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Ethnomathematics: Learning Geometric Transformation Through the Formation of *Lagosi* Motif

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ABSTRACT

The Lagosi motif, a prominent design in the traditional fabric of the Wajo district, is well-known but increasingly rare among local weavers. This motif, drawing inspiration from natural elements such as flowers and stems, holds significant philosophical and cultural meaning for the Wajo people, serving as a key element of their endangered cultural heritage. Despite its cultural importance, the motif has been minimally explored in the context of ethnomathematics. Consequently, this study investigates the mathematical concepts inherent in the design of Lagosi motifs, aiming to utilize them as educational tools for students and to support cultural preservation efforts. Employing a qualitative research methodology with an ethnographic approach, data were collected through observations, interviews, and documentation. The validity and reliability of the data were ensured through triangulation and confirmability. The study reveals that geometric transformations, specifically translation and reflection, play a central role in the creation of Lagosi motifs. These findings highlight the natural emergence of mathematical concepts within local cultural practices, offering potential for their integration into contextualized mathematics education. Furthermore, the results aim to instill a sense of cultural pride in students, thereby contributing to the preservation of Wajo's cultural heritage. The study also underscores the opportunity to leverage Lagosi motifs as culturally relevant educational tools and to foster interdisciplinary collaboration between mathematics and cultural studies.

Keywords: Ethnomathematics; Geometry; Lagosi motifs, Wajo, Weaving

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INTRODUCTION

Geometric transformations are an important component of geometry that facilitate the analysis and creation of complex patterns and motifs (Clements & Sarama, 2004). These transformations include several operations, including translation, rotation, reflection, and dilation, each of which provides a unique way to change the structure and appearance of geometric figures (Reksaningrum & Muljani, 2022; Rozi & Budiarto, 2022). Through these transformations, geometric patterns can be altered, combined, and adapted to create various visual compositions.

In local cultural contexts, the integration of mathematics, particularly geometry, presents challenges and opportunities. Although mathematics provides a universal language for understanding and expressing concepts, cultural nuances and practices can differ, creating a gap between mathematical principles and local traditions (de Abreu, 2020; Morita-Mullaney et al., 2021; Owens, 2014). Bridging this gap requires a different approach, one that recognizes the importance of the cultural context while using mathematical concepts to enrich and preserve cultural heritage. In this case, ethnomathematics has emerged as a solution that integrates culture and mathematics (Pathuddin & Raehana, 2019). Ethnomathematics broadens the horizons of mathematics so that cultural diversity becomes a richer contributor to people's understanding of their world (Barton, 1996).

Many studies have explored the interface between geometry and local culture. The exploration of ethnomathematics in the Al-Barkah Grand Mosque shows the concept of geometric transformation, such as reflection on the mosque door and rotation and translation of the fence ornament (Soebagyo & Luthfiyyah, 2023). Furthermore, ethnomathematical research conducted on various types of woven fabrics and batik cloth patterns also shows the existence of geometric transformations, such as translation, reflection, rotation, and dilation (Bustan et al., 2021; Christanti & Sari, 2020; Intan, 2021; Irvan, 2023; Kusno et al., 2024; Prahmana & D'Ambrosio, n.d.; Turmuzi et al., 2022). Furthermore, translational geometry is also found in the traditional and Balairung Istana Maimun (Ditasona, 2018; Hasibuan & Hasanah, 2022). However, despite these efforts, there is still a gap in the literature regarding the specific applications of geometric transformations in the formation of *Lagosi* motifs.

Lagosi is a typical woven fabric motif from Wajo Regency, South Sulawesi Province. *Lagosi* motifs were obtained directly from the roses. The parts of the flower that become the appearance of this motif are the flowers, small stems, large stems, leaves, and shoots (Sutera, 2024). The complicated process of creating the motif led to the abandonment of the *Lagosi* motif by traditional weavers. Today, it is very rare to find traditional weavers in the Wajo district who have the expertise to make this motif; even in certain areas, some young weavers do not even recognize this motif. *Lagosi* motifs are now only found in modern printing techniques such as screen printing, printing, and embroidery. Indirectly, modernization has eroded the existence of a culture that is full of meaning and philosophy. In addition, when analyzed further, the traditional technique of creating *Lagosi* motifs actually applies mathematical concepts, especially in the area of geometric transformation.

Therefore, the main focus of this study is to explore the concept of geometric transformation. This study aims to fill the gap by exploring how the concept of geometric transformation, especially translation and reflection, is applied in the making of *Lagosi* motifs by traditional weavers. In addition to providing insight into the relationship between mathematics and culture, this study also has the potential to be a medium for learning mathematics that is relevant to the local cultural context. In the long term, it is hoped that the results of this study can contribute to efforts to preserve culture and increase students' pride in their cultural identity.

