




A Study of Framework Development and Research of Jewelry Design, Based on Pattern Egyptian Culture (Lotus Flower) Used in Culture Product Design

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Abstract. Industrial design has played a crucial role in the integration of cultural elements into products and in increasing their cultural value in the competitive global marketplace. Nowadays there is a shortage of design studies and products that dealt with the Egyptian styles. Even though, the ancient Egyptian civilization is full of patterns and symbols that we can exploit, develop, and manufacture with different products. Lotus flower one of the most important symbol in the antient Egypt, it was associated with Egyptian gods because of the way in which the Lotus emerged from the water. The Ancient Egyptians believed that Lotuses were symbolic of creation, rebirth, strength. This article aims to clarify the true meaning of the Lotus flower pattern and how to transform this cultural feature into innovative jewelry designs under the framework of culture-oriented design. The main contribution of this work is to explore the old Egyptian styles and convert them into designs that are compatible with this era to spread the culture attractively. This process is done firstly through a detailed explanation of this pattern, this phase consists of cultural features, literature reviews, and concepts. Secondly, used some design programs such as Auto CAD and Render software to transform this pattern into jewelry designs. Finally, this paper establishes a cultural product jewelry design model that is meant to provide designers with valuable research that can be applied in many artistic fields like clothing design, fashion, decoration, and modern designs for this pattern.

Keywords: Cultural product · Design framework · Egyptian culture

1 Introduction

In the global market-local design era, connections between culture and design have become more closely. When we think about the “globalization”, we must consider “localization” for the market first (Designers need a better understanding of cross-cultural communications not only for the global market but also for the local cultural) [1]. Design and transformation local cultural features into products appear to be more and more important in the global market. Cultural features are unique characters to be embedded

into a product both for the enhancement of its identity in the global market and for the fulfilling of the individual consumer's experiences [2]. Also, using local features in design fields as a strategy to create product identity worldwide, the designers have noted the importance of associating products with cultural features to enhance the product value [3].

The field of industrial design has played an important role in embedding cultural elements into products and in increasing cultural value in the global competitive product market. Therefore, designing a product with local features to emphasize its cultural value has become a critical issue in the design process, further explore how to integrate the local cultural features into the product design. Also, try to build a conceptual framework of design transformation [4]. The design is an important medium of communication, which is popularized in the culture of the earth to integrate the historical value with modern life. To make some contributions to the inheritance of Egyptian cultural heritage and the economic value of cultural products, the traditional Lotus flower pattern can be applied better to the cultural product design for modern life [5]. This paper aims to design the Egyptian culture as the Egyptian civilization is full of distinctive and wonderful patterns where the goal is to apply the famous Lotus flower pattern in ancient Egypt in modern jewelry designs, as jewelry making was very important in ancient Egypt. By creating modern jewelry designs to convey cultural traits in the form of a modern product [6], Through creating a framework for design and consumer opinions, also using CAD programs to transform the design into products closer to reality.

Culture as a form of creative resources can assist designers in catalyzing innovative product design. Based on the research conducted by Gaidysheva and Parnyakov, they illustrate the development of decorative handicrafts through the indigenous peoples of the far east, where the author incorporated elements of the Nanai shaman's culture into the design of modern things and transformed the culture into a cultural product [7]. Based on the research of Professor Rung-Tai Lin, he stated that connections between culture and design have become increasingly evident in this global market-local design era. Besides, designing culture into products will become a trend in the global market. The researcher aims to propose a cultural product design model, where the author transferred Taiwan's culture to modern design and product elements to enhance its design value as the results presented demonstrate the intertwining experience between design and culture. There is a need for a better understanding of cross-cultural communication to participate in the global market and develop a local design. As a result, cultural issues become essential for product design in the global economy. The intersection of design and culture becomes a vital issue making both local design and the global market worthy of further in-depth study [8]. Based on Ser's research, the researcher stated how to transform cultural features into design elements under the framework of culture-oriented design. The researcher plays a role as an explorer to generate a product design based on the cultural product design model [9]. Other researchers used gardenia flower as a basis to transfer the local culture of Taiwan's community (Fuzhou area) into a series of gardenia-inspired cultural products, where three levels of design thinking were used to translate gardenia and design cultural products based on it, this study incorporated code design methods and the three levels of design thinking to develop cultural product designs [10].

2 Culture Features and Product Design

2.1 Three Cultural Levels

Culture generally refers to patterns of human activity and symbolic structures, Moreover, culture has been described as the evolutionary process that involves Language, customs, religion, arts, thought, and behavior [11, 12]. From a design point of view, suggested a multi-layered cultural architecture including “artifacts”, “value” and the ‘basic assumptions’ that defined key design features such as ‘functional’, Aesthetic and symbolic [13, 14], developed a framework for the study. Cultural objects have three special levels: the external “physical” level, the intermediate “behavioral” level, and the internal “intangible” level. As shown in Fig. 1, the culture can be categorized into three Layers: (1) Physical culture, including food, clothing, and transportation relevant things, (2) Social or behavioral culture, including human relations and social organization, and (3) Spiritual or idealistic culture, including art and religion [15]. These Three culture layers can be installed in the above three Leong culture levels., and they can be three design features it has been defined as follows: (1) The internal level that contains special content such as stories, emotion, cultural characteristics, (2) the intermediate level that contains the function, and operational concerns, usability, and safety, (3) the external level dealing with color, texture, shape, decoration, surface pattern, line quality, and details.

