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Ethnomathematics: Concept of Transformation Geometry in Sasambo Batik Motifs Bale Lumbung Sasak

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Abstract

The research method used is qualitative research with an ethnographic approach. This purpose aims to explore the existence of mathematical concepts, especially the transformation geometry material in Sasambo Sasak batik. Then describe the transformation concepts contained in the batik. Researchers dig up information through observation, literature, and interviews with batik-related craftsmen to obtain accurate information. Respondents in this study were determined by the purposive sampling method. The selected respondents are Sasambo batik craftsmen. The results showed that there are geometric transformation concepts in the Sasambo Bale Lumbung Sasak batik motif, including translation, reflection, dilation, and rotation.
Keywords: Ethnomatics, Geometry Concepts, Sasambo Batik

1. Introduction

Mathematics is part of science that has an important role in supporting the progress of modern technology (Mulbar, 2012). In addition, in informal schools, learning mathematics is an important element of education that can improve students' problem solving, reasoning, and thinking processes to solve problems and has an important role in students' futures (Dewi Murniati et al., 2013).

Along with the times, the problems found in learning mathematics are very complex. Therefore, learning mathematics should be connected with the reality of social life, because mathematics has become part of the culture during student life (Putri, 2017; Sandhi et al., 2018). In addition, learning mathematics through culture is also very interesting because there is social interaction between students so that learning becomes more meaningful (Elly Susanti et al., 2020; Sudirman et al., 2017).

Mathematics and culture are two things that are very closely related. Both are unavoidable in everyday life (Putri, 2017). However, it is not uncommon for mathematics to be considered disconnected from everyday life. The term used for mathematics that includes culture is ethnomathematics (Jayanti & Puspasari, 2020).

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Ethnomathematics was introduced by D'Ambrosio in 1985. Ethnomathematics is referred to as a branch of science that builds students' mathematical knowledge through local culture (D Herawaty et al., 2018; Richardo, 2017). The development of ethnomathematics is very rapid, so that people are less aware of the presence of ethnomathematics. This is because ethnomathematics is considered too simple when compared to mathematics at the formal school level (Samo, 2017; Sandhi et al., 2018).

Ethnomathematics is a study that emphasizes the relationship between mathematics in schools and culture in society (Yuningsih et al., 2021). Ethnomathematics is a form of innovation to eliminate the notion that mathematics is rigid. Through ethnomathematics, it can bridge between culture or daily habits and formal mathematics (Putri, 2017). This can clarify that mathematics and local culture are indeed related to each other, and mathematics can be explored within a culture (Jayanti & Puspasari, 2020).

Indonesia is one of the Asian countries with a variety of cultures. One of the proven areas, namely West Nusa Tenggara (NTB), has abundant cultural wealth (Sukarni & Windhari, 2017). The superior culture in NTB collaborates with three different tribes, namely the Sasak, Samawa, and Mbojo who are wrapped in Sasambo batik creations (Amalia Ika Safitri, Agus Sudarmawan, 2019). In 2010, Sasambo batik was ratified as a cultural heritage of NTB by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (Sukarni & Windhari, 2017).

Sasambo batik is an acronym for the names of three major tribes in NTB, including the Sasak (Lombok indigenous people), Samawa (Sumbawa native tribes), and Mbojo (Bima indigenous people) (Amalia Ika Safitri, Agus Sudarmawan, 2019; Sukarni & Windhari, 2017). This is with the aim of making every tribe in the NTB province feel ownership and mutual preservation of the use of Sasambo batik in everyday life.

Through interviews, information was obtained that the motifs contained in Sasambo batik were inspired by four elements that describe the characteristics of the NTB region, namely: (1) The motifs of cultural knick-knacks such as art tools such as drums beleq, peresean, bale lumbung, and cidomo. (2) Motifs that describe the beauty of nature, such as beaches, forests, and mountains. (3) The motifs of typical culinary plants and herbs in NTB. (4) Animal and plant motifs inspired by the NTB government's flagship program in developing the local economy.

The main focus of this research is to explore the mathematical concepts contained in the Sasambo Bale Lumbung Sasak batik motif. The origin of the Bale Lumbung batik motif certainly carries a message of its own uniqueness and uniqueness when compared to other motifs. In addition, through the architecture of

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the Bale Lumbung motif on Sasambo batik, it is also designed using mathematical measurements, the balance of the distance between the images or the geometric shapes of the parts of the motif.

