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MATHEMATICAL CONCEPTS ON BATIK BANTEN MOTIFS

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Abstract
Ethnomathematics applies mathematical concepts associated with cultural phenomena carried out by a group of people and others. Indonesia is one of the countries that have cultural wealth from various regions. One of these cultures is batik. Batik can be associated with mathematical concepts; various regions own batik. Banten is one of the batik artisan provinces. It is time for us as a younger generation to help preserve and even introduce batik to remain famous in modern times like this. Banten has a variety of batik motifs that we will discuss such as baduy kahuripan, tambakbaya, queen girlfriend, pasepan and gula sakojor. All motives have their philosophy. Ethnomamatics research is qualitative research using ethnographic approaches. The research results obtained that in addition to containing philosophy of various motives. Motifs in batik also have continuity with mathematical concepts such as revival, cooperation, symmetry, and concepts on geometric transformations such as translation, dilation, reflection, and even rotation.
Keywords: Ethnoomatematics; Banten Batik Motif; Philosophical Meaning; Numerical Ideas; and Mathematical Concepts

INTRODUCTION

Mathematics is one of the subjects in school, and the theory taught is often encountered in everyday life. Since long ago, mathematics has existed, but many people have not realized the existence of mathematics around it. Without realizing mathematics has something to do with culture, it can be said that mathematics existed a long time ago. The relationship of mathematics with this culture is called ethnomathematics.

According to D'Ambrosio: 1984 (in Mahuda, 2020, p. 30), the word ethno has meanings in cultures such as dialects, languages, beliefs, values, food, clothing, behavior and habits. As for mathematical concepts in the form of measurements, calculations, classifications and theories to make decisions. Thus, the application of mathematics in cultural groups is followed by ethnomathematics. Ethnomathematics is the practice of cultural groups with mathematical concepts identified as tribal communities, children and others (D'Ambrosio, 1985). Thus, based on the definition above, Ethnomatematics is an application of mathematical concepts associated with cultural phenomena carried out by a group of people and others.

Indonesia is one of the countries that have cultural wealth from various regions. The cultural wealth owned by Indonesia is one of the batik; batik was designated as a cultural

heritage owned by Indonesia on October 2, 2009, so on that date, it is called national batik day. Batik culture is owned by several specialties, one of which is Banten batik. Banten batik has many unique motifs; the difference between Banten batik and other batik is motifs, colors and philosophies. Ethnomathematics exists in the dominant batik with its motifs.

METHOD

The method in this study uses library research. Previously, we observed by visiting the Banten batik center; in this type of research, we analyzed ideas, knowledge, and findings obtained from observations to present theoretical and scientific information. The information collected and analyzed is secondary data in research results such as direct observations, journals, and sites related to ethnomatematethnomathematicsrch began on November 20, 2021; this study was conducted in Cipocok, namely in the Banten batik center. This location was chosen because the batik-making place has been quite long since 2004, and there are various kinds of batik as well. Namely, there are written batik and printed batik. Founder of Ir. Uke Kurniawan with 75 ornamental varieties that have been applied to 50 Banten batik designs and received legitimization from the institution. On May 25, 2004, through the regulation of the Minister of Justice, he already had a patent. The basic pattern batik motif of ornamental variety comes from ancient historical objects called terra artifacts from archaeologists in 1976.

Color tends to be soft gray showing the character of Banten people and the nature of color; among others, the ideals of the idea of willpower and temperament tend to be high and calm carrying. The name of the motif used is related to the history of Banten, which comes from ancient villages, rice fields and the Banten sultanate. This research technique is (1) Data processing, (2) Interview, and (3) Observation.

RESULTS AND DISCUSSION

The results of this study are focused on the existing motives of mathematical concepts. Banten batik has many motifs, in this study only took 5 banten motifs, namely tambakbaya batik, queen girlfriend batik, pasepen batik, sakojor sugar batik and baduy kahirupan batik. The mathematical concepts contained in the 5 batiks are:

1. Batik Tambakbaya

This tambakbaya motif is the city name of the palace building where the keratin night guard.

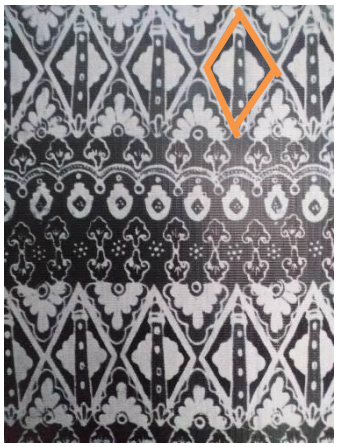

Figure 1. Batik Tambakbaya (Personal Documentation)

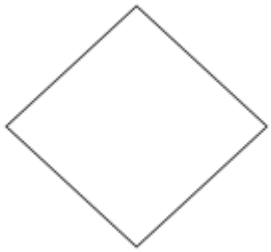

Figure 2. Split Ketupat

In tambakbaya batik, there is a mathematical concept, namely rhombus, where the rhombus is one of the flat rectangular wakes in the mathematics of Junior High School Class VII. In addition, in the batik tambakbaya motif, there is also a flat wake in the form of a circle with a small diameter.

