Journal of Education and Learning (EduLearn)
Vol. 20, No. 2, May 2026, pp. 1261~1272
ISSN: 2089-9823, DOI: 10.11591/edulearn.v20i2.21872

Connection ethnomathematics and ethnomodeling in the *bocah sukerta* traditional ceremony, Indonesia

Sudirman[1], Ebenezer Bonyah[2], Jenisus O. Dejarlo[3], Runisah[4], Nandang[4], Rosyadi[4], Mochammad Taufan[4], Anzzal Ibrahim[4]
[1]Master of Mathematics Education, Graduate School, Universitas Terbuka, Banten, Indonesia
[2]Department of Mathematics Education, Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi, Ghana
[3]Department of Mathematics Education, University of Rizal System, Rizal, Philippines
[4]Department of Mathematics Education, Universitas Wiralodra, Indramayu, Indonesia

Article Info

Article history:

Received Feb 19, 2024
Revised Jul 21, 2025
Accepted Sep 30, 2025

Keywords:

Didactical design in mathematics
Ethnomathematical connection
Ethnomodeling connection
Institutionalization of mathematical concepts
Traditional ceremony *bocah sukerta*

ABSTRACT

This research aims to identify and reveal the connection between ethnomathematics and ethnomodeling in Indonesia's *bocah sukerta* traditional ceremony. An ethnographic design was used to reveal the research objectives. The participants involved in this research were the ceremony leader and *bocah sukerta*. Next, the data obtained from interviews and observations were analyzed using the content analysis method. The research results reveal that the ethnomathematics connection is reflected in weighting activities (weighing objects, calculating total weight, making comparisons, and balancing weights) and the shape of the scales (the basic shape represents 2D geometry, and the frame shape represents 3D geometry). This research also concludes that the ethnomodeling connection produces mathematical understanding, especially in arithmetic operations, weight measurements, weight conversions, mathematical equations, basic statistics, Cartesian coordinates, the center point of a square, and determining a pyramid's distance, length, and area. Furthermore, this research concludes that the relationship between ethnomathematics and ethnomodeling in the *bocah sukerta* traditional ceremony can be used to construct didactic designs for square material volumes and rectangular pyramids.

Corresponding Author:

Sudirman
Master of Mathematics Education, Graduate School, Universitas Terbuka
Cabe Raya Road, Pondok Cabe, Pamulang, South Tangerang 15437, Banten, Indonesia
Email: sudirman.official@ecampus.ut.ac.id

1. INTRODUCTION

Mathematics is part of human culture and civilization [1]. However, there are differences between mathematics as a culture and mathematics taught in schools. Mathematics as a culture refers to the use of mathematics in everyday life, traditions, and societal habits [2], while mathematics in schools often uses a more abstract and theoretical approach, emphasizing the application of mathematical concepts in problem-solving and the development of logical thinking skills [3]. Even though these differences cause difficulties in understanding and studying mathematics [4], the two are interrelated and influence each other. Understanding the relationship between these two concepts can help promote contextual and relevant mathematics learning for students while also enriching their appreciation of the cultural diversity around them. Therefore, it is necessary to connect mathematics as a culture with mathematics taught in schools [5], [6]–[9], and local culture can be the key to this connection [10], [11].

Mathematics teaching in many countries, including Indonesia, is sometimes influenced by Western culture [12], which may not be entirely in harmony with local cultural realities and values. This can create a gap between the subject matter taught at school and students' daily experiences. The ethnomathematics approach, described by Rosa and Orey [13] as an exciting alternative, becomes relevant in this context. With ethnic, cultural, linguistic, and regional diversity, ethnomathematics offers an opportunity to appreciate cultural differences in mathematics learning. Beyond enriching teaching, this approach also serves as a platform for maintaining local values and practices often overlooked in mathematics education [14].

In another context, a review of literature related to ethnomathematics connections emphasizes how mathematical ideas are reflected in various cultures, traditions, and daily habits. Olivero-Acuña *et al.* [15] explore the ethnomathematical connections between coastal cheese-making practices and mathematical concepts such as geometric solids, measurement units, and proportionality within a cultural context. Azmi *et al.* [16] develop and examine an instructional framework that integrates computational thinking into the ethnomathematical exploration of *Rumoh Aceh* to enhance junior high school students' understanding of geometric concepts through culturally grounded learning experiences. Pabón-Navarro *et al.* [6] investigated ethnomathematics relationships in mud brick-making in Salamina-Magdalena, Colombia. Bantaika *et al.* [17] explore mathematical concepts and cultural values in the reception traditions of the Dawan tribe (Atoni Meto). Furthermore, Prahmana *et al.* [18] explored ethnomathematical relationships in determining the seasonal system and burial dates of the people of Yogyakarta, Indonesia. Apart from that, Syahrin *et al.* [19] conducted a study of the relationship between ethnomathematics and the *Aboge* calendar (*alif, rebo, wage*) as a determinant of Islamic holidays and traditional ceremonies at the Kasepuhan Palace in Cirebon. Previous studies confirm that many researchers have explored ethnomathematics in traditional ceremonies. However, it is explicitly connected to the concept of ethnomodeling and its implications for didactic design in schools.

