ETDC Indonesian Journal of Research and Educational Review
Volume 4, No. 4, 2025, pp 1157 - 1167
e–ISSN 2809-3682
p–ISSN 2809-7505

https://doi.org/10.51574/ijrer.v4i4.3709

Ethnomathematical Exploration of the Wiwitan Methik Pari Ritual Culture

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Article Info

Article history:

Received June 19, 2025
Revised August 24, 2025
Accepted August 31, 2025

Keywords:

Ethnomathematics;
Local Culture;
Mathematical Concepts;
Methik Pari;
Wiwitan Ritual.

ABSTRACT

The Wiwitan ritual is an agrarian tradition performed before the harvest as an expression of gratitude to God and ancestors. In its implementation, this ritual contains various cultural practices that contain mathematical concepts, such as patterns, geometric shapes, and measurements. Therefore, this study is geared toward investigating the ethnomathematic elements contained in the Wiwitan metik pari ritual culture in Umbulsari, Jember. A qualitative approach with ethnographic methods was used to uncover the meaning and practices of mathematics integrated into the ritual activities. Data were collected through participatory observation, in-depth interviews with traditional leaders and residents, and visual documentation. The findings indicate that local mathematical concepts, passed down from generation to generation, are present in the processes of preparing offerings, arranging the ritual venue, and determining the timing of implementation. These findings indicate that local culture can be a contextual learning resource that enriches mathematics learning in schools. This study recommends the integration of ethnomathematic values in the curriculum to strengthen cultural identity while increasing the relevance of mathematics learning.

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1. INTRODUCTION

Mathematics is a science that is not only limited to numbers and formulas but is also closely related to human activities and culture in everyday life (Ascher, 2018; Vos, 2018; Yulianasari et al., 2023; Rosa, 2023). Various community traditions and rituals often reflect mathematical concepts, serving as a manifestation of meaningful local values (Rosa & Orey, 2011; D'Ambrosio & Rosa, 2017; Novikasari et al., 2024). One approach that examines the relationship between mathematics and culture is ethnomathematics (Abdullah, 2017; D'Ambrósio & Knijnik, 2019; Lutfiyah et al., 2023; Kabuye Batiibwe, 2024).

In Jember Regency, particularly in Umbulsari, there is a cultural tradition known as the Wiwitan ritual for harvesting rice. This ritual is a form of community gratitude for

the harvest and the continuation of life (Sartini, 2017). Scientists have not widely explored the various patterns, calculations, and symbols in the Wiwitan metik pari ritual, which contain implicit mathematical values (Kristanti et al., 2022). Therefore, exploring ethnomathematics in the Wiwitan metik pari ritual culture in Umbulsari, Jember, is important for exploring and understanding how mathematical concepts are applied in the social and cultural life of the local community.

Indonesia is renowned for its rich cultural diversity and generations-old traditions (Indrawati & Sari, 2024; Nuraini et al., 2025). One cultural heritage still preserved by the Javanese people, particularly in agricultural areas like Umbulsari, Jember, is the Wiwitan ritual for harvesting rice. The Wiwitan metik pari ritual is a traditional ceremony performed by farmers as an expression of gratitude and a request for safety before beginning the rice harvest (Kiki Susanti, 2019; Salim et al., 2024). The word "wiwitan" itself comes from the Javanese language, meaning "beginning" or "start," reflecting the ritual's significance as a sign of the beginning of the harvest season. The Wiwitan metik pari ritual contains various symbolic elements and procedures that carry deep philosophical and cultural meaning, such as the use of uborampe (offerings) consisting of a tumpeng (rice cone), roasted chicken (ingkung), eggs, spices, and various other ingredients, each with its meaning (Dwi et al., 2025; Deha et al., 2025). Besides expressing gratitude to Dewi Sri, the goddess of rice and fertility, this ritual also serves as a means of strengthening social relations and maintaining harmony between humans and nature (Salim et al., 2024).

From an ethnomathematics perspective, the Wiwitan ritual contains mathematical values found in the patterns, calculations, and sequence of the ritual process (Nursyahida, 2020). For example, these include calculating harvest times, distributing offerings, geometric patterns in the arrangement of offerings, and the measurement system used in traditional agriculture. The ethnomathematical approach allows us to explore how the Umbulsari community integrates mathematical concepts into their cultural practices (Simbolan, 2024; Cesaria et al., 2025), which has not been studied in depth so far. This exploration is important not only for documenting and preserving local traditions but also for enriching mathematics education with an authentic cultural context (Aikenhead, 2017; Dhema et al., 2025; Maulida et al., 2025).