Based on the initial observations made by the researcher, one of the mathematical concepts unconsciously applied by the community to make Sasambo batik with the Bale Lumbung motif is transformation geometry. This is supported by information obtained by researchers from craftsmen who explain that there is a mathematical concept in the formation of the Sasambo Bale Lumbung batik motif.

Several studies examining ethnomathematics show that there are mathematical concepts in batik motifs, including exploration of geometric concepts in Pasedahan Suropati batik (Ulum et al., 2018). Ethnomathematical exploration was also carried out in making batik motifs in Majalengka Regency (Sudianto & Santoso, 2021). Furthermore, research by Afifah et al. (2020) conducted an exploration of mathematical concepts in Gajah Mada batik with the Sekar Jagad motif. In addition, there is also research related to the exploration of mathematical concepts in Sukapara batik (Mulyani & Natalliasari, 2020).

Based on the previous studies above, it is obtained that there is no research that focuses on mathematical exploration, especially the concept of transformation geometry on the Sasambo Bale Lumbung Sasak batik motif. So research related to this context is very important to do to reveal the mathematical concepts contained in the Sasambo batik motif. Therefore, researchers are interested in conducting research with the title " Ethnomathematics: Concept of Transformation Geometry in Sasambo Batik Motifs Bale Lumbung Sasak".

2. Method

This type of research uses qualitative research with an ethnographic approach. This objective aims to explore the existence of mathematical concepts, especially the transformation geometry material in Sasambo Sasak batik. Then describe the transformation concepts contained in the batik. Researchers dig up information through observation, literature, and interviews with batik-related craftsmen to obtain accurate information. Respondents in this study were determined by a purposive sampling method. The respondents selected were Sasambo batik craftsmen in the Sasambo Bumi Gora (SBG) batik center, Griya Perampuan Asri VIII/Block S NO 6-7, Perampuan Village, Labuapi District, West Lombok Regency, NTB and a mathematics teacher. The flow of this research, namely documenting everything related to the Sasambo batik motif, conducting interviews with respondents to explore information, and obtaining research results and conclusions. Data analysis techniques used include data reduction, data presentation, and drawing conclusions or verification.

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3. Result and Discussion

Through the results of observations that have been made by Sasambo batik craftsmen at the Sasambo Bumi Gora batik center, it can be seen that Bale Lumbung Sasak has 4 pillars, each with a height of 189 cm. The distance between the poles is 168 cm, and the length of the Bale Lumbung roof is 280 cm. For a clearer description of Bale Lumbung Sasak, see Figure 1.

Figure 1. Bale Lumbung Sasak

1. Translation

Bale Lumbung Sasak is proof that there is a wealth of culture in Lombok. In addition, Bale is also an inspiration for batik craftsmen to form a distinctive motif on Sasambo batik. As for the Bale Lumbung motif found in Sasambo batik, it can be seen that the length of the pole is 1.5 cm with a distance between the poles of 1 cm. The length of the roof of the Bale Lumbung motif for Sasambo batik is 2.15 cm, and the distance between the first and second Bale Lumbung motif is 2 cm. Furthermore, the distance between the second and third Bale Lumbung motifs is 2 cm, and the distance between the third and fourth Bale Lumbung is 2 cm. Based on the Bale Lumbung motif found in Sasambo batik, there are several geometric concepts contained in the Bale Lumbung batik Sasambo motif, the first of which is the length of the pole, where the length of the poles with each other has the same size, namely 1.5 cm, so it can be stated that the poles with each other have a measure of symmetry. For more details, see the following image.