Based on research findings, ethnomathematics plays a strategic role as a bridge between mathematics as a cultural construct and the development of mathematical concepts in school settings. This connection strengthens the relevance of learning to students' daily lives, thereby supporting the development of more meaningful conceptual understanding through real-life experiences. This aligns with Azmi *et al.* [16] assertion that ethnomathematics reflects the relationship between mathematical practices experienced by students within their own life contexts. In this regard, the ethnomodeling approach further expands and deepens the role of ethnomathematics by interpreting and formally representing cultural practices through the lens of academic mathematics [12], [20]. Rosa and Orey [13] explain that ethnomodeling enables a reciprocal relationship between cultural knowledge and mathematical reasoning, wherein mathematics is not only enriched by cultural practices but also sheds light on the underlying logic of those cultural systems. Ethnomodeling is not merely a reductive process of translating cultural artifacts into formal equations; rather, it is a dialogical process that respects and engages with the epistemological foundations of the communities being studied. For instance, modeling the symmetrical principles found in traditional weaving patterns or analyzing navigation techniques rooted in oral traditions can reveal both mathematical insights and cultural sophistication. Thus, ethnomodeling serves as an effective pedagogical strategy to integrate mathematical modeling with culturally relevant contexts, particularly in diverse and multicultural learning environments.

In the context of this research, it is not only about connecting ethnomathematics to the *bocah sukerta* traditional ceremony but also about trying to produce a mathematical model using an ethnomodeling framework. Additionally, the reason for exploring the traditional *bocah sukerta* ceremony is that it holds various mathematical values that are interesting to study further. One example is the heavy weighting of *bocah sukerta* in Indramayu, Indonesia. *Bocah sukerta* refers to the belief that a child living in that area will be protected from disaster. When a child has weight, they will avoid bad things and receive good luck. Based on the uniqueness of the *bocah sukerta* traditional *bobotan* ceremony, this research aims to identify and reveal the relationship between ethnomathematics, ethnomodeling, and their impact on the process of institutionalizing mathematics in schools.

2. METHOD

2.1. Design

This study uses an ethnographic approach. According to Hammersley [21], the ethnographic approach can be used to understand the symbols contained in the culture of a society. In the context of this research, the study of ethnomathematics connections refers to Rodríguez-Nieto and Alsina [7], who explain that the study of ethnomathematics connections arises when a group of people gives significance to mathematical concepts or objects, links expression, and substance, and unites these mathematical objects with cultural reality. Meanwhile, according to Alangui [20], the ethnomathematics connection framework begins by formulating general questions and designing initial answers, which are then evaluated, analyzed, and constructed further by researchers. The result describes activities illustrating the relationship between mathematical concepts and cultural contexts. In addition, the ethnomodeling connection framework refers to the conceptual structure used to describe and analyze the relationship between traditional or local knowledge and mathematical modeling processes [22]. It includes stages such as identifying traditional models, mathematical analysis of those models, and integration of the analysis results into a modern mathematical context.

2.2. Research subject

The subjects in this research include key informants and case informants. These two types of informants are used to ensure the validity of the data. The key informant in this research was the leader of the traditional ceremony, namely Ki Dalang Karno, while the case informant was someone who had carried out the weighing procession (*bocah sukerta*). The ceremony leader is considered a key informant because he provides essential information regarding the history, stages of the ceremony, and characteristics of the shape of the scales for the *bocah sukerta* traditional ceremony.

2.3. Data collection technique

This research data collection technique uses observation, interviews, and documentation. Observation is used to directly observe *bocah sukerta* traditional ceremony activities and record processes and activities related to mathematical concepts. Furthermore, this research conducted the interview process periodically and openly to explore mathematical values in the *bocah sukerta* traditional ceremony activities. In the interview process, researchers use subject naming, which aims to make it easier for readers to understand the content of the interview. Respondent 1 (R1) is used for naming Ki Dalang Karno (ceremony leader/key informant), while R2 is for the child being weighed (case informant). Researchers also used documentation to photograph, video, and record the ceremony process and its relationship to mathematical values in traditional ceremonies.

2.4. Data analysis technique

This study used qualitative data analysis as the data analysis technique. The qualitative analysis begins with examining the data obtained from interviews and observations. Data from interviews and observations were transcribed, reduced, abstracted, coded, presented, and analyzed using the content analysis method. In this study, there were five stages of conducting content analysis, namely: i) compiling interview transcripts and observation notes; ii) building categories; iii) coding of interview texts and field notes; iv) analyzing the results; and v) present the results of interviews and observation notes [23]. This research, using NVivo 12 began by importing the results of interviews with respondents and field notes during the *bobotan* traditional ceremony process. After the data was imported, the researcher began to create a coding project by identifying the themes of this research related to "ethnomathematical connections and the traditional *bobotan bocah sukerta* ceremony. Next, after the codes were formed, the researcher began analyzing the codes' relationships. This can help in compiling findings by the research objectives. In the final stage, researchers used the NVivo 12 features to analyze the data, including creating reports, looking for patterns, and identifying qualitative findings.

3. RESULTS AND DISCUSSION

3.1. Connection of ethnomathematics and ethnomodeling in the *bocah sukerta* traditional ceremony

Based on the interview with the Dalang and the results of observations during the implementation of traditional ceremonies, it was revealed that ethnomathematics at the *bocah sukerta* traditional ceremony appeared in weighing activities such as weighting. Apart from that, it can also be seen in the shape of the scales on the base and frame.

3.1.1. Weighting

The ethnomathematics connections in the weighing process are related to the weighing activity. In the traditional weighting activity of the *bocah sukerta* ceremony, one arm is used to store the weight of the offerings, and the other arm is used to place the weight on the scale in the form of the weight of the *bocah sukerta*. Overall, the mathematical activities in the weighting process are comparing weights, weighing objects, calculating total weight, creating comparisons, and balancing weights, as in Figure 1.

Furthermore, ethnomodeling on weighting activities can be formulated using illustrations; if the weight of *bocah sukerta* is 45.7kg, then the weight of the offering can be determined using the concept of arithmetic operations, weight measurements, and mathematical equations. For example, if we know that the offerings consist of rice, chicken eggs, mangoes, traditional foods, and other offerings, then we can arrange the mathematical equation as follows:

x_1= weight of rice (in kg), x_2= weight of eggs (in kg), x_3= weight of mango (in kg)
x_4= weight of traditional food (in kg), ………, x_n= weight of other offerings
So, the equation for the total weight of the offering can be written as (1):

$$x_1 + x_2 + x_3 + x_4 + \cdots + x_n = 45.7kg \quad (1)$$

To achieve balance in the weighting, you can add various offerings until the weight is the same as the weight of the *bocah sukerta*.