This study aims to describe and analyze the mathematical elements contained in the Wiwitan ritual of metik pari, thereby contributing to the development of more contextual and meaningful mathematics learning. Understanding ethnomathematics in this ritual is expected to open new insights for mathematics education that integrates local cultural values as an authentic and relevant learning resource for students. Therefore, this study aims to uncover and analyze the mathematical values contained in the Wiwitan ritual of metik pari in Umbulsari, Jember, as part of local wisdom with educational and cultural value.

2. METHOD

This research uses a qualitative method with an ethnographic approach. The aim is to explore and understand the mathematical practices embedded in the Wiwitan metik pari ritual culture in Umbulsari, Jember, in depth and contextually. An ethnographic approach was chosen because it allows researchers to directly observe community activities and understand the meaning and values embedded in the ritual from the perspective of cultural participants.

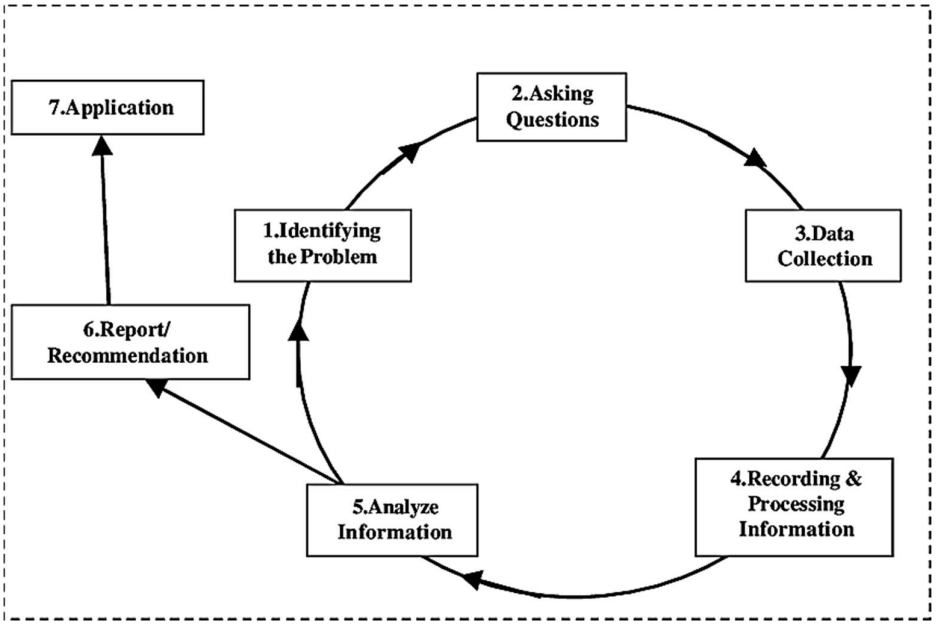

Figure 1. Flowchart Ethnographic Approach

Data collection techniques include participatory observation, where researchers were directly involved in the Wiwitan metik pari ritual process to observe the calculation patterns, symbolism, and mathematical practices that emerged during the ritual. Researchers conducted in-depth interviews with traditional leaders, farmers, and ritual participants, serving as primary sources to gather information about the meaning, calculation processes, and cultural values associated with the Wiwitan metik pari ceremony. The researchers also collected photographs, videos, and field notes to support the data analysis and strengthen the validity of the research findings.

The collected data were then analyzed descriptively and qualitatively using content analysis and cultural interpretation techniques to identify mathematical elements present in the ritual, such as the auspicious day calculation system, harvest distribution patterns, and symbols containing mathematical values. This analysis also links the findings with the concept of ethnomathematics as a bridge between mathematics and local culture. With this method, the research is expected to provide a comprehensive picture of how traditional mathematics is manifested in the Wiwitan ritual of metik pari in Umbulsari, while also contributing to cultural preservation and the development of mathematics

learning based on local wisdom. In Indonesia, local cultural contexts widely use common practices in ethnomathematics research.

3. RESULTS AND DISCUSSION

Results

The Wiwitan Metik Pari ritual in Umbulsari, Jember, is a Javanese farming tradition performed before the rice harvest as a form of gratitude to God and respect for Dewi Sri. This ritual has been passed down through generations and is still preserved in several villages in Jember, including Umbulsari. The Wiwitan Metik Pari ritual consists of several stages, from calculating the time for the ritual, preparing the tools, preparing the ingredients, and holding a communal prayer in the rice fields. The Wiwitan Metik Pari ritual is generally held before the rice harvest, with the timing determined based on calculations from the beginning of the planting season. The location of the ritual is often chosen at strategic points, such as the middle of the rice fields or at road intersections, which hold special significance in Javanese cosmology. The following presents the Wiwitan ritual offerings in Figure 2.

