UPCYCLING FABRIC WASTE FOR HOME DECORATION BY IMPLEMENTING ISLAMIC ART APPROACH

Andi Pramono
Interior Design Department, School of Design,
Bina Nusantara University,
Jakarta, Indonesia
Corresponding Author:
andi.pramono@binus.ac.id

Tiara Ika Widia Primadani
Interior Design Department, School of Design,
Bina Nusantara University,
Jakarta, Indonesia

Yudhistya Ayu Kusumawati
Visual Communication Design Department, School
of Design, Bina Nusantara University,
Jakarta, Indonesia

Bambang Kartono Kurniawan
Interior Design Department, School of Design,
Bina Nusantara University,
Jakarta, Indonesia

Febby Candra Pratama
Entrepreneurship Department, BINUS Business
School Undergraduate Program
Bina Nusantara University,
Jakarta, Indonesia

ABSTRACT

Humanity's activities cause the destruction that occurs in the world as a caliphate, as stated in Surah Ar-Rum (30), verse 41 of the Quran. One of the products that might harm the ecosystem is waste. Various countries, including the Indonesian Government, have competed with numerous initiatives and policies to save environmental sustainability. The author of this study provided training on how to conserve the environment by processing trash, particularly fabric waste. Bina Nusantara University's community development initiative invites numerous assisted MSMEs to participate in a waste management training session. Participants are instructed on how to transform fabric waste into useful interior products. The techniques conducted start from joining fabric waste with patchwork, quilting, and applique connection techniques. From the connection results, the product's value can be increased again by adding a digital screen printing technique. Islamic Art is one of the many motifs that can be used. Implementing Islamic geometric patterns and floral, vegetal, and calligraphy designs on interior accessories are some examples of Islamic art motifs. Apart from being able to decorate the interior of the home, particularly by giving it an Islamic feel, the objective of creating this product is to conserve the environment through upcycling technology.

KEYWORDS:
Fabric Waste; Home Decoration; Islamic Art; Islamic Geometric; Upcycling

INTRODUCTION

The mischief that occurs on the earth is the acts done by humanity as a caliphate. As Allah Subhanahu Wa Ta'ala Kalam in the Quran surah Ar-Rum (30) verse 41, corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned so He [i.e., Allah] may let them taste part of [the consequence of] what they have done that perhaps they will return [to righteousness]. Fakhruddin al-Razi in [1] concludes this surah that the damage that occurs on earth is the result of what humankind have done.

Waste or garbage is the unusable materials of a business or activity [2]. In principle, this waste is a trash material that a company no longer uses in production. Waste that decomposes naturally is referred to as organic waste [3]. In contrast, inorganic waste is trash that can not decompose naturally [3], [4]. When Inorganic waste is not processed correctly, it will cause damage to the earth, as mentioned in Quran surah Ar-Rum (30) verse 41.

An example of inorganic waste is fabric waste. Therefore it needs to recycle to tackle or reused for other products [5], [6]. One of the efforts to overcome trash is implementing the Reduce, Reuse, and Recycle program called 3R. Reduce by undertaking decreasing waste. Reuse is by doing an action to use the waste, whether for its original purpose or to fulfill a different function. Recycling is transforming waste materials into new elements [7].

Besides processing fabric waste by reuse method, this fabric waste, according to Myers [8], can further enhance its functional value with upcycling. Recycling and upcycling have similarities in environmental conservation in waste management [9]. However, recycle method emphasizes lowering the material's value, such as processing plastic into plastic seeds. While the upcycle emphasizes more on increasing the value of the material benefits.

In interior design, fabric waste can be used for home decoration, such as lampshade stands, pendant lampshades, cushions, and wall decorating. The technique of joining one fabric with another is

patchwork, quilting, and applique [10]. This joining technique can produce a variety of motifs. One of them is an Islamic Geometrical pattern. The implementation of this motif can be applied to cushion and wall decorating. Furthermore, Islamic calligraphy can embed the fabric using screen printing techniques. It aims to implement wall decoration, but not for cushions placed on chairs or sofas.

This study aims to provide several solutions for processing waste fabrics for household accessories to decorate the room. Although using waste materials, the resulting product is not inferior to products that use whole cloth as the primary material. At the same time, the decorative motifs on these products apply to Islamic art. Applying Islamic Art to home decoration has indirectly introduced Islamic nuances such as geometrical patterns, Kufi calligraphy, Islamic calligraphy, vegetal ornamentation, and floral patterns. The benefit of this research is to provide solutions for processing existing fabric waste. In addition, using this waste cloth will reduce the production of basic cloth materials derived from nature. Some product producers utilize textiles as the primary material, but the authors aim to provide an alternative by employing fabric waste materials to help the environment.

