Islamic geometric motifs in modular design for women clothes

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Abstract

Although a modular design which is one of eco-fashion innovation has been well known in Europe since the eighties (1980s) and early nineties (1990s) of the twentieth century, yet it does not receive enough attention and is still not noticeable in the fashion design community in Egypt. So, the importance of this paper lies in identifying this design method, and to what extent it can be used to develop women's fashion design. Also, this research paper aims to add this design style to academic studies and design libraries, and make it familiar in Egypt's societal culture, through the use of one of the most important symbols of Egyptian identity taken from Islamic art which is: units of "Islamic Geometric Motifs" adopted in their construction to repeat one simple geometrical unit. The study searches in how to deal with the structural composition of Islamic decorative units based on a specific repetitive pattern (horizontal, vertical, axial or circular). In this paper the modules are based on a group of simple Islamic geometric shapes in which they are pieced together via small slices in a variety of configuration, to create different structural forms liable to be interchangeable depending on assembly / disassembly manner. As a result of studying such motifs, the researcher can only assume that this study will help reflect the aesthetic values of Islamic geometric motifs and enables designers to edit and control its content freely to create unique designs that can be used for women's fashion using one color for age category (30-40).

Key words:

“Modular design” – “Eco-fashion” – “Islamic geometric motifs”.

Problem statement:

The research problem can be summarized as.

1) Can we use modular design assembly / disassembly manner with Islamic geometric motifs?
2) To what extent the success of suggested manner expresses the form of Islamic geometric motifs?
3) What is the ability to use modular design assembly / disassembly manner in designing different styles of women clothes?

Research objectives:

Access the best method of modular design by assembly / disassembly in Islamic motifs in designing women clothes without affecting aesthetic values.

Research limitation:

Design women's clothes by using modular designs in Islamic geometric motifs (In the period between the 13th and 17th centuries in Central Asia and Spain) by one color for age category (30-40).

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Introduction:

In 1965, the concept of modular design was first introduced by Martin stark where it was proposed to use modular product in production as a new concept of variation, it enabled to modify specific modules for a new requirement without influencing the main infrastructure.

It has been employed in many fields of design and manufacturing (Tseng & Roger, 2018) as fashion industry to slow the pace of fashion by promoting sustainable consumption through sustainable design and use practices that extend the lifecycle of products (Cadenas & Mario, 2016) where it has been argued that the most significant environment impact of clothes are commonly associated with consumer use and the after purchase phase. That consumers discard clothing after wearing it only few times following the fast change in fashion (Hur, 2015).

So the main concerns of this study is to use modular design by assembly/ disassemble to create different designs by using familiar units to our society as Islamic geometric motifs as attempts to make foreign imported idea familiar to our society of fashion through implanting oriental motifs and achieve in other hand benefits of reduction of consumption and disease diversity.

Transformable fashion design:

It generally indicates the change of shape, form or structure without loss of substance (Niinimäki, 2013).

It aims to create sustainable design from smaller components which can be separated and recombined by many tools such as zippers, hook, velco tape, buttons……).

To create an entirely different garment styles by attaching/ detaching different parts of garment, different fabrics, patterns and colors (Gong, 2012).

From sustainable design perspective a modular design strategy can be considered a transformable design (Niinimäki, 2013).

Modular design:

It can be defined as strategy to build subsystems modules that work on as an integrated whole (Ribeiro & Barata, 2012).

Modular design refers to design technique that can be used to develop complex products by similar components, the components (modules) must have features that enable them to be coupled. Single modules may only perform discrete function but when combined with other modules they can together provide a variety of functions (Hour&Thomas,2011).

Importance of modular design:

Products that are based on modularity idea have many advantages:

It can be upgraded by adding a new function by plugging new modules, it has a high degree of quality which is enabling maintenance, that it's easy to modify each module instead of changing a whole design, so it can be repaired easily by assembly or disassembly.

Differential consumption and reduction of product costs these advantages can improve the extension of product life cycle and reduce of wastes and consumption of nature resources (Ribeiro & Barata, 2012).

