ETHNOMATHEMATICS: EXPLORATION OF MATHEMATICS THROUGH A VARIETY OF BANTEN BATIK MOTIFS

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Abstract

Mathematics is a science interconnected with human life, one of which is the field culture. The relationship between culture and mathematics is referred to as ethnomathematics. Ethnomathematics is a study of science that studies the relationship of mathematics to culture. Indonesia has a cultural diversity, one of which is batik. Which batik has been designated as a cultural heritage by UNESCO and should be developed and preserved by the community? Batik Indonesia has motifs and patterns according to their respective regions. Banten as a batik producing area has 75 varieties of Banten batik motifs that were legitimized on May 25, 2004. This study describes several Batik motifs and their relation to mathematical concepts. The research was conducted using a qualitative descriptive method with an ethnographic approach. This study found that the variety of Banten batik motifs has mathematical and philosophical value. The mathematical value contained in the Banten batik motif is in mathematical concepts consisting of plane figures and geometric transformation.
Keyword: ethnomathematics, Batik Banten, Exploration

INTRODUCTION

is a subject that is considered difficult for some students. Mathematics is regarded as a lesson that is nothing more than numeracy, playing with theangkaadanrrumus. Thus, students assume that mathematics understood or studied. Whereas students need mathematics to develop the ability to think logically, systematically, and critically as the basis of human thinking in life (Maryati & Rully C.I.P., 2018). Therefore, mathematics has become one of the essential subjects to be studied at all school levels.

Mathematics is set in everyday life. Even in every problem or problem, man cannot be separated from the role of mathematics. If we observe the objects around, ranging from tables, chairs, and *mobile phones*, to the house we live in, using mathematics. Indirectly, humans have known mathematics in their daily activities, but many do not realize it. Various products or works from the customs and culture of the surrounding community without us suspecting to have mathematical elements. This connection between culture and mathematics gave birth to a study called ethnomathematics.

The first person to introduce ethnomathematics was D'Ambrasio. According to him, ethnomatematikaaberasall from the words "ethnic," "mama," and "tics," which are defined as ethics implemented in a cultural group that refers to their cultural symbols as well their behavior and customs. (Arwanto, 2017)

As a nation with cultural diversity, Indonesia has the most recognizable culture in the eyes of the world, namely batik. Even was determined *ajamasterpiecessoff their IntangibelllHeritage* obtained by UNESCO on 22Oktoberr 2009. Indonesian Batik has various types and patterns from each region. One of the batiks producing areas is Banten. Batik

Banten has a distinctive motif characterized by Banten's historical philosophy values. Banten Batik has 75 varieties of motifs legitimized on May 25, 2004. However, many people are not familiar with Banten batiks. Therefore, the ethnomathematics of culture owned by an area can be introduced and preserved to the crowd, especially students, as the nation's successor.

Ethnomathematics allows youth, especially batik, to be introduced to the crowd, one of which is used in mathematics learning. Researchers studied and analyzed the ethnomathematics of Banten batik based on several previous studies related to ethnomathematics, including ethnomathematics on Banten batik motifs by Isnaini Mahuda (2020), ethnomathematics of Surakarta palace batik patterns by M. G Astriani & Y. D. Kristanto (2021), ethnomathematics in batik knowing by A.D.I. Christiani, F.Y. Sari & E. Pramita (2020), ethnomathematics in batik pamiluto Gresik by Roisatun Nisa (2020), ethnomathematics on Madura batik by Moh. Zayyadi (2020), and another research are using ethnomatematikaapadaabergaiimotif batikkdiiIndonesia.

METHOD

This research uses the descriptive method ccukualitatiff with the approximation of the ethnographic approach. According to Krisyanto (in A.D.I. Christiani, F.Y. Sari & E. Pramita, 2020), methods aim to describe and decipher phenomena like going through the collection of dataaberdasarkannfaktaa on the field.

Arikunto (in Isnaini Mahuda, 2020) revealed that in descriptive research this study seeks to decipher the data with terms or sentences to get a conclusion.

The nearekatannetnografii is an empirical and theoretical approach that has the intention to get a picture and an in-depth analysis of culture based on Field research (Spradley in Sudirman, 2018). According to the type and approach of the study, the main instrument based on this research is the researcher himself *(human agency)*, which is supported by several other tools, namely field records, interviews, and documentation. This research was conducted on November 20, 2021, in the Kebon Kubil area, Serang city.

RESULTS AND DISCUSSIONS

This study defined the concept of mathematics or elements of mathematics elements in several Banten batik motifs accompanied by philosophical values. The following will be outlined mathematical concepts contained in Banten batik motifs.

