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Tongkonan Transformation: Function, Form, and Material in Toraja Church

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Abstract

This study examines the transformation of function, form, and material in adapting the traditional *Tongkonan* house into the Toraja Church in Surabaya. The *Tongkonan*, central to Toraja cultural identity, undergoes reinterpretation when relocated to an urban context. Using a qualitative descriptive method with field observation, literature review, and interviews, the research compares traditional *Tongkonan* houses in Tana Toraja with their adaptation in Surabaya. The findings show a functional shift from domestic and ritual uses to religious worship, a transition in material from wood, bamboo, and thatch to reinforced concrete, steel, and glass, and partial preservation of the iconic curved roof form. These changes reflect a balance between maintaining cultural symbolism and meeting urban building standards. The study contributes to sustainable vernacular architecture discourse by offering insights into adaptive reuse and strategies for integrating traditional values into contemporary urban environments.

INTRODUCTION

The *Tongkonan*, the traditional ancestral house of the Toraja people in Sulawesi, Indonesia, represents more than a physical dwelling; it is an embodiment of cultural identity, social hierarchy, and spiritual symbolism (Waterson, 1990). Its distinctive features include the boat-shaped roof, carved wooden façades, and a tripartite spatial division—*Sulluk Banua* (foot), *Kale Banua* (body), and *Ratiang Banua* (head)—each of which conveys symbolic and functional meanings linking architecture with cosmology and community (Shandra, 2009; Sanda Lebang Pakan et al., 2018). Beyond form, *Tongkonan* functions as a center of family and ritual life, integrating spiritual, social, and economic roles within Toraja society (Pasapan & Adam, 2025).

Vernacular architecture such as the *Tongkonan* illustrates the intimate relationship between built form, material resources, and cultural practice. Oliver (2006) argues that vernacular architecture emerges from collective traditions balancing human needs with environmental conditions, while Rapoport (1969) emphasizes that house forms are shaped not only by climate and technology but also by symbolic and cultural values. In the *Tongkonan*, wood, bamboo, and thatch are not merely structural but expressions of ecological adaptation and spiritual meaning (Manurung, 2017; Rombe et al., 2022).

When transposed beyond its original highland context, transformations inevitably occur. In diaspora communities such as Surabaya, Torajan churches incorporate *Tongkonan*-inspired elements as cultural markers while negotiating different climates, materials, and regulations (Ramma et al., 2023). Such adaptations often result in hybrid forms that preserve symbolic expression while employing modern construction systems. As Asquith and Vellinga (2005) suggest, vernacular traditions evolve through reinterpretation, sustaining cultural meaning while meeting contemporary needs.

The Toraja Church in Surabaya exemplifies this negotiation. Here, the *Tongkonan's* function has shifted from residential and ritual to religious and communal, the form has been selectively preserved—especially the iconic curved roof—and the material has transitioned from organic to industrial resources such as reinforced concrete and steel. This study therefore aims to analyze the transformation of *Tongkonan* architecture in the Toraja Church of

Surabaya, focusing on function, form, and material, to contribute to the discourse on sustainable vernacular architecture.

Sustainable Vernacular Architecture

Vernacular architecture has long been recognized as an adaptive response to social organization, cultural norms, and environmental conditions. Oliver (2006) situates vernacular forms as cultural products shaped by collective traditions, materials, and rituals, while Rapoport (1969) highlights their role as socio-cultural constructs mediating symbolic meaning and environmental adaptation. In Southeast Asia, Waterson (1990) describes houses such as the *Tongkonan* as "living houses" that embody both cosmological beliefs and daily life.

For the Toraja, the *Tongkonan* exemplifies sustainable principles through elevated structures for ventilation, wide roof overhangs for climate control, and reliance on renewable resources such as wood, bamboo, and thatch (Manurung, 2017; Shandra, 2009). At the same time, its form and spatial order reinforce ritual continuity and social cohesion (Sanda Lebang Pakan et al., 2018). More recent studies have emphasized *Tongkonan's* role within cultural landscapes and socio-economic systems, particularly its integration with agricultural practices and symbolic status within Toraja society (Romme et al., 2022; Ramma et al., 2023).

