
Architectural Symmetry in Batak Toba Traditional Houses: A Geometric Exploration

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Abstract

This research explores the concept of geometry in the architectural symmetry of Toba Batak traditional houses. The main focus is on the symmetry patterns that exist in the layout, decoration and structural elements of this traditional house. This research aims to investigate the concept of geometric symmetry in Toba Batak traditional houses, with a focus on cultural values, philosophy and visual harmony reflected in architectural design. Data was obtained through literature studies which included scientific journals, books, articles and previous research. The results of this research not only provide a deeper understanding of Indonesia's rich culture, but also have the potential to contribute to the preservation of Toba Batak traditional houses and cultural heritage as a whole. By understanding the role of geometric symmetry in this traditional house, this article opens insight into how this element is an integral part of the architectural heritage of the Toba Batak tribe, explores deeper cultural values, and introduces new literature in the context of traditional Indonesian architecture.

Keywords: Traditional House, Ornament, Symmetry.

1. Introduction

Indonesia merupakan negara yang kaya akan warisan budaya, terutama dalam bentuk arsitektur rumah adat. Salah satu kekayaan budaya yang menarik perhatian adalah rumah adat Batak Toba. Rumah adat batak toba dianggap sesuatu yang sakral karena dalam pembagian dan fungsi rumah adat tersebut terdapat nilai-nilai kosmologis dan filosofis sebagai dasar pendirian bangunan. Rumah adat Batak Toba mempunyai tipe yang berbeda-beda bergantung dari dimensi serta tipe ornamen yang terdapat di dalamnya. Rumah adat ini bukan hanya merupakan tempat tinggal bagi masyarakat Batak Toba, tetapi juga merupakan cerminan dari nilai-nilai budaya, sejarah, dan identitas etnis mereka. Satu aspek penting dalam merunut kekayaan arsitektur rumah adat ini adalah simetri arsitektur yang ada di dalamnya.

2. Methods

This study is based on a qualitative approach used to delve into a profound understanding of the investigated phenomenon. In this research, data and information are obtained from the review of existing literature, such as scholarly journals, books, articles, and previous studies

categorized as a literature review. Literature review is an activity to examine or reevaluate various literature published by academics or researchers related to the topic under investigation. According to Cooper in Creswell (2010), literature review aims to inform readers about the results of other research related to the current study, connect the research with existing literature, and fill gaps in previous studies (Creswell, 2010). This research does not involve primary data collection through surveys, interviews, or experiments but focuses more on the analysis and synthesis of information from various relevant literary sources.

3. Result and Discussion

3.1. Batak Toba Traditional House

Rumah Adat Batak Toba is a traditional house originating from the North Sumatra province. One of the areas in North Sumatra that still has many Batak Toba traditional houses is in the Toba Samosir and Humbang Hasundutan regions. The residence of the Batak Toba indigenous people is built through mutual cooperation, including their traditional houses adapted to customary principles (Harahap, B. A., and Hotman, M. S. 1987). Constructing these traditional houses requires significant effort, cost, and a considerable amount of time. In the past, many traditional houses were left unfinished according to customary norms or rules. However, these houses were still inhabited. Initially, one Batak Toba traditional house was occupied by several families, so each room had its own name based on the family residing in it. However, nowadays, this is no longer found. If more than one family lives in a traditional house, they are usually the children of the house owner who are already married, temporarily staying with their parents.

