Mathematics in Culture: Revealing Hidden Secrets Behind Indonesian Traditional Ceremonies

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Abstrak

Etnomatematika mengkaji keterkaitan antara matematika dan budaya, dengan menyoroti bagaimana konsep-konsep matematika tertanam dalam tradisi lokal. Di Indonesia yang kaya akan budaya, etnomatematika semakin relevan. Studi ini meneliti keberadaan prinsip-prinsip matematika dalam upacara-upacara tradisional, dan mengungkap integrasinya ke dalam berbagai unsur budaya seperti pakaian, tarian, alat, dan ritual. Penelitian ini menggunakan metode Systematic Literature Review (SLR) denagn pendekatan PRISMA untuk menganalisis 27 artikel yang diterbitkan antara tahun 2018 hingga 2024. Artikel-artikel dipilih melalui proses pencarian dan penyaringan yang terstruktur berdasarkan kriteria inklusi dan eksklusi yang telah ditentukan sebelumnya. Pengumpulan data difokuskan pada identifikasi konsep-konsep matematika dalam upacara tradicional, sementara análisis tematik digunakan untuk mengka tegorikan pola-pola etnomatematika dalam praktik budaya Indonesia. Temuan menunjukkan pola-pola umum seperti bentuk geometri, teknik pengukuran, dan simetri yang terlihat pada artefak, pakaian tradicional, dan praktik upacara. Selain itu, studi ini juga mneyoroti variasi penerapan matematika di berbagai daerah, yang mencerminkan keragaman budaya Indonesia. Wawasan ini memiliki implikasi penting bagi pengembangan pendidikan matematika yang lebih kontekstual dan relevan. Dengan mengaitkan konsep-konsep matematika dengan budaya local, etnomatematika dapat meningkatkan keterlibatan dan pemahaman siswa, sehingga pembelajaran menjadi lebih bermakna dan berakar pada budaya. Pendekatan ini tidak hanya memperkaya pendidikan matematika, tetapi juga melestarikan dan menhargai warisan budaya unik Indonesia, serta mendorong kerangka pendidikan yang lebih inklusif dan beragam.

Abstract

Ethnomathematics examines the intersection of mathematics and culture, highlighting how mathematical concepts are embedded within local traditions. In culturally rich Indonesia, ethnomathematics holds increasing relevance. This study examines the presence of mathematical principles in traditional ceremonies, revealing their integration into various cultural elements, including clothing, dances, tools, and rituals. This study employs a systematic literature review (SLR) using the PRISMA approach to analyze 27 articles published between 2018 and 2024. Articles were selected through a structured search and screening process based on predefined inclusion and exclusion criteria. Data collection focused on identifying mathematical concepts in traditional ceremonies, while thematic analysis was used to categorize ethnomathematical patterns in Indonesian cultural practices. Findings highlight common patterns, such as geometric shapes, measurement techniques, and symmetry, which are evident in artifacts, traditional attire, and ceremonial practices. Additionally, the study underscores the variation in mathematical applications across different regions, reflecting Indonesia's cultural diversity. These insights have significant implications for developing a more contextual and relevant mathematics education. By connecting mathematical concepts with local culture, ethnomathematics enhances student engagement and understanding, making learning more meaningful and culturally grounded. This approach not only enriches mathematical education but also helps preserve and appreciate Indonesia's unique cultural heritage, promoting a more inclusive and diverse educational framework.

INTRODUCTION

Ethnomathematics is a branch of science that examines the relationship between mathematics and culture (Serepinah & Nurhasanah, 2023). Culture has a close connection with the social context of society, while mathematics is one of the knowledge disciplines that provides benefits in addressing the daily challenges faced by communities (Zaenuri & Dwidayati, 2018).

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In Indonesia, a country rich in cultural diversity, the study of ethnomathematics is becoming increasingly relevant.

Ethnomathematics explores how mathematical concepts are reflected in local cultures, including various customary ceremonies that are integral to Indonesian society. According to D'Ambrosio (Putri, 2017), ethnomathematics is defined as the application of mathematics in everyday practices among various cultural groups and professional classes. Ethnomathematics is an approach that can explain the relationship between local culture and mathematics as a field of knowledge. The formation of ethnomathematics occurs through ways or habits closely related to local tradition, which are often inherited through generations and hold significant value for community life, thus remaining relevant to this day. Investigating the role of mathematics in traditional ceremonies is not just about understanding how mathematics is applied within a cultural context but also about preserving and enriching a rich and diverse cultural heritage. Unveiling this relationship can provide a deeper understanding of traditional community life and enrich insights into unique local cultures. The importance of ethnomathematics studies within the Indonesian cultural context lies not only in understanding mathematical practices within traditional ceremonies but also in contributing to a more contextual and relevant mathematics education (D'ambrosio, 2001). Traditional ceremonies are chosen as the focus because they integrate various cultural elements such as attire, dance, tools, and rituals where mathematical concepts like geometry, measurement, and symmetry are embedded (Barton, 1996). These ceremonies serve as living representations of indigenous knowledge, making them a rich source for ethnomathematical exploration and educational applications. Introducing mathematical concepts through local cultural contexts can make mathematics learning more engaging and meaningful for students while also helping to promote and preserve the diversity of Indonesian culture.