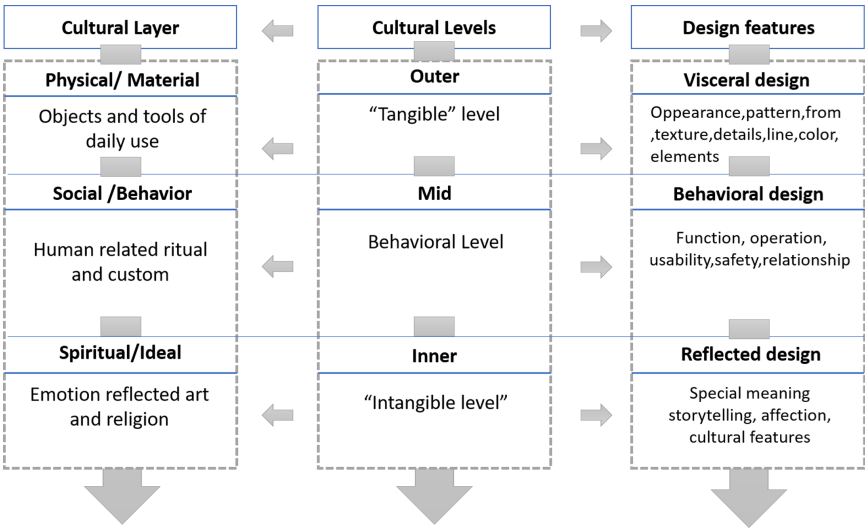


Fig. 1. Three layers and levels of cultural objects and design features [8].

2.2 Fundamental Cultural Resources of Ancient Egyptian Civilization

Designing culture, improving quality, and adding additional value to the product is essential for designing a cultural product and improving product performance. Egypt has strong potential to innovate and develop important cultural products [16]. Three basic resources for innovation and development as follows (1) The culture of the ancient Egyptian people in the ancient Egyptian civilization, (2) The ancient Egyptian civilization arose on the banks of the Nile River nearly 7,000 years ago and is the first and oldest civilization in history, (3) The multiplicity of patterns, symbols, and arts in which the ancient Egyptian artist created crafts and handicrafts that the ancient Egyptian civilization was famous for, such as the manufacture of jewelry and the multiplicity of Egyptian antiquities that are present in all museums inside and outside Egypt. Among these three resources [17, 18], the ancient Egyptian culture already has a unique and great inspiration with its primitive arts and handicrafts, therefore, the investigation of the ancient Egyptian culture as it has different arts and styles that distinguish it from any culture in the world [6]. For example, the art of making jewelry in which the ancient Egyptians excelled, as jewelry was an important method through which the ancient Egyptians tried to attract the attention of the gods (according to their belief). They believed that the more jewelry they wore, God's attention increased to them. As the ancient Egyptian culture and arts in Egypt are wonderful and their beautiful handicrafts have great potential to enhance the value of product design and thus increase its recognition in the global market [19].

2.3 Overview of the Lotus Flower Pattern and Jewelry Making in Ancient Egypt

The flower was known as Seshen and was associated with Egyptian gods. Because of the way in which the lotus emerged from the water, the Ancient Egyptians believed that lotuses were symbolic of creation, rebirth, strength [20]. The lotus flower was sacred in the life of the ancient Egyptian since the beginning of the ancient Egyptian history in the third millennium B.C., the lotus flower was not an aesthetic decorative element that the Egyptian depicted on the walls of temples only or used in the manufacture of perfumes or jewelry but was the title of creation among the ancient Egyptians [21]. The manufacture of jewelry was very important in ancient Egypt, and the evident greatness of the ancient Egyptian civilization in the handicrafts and artifacts. Jewelry was an important means by which the ancient Egyptians tried to attract the attention of their deities (according to their belief) [6]; they believed that the more jewelry they wore, God's attention increased to them. In ancient Egypt, women, men, and children, from poor families to royalties, wore the best colored jewelry they could afford, the materials from which the jewelry was made differ according to their wealth and stature, however, necklaces, bracelets, neck collars, pendants, earrings, arm, rings, and amulets adorned their necks, wrists, ears, fingers, and ankles [22, 23]. One example of this is the amulet, many ancient Egyptians wore jewelry for many different reasons, as shown in Fig. 2.

