



Local Wisdom and Ethnomathematics in Banyumulek Pottery from the Perspective of Sustainable Cultural Heritage

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Abstract

This study investigates the Banyumulek pottery tradition in West Lombok, Indonesia, through the interconnected lenses of ethnomathematics and Sustainable Cultural Heritage. As globalization increasingly threatens traditional crafts, preserving the intangible knowledge embedded within these cultural practices has become imperative. This research aims to identify the values of local wisdom, describe the ethnomathematical concepts utilized in the pottery production process, and analyze their contribution to sustainable cultural preservation. Employing a qualitative ethnographic design, data were collected via participant observation, in-depth interviews with local artisans, and documentation. The findings reveal that the Banyumulek pottery tradition is deeply rooted in local wisdom, encompassing vital social cohesion, ecological sustainability, and cultural economy values. Furthermore, the production stages inherently apply diverse ethnomathematical concepts predominantly geometry, alongside measurement, proportion, symmetry, and patterns which have evolved naturally through collective community experience rather than formal education. This mathematical knowledge functions as a living cultural system transmitted intergenerationally. Consequently, the study formulates a conceptual preservation model that positions ethnomathematics as a crucial bridge connecting traditional knowledge with modern academic frameworks. In conclusion, Banyumulek pottery fulfills the social, economic, environmental, and educational dimensions of Sustainable Cultural Heritage. Preserving this craft necessitates safeguarding its underlying knowledge systems, underscoring the need for synergistic stakeholder support to leverage ethnomathematics in both cultural conservation and contextual education.

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Introduction

Cultural heritage is an essential asset that reflects the identity, history, and knowledge systems developed within a society. Amidst globalization and rapid social transformation, the existence of cultural heritage faces various challenges that can threaten its sustainability. Globalization not only brings changes to societal consumption patterns and lifestyles but also influences the younger generation's perspective on local culture. Consequently, various traditional cultural practices previously handed down through generations have begun to experience a decline in existence and a loss of cultural practitioner regeneration. Therefore, cultural heritage preservation efforts are no longer merely oriented toward the protection of physical artifacts but also encompass the preservation of the accompanying knowledge, skills, values, and cultural practices (Yang et al., 2018; Zbuche, 2021).

One form of cultural heritage that holds historical, social, economic, and educational value is traditional craftsmanship. Crafts do not merely produce functional and aesthetically valuable products; they also represent the collective experience of the community in managing resources, developing local technology, and building cultural identity. In various traditional communities, crafting activities serve as a medium for knowledge transmission that occurs informally through daily practices. The existence of traditional crafts has even become a crucial part of maintaining cultural sustainability and strengthening the social resilience of local communities (Anand & Bhasin, 2019; Ding, 2025).

One of the traditional craft centers with high cultural value in Indonesia is Banyumulek Pottery, which developed in Banyumulek Village, West Lombok Regency, West Nusa Tenggara. Banyumulek Pottery is widely recognized as a cultural product of the Sasak people, distinguished by its unique shapes, production



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techniques, and decorative motifs. Pottery-making activities have been a part of the local community's life for several generations, serving as both a source of livelihood and a symbol of local cultural identity. In its production process, artisans continue to preserve various traditional techniques inherited across generations, ranging from raw material processing and pottery body formation to the firing process and the application of motifs and ornaments.

Nevertheless, the sustainability of the Banyumulek pottery tradition currently faces several challenges. Shifting market preferences, the influx of modern industrial products, a declining interest among the younger generation in the artisan profession, and the increasingly limited documentation of traditional knowledge are factors that potentially threaten the continuity of this cultural heritage. If not seriously anticipated, various local knowledge embedded in pottery-making practices risk degradation or even extinction alongside the diminishing number of traditional practitioners. This condition highlights the importance of documentation and revitalization efforts for the local knowledge inherent in the Banyumulek pottery tradition.