Indonesia, with its rich cultural diversity and traditions, offers excellent potential for ethnomathematics studies, particularly in the context of traditional ceremonies and rituals. These ceremonies involve various other cultural elements, such as traditional dances, attire, tools, ornaments, or cultural artifacts used in these ceremonial processes. However, despite this cultural wealth being the focus of attention in various studies, detailed research on the use of mathematics in traditional ceremonies remains limited. Previous research has explored mathematical concepts in various cultural practices. Merdja & Restianim (2022) revealed the presence of plane geometry, symmetry, and tessellation patterns in Ende Lio traditional weaving motifs. Melinda & Septianawati (2023) identified geometric formations, such as hexagons, parallelograms, and circular patterns, in the choreography of Dayak Totokng dance. Turmuzi et al. (2022) found a wide range of mathematical concepts, including plane and solid geometry, measurement, and transformations, embedded in Sasak cultural practices such as architecture, handicrafts, traditional games, and culinary products. While these studies highlight the mathematical dimensions of various cultural expressions, comprehensive investigations specifically focusing on the mathematical principles embedded in traditional ceremonies remain scarce. By examining how mathematical concepts are reflected in traditional ceremonies, this research seeks to provide a more in-depth understanding of the role of mathematics in Indonesian local culture.

Furthermore, this research is also expected to contribute to the development of more contextual and relevant mathematics education for Indonesian society while preserving its rich and unique cultural heritage. Traditional ceremonies, which are ritualistic events passed down through generations, serve as mediums for transmitting cultural values, social norms, and indigenous knowledge (D'ambrosio, 2001). These ceremonies often involve structured patterns, measurements, and symbolic representations, making them a natural context for integrating mathematical concepts into cultural learning. By analyzing the mathematical structures inherent in these ceremonies, this study bridges the gap between abstract mathematical theories and real-life cultural practices, fostering deeper engagement and understanding in mathematics education (Barton, 1996).

This research aims to explore the integration of mathematical concepts within Indonesian traditional ceremonies, which are rich in cultural and symbolic elements. The

objectives of this study are: 1) to identify various ethnomathematical concepts reflected in traditional ceremonies, including clothing, dance, tools, ornaments, and artifacts; 2) to analyze common patterns and regional variations in the application of mathematics within these ceremonies, and 3) to examine the implications of these findings for the development of more contextual and culturally relevant mathematics education in Indonesia. To address these objectives, the study formulates the following research questions: 1) What mathematical concepts are embedded in Indonesian traditional ceremonies? 2) How do different regions incorporate mathematics into their cultural practices? 3) How can ethnomathematical insights be applied to improve mathematics education in Indonesia?

These research objectives are crucial for education in Indonesia because they directly address the need to contextualize mathematics education within the country's diverse cultural landscape. By linking mathematical concepts with traditional ceremonies, students can learn mathematics in a way that resonates with their daily lives and cultural identities. This approach not only fosters greater engagement and understanding but also helps to preserve and celebrate Indonesia's cultural heritage.

If these objectives are achieved, the research can make a significant contribution to the education process by providing culturally relevant teaching materials and methodologies. In particular, mathematics education can benefit from this integration by making abstract concepts more tangible and meaningful for students. For example, geometrical patterns found in traditional weaving or rituals can serve as practical examples to teach symmetry, measurements, and transformations. This not only enriches the learning experience but also promotes a deeper appreciation for local culture among students.

METHOD

This study employs the Systematic Literature Review (SLR) method, a systematic approach used to identify, assess, and interpret findings related to a research topic to address predetermined research questions (Kitchenham et al., 2010). This method is systematically conducted, following specific stages and protocols, to avoid bias and ensure a subjective understanding. The stages of this research include formulating the research question, conducting a literature search, determining inclusion and exclusion criteria, selecting relevant literature, presenting data, processing data, and drawing conclusions.