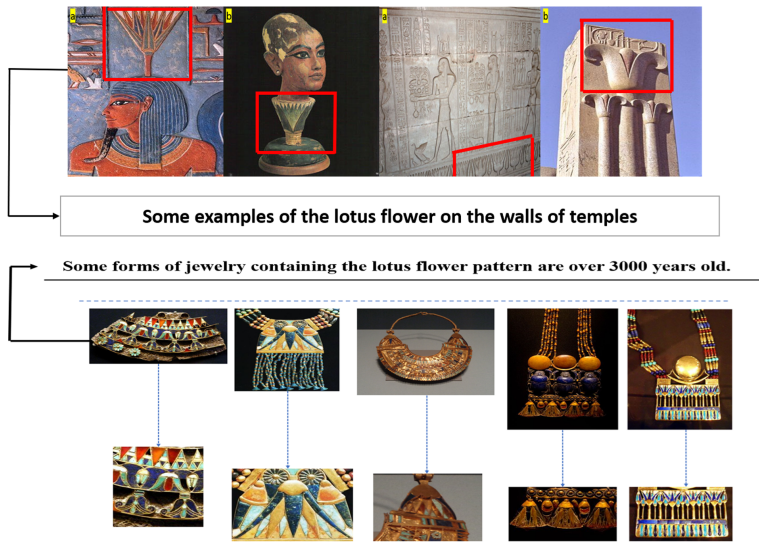



Fig. 2. Illustration of examples of the Lotus flower in ancient Egyptian life and ornaments



2.4 Cultural Attributive Analyses and Design Concepts Table

In Egypt, cultural has awareness initiatives to promote the Egyptian product attracted the design research community and then the handicrafts in ancient Egypt that disappeared due to the lack of a new generation of cultural craftsmen, [13] the transfer of local culture to younger generations has been retreated, studies show positive results, as Egyptian culture is a great value and deserves to be incorporated into the current daily products through the new design [24]. At this point, we focused on collecting data from the culture in terms of materialism, habits, and spirituality, then the data collected was matched with different data based on the civilization, the name of the object, the type, the image, the material, the color [19], the feature, the function, the style, the shape of the rules form composition, Cultural importance. These elements covered three levels of cultural and basic characteristics. [25]. We suggest that this information serve as a reference for designers during the product design phase. Table 1 illustrates an example of cultural design features.

Table 1. Example of a cultural attributive analyses and design concepts table

Analysis of Cultural Attributes		Interpretation of Culture	Features of Product	Category of Products
Cultural	Ancient Egyptian civilization	Wear, status symbol, jewelry decorative, arrangement also followed special rules, symmetrical	shading effects, decorative, extension of personal particularity	jewelry, Ornament, fashion, furniture
Object	Necklace a lotus flower			
Type	Ornament			
Image				
Material	glass beads shell pieces metal• gold.			
Color	The solid colored beads in blue, green, white and black. The shell pieces are white.			
Characteristic	These were precious jewelry worn by kings and queens and written on it the name of her lamb and buried with him when he died, and it was always made of precious metals such as gold and precious stones			
Operation	The manifold stones were often used together, such as in multiple-strand ornaments. were worn at the chest or around the neck.			
Pattern	Each type of traditional bead had a different name, and associated legend.			
Form grammar	The order of arrangement also followed special rules.			
Form construct	The lower part is characterized by its large size and always contains a symbol of the gods and mostly the lotus flower, and it consists of multi-colored beads, and the lower part is the precious and unique part of completely decorated with pieces of green and blue gemstones, and made of gold			
Formation	This neckline is a ribbon consisting of a main part in the middle with three or more strands of chains. The branches have large colored beads and small beads and shells of one color.			
Using scenario	This type of neck necklace will only be worn by the king at ceremonies And when he dies, he is placed with him			
Cultural content	They would be used as wedding gift to the bride . In addition, also were believed to bring luck, And protection.			

Sketch of Design Concept as Metaphor, Features of Product: extension of personal particularity, jewelry, wear



3 Methodology

This research consists of two parts: primary data and secondary data. The primary data was conducted on the study of the lotus flower pattern and the analysis of this pattern with the expectation that it will be a framework for the design process. Secondary data we Are practicing design and creating a cultural product based on the design framework, process, and design concepts through jewelry design CAD software [26].

3.1 Design Framework and Process

Culture plays an important role in the field of design, and cultural design will become a key point in design evaluation in the future. Incorporating cultural features into the product design process will become a new design trend in the global market, [27]. Apparently, we need a better understanding of cultural communications not only for taking part in the global market, but also for developing local design, the cultural product design is a process of rethinking or reviewing the cultural features and then redefining them to design a new product to fit into society and satisfy consumers through culture and esthetic. [28]. Designing new products by adding unique cultural features would not only benefit economic growth, but also promote unique local culture in the global market. Therefore, transforming cultural features into a cultural product becomes a critical issue. [14] In order to facilitate the understanding of the cultural product design process, The author has suggested a framework and process are proposed for combining consumer attitudes, cultural levels, cultural attributes, transformation, product semantics and design features as shown in Fig. 3. A good understanding of the cultural attributes will benefit articulating the context between the culture and product design and therefore accelerate concept development, based on the cultural product design framework and process, the cultural product is designed using scenario and semantics approaches. In a practical design process four phases are used to design a cultural product, namely: definition (telling a situation), knowledge (setting an objective), fulfilment (writing an analysis), and Implementation (designing a product) as shown in Fig. 3, In addition, consumer needs, cultural content and design theories.