One approach that can be utilized to uncover and document local knowledge within cultural activities is ethnomathematics. Ethnomathematics is a field of study that examines the relationship between mathematics and culture, positioning mathematical activities as part of the community's social practices. D'Ambrosio (2001) explains that ethnomathematics seeks to understand how a cultural group performs activities of counting, measuring, classifying, designing, and problem-solving based on their life experiences. This perspective asserts that mathematics is not only present in formal academic environments but also develops naturally in various societal cultural activities.

Ethnomathematical studies evolved from the notion that every cultural group possesses its own distinct way of constructing mathematical knowledge in accordance with its needs and life contexts (D'Ambrosio, 2006). This thought was subsequently reinforced by various studies demonstrating that traditional cultural practices harbor a myriad of mathematical concepts that can be identified through the shapes, patterns, sizes, proportions, and production techniques utilized by the community (Gerdes, 1994; Jungic, 2021). In the context of traditional pottery, concepts such as geometry, symmetry, measurement, proportion, patterns, and shape transformations can be found at various production stages.

A systematic review conducted by Iskandar et al. (2022) indicates that geometric concepts are a dominant theme in ethnomathematics research across various cultural artifacts. Research findings by Sari et al. (2022) also demonstrate that Indonesian local cultural artifacts contain diverse mathematical concepts that can serve as learning resources as well as mediums for cultural preservation. Thus, Banyumulek pottery holds significant potential to be studied as a representation of the Sasak community's mathematical knowledge, which has thus far evolved through cultural practices.

Beyond serving as a tool for identifying mathematical concepts, ethnomathematics plays a strategic role in supporting cultural preservation. D'Ambrosio and Rosa (2017) assert that ethnomathematics functions as a bridge between tradition and modernity through the processes of documenting, interpreting, and developing local knowledge within an academic framework. This approach ensures that cultural heritage is not only maintained as a relic of the past but is also utilized as a source of learning and innovation for the present generation.

In recent decades, the concept of Sustainable Cultural Heritage has been increasingly utilized as a framework for understanding cultural heritage continuity. This concept emphasizes that cultural preservation must holistically address social, economic, environmental, and educational dimensions so that cultural heritage remains vibrant and relevant to society (Yang et al., 2018; Zbучea, 2021). Cultural sustainability is determined not only by the existence of cultural products themselves but also by the continuity of the knowledge systems, values, and skills that support them. Nuryanto (2023) explains that traditional craftsmanship holds a strategic position in maintaining the continuity of intangible cultural heritage while concurrently strengthening local community identity.

Although ethnomathematics research has grown rapidly in various countries (Rosa & Orey, 2016; Palhares, 2023; Maboṭṭja, 2025), studies connecting ethnomathematics, traditional pottery, and the Sustainable Cultural Heritage perspective remain relatively limited. The majority of research focuses on identifying mathematical concepts in cultural artifacts or developing culture-based learning (Wulandari et al., 2024; Xu & Ball, 2024). Studies specifically examining the contribution of ethnomathematics to the preservation of Banyumulek pottery as sustainable cultural heritage are still scarce. This gap forms the essential rationale for conducting this research.

Based on this premise, this study is directed toward identifying the values of local wisdom embedded in the Banyumulek pottery tradition, describing the mathematical concepts that emerge during its production process, and analyzing the contribution of ethnomathematics to the reinforcement of Sustainable Cultural Heritage. The research findings are expected to enrich the repertoire of ethnomathematics research in Indonesia while

simultaneously contributing to local knowledge-based cultural preservation efforts. Furthermore, this research supports the achievement of the Sustainable Development Goals (SDGs), particularly Goal 11 concerning sustainable cities and communities through the protection and safeguarding of cultural heritage.