METHOD

This is a qualitative study with an ethnographic approach that examines the relationship between people and various aspects of their lives, including culture (Harwati, 2019). Understanding culture by learning from local people is an important part of ethnography (Siddiq & Salama, 2019; Winarno, 2015). This is in line with the purpose of this study, which is to explore and analyze the concept of geometric transformation applied by traditional weavers in the process of creating *Lagosi* motifs. This approach was chosen because it allows researchers to understand cultural processes in depth by directly interacting with and studying traditional practices in the local social and cultural context. This approach is very relevant to the research objective, which is to reveal how mathematical concepts emerge naturally in the process of making traditional motifs that are rich in cultural values. This research was conducted in Wajo Regency because it is the center of woven fabric production in South Sulawesi, especially *Lagosi* woven fabric, so that the required data can be obtained more easily. The subjects of this study were weavers, namely those who were directly involved in the process of making woven *Lagosi* fabric.

Data were collected through observation, interviews, and documentation. observations were conducted at a *Lagosi* woven fabric manufacturing site. Different types of woven fabrics with *Lagosi* motifs were observed. Observations were also made during the process of making woven *Lagosi* fabric to reveal the concept of geometric transformation used by artisans to form *Lagosi* motifs. During the observation, the researcher directly observed each stage in the process of making Lagosi motifs, from material preparation to final weaving. The researchers noted steps that involved the application of geometric transformation concepts such as translation and reflection, and noted the weavers' interactions with the traditional tools used. Observations were conducted in a participatory manner, where the researcher participated in the process without interrupting the weaver's activities, to gain a deeper understanding of the process. In addition, interviews were conducted with informants who knew woven *Lagosi* fabrics. Three informants were interviewed, consisting of one woven fabric *Lagosi* seller and two weavers. The researchers asked as many questions as possible about the process of making woven *Lagosi* fabric, such as the preparation of materials, the process of weaving, the cultural meanings contained, and the difficulties faced in preserving the motifs. The interviews were conducted before, after, and during the creation of the motif. To complement the data obtained through the interviews and observations, the researchers documented everything related to the creation of *Lagosi* woven fabrics. The documentation took the form of pictures of the materials, tools, and stages passed in the process of making the *Lagosi* woven fabric.

To ensure the validity of the data, the researchers triangulated them. Triangulation was performed in the form of source and method triangulation. Through method triangulation, researchers compared data obtained from observations, interviews, and documentation. Source triangulation was performed by comparing the results of one informant's interviews with those of other informants. After obtaining valid data, the next step was to analyze the obtained research results. The analysis was performed by linking the process of making *Lagosi* motifs with the concept of geometric transformation using Geogebra tools. Furthermore, before presenting the research results, a confirmation is carried out by discussing the research results with several parties in order to obtain more valid results..

RESULTS & DISCUSSION

Result

Based on the results of the analysis of the *Lagosi* weaving motif, mathematical concepts were found, such as geometry, in particular, the geometry of transformation. Geometry transformation is defined as the process of changing the shape and location of a geometric figure from an initial position to another position. This is denoted by the initial position (x, y) to another position (x', y'). Geometric transformations found in the *Lagosi* woven fabric motifs are translation and reflection.

Translasi

Translations are displacements of points on a plane with a given distance and direction, represented by directed line segments (vectors).

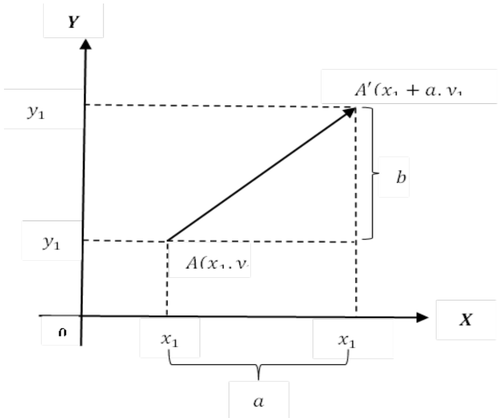

Figure 1. Translation of point A to ABased on figure 1 above, a translation expressed by component $\binom{a}{b}$ will map point $A(x_1, y_1)$ to $A'(x_1 + a, y_1 + b)$ which is denoted as follows.

$$A(x_1, y_1) \xrightarrow{\binom{a}{b}} A'(x_1 + a, y_1 + b) \quad (1)$$

where:

$A(x_1, y_1)$: initial coordinates

a : translation on the x-axis

b : translation on the y-axis

$A'(x_1 + a, y_1 + b)$: translation on A

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Figure 2. Motif with Translation Concept

From Figure 2 above, it can be seen that there is a translational concept that is used by weavers in the production of woven fabrics such as *Lagosi*.

Figure 3. The concept of translation in fabric motifs

Figure 3 shows a shift in the position of the motif either left, right, up, or down without changing the shape and size. Mathematically, it can be represented as follows.