However, as Asquith and Vellinga (2005) argue, vernacular architecture in the 21st century cannot remain static. Instead, it evolves through reinterpretation shaped by migration, modernization, and material innovation. The adaptation of *Tongkonan* forms in urban areas such as Surabaya illustrates this process: symbolic elements are selectively retained, functions redefined, and materials replaced with industrial alternatives (Pasapan & Adam, 2025). Within this framework, the *Tongkonan* is not only a cultural symbol but also a sustainable model, offering insights into balancing tradition with modern requirements

METHODS

This study employs a qualitative descriptive method with comparative analysis to investigate the transformation of *Tongkonan* architecture from its traditional context in Tana Toraja to its modern application in Surabaya. The methodology captures both cultural meaning and architectural modification in relation to function, form, and material.

Research Sites

Two primary sites were selected for analysis:

1. Traditional *Tongkonan* houses in Pallawa Village, Sesean Subdistrict, North Toraja, South Sulawesi. The data on Pallawa were not obtained through direct field observation but derived from secondary sources. Pallawa is widely documented in previous studies as one of the most authentic traditional *Tongkonan* settlements that preserve original construction methods, materials, spatial organization, and symbolic meaning (Waterson, 1990; Shandra, 2009; Sanda Lebang Pakan et al., 2018). These scholarly works provide the foundation for understanding the architectural and cultural characteristics of *Tongkonan* in their original context.
2. The Toraja Church in Surabaya, East Java. This site was studied through direct field observation and photographic documentation. The church represents the modern adaptation of *Tongkonan*-inspired architectural elements within an urban and religious context, highlighting transformations in function, form, and material.

Additional cases were reviewed from secondary literature to broaden comparative understanding of *Tongkonan* adaptation in contemporary settings (Ramma et al., 2023; Rombe et al., 2022).

Data Collection

Data was obtained from three primary sources:

- Field Observation: Structural systems, spatial layout, materials, and ornamentation were documented in both Pallawa and Surabaya.
- Literature Review: Academic sources on *Tongkonan* and vernacular theory (Oliver, 2006; Rapoport, 1969; Waterson, 1990; Asquith & Vellinga, 2005; Shandra, 2009; Manurung, 2017; Rombe et al., 2022).
- Interviews: Semi-structured interviews with Toraja elders, church leaders, and cultural scholars, selected for their knowledge of *Tongkonan* construction, symbolism, and cultural adaptation in diaspora communities.

Inclusion and Exclusion Criteria

To ensure analytical consistency, the following criteria were applied:

- Inclusion:
  - Traditional *Tongkonan* houses in Tana Toraja that maintain original functions, forms, and materials (wood, bamboo, thatch).
  - Modern adaptations (such as churches or community halls) that intentionally reference *Tongkonan* form and symbolism.
- Exclusion:
  - Buildings that merely imitate *Tongkonan* form superficially without cultural or functional grounding.
  - *Tongkonan* structures in a state of severe disrepair or no longer in active use.

Environmental Comparison

Environmental factors were explicitly considered to understand architectural adaptation:

- Tana Toraja: Highland environment, cool and humid, where wooden materials, elevated floors, and ventilated forms are ecologically suited.
- Surabaya: Lowland coastal environment, hot and humid, highly urbanized, where reinforced concrete, steel, and masonry are preferred for durability and compliance with building codes.

This comparison highlights the environmental pressures that drive material transformation and functional reinterpretation.

Data Analysis

Data was analyzed through a comparative framework:

- Function: Assessing changes from residential–ritual use in Toraja to religious–communal use in Surabaya.
- Form: Evaluating the preservation, modification, or loss of traditional elements such as stilts (*Sulluk Banua*), body (*Kale Banua*), and curved roof (*Ratiang Banua*).
- Material: Comparing traditional renewable materials with modern industrial substitutes, while noting cultural and environmental implications.

The analysis integrates empirical observations with theoretical frameworks of sustainable vernacular architecture, enabling a holistic understanding of how *Tongkonan* values are preserved, transformed, or compromised in urban adaptation.