Materials and Methods

This study employed a qualitative ethnographic approach to examine local wisdom, ethnomathematical practices, and cultural heritage sustainability within the Banyumulek pottery tradition. The research was conducted purposively in Banyumulek Village, West Lombok, because the area remains an active centre of traditional pottery production. Informants included senior and young artisans, community leaders, craft entrepreneurs, and village officials selected through purposive sampling. Data were collected through participant observation, semi-structured interviews, and documentation to identify cultural values, knowledge transmission, symbolic meanings, and mathematical concepts such as geometry, measurement, proportion, symmetry, and patterns embedded in pottery production (D'Ambrosio, 2001, 2006; Rosa & Orey, 2016). The data were analysed interactively using the Miles, Huberman, and Saldaña model through data condensation, data display, and conclusion drawing, focusing on local wisdom, ethnomathematics, and Sustainable Cultural Heritage. Research trustworthiness was ensured through source triangulation, methodological triangulation, and member checking by comparing information from different informants, data collection methods, and participant verification. These procedures enabled an accurate interpretation of how ethnomathematical knowledge supports the preservation and sustainability of Banyumulek pottery as part of the Sasak community's cultural heritage.

Results and Discussions

Local Wisdom in the Banyumulek Pottery Tradition

Banyumulek pottery is a representation of the Sasak community's local wisdom that has developed and been handed down through generations. The pottery-making tradition yields not only craft products with economic value but also reflects the knowledge systems, cultural values, and social practices that shape local identity. In the perspective of intangible cultural heritage, the existence of Banyumulek pottery demonstrates that culture is present not only as physical artifacts but also as skills, experiences, knowledge, and values continuously reproduced through the community's daily activities (Nuryanto, 2023; Ding, 2025).

Based on observations and interviews with the artisans, it was discovered that the Banyumulek pottery-making process continues to preserve various traditional techniques inherited from preceding generations. Knowledge concerning raw material selection, shaping techniques, the drying process, and firing is not acquired through formal education, but rather through direct learning processes within the family and artisan community environments. This transmission pattern indicates that the family functions as a cultural institution safeguarding the continuity of traditional knowledge. From an early age, children are introduced to pottery-making activities through observation and direct involvement in the production process, resulting in a natural and continuous knowledge transfer.

These findings suggest that local wisdom in the Banyumulek pottery tradition is not solely related to technical skills but also reflects robust social values. Pottery production activities provide a space for interaction among family and community members, facilitating the exchange of experiences and the formation of social solidarity. Production activities performed collectively forge tight cooperative relationships among the artisans. In this context, pottery is not merely perceived as an economic commodity but also as a medium strengthening community social cohesion. This condition aligns with the view of Yang et al. (2018), who state that traditional crafts serve a vital function in sustaining social relationships and reinforcing local community identity.

Besides social values, the Banyumulek pottery tradition encompasses ecological values reflected in the prudent utilization of natural resources. Artisans utilize local clay as the primary production material, considering the quality and characteristics of materials available in the surrounding environment. The utilization of these local raw materials demonstrates a profound connection between the community and the environment in which they reside. Knowledge regarding suitable clay types, required moisture levels, and material processing techniques forms part of the collective experience forged through long-term interaction with nature. These practices reflect community adaptation to the environment while highlighting the presence of traditional ecological knowledge supporting sustainable production activities.

Further ecological value is evident in the use of relatively simple production methods with minimal reliance on modern technology. The majority of production stages still depend on manual skills, effectively minimizing energy consumption and reliance on external resources. Although market developments prompt various

innovations in product design and marketing, the core principles of traditional production are maintained as part of the Banyumulek community's cultural identity. These findings support Zbucnea's (2021) assertion that traditional craft practices contribute significantly to sustainable development by integrating cultural, economic, and environmental aspects into a mutually supportive system.

Local wisdom in the Banyumulek pottery tradition is also reflected in the cultural economy values developing within community life. For most artisan families, pottery acts as the primary income source sustaining household economic continuity. Nevertheless, the economic orientation in pottery production does not eradicate the cultural value embedded in every produced item. Artisans retain traditional techniques and characteristics even when adapting to constantly changing market demands. This effort to preserve local distinctiveness reveals a collective awareness that cultural value is a crucial asset distinguishing Banyumulek pottery from other craft products.