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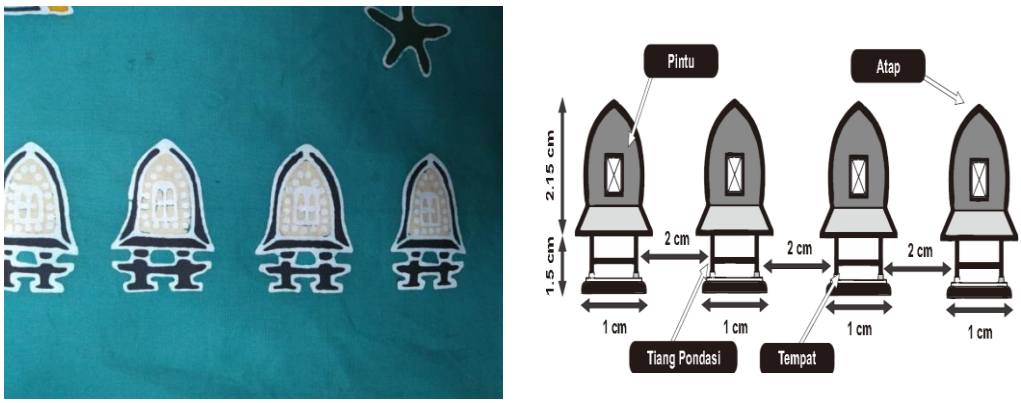

Figure 2. The Concept of Translational Transformation on the Bale Lumbung Motif

Based on Figure 2, it can be seen that the distance between the poles of the Bale Lumbung batik Sasambo motif is 1 cm. The shift in the Bale motif on batik is carried out from the starting point to the next point, which is 2 cm. Likewise, the second, third, and so on shifts have the same value, which is 2 cm. This proves that there is a geometrical concept of transformation on the poles of the Bale Lumbung batik Sasambo motif, namely translation, because the shift made to the Bale motif in batik has the same value from one point to another.

2. Reflection

Furthermore, the roof motif on Sasambo batik has a size of 2.15 cm, with a peak on the roof of Bale Lumbung with Sasambo batik motifs. The peak point is at the top of the roof of the batik motif, where the left and right sides of the roof of the Sasambo batik motif have the same value and size. More details can be seen in the following image.

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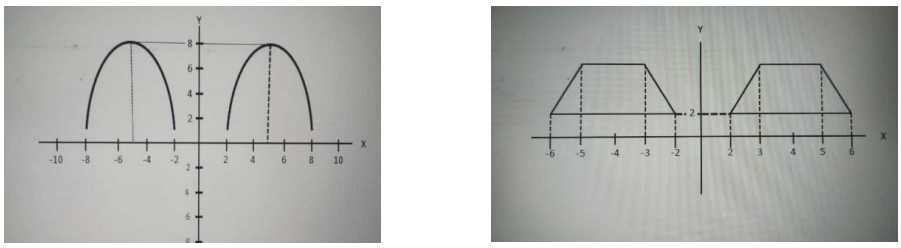

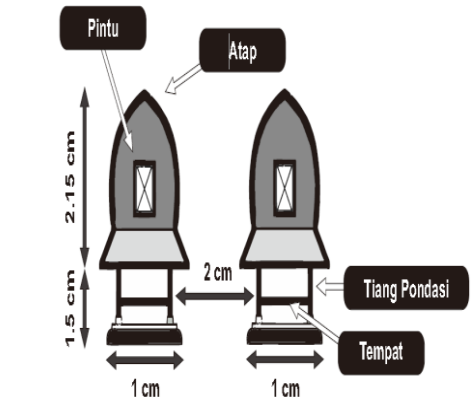

Figure 3. The Concept of Reflection Transformation on the Bale Lumbung Motif

Based on Figure 3, on the left with the right side of the roof with a peak on the top of the roof of the Sasambo batik motif, which faces downwards with a parabolic curve shape, and on the bottom of the roof, it is in the form of a trapezoid, so that if it is reflected, it will produce a building shape with asymmetrical architecture. This proves that there is a geometrical concept of transformation on the roof motif of Bale Lumbung batik Sasambo, namely a reflection, because there is an axis of symmetry on the left roof with the right roof having a peak at the top of the roof of the Sasambo batik motif facing downwards.

3. Dilation

The architectural firm of the Sasambo batik motif also consists of images of Bale Lumbung Sasak in different sizes. The difference in size can be seen more clearly in the following image.