Figure 1. The location of the Traditional Toraja *Tongkonan* house and the Surabaya Toraja Church

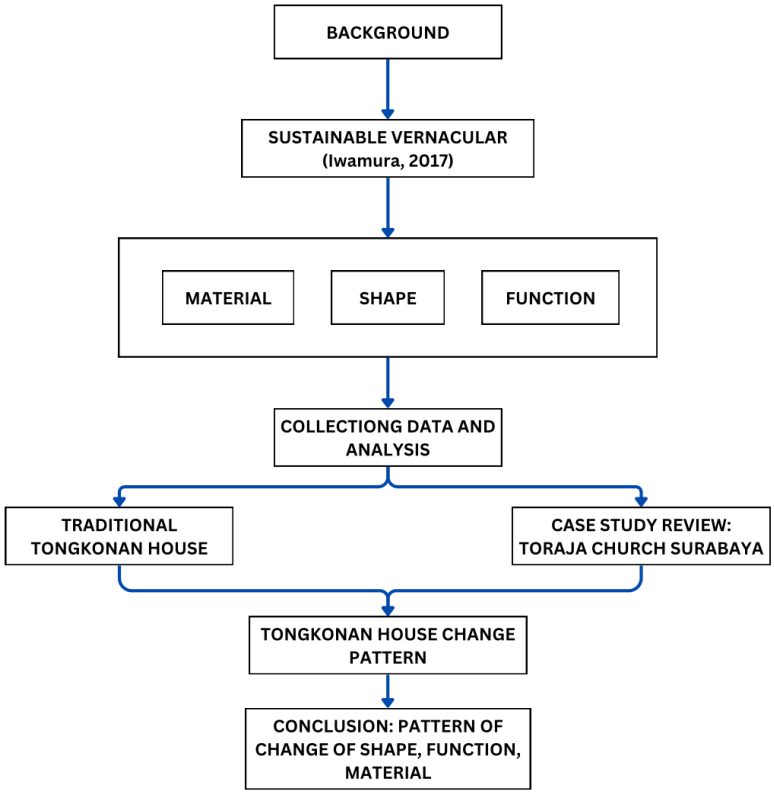

Figure 2. Framework of Thinking

RESULTS AND DISCUSSION

Transformation of Function

The *Tongkonan* traditionally functions as both a domestic residence and a socio-cultural hub. It serves as a center for extended families, a site for ritual gatherings, agricultural storage, and a symbolic marker of lineage (Waterson, 1990). In Pallawa, Toraja, these functions remain intact: the *Sulluk Banua* (foot section) accommodates storage and livestock; the *Kale Banua* (body section) provides space for daily living and ritual activities; and the *Ratiang Banua* (head section/roof) symbolizes ancestral connections and stores heirlooms.

In Surabaya, however, the adaptation of *Tongkonan* into a church has redefined these functions. The *Sulluk Banua*, once a semi-open underfloor space, has been transformed into a kitchen and consistory room, reflecting new communal needs. The *Kale Banua*, formerly the locus of domestic and ritual life, now functions as a main worship hall with pews and a pulpit. Meanwhile, the *Ratiang Banua* no longer stores heirlooms but serves as the protective roof over the congregation. This transition illustrates how the *Tongkonan's* symbolic and social roles are retained in part, but reoriented towards Christian religious worship and diaspora identity. Function has thus shifted from domestic–ancestral to religious–communal, while maintaining its role as a cultural marker.

Transformation of Form

The architectural form of the *Tongkonan* is highly symbolic and structured around a tripartite division. The elevated stilts (*Sulluk Banua*) provide resilience against humidity, pests, and seismic activity. The middle body (*Kale Banua*) incorporates carved wooden walls with distinctive spaces such as the *sumbung* (central room symbolizing authority), the *lego-lego* (semi-open veranda for social interaction), and the *tangana' banua* (front room for receiving guests). The roof (*Ratiang Banua*), with its curved boat-like profile, symbolizes the ancestral journey and spiritual continuity of the Toraja people (Oliver, 2006; Rapoport, 1969).