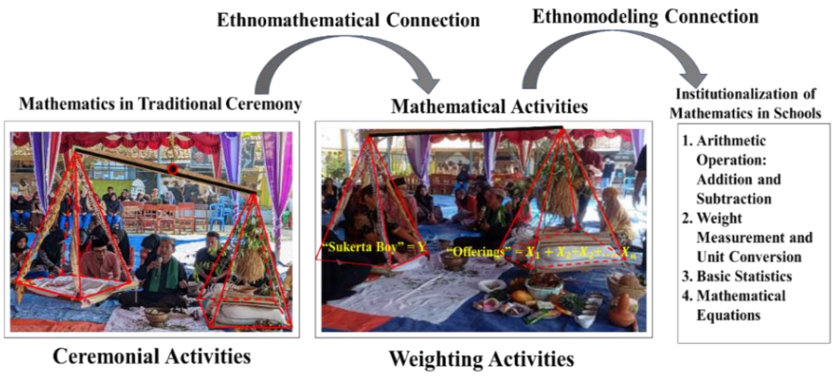

Figure 1. Connection of ethnomathematics ethnomodeling in weighting activities

3.1.2. Shape of the scale base

Based on the researcher's observations of the shape of the scales, it can be concluded that the ethnomathematics connection to the shape of the scales appears in the shape of the base of the scales. The shape of the scale base is square with an area of 1m (length and width are 1m). In ethnomodeling, to find the center point of a square, we need to draw two diagonals on the large square. The two diagonals will intersect at the center point if their width and length are the same, as in Figure 2.

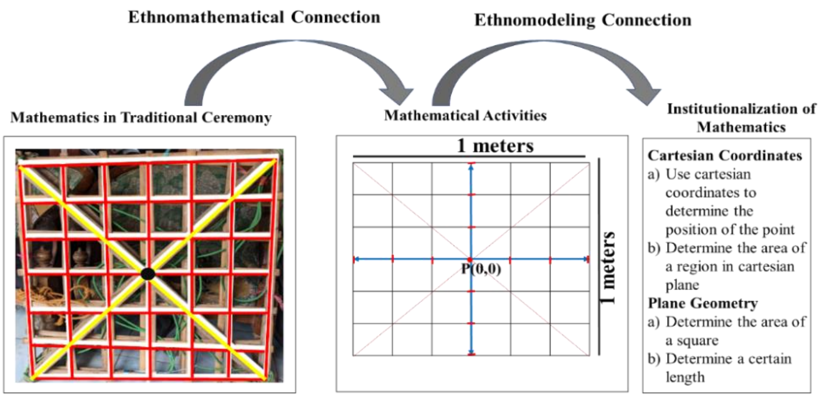

Figure 2. Ethnomathematics connection, ethnomodeling on the shape of the scale base

In addition, to determine the center point of the square, as in Figure 3, in the Cartesian coordinate system, it can be modeled using (2) and (3):

$$x_p = \frac{x_a+x_b+x_c+x_d}{4} \tag{2}$$

$$y_p = \frac{y_a+y_b+y_c+y_d}{4} \tag{3}$$

where, (x_p, y_p) are the coordinates of the center point of the square and (x_a, y_a), (x_b, y_b), (x_c, y_c), (x_d, y_d) are the coordinates of the four corner points of the square. Apart from using the Cartesian coordinates approach, you can also use the distance approach, the intersection points of two diagonals.

$$(PR)^2 = (PQ)^2 + (QR)^2 \tag{4}$$
$$PR = \sqrt{100+100}$$
$$PR = 10\sqrt{2}\,cm$$

Since the two diagonals PR=QS are $10\sqrt{2}$ cm apart, the segments they divide at the midpoint of the square are each half the length of the diagonal or half of $10\sqrt{2}$ cm, i.e. $5\sqrt{2}$ cm. The intersection point between these two diagonals is the center point of the square. Therefore, the distance from the intersection point to one end of the diagonal is $5\sqrt{2}$ cm.

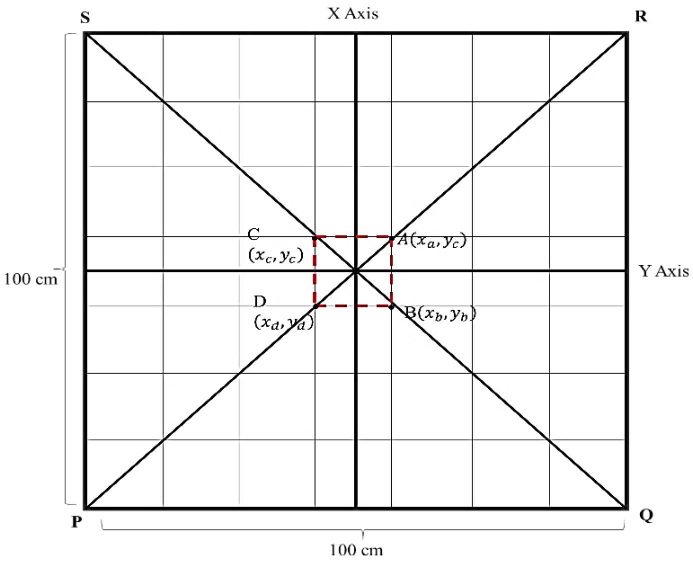

Figure 3. Square center point

3.1.3. Shape of the scale framework

The scale frame can be connected from the corner points of the square (base of the scale) to the points on the arms of the scale, thus forming a rectangular pyramid. Apart from that, from the rectangular pyramid, four right triangles can be formed as a blanket for the rectangular pyramid. Additionally, the two pyramids must be congruent to have a good balance, as in Figure 4. Therefore, the ethnomathematics connection is visible in the form of the framework.