1. Pamaranggen Motif

1. PAMARANGGEN

Picture   1.1

Pamaranggen is the name of the location in the Banten Sultanate, which is used as a place for gathering kris artisans and keris accessories. This batik motif has red, black, and white as the color-forming elements. Its meaning shows courage, wisdom, firmness, purity, and sincerity. This batik motif is in the form of a rhombus decorated with flowers in the middle.

If observed   accurate This batik motif resembles a butterfly pattern.
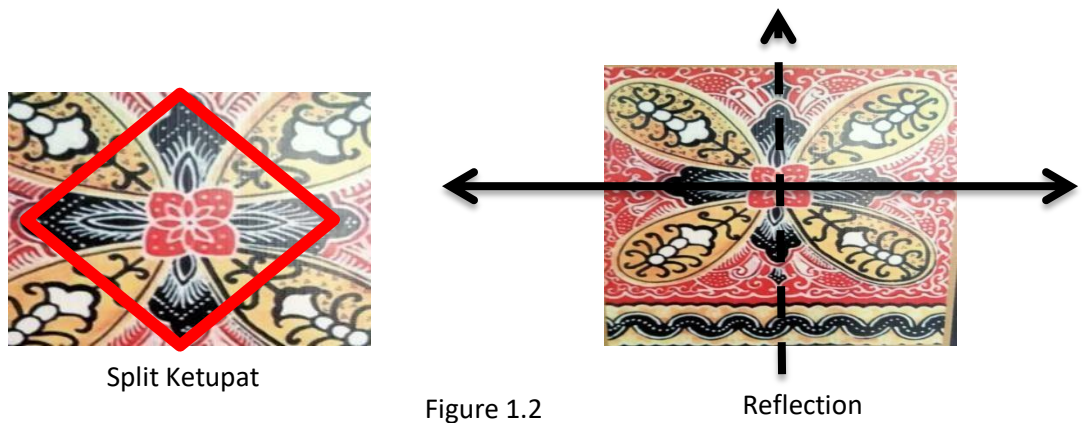
Split Ketupat

Figure 1.2   Reflection

The mathematical elements seen in Figure 1.2 are   horizontal wake-up concept, the rhombusupatt, and the idea of reflection (mirroring), if described at the coordinates of the cartesiuss, which becomes the axis of the axis is the upright axis or y-axis. 2. Kasunyatan Motif

2. CASSNYATAN

Figure 2.1

Kasunyatan on this batik motif is the name of the residence of the village of the saints. Kasunyatan batik has a dominant color, red, which symbolizes courage and strength. In this batik motif, there is a pattern of circles and rhombus.
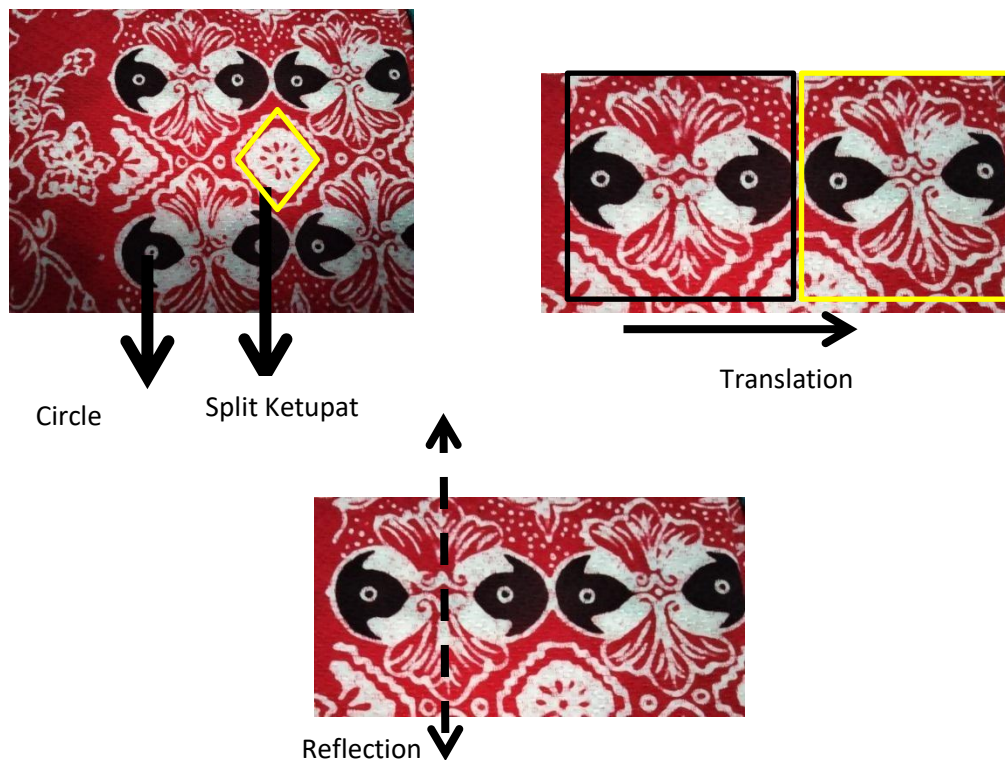