2. Batik Ratu Pacar

Figure 3. Batik Ratu Pacar (Personal Documentation)

The mathematical concept in this motif is using a flat build shape split rhombus at the bottom of the motif.

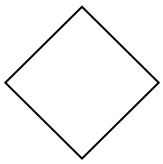

Figure 4. Split ketupat

In addition to the rhombus, we can pay attention to the motif of the queen boyfriend has a circle shape where the circle is also one of the flat wakes in mathematics lessons.

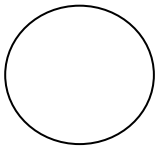

Figure 5. Circle

In the motif of the queen of this boyfriend, there is also the concept of reflection, which is a motive formed from the mirroring process to produce a similar motif, followed by the nature of the mirroring.

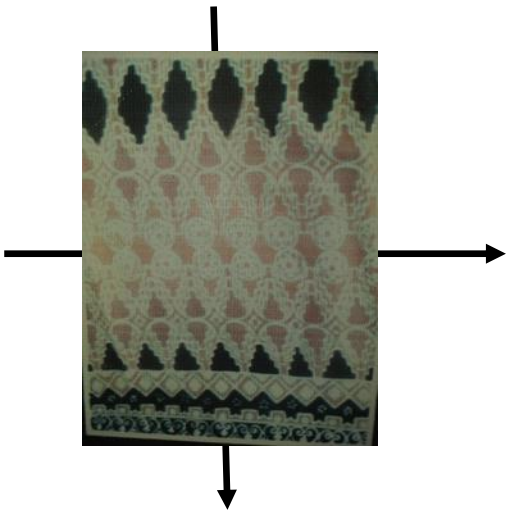

Figure 6. Reflection of the girlfriend queen's motif

3. Batik Pasepen

Batik pasepen is the name of the palace layout place where potters and ceramic craftsmen in the Banten Sultanate area. The ornamental variety motif found in pasepen batik is an intellectual heritage of Banten's past.

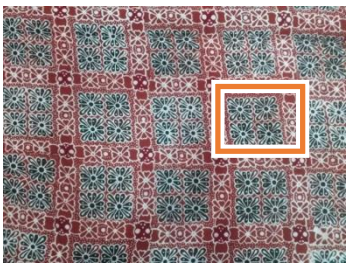

Figure 7. Batik Pasepen

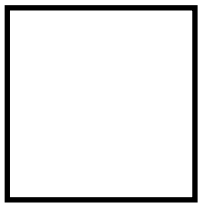

Figure 8. Square

In this Pasepen batik, there is a mathematical value to building a square flat. In addition, in Batik Pasepen, there is also a mathematical value (mirroring). It can be seen when depicted on the coordinates of Cartesius then observe the following figure:

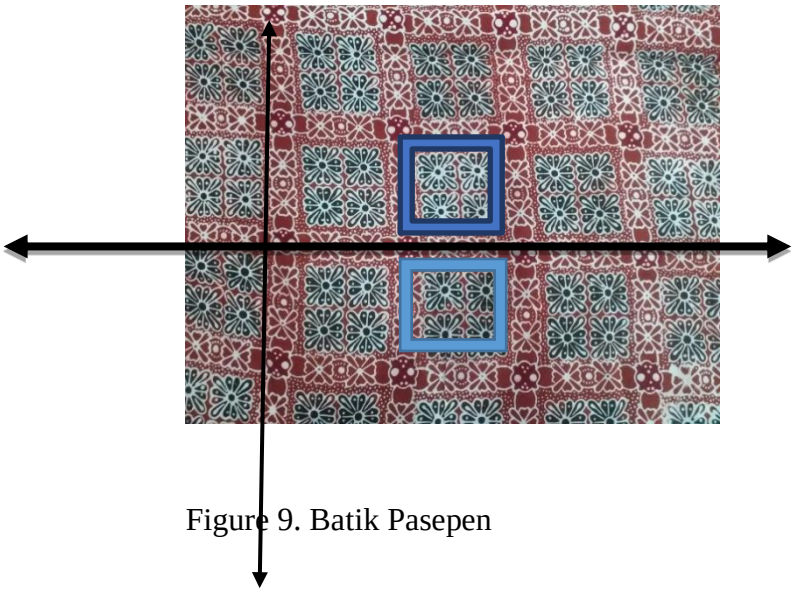

Figure 9. Batik Pasepen

4. Batik Gula Sakojor

Figure 10. Batik Gula Sakojor (Subekhi Documentation, et al: 2021)

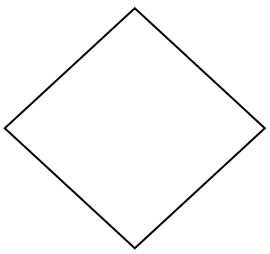

Figure 11. Split Ketupat

In this sakojor sugar batik, there is a mathematical concept of flat build rhombus; rhombus is a two-dimensional flat wake contained from four triangles with the same angle. Rhombus is found in the mathematics subjects of Grade VII Junior High School.