Upcycling the waste material and implementing Islamic Art in its product are state-of-the-art in this research. There are several ways to manage fabric waste. Previous research about fabric waste management has already been conducted by [3], [6], [8], [10]–[13] by maximizing fabric waste to become a more valuable product. Moreover, the theory of Islamic Art and implementation has been researched by [14] and [15]. An explanation of Islamic geometrical patterns has already been written by (Abullahi & Embi, 2013; Dabbour, 2012; Pramono, 2012). The ornaments as an aesthetical aspect of Islamic Art implemented in vegetal and floral patterns were discussed by [19].

ISLAMIC ART

The inspiration of an Islamic style is influenced by religious and cultural values, represented in various building types such as Masjid. This Style started during the lifetime of Prophet Muhammad Sallallahu Alayhi Wasallam [14]. It was mentioned earlier that the Islamic Style applies a floral motif, geometrical pattern, and calligraphy. This Style has been implemented among the relic of Islamic civilization as a manifestation of its artistic character in adornment or decoration art in the Real Alcazar in Seville and Alhambra in Granada, Spain [15], [17].

Geometrical is considered the visual representation of the mathematical guide discovered throughout man, nature, and the universe [20]. Previous research [17] mentioned that the basic drawing of the geometrical pattern is a circle. It represents a religion that emphasizes One God and the role of Mecca, which is the core of Islam, which all Muslims face in prayer [16]. Phi used to calculate the circle's area and circumference is the Quran's interpretation. Phi, which consists of the number 22 /7, correlates with the hajj

and the pillars of Tawaaf. In the Qur'an, surah Al-Haji is the 22nd letter sequence. Tawaaf, the pillar of the hajj, is around the Kaaba and is performed seven times [21]. Figure 1 shows making a simple motif using circles and lines step by step.

The first step is to make a circle using a compass. The pivot used as a term is called the center. The next step is to create a line that passes through the center, and the intersection will appear marked with points A and B. Next, make a circle on the left side with center point A and a circle on the right side with center point B. From making two circles, an intersection will appear marked with points C, D, E, and F. Create four arches using 4 points as a center. It will get an intersection marked with points G and H. Draw a straight line between G and H, and then the line will form an intersection with a circle. The intersection is marked as points I and J. The next step is making a circle on the top side using point I as the center and a circle on the bottom side with point J as the center. Finally, an intersection will be formed with two other circles marked with points K, L, M, and N from making these two circles.
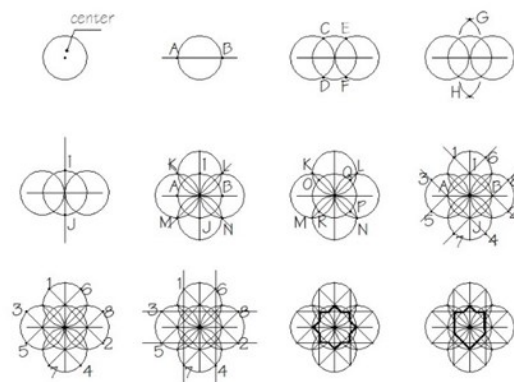

Figure 1. Step by step in creating a simple motif using circles and lines

The next step is to draw a line connecting dots K and N and L and M. The K-N line will intersect the first circle and resulting points O and P. At the same time, the L-M line intersects the first circle, resulting in the appearance of points Q and R.

The following step connects points I and B until they intersect with the right and upper circles, indicating points 1 and 2. Next, connect the intersect points A-J to the left and bottom circles, which occur at points 3 and 4. In the same step, connecting points A-I generates points 5-6, and connecting points BJ produces points 7-8. The dots represent numbers and are connected in the following order: 1-7, 6-4, 3-8, and 5-2. The final step is to join the lines in the first circle. A motif will form inside the first circle and can be combined with others to generate a pattern.