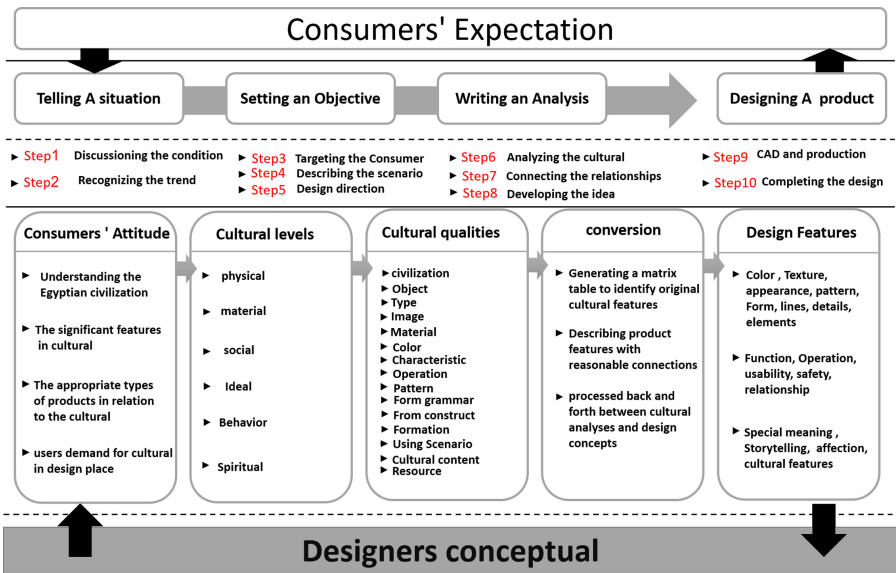


Fig. 3. Design framework and process for cultural products.

Ten steps of design procedure would provide designers or students a systematic method to designing a cultural product. The four phases and ten steps of the cultural product design process are further described accordingly as follows:

Definition/Telling a Situation:

1. Discussing the condition: Understanding cultural products through discussions. Designers must have a clear understanding of design aspirations and develop of attributes hierarchy.
2. Recognizing the trend: Based on cultural attributes, Integration of technological applications into the design of the new product.

Knowledge/ Setting an Objective:

3. Targeting the consumer: Explore the consumer community to define a product image using meaning and style derived from the concerns of the features of culture.
4. Describing the scenario: this step allows designers to describe scenarios of users who prefer a particular style and identify with the features, meaning, category, and appropriateness of the product.
5. Design direction: this step establishes a design specification, which will identify the goal, function, target group, and limitation of the design.

Fulfilment/ Writing an Analysis:

6. Analyzing the culture: based on cultural layers, generate a matrix table as shown in Table to identify original cultural features including civilization object, type, image, material, color, characteristic, operation, pattern, form grammar, form construct, formation, using scenario, cultural content, and resource.
7. Connecting the relationships: describe product features and develop a product with these cultural attributes. The analysis and synthesis will be processed back and forth between cultural analyses and design concepts as shown in Table.
8. Developing the concept: this step is the concept development and design realization, to transform the cultural meaning into a logically correct cultural product.

Implementation/Designing a Product:

9. CAD and production: in this step we used the CAD design software to form a surface by drawing lines, then formed a body by these surfaces we got.
10. Completing the design: examining the details and integrity of the cultural product as product features, supply cultural attributes to transform them reasonably into the product performance.

3.2 Quantitative Analysis

Design a questionnaire about creating a cultural product in the form of modern jewelry and consumers' awareness of the ancient Egyptian culture in designing a cultural product.

The questionnaire design perceptions regarding three aspects- appearance, function, and emotion. Viewer and consumer perceptions were identified from survey results to design-related cultural products, The questionnaire design is shown in Table 2, and the conclusions are as follows:

1. People who respond to attitudes towards ancient Egyptian culture believe that products with designs of Egyptian culture can enhance positive qualities and value-added value in life and competitively increase product value in the market.
2. People who respond to the most important features of the ancient Egyptian culture agree on the following order of importance: jewelry design, decoration, clothing design as these parts give a unique style to contemporary product and design, as jewelry, decoration and clothing design are among the favorites of most consumers. Because these parts are related to fashion and in our time, they represent great importance to most people and a product that facilitates exchange between people.
3. Topics that respond to appropriate product types in relation to ancient Egyptian culture the culture believes that jewelry, fashion decoration, and handicrafts, innovation will be improved through the unique style and contemporary design.
4. The topics that respond to users' demand for the ancient Egyptian culture in place of design are cultural features, texture, shape, color.

Table 2. Questionnaire design for lotus flower-inspired cultural products

Dimension	Operational aspect	Question
Tangible level	Perceptions of appearance	Q1. Does this product appropriately use the outer shape of the Lotus Flower to form its overall form? Q2. Can these products clarify the culture meanings of the Egyptian civilizations? Q3. What are the appropriate products that show the ancient Egyptian culture and can spread quickly?
Behavioral level	Perceptions of function	Q4. Do the functions of this product fit the requirements of modern individuals? Q5. Are these products look suitable for use? Q6. Are these products with Egyptian cultural designs can increase the value of the product?
Intangible level	Perceptions of emotions	Q7. Does this product touch you emotionally? Q8. Do you like these new products designs?
Assessment level	Overall perceptions	Q9. Do you find these products creative and ingenious? Q10. Do products with Egyptian cultural designs could increase the value of product?