Figure 2.2

Mathematical elements contained in this batik motif are flat build and geometric transformation. The building that is depicted is a rhombus and a circle. While the change defined is a reflection (mirroring) against the vertical line (y-axis) and translation (shift) to the right against the horizontal line (x-axis).
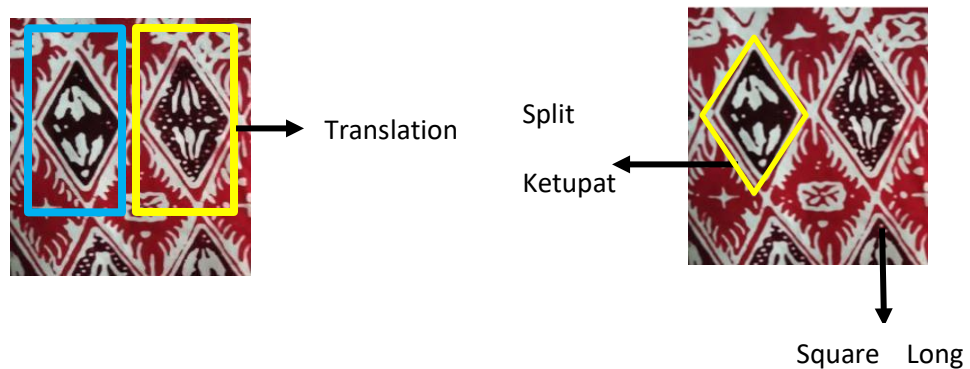
3. Motif Sabakingking

Sa bakingking

Figure 3.1

The sebakingking motif is composed of rectangular piles with fluffy sides. This motif has a philosophical value related to the title of panembahannSultannMaulanaaHasanudin in spreading Islam.

Translation

Split

Ketupat

Square   Long

Picture   3.2

The mathematical element in the sabakingking motif building consists of a rectangle and rhombus, while the concept of geometric transformation is a translation (shift). In addition, there is a concept of revival shown by the pink quadrilateral and the crimson rectangle.

4. Motif Pangindelan Mas

Figure 4.1

The batik motif of Banten pangindelan mas has a philosophical value to the name of the third door clean water filtration place in the Banten Sultanate. The mathematical element contained in this motif is flat wake-up symmetry. Build flat depicted that is split ketupat and circle. In addition, there is the concept of geometric transformation, namely translation and reflection.

Circle

Split Ketupat

a

a'