The research questions posed include inquiries such as: 1) what mathematical concepts are embedded in Indonesian traditional ceremonies? 2) How do different regions incorporate mathematics into their cultural practices? 3) How can ethnomathematical insight be applied to improve mathematics education in Indonesia?

To answer these questions, data analysis was conducted using a thematic approach, where identified mathematical elements were categorized based on their occurrence in different cultural contexts. Thematic coding was applied to categorize mathematical concepts, including geometry, measurement, symmetry, and transformations, and this process was conducted manually without the use of qualitative data analysis software. Patterns and variations across different traditional ceremonies were analyzed to determine recurring mathematical structures. Additionally, comparative analysis was used to examine regional differences, while implications for mathematics education were drawn by mapping the findings to existing pedagogical frameworks.

The literature search was conducted on the *Google Scholar* database using the *Publish or Perish* application with the keywords etnomatematika pada upacara dan ritual adat," limiting the selection to studies on ethnomathematics in Indonesia. To ensure credibility, only articles published in national and international peer-reviewed journals were included in the analysis, with a publication range from 2018 to 2024. Limiting articles published between 2018 and 2024 ensures that the research reflects the most recent developments and trends in the field of ethnomathematics. By focusing on publications from this period, the study captures contemporary perspectives and findings that are relevant to current educational contexts and challenges. This timeframe also aligns with the growing academic interest and publications in

ethnomathematics within Indonesia, as the field has gained increasing attention over the years. Such a limitation helps maintain the relevance and validity of the study by excluding older references that may not fully represent the present cultural or educational dynamics.

Additionally, this approach ensures that the findings are based on the latest available research, making the study more impactful for the development of contextual and modern mathematics education in Indonesia. The inclusion criteria used were studies related to mathematical concepts found in traditional ceremonies or rituals from various regions in Indonesia, as well as research results published in national journal articles or conference proceedings. From this search, articles were screened using *Covidence* based on the established criteria and using the PRISMA method.
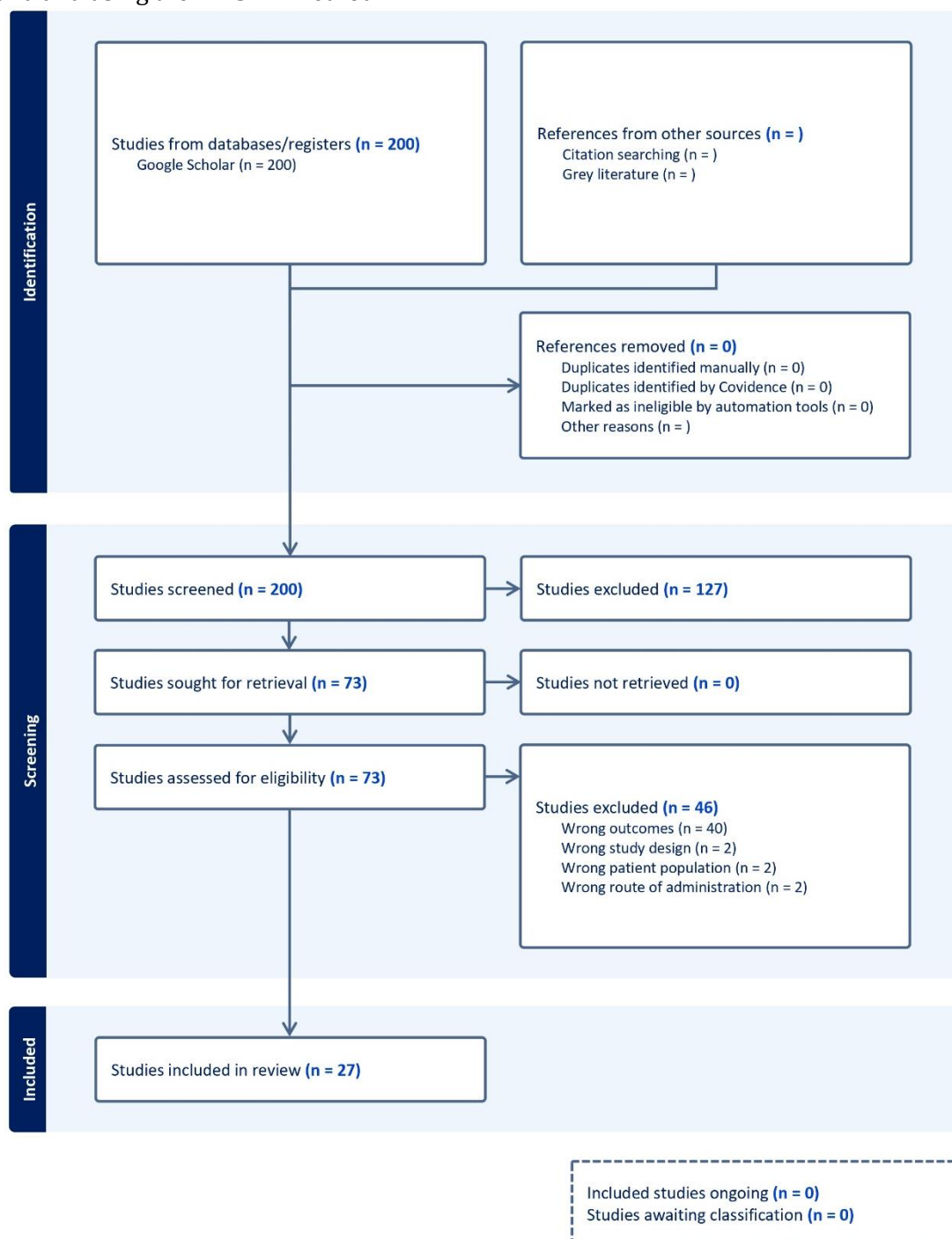