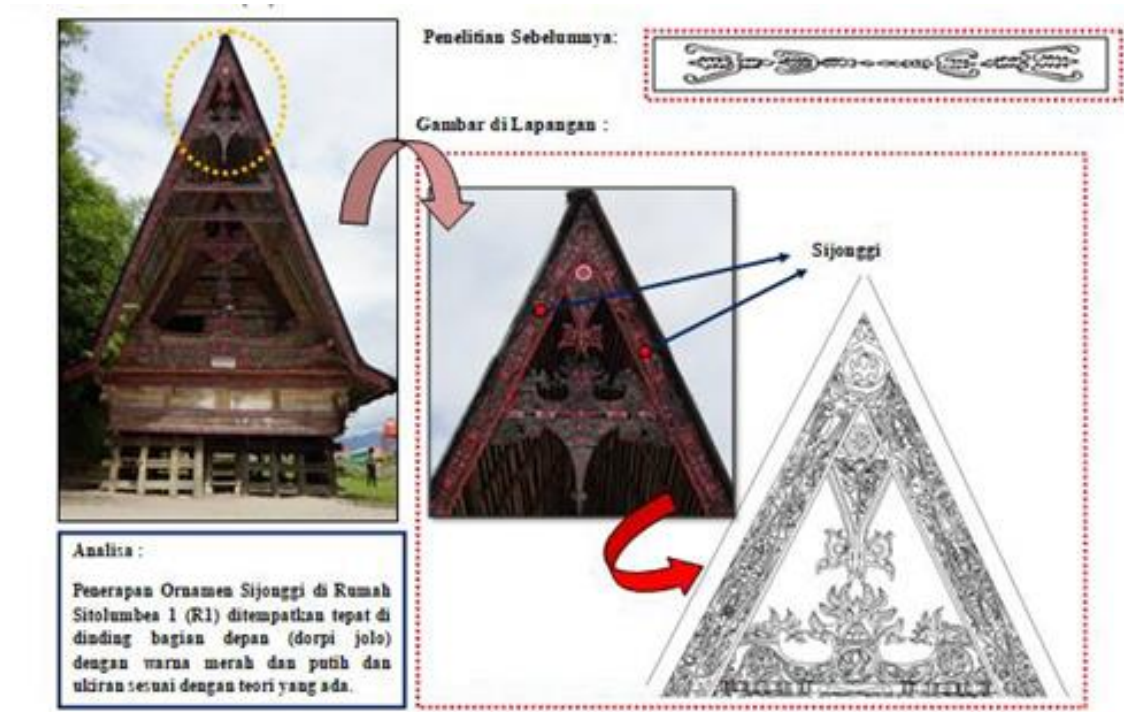
There are two types of Batak Toba community houses, namely Sitolumbea house and Sisampuran or Sibaba ni amporik house. The most noticeable difference between these two types of houses lies in the structure of the stairs and doors. In the Sitolumbea house, the stairs and doors are located inside, with the stairs positioned between the front and inner pillars, while the door is on the floor. In the Sisampuran house, the stairs and doors are on the outside, with the stairs at the front of the pillar and the door on the front wall. The Sitolumbea Batak house is referred to as a female-type house. There are other differences, but these differences may not be very noticeable at first glance. Therefore, in discussing the parts of the Batak Toba traditional house, the Sitolumbea Batak house serves as the reference.

The roof of the Batak Toba traditional house is made of ijuk, consisting of three layers. The first layer is called tuham-tuham, which is a large group of ijuk, arranged starting from the thick jabu bona, with dimensions of 20 cm thickness and $1 \times 1.5 \text{ m}^2$ area. Ijuk is filled between each tuham to create a smooth surface. The second layer is lalubak, which is ijuk taken from the enau tree, placed on the third layer. Each layer is tied with bamboo needles at a distance of 0.5 m. The traditional Batak Toba house is a type of raised or stilt house, so entering through the door requires climbing stairs, usually with an odd number of steps, such as 5, 7, and 9. The Batak Toba traditional house is symbolized by the three continents. The upper continent is the roof, the middle continent is the floor and walls, and the lower continent is the space underneath. The upper continent is a place for the gods, the middle continent is for humans, and the lower continent is a place for death. This house consists of many large and sturdy round wooden pillars.

3.2. Roof

Figure 1

The roof of a traditional Batak house



The traditional Batak Toba house is one of the traditional houses that has a cone-shaped roof. The concepts of symmetry in pyramids and cones can be applied to the roof of the Batak Toba traditional house. Here are some concepts of pyramid and cone symmetry that can be applied to the roof of the Batak Toba traditional house:

1. Rotational symmetry: The roof of the Batak Toba traditional house has rotational symmetry due to its cone-shaped roof. The axis of rotational symmetry is located at the center of the cone's base circle. When the roof is rotated around this point, it will have the same shape as before the rotation.
2. Mirror symmetry: The roof of the Batak Toba traditional house also has mirror symmetry because its shape is symmetrical on both sides of the plane that divides the roof into two equal parts. If the roof is flipped to become a mirror symmetry plane, it will have the same shape as before the flip.