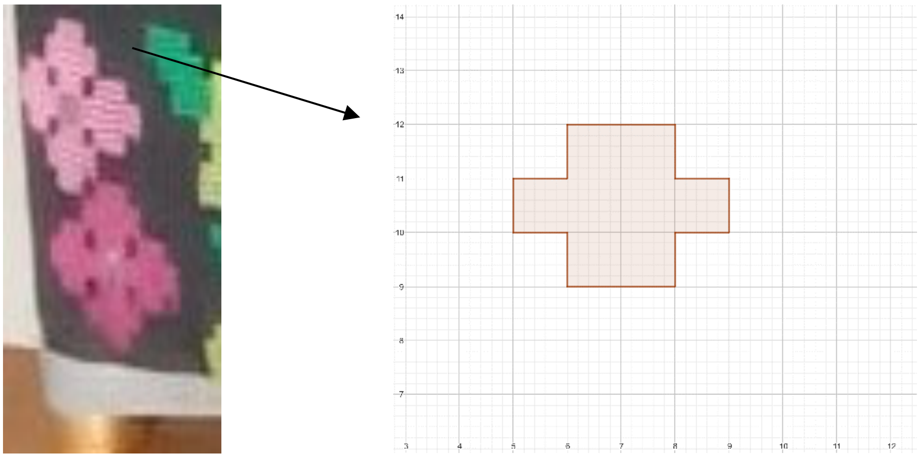


Figure 4. The motif to be translated

In the motif above, one part of the motif is taken to show the translational concept formed. The image shown on the right can be re-imagined as follows.

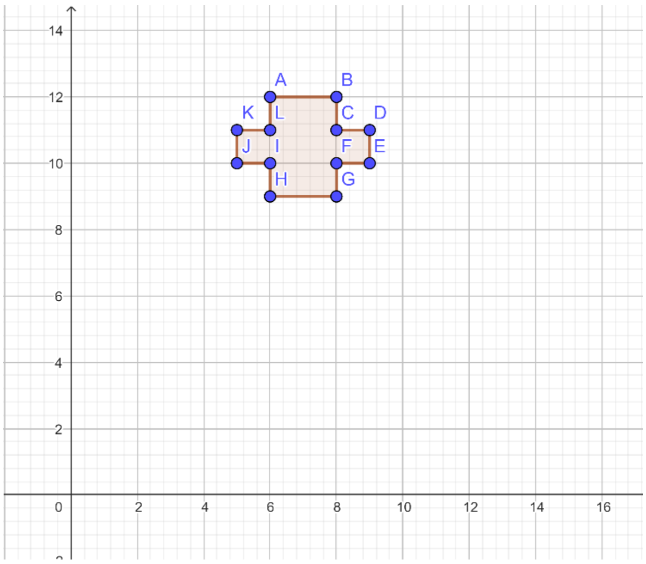


Figure 5. Initial Motif Piece

In the picture above, a 2D shape is found consisting of 12 sides dan 12 points. The coordinate points on the shape above are as follows.

$A = (6,12)$

$B = (8,12)$

$C = (8,11)$

$D = (9,11)$

$E = (9,10)$

$F = (8,10)$

$G = (8,9)$

$H = (6,9)$

$I = (6,10)$

$J = (5,10)$

$K = (5,11)$

$L = (6,11)$

Next, the shape is shifted by translating each of its points. The first translation is performed on the translation vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and the following result is obtained.

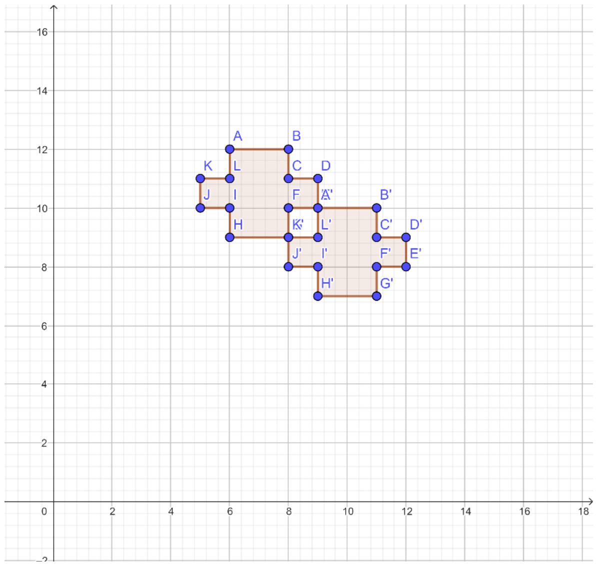


Figure 6. The translation of $ABCDEFGHIJKL$ on vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$

The main reason for choosing this vector is to accurately represent the geometric shifting process that occurs during the creation of the motif. In the case of the *Lagosi* motif, we observe that certain patterns are repeated with consistent shifts both horizontally and vertically. The chosen vectors describe these shifts, for example the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$, which indicates that each point in the motif is shifted 3 units to the right and 2 units down. The choice of this vector is based on measuring the distance between motif elements that are repeated periodically in the *Lagosi* weaving pattern.