In Islamic arts and architecture forms, especially geometrical pattern design, the essential geometric proportional systems are the primary three proportional roots $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, and the golden mean proportion [18]. Taking the diagonal of a square

produces the number √2. The angle formed by the horizontal and diagonal lines and the vertical and diagonal lines is 45⁰. The diagonal line of √2 is applied as a vertical line and is combined with the square's horizontal line. It generates the diagonal √3. And so on until a proportion, the golden section, is obtained. Figure 2 shows how the golden section's proportions are generated.
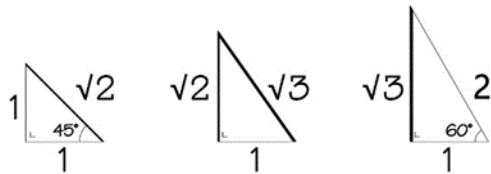

Figure 2. The root proportions √2 and √3

By drawing some circles with some rules, it will appear the intersection points. For example, connecting the intersection points using proportional √2 will appear a square, and using proportional √3 will seem a triangle and hexagon. Furthermore, the golden mean proportion is a proportional system whereby a set proportion relates two elements. For example, figure 3 depicts the square containing √2, the hexagon using √3, and the pentagon with the golden mean, $[(5+1)/2]=1.61803$ [18].

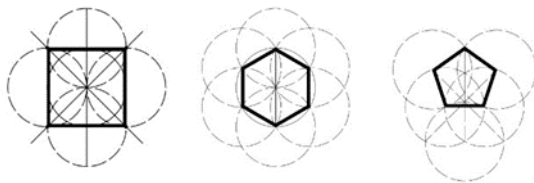**Figure 3. The proportional roots (from left to right): the square contains √2 proportions, the hexagon includes √3 proportions, and the pentagon contains golden mean (Phi) proportion.**

METHODS

The Department of Interior Design, School of Design, Bina Nusantara University, conducted the research as part of its community service. There were 24 Micro, Small, and Medium Enterprises (MSME) actors, with 95% being MSME company owners. The author taught a class on turning fabric waste into a decorative item for the home. More than 70% of the participants do not use waste materials as their derivative products. Hence this topic, fabric waste management, was provided. If this significant amount of trash does not receive guidance, manufacturing waste may expand year after year.

The author conducts multiple literature reviews to support this research for the next stage. Some of these literature studies include ideas for items made from garbage, particularly fabric waste. Some of these products emphasize the product's function value, while others emphasize the product's aesthetic value as a house ornament. The first issue with fabric waste is that it contains materials that might contaminate the environment. As a result, specific action is required to overcome it. Several earlier studies used 3R approaches to solve the problem.

Departure from the earlier study, the author created one of the 3R approaches, namely upcycle, which originated from the reuse method. The reuse method is a way of repurposing previously used materials. While the upcycle technique, in addition to using existing materials, also increases the value of the item itself. The fabric material reusing approach is applied for items requiring fewer resources. For example, they are used for masks, tissue boxes, and other little accessories. In addition, the fabric is linked using tie techniques such as patchwork, quilting, and appliqué in the upcycle technique. This connection technique will obtain an extensive fabric material for broader purposes, such as blankets, lampshade decoration, headboards, bed linen, and cushions.

It can use digital screen printing to produce a more aesthetically pleasing impression. It is possible to adorn the connecting technique with ornaments utilizing this technique. This technique is very beneficial in making it happen to add an identity, such as writing the owner's name, writing in the form of quotes, or trending decorations.

Screen printing equipment includes cutting sticker machines and fusing press machines for the garment. A cutting machine is a printer that cuts based on a pattern created with graphics software such as Corel Draw. Polyflex is the material being cut. After cutting the poly flex, the unused material must be peeled or removed. Furthermore, the used poly flex material is attached to the fabric for 10 seconds using a fusing press machine set to 160 degrees Celsius. Following the completion of the pressing process, the heat-resistant plastic is removed, and the digital screen printing is done.

The graphic below depicts the process of processing fabric waste into high-value products using the upcycling method.
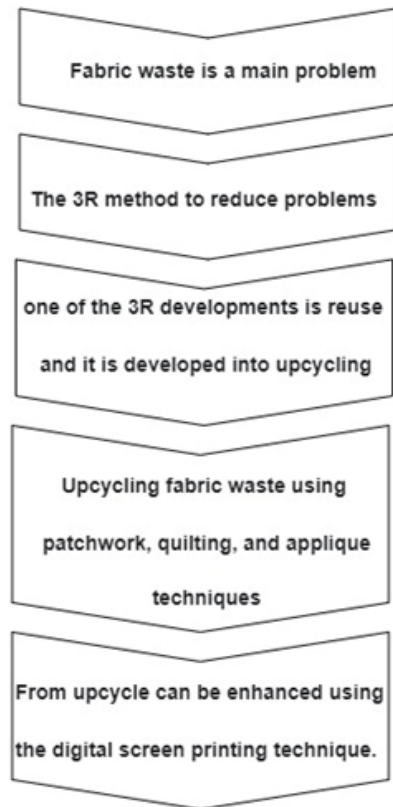
Figure 4. Activity Flowchart

RESULT AND DISCUSSION

Processing fabric waste that is a part of inorganic waste needs severe treatment. The primary purpose of this treatment is for environmental sustainability. The most famous Waste management is 3R, then developing another technique in waste management, namely upcycling. In managing fabric waste by upcycling methods, a literature study is needed to join fabric pieces with several techniques. In addition, it is also essential to study fabric upcycle techniques, such as adding patterns with screen printing.