Figure 2. Wiwitan ritual offerings

The Wiwitan Metik Pari ritual consists of several stages, namely:

Timing of the Wiwitan Metik Pari Ritual

The timing of the Wiwitan Metik Pari ritual is usually determined before the rice harvest, which occurs periodically, with the timing determined based on calculations from the beginning of the planting season, namely every four months. This means it can be performed three times a year. It is usually performed in the afternoon, as it is believed to bring blessings. The wiwitan metik pari ritual is implemented once a year for 4 months, totaling 12 months. So in 1 year the wiwitan metik pari ritual is carried out 3 times.

Preparing the Wiwitan Metik Pari Ritual Tools

Preparing the tools for the Wiwitan Metik Pari ritual can be explained based on Javanese traditional practices as follows:

Prepare the main traditional tools, such as a sickle (a traditional tool for cutting rice), which is sharp and clean so that the rice harvesting ritual runs smoothly and

symbolically perfectly. An ethnomathematical analysis of this ritual tool is based on the concept of geometry and shape. The sickle has a curved shape like a crescent moon, which is related to the geometric concepts of curves and intersections of circles. This shape was traditionally chosen because it has optimal function in cutting rice effectively and efficiently. Mastery of this shape reflects the community's understanding of plane and spatial shapes in real life. Figure 3 illustrates the rice-cutting sickle.

Figure 2. Rice Cutting Sickle

Provide a jug filled with holy water as a medium for the purification ritual during the procession. This water is typically used for sprinkling as a symbol of purity and blessing. The ethnomathematical analysis of this tool is based on symmetry and geometric shape: the jug has a central bulge with a symmetrical neck and holes. This shape represents a simple geometric design that effectively holds water and allows for its easy extraction, symbolizing purity in the ritual.

Coordinate with elders or pinisepuh (elderly persons) to lead the ritual so that the prayer and rice-cutting process can proceed orderly according to prevailing customs. The ethnomathematical analysis of this tool is based on sequence and repetition:Coordinating with elders regarding the ritual sequence and the number of repetitions of certain prayers or processes demonstrates an understanding of the sequential and repetitive patterns within the ritual. Thus, the preparation of the wiwitan ritual tools is not only technical and symbolic but also incorporates the informal application of mathematical concepts inherent in the local cultural wisdom of Javanese farming communities.

Preparing Ingredients for the Wiwitan Metik Pari Ritual

Preparing ingredients for the Wiwitan Metik Pari ritual usually begins with the collection and arrangement of complete offerings, or uburampe (rice offerings), as a thanksgiving offering to Dewi Sri and the earth. The main ingredients include:

Savory rice, or tumpeng rice, which symbolizes prosperity and hopes for a bountiful harvest. The ethnomathematical analysis of this tumpeng rice is geometry and shape:The cone-shaped shape of the tumpeng rice is a concrete example of a geometric figure with symbolic meaning. Free-range chickens (ayam ingkung), which briefly

symbolize protection and prayers for a smooth harvest. The ethnomathematical analysis of this free-range chicken (ayam ingkung) is Number:The determination of the number of ingkung chickens to be served, usually one whole chicken, demonstrates the concept of a single number as a representation of the whole. Janur formed into a diamond symbolizes purity, hope for safety, and blessings of the harvest. The ethnomathematical analysis of this ketupat-shaped janur is geometry and weaving: The woven janur forms a rhombus or parallelogram pattern, which is a flat shape with certain sides and angles. The weaving process contains the concept of repeating pattern structure, symmetry, and the relationship between angles and sides that require spatial skills and an understanding of practical geometry. Javanese Jenang symbolizes gratitude, hope for blessings, and happiness for the upcoming harvest. The ethnomathematical analysis of this Javanese jenang is geometry and space:Jenang is poured into a pan with a square/block shape, which is a spatial concept.

Flowers symbolize fragrance, which supports the solemnity of prayer and serves as an offering element that enhances the meaning of gratitude and hope for blessings related to the rice harvest. The ethnomathematical analysis of these flowers is the calculation and determination of the number of flowers: In rituals, the number and type of flowers offered usually follow a certain number pattern that has symbolic and mathematical meaning, such as odd numbers or special numbers based on tradition. This symbol reflects the concept of numbers, combinations, and groupings in a cultural context. 1 egg symbolizes fertility, the beginning of a new life, and the hope of blessings for the rice harvest.