Translation

Figure 4.2

Reflection
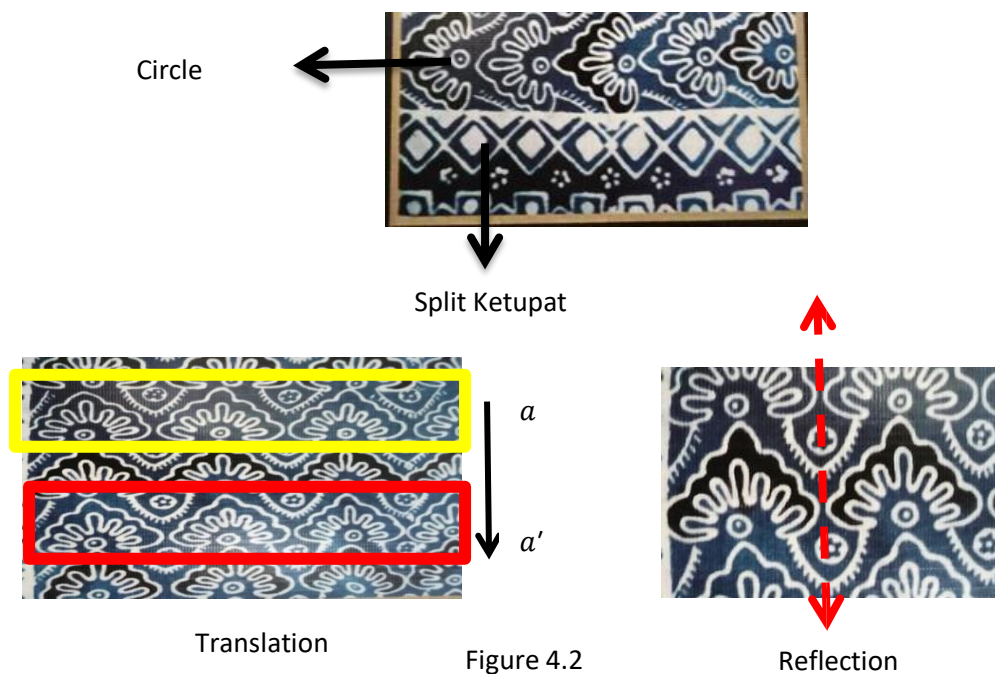
5. Pasepen Motif

Figure 5.1

The pasepen motif has a philosophical value where SultannMaulanaaHasanudin performed tafakur in the Banten Sultanate. The mathematical elements depicted in this batik motif are the concept collection and geometric transformation. The flat build depicted is a circle and triangle are undergoing geometric transformation, namely translation.
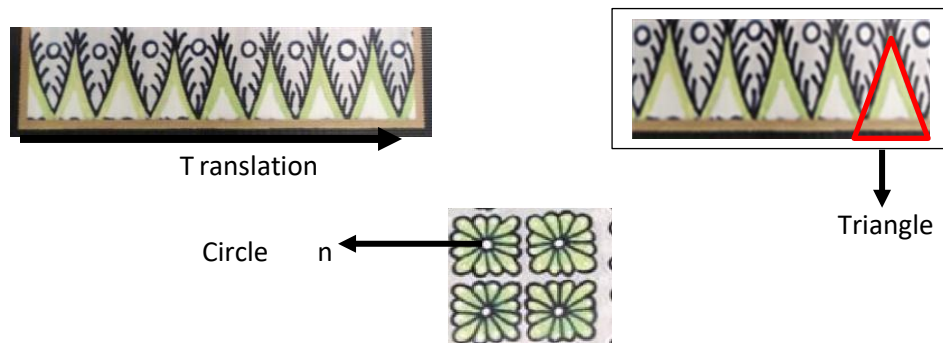

Figure 5.2

6. Pejantren Motif

Pesantren Batik is patterned with a basic pattern in the form of flowers, and its color components are patterned blue for basic fabrics and dark red. The name of the pesantren is related to the place where a woven craftsman in an area of Banten or a settlement of Banten people who work as weavers.
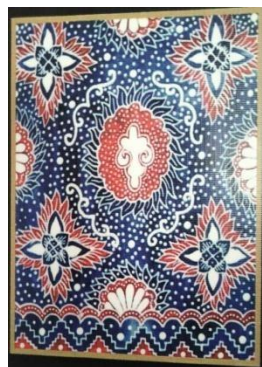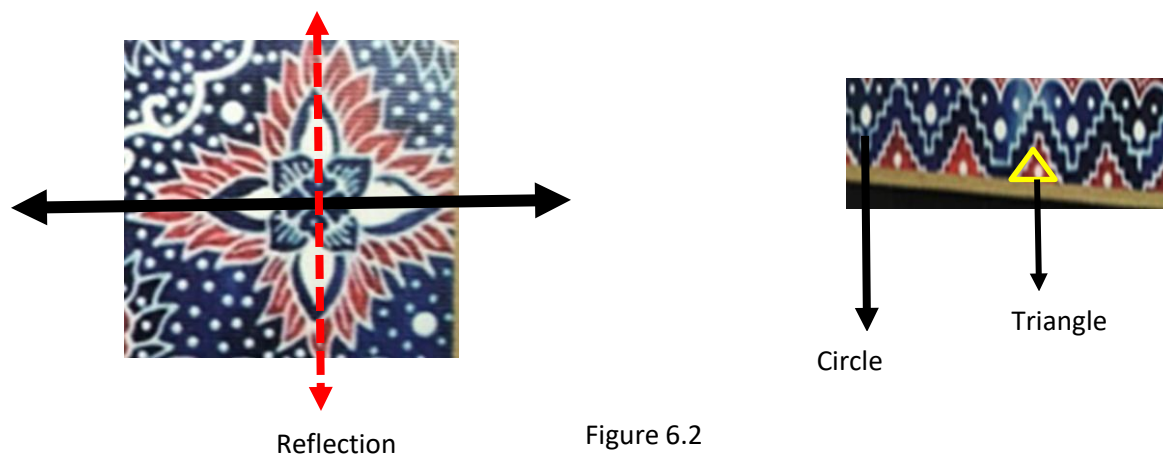

Figure 6.1

Mathematical elements contained in the batik pesantren the concept of reflection (mirroring) and flat build, namely circles and triangles, as shown in figure 6.2.

Reflection

Figure 6.2

CONCLUSION

Based on the research results presented above, the variety of Banten motifs has elements or mathematical values in addition to philosophical matters. The intellectual significance of Banten batik motifs is based on the history of Banten and the people of Banten itself. The mathematical values depicted in Banten batik motifs are in the form of mathematical concepts consisting of building data (rectangles, triangles, circles, and rhombus) and transformation geometry. (translation and reflection).

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