THE 3R'S WASTE MANAGEMENT

The 3R's waste management refers to reducing, reusing, and recycling the material. The primary principle of waste management is reducing the quantity of waste one generates. The second principle of waste management is reusing materials in their original form instead of eliminating them or moving those materials onto others who could manage them. The last principle is recycling. It is a policy of helpful utilization of materials and processing them to obtain equal or lower quality [22].

Fabric pieces which are a part of inorganic waste, need special handlers in their management.

Community willingness is part of the participation of the 3R campaign in waste management by carrying their shopping bag, ordering recycling products, and producing handicrafts from waste material. Government willingness is also real support for the program by using the recycled product and giving rewards and awards for 3R waste management operations [23].

The Indonesian Government has also made resolutions in handling waste by declaring the Indonesia Waste Free 2020 campaign by the Ministry of Environment and Forestry (KLHK) in 2016 [7]. The real action is reflected by developing the waste collection and transportation business sector, waste processing equipment and machinery industry, recycling industry, composting and biogas industry, and waste industry into alternative energy [24]. Bina Nusantara University was concerned about industrial waste as well. As a result, the community development (Comdev) program invites several assisted MSMEs from the Bina Nusantara Malang campus to participate in a waste management training session. The instructors are academics from the interior design department who delivered the course on utilizing fabric waste as a more valuable resource, particularly in the interior sector. The primary goal of this course was to reduce waste by teaching participants how to use fabric waste as a primary material in creating home decoration products. The next goal is to educate participants with an overview so that they can make derivative items from fabric waste.

In other parts of the world, Bangladesh also implements three phases for supporting the 3R campaign [25]. In the first phase, the waste generators divide trash with higher market value and sell them to street hawkers. In the second phase, the scavengers searched the wastes near the bins to collect recyclable materials of low market value. The final stage is containing recyclable materials by the waste pickers from the waste vehicles immediately after unloading at dumpsites.

UPCYCLING FABRIC PIECES

There are various ways of upcycling fabric waste, especially for small pieces of fabric. The primary step to joining the small pieces of the fabric is using patchwork, quilting, and applique technique. Patchwork is the technique of joining several small pieces of fabric to be put together in larger sizes, which can be squares, triangles, or other geometric shapes [10], [12]. The first step in sewing patchwork is to cut little pieces of fabric, such as 10cm squares. Next, sew on the backside of the fabric with the Front facing the other fabric's Front. Finally, connect and sew all the small pieces together to make a large fabric. Once all the little materials are joined, iron the Front and back to make them look acceptable. Figure 5 shows the step-by-step process for making patchwork.
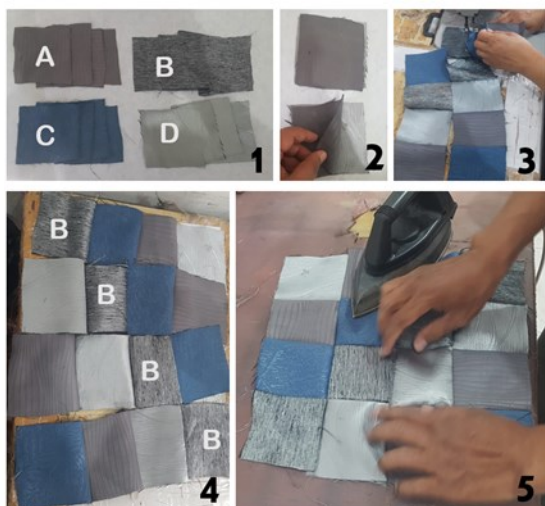
Figure 5. Step by step in applying the patchwork technique