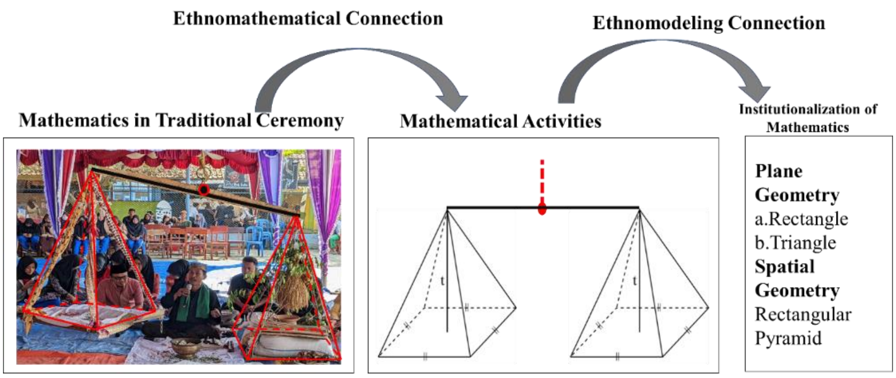

Figure 4. Ethnomathematics connection, ethnomodeling on the shape of the scale's framework

The balance axis is usually along which an object or weight will be placed and rotates when balanced by a comparable weight on the other side, as in Figure 5. Therefore, the ethnomodeling used to determine the scale axis is:

$$x = \frac{m_2.d_2 - m_1.d_1}{m_1 + m_2} \quad (5)$$

where, x is the position of the scale axis, m_1 is the object on one side of the scale, m_2 is the object on the other side of the scale, d_1 is the distance from one axis of the scale to the center of gravity m_1 and d_2 is the distance from one axis of the scale to the center of gravity m_2. In another context, to find the ratio of the volumes of two square pyramids, we need to use the pyramid volume formula, which is given by (6).

$$V = \frac{1}{3}\ x\ base\ area\ x\ height \quad (6)$$

For a square pyramid, the height is the length of the vertical side. If it is given that the length of the base side is 1 m and the length of the vertical side is 2 m, then the volume of the two square pyramids.
First pyramid volume:

$$V_1 = \frac{1}{3} x (1\ m\ x\ 1\ m)\ x\ 2\ m \quad (7)$$
$$V_1 = \frac{1}{3} x\ 1\ m^2 x\ 2\ m$$
$$V_1 = \frac{2}{3}\ m^3$$

second pyramid volume:

$$V_2 = \frac{1}{3} x (1\ m\ x\ 1\ m)\ x\ 2\ m \quad (8)$$
$$V_2 = \frac{1}{3} x\ 1\ m^2 x\ 2\ m$$
$$V_2 = \frac{2}{3}\ m^3$$

since the volumes of both square pyramids are the same, the volume ratio is 1:1. This means that the volumes of the two square pyramids have the same ratio, that is, each pyramid has the same volume.

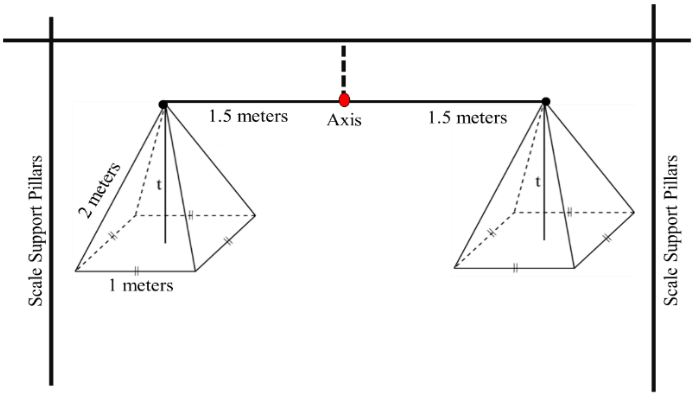

Figure 5. Scale framework

3.2. Implications for didactical design

The institutionalization of mathematical concepts found in the *bocah sukerta* traditional ceremony procession is an innovative step to help students understand mathematical concepts. Additionally, by integrating these concepts into the didactic design of square materials, educators can create more meaningful learning experiences for students. This step not only allows students to understand mathematical concepts better but also helps them appreciate and preserve local cultural heritage.

Process at school is to use realistic mathematics education with the iceberg concept. Learning steps can be designed to take students from the most concrete understanding to more abstract mathematical concepts, using the context of the *bobotan* traditional ceremony on a square scale basis, as in Figure 6.

– Concrete stage (lower iceberg)

The teacher can introduce the context of the *bocah sukerta* traditional *bobotan* ceremony and explain its important role in community life. After that, the teacher shows or describes the square-shaped scale base used in the *bobotan* traditional ceremony. Next, the teacher invites students to make direct observations or through pictures or videos about the traditional ceremony to gain a concrete understanding of how scales and their bases are used in traditional ceremonial processions.

– Representative stage (central iceberg)

At the representation stage, there are two forms of representation used, namely, a model of the shape represented in a drawing or using simple equipment such as paper, pencils, or everyday objects to create a model or representation of a square scale base. Apart from that, the teacher invites students to design and make a simple scale model using the principles of square geometry. Then, the teacher introduces basic mathematical concepts related to the area of a square built from small square units.