Modular fashion:

It refers to clothing items that have detachable pieces, so that one can easily alter the clothing item to suit changing.

Needed at: (different occasions- repair damage in specific parts) and tastes over time as: seasonal trends, color, fabrics, shape…. etc.).

The methods to achieve modularity can be defined be three parameters.

1) The product generation (product reengineering or new product development.
2) The product variety.
3) Product life – cycle (design – assembly, services and recycling) (Ribeiro & Barata, 2012).

There are two kinds of modular systems as follows:

(1) The garment has comprised multiple pieces which can be connected and separated by many tools such as (zippers, hook, Velcro tape, buttons…. etc.) to create different garment styles. fig (1)

Fig (1): example of modular design consists of multiple pieces.

(2) The garment shape and structure depend on pattern of repeating unit which could be combined to create larger fabrics that can enable the user to use it to become induced in customizing the design of garment as Balgooi and Soeploor's, they have created "fragment textiles" (2009). Fig(2)

Fig (2): example of fragment textiles.

Islamic art:

Islamic art encompasses the visual arts produced from the 7th century on word by people who lived within the areas that was inhabited or ruled by Islamic population in these vast space that was spread across Europe, Africa and Asia learning treasures unrivaled beauty (Thalal & Benatia, 2013).

It embraces art forms such as architecture ceramic art, mosaics, relief sculpture, wood, drawing, textile…..etc. (Islamic art).

The four basic components of Islamic ornament are calligraphy, vegetal patterns, geometric patterns and figural representation (the nature of Islamic art).

Geometric Islamic arts:

Geometric patterns associated with Islamic art are a set of simple basic forms as circle and square, geometric patterns were combined, duplicated, interlaced and arranged in intricate combinations, these geometric ornamentation in Islamic art offers a remarkable amount of freedom in its repetition, complexity and the possibility of infinite growth (Geometric patterning Islamic art) the methods of construction of geometric patterns based on the concept of symmetry and regularity which hide mathematical rules developed by the ancient Islamic artists (Thalal & Benatia, 2018). This is exactly the essence of the concept of modularity when several basic elements modules are combined to create a large number of different structures (Rodovic,2014). This has urged the researcher to use, geometric Islamic motifs in modular design by search for modularity from the recognition of sets of basic elements, construction ruler, then the derivation of different generated designs / forms/ structure.

Method:

In this study the researcher created (6) modular fabric tiles from (Gogh) material based on modules inspired from Islamic geometric units, these modules pieced together via small slices in variety configuration to create different interlocking styles of vest/ top for women depending on assembly/ disambly manner.

Everyone who has used Islamic geometric motif has analyzed them in two ways to have module that is repetitive. **Those 5 models were implemented for each technique:**

1) Technique (A) its module is based on simple geometric shapes as (square – hexagon – rectangle……. etc.).
2) Technique (B) its module is based on more complex geometric shapes as (star - rosette …… etc.).

All modules fabric has been applied by one color (white) in attempt to measure which method is the best for expressing Islamic geometric motifs with high ability degree of designs diversity, with keeping the soul and aesthetic values of Islamic geometric arts is the main aim of this paper, in order to achieve this the researcher made a questionnaire composed of **(5) items as follows:**

1) The construction method of modules reflects the aesthetic values of Islamic geometric art.
2) The used analyzed modules are expressing the Islamic geometric motifs.
3) The resulted interfaces and spaces from overlapping and intersection express Islamic unit.
4) The chosen method achieved balance between Islamic motifs and silhouette of body – the chosen method achieved high degree of suitability between Islamic motif and body silhouette.
5) The chosen method achieved high level in diversity and innovation in design without any defect in aesthetic values of Islamic motifs. Each item was assessed between 5= strongly degree, 1= strongly disagree.

