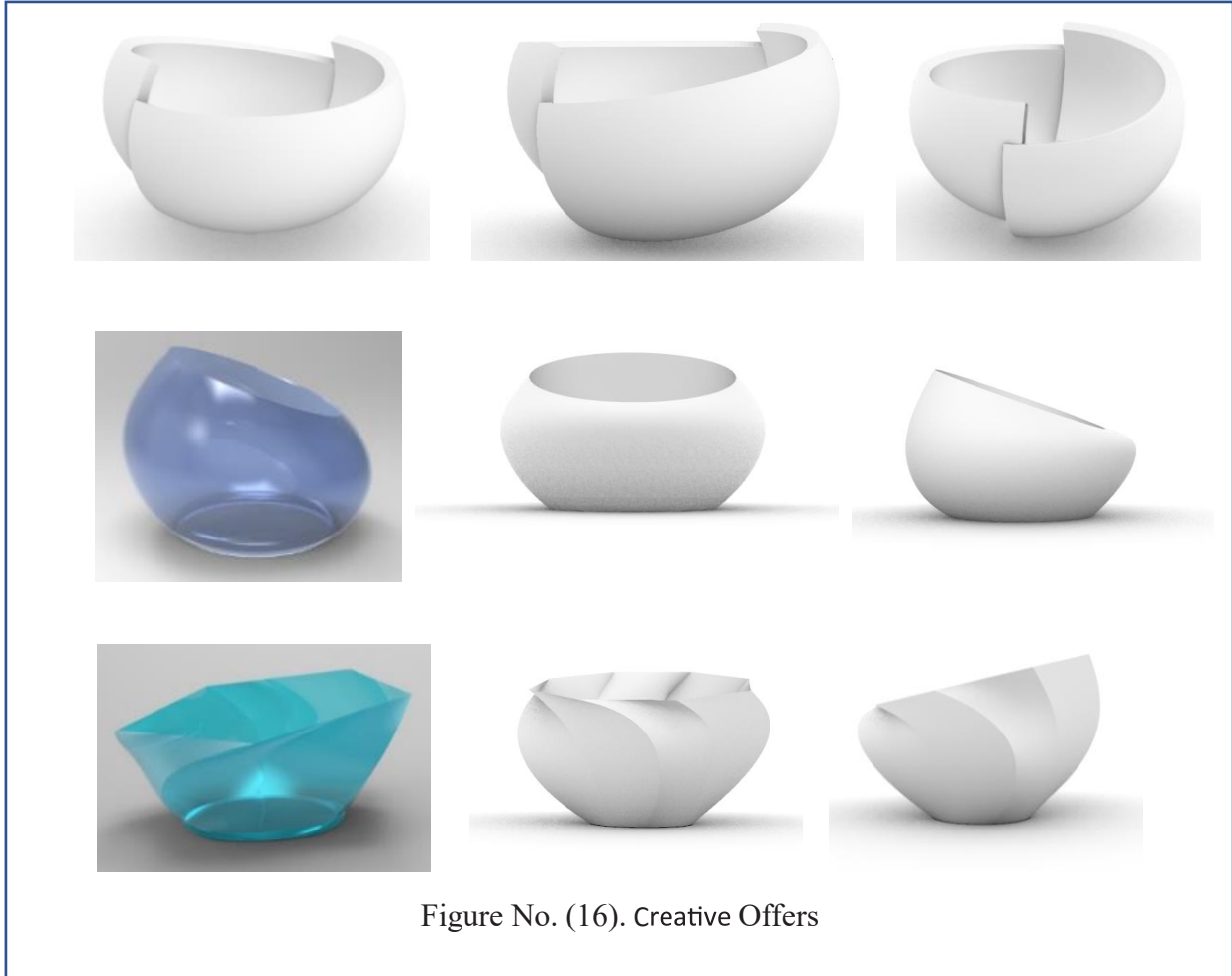


Figure No. (15) innovative design

3-3- Creative Offers

Ability to transform new or existing techniques into new products by focusing on research and development. As in Figure No. (16).