In figure 6 above, the shape of $ABCDEFGHIJKL$ is translated with a vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$. This means that each point on the shape is shifted by 3 units to the right and then shifted down by 2 units. The translation result can be calculated using equation (6) as follows.

- Point $A = (6,12)$:

$$A(6,12) \xrightarrow{\begin{pmatrix} 3 \\ -2 \end{pmatrix}} A'\big(6+3, 12+(-2)\big)$$

$$A(6,12) \xrightarrow{\binom{3}{-2}} A'(9,10)$$

From these results, the coordinates obtained by translating point $A(6,12)$ to vector $\binom{3}{-2}$ are $A'(9,10)$. his result corresponds to Figure 23 which shows that A' is at the coordinate point $(9,10)$.

Similarly, the translation results for points $B, C, D, E, F, G, H, I, J, K, L$ are obtained as follows.

$B' = (11,10)$

$C' = (11,9)$

$D' = (12,9)$

$E' = (12,8)$

$F' = (11,8)$

$G' = (11,7)$

$H' = (9,7)$

$I' = (9,8)$

$J' = (8,8)$

$K' = (8,9)$

$L' = (9,9)$

Furthermore, the next translation process is performed with the translation vector $\binom{0}{-4}$ and the following results are obtained.

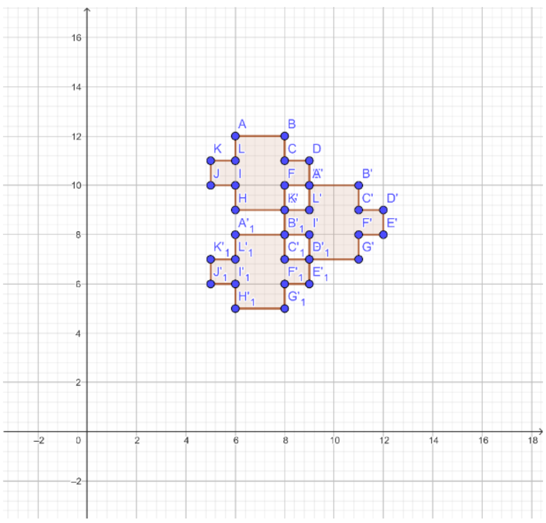


Figure 7. The translation $ABCDEFGHIJKL$ on Vector $\binom{0}{-4}$

In figure 7 above, $ABCDEFGHIJKL$ are translated with vector $\binom{0}{-4}$. This means that each point on the shape is moved down by 4 units. The translation result can be calculated using equation (6) as follows.

- Point $A = (6,12)$:

$$A(6,12) \xrightarrow{\begin{pmatrix} 0 \\ -4 \end{pmatrix}} A_1{}'\big(6+0, 12+(-4)\big)$$

$$A(6,12) \xrightarrow{\begin{pmatrix} 0 \\ -4 \end{pmatrix}} A_1{}'(6,8)$$

From these results, the coordinates obtained by translating point $A(6,12)$ to vector $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ are $A_1{}'(6,8)$. This result corresponds to Figure 24 which shows that $A_1{}'$ is at the coordinate point (6,8).

Similarly, the translation results for points $B_1{}', C_1{}', D_1{}', E_1{}', F_1{}', G_1{}', H_1{}', I_1{}', J_1{}', K_1{}', L_1{}'$ are obtained as follows.

$B_1{}' = (8,8)$
$C_1{}' = (8,7)$
$D_1{}' = (9,7)$
$E_1{}' = (9,6)$
$F_1{}' = (8,6)$
$G_1{}' = (8,5)$
$H_1{}' = (6,5)$
$I_1{}' = (6,6)$
$J_1{}' = (5,6)$
$K_1{}' = (5,7)$
$L_1{}' = (6,7)$

Furthermore, the next translation process is performed again with the translation vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ and the following results are obtained.

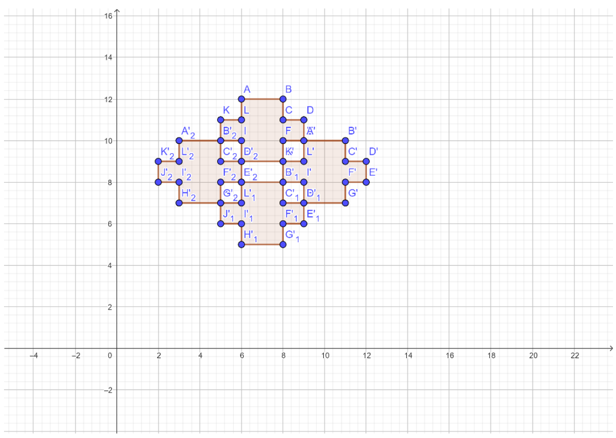


Figure 8. The translation $ABCDEFGHIJKL$ to vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

In figure 8 above, the shape $ABCDEFGHIJKL$ is translated by the vector $\binom{-3}{-2}$. This means that each point on the shape is moved 3 units to the left and 2 units to the bottom. The translation result can be calculated using equation (6) as follows.