The ethnomathematical analysis of this material is the Symbol of Number and Unity: One egg symbolizes a whole unity that carries the meaning of fertility and the beginning of a new life, displaying the concept of the number one as a basic symbol of sustainability and the beginning in the life cycle and harvest. Kitchen spices symbolize gratitude, blessings, and fertility in the Javanese farming tradition. The spices used in offerings or dishes in this ritual symbolize the elements that support life and the future harvest. The ethnomathematical analysis of these ingredients is calculation and proportion: The spices are arranged in a certain balanced amount and measurement, showing the application of the concept of proportion and balance. This approach avoids excess or deficiency in the offering, maintaining the symbolic harmony that is important in the ritual. The following shows geometric-shaped ritual materials in Figure 4 and Figure 5.

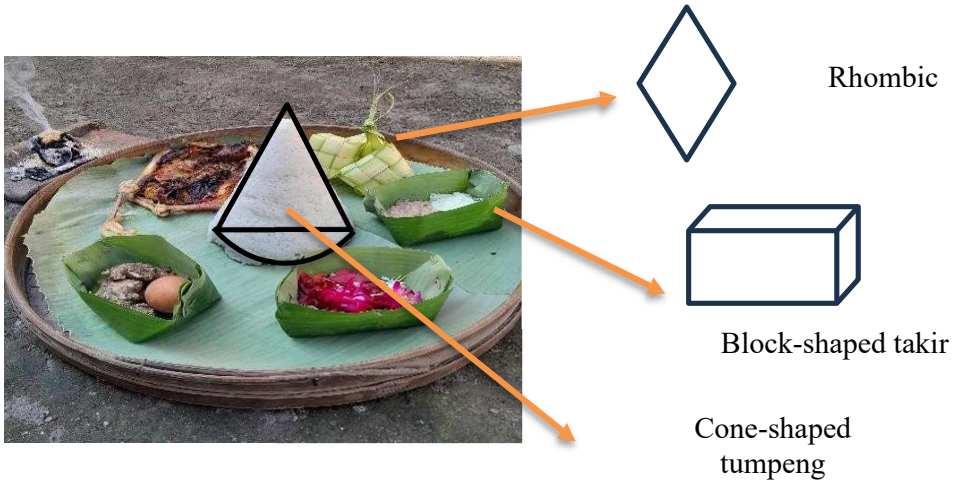

Figure 4. Geometric Shaped Ritual Materials

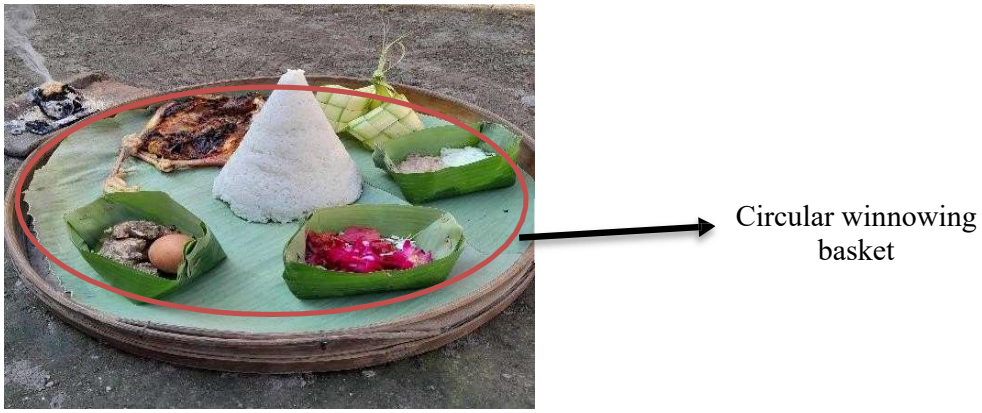

Figure 5. Geometric Shaped Ritual Materials

In the Wiwitan metik pari ritual, simple geometric principles are applied. For example, the tumpeng is shaped like a cone, the tampah is circular, the takir resembles a block, and the ketupat is shaped like a rectangular pyramid wrapped in rhombus-shaped woven fabric.

