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Publishing House Ltd.,
United Kingdom

International Social Sciences and Education Conference 2025
"Empowering Knowledge: Driving Change Through Social Science and Educational Research"
Virtual Conference
24-25 May 2025

Organised by: CLM PUBLISHING RESOURCES

An Ethnomathematics Study of Kelantan's Traditional Dessert

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Abstract
Kelantan, "The Land of Lightning", is known for its desserts such as *Lompat Tikam*, *Cek Mek Molek*, *Puteri Mandi*, *Akok*, *Jala Emas*, *Buah Tanjung* and *Tahi Itik*. Despite their uniqueness, these desserts fade among younger generations. This study explores Kelantanese desserts through ethnomathematics. Data collection methods included observation, documentation and expert review. The findings revealed that Kelantanese desserts come in various shapes. It is incredible to observe how Kelantanese are very creative in producing cuisines that have unique names and beautiful shapes. Further research could preserve this heritage, inspire geometric learning and promote these treats to sustain the cultural and culinary legacy.

Keywords: Ethnomathematics, Kelantanese dessert, Geometry

DOI: https://doi.org/10.21834/e-bpj.v10iSI33.7088

1.0 Introduction

Kelantan comes from the word "Kilatan", which means the Land of Lightning (Utaberta et al., 2022). It is also known as *Negeri Che Siti Wan Kembang* or Tanah Serendah Sekebun Bunga. Kelantan, situated in the northeast of Peninsular Malaysia, is renowned for its expansive paddy fields, vibrant coastal fishing communities, beaches lined with casuarina trees, and, of course, its traditional desserts. The primary objectives of this study are to identify, describe, and evaluate the geometric forms of traditional Kelantanese sweets and their relationship to Kelantanese culture. We demonstrate this by analysing the theoretical and methodological principles necessary to understand the local mathematical knowledge embedded in Kelantan's traditional desserts. This qualitative study, grounded in ethnomathematics, explores how geometric principles are applied within cultural practices and highlights their significance for preserving culture, innovating education, and promoting sustainable economic development. The traditional desserts of Kelantan use specific raw

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DOI: https://doi.org/10.21834/e-bpj.v10iSI33.7088

ingredients, methods, processes, techniques, materials, and recipes passed down through generations (Abdullah et al., 2021). Visitors often find these sweet treats at the busy Pasar Siti Khadijah or Pasar Terapung Pangkalan Datu, a floating market held every Saturday.

Some famous desserts in Kelantan are *Lompat Tikam*, *Cek Mek Molek*, *Puteri Mandi*, *Akok Kedut*, *Jala Emas*, *Buah Tanjung* and *Tahi Itik*. These desserts are well-known for their vibrant colours and sweet flavours, which are guaranteed to appeal to any dessert enthusiast. With unique names and colours, these desserts also have beautiful shapes that can be analysed using ethnomathematics, which explores the multicultural view of mathematical ideas and how different cultures use mathematics (Utaberta et al., 2022). Several analyses can be made on the shapes of desserts found in Kelantan, highlighting the creativity of the Kelantanese in attracting the interests of both locals and tourists.

Figure 1: Pasar Siti Khadijah
(Resercher, 2025)

Figure 2 : Pasar Terapung Pangkalan Datu
(*Husna, 2020*)

2.0 Literature Review

The term “ethnomathematics” was coined by the Brazilian mathematician D’Ambrosio (D’Ambrosio, 1985). Since then, there has been much discussion about the definition of ethnomathematics and its place in the academic world. Ethnomathematics is significant in understanding culture and mathematics, primarily to foster an appreciation of the connection between the two. Beyond its academic value, ethnomathematics holds significant economic potential. By exploring the mathematical principles embedded in cultural practices, such as the geometric designs of traditional desserts of Kelantan, we can unlock innovative opportunities for product development, tourism, and local entrepreneurship. This approach not only preserves cultural heritage but also stimulates economic growth by creating

marketable products that appeal to local and global audiences. In this way, ethnomathematics connects cultural preservation with economic innovation, providing communities a sustainable way to prosper in today's modern economy.