Figure 6. Connecting some small fabric waste using a patchwork technique

It is necessary to prepare four kinds of fabric, each of which is cut into four pieces with a size of 10 cm, as shown in Figure 5.1. and labeled A, B, C, and D, to make a patchwork motif consisting of four rows and four columns using four fabric motifs. In the next step, 5.2, connect two fabric motifs, B-C and A-D, for the first and third rows. The Front of the A fabric meets the Front of the D fabric and is sewn on the back. Meanwhile, to make patterns in the second and fourth rows, it is necessary to connect the D-B and C-A fabric motifs by sewing them on the back of the fabric. As shown in Figure 5.3., the two fabric motifs sewn in pairs are combined with other pairs to form a row of 4 fabric motifs as shown in Figure 5.3. The order of merging the patterns in the first row, B-C-A-D, is changed to A-D-B-C for the patterns in the third row. Likewise, for the arrangement in the second row, D-B-C-A, the pattern is changed to C-A-D-B for the fourth-row arrangement. As a result, the pattern is shown in Figure 5.4. and the arrangement of motifs B sequentially diagonally. The last step is to connect the four rows into a single unit by sewing the back, thus getting the pattern as shown in the picture. 5.5. Figure

6 shows how the connection results can be rotated 45 degrees to generate a diamond design.

Bae and Kang in [12] quilting is a sewing technique almost the same as patchwork, but this technique is implemented in thick materials like dacron. The last technique is forming the pattern in small pieces, then sewn on the large pieces. This technique, Rawson in [10], calls as applique. Figure 7 shows the applique technique using macrame fabric as the pattern.

Figure 7. Embedding macrame to cushion using applique technique

Another way of upcycling for wide pieces of fabric is increasing the sense of the value of the upcycling fabric. It can change the original structure feature of the fabric by eliminating part of the fabric or degrading the surface form of the fabric [13]. To increase the Islamic art value in home decoration, the cushion can be added to a macramé. The word macramé in Arabic, written Migramah translated in English as fringe, originated on the Arabian Peninsula. In the early 12th century, the Moors brought macrame to Spain [26]. Embed a macramé in the cushion cover; this could be done manually or using a macramé lace from sheers fabric waste.

EMBEDDING CALLIGRAPHY USING SCREEN PRINTING

After producing home decorations using fabric waste, the next step is to embed screen printing on the fabric, either manually or digitally. Both techniques have some advantages and disadvantages. However, digital screen printing is more beneficial than manual screen printing regarding color quality, precision and accuracy, customized design, and production costs [27]. Polyflex screen printing is one of the techniques in digital screen printing, with many motifs, colors, and types of materials. The purpose of digital screen printing is to add beauty to the product upcycle that has been made.

To start making digital screen printing, one must first prepare a file using vector graphics editor software. The author uses Corel Draw in this study, as

seen in Figure 8.1. The advantage of this software is that it has a feature that can automatically trace bitmap images such as jpg files. This feature is very suitable for beginners with neither editing nor designing skills, so they can take advantage of this feature to convert bitmap images into vectors. After the image file is ready to be printed, as shown in Figure 8.2, it is necessary to prepare the poly flex material on the sticker cutting machine. Run a print command on the computer, and the machine will cut according to the pattern. After cutting, the next step is to peel or remove the unused material, as seen in Figure 8.3.

The next step is to attach the poly flex motif to the fabric and attach it using a fusing press machine, as seen in Figure 8.4. Based on the author's previous project experiments, the engine heat setting was set to 160 degrees Celsius to achieve excellent results. The poly flex is ready to be affixed to the fabric when the machine's indicator reads 160. The pressure should last for 10 seconds. The ideal duration and heat in pressing are determined by the number of 10 seconds and a temperature of 160 degrees. If the duration is too short and the temperature is less than 160 degrees Celsius, the poly flex may not adhere completely to the fabric.

On the other hand, the fabric may be damaged or burned if the temperature is too high and the duration is too long. After pressing the fabric, as shown in Figure 8.5, the heat-resistant plastic attached to the poly flex is removed. Figure 8 depicts detailed step-by-step digital screen printing.

Figure 8. Step by step in processing digital screen printing

Adding this digital screen printing will conduct what Style to use. For example, when classical Style wants to embed the objects, it can attach classic Style, such as renaissance, baroque or rococo design. Furthermore, to insert Islamic Style into the product, motifs are embedded in a vegetal and floral motif, repetitive Islamic geometric patterns, Islamic calligraphy, or modern Islamic calligraphy, like Kufic [28].