In the construction of traditional Batak Toba houses, the concepts of pyramidal and conical symmetry can be applied to the traditional roof to create a sense of balance and harmony in its construction. Additionally, the use of a cone-shaped roof in traditional Batak Toba houses also holds high aesthetic value. The tarup (roof) of the house is made of ijuk, consisting of three layers. The first layer is called tuham-tuham (a large roll of ijuk, arranged starting from the thick jabu bona with a thickness of ± 20 cm and an area of 1×1.5 m). The space between these tuhams is filled with ijuk to create a smooth surface. It is then layered again with lalubak, which is ijuk taken directly from the enau tree and still dense.

3.3. Window

Figure 2

The Windows of a traditional Batak house



The traditional Batak Toba house has various window designs, but the square concept can be applied to several window shapes in the traditional Batak Toba house. Here are some examples of the square concept applied to window shapes in the Batak Toba traditional house:

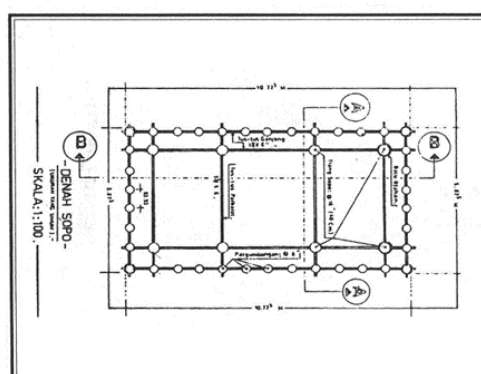
1. Square window: Some traditional Batak Toba houses have square-shaped windows located on the house walls. These square windows have a simple yet aesthetically pleasing design in the traditional Batak Toba house.
2. Rectangular window: In addition to square windows, some traditional Batak Toba houses also have rectangular windows. These windows are longer than square windows but still maintain angles that form a square shape.
3. Square-framed window: Some windows in the Batak Toba traditional house have square-shaped frames, adding aesthetic value to the windows. The square frame can be made of wood or other materials that fit the concept of the traditional Batak Toba house.

In the construction of the Batak Toba traditional house, the idea of square-shaped windows can be applied to create a sense of balance and harmony in the building. Additionally, the use of square windows in the traditional Batak Toba house can bring high aesthetic value.

3.4. House Foundation

Figure 3

The foundation of a traditional Batak house



The foundation of the traditional Batak Toba house comes in various shapes, but the rectangular concept can be applied to several forms of the foundation of the traditional Batak Toba house. Here are some examples of the rectangular concept applied to the foundation of the traditional Batak Toba house:

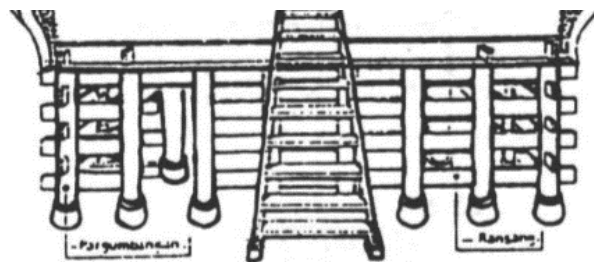
1. Rectangular foundation: Some traditional Batak Toba houses have rectangular-shaped foundations made of stones or other materials suitable for the Batak Toba traditional house concept. This rectangular foundation has a simple shape but provides stability and strength to the traditional Batak Toba house.
2. Foundation with a rectangular frame: Some foundations of Batak Toba traditional houses have frames in a rectangular shape, adding aesthetic value to the foundation. This rectangular frame can be made of wood or other materials that fit the concept of the traditional Batak Toba house.

In the construction of the Batak Toba traditional house, the rectangular idea can be applied to create a sense of balance and harmony in the building. Additionally, the use of a rectangular-shaped foundation in the traditional Batak Toba house can bring significant aesthetic value.