3-4- Service (Added Value)

Providing value-added services for the new glass product (and by cutting and sticking with different materials such as UV material to get more than one product from a single mold), this gives a variety of products and achieves economic value and helps in marketing them, as it can be introduced to the market in the form of sets (method creativity) used in interior design as in Figure No. (17), (18), (19)

Frist design:

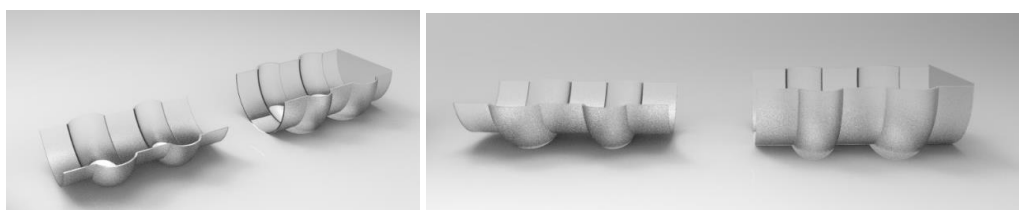
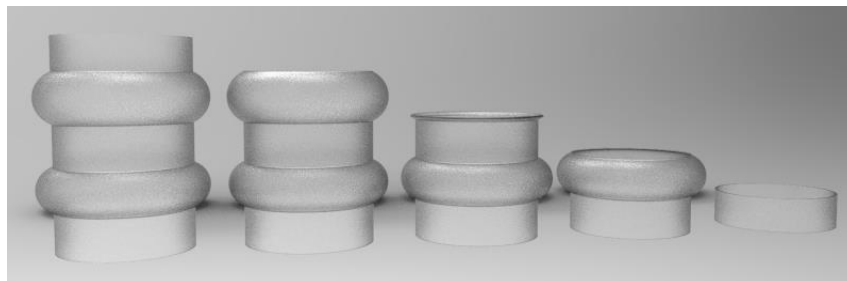
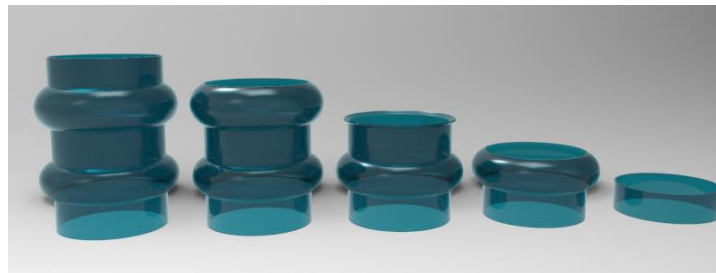
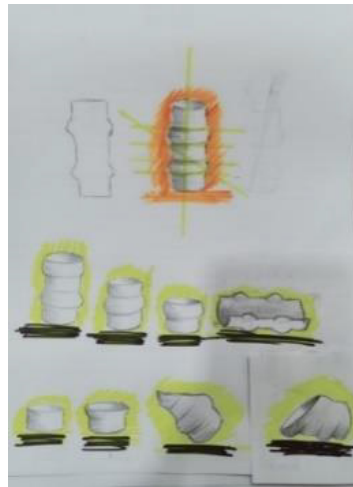


Figure No. (17) Glass Products from cutting and pasting with UV

Second Design:

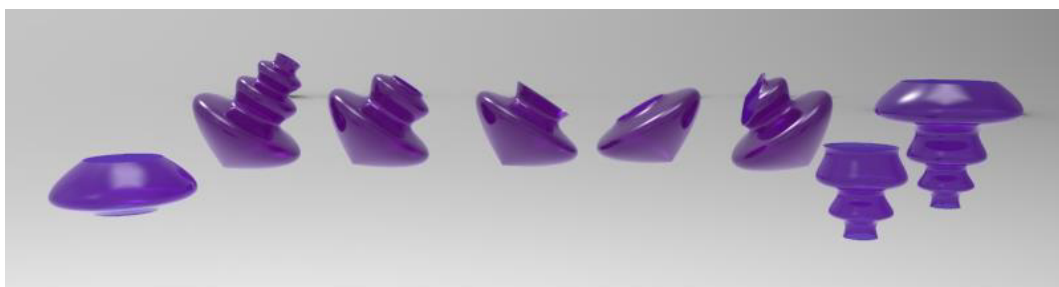
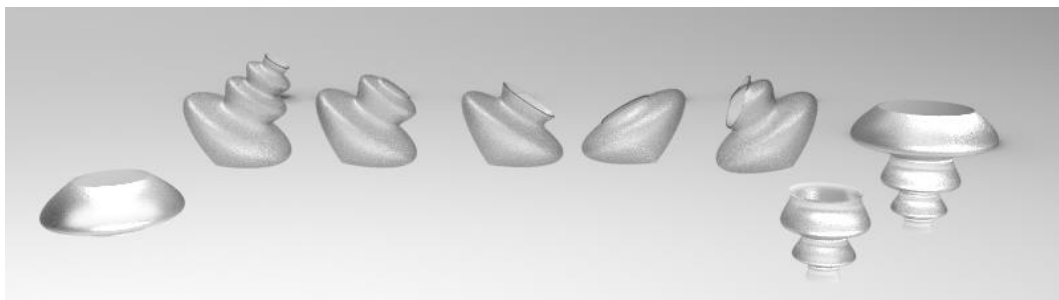
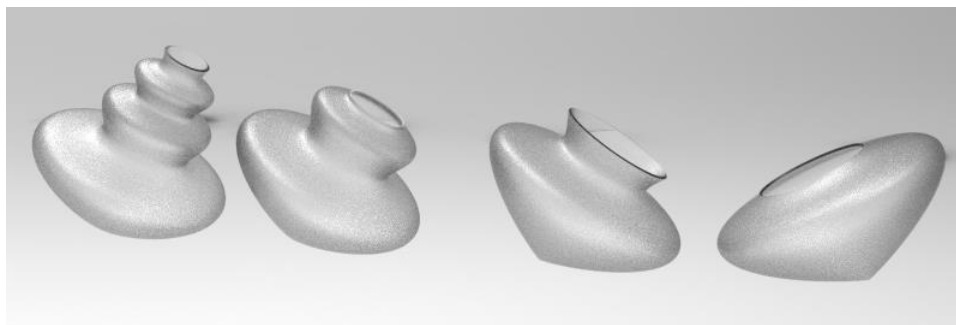