The study used a questionnaire to analyze and compare perceptions and feelings regarding the lotus flower- inspired cultural product designs. The questionnaire results may serve as a reference for future studies in designing related products.

4 Design Practices in Innovation Jewelry Designs

Based on the study stage, we now propose a cultural product design process, which proves the effectiveness of this systematic approach in designing culture. The design practice in this study is the result of integrating literature reviews and design concepts from the ancient Egyptian civilization, and creating cultural products related to life now [29]. Despite the multiplicity of the ruling families, the jewelry industry in Egypt was a very important and distinctive industry in each of these families, and the lotus flower pattern remained engraved on these jewelry, as it represented an important pattern in the lives of Egyptians as it was involved in many industries such as the perfume industry. Moreover, these are distinctive features to demonstrate their application in the design of cultural products that consumers can easily identify, Through the design framework and design practices, the culture of the original cultural object and the analysis of cultural attribution were recorded in the design concepts table (Table 1), and cultural products were created in the form of jewelry bearing the cultural features of the original being through the steps that we mentioned and explained before, And we created three designs inspired by the Egyptian lotus flower [30], and it is a simple product that meets the requirements of the consumer and thus is a product that is able to compete in the global market and carries the cultural features of the original organism, and finally the practices were completed using CAD programs to simulate the display of the actual product, as shown in Fig. 4, where lotus flower jewelry was a valuable thing and was worn by royalty and used as gifts on occasions, and the stones used in the manufacture of these jewelry were based on the status of the wearer, and the social status, using design practices three designs were created in the form of jewelry (Figs. 5 and 6).

Where the first figure expresses the shape of a clock inspired by the shape of the lotus flower in a modern design that is able to compete in the global market, and the second shape expresses the lotus flower in the form of a simple necklace, and the third shape also expresses the lotus flower also, but in a different way that opens and closes in the form of a necklace, As cultural products are innovated using cultural features as examples to explore the relevance of the design reference to cultural features, it provides designers with a valuable reference for creating successful products.

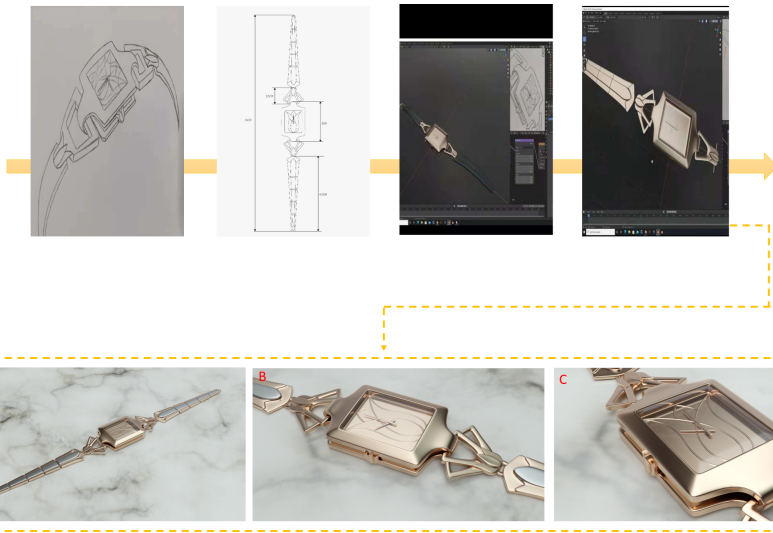


Fig. 4. The first design, wristwatch, innovating the design from Lotus flower by using Render software.

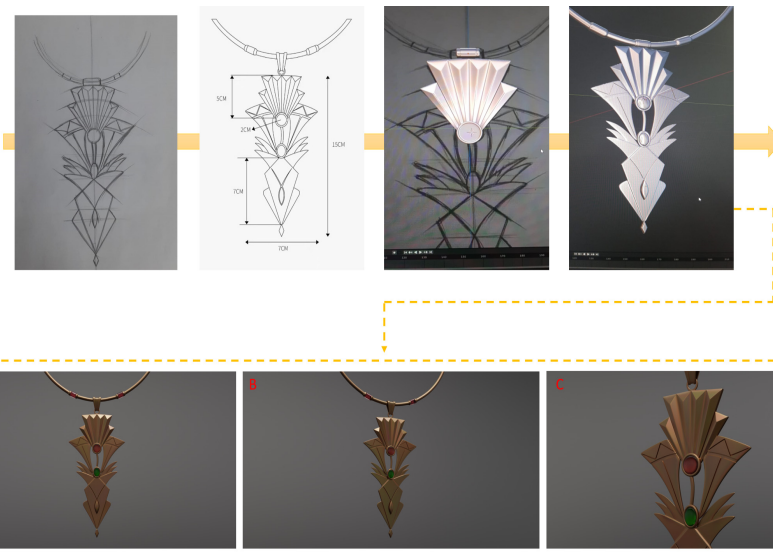


Fig. 5. The second design, necklace, innovating the design from Lotus flower by using Render software.