– Symbolic stage (upper iceberg)

At this stage, the teacher invites students to measure the lengths of the sides and diagonals of the square scale model they made. Apart from that, teachers can discuss the concepts of the area and perimeter of a square and how to calculate them, as well as their relationship to the base of a square scale. Teachers can also encourage students to create mathematical representations or formulas that represent the relationships between various measurements and concepts related to the base of a square scale. In the final stage, the teacher invites students to reflect on their experiences in designing and understanding square weighing bases, as well as their relationship to the traditional ceremony.

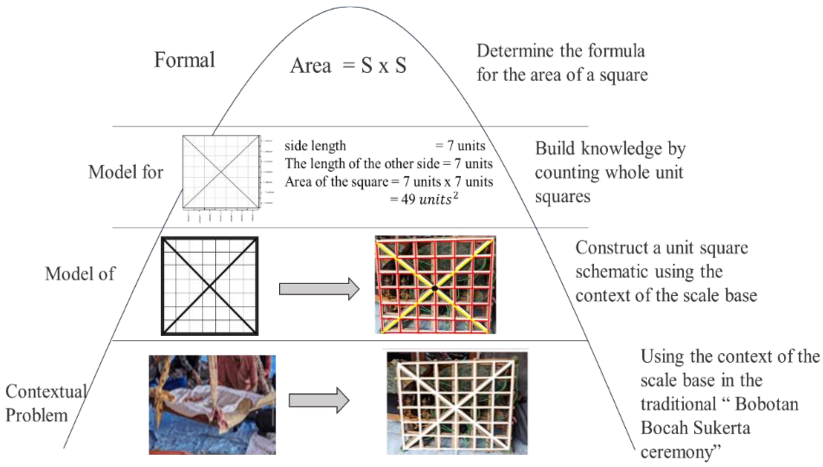

Figure 6. Iceberg on the square area concept

3.3. Discussion

In this research, we found that the connection of ethnomathematics in the *bocah sukerta* traditional ceremony is reflected in the weighing process and the weighing tools. The connection of ethnomodeling is evident in the weighting process and the shape of the scales, which can be used to institutionalize school mathematical concepts. These concepts include arithmetic operations (addition and subtraction), weight measurement and unit conversions, basic statistics, mathematical equations, Cartesian coordinates, and determining distances. This can be seen from the framework of research findings, as in Figure 7.

The institutionalization of school mathematics concepts revealed in this research is in line with research by Wiryanto *et al.* [24], which uses tools and calculation procedures at the Tedhak Siten ceremony which can be used as learning material for the concept of units of time, least common multiple, modulo 5, modulo 7, circle, triangle, rectangle, cylinder volume, and sphere volume. Apart from that, Irfan *et al.* [25] concluded that the tools used in the Ki Ageng Wonolelo ceremony represent 2D and 3D geometric shapes. Furthermore, in the traditional skating procession, Kholid *et al.* [26] describe the concept of geometry in the form of traditional ceremonial equipment used to carry out traditional procedures.

Apart from that, the concept of geometry in the weighting process involves the concept of mathematical equations or is related to algebra. This finding aligns with research by Umbara *et al.* [27], which explains the concept of algebra in Sundanese traditional ceremonies in Indonesia. Another study conducted by Purniati *et al.* [28] concluded that the ethnomathematics of mosque buildings and their ornaments are related to geometric and algebraic concepts. Umbara *et al.* [29] explore and analyze the mathematical ideas embedded in the Cigugur indigenous community's calculation practices for determining auspicious times to begin house construction, using an ethnomathematics and ethnomodelling approach. These findings also confirm that ethnomathematics and ethnomodeling in the traditional *bocah sukerta* ceremony can be used as an initial context for learning mathematics, specifically regarding squares, weight measurements, and mathematical equations. This aligns with the results of Supriadi [30], [31] using Sundanese ethnomathematics to produce didactic designs for elementary school students, especially regarding the operation of whole numbers and fractions. In addition, Anriana *et al.* [32] revealed that ethnomathematics exploration of the Bengkalis Malay community could be used as a source of elementary school mathematics teaching materials, especially for measuring length, weight, area, volume, and time. Nurafifah *et al.* [33] concluded that ethnomathematics on traditional boat structural forms can help students understand the concepts of 2D geometry and 3D geometry. Furthermore, Putri *et al.* [34] found that the PMRI approach effectively improved students' problem-solving abilities in algebraic arithmetic operations through contextual learning based on the Palembang environment. Meanwhile, Verner *et al.* [35] develop teacher competence in teaching mathematics using an ethnomathematics approach. Therefore, according to Sunzuma and Maharaj [36], schools need to redesign the curriculum in schools to include an ethnomathematics approach and train prospective mathematics teachers to understand the ethnomathematics approach.

This research confirms that the connection between ethnomathematics and ethnomodeling in the *bocah sukerta* traditional ceremony not only provides a deeper understanding of culture and traditions but also provides a strong foundation for learning mathematical concepts, such as measuring body weight, mathematical equations, and 2D and 3D geometry. This creates a more meaningful and relevant learning experience for students and increases their appreciation of cultural values and diversity. Thus, it is impressive that this research has the potential to enrich students' learning experiences while promoting cultural diversity in mathematics education. This research has limitations because it only identifies and reveals mathematical concepts through ethnomathematics and ethnomodeling connections at the *bocah sukerta* traditional ceremony. However, further and in-depth studies are needed to ensure the impact of learning using the context of the *bocah sukerta* traditional ceremony. Apart from that, this research also provides opportunities for advanced researchers to develop learning modules based on the findings of this research. These modules can be used as independent learning resources for students or as additional materials in classroom learning.