In the Toraja Church Surabaya, some of these forms are preserved while others are modified. The stilts are eliminated, replaced by a rigid concrete foundation suited to urban conditions. The body section retains certain symbolic carvings and spatial hierarchies but is reconfigured for liturgical functions. The roof maintains its iconic curvature, ensuring visual continuity with Toraja identity, but is enlarged in scale to cover a congregational hall. Orientation, once aligned with cosmological principles in Toraja, is adjusted here to suit site constraints in Surabaya's

dense urban context. These adaptations show a selective preservation of form: the roof is emphasized as a cultural signifier, while other elements are transformed to meet functional and regulatory needs.

Transformation of Material

Traditional *Tongkonan* construction relies on renewable materials such as hardwood (uru), bamboo, and *ijuk* (thatch from sugar palm fiber). These materials not only reflect ecological adaptation to Toraja's cool, humid highlands but also reinforce cultural continuity through communal construction practices (Ng & Lin, 2013; Manurung, 2017).

In Surabaya, however, the hot, humid lowland climate and urban regulations necessitate material changes. The stilts, once built from wooden posts, are replaced with reinforced concrete foundations. The walls, traditionally made of carved wooden panels joined without nails, are replaced with brick and concrete, reducing natural ventilation but increasing structural stability. The roof, once framed with wood and bamboo covered in thatch, is reconstructed with lightweight steel frames and concrete or metal tiles. While these materials improve durability and compliance with building standards, they diminish the ecological sustainability inherent in the original *Tongkonan*.

Nevertheless, some cultural meaning persists. For example, decorative carvings are replicated in concrete or painted finishes, ensuring symbolic continuity even when traditional wood is no longer used. Recent scholarship (Rombe, Goh, & Md. Ali, 2022) suggests that such hybridization—where form and meaning are preserved while materials evolve—represents a pragmatic pathway for sustaining vernacular identity in urban diaspora settings.

Comparative Analysis

The comparative framework (Table 1–4) highlights the extent of transformation across the three architectural parameters:

- Function: from household residence and ritual space to church and communal worship hall.
- Form: roof curvature largely preserved; stilts and spatial orientation modified or lost.
- Material: natural renewable resources are replaced with industrial, durable materials.

By situating these changes within the theoretical framework of sustainable vernacular architecture, it becomes clear that the Surabaya adaptation negotiates between cultural preservation (retaining symbolic roof form and carvings) and modern demands (using concrete and steel for stability). This balance, however, leans more heavily toward modernization, with sustainability aspects of the original *Tongkonan*—such as passive cooling and renewable materials—being compromised.

Critical Discussion

The results indicate that the most substantial transformation lies in material adaptation, driven by environmental conditions and building regulations. Function follows as the second most altered parameter, reflecting a shift from kinship-based domesticity to religious communalism. Form, while partly preserved, is strategically emphasized in the roof to symbolize identity. These findings resonate with Asquith and Vellinga's (2005) argument that vernacular architecture evolves through reinterpretation rather than replication. The Toraja Church in Surabaya exemplifies this process: it sustains cultural visibility for the diaspora while adapting to the realities of an urban environment.

Table 1. Comparative analysis of spatial functions in the *Kale Banua* (body section) between traditional *Tongkonan* houses and the Toraja Church in Surabaya.

Part of *Tongkonan*	*TONGKONAN* TRADITIONAL HOUSE	TORAJA CHURCH SURABAYA	CHANGES THAT OCCUR
Legs/Foot (*Sulluk Banua*)	Wooden poles rest on natural stone, without nails, flexible against earthquakes.	Reinforced concrete foundation, fixed structure with high rigidity.	Materials change from wood to concrete; the construction method is more permanent
Body (*Kale Banua*)	Wooden walls with peg joints without nails, carvings as a symbol of social status, natural ventilation.	Concrete walls reinforced with paint, minimal natural ventilation, still maintaining some aesthetic elements.	Materials changed from wood to concrete, modern connection systems replaced wooden pegs, functions switched from houses to places of worship.
Roof/Head (*Ratiang Banua*)	Wooden frame with bamboo and *ijuk*, curved shape resembling a boat, without nails.	A light steel frame with concrete or metal tiles, still maintains a curved shape.	The material changed from bamboo to light steel, the construction method used bolts and welds, and the shape was maintained.