From a Sustainable Cultural Heritage perspective, this condition illustrates that cultural sustainability is dictated not only by the community's ability to preserve the physical form of cultural products but also by their success in maintaining the knowledge systems underpinning the production process. Anand and Bhasin (2019) elucidate that cultural heritage sustainability is realized when local communities can integrate traditional values with contemporary needs without losing their cultural identity. In Banyumulek pottery, this process is visible in the artisans' ability to innovate in design and expand the market without abandoning the traditional principles inherited from prior generations.

Furthermore, the research results reveal that the local wisdom values encapsulated in the Banyumulek pottery tradition are closely interconnected with the ethnomathematical concepts discussed in the subsequent section. Knowledge of dimensions, proportions, shape balance, and the repetition of motifs used in pottery making is essentially part of the local knowledge system developed through the community's cultural experiences. This knowledge is practically transmitted through production activities, becoming an integral part of the craft tradition. Thus, the Banyumulek pottery tradition serves not only as a means of cultural preservation but also as a vessel for the transmission of diverse forms of knowledge encompassing social, ecological, economic, and mathematical aspects.

Overall, the research findings denote that local wisdom in the Banyumulek pottery tradition is the primary foundation supporting the continuity of the Sasak community's cultural heritage. The social values fortifying community bonds, ecological values driving sustainable resource use, and cultural economy values sustaining community livelihood demonstrate that Banyumulek pottery possesses roles extending far beyond its economic function as a craft product. The presence of these values constitutes essential cultural capital in preserving the tradition's continuity while strengthening the position of Banyumulek pottery as a living cultural heritage that continues to evolve amid the dynamics of contemporary society.

Ethnomathematics in Banyumulek Pottery

Research results indicate that the Banyumulek pottery-making tradition represents not only the Sasak community's local wisdom but also contains various mathematical concepts integrated into every production stage. These concepts evolve naturally through collective community experience and are passed down through generations without necessitating formal mathematical formulation. These findings reinforce D'Ambrosio's (2006) view that mathematics is intrinsically a part of cultural activities, emerging as a community's response to life's necessities and its social environment. In the context of Banyumulek pottery, various activities such as measuring, shaping, setting proportions, pattern making, and motif repetition denote the existence of mathematical practices living within the artisan community's culture.

Based on field observations, the concept of geometry is the most dominant ethnomathematical aspect identified in the Banyumulek pottery production process. Various pottery products display distinct geometric shapes, such as circles, cylinders, cones, hemispheres, and combinations of several three-dimensional shapes. Artisans consistently form the pottery body while observing size balance among the base, body, and neck of the pottery to yield proportional shapes. Although artisans generally do not utilize formal geometric terms, they possess a practical comprehension of ideal shape characteristics based on years of acquired experience.

The presence of geometric concepts in cultural artifacts has been a primary focus in ethnomathematical studies. Iskandar et al. (2022), through a systematic literature review, found that geometry is the most frequently appearing mathematical concept in diverse traditional cultural practices. The findings in Banyumulek pottery corroborate these results, as the majority of the produced shapes exhibit tangible applications of two-dimensional and three-dimensional geometric concepts. From an ethnomathematical perspective, the use of these geometric shapes demonstrates that the community possesses the capacity to construct mathematical knowledge through cultural practices without relying on formal educational systems.

In addition to geometric concepts, this study also identified the application of measurement concepts in the pottery production process. Measurements are conducted from the initial shaping stage through to the final

finishing stage. Artisans utilize various traditional measurement techniques to determine the height, diameter, thickness, and capacity of the pottery. Interestingly, most measurements are conducted without the use of standard measuring instruments such as rulers or measuring tapes. Instead, artisans employ the dimensions of hands, fingers, palms, or visual estimations honed through years of experience. This practice indicates that measurement concepts in traditional societies do not always depend on standard units but can evolve through local measurement systems collectively agreed upon and understood by the community.