Figure 1. Article screening output using *evidence* with PRISMA method
(*Source: Author's analysis, 2024*).

RESULTS AND DISCUSSION

Results

 a. **Identification of Ethnomathematical Concepts in Traditional Ceremonies**

Various traditional ceremonies in Indonesia incorporate mathematical concepts into diverse cultural elements, including traditional clothing, dances, ritual tools, and ceremonies. Cultural artifacts found in the Museum of Sumba Cultural House, for example, reflect geometric shapes such as rectangles, cylindrical drums, and conical jars, which hold specific meanings in the Merapu ritual (Litik & Argarini, 2023). The Oko Mama weaving process in Kuanfatu demonstrates the application of measurement and calculation concepts using a traditional tool called Hepa to determine the width of palm leaves used in the weaving process (Beti et al., 2021). Similarly, in the Syawalan tradition, the construction of the Gunungan Megono incorporates volume and surface area calculations, ensuring the proper proportions for ritual use (Karimah & Dewi, 2022). Additionally, in the Maruba ceremony in Hulu Aik, integer operations are frequently utilized in traditional musical performances that accompany the ceremony (Yanti et al., 2022).

Traditional clothing and weaving motifs also certain numerous mathematical elements. The weaving motifs of the Ende Lio community feature geometric shapes, including triangles, diamonds, squares, and other polygons, arranged in a systematic pattern to create distinct designs (Merdja & Restianim, 2022). The traditional clothing of the Mori tribe in Central Sulawesi also exhibits symmetry and proportion concepts in its design, which are similarly found in the woven textiles of Wolotopo village that incorporate vertical lines, squares, trapezoids, and triangles to form recurring patterns (Manda et al., 2023; Pakia et al., 2023).

Traditional dances also illustrate the application of mathematical concepts in movement and floor patterns. The Gawi dance from East Nusa Tenggara integrates lines, angles, and geometric shapes into its choreography (Tupen et al., 2024). The Kayiak Nari traditional dance from South Bengkulu exhibits rotation, reflection symmetry, and dilation in its movement patterns (Alkarimah et al., 2023), whereas the Dayak Totokng dance from Kalimantan features hexagonal and parallelogram geometric patterns in its formations (Melinda & Septianawati, 2023).

In the context of rituals and traditional ceremonies, mathematical concepts emerge in the form of measurement and time calculations used in various processes. The Pati Ka ceremony of the Lio tribe at Lake Kelimutu incorporates geometric concepts into the ritual attire, featuring square garments and triangular headbands worn by participants. Measurements are also applied in the construction of ancestral monuments, where the ratio of length to height must adhere to traditional customs (Towe, 2018). The Rokat Tase ceremony in Madura encompasses various geometric concepts, including angles, circles, lines, symmetry, reflection, and transformation, which are applied in the arrangement of ritual objects and accompanying dances (Fajriyeh & Zayyadi, 2023). In the traditional wedding ceremonies of the Lampung, Javanese, and Balinese communities, geometric principles are evident in the ritual decorations and timing calculations, which are based on traditional arithmetic systems (Safitri et al., 2021). Meanwhile, in Pulo Traditional Village, auspicious wedding dates are determined using set theory and arithmetic operations (Maryani et al., 2022).

 b. **Common Patterns and Differences in the Use of Mathematics in Traditional Ceremonies**

Despite regional variations, common patterns in the use of mathematical concepts in traditional ceremonies across Indonesia can be identified. Many traditional ceremonies feature recurring geometric patterns, such as triangles, squares, and diamonds, in weaving motifs, traditional attire, and dance formations. For example, the weaving motifs of the Ende Lio community and the traditional clothing of the Mori tribe systematically arrange geometric shapes to create unique aesthetic patterns (Merdja & Restianim, 2022; Pakia et al., 2023). The use of traditional measuring tools is also prevalent in various cultural practices, such as the Oko

Mama weaving process, which utilizes the Hepa tool to measure the width of palm leaves (Beti et al., 2021).