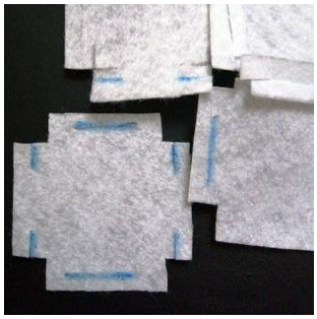
The experimental works were evaluated by ten professors and assistant professors in the field of fashion design, the following is an over view of (12) patterns and their application in different designs of **(vest) for women allowing the change of:**

1) The shape of the neck and/ or collar.
2) The length, shape and fullness of sleeves with or without cuffs.
3) The length, shape and fullness of a top or a vest.

Fig (3): The Alhambra, Granada Spain, checkerboard Zellij wall paneling topped with inscriptional decoration in Stucco. Patio de in Alberca.

Model (1A):

The modular unit shown on figure (1A) was developed from two rectangular shapes which have the same size integrated in reverse, the modular unit have slots at two sides (a) enable the tabs of another module to be threaded through, to interlock, the combining of these modules creates central square space as shown in figure (b) repetition that generates the extension checker board structural tessellation (c).



Model (1B):

The modular shown in figure (1B) was developed from square (a), the modular units have two slots in two edges and two tabs in another two edges, when (five) modules are interlocked, tabs combined forming/ square unit as second layer of fabric tessellation as (b), as locking process enables the extension of checker board structure (c).

Fig (4): Ceramic in the tomb of Khawaja Qutb-al-Din Bakhtyar Kak

Model (2A):

The modular unit in figure (2A) is based on six – pointed rosette with six equal length sides each side of them was transformed into slot or tab alternatively to be used in connection with similar unit as (a).

Combining seven modules units create a hexagon shape in the middle as shown in (b), the series of modules was extended to each the edge of rosette module like (c).






Model (2B):

1- The module unit in (2B) is based on primary modular structure from rectangular shape shown in (a), each corner of unit is used to connect with similar unit through slot or tab.

2- The over lapping tabs at each, are shared from a diamond that generates a second layer of fabric creating a rich surface texture as (b).

3- Combining six of these rectangular modules creates hexagon shape in the middle as shown in (c).

Fig (5): A rhomb bitrihexagonal tiles.

Model (3A):

The modular unit shown in figure (3A) was developed from a shape resembling a six pointed rose, every edge has slot or tab alternatively to be combined with similar unit as (a), when two modules interlock, the overlapping tabs at each shared edge from a hexagonal shape create ellipse regions in the residual space between the two modules as (b).

Model (3B):

The modular unit shown in figure (3B) was based on regular hexagonal unit that has slot and tab at all edges alternatively to be used in connection with slots and tab of rectangular units as shown in (a) when modular are interlocked they create a residual space from regular triangle as (b).