3.5. The Legs of Traditional House

Figure 4

The foundation of a traditional Batak house



The traditional Batak Toba house has wooden legs that function as supports for the roof. The concepts of square and rectangle can be applied to the shape of the house's foundation. Here are some examples of the square and rectangular concepts applied to the shape of the wooden legs of the traditional Batak Toba house:

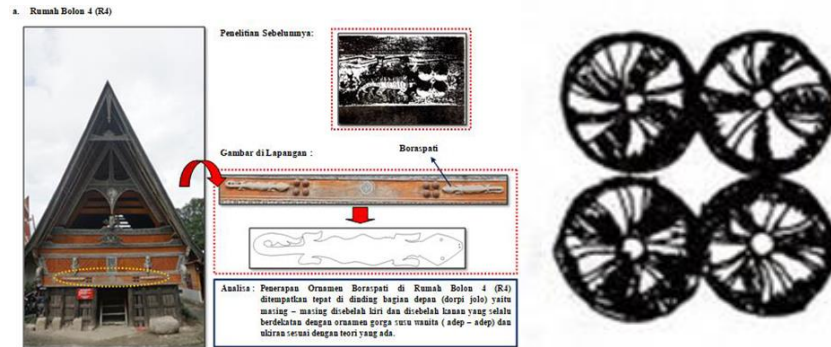
1. Square-shaped house legs: Some traditional Batak Toba houses have square-shaped wooden legs. These square-shaped house legs have a simple form but still provide sturdiness and stability to the traditional Batak Toba house.
2. Rectangle-shaped house legs: In addition to square legs, some traditional Batak Toba houses also have rectangular-shaped legs. These rectangular-shaped house legs are longer than square legs but still have angles that form squares and rectangles.

In the construction of the Batak Toba traditional house, the concepts of square and rectangle shapes applied to the legs can create a sense of balance and harmony in the building. Additionally, the use of square or rectangular-shaped house legs in the traditional Batak Toba house can bring high aesthetic value.

3.6. Adep-adeq

Figure 5

The foundation of a traditional Batak house



Gambar 5. Susu/Adep-adeq

Ornamental carvings in the shape of women's breasts, placed in rows, four on each side on the front wall. This ornament is always close to Boraspiti, as if its mouth is approaching the breasts. This ornament serves the same function as the *gajah dompak*. If this motif is present in traditional houses, the *gajah dompak* ornament is not made, and vice versa. Breasts are considered a symbol of fertility and wealth and are often referred to as a symbol of motherhood (*inanta parsonduk*), which means nurturing and compassionate. The geometric concept in the carvings of breasts/*adeq-adeq* is in the form of a semicircle, where a hemisphere is a three-dimensional space formed from half a sphere. The hemisphere has a semicircular shape on its base and curves on the top.

3.7. Doors

Figure 6

The doors of a traditional Batak house



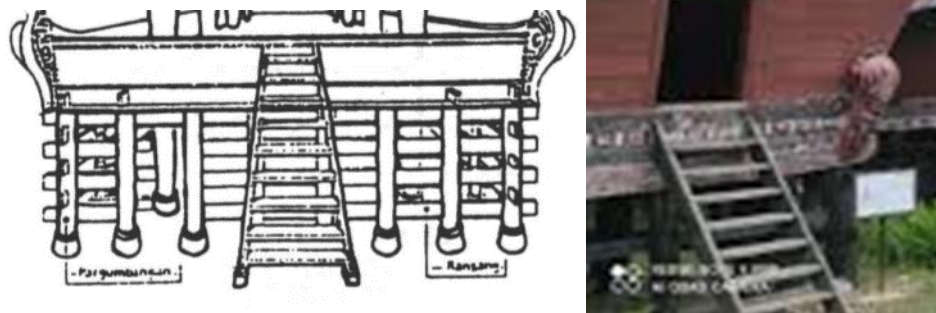
The geometric concept of a square can be applied in the construction of the doors of traditional Batak Toba houses. Traditional Batak Toba houses have doors made of wood and have a square or rectangular shape. These doors have carvings or decorations that follow the square or rectangular shape on the top or sides of the door. In the construction of ornaments and buildings, the geometric concept of a square can be applied to create a sense of balance and

harmony in the structure. Additionally, the use of geometric shapes in the ornaments and structures of traditional Batak Toba houses can also provide high aesthetic value.