Symmetry and proportion are also integral aspects of many cultural elements. In dances such as Kayiak Nari and Dayak Totokng, symmetrical patterns, and transformations are applied in dancer formations to create visual balance (Alkarimah et al., 2023; Melinda & Septianawati, 2023). Similarly, in traditional architecture, symmetry is employed in designing the ancestral monuments of the Lio tribe, ensuring balanced proportions between height and width (Towe, 2018).

However, variations exist in how mathematical concepts are applied in different regions. The Lio tribe, for instance, emphasizes squares and triangles in the Pati Ka ritual, whereas the Dayak Kanayat'n tribe utilizes isosceles triangles and trapezoids in the Nimang Padi ritual (Towe, 2018; Yessi et al., 2023). Measurement methods also vary; the Sasak culture employs distinct traditional measuring units, whereas the Dayak Kebahan tribe focuses on weight measurement in wedding traditions (Cantika & Munaldus, 2022).

c. Implications for the Development of Contextual and Culturally Relevant Mathematics Education

The findings of this study indicate that integrating ethnomathematical concepts into mathematics education can enhance students' understanding and engagement in learning. Connecting mathematical concepts with traditional cultural practices makes abstract mathematical principles more tangible and relevant to everyday life. For example, weaving patterns can serve as concrete examples in teaching geometry, while calculations in traditional ceremonies can be used to illustrate arithmetic and measurement concepts (Litik & Argarini, 2023; Widyasari & Hariastuti, 2021).

A culture-based educational approach also has the potential to enrich teaching materials with contexts that are more familiar to students. Studies have shown that the use of culturally relevant student worksheets in teaching seventh-grade geometry enhances student engagement and comprehension (Manik et al., 2022). Additionally, developing textbooks and interactive learning modules incorporating ethnomathematical elements can make learning more engaging (Achilla, 2024).

Beyond its educational benefits, integrating ethnomathematics into the curriculum contributes to cultural preservation. By understanding the mathematical principles embedded in traditional ceremonies, students not only learn about mathematics but also gain insights into their cultural heritage (Safitri et al., 2021). Therefore, ethnomathematics serves as a bridge between modern education and local cultural values, fostering a more inclusive and meaningful learning experience.

Discussion

In exploring the ethnomathematical concepts embedded in various traditional ceremonies across Indonesia, this study uncovers the rich mathematical structures that have long been woven into cultural practices. Mathematics, often perceived as an abstract and academic discipline, is deeply interwoven with local traditions, manifesting in artifacts, clothing, dances, rituals, and ceremonies. These cultural elements serve as living proof that mathematical principles transcend formal education and are inherent in the heritage of Indigenous communities.

One of the most striking examples of ethnomathematics in cultural artifacts is the Sumba House of Culture Museum, which houses ancient artifacts such as drums, statues, and spears. These objects display clear geometric patterns, including squares, rectangles, triangles, circles, and other symmetrical forms. In their study, Litik & Argarini (2023) not only identified these mathematical concepts but also provided photographic documentation of the artifacts, such as tombstones, spears, mamoli, and drums, thereby reinforcing the validity of the mathematical interpretations.
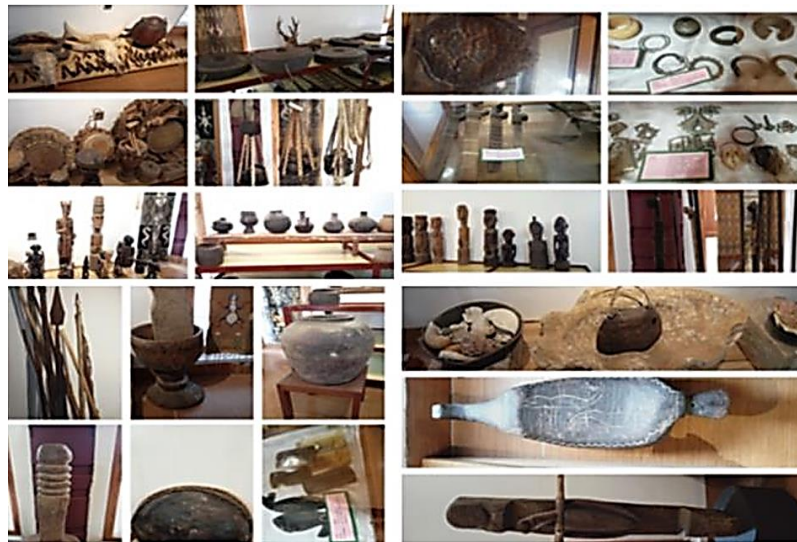
Figure 2. Examples of ethnomathematics in artifcats of the Sumba House of Culture Museum (Litik & Argarini, 2023).