These findings resonate with the thoughts of D'Ambrosio (2001), who explains that every cultural group develops a measurement system suited to its needs and life contexts. This system may differ from formal mathematical standards but retains adequate accuracy to support community activities. In Banyumulek pottery, the artisans' proficiency in producing relatively consistent sizes signifies a mastery of measurement concepts attained through cultural learning processes and repetitive practice.

Concepts of proportion and ratio are also distinctly visible in the pottery shaping process. Artisans intuitively determine the size relationships among various product parts to generate harmonious shapes with high aesthetic value. The proportion between the pottery's height and width, the size of the neck relative to the body, and the balance between decorative and functional parts act as crucial considerations in the production process. Although not expressed in mathematical formulas, the application of these proportional principles demonstrates an empirical mathematical understanding developing within the artisan community.

Rosa and Orey (2013) expound that such cultural practices can be comprehended through the ethnomodeling approach, namely the process of interlinking mathematical models developing in society with academic mathematical concepts. In the context of Banyumulek pottery, determining product proportions can be viewed as a form of ethnomodeling reflecting the community's capability to devise mathematical strategies based on experience and practical needs. Consequently, pottery production activities produce not only cultural products but also represent mathematical thought processes occurring in everyday life.

Other ethnomathematical aspects identified are the concepts of symmetry and patterns. Various decorative motifs applied to the pottery's surface display regular repetitive patterns. Artisans consistently arrange motif positions to yield visual balance across all parts of the product. In several pottery types, applications of rotational and translational symmetry were observed through motif repetition at relatively equal intervals. The existence of these patterns signifies an intuitive societal comprehension of structural regularity and balance, which constitute fundamental pillars in mathematics.

Gerdes (1994) affirms that patterns and symmetry are among the most readily identifiable forms of mathematical expression in various traditional cultural artifacts. The findings in Banyumulek pottery reveal that these concepts function not only as aesthetic elements but also as part of the local knowledge system passed down from generation to generation. Artisans learn to recognize and reproduce patterns through observation and direct practice; thus, this mathematical knowledge is preserved within the community without requiring formal documentation.

The existence of these diverse ethnomathematical concepts in Banyumulek pottery indicates that the Sasak community's cultural activities harbor complex and academically valuable mathematical knowledge. This knowledge develops through practical experiences occurring in daily life and forms an integral part of the community's cultural system. These findings support Rosa and Orey's (2016) perspective that ethnomathematics is a tool for understanding the diversity of mathematical reasoning developing across different cultural communities. By identifying the mathematical concepts embedded in the pottery tradition, this research contributes not only to the advancement of ethnomathematical studies but also provides a robust foundation for documenting and preserving local knowledge traditionally transmitted orally and practically.

Furthermore, the presence of geometry, measurement, proportion, symmetry, and pattern concepts in the Banyumulek pottery tradition demonstrates the significant potential of local culture as a contextual learning resource. These findings align with research by Wulandari et al. (2024) and Maboja (2025), who assert that integrating culture into mathematics learning can enhance the relevance and meaning of mathematical concepts for students. Therefore, ethnomathematics in Banyumulek pottery holds not only cultural value but also educational value that can be leveraged in developing local culture-based mathematics education while concurrently supporting sustainable cultural heritage preservation efforts.

Ethnomathematics as a Form of Local Knowledge

The research findings demonstrate that the mathematical concepts present in the Banyumulek pottery tradition function not only as a part of the production process but also as a form of local knowledge that develops and is passed down within the life of the Sasak community. This knowledge is forged through collective experiences handed down through generations and transmitted through direct practice in pottery-making activities. Thus, ethnomathematics in Banyumulek pottery can be understood as a part of the cultural knowledge system that lives and continues to be preserved by the artisan community.

In the ethnomathematical perspective, mathematics is not viewed solely as a formal science developing in academic settings, but also as a cultural construct arising from societal needs in managing daily life (D'Ambrosio, 2006). Every cultural group possesses distinct methods for measuring, comparing, grouping, and designing shapes corresponding to its social and environmental context (D'Ambrosio, 2001). In the Banyumulek pottery tradition, these concepts are evident in the process of determining dimensions, shaping proportions, regulating form balance, and arranging decorative patterns and motifs applied to the pottery products.