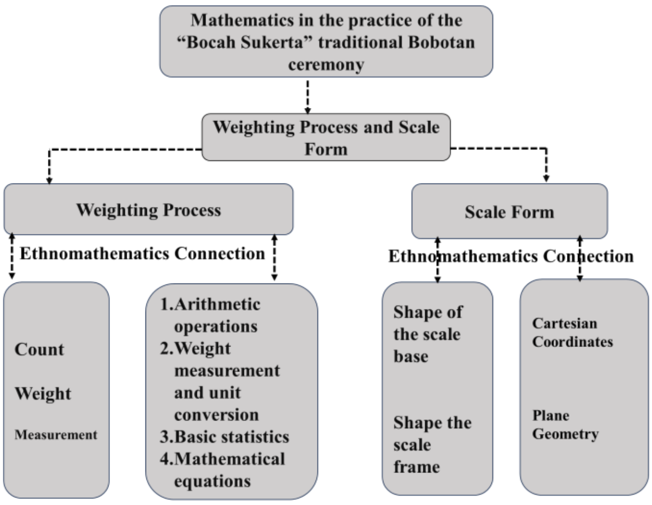

Figure 7. Research findings framework

4. CONCLUSION

The *bocah sukerta* traditional ceremony procession in Indonesia is a series of activities aimed at preserving local culture and serves as a valuable context for mathematics learning in schools. Ethnomathematics, as an essential part of scientific studies that emerges from culture, can significantly link cultural aspects and mathematical activities. Therefore, the results of this study conclude that the relevance of ethnomathematics in the *bocah sukerta* traditional ceremony is reflected in weighting activities, such as comparing weights, weighing objects, calculating total weight, making comparisons, and balancing weights. Additionally, the ethnomathematical connection is also evident in the base and frame of the scales, which represent 2D and 3D geometric shapes.

This research also concludes that the ethnomodeling connection to weighting activities can produce mathematical understanding, especially in arithmetic operations (addition and subtraction), weight measurement, weight conversion, mathematical equations, and basic statistics. Furthermore, the ethnomodeling connection to the base and frame of the scales facilitates understanding of concepts such as Cartesian coordinates, the center point of a square, determining length and distance, calculating the square area, and the concept of the volume of a rectangular pyramid. Moreover, this research concludes that the connection between ethnomathematics and ethnomodeling in the *bocah sukerta* traditional ceremony can be used to construct didactic designs based on the concept of a square, measuring weight, and calculating the volume of a rectangular pyramid. This implies that ethnomathematics in the *bocah sukerta* traditional ceremony can be used to develop engaging and relevant learning materials, enabling students to experience fundamental and meaningful mathematical concepts. This approach can increase students' interest and motivation in studying mathematics. Additionally, the findings of this research can serve as a basis for further studies in the field of ethnomathematics, both in the context of the *bocah sukerta* traditional ceremony and other cultural contexts.

ACKNOWLEDGMENTS

We thank all research participants for the information provided during the interviews. We would also like to thank the Universitas Terbuka and Universitas Wiralodra for facilitating the implementation of this research.

FUNDING INFORMATION

This research received financial support from Universitas Terbuka and Universitas Wiralodra. The funding covered publication costs and research-related expenses. The authors gratefully acknowledge this support in facilitating the completion and dissemination of the study.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Sudirman	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	
Ebenezer Bonyah		✓		✓	✓					✓				
Jenisus O. Dejarlo		✓		✓	✓					✓				
Runisah	✓	✓		✓	✓			✓	✓	✓				
Nandang	✓	✓		✓	✓			✓	✓	✓				
Rosyadi	✓	✓		✓	✓			✓	✓	✓				
Mochammad Taufan	✓	✓		✓	✓			✓	✓	✓				
Anzzal Ibrahim	✓	✓		✓	✓			✓	✓	✓			✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have read and agreed to the final version of the manuscript.

INFORMED CONSENT

All participants and community representatives involved in this study provided their informed consent before taking part in the research. The researchers explained the objectives, procedures, and cultural sensitivity related to the *bocah sukerta* traditional ceremony

ETHICAL APPROVAL

This study was conducted in accordance with the ethical standards of research involving human participants and cultural communities. Ethical approval was obtained from the Research Ethics Committee of Universitas Terbuka. The researchers also received permission and support from local cultural leaders and community representatives to ensure that all procedures respected the values, norms, and traditions associated with the *bocah sukerta* ceremony.

DATA AVAILABILITY

The data supporting the results of this study are publicly available at https://doi.org/10.5281/zenodo.17592428.

REFERENCES

[1] B. R. Acharya, M. P. Kshetree, B. Khanal, R. K. Panthi, and S. Belbase, "Mathematics educators' perspectives on cultural relevance of basic level mathematics in Nepal," *Journal on Mathematics Education*, vol. 12, no. 1, Jan. 2021, doi: 10.22342/JME.12.1.12955.17-48.

[2] K. Francois and B. Van Kerkhove, "Ethnomathematics and the philosophy of mathematics (education)," in *Philosophy of Mathematics: Sociological Aspects and Mathematical Practice. Texts in Philosophy 11*, B. Löwe and J. Symons, Eds., College Publications, 2010, pp. 121–154.

[3] L. E. Richland, J. W. Stigler, and K. J. Holyoak, "Teaching the conceptual structure of mathematics," *Educational Psychologist*, vol. 47, no. 3, pp. 189–203, Jul. 2012, doi: 10.1080/00461520.2012.667065.

[4] J. Hiebert and T. P. Carpenter, "Learning and teaching with understanding," in *Handbook of research on mathematics teaching and learning: A project of the National Council of Teachers of Mathematics*, D. A. Grouns, Ed., New York: Macmillan, 1992, pp. 65–92.

[5] C. A. Rodríguez-Nieto, Y. C. Escobar-Ramírez, V. F. Moll, and A. A. Araújo, "Ethnomathematical and mathematical connections activated by a teacher in mathematical problems posing and solving," *Acta Scientiae*, vol. 25, no. 1, Jan. 2023, doi: 10.17648/acta.scientiae.7356.