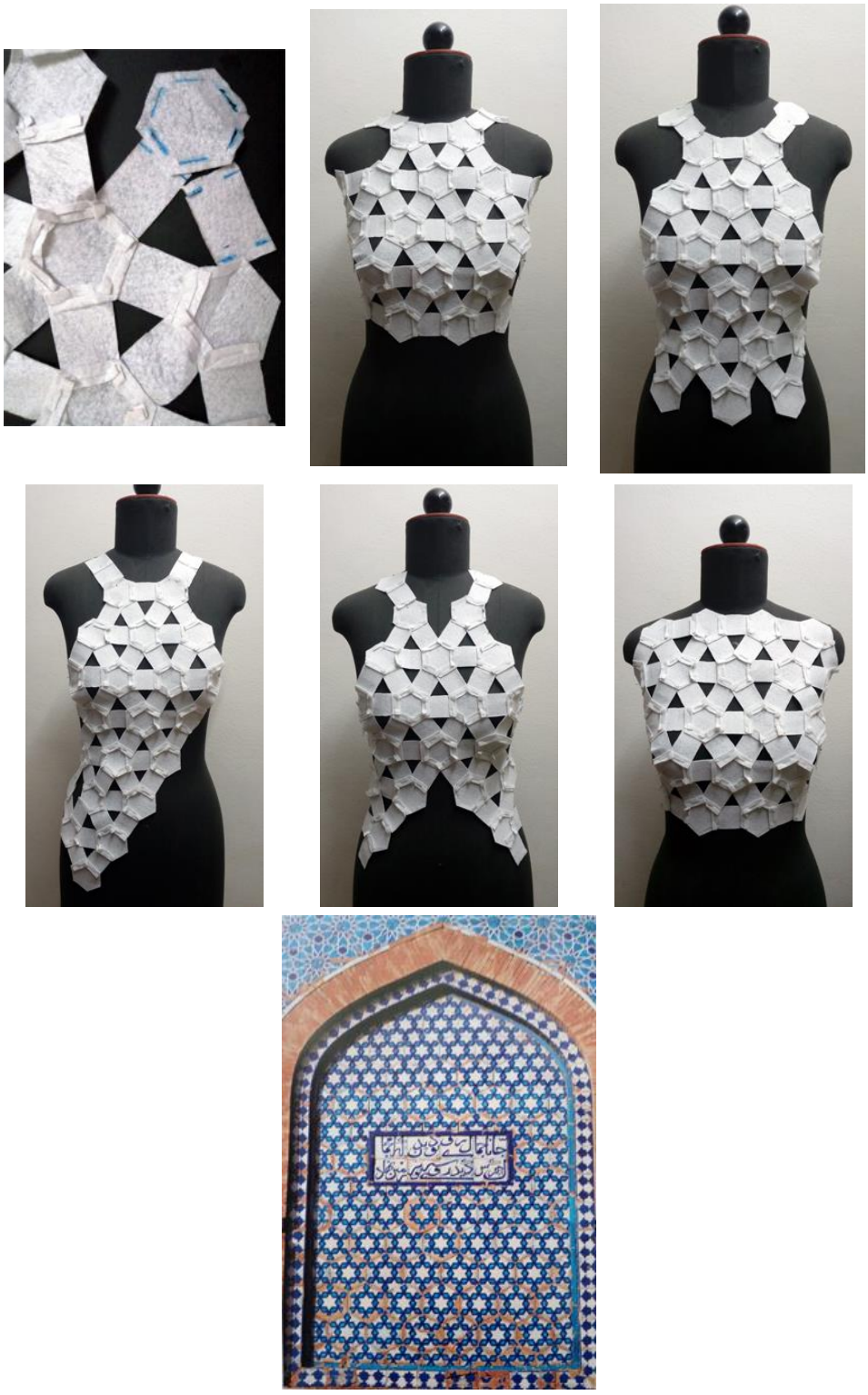


Fig (6): Tomb of Sultan Ali Akbar, Multan (Pakistan)

Model (4 A):

The module unit shown in figure (4a) was developed from two integrated diamond shape that have the same size as (a), the modules units have two slots and two tabs alternatively, combining three of these modules creates parallelogram in the residual space between them as (b) when seven modules interlock the over lapping tabs and parallelogram form a hexagonal star in the middle as (c).

Model (4B):

The modular unit shown in figure (4b) is based on regular hexagonal unit, each angle of modular unit transformers into slot or tab alternatively to be used in connection with similar unit as (a) combining seven modules unit create hexagonal-star in the middle as (b) hexagonal modules were assembled into the regular tessellation shown in (c).

Fig (7): mosaic Madar.Ishah Madrasa, Isfahan (Iran)-1704

Model (5A):

In this figure there are two shapes, where the module unit extracted from (1) regular hexagonal shape (2) regular triangle, as (a) the modulated triangular unit was the linked unit between modulated hexagonal unit. Whereas slots at six tapered heads of the modulated hexagon units enable the tabs of modulated triangular units to be threaded through to interlock as (b), combining seven of modulated hexagon units create a linear hexagonal pattern surrounding it as shown in (c).

Model (5B):

The modular shown in figure (5b) was developed from regular hexagon every module have two slots to enable the tab of another module to be threaded through overlapping by two- third as (a) combining six individual hexagonal modules creates a hexagon- stars in residual middle space as shown in (b).