3.8. Stairs

Figure 7

The stairs of a traditional Batak house



The geometric concept of a beam can be applied in the construction of stairs in traditional Batak Toba houses. The floor beams or joists in a Toba Bolon House are made of strong and hard square-shaped wooden beams. These beams are installed above wooden foundation pillars, and notches are made on the foundation pillars to support the beams, which in turn support the building's floor. The size of the floor beams in a Toba Bolon House is approximately 10 x 20 cm, with the length following the length of the building.

The stairs in a Toba Bolon House have an odd number of steps, usually ranging from 5 to 7 steps. This is based on the belief of the Batak Toba tribe that odd numbers are considered lucky. The stairs are made of sibagure wood and are located in the middle of the front part of the house, providing access to enter or exit the house through the door located behind the wall, requiring one to stoop down.

3.9. Gorga

Figure 7

The carving of a traditional Batak house



Gorga Batak Toba is a form of carving or sculpting art that is typically found on the exterior of traditional Batak Toba houses. These decorations can either be colored carvings or monochromatic images. The concept of geometric symmetry is widely applied in this art form. Many gorga designs exhibit central symmetry around a specific point. Patterns of this nature are often radial and centered around a particular point. This central point is frequently the focus of the design, creating a sense of balance and harmony. Reflective symmetry is also evident in many gorga designs. Symmetrical lines are employed to create identical patterns on both sides. Designs appearing on one side are often repeated in reverse or rotated 180 degrees to achieve visual symmetry.

In addition to symmetry, gorga often incorporates geometric motifs such as circles, triangles, and rectangles. Gorga decorations with ipon-ipon carvings have geometric shapes that serve as adornments on the edges of an ornament. There are several forms of ipon-ipon, including semicircles, meanders (twists and turns), triangles, and tendrils. Another type is the iran-iran ornament. This decoration consists of curved lines that intersect, interspersed with plus signs. Iran serves as a type of embellishment for the human face to appear more beautiful and dignified. It is placed on the songsong boltok (support beams) as it is considered the "face" of the house. The Sitangan gorga, with a shape resembling the number three and overlapping, also embodies the application of geometric concepts. The Sitangan is a closed box made of silver or gold, used to hold betel leaves, areca nuts, gambier, tobacco, and lime. Its shape varies and can be circular, square, hexagonal, and so on. This ornament symbolizes advice for homeowners to eliminate arrogance and pride towards others and to live harmoniously in society.

In addition to the ipon-ipon, iran-iran, and Sitangan gorga carvings, the sitompi gorga also applies geometric concepts in its patterns. This decoration features circular lines resembling meandering lines, crossing each other, meeting at the ends, and curving. Sitompi is a tool used to tie the neck of a water buffalo used for plowing fields, made of woven rattan. Sitompi symbolizes the need for mutual love and connection within the culture. It is placed on the dorpi jolo (front wall) and the left and right walls of traditional Batak Toba houses.

4. Conclusion

From the discussion in this journal, it can be concluded that the traditional house of Batak Toba is a cultural heritage with crucial geometric symmetry aspects in its design and structure. Concepts such as rotational symmetry, reflective symmetry, and geometric shapes like squares and rectangles are applied to various elements of this traditional house, including the roof, windows, foundation, house stilts, doors, stairs, and decorations like Gorga. This symmetry creates visual and structural harmony, reflecting stability, balance, and a harmonious relationship with the surrounding environment.

In addition to geometric aspects, the traditional house of Batak Toba also holds philosophical and cultural values that are reflected in its architectural design. The house serves not only as a dwelling but also as a reflection of cultural values, history, and the ethnic identity of the Batak Toba community. Therefore, preserving the traditional house of Batak Toba is crucial for conserving Indonesia's cultural richness.

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