Similarly, in the Kuanfatu region, the traditional weaving process known as Oko Mama relies heavily on mathematical concepts, including measurement, calculation, and geometric design (Beti et al., 2021). The Syawalan tradition of Gunungan Megono further exemplifies the practical application of mathematical principles, where volume and surface area calculations play a crucial role in constructing the towering Gunungan food offering (Karimah & Dewi, 2022).

Mathematical patterns are also evident in traditional textiles and attire. The Ende Lio weaving motifs prominently feature geometric shapes such as triangles, rhombuses, squares, circles, and polygons, reflecting the integration of mathematical symmetry and tessellation in fabric design. In their study, Merdja & Restianim (2022) not only identified these geometric concepts but also provided photographic documentation of specific motifs, including Nepate'a, Bunga Sina, Mangga, Kelimara, Soke Lo'o, and Mata Sinde, which clearly illustrate shapes such as congruent and similar triangles, rectangles, rhombuses, circles, and hexagons. Furthermore, their interviews with weavers revealed mathematical practices in the weaving process itself, such as counting threads, measuring lengths, and calculating areas, thereby reinforcing the validity of the mathematical interpretations.
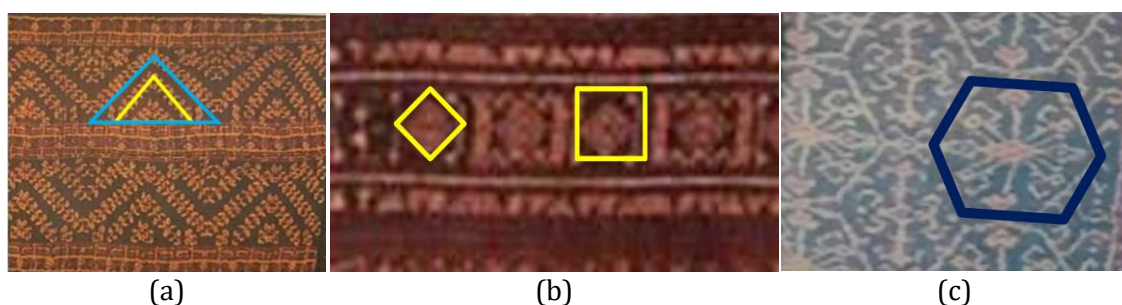

(a) (b) (c)

Figure 3. Examples of geometric patterns in Ende Lio weaving motifs: (a) Nepate'a motif (triangles, similarity), (b) Kelimara motif (squares and rhombuses), (c) Mata Sinde motif (hexagon and circle) (Merdja & Restianim 2022).

Likewise, the Mori tribe's traditional clothing incorporates a wide range of mathematical concepts, including triangles, squares, rhombuses, trapeziums, circles, and geometric transformations such as reflection. In their study, Pakia et al. (2023) not only identified these concepts but also provided photographic documentation of the motifs, for example, megopa-gopa (square), ate (rhombus), pasapu (trapezium), bobonggoli (circle), and symmetrical arrangements of triangles, demonstrating how symmetry, proportion, and numerical patterns

are embedded in the fabric design. These visual evidences reinforce the mathematical interpretations and highlight the deep integration of geometry in Mori cultural attire.
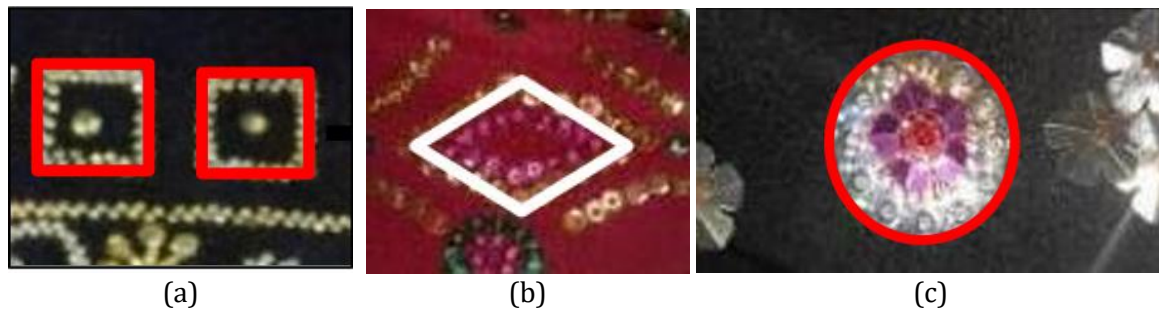

(a)   (b)   (c)

Figure 4. Geometric motifs in Mori traditional clothing: (a) square motif (megopa-gopa), (b) rhombus motif (ate), (c) circle motif (bobonggoli) (Pakia et al., 2023).