[6] M. L. Pabón-Navarro, C. A. Rodríguez-Nieto, and A. M. Povea-Araque, "Ethnomathematical connections in bricks making in Salamina-Magdalena, Colombia, and geometric treatment with geogebra," *TURCOMAT: Turkish Journal of Computer and Mathematics Education*, vol. 13, no. 3, pp. 257–273, 2022.

[7] C. A. Rodríguez-Nieto and Á. Alsina, "Networking between ethnomathematics, STEAM education, and the globalized approach to analyze mathematical connections in daily practices," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 18, no. 3, p. em2085, 2022, doi: 10.29333/ejmste/1171.

[8] S. Mania and S. Alam, "Teachers' perception toward the use of ethnomathematics approach in teaching math," *International Journal of Education in Mathematics, Science and Technology*, vol. 9, no. 2, pp. 282–298, 2021, doi: 10.46328/ijemst.1551.

[9] C. A. Rodríguez-Nieto, M. L. Pabón-Navarro, B. M. Cantillo-Rudas, S. Sudirman, and V. F. Moll, "The potential of ethnomathematical and mathematical connections in the pre-service mathematics teachers' meaningful learning when problem-solving about brick-making," *Infinity Journal*, vol. 14, no. 2, pp. 419–444, 2025, doi: 10.22460/infinity.v14i2.p419-444.

[10] Sudirman, C. A. Rodríguez-Nieto, E. Bonyah, S. Takiveikata, and J. O. Dejarlo, "Social arithmetics: learning from Indramayu traditional market traders in doing calculations," *International Journal of Mathematics and Sciences Education*, vol. 1, no. 1, Jun. 2023, doi: 10.59965/ijmsed.v1i1.25.

[11] I. P. A. A. Payadnya, I. G. A. P. A. Wulandari, K. R. Puspadewi, and S. Saelee, "The significance of ethnomathematics learning: a cross-cultural perspectives between Indonesian and Thailand educators," *Journal for Multicultural Education*, vol. 18, no. 4, 2024, doi: 10.1108/JME-05-2024-0049.

[12] A. J. Bishop, "Cultural conflicts in mathematics education: developing a research agenda," *For the Learning of Mathematics*, vol. 14, pp. 15–18, 1994.

[13] M. Rosa and D. C. Orey, "Ethnomodeling as a research theoretical framework on ethnomathematics and mathematical modeling," *Journal of Urban Mathematics Education*, vol. 6, no. 2, 2013, doi: 10.21423/jume-v6i2a195.

[14] T. Sharma and D. C. Orey, "Meaningful mathematics through the use of cultural artifacts," in *Ethnomathematics and its Diverse Approaches for Mathematics Education*, M. Rosa, L. Shirley, M. E. Gavarrete, and W. V. Alangui, Eds., Springer Cham, 2017, pp. 153–179, doi: 10.1007/978-3-319-59220-6_7.

[15] R. R. Olivero-Acuña, C. A. Rodríguez-Nieto, V. F. Moll, B. M. Cantillo-Rudas, and F. M. Rodríguez-Vásquez, "Ethnomathematical connections between the production of coastal cheese, geometric solids, measurements, and proportionality: a study with a Colombian merchant," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 21, no. 4, art. no. em2608, 2025, doi: 10.29333/ejmste/16081.

[16] N. Azmi, S. Arif, H. Sofyan, and R. Oktavia, "Bridging geometry and cultures for junior high school level: Rumoh Aceh design from a computational thinking perspective," *Journal on Mathematics Education*, vol. 16, no. 2, 2025, doi: 10.22342/jme.v16i2.pp383-406.

[17] A. Bantaika, A. L. Son, Y. N. Deda, and J. Garcia-Garcia, "Mathematical concepts and cultural values in guest reception traditions: an ethnomathematic study of the Dawan Tribe community on Timor Island," *International Journal of Didactic Mathematics in Distance Education*, vol. 2, no. 1, 2025, doi: 10.33830/ijdmde.v2i1.9702.

[18] R. C. I. Prahmana, W. Yunianto, M. Rosa, and D. C. Orey, "Ethnomathematics: pranatamangsa system and the birth-death ceremonial in Yogyakarta," *Journal on Mathematics Education*, vol. 12, no. 1, Jan. 2021, doi: 10.22342/JME.12.1.11745.93-112.

[19] M. A. Syahrin, T. Turmudi, and E. Puspita, "Study ethnomathematics of aboge (alif, rebo, wage) calendar as determinant of the great days of Islam and traditional ceremony in Cirebon Kasepuhan Palace," in *AIP Conference Proceedings*, 2016, doi: 10.1063/1.4941172.

[20] W. V. Alangui, "Ethnomathematics and culturally relevant mathematics education in the Philippines," in *Ethnomathematics and its Diverse Approaches for Mathematics Education*, M. Rosa, L. Shirley, M. E. Gavarrete, and W. V. Alangui, Eds., Cham, Springer, 2017, pp. 183–208, doi: 10.1007/978-3-319-59220-6_8.

[21] M. Hammersley, "Ethnography: problems and prospects," *Ethnography and Education*, vol. 1, no. 1, 2006, doi: 10.1080/17457820500512697.

[22] S. Desai, F. Safi, S. B. Bush, T. Wilkerson, J. Andreasen, and D. C. Orey, "Ethnomodeling: extending mathematical modeling research in teacher education," *Investigations in Mathematics Learning*, vol. 14, no. 4, Oct. 2022, doi: 10.1080/19477503.2022.2139092.

[23] A. Strøm and M. S. Fagermoen, "Systematic data integration—a method for combined analyses of field notes and interview texts," *International Journal of Qualitative Methods*, vol. 11, no. 5, 2012, doi: 10.1177/160940691201100502.