In addition to the mathematical concept contained in daam batik gula sakojor is built flat rhombus, there are also mathematical concepts in this sakojor sugar batik, namely:

Reflection

Figure 12. Batik Gula Sakojor

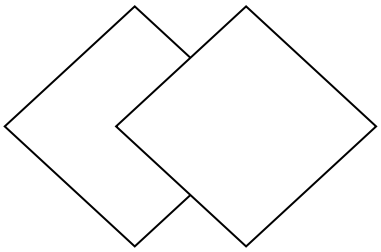

Figure 13. Mathematical Reflection

Reflection or mirroring is the material in the mathematics lesson of one part of the transformation; reflection is a geometric build that provides displacement with the nature of a flat mirror image.

1. Batik kahuripan baduy

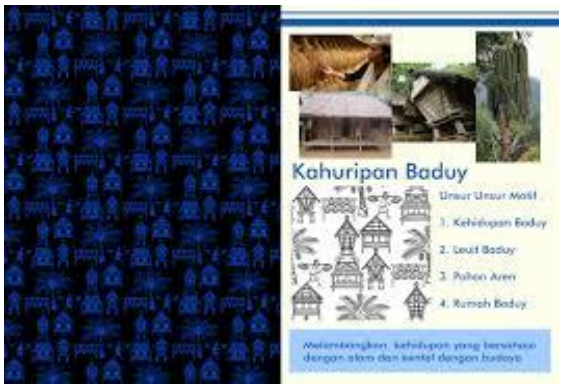

Figure 14. Batik Kahirupan Baduy

This batik is a typical Banten batik, namely the Baduy community with the name "Baduy kahuripan," which means the life of the baduy community. One of these batik patterns has a deep meaning in it. It is symbolized by community activities in the environment that are still attached to the owned and preserved customs. The baduy tribe is one of the indigenous people located in the interior of Banten Province. Based on the pattern, we can see a variety of baduy community activities, such as palm plants, baduy community residences, but (rice barns), and rice to eye portraits of baduy people.

1. There is a flat wake-up shape that is,

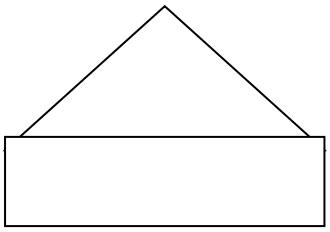

Figure 15. Triangles and Rectangles

In this baduy kahuripan batik, there is a picture of a badly traditional house that turns out there is a mathematical concept of building flat triangles and rectangles, both of which are 2-dimensional flat wakes contained in the material of the 7th grade of junior high school.

In addition, the mathematical concepts contained in this baduy batik kahirupan are as follows:

2. We can see this batik motif is from several characteristics of the keseharian community sector. Namely, there are traditional houses, palm plants, rice deposits, rice until one of the living habits of the surrounding residents, so the mathematical concept contained in the pattern This batik is in the form of geometric transformation, which is a shift or commonly called translation. An example that we can see if a subset of batik pattern sector we put in one of the fields made of two lines, then from the sector Kumpulan is: for example if a point is shifted so to the right then towards the top like

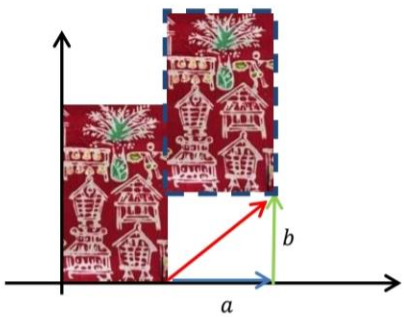

Figure 16. Translation

CONCLUSION

Based on the results above in the discussion of this study, the conclusion is that the motifs in Banten batik have thein value that exists in the name of the motif and elements. In addition, in Banten batik, there is also a mathematical value of geometry that contains aspects of flat build such as rhombus, squares, rectangles and triangles. Mathematical concepts on geometric transformation consist of the concepts of translation, reflection, and dilation. As for this study, 5 motives have been studied related to each other on mathematical concepts.

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