Ethnomathematics studies the varied mechanisms through which mathematical concepts are embodied, comprehended, practiced, and transmitted across distinct cultural contexts. It rejects the concept that mathematics is a universal, abstract study (Baker, 2022). It claims that cultural practices, artefacts, rituals, and daily activities, including the preparation and display of food deeply embed mathematical cognition. This study investigates the application of ethnomathematical principles to food and sweets, stressing their value in cultural preservation, stimulating educational innovation, and respecting indigenous knowledge systems. Ultimately, it situates the study of Kelantanese desserts into this broader context.

2.1 Ethnomathematics: Integrating Cultural Contexts with Mathematical Concepts

Ethnomathematics challenges the dominance of Western academic mathematics by recognising the depth and complexity of mathematical knowledge available beyond formal educational environments. It explores principles such as spatial thinking, symmetry, proportion, measuring, counting systems, classification, patterns, and algorithms as represented in cultural behaviors, including weaving, navigation, gaming, architecture, and food. This perspective considers culture not just as a framework for the application of mathematics, but as the basic basis and determinant of mathematical concepts. Understanding these culturally rooted mathematical processes is vital for decolonizing mathematics education and establishing educational approaches suited to diverse cultures (Kadonsi, Kapalu Kenneth, and Magdalene 2023).

2.2 Cuisine as a Repository of Ethnomathematical Knowledge

Food processing is mathematical. It involves exact or culturally accepted measurements (such as cups, handfuls, or pinches), geometric manipulations (including cutting, folding, and shaping), and an understanding of ratios and proportions (such as combining components or changing dough hydration). In culinary techniques, factors such as timing and dish layout are typically highlighted (Kumar et al. 2021). Every culture has its own unique system for resolving these tasks, influenced by its environment, resources, social dynamics, and cultural convictions. Consider, for instance, the wonderful geometric patterns in Scandinavian butter cookies, the painstaking arrangement of samosas or dumplings, the fractal designs of Romanesco broccoli, or the constancy in dividing bread dough. All of these demonstrate mathematical reasoning that is deeply rooted in culinary traditions. Analyzing these traditions from an ethnomathematical perspective demonstrates creativity and logical thinking throughout centuries, frequently offered through practical experience. Although several ethnomathematical studies generally concentrate on staple foods or major dishes, desserts frequently provide a dynamic platform for geometric innovation and symbolic importance. Since sweets go beyond basic nutrition, bakers express their creativity through complex shapes, patterns, and embellishments, which highlight the underlying geometric principles (Rini et al., 2024).

2.3 Ethnomathematics of Cuisine: Cultural Identity and Knowledge Dissemination

Examining food via the perspectives of ethnomathematics exceeds the identification of geometric forms; it analyses cultural significances and the transfer of knowledge (Jasmani et al. 2024). The shapes used for desserts are never accidental; they typically hold symbolic value related to nature, mythology, religious beliefs, or social status, as seen in mooncakes or Christmas cookies made in specific forms. The techniques and recipes demonstrate indigenous technical knowledge, usually communicated through experiential learning and practice, highlighting different measurement systems and practical geometry particular to that culture. Documenting this information is vital for maintaining culture, particularly when globalisation endangers indigenous practices.

In the world of food enthusiasts, ethnomathematicians have spread the knowledge of mathematics in identifying food shapes. Research by Diva (2024) focused on snacks from the Kudus Market. The study found geometric concepts in snacks, including triangular, rectangular, and circular shapes. Jasmani et al. (2024) studied several Indonesian snacks, such as *Kuih Pinyaram*, *Sala Leak*, *Kue Sapik*, *Rakik Kachang*, and *Puluik Manih*. The findings revealed that *Kuih Pinyaram* has circular elements, *Sala Leak* has spherical elements, *Kue Sapik* has triangular shapes and angles, and *Rakik Kachang* has rectangular shapes and angles. *Puluik Manih* contains geometric elements such as vertices, lines, and angles. Ja'faruddin et al. (2023) conducted a study to explore geometric ideas in a traditional food called *Tumpi-Tumpi*. The results showed an iceberg model for the mathematical problem using *Tumpi-Tumpi*.