The mathematical knowledge possessed by the artisans is generally not obtained through formal education but via experience and culture-based practical learning. The ability to determine consistent measurements, maintain proportions among pottery parts, and generate symmetrical patterns evolves through direct engagement in the production process over many years. Even though the artisans do not use formal mathematical terminology, they effectively apply these concepts in producing items with high functional and aesthetic value. These findings support Gerdes's (1994) assertion that various traditional cultural activities intrinsically involve mathematical reasoning processes that evolve naturally within society.

As a form of local knowledge, ethnomathematics in Banyumulek pottery exhibits a strong connection between the community's cultural and cognitive aspects. The mathematical knowledge applied by the artisans is inseparable from the cultural values thriving within the community. The shapes, sizes, and motifs of the pottery take into account not only practical functions but also reflect the cultural identity and collective experience of the Sasak people. Hence, the mathematical concepts embedded in the pottery do not stand independently but are integrated with the value system and traditions inherited from generation to generation.

Rosa and Orey (2013) explain that the relationship between culture and mathematics can be understood through the ethnomodeling approach, which is the effort to link community cultural practices with more formal mathematical representations. In the context of this study, Banyumulek pottery can be viewed as a cultural artifact representing concepts of geometry, measurement, proportion, symmetry, and patterns developing in community life. This approach allows local knowledge, which has thus far developed practically, to be understood within an academic framework without omitting the cultural values attached to it.

The existence of ethnomathematics as a form of local knowledge plays a critical role in cultural preservation efforts. The preservation of cultural heritage involves not merely safeguarding the physical presence of cultural products but also maintaining the knowledge system that underpins their creation process. In this regard, ethnomathematics serves as a means of documenting and recognizing the traditional knowledge possessed by the community. D'Ambrosio and Rosa (2017) emphasize that ethnomathematics can act as a bridge between local knowledge and academic knowledge, ensuring that the cultural values embedded in traditional practices can continue to be understood and inherited.

In addition to contributing to cultural preservation, ethnomathematics bears relevance in the educational sector. The integration of local culture into mathematics learning can assist students in comprehending mathematical concepts more contextually while fostering appreciation for their regional cultural heritage (Wulandari et al., 2024; Mabotja, 2025). Consequently, Banyumulek pottery functions not only as a cultural product but also as a knowledge resource endowed with educational value, contributing to the sustainability of the Sasak community's cultural heritage. These findings illustrate that ethnomathematics is an essential element of local knowledge capable of solidifying cultural identity while supporting sustainable cultural preservation.

Banyumulek Pottery from the Perspective of Sustainable Cultural Heritage

Within the perspective of Sustainable Cultural Heritage, cultural heritage continuity is measured not solely by the existence of artifacts or cultural products still in production, but also by the community's capability to retain the knowledge, skills, cultural values, and social practices supporting the tradition's perpetuation (Yang et al., 2018). Therefore, Banyumulek pottery can be comprehended as a living heritage that continuously evolves through the artisan community's activities and their interaction with social, economic, and cultural transformations.

Conceptual Model of Banyumulek Pottery Preservation Based on Ethnomathematics

Based on the research findings regarding local wisdom, ethnomathematical concepts, and cultural heritage sustainability in the Banyumulek pottery tradition, a conceptual model for cultural preservation can be formulated that positions ethnomathematics as a connecting instrument between local knowledge and cultural heritage continuity. This model is built upon the finding that pottery-making practices not only yield craft products but also act as a medium for transmitting various forms of knowledge encompassing social, cultural, economic, environmental, and mathematical elements. Therefore, efforts to preserve Banyumulek pottery must be conducted comprehensively, paying heed to the continuity of the knowledge systems fundamental to these cultural practices.