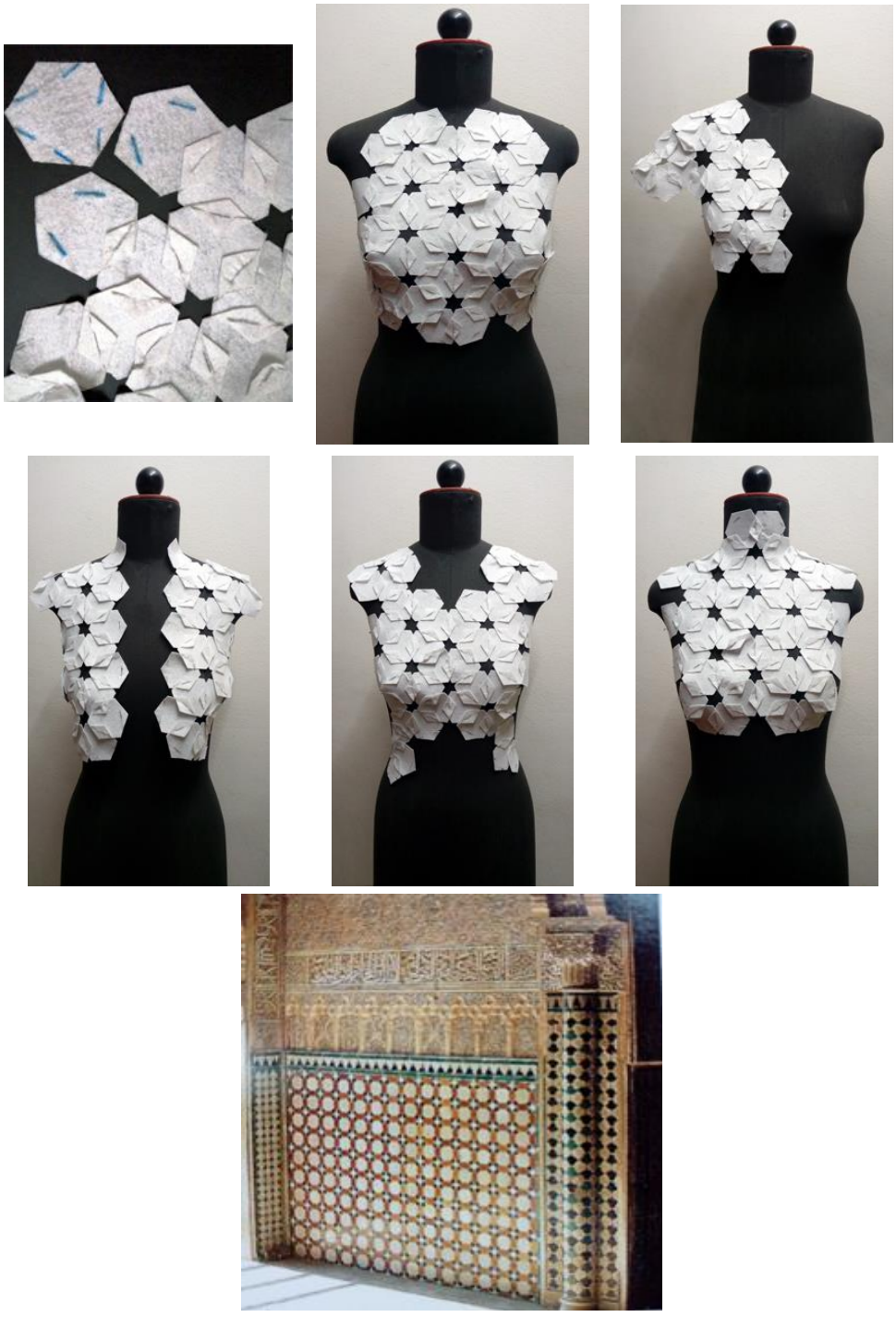


Fig (8): Alhambra palace, Granada, Spain La1004

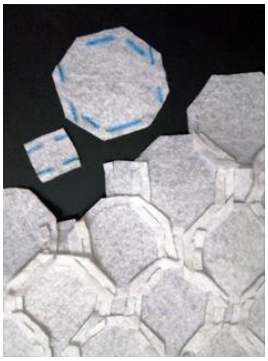
Model (6A):

The modular unit shown in figure (8) was developed from two modules (1) an equilateral octagon inscribed within a unit extracted from square (2), square inscribed within a small size unit as (a) every edge of the modulated octagon unit has slot or tab alternatively to be combined with similar unit while slot on the corner of modulated octagon module enables the tab of modulated square unit to be threaded through to interlock as (b).