In Malaysia, bite-sized snacks known as "kuih" represent the traditional desserts of the country. While many of these desserts are sweet, some are also savoury. In Kelantan, Perlis, Kedah, and Perak, desserts are usually sweet, whereas in Negeri Sembilan and Melaka, desserts are more flavorful. Nowadays, younger generations rarely know about most traditional desserts. *Tepung Kulit, Wadai Kipeng, and Putugal* are traditional desserts that few people remember today. Some researchers have taken the initiative to explore Malaysian desserts, such as *Kek Lapis* Sarawak, which has colourful layers meticulously arranged in distinct geometric patterns. Creating this cake requires a vivid imagination, an almost mathematical mind for details, and a steady hand (Jaisuda, 2024).

Geometric designs on food refer to the shapes that designers create. Geometric design is a branch of mathematics that deals with various shapes, which can be analysed through ethnomathematics (Pradhan et al., 2021). In Euclidean geometry, there are two-dimensional and three-dimensional shapes. The two-dimensional shapes include triangles, squares, rectangles, circles, and other flat shapes. The three-dimensional shapes include cuboids, cubes, and trapezoids.

2.4 Discrepancies and the Kelantanese Context

Despite the availability of ethnomathematical studies on food, such as those exploring bread-making, cheese manufacturing, and traditional agricultural methods, there is a striking absence of particular research on the ethnomathematics of traditional sweets, notably in Southeast Asia. A fascinating and understudied research topic is the diverse range of Kelantanese desserts, notable for their intriguing

names such as "Jala Emas" (Golden Net) and "Tahi Itik" (Duck Droppings), as well as for their geometric shapes like squares, oblongs, ovals, dimples, circles, strings, teardrops, and rounds. The declining popularity of these culinary delights among younger generations highlights the importance of documenting not only the recipes but also the mathematical concepts and cultural relevance underpinning their manufacturing. This paper tries to bridge the gap by evaluating the shapes and designation of Kelantanese sweets from an ethnomathematical approach, therefore aiding in cultural preservation and the production of educational resources relevant to local contexts in Malaysia and beyond. By exposing the mathematical cleverness inherent in these wonderful traditions, it strives to inspire appreciation and safeguard their continuing history.

3.0 Methodology

This study aimed to explore ethnomathematical elements in Kelantanese desserts, with a specific focus on analysing their geometric shapes. This research took place at Pasar Siti Khadijah, a well-known market in Kota Bharu frequented by both locals and tourists.Three Kelantanese dessert makers residing in Berek 12, near Kota Bharu, were selected as participants. Data collection employed a triangulation method comprising direct observation, analysis of traditional Kelantanese desserts, and semi-structured interviews with the dessert makers to understand the processes involved in their preparation. The collected data were analysed to identify the unique naming conventions and geometric designs associated with Kelantanese desserts. A thematic analysis was conducted to examine these designs, including the underlying philosophical meanings embedded in the dessert names. To achieve the research objectives, a triangulation method was employed, integrating observation, interviews, and data analysis. Primary data were collected through direct observations and interviews, while secondary data were gathered from books, websites, and magazines to complement and support the primary dataIn collecting primary data, particular attention was given to the geometric features of the desserts such as size, shape, arrangement, and patterns to better understand the geometrical concepts present in the artistry of Kelantanese dessert preparation. However, the main emphasis was placed on analysing the shapes and character concepts found in the designs of Kelantanese desserts.

4.0 Results and Discussions

4.1Lompat Tikam

Figure 3: Lompat Tikam
(Resercher, 2025)

Lompat Tikam, which translates to jump and stab, is a traditional dessert featuring a creamy green pudding made from rice flour and the juice of pandan leaves. According to an interview with Kak Mah, a Kelantanese dessert maker, she grinds the rice flour herself at home to ensure the highest quality. Based on observation, the shape of the creamy green pudding varies according to the individual who cuts it. The green pudding takes on several shapes known as quadrilaterals, which are two-dimensional figures characterized by four straight sides, four vertices (corners), and four angles. Among these, the rhombus—a quadrilateral with all sides of equal length—is the most clearly discernible shape.