The conceptual model developed in this research comprises four primary components: local wisdom, Banyumulek pottery production activities, ethnomathematical concepts, and Sustainable Cultural Heritage. These four components form interconnected relationships and function as a mechanism for sustainable cultural preservation. In the initial stage, local wisdom acts as the foundation shaping the various values, norms, skills, and traditional knowledge developing within the artisan community. This local wisdom is reflected in production techniques, skill transmission patterns, local resource utilization, and the social values regulating the artisan community's life.

Local wisdom is subsequently manifested through pottery production activities occurring continuously in the community's life. Production activities operate not merely as economic endeavors but also as spaces for cultural reproduction, enabling traditional knowledge to remain vibrant and be transmitted across generations. As posited by Nuryanto (2023), the sustainability of traditional crafts is heavily reliant on the community's ability to maintain the cultural practices acting as mediums for knowledge transfer and cultural identity. In the context of Banyumulek, the pottery production process serves as the primary instrument preserving the continuity of the Sasak community's cultural heritage.

Following this, within every pottery production stage, various ethnomathematical concepts encompassing geometry, measurement, proportion, symmetry, and patterns are identified. These concepts evolve naturally via the community's experiences and cultural practices. This finding fortifies D'Ambrosio's (2006) perspective that mathematical activities are an inseparable component of a community's cultural life. Through an ethnomathematical lens, various practices previously regarded as traditional skills can be understood as forms of mathematical knowledge holding scientific and educational value. Thus, ethnomathematics functions as a mechanism for documenting and interpreting the local knowledge embedded in the Banyumulek pottery tradition.

The presence of ethnomathematics within this model plays a strategic role by acting as a bridge connecting local culture and modern knowledge systems. D'Ambrosio and Rosa (2017) clarify that ethnomathematics enables dialogue between tradition and modernity through the recognition of the diversity of knowledge systems evolving in society. In this research, documenting the mathematical concepts inherent in Banyumulek pottery not only fortifies cultural preservation efforts but also unlocks opportunities for their utilization as local culture-based learning resources. Ergo, ethnomathematics becomes an instrument capable of enhancing the relevance of cultural heritage for the younger generation while expanding its utilitarian value within the educational sector.

The output of integrating local wisdom, production activities, and ethnomathematics is the realization of Sustainable Cultural Heritage, characterized by the sustainability of traditional knowledge, the fortification of cultural identity, the regeneration of cultural practitioners, and the continuity of the local craft-based creative economy. This perspective aligns with Yang et al. (2018), who assert that cultural heritage continuity is determined not solely by the presence of cultural artifacts but also by the community's capability to retain the background knowledge and practices. Moreover, Zbucheá (2021) adds that sustainable cultural preservation must harmoniously integrate social, economic, environmental, and educational dimensions.

Thus, the conceptual model of ethnomathematics-based Banyumulek pottery preservation demonstrates that cultural heritage sustainability can be attained by reinforcing the linkage between local knowledge and community cultural practices. Ethnomathematics acts not only as an academic approach to identify mathematical concepts in culture but also as a preservation strategy capable of documenting, transforming, and transmitting traditional knowledge to succeeding generations. This model offers a theoretical contribution to the advancement of ethnomathematical studies while concurrently presenting a practical framework for endeavors to preserve Banyumulek pottery as a sustainable cultural heritage of the Sasak people.

Conclusion

The study of Banyumulek pottery shows that this traditional craft holds economic, aesthetic, cultural, and educational value while reflecting the local wisdom and ethnomathematical knowledge of the Sasak community. Its production process involves concepts of geometry, measurement, proportion, symmetry, and patterns that artisans acquire through experience, observation, and intergenerational practice rather than formal education. These findings confirm that mathematical knowledge also develops within cultural activities and local knowledge systems. Ethnomathematics therefore serves as a bridge between traditional practices and modern academic understanding by enabling local knowledge to be identified, documented, and interpreted without removing its cultural meaning. From a Sustainable Cultural Heritage perspective, Banyumulek pottery supports social, economic, environmental, and educational sustainability through the preservation of skills, values, identity, and responsible use of local resources. Its continuity depends not only on maintaining pottery

as a cultural product but also on protecting the knowledge system behind its production. Therefore, regional governments, educational institutions, cultural communities, and creative industry stakeholders should strengthen documentation, preservation, and educational integration efforts, particularly by incorporating Banyumulek ethnomathematics into local culture-based mathematics learning and expanding similar studies to other traditional craft centres.