Wolotopo Village's woven cloth showcases a wide range of geometric concepts, including vertical lines, rectangles, squares, trapezium, triangles, rhombuses, kites, and circles. In their study, Manda et al. (2023) not only identified these elements but also provided photographic documentation of specific motifs, for instance, the Luka motif (vertical lines, rectangles, and kites), Kelimara motif (trapezium), Mata Pea motif (isosceles triangle), Mata Rote motif (square), One Mesa motif (rhombus), and Mata Soke motif (circle). These visual evidences reinforce the mathematical interpretation and demonstrate how structured geometric principles are deeply embedded in Wolotopo's weaving tradition.
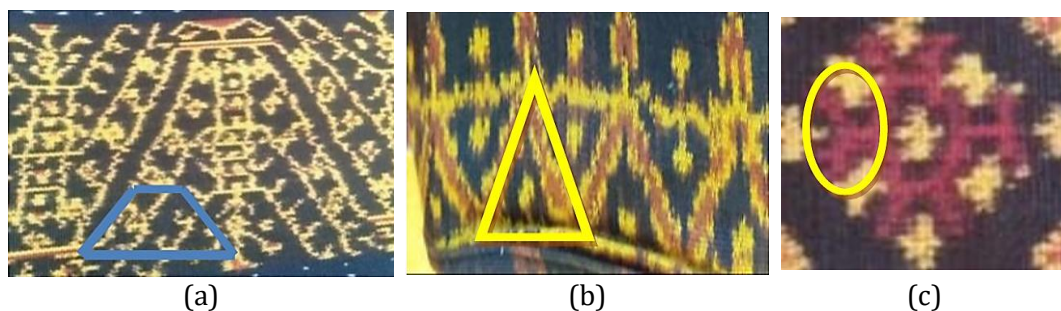

(a)   (b)   (c)

Figure 5. Example of geometric motifs in Wolotopo woven cloth: (a) Kelimara motif (trapezium), (b) Mata Pea motif (isosceles triangle), (c) Mata Soke motif (circle) (sManda et al. 2023).

Traditional dances across Indonesia also demonstrate a strong mathematical foundation. The Dayak Totokng dance, for instance, features formations that align with geometric patterns such as hexagons, parallelograms, and circles (Melinda & Septianawati, 2023). Meanwhile, the Kayiak Nari traditional dance incorporates mathematical transformations, such as similarity, reflection symmetry, and dilation, illustrating how mathematical concepts can be expressed through movement (Alkarimah et al., 2023).

Beyond tangible artifacts and performances, rituals and traditional ceremonies embed mathematical reasoning in unique ways.in the Lio tribe's rituals, squares and triangles appear on traditional clothing and headbands, while the construction of the spirit monument, dakutapae, relies on area and perimeter calculations (Towe, 2018). Javanese wedding traditions incorporate complex mathematical calculations, such as determining auspicious wedding dates through the weton system, which is based on modular arithmetic and set theory (Safitri et al., 2021). Similarly, the Rokat Tase' ceremony at Jumiang Beach, Pamekasan, exhibits mathematical elements such as angle geometry, circular formations, symmetry, reflection, and rotation, further demonstrating the pervasive presence of mathematical principles in cultural rituals (Fajriyeh & Zayyadi, 2023).

These examples illustrate the universality of mathematical concepts, demonstrating that geometry, symmetry, proportion, and measurement are not confined to textbooks but are deeply ingrained in daily life. Across different regions of Indonesia, common mathematical patterns emerge in traditional practices. Geometric shapes, such as squares, triangles, and rhombuses, frequently appear in textiles and artifacts, as seen in the woven fabric motifs of the Ende Lio and the Mori tribe's attire (Merdja & Restianim, 2022; Pakia et al., 2023). Measurement and calculation are integral to various traditions, including the use of meticulous measuring tools like the Hepa tool for determining the width of lontar leaves (Beti et al., 2021). The concepts of symmetry and proportion are omnipresent, shaping traditional clothing, dance movements, and carvings in cultures such as the Sasak community and the Sekaten ceremony (Ramadani et al., 2020; Turmuzi et al., 2022). Even the determination of auspicious days in ceremonies is rooted in mathematical reasoning, with communities like those in Giring Village and Pulo Traditional Village utilizing set theory and numerical cycles (Lestari et al., 2020; Maryani et al., 2022).