- Point $A = (6{,}12)$:

$$A(6{,}12) \xrightarrow{\binom{-3}{-2}} A_2{}'\big(6+(-3),12+(-2)\big)$$

$$A(6{,}12) \xrightarrow{\binom{-3}{-2}} A_2{}'(3{,}10)$$

From these results, the coordinates of the translation of point $A(6{,}12)$ to vector $\binom{-3}{-2}$ are $A_2{}'(3{,}10)$.
This result corresponds to Figure 25 which shows that $A_2{}'$ is at the coordinate point $(3{,}10)$.
Similarly, the translation results for points $B_2{}', C_2{}', D_2{}', E_2{}', F_2{}', G_2{}', H_2{}', I_2{}', J_2{}', K_2{}', L_2{}'$ are obtained as follows.

$B_2{}' = (5{,}10)$

$C_2{}' = (5{,}9)$

$D_2{}' = (6{,}9)$

$E_2{}' = (6{,}8)$

$F_2{}' = (5{,}8)$

$G_2{}' = (5{,}7)$

$H_2{}' = (3{,}7)$

$I_2{}' = (3{,}8)$

$J_2{}' = (2{,}8)$

$K_2{}' = (2{,}9)$

$L_2{}' = (3{,}9)$

After three translations, the motif is obtained as previously introduced or as shown in the following figure.

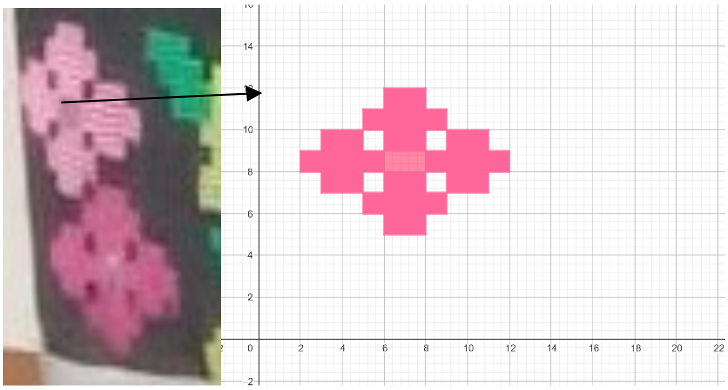


Figure 9. The Translated Motif

In the same way, translations are made for the next motif so that the following results are obtained.

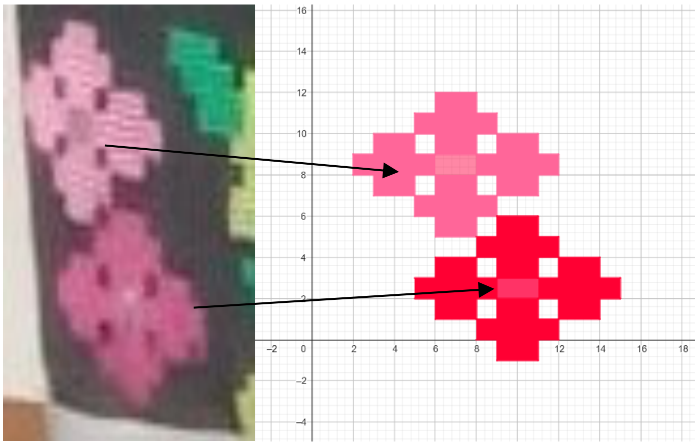


Figure 10. Translated Motifs

Reflection

Reflection is a transformation that moves any point on a plane by using the mirror-image properties of the moved points. The nature of reflection is such that the distance from the object to the mirror is equal to the distance from the shadow to the mirror. In addition, the mirrored objects face each other.

Figure 11. The Concept of Reflection on Fabric Motifs

From Figure 11 above, we can see the concept of reflection used by weavers when making woven fabrics such as *Lagosi*. Mathematically, it can be expressed as follows.

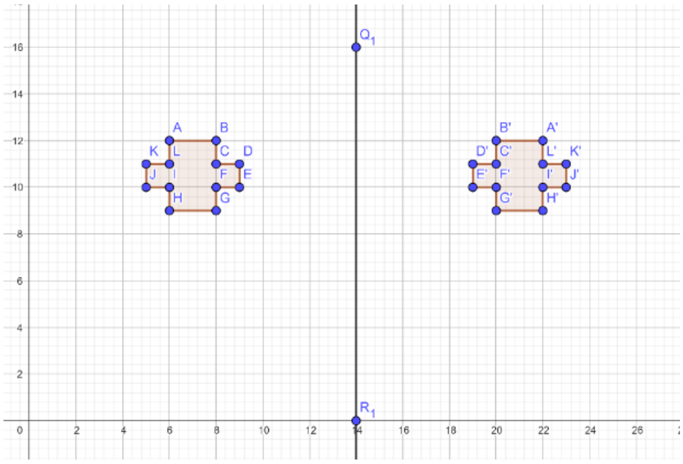


Figure 12. Reflection $ABCDEFGHIJKL$ to line $x = 14$

In Figure 12, it can be seen that each point on the $ABCDEFGHIJKL$ is reflected on the line Q_1R_1 with the equation of the line $x = 14$. The line $x = 14$ was chosen based on the observation of the symmetry pattern found in the *Lagosi* motif. To ensure that the line $x = 14$ is the corresponding reflection line, we first identified the coordinate points on the motif under analysis. Then, we calculated the distance of each point from the mirror line and verified that the point's reflection was at the same distance on the opposite side of the x=14 line. The reflection result can be calculated using the transformation matrix as follows.