Recitation of the Wiwitan Metik Pari Ritual Prayer

The recitation of prayers in the Wiwitan Metik Pari ritual is an important part, serving as an expression of gratitude, a request for safety, and a hope for blessings for the rice harvest. This prayer is usually led by a traditional figure or the most respected elder (mbah kaum), who performs the ritual in the rice fields before the rice cutting begins, signaling the beginning of the harvest. The prayers include:

First, an opening prayer asking for blessings and safety. Second, a recitation of a traditional mantra or kidung (singing song) repeated in a specific order. Third, the prayer is accompanied by the burning of incense, the scattering of flowers, and the sprinkling of holy water from a kendil (a water jug) as a symbol of purification. Fourth, after the

prayer is completed, the rice is cut with a sickle to signal the beginning of the harvest. The ethnomathematics in the recitation of the traditional mantra, which is repeated in a specific order, accompanied by the burning of incense, the scattering of flowers, the sprinkling of holy water, and the cutting of rice with a sickle as a sign of harvest, involves number patterns in the repetition of the mantra, counting and the sequence of the prayers, and the measurement and geometric layout of ritual objects. Rice cutting also reflects the measurement of time and quantity in the harvest cycle. All of this harmoniously combines mathematical and cultural values in a tradition rich in meaning.

Discussion

From an ethnomathematics perspective, the Wiwitan metik pari ritual contains mathematical values found in the patterns, calculations, and sequence of the ritual procession. This is consistent with findings from the Wiwitan metik pari ritual in Umbulsari, Jember, which displays symmetrical patterns in the arrangement of offerings, the calculation of the ritual's time, which is carried out periodically every four months, and the use of simple geometric shapes such as cones, circles, and rectangular pyramids. As stated by Nursyahida (2013) and Fadlilah et al. (2017), the mathematical concepts in these patterns and calculations are not merely technical aspects but also an integral part of local wisdom and identity passed down through oral tradition.

Thus, the sequence of the Wiwitan metik pari ritual procession not only has cultural and spiritual value but also represents mathematics as a concrete, lived practice within the cultural context of the community, demonstrating the close relationship between ritual patterns and the mathematical understanding that naturally develops in everyday life. The Wiwitan metik pari ritual includes various uborampe elements such as tumpeng (rice cone), roasted chicken (ingkung), eggs, spices, and other ingredients, each of which has deep symbolic and philosophical meaning. This finding aligns with what Kristanti et al. (2022) and Lifia (2024) stated, stating that these offerings are not merely physical offerings but also imbued with cultural values, such as gratitude, hopes for fertility, blessings of the harvest, and balance in life.

Practical Implications

1. Application of Ethnomathematics in Learning: This research can serve as a reference for applying ethnomathematics in mathematics learning so that students can better understand mathematical concepts and develop an awareness of local culture.
2. Development of Learning Materials: Mathematics learning materials can be developed by integrating ethnomathematics from the Methik Pari Wiwitan ritual culture so that students can better understand mathematical concepts and develop an awareness of local culture.
3. Improving the Quality of Learning: This research can help improve the quality of mathematics learning in schools by integrating ethnomathematics from the Methik Pari Wiwitan ritual culture.

Theoretical Implications

1. Development of Ethnomathematics Theory: This research can contribute to the development of more effective and contextual ethnomathematics theory by examining the ethnomathematics of the Methik Pari Wiwitan ritual culture.
2. Application of Ethnomathematics in Various Contexts: The results of this research can provide examples of the application of ethnomathematics in various contexts, such as mathematics learning and curriculum development.
3. Development of an Ethnomathematics-Based Learning Model: This research can be a reference for developing a more effective ethnomathematics-based learning model to improve students' understanding of mathematical concepts.

4. CONCLUSION

The Wiwitan Metik Pari ritual incorporates many ethnomathematical ideas from Javanese farming practices. These include the application of symmetrical patterns in the preparation of offerings, the use of simple geometric shapes such as circles, cones, and rectangular pyramids, and the calculation of ritual time, which is performed periodically every four months. These mathematical theories, in the form of patterns and calculations, are not merely technical; they are also an important part of local wisdom and identity, passed down orally from generation to generation. Therefore, the sequence of the Wiwitan Metik Pari ritual procession has cultural and spiritual value and also demonstrates mathematics as a tangible cultural practice. The procession demonstrates the strong connection between ritual patterns and the mathematical understanding that emerges naturally in everyday life. Consequently, the Wiwitan Metik Pari ritual is both a cultural and religious expression and an ethnomathematical practice that uses numbers, geometry, proportions, patterns, and the cycle of time to ensure a balanced harvest and produce profitable yields.

As a suggestion, teachers can apply ethnomathematics in mathematics learning to improve students' understanding of mathematical concepts and awareness of local culture. This research can help improve the quality of mathematics learning in schools by integrating ethnomathematics into the Methik Pari Wiwitan ritual culture. Further research can be conducted to develop a more effective and contextual ethnomathematics-based learning model by integrating the Methik Pari Wiwitan ritual culture. Additionally, further research can be conducted to create a more effective tool for measuring students' understanding of both mathematical concepts and the ethnomathematics related to the Methik Pari Wiwitan ritual culture.

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