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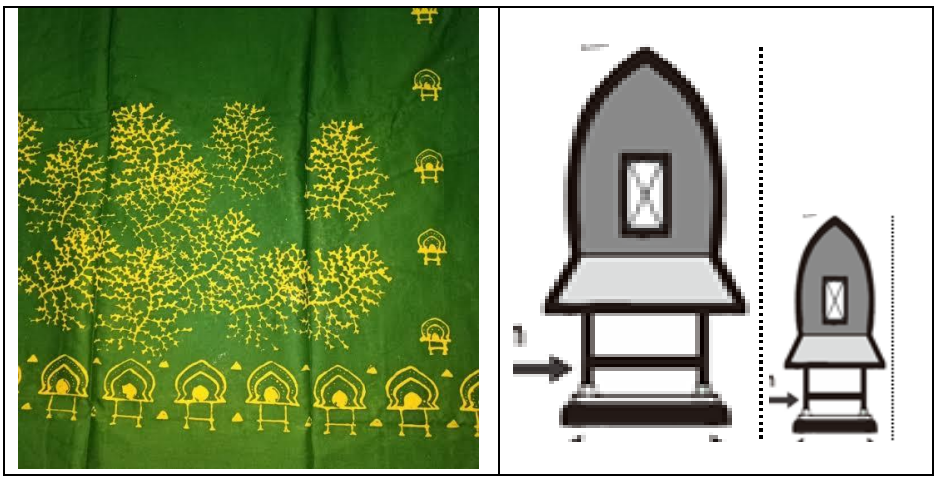

Figure 4. The Concept of Dilatation Transformation on the Bale Lumbung Motif

Based on Figure 4, the Bale Lumbung motif found in sasambo batik is both large and small. The craftsmen designed the Bale Lumbung Sasak batik motif with a size of 1: 3 cm^2 for the image of the Sasambo batik motif. Thus, this explains that there is a geometric transformation concept, namely the dilatation of the Sasambo batik motif, because the motif is formed by craftsmen through a process of changing sizes from large to small or vice versa.

4. Rotation

Furthermore, the Bale Lumbung Sasak batik motif formed by craftsmen obtained the concept of transformation geometry, especially rotation. This can be explained by the following picture.

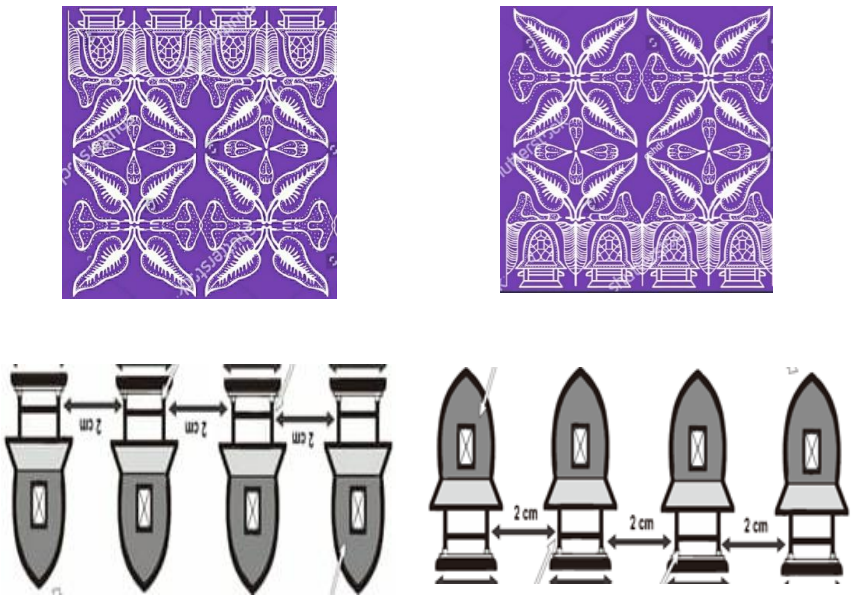

Figure 5. The Concept of Rotational Transformation on the Bale Lumbung Motif

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Through Figure 5, it can be stated that without realizing it, the batik craftsmen who formed the Bale Lumbung Sasak motif in sasambo batik applied the concept of transformation geometry, namely rotation. The rotation in the batik motif has a rotation of 180^0. Thus, it can be said that in the Bale Lumbung Sasak motif there is a geometrical concept of transformation in rotation.

4. Conclusion

Based on the results and discussion, it can be concluded that there are several geometric transformation concepts in the Sasambo batik motif that relate to the Bale Lumbung Sasak motif. The mathematical concepts include translation, reflection, dilation, and rotation.

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