- Point $A(6,12)$

Transformation Matrix:

$$M = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 6 \\ 12 \end{pmatrix} + \begin{pmatrix} 2(14) \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 6 \\ 12 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -6 \\ 12 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 22 \\ 12 \end{pmatrix}$$

Thus obtained,

$A(6,12) \longrightarrow A'(22,12)$

Alternatively, it can be calculated in the following way.

$A(6,12) \longrightarrow A'(2(14) - 6,12)$

$A(6,12) \longrightarrow A'(28 - 6,12)$

$A(6,12) \longrightarrow A'(22,12)$

This result is consistent with figure 12 which shows that point A' which is the result of the reflection of the point A on the line $x = 14$ is located at the coordinates $(22,12)$. In addition, it can also be clearly seen that the mirroring property applies, where the distance of the original point from the mirror line is equal to the distance of the shadow point from the mirror.

- Point $B(8,12)$

Transformation Matrix:

$$M = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 8 \\ 12 \end{pmatrix} + \begin{pmatrix} 2(14) \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 8 \\ 12 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -8 \\ 12 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 20 \\ 12 \end{pmatrix}$$

Thus obtained,

$B(8,12) \longrightarrow B'(20,12)$

Alternatively, it can be calculated in the following way.

$B(8,12) \longrightarrow B'(2(14) - 8,12)$

$B(8,12) \longrightarrow B'(28 - 8,12)$

$B(8,12) \longrightarrow B'(20,12)$

This result corresponds to Figure 13 which shows that point B' which is the result of the reflection of point B to line $x = 14$ is located at the coordinates $(20,12)$.

In the same way, the translation results for points $C', D', E', F', G', H', I', J', K', L'$ are obtained as follows.

$C' = (20,11)$

$D' = (19,11)$

$E' = (20,10)$

$F' = (20,10)$

$G' = (20,9)$

$H' = (22,9)$

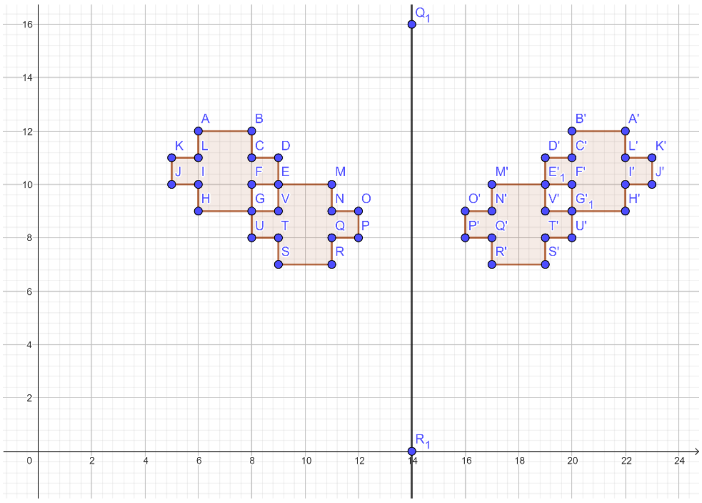
$I' = (22,10)$

$J' = (23,10)$

$K' = (23,11)$

$L' = (22,11)$

Furthermore, the reflection process is repeated on the next object, $EMNOPQRSTUGV$ to the line $x = 14$.



Gambar 13. Reflection $EMNOPQRSTUGV$ to the line $x = 14$

Figure 13 shows that each point on $EMNOPQRSTUGV$ is reflected to the line Q_1R_1 with the equation of the line $x = 14$. The reflection result can be calculated as follows.

- Point $O(12,9)$

Matrix:

$$M = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 12 \\ 9 \end{pmatrix} + \begin{pmatrix} 2(14) \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 12 \\ 9 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -12 \\ 9 \end{pmatrix} + \begin{pmatrix} 28 \\ 0 \end{pmatrix}$$

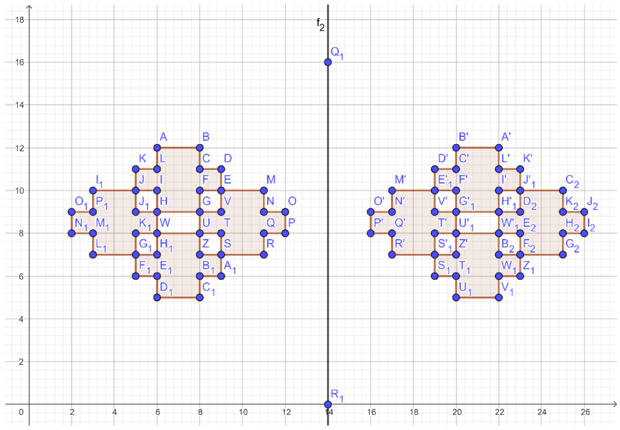
$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 16 \\ 9 \end{pmatrix}$$