Combining four of these octagon modules creates square in the middle between them, the overlapping tabs at each shard corner from a square that generate a second layer of fabric creating a rich surface texture as (c).

Model (6B):

The modular unit shown in figure (6b). was based on primary modular structure from octagonal shape and rectangular shape shown in (a) every edge of the octagon unit has slot or tab alternatively to be combined with another similar module. While rectangular unit have two tab combined with slot on octagon unit as (b). Combining four of these octagon modules creates square between them as (c).






Discussion:

Table (1) Average of every sample on the (A) technique.

It is evident from table (1) that the sample no. 1 came first with an average of 4.60 followed by the sample no. 3 in the second with an average of 4.16, the sample no. 5 came in the third with an average of 4.14, the sample no. 6 came in fourth with an average of 4.07 then the sample no. 2 came in the fifth with an average of 3.80, finally the sample no. 4 came in the last position with an average 3.56.

INSPECTOR	D1	D2	D3	D4	D5	D6
1	4.60	3.80	4.40	3.00	3.80	4.00
2	4.80	3.40	4.20	3.40	4.20	3.50
3	4.80	3.40	4.60	3.00	3.60	4.80
4	4.60	3.80	3.80	3.20	4.00	4.60
5	5.00	3.40	3.80	4.80	5.00	5.00
6	4.80	4.20	4.40	3.60	3.80	3.40
7	3.80	3.80	3.60	3.20	3.60	3.00
8	5.00	3.20	4.40	4.40	5.00	4.60
9	4.00	4.80	4.00	3.20	4.00	4.40
10	4.60	4.20	4.40	3.80	4.40	3.40
MEAN	4.60	**3.80**	**4.16**	**3.56**	**4.14**	**4.07**

Table (2) Average of every sample on the (B) technique.

It is evident form table (2) that the sample no. 5 came first with average of 4.54, followed by the sample no. 2 in the second with an average 4.46, then the sample no.3 in the third with an average 4.44 the sample no. 6 in the fourth with an average 4.41 finally the sample no. 1 came in the last position with an average 3.98.

INSPECTOR	D1	D2	D3	D4	D5	D6
1	3.40	4.40	4.00	4.80	5.00	4.60
2	4.20	4.00	5.00	4.00	4.00	4.33
3	4.00	5.00	5.00	5.00	4.80	4.60
4	3.80	5.00	5.00	5.00	5.00	4.60
5	4.00	5.00	5.00	4.20	3.80	5.00
6	4.40	4.60	4.60	4.60	5.00	5.00
7	3.60	2.20	3.00	4.00	4.80	3.20
8	4.00	5.00	4.20	4.40	4.00	4.60
9	4.40	4.60	4.00	3.00	5.00	4.40
10	4.00	4.80	4.60	4.40	4.40	3.80
MEAN	**3.98**	**4.46**	**4.44**	**4.34**	**4.58**	**4.41**

By comparison averages in both tables (1) & (2), the results indicate that the technique (B) succeeded in expressing Islamic motifs in proportion 1-5

Conclusion:

It was found out through experimental work that the best manner which expresses the soul of Islamic geometric motifs was manner (A) which depends on modules based on simple shapes.

1) It reflects the aesthetic values of Islamic geometric motifs.
2) It enables the designer to move and control it with more freedom to interlock.
3) It enables to create Islamic geometric shapes as stars which cannot be used by explicitly as in complicated module in manner (D) because when it's interlocked with others, it produces forms that are not considered Islamic motif, so it loses its aesthetic values.
4) It enables to create different styles of vest for women with high level in fitting and appearance.

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