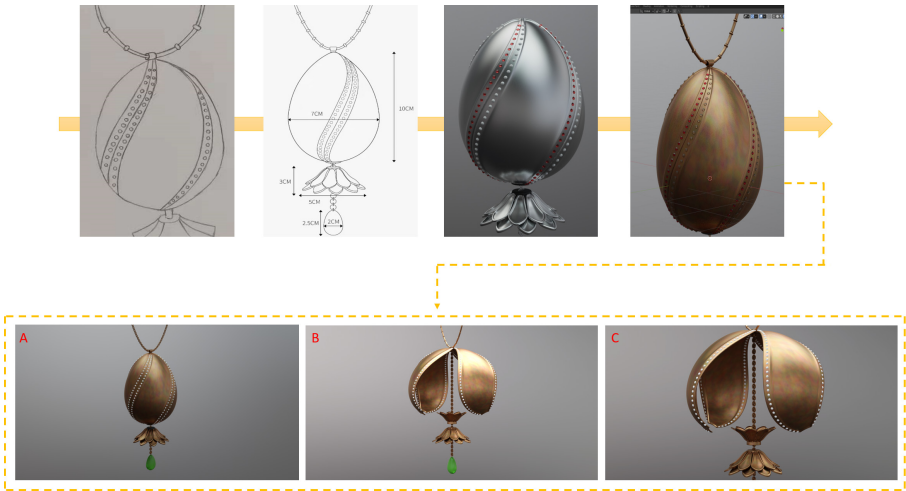


Fig. 6. The third design, necklace (chain), innovating the design from Lotus flower by using Render software.

4.1 Design Practices in Innovation Cultural Product Designs

The framework can also be applied outside jewelry design for other cultural products by incorporating cultural features into the product design process, combining consumer needs, cultural levels, design theories. Also, applying the four stages of cultural product design, namely definition, knowledge, fulfillment, and implementation, where the author implemented the framework on some other products, creating cultural products capable of competing in the global market. Figure 7 shows some cultural products inspired from the Lotus flower designed by using Auto CAD and Render software.

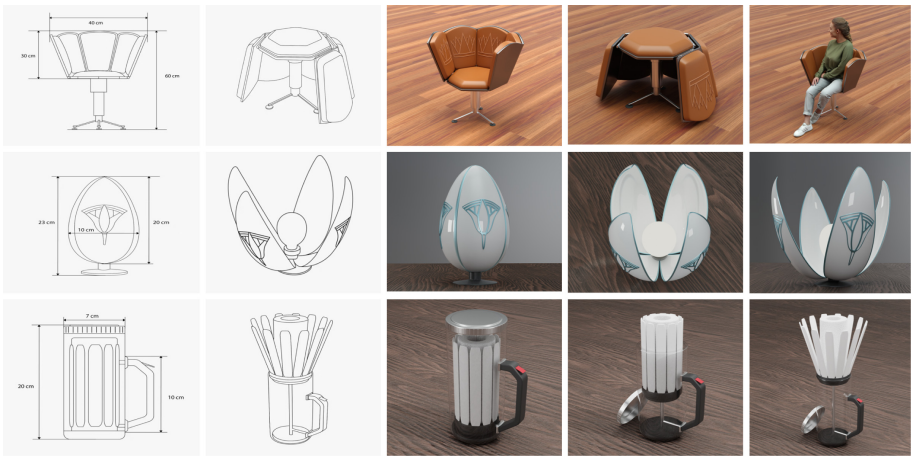


Fig. 7. Some cultural products are inspired by the Lotus flower pattern (chair, lighting unit, and water filtration cup, appeared from top to down).

These designs reveal the cultural form of the lotus flower in the ancient Egyptian civilization, according to the design framework and process. Modern products were created and designed using culture as examples to explore the feasibility of design reference from cultural features, providing designers with a valuable reference for successful cultural design.

Descriptive of the Quantitative Analysis

The questionnaire survey was conducted in June and July of 2021, and the participants consisted of university students, teachers, artists, designers, and others. The questionnaires were presented in Google Forms, where the participants completed the questionnaires based on their understanding of the questions. The questionnaire measured four dimensions; each dimension contained two or three questions; an analysis of the questionnaire participants demonstrated the following distributions. (a) Regarding gender, 70 participants (72.92%) were women, and 26 (27.08%) were men (b) Regarding age, 30 participants were (30.92%) aged 20–40 years, 25 (25.77%) were aged 30–40 years, 22 (22.68%) were aged 31 years or older, and 20 (20.63%) were aged 30 years or younger. (c) Regarding their professional backgrounds, 25 people (23.36%) had an art-related background, 17 (15.89%) had a design-related background, and 65 people (60.75%) had other learning backgrounds. The participants' opinions about the lotus flower-inspired cultural products were as follows:

- Lotus flower watch: In terms of appearance, 70.2% of the participants agreed that the product used the appearance of the lotus flower. Concerning function, 59.3% of the participants agreed that the product looked beautiful and unpretentious, 88.2% of the participants agreed that the product was convenient to use, and 70.8% of the participants agreed that the functions of the product met the needs of modern people. Regarding emotional perceptions, 52% of the participants agreed that the product displayed cultural meanings, and 65% of the participants agreed that the product touched them emotionally. With respect to the overall assessment, 64.4% of the participants agreed that the product was creative and ingenious, and 80.2% of the participants agreed that they were fond of the product.
- Lotus flower necklace: In terms of appearance, 71.2% of the participants agreed that the product used the appearance of the lotus flower appropriately to form its overall appearance. Concerning function, 80.5% of the participants agreed that the product looked beautiful and unpretentious, respectively; 56.9% of the participants agreed that the product was convenient to use, and 60.6% of the participants agreed that the functions of the product met the needs of modern people. Regarding emotional perceptions, 74.1% of the participants agreed that the product demonstrated the fun of history, 60.7% of the participants agreed that the product displayed cultural meanings, and 59.8% of the participants agreed that the product touched them emotionally. With respect to the overall assessment, 59.1% of the participants agreed that the product was creative and ingenious, and 67.6% of the participants agreed that they were fond of the product.