In Islamic Style, it is not permitted to add motifs of living objects such as humans and animals, be they partially or entirely. Therefore vegetal, floral, and geometric pattern is the main decoration in Islamic

Style [29]. When embedding quranic verses in calligraphy, it should consider its laying position. Quranic verses are the Kallam of Allah and should not be careless in their placement, for example, not inserting Islamic calligraphy to the cushion in the chair or sofa. When embedding Islamic calligraphy, it is better to put it on the area hanged to the wall or attach it to the chandelier shade.

Islamic calligraphy is an art that combines the verses quoted in the Qur'an with the visual form shown. So this calligraphy becomes a work of Art behind the visual beauty contained in the expressed meaning. In addition, calligraphy has a non-visual sense implied [30]. In general, calligraphy uses verses from the Qur'an, so its placement should not be placed anywhere. Islamic calligraphy is often used on wall decorating and also kiswah hung by pipes, as shown in figure 9.

Figure 9. Attaching Islamic calligraphy into kiswah hanging on a curtain pipe

Calligraphy is a type of visual Art. The term was derived from the Greek, Kallos, which means good, and Graphẽ, representing writing. Calligraphy is often considered the most profound Islamic Art because verses in Quran inspire this Art [31]. The use of Islamic calligraphy on interior decoration will enhance the Islamic atmosphere in the house. For example, it can be combined with an Islamic geometric pattern to decorate the wall. Furthermore, it functions as visual Art and conveys the message of the Quran to someone with a sentence written on the canvas, as seen in figure 10.
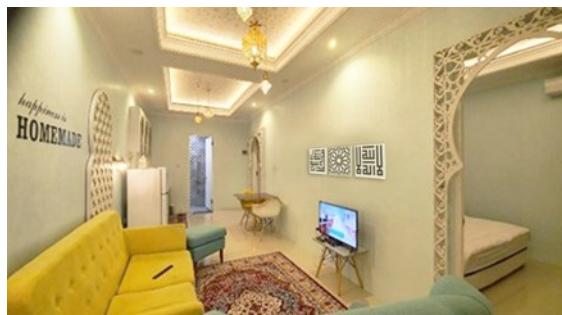
Figure 10. Islamic Art and calligraphy are attached to the wall decorating of Griyapram guest house

BORDERING AN ART USING ISLAMIC GEOMETRIC PATTERNS AND FLORAL

Islamic Art restricts the representation of humans and animals, as stated in the preceding paragraph. To decorate the appearance in Islamic Art, often attach ornament. The primary characteristic of Islamic decoration is generally shaped vegetal and floral patterns such as leaves, stems, buds, flowers, and palms [19]. These ornaments are inserted to fill in the blanks of the Islamic Geometrical pattern. In addition, this ornament is used to border the artwork. These ornaments are often found on wall sculptures, roofs, gates, rugs, carpets, and other artwork.

Aside from each Islamic Art that can stand alone as interior decoration, several designs combine two or even all three. Artists in Islamic Art frequently combine calligraphy with floral as a border to break up the monotony of the display. Calligraphy is the main message in some designs, with geometric motifs as the border. The Al-Qur'an and kiswah manuscripts contain Islamic Art that depicts the surah as the main message, with a geometric or floral pattern as a border. Geometric patterns are also used as the main Art, with floral as the border. This Art is frequently found on the mihrab in mosques [32] and on some walls in the Andalusian region [17], [33]. Figure 11 depicts a wall decoration incorporating Islamic calligraphy as the main message and geometric and floral patterns as the border.

Figure 11. Wall decoration consists of 3 kinds of Islamic Art

A simple material should be used when combining three Islamic arts on a fabric. It is because the three arts can all appear at the same time. If it is displayed on connection fabrics, such as patchwork, it should only show one type of Art, such as Islamic calligraphy. Because the background already contains a variety of motifs, the Art in the foreground should be more superficial.

CONCLUSION

Waste can be reduced in three ways: reduce, reuse, and recycle. The Government and the campus compete to reduce waste, particularly fabric waste. Bina Nusantara University invites numerous assisted MSMEs to participate in a waste management training session in its community development program. Participants were trained on how to turn fabric waste into valued interior products. The techniques demonstrated begin with joining fabric waste using patchwork, quilting, and applique connection techniques. These three techniques are examples of the reuse method in action. Other approaches, such as digital screen printing with themes such as Islamic Art, are required to value the benefits of these products. The improvement of the reuse approach is the upcycling method. It is a process that converts an object no longer in use into a new object with a value equal to or greater than the original. The use of Islamic geometric designs, floral, vegetal, and calligraphy patterns on interior items may enhance the interior of a home while also giving it an Islamic atmosphere.

ACKNOWLEDGEMENT

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