Despite these overarching mathematical patterns, variations exist due to cultural interpretations and local applications of mathematical principles. The Lio Tribe of East Nusa Tenggara, for example, uses squares and triangles in ancestral monuments to symbolize harmony between the physical and spiritual worlds, while Javanese and Balinese wedding rituals employ circles and hexagons in their ornaments to represent continuity and harmony (Safitri et al., 2021; Towe, 2018). The distinctive weaving techniques of Ende Lio and Wolotopo Village demonstrate an advanced understanding of symmetry and tessellation, ensuring that motifs are evenly distributed (Manda et al., 2023; Merdja & Restianim, 2022).

Measurement methods also differ across regions. The Lampung tribe employs an indigenous counting system for offerings and communal feasts, dividing food into precise fractional portions (Safitri et al., 2021). In contrast, the weton system of Javanese wedding traditions applies modular arithmetic to match birth cycles and determine ideal marriage dates (Lestari et al., 2020). Even in architectural traditions, mathematical precision is evident, such as in the Pati Ka ritual of the Lio Tribe, where ancestral monument dimensions adhere to proportional ratios based on cultural numerology (Towe, 2018).

Mathematical principles are also embedded in the techniques and designs of artifacts. Sasak pottery in Lombok utilizes cylindrical and conical forms, with artisans employing volume calculations to shape their creations (Turmuzi et al., 2022). The Dayak Libau woven fabric of West Kalimantan features scaling and proportional adjustments to ensure consistency in motif sizing across different fabric lengths (Manik et al., 2022). Similarly, Wolotopo weaving adheres to strict symmetry and transformation principles, thereby preserving aesthetic harmony (Manda et al., 2023).

The application of mathematics in specific rituals further underscores the cultural significance of mathematical concepts. The Dayak Kebahan wedding ritual involves financial planning, dowry calculations, and currency conversions, incorporating arithmetic and economic principles (Stevani et al., 2022). The Syawalan Gunungan Megono tradition relies on geometric calculations of volume and surface area to construct its towering food offerings (Karimah & Dewi, 2022). The Rokat Tase ceremony integrates angle geometry, reflections, and rotations in the arrangement of ceremonial objects and performances (Fajriyeh & Zayyadi, 2023).

Ultimately, this research confirms that mathematical principles are deeply embedded in Indonesian traditions, demonstrating that mathematics is not merely an academic discipline but a cultural reality. The implications for mathematics education are profound; linking mathematical concepts with local culture enhances engagement and fosters a deeper understanding of the subject (Litik & Argarini, 2023). Ethnomathematics enables students to view mathematics as part of their cultural heritage, making learning more relevant and meaningful (Widyasari & Hariastuti, 2021). This approach enriches curriculum design, strengthens cultural identity, and fosters appreciation for local wisdom, ensuring that mathematics education remains inclusive and deeply connected to students' lived experiences.

CONCLUSION AND SUGGESTIONS

This research reveals that ethnomathematical concepts, such as geometry, measurement, symmetry, and proportion, are reflected in various cultural and traditional aspects of Indonesia. These findings demonstrate that mathematics is not only an academic discipline but is also integrated into daily life through traditional ceremonies and cultural artifacts. By examining these cultural practices, this study answers the formulation of the problem by showing how mathematics is embedded in local traditions and how it varies across different regions of Indonesia. Furthermore, these findings emphasize the importance of incorporating ethnomathematics into the educational curriculum, as it can enhance students' understanding of mathematics by relating it to their cultural heritage. This connection fosters a deeper appreciation of both mathematics and cultural diversity. The study highlights the potential to develop more contextual and relevant teaching methods that integrate local cultural practices, making mathematics education more inclusive and meaningful.

Based on these findings, future research should investigate the practical application of ethnomathematics in classroom settings. Developing curriculum models and learning resources that incorporate traditional cultural elements can make mathematics education more engaging and relevant. Additionally, comparative studies across different cultural groups in Indonesia can further enrich the understanding of regional variations in ethnomathematics—collaborations between educators and researchers. Moreover, local cultural practitioners are also recommended to preserve and document mathematical knowledge embedded in traditional ceremonies. This approach ensures that Indigenous mathematical concepts remain relevant in modern education while contributing to the conservation of culture.

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