- Lotus flower chain: In terms of appearance, 60% of the participants agreed that the product used the appearance of the lotus flower appropriately to form its overall appearance, concerning function 80% of the participants agreed that the product looked beautiful and unpretentious, 60.8% of the participants agreed that the product was convenient to use, and 57.9% of the participants agreed that the functions of the product met the needs of modern people. Regarding emotional perceptions, and 77.6% of the participants agreed that the product touched them emotionally. 62% of the participants agreed that the product displayed cultural meanings, with respect to the overall assessment, 65.2% of the participants agreed that the product was creative and ingenious, and 63.5% of the participants agreed that they were fond of the product.

5 Conclusion and Recommendations

The diversity of Egyptian styles and the uniqueness of the ancient Egyptian culture provides a potential application in the field of design. By enhancing the original meaning and images of cultures and making use of new production technology. The culture of the ancient Egyptian civilization in Egypt will have great potential to enhance the value of product design, thus, increasing the identification of Egyptian products in the global market. The framework design and the development process of the innovation of cultural products are established through the analysis of cultural attribution and the table of design concepts, through the integration of all the information. We provided a method for designing culture through cultural features and product features the importance of a product with cultural features to enhance the value of the product and meet the needs of the user. Ancient Egyptian patterns were simple symbols but had great meanings, so the investigation of the ideal product for the consumer always produced as things to use the results showed the potential for enhancement and uniqueness through product design, for cultural creativity and for products inspired by culture.

The study results and recommendations for future research directions are as follows.

- This study included cultural analyzes, design concepts, literature review, and through the integration of all this, we provided a framework that combines cultural features, product features, creating jewelry designs, also the importance of the product with cultural features to enhance the value of the product and meet user needs.
- Future studies can reference this study to devise framework to design their cultural product and apply the framework in the creative design of cultural products, assets of intangible value in Egypt, such as historical buildings, unique handicrafts, and historical monuments. All of this will preserve the Egyptian culture enable the development of cultural products, facilitate local industry development, and driving the regional economy.

References

1. Gilal, F.G., Zhang, J., Gilal, N.G., Gilal, R.G.: Integrating self-determined needs into the relationship among product design, willingness-to-pay a premium, and word-of-mouth: a