4.2 *Cek Mek Molek*

Cek Mek Molek, meaning lovely young lady, is a sweet potato dough stuffed with a teaspoonful of sugar and then deep-fried, resulting in a perfectly crisp texture. *Cek Mek Molek* derives its name from its oval shape, a closed curve in a plane resembling the outline of an egg.

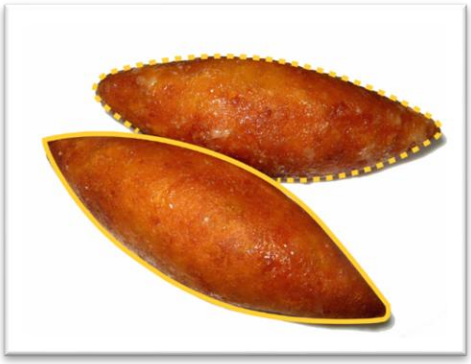

Figure 4: Cek Mek Molek
(Tourism Terengganu, 2024)

4.3 Puteri Mandi

Figure 5: Putri Mandi
(Fatihah, 2025)

Puteri Mandi is soft, sticky, and chewy, with a unique dimpled shape and a variety of vibrant colours, including bright green and pink.This bite-sized dessert is made from wheat flour and glutinous rice flour, lavishly coated with grated coconut and palm sugar syrup. The dimpled shape of *Puteri Mandi* resembles a slight indentation typically seen on the skin.

4.4 Akok Kedut

Figure 6: Akok
(Researcher 2025)

Akok is a soft, custard-like delicacy prepared from a rich blend of coconut milk, eggs, wheat flour, palm sugar, and a touch of salt. Kak Yea, an experienced Akok maker, attributes the distinctive quality of her Akok to her continued use of charcoal as a fuel source, which preserves the delicacy's original taste and texture. In contrast, in the modern era, most Akok makers have transitioned to using gas stoves for convenience. However, this method is widely perceived to yield a less authentic flavour compared to the traditional charcoal technique. Observationally, Akok is typically perfectly circular, distinguished by its continuous, curved edge.

4.5 Jala Emas

Figure 7: *Jala Mas*
(WendyinKK, 2016)

The delicate, lace-like appearance of Jala Emas, or Golden Net, contrasts with the intricate process required to make it. This royal-inspired dessert is made using a Roti Jala mould, where a rich batter made from duck egg yolks and sugar is carefully blanched in boiling water, forming fine golden threads. Once reserved for the royal household, Jala Emas is now a cherished treat at engagement and wedding ceremonies. Its shape resembles interwoven strings, meticulously arranged to create an elegant and intricate design.
Historically reserved for royalty, Jala Emas is now prepared mainly for special occasions or during Ramadan. According to the dessert maker interviewed, Jala Emas is a traditional Malay dessert made by cooking egg yolks in bubbling sugar syrup. Once cooked, the mixture is lifted out to form delicate golden threads. Observations reveal that Jala Emas resembles interwoven strings, meticulously arranged to create an elegant and intricate design.

4.6 Buah Tanjung

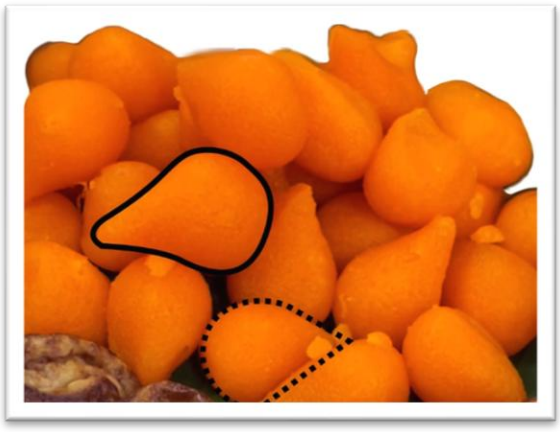

Figure 8: Buah Tanjung
(Amirnawawi, 2025)