References

- Anand, P., & Bhasin, A. (2019). *Sustaining cultural heritage: Deriving the contemporary from traditional crafts*. Lens Conference Proceedings.
- D'Ambrosio, U. (2001). What is ethnomathematics, and how can it help children in schools? *Teaching Children Mathematics*, 7(6), 308–310.
- D'Ambrosio, U. (2006). *Ethnomathematics: Link between traditions and modernity*. Sense Publishers.
- D'Ambrosio, U., & Rosa, M. (2017). Ethnomathematics and its pedagogical action in mathematics education. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Eds.), *Current and future perspectives of ethnomathematics as a program* (pp. 63–74). Springer.
- Ding, C. (2025). Traditional handicrafts as intangible cultural heritage: A systematic literature review. *SAGE Open*, 15(1).
- Gerdes, P. (1994). Reflections on ethnomathematics. *For the Learning of Mathematics*, 14(2), 19–22.
- Iskandar, R. S. F., Karjanto, N., Kusumah, Y. S., & Ihsan, I. R. (2022). A systematic literature review on ethnomathematics in geometry. *Journal of Physics: Conference Series*, 2438(1), 012026.
- Jungic, V. (2021). On ethnomathematics: In memory of Ubiratan D'Ambrosio. *arXiv Preprint arXiv:2109.02560*.
- Mabotja, K. (2025). Ethnomathematics in pre-service mathematics teacher education. In *Contemporary Issues in Mathematics Education*. IntechOpen.
- Nuryanto. (2023). Traditional craftsmanship and intangible cultural heritage values in Indonesia. *International Journal of Intangible Heritage*, 18, 45–58.
- Palhares, P. (2023). Ethno + mathema + tics: The legacy of Ubiratan D'Ambrosio. *Accromath*, 18(1), 12–20.
- Rosa, M., & Orey, D. C. (2013). Ethnomodeling as a research theoretical framework on ethnomathematics and mathematical modeling. *Journal of Urban Mathematics Education*, 6(2), 62–80.
- Rosa, M., & Orey, D. C. (2016). State of the art in ethnomathematics. In M. Rosa et al. (Eds.), *Current and future perspectives of ethnomathematics as a program*. Springer.
- Sari, A. K., Widodo, S. A., & Prahmana, R. C. I. (2022). Ethnomathematics study: Cultural values and geometric concepts in Indonesian local culture. *Journal of Research and Advances in Mathematics Education*, 7(2), 115–128.
- White, E. (2024). In the potter's hand: Tourism and everyday practices of ceramic craft heritage. *Journal of Heritage Tourism*, 19(5), 620–637.
- Wulandari, I. G. A. P. A., Payadnya, I. P. A. A., Puspawati, K. R., & Saelee, S. (2024). The significance of ethnomathematics learning: A cross-cultural perspectives between Indonesian and Thailand educators. *arXiv Preprint arXiv:2404.01648*.
- Xu, H., & Ball, R. (2024). Multiple forms of knowing in mathematics: A scoping literature study. *arXiv Preprint arXiv:2406.16921*.
- Yang, Y., Shafi, M., Song, X., & Yang, R. (2018). Preservation of cultural heritage embodied in traditional crafts in developing countries. *Sustainability*, 10(5), 1336.
- Zbuche, A. (2021). Traditional crafts: A literature review focused on sustainable development. *Sustainability*, 13(5), 2737.
- Zaslavsky, C. (1999). *Africa counts: Number and pattern in African cultures* (3rd ed.). Lawrence Hill Books