Figure No. (18) Glass Products from cutting used a s sets

Third design:

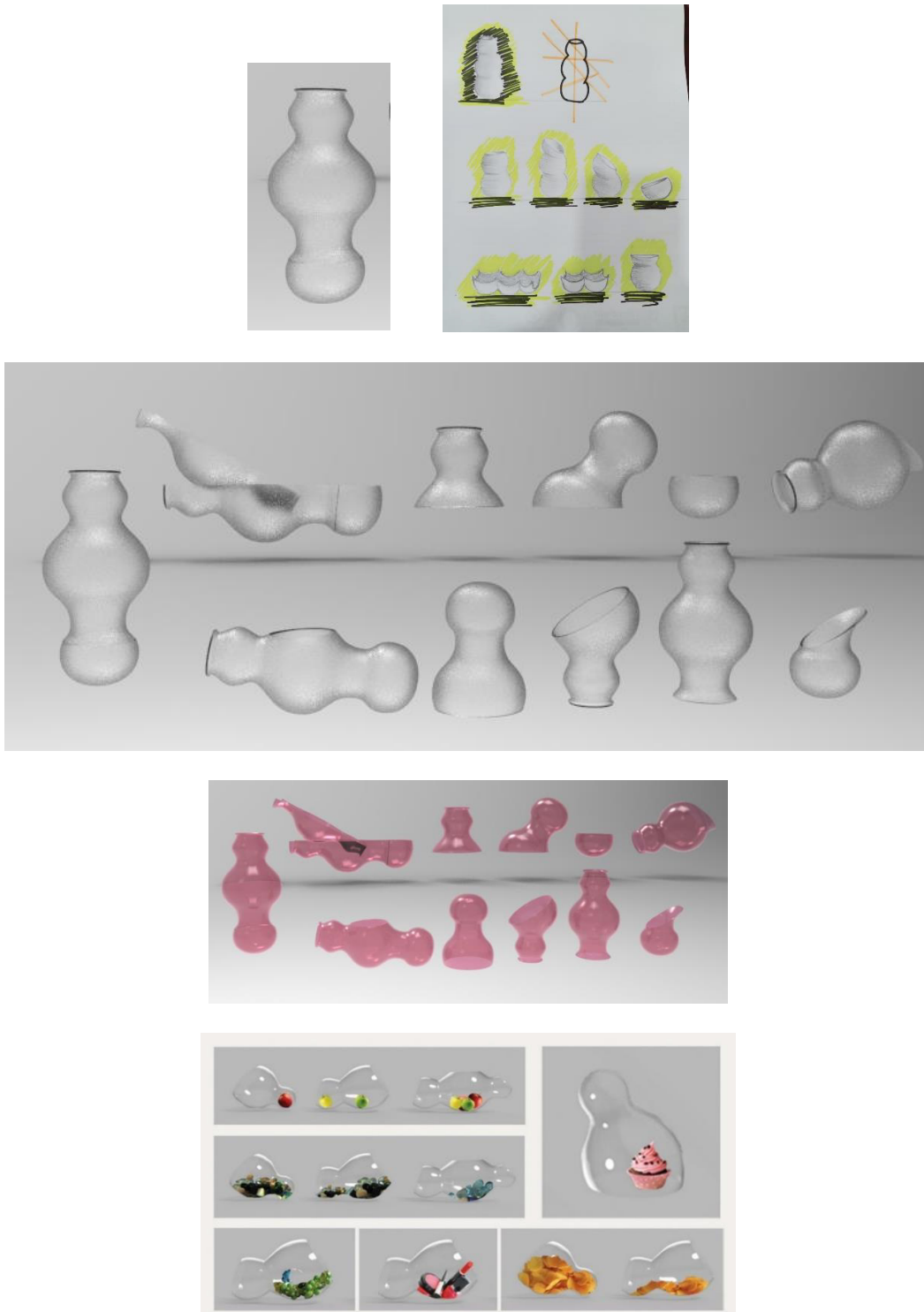


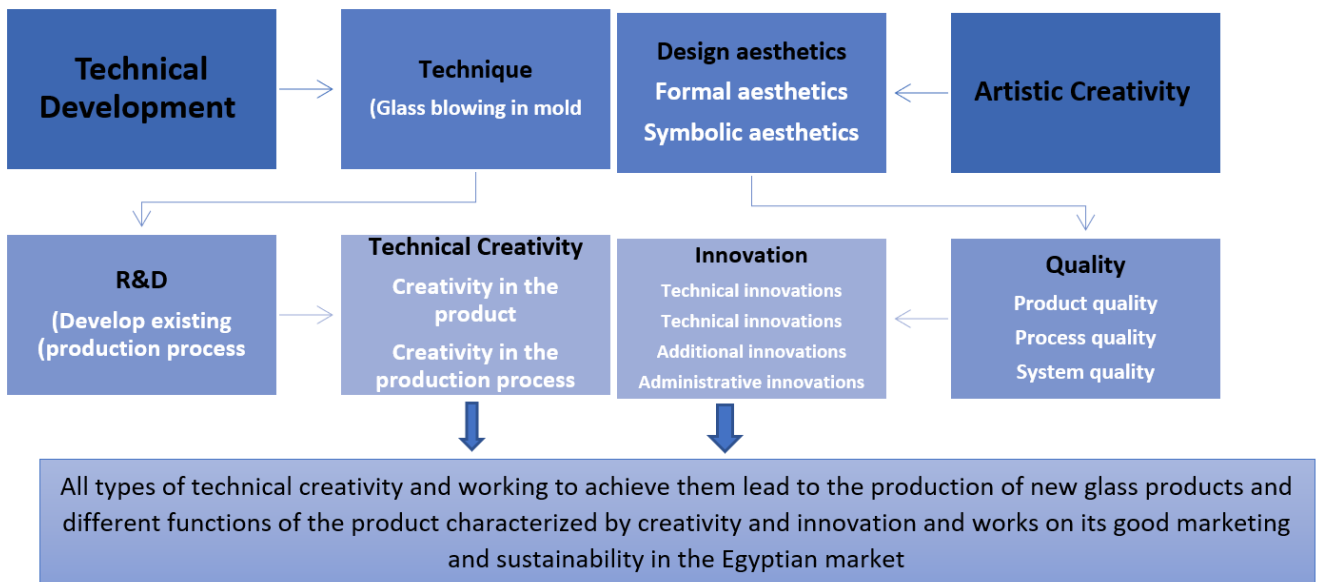
Figure No. (19) Glass Products from cutting by saw used as sets

4. Results

1. There is a common relationship between creativity, innovation, and design. Through the Department of Research and Development, creative ideas can be transformed into designs through innovation.
2. The initiation of creativity and innovation processes for the glass product will affect production processes and the quality management system in general.
3. An institution that adopts a culture of technical creativity that makes it produces distinctive products of high quality, which achieves a competitive advantage over others.
4. The glass product varies by offering different shapes and functions to it.
5. When glass products are similar in price and functionality, the glass product with aesthetic design is the influencing factor, so glass production organizations must pay attention to design aesthetics since appearance has a significant impact on consumer preferences.
6. Using unconventional glass production tech-

niques help enrich products and set them apart from others

7. The researcher also reached through the applications to
 - Designs with (creativity of the concept) as it created new jobs on the market, which makes it achieve a competitive advantage over others such as (food cover / flower containers / nuts bowl).
 - Designs (presentation creativity) by designing new products that are different in appearance, needs, or functions.
 - Designs (creativity in production and method) through products that are innovative and distinguished (unconventional nozzles) and can also be presented in the market in the form of (Sets).
 - (Technology innovation) by obtaining more than one product of the same mold, which reduces the cost of production on the factory and increases profitability.
8. From the above, the relationship between artistic creativity and technical development of the glass product can be shown as follows:



5- Recommendations:

1. The research recommends the necessity of establishing a special section for creativity and innovation within every glass establishment in Egypt.
2. Adopting improvement and development as a continuous process, which supports the process of technical innovation.
3. Opening the horizons of creativity in the decisions of industrial glass design and communicating with the owners of institutions and factories to adopt some of them.

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