[24] Wiryanto, M. G. Primaniarta, and J. R. L. de Mattos, "Javanese ethnomathematics: exploration of the Tedhak Siten tradition for class learning practices," *Journal on Mathematics Education*, vol. 13, no. 4, 2022, doi: 10.22342/jme.v13i4.pp661-680.

[25] M. Irfan, D. S. Setiana, E. F. Ningsih, W. Kusumaningtyas, and S. A. Widodo, "Traditional ceremony Ki Ageng Wonolelo as mathematics learning media," *Journal of Physics: Conference Series*, vol. 1175, no. 1, 2019, doi: 10.1088/1742-6596/1175/1/012140.

[26] M. N. Kholid, L. Fitriana, M. Adnan, A. Hendriyanto, and S. Sahara, "Ethnomathematics: the discovery of mathematical concepts in the Sekaten tradition," *AIP Conference Proceedings*, vol. 2566, 2022, doi: 10.1063/5.0114930.
[27] U. Umbara, S. Prabawanto, and M. G. Jatisunda, "Combination of mathematical literacy with ethnomathematics: how to perspective Sundanese culture," *Infinity Journal*, vol. 12, no. 2, 2023, doi: 10.22460/infinity.v12i2.p393-414.
[28] T. Purniati, T. Turmudi, D. Juandi, and D. Suhaedi, "Ethnomathematics exploration of the Masjid Raya Bandung ornaments in transformation geometry materials," *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, vol. 5, no. 2, 2021, doi: 10.31331/medivesveteran.v5i2.1639.
[29] U. Umbara, Wahyudin, and S. Prabawanto, "Exploring ethnomathematics with ethnomodeling methodological approach: how does Cigugur indigenous people use calculations to determine a good day to build houses," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 17, no. 2, p. em1939, 2021, doi: 10.29333/ejmste/9673.
[30] S. Supriadi, "Didactic design of Sundanese ethnomathematics learning for primary school students," *International Journal of Learning, Teaching and Educational Research*, vol. 18, no. 11, 2019, doi: 10.26803/ijlter.18.11.9.
[31] S. Supriadi, "Elementary school students' reflection: didactical design analysis on integer and fraction operations on mathematical concepts with Sundanese ethnomathematics learning," *Pegem Egitim ve Ogretim Dergisi*, vol. 12, no. 4, 2022, doi: 10.47750/pegegog.12.04.19.
[32] R. Anriana, G. Witri, Z. H. Putra, M. Fendrik, Dahnilsyah, and A. Aljarrah, "Ethnomathematics study in measurement of bengkalis Malay community as mathematics resources for elementary school," *Ethnography and Education*, vol. 18, no. 3, 2023, doi: 10.1080/17457823.2023.2232500.
[33] L. Nurafifah, F. Gunadi, S. Sudirman, and W. Wahyudin, "Ethnomathematical connections of Indramayu traditional boat forms: implications for institutionalization school geometry concept," *Mathline: Jurnal Matematika dan Pendidikan Matematika*, vol. 9, no. 1, 2024, doi: 10.31943/mathline.v9i1.561.
[34] R. I. I. Putri, Zulkardi, and A. D. Riskanita, "Students' problem-solving ability in solving algebra tasks using the context of Palembang," *Journal on Mathematics Education*, vol. 13, no. 3, 2022, doi: 10.22342/jme.v13i3.pp549-564.
[35] I. Verner, K. Massarwe, and D. Bshouty, "Development of competencies for teaching geometry through an ethnomathematical approach," *Journal of Mathematical Behavior*, vol. 56, 2019, doi: 10.1016/j.jmathb.2019.05.002.
[36] G. Sunzuma and A. Maharaj, "Teacher-related challenges affecting the integration of ethnomathematics approaches into the teaching of geometry," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 15, no. 9, 2019, doi: 10.29333/ejmste/108457.

BIOGRAPHIES OF AUTHORS

Sudirman is a doctor at the Master of Mathematics Education, Graduate School at Universitas Terbuka, Indonesia. His research fields are ethnomathematics, learning geometry, and the use of technology in learning geometry. He can be contacted at email: sudirman.official@ecampus.ut.ac.id.

Ebenezer Bonyah is a professor in the Department of Mathematics Education, Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi, Ghana. His research areas are mathematical modeling and mathematics learning. He can be contacted at email: ebbonya@gmail.com.

Jenisus O. Dejarlo is a Doctor of Philosophy and associate professor at the University of Rizal System. His research fields are related to mathematics learning, realistic mathematics, and ethnomathematics. He can be contacted at email: Jenisus.dejarlo@urs.edu.ph.

Runisah is an associate professor in the Department of Mathematics Education, Universitas Wiralodra, Indramayu, Indonesia. Her research fields are related to mathematics learning, mathematical thinking abilities, and metacognition. She can be contacted at email: runisah@unwir.ac.id.

Nandang is an associate professor in the Department of Mathematics Education, at Universitas Wiralodra, Indramayu, Indonesia. His research fields are related to mathematics learning, realistic mathematics, ethnomathematics, and mathematical thinking skills. He can be contacted at email: nandang1967@unwir.ac.id.

Rosyadi is an assistant professor at Universitas Wiralodra, Indramayu, Indonesia. His research fields are related to mathematics learning, realistic mathematics education, and ethnomathematics. He can be contacted at email: rosyadi@unwir.ac.id.

Mochammad Taufan is assistant professor at Universitas Wiralodra, Indramayu, Indonesia. His research fields are related to mathematics learning, the use of technology in mathematics learning, and ethnomathematics. He can be contacted at email: mochammad.taufan@unwir.ac.id.

Anzzal Ibrahim is a student at Universitas Wiralodra, Indramayu, Indonesia. His field of study is mathematics education. He has a strong interest in educational research and learning innovation. He can be contacted at email: anzzal.ibrahim@gmail.com.