Thus obtained,

$O(12,9) \longrightarrow O'(12,9)$

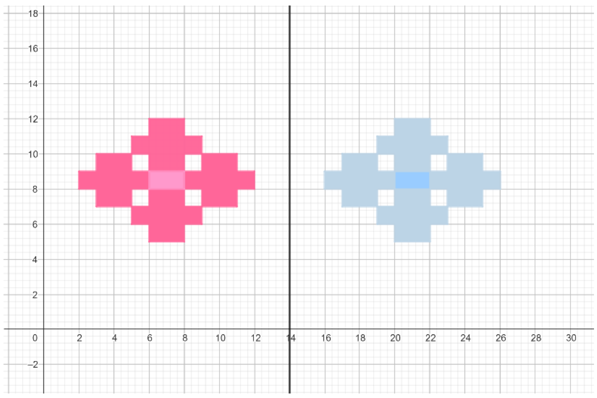
This result is consistent with Figure 14 which shows that point O to the line $x = 14$ is at coordinate $(12,9)$. In addition, it can also be clearly seen that the mirroring property applies, where the distance from the original point to the mirror line is equal to the distance from the shadow point to the mirror.

In the same way, the reflection results for the other points are obtained. Furthermore, repeated reflections are performed on the next objects on the line $x = 14$ so that the following reflection results are obtained.



Gambar 14. Results of Reflection of All Points to the Line $x = 14$

After four reflections, the motif was obtained as previously introduced or as shown in the following figure.



Gambar 15. First Motif Reflection Results

In the same way, the reflection is performed for the next motif using a different reflection point, $x = 16$, so that the following results are obtained.

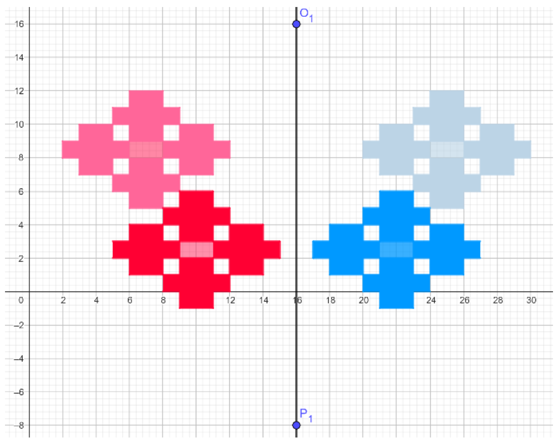


Figure 16. Reflection Results of the Second Motif

In Figure 16, it can be seen that the resulting reflection motif corresponds to the motif found in one of the analyzed woven fabrics or can be seen in the following figure.

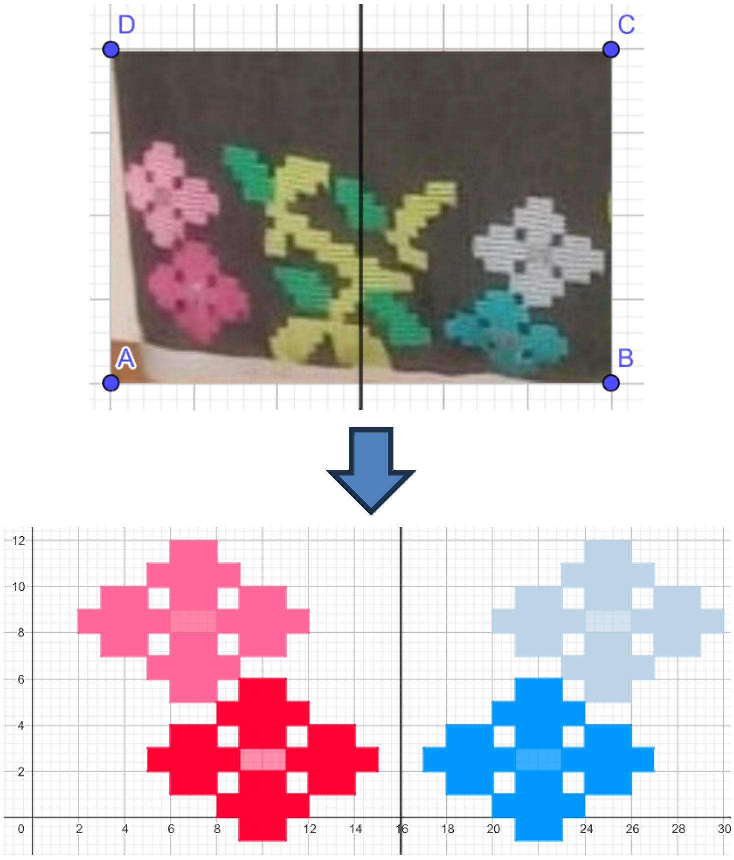


Figure 17. Results of Reflection on Motifs

Figure 17 above shows that weavers have applied the concept of reflection to the process of making woven fabrics.