Based on an interview with the dessert maker, Kak Na, Buah Tanjung is a delightful, bite-sized sweet made from a rich blend of egg yolks, sugar, rice flour, and glutinous rice flour. People now reserve it for special occasions or Ramadan, though it was formerly served to royalty. According to Kak Na, Buah Tanjung is made by mixing egg yolks with rice flour and glutinous rice flour. Subsequently, the shaped dough is dipped into sugar syrup. In terms of appearance, the kuih resembles a teardrop, featuring a rounded globular base that tapers gracefully to a fine point. The dessert maker emphasised that the technique for making Buah Tanjung is highly specialised and can only be mastered by experts.

4.7 Tahi Itik

Figure 9: Tahi Itik
(Zamri, 2010)

Tahi Itik is prepared using carefully measured portions of egg whites, coconut milk, glutinous rice flour, white sugar, and pandan leaves. According to the dessert maker, it is served on special occasions, often alongside Jala Emas and Buah Tanjung. The preparation requires continuous stirring over heat for at least an hour to achieve the desired consistency. Its shape is generally determined by the preference of its maker, however, it is most commonly round and is characterised by a smooth, curved form without sharp edges. These findings are consistent with previous research by Aftina Ardiyanti and Putri Nurmalasari (2024), who observed that local desserts exhibit a variety of shapes.

Several previous researchers have demonstrated that traditional foods within their local communities exhibit a variety of shapes. For example, Hikmawati Pathuddin (2021) investigated Barongko cake as a resource for mathematics education. In addition, E. Wulantina (2024) explored Lampung traditional cakes for their mathematical learning potential. Furthermore, Z. Busrah (2021) conducted mathematical modelling of the volume of solid revolution in Buginese and Makassarese traditional foods. Similarly, W.K. Wardah examined the geometric properties of Banang-Banang, a traditional food from Jeneponto District.

5.0 Conclusion

Kelantanese desserts are unique not only in their names and shapes but also as representations of a rich cultural heritage with significant economic potential. The square shape of *Lompat Tikam*, the oval form of *Cek Mek Molek*, the dimpled design of *Puteri Mandi*, the circular structure of *Akok*, the intricate string pattern of *Jala Emas*, the teardrop silhouette of *Buah Tanjung*, and the rounded form of *Tahi Itik* all embody the geometry of tradition. By applying ethnomathematics methods, these shapes can serve as a foundation for innovative product designs that appeal to younger generations and tourists, thereby boosting local tourism and creating new revenue streams for local producers and entrepreneurs.

This research is limited by its geographical and cultural distinctiveness, concentrating only on Kelantanese sweets, which restricts its generalizability to other places. The examination is limited to geometric forms, excluding additional mathematical aspects such as measuring systems or proportional reasoning in recipes. Only seven desserts were analysed, perhaps neglecting obscure types. This qualitative ethnographic research uses observational and documentary approaches, neglecting quantitative measures, possibly leading to interpretative subjectivity. Ultimately, suggested applications in education and economic development are still theoretical, without actual evidence of their viability or influence in practical settings. These constraints highlight opportunities for future study development. Future research can focus on developing modernised shapes that attract broader audiences, fostering entrepreneurship and preserving this culinary heritage. Additionally, incorporating these geometric concepts into educational programs can encourage younger generations to explore how culture, mathematics, and innovation intersect. This approach can help drive sustainable economic growth in Kelantan's traditional dessert industry.This study presents scholars with fascinating opportunities to investigate how ethnomathematics can restore cultural customs and stimulate economic development. To increase tourism, generate employment, and strengthen local communities, policymakers can play a significant role by endorsing programs that honor and promote the culinary history of Kelantan. This study offers a new perspective on respecting the past while creating a better future, reminding us that tradition and advancement can coexist.

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