- cross-cultural gender-specific study. *Psychol. Res. Behav. Manag.* **11**, 227–241 (2018). <https://doi.org/10.2147/PRBM.S161269>
2. Hung, Y.-H., Lee, W.-T.: The need for a cultural representation tool in cultural product design. Springer Singapore (2018). <https://doi.org/10.1007/978-981-10-8189-7-9>
 3. Yousif, T.: The reflection of culture features on product design Tamer Yousif. *Online J. Art Des.* **8**, 215–222 (2020)
 4. Shin, M.J., Cassidy, T., Moore, E.M.: Design reinvention for culturally influenced textile products: focused on traditional Korean bojagi textiles. *Fash. Pract.* **7**, 175–198 (2015). <https://doi.org/10.1080/17569370.2015.1045354>
 5. Kathy, J.: Secrets of the Ancient Egyptian Sacred Blue Lotus. pp. 1–3 (2015)
 6. Atherton-Woolham, S., McKnight, L., Price, C., Adams, J.: Imaging the gods: animal mummies from Tomb 3508, North Saqqara, Egypt. *Antiquity* **93**(367), 128–143 (2019). <https://doi.org/10.15184/aqy.2018.189>
 7. Gaidysheva, M., Parnyakov, A.V.: Design of applied and decorative art elements based on the example of Nanai shaman's culture. *Pacific Sci. Rev.* **16**, 140–147 (2014). <https://doi.org/10.1016/j.pscr.2014.08.025>
 8. Lin, R.T.: Transforming Taiwan aboriginal cultural features into modern product design: a case study of a cross-cultural product design model. *Int. J. Des.* **1**, 45–53 (2007)
 9. Ser, S.: On culture-oriented product design: a study to transform cultural features to design elements. *Int. J. Creat. Futur. Herit.* **6**, 163–197 (2018)
 10. Trapani, P.: Designing co-design: addressing five critical areas to increase the experience of participants and facilitator in a co-design session. In: Rau, P.-L. (ed.) HCII 2019. LNCS, vol. 11576, pp. 79–93. Springer, Cham (2019). https://doi.org/10.1007/978-3-030-22577-3_6
 11. Qian, J., Xiao, A., Xin, X., He, M.: Pattern primitive library construction and feature analysis of kirgiz textile pattern. *Human. Soc. Sci.* **7**(6), 191 (2019). <https://doi.org/10.11648/j.hss.20190706.11>
 12. HeMin, D.: Cultural creative product design from the perspective of chinese ancient ware modelling. *E3S Web Conf.* **179**, 02033 (2020). <https://doi.org/10.1051/e3sconf/202017902033>
 13. Lin, R., Cheng, R., Sun, M.-X.: Digital archive database for cultural product design. In: Aykin, N. (ed.) UI-HCII 2007. LNCS, vol. 4559, pp. 154–163. Springer, Heidelberg (2007). https://doi.org/10.1007/978-3-540-73287-7_20
 14. Chai, C., Shen, D., Bao, D., Sun, L.: Cultural product design with the doctrine of the mean in confucian philosophy. *Des J* **6925**, 1–23 (2018). <https://doi.org/10.1080/14606925.2018.1440842>
 15. Qin, Z., Ng, S.: Culture as inspiration: a metaphorical framework for designing products with traditional cultural properties (TCPs). *Sustain* **12**(17), 7171 (2020) <https://doi.org/10.3390/su12177171>
 16. Berk, G.G.: A Framework for Designing in Cross-Cultural Contexts: Culture-Centered Design Process a Dissertation Submitted to the Faculty of the Graduate School of the University Of Minnesota. pp. 1–287 (2013). <https://doi.org/10.11299/155725>
 17. Allen, J.P.: The ancient egyptian pyramid texts. *Anc. Egypt Pyramid Texts* **33**, 182–193 (2017). <https://doi.org/10.2307/j.ctt14jxv34>
 18. Troalen, L., Guerra, M.F., Maitland, M., et al.: Analytical study of the Middle Kingdom group of gold jewellery from tomb 124 at Riqqa. *Egypt. X-Ray Spectrom.* **48**, 586–596 (2019). <https://doi.org/10.1002/xrs.3026>
 19. Li, H., Yi, X., Chen, M.: Symbolic meanings of Pharaoh 's false beard in ancient Egypt. pp. 352–359 (2017). <https://doi.org/10.25236/ssah.2017.77>
 20. Hedegaard, S.B., Delbey, T., Brøns, C., Rasmussen, K.L.: Painting the Palace of Apries II: ancient pigments of the reliefs from the Palace of Apries, Lower Egypt. *Herit. Sci.* **7**(1), 1–32 (2019). <https://doi.org/10.1186/s40494-019-0296-4>

21. Al-gaoudi, H.A.: Painted ancient Egyptian mummy cloth of Khonsuemrenep from Bab EL-GASUS excavation: scientific analysis and conservation strategy. *Sci. Cult.* **6**, 49–64 (2020). <https://doi.org/10.5281/zenodo.3724852>
22. Ulusman, L., Bayburtlu, C.: Paradigm for art education; creation story of jewels, theme, design, artwork, 3D. *Procedia – Soc. Behav. Sci.* **51**, 284–288 (2012). <https://doi.org/10.1016/j.sbspro.2012.08.160>
23. Jassawalla, A.R., Sashittal, H.C.: Cultures that support product-innovation processes. *Acad. Manag. Exec.* **16**, 42–54 (2002). <https://doi.org/10.5465/AME.2002.8540307>
24. Efimova, A.: Masterpieces of Jeweller’s Art in the Egyptian Style Made by Cartier in the Period of Art Deco. vol. 103, 16–17 (2017). <https://doi.org/10.2991/iccse-17.2017.101>
25. Hu, Y., et al.: Transforming chinese cultural features into modern product design. In: Rau, P.-L. (ed.) *HCI 2020. LNCS*, vol. 12192, pp. 313–324. Springer, Cham (2020). https://doi.org/10.1007/978-3-030-49788-0_23
26. Siri wattanasakul, K., Boonyongmaneerat, Y., Chandrachai, A., Anuntavoranich, P.: Creating effective and innovative cooperation between Universities and SMEs: a case study of the Thai Jewellery industry for design skill development. In: *ISPIM Conference Proceedings*, pp. 1–15 (2020)
27. Hidayat, J., Tjakra, G., Darmawan, R., Dharmawan, C.: Hybrid Design Model in Cross Cultural Collaboration: Case Study - Contemporary Bamboo-Ceramic-Batik-Silver Crafts Made by Indonesian and Japanese Artists. pp. 394–399 (2020). <https://doi.org/10.5220/0008885703940399>
28. Gao, Y., Fang, W., Gao, Y., Lin, R.: Conceptual framework and case study of china’s womanese scripts used in culture product design. *J. Arts Human.* **7**(3), 57 (2018). <https://doi.org/10.18533/journal.v7i3.1363>
29. Johnson, M.J.: Art and architecture. *Brill’s Compan. Eur. Hist.* **9**, 350–389 (2016). <https://doi.org/10.1163/9789004315938-015>
30. Elhabashy, S., Abdelgawad, E.M.: The history of nursing profession in ancient Egyptian society. *Int. J. Africa Nurs. Sci.* **11**, 100174 (2019). <https://doi.org/10.1016/j.ijans.2019.100174>