Discussion

The results of this study indicate that mathematical concepts, especially the concept of geometric transformation, are used in the process of making *Lagosi* motifs on typical Wajo woven fabrics. This provides an insight into the application of mathematical principles in a real-world context. This finding is consistent with the results of previous research, which found that some Wajo weavings also use geometric concepts in the production of their motifs and need to be socialized. For example, the concept of geometric transformation is found in typical Wajo lipa' sabbe motifs, which indicate the existence of intelligence and special abilities, such as the ability to change color, size, direction, and shape, possessed by traditional weavers (Busrah et al., 2023). In addition, these findings can serve as math learning resources for students in local areas. Teachers can incorporate these traditional practices into their curricula to make mathematics more culturally relevant and interesting to students. This is consistent with the results of a previous study that used *caramming* flower motifs, a typical woven fabric motif of Wajo, in mathematics learning in the classroom. This study showed that this activity can improve students' understanding of the concept of geometric transformation in a simple and fun manner (Aras et al., 2023).

The results also show that learning with resources in the form of *Lagosi* weaving motifs not only teaches mathematical concepts but also emphasizes cultural appreciation and diversity. By exploring mathematical concepts, this research contributes to the preservation of cultural heritage. By recognizing the geometric concepts used by traditional weavers in the Wajo District, this research reveals the intellectual achievements of local communities that are naturally acquired without formal education. This is in line with previous research that mathematical intelligence emerges naturally even without formal education, so that mathematics and culture are two things that cannot be separated (Pathuddin & Mariani, 2023; Pathuddin & Nawawi, 2021). Thus, the results of this study are expected to increase students' pride in their cultural identities. Understanding the mathematical concepts involved in *Lagosi* motif-making can help ensure that this traditional weaving technique has been passed down from generation to generation, and is a local wisdom that should continue to be preserved.

In contrast to several previous studies that have examined the use of mathematics in various woven fabric motifs and batik in certain tribes in Indonesia, this research focuses on exploring ethnomathematics in a different tribe, namely the Bugis tribe in the Wajo district, which has rarely been studied. Furthermore, this research focuses on the *Lagosi* motif, which is very rarely explored, so this research complements previous research that is still limited to exploring more general Wajo weaving motifs, so it can emphasize community understanding while enriching contextual learning resources for students throughout Indonesia.

Although this research has made a significant contribution, some limitations need to be noted. First, this research only focuses on the concept of geometric transformation, namely translation and reflection, without examining other mathematical concepts that may also be applied in the making of *Lagosi* motifs. Further research is needed to explore other mathematical concepts, such as symmetry or rotation, which may also be relevant in the process of making these traditional motifs. Secondly, this study includes only three traditional weavers in Wajo, which although purposively selected, may not fully represent the diversity of techniques or interpretations of *Lagosi* motifs across weaver communities in the region. A broader study with a larger number of informants from different regions may provide a more holistic view of the variations in the application of mathematical concepts to traditional motifs.

CONCLUSION

The *Lagosi* motif is one of the motifs in the typical fabric of the Wajo district, and is rarely taught traditionally to young weavers. Modernity eroded its existence. This research shows the existence of geometric transformation concepts such as translation and reflection in the process of creating *Lagosi* motifs. This concept is demonstrated using geogebra by describing step-by-step from a coordinate point to the formation of the motif. Thus, the mathematical thinking skills of these weavers can be a valuable reference that can be used in contextualized mathematics learning in the classroom.

Furthermore, this research also shows that traditional weavers indeed possess mathematical intelligence that is unconsciously implemented in the process of making *Lagosi* motifs. By transforming traditional skills into formal learning, it is expected that students' love and pride in their local culture will be fostered. This will be a solid foundation for efforts to preserve the almost extinct cultural heritage.

In this study, the mathematical concepts identified were still limited. The researcher focused only on geometry transformation. In addition, the researcher only studied *Lagosi* motifs, so the exploration of other traditional motifs and deeper studies to find other concepts can be recommended for future research. Furthermore, the exploration of ethnomathematics opens opportunities for interdisciplinary collaborative research by bridging mathematics with other fields. Educators can integrate *Lagosi* motifs as part of contextualized mathematics learning, especially in geometry and geometry transformation materials. In addition, the results of this study can also be a reference for policymakers in the field of education. Authorities, including the Ministry of Education, can encourage the development of learning materials based on local culture. *Lagosi* motifs can be used as one example in mathematics learning modules that are contextualized with local culture. This would promote respect for cultural richness while ensuring that education remains relevant to students' daily experiences.

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