This study was conducted using a qualitative descriptive method, involving three main research stages. The first stage consisted of identifying and describing the materials used in traditional *Tongkonan* houses, which served as the foundation for data categorization. The second stage involved collecting data through both literature review and direct observation of buildings in Surabaya that adopt or are inspired by *Tongkonan* architecture—specifically, the Toraja Church in Surabaya. The data gathered focused on the materials used, as well as the problems and structural damages observed, which were then considered as design inputs.

The final stage consisted of drawing conclusions in the form of design parameters. These parameters were derived from an evaluation of the materials identified during the study, emphasizing aspects such as material availability and adaptability within the context of urban Surabaya.

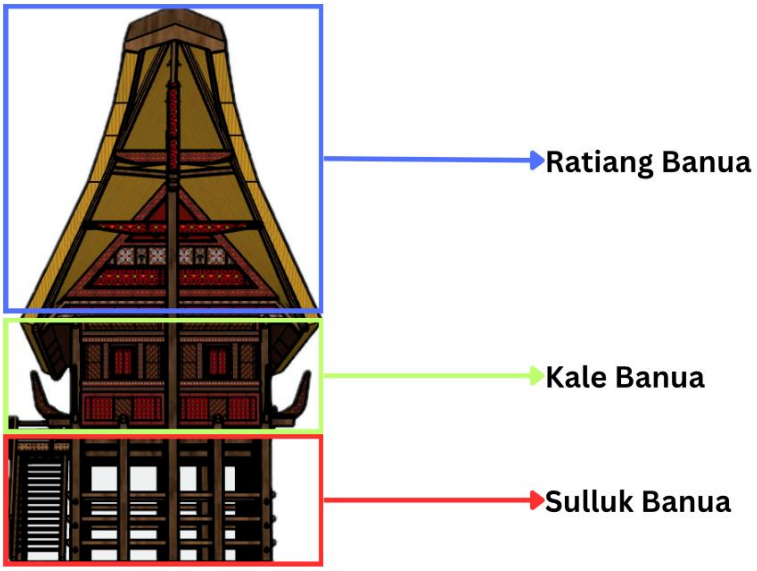

Figure 3. *Tongkonan* Toraja Traditional House Sketch and sketchup on the building
(Source: Redrawn based on 3D warehouse sketchup, Arief Maman)

Main Structure of the *Tongkonan* House and Its Tectonic Comparison with the Toraja Church in Surabaya

The structural elements of the traditional *Tongkonan* house underwent significant changes when adapted into the Toraja Church in Surabaya, particularly in terms of tectonics. The lower section (Sulluk Banua), originally composed of wooden columns resting on natural stone to prevent decay, has been replaced with reinforced concrete foundations for greater stability. The main body (*Kale Banua*), which traditionally used wooden walls joined with pegs and without nails, is now constructed using reinforced concrete walls—offering stronger support but reducing natural ventilation. Despite the material change, the traditional *Tongkonan* carvings are preserved as aesthetic elements. The roof (*Ratiang Banua*), once built from bamboo and thatch using a nail-less joint system, has been replaced with a lightweight steel frame and concrete tiles. The iconic curved form is maintained, but the construction employs modern connections such as welding and bolts.

These changes indicate that both materials and construction methods have undergone significant modernization, while the form is retained as a symbol of cultural identity. This adaptation enhances structural durability and compliance with urban regulations but reduces the flexibility and sustainability aspects inherent to the traditional *Tongkonan's* natural materials.

Sulluk Banua (Foot Section)

The foot section of the *Tongkonan* serves as the primary foundation that supports the entire structure. Tectonically, this system consists of wooden columns resting on natural stone without being embedded in the ground. This method allows flexibility in response to soil movement and offers resilience against earthquakes. Additionally, it prevents wood decay caused by ground moisture, making it a construction system highly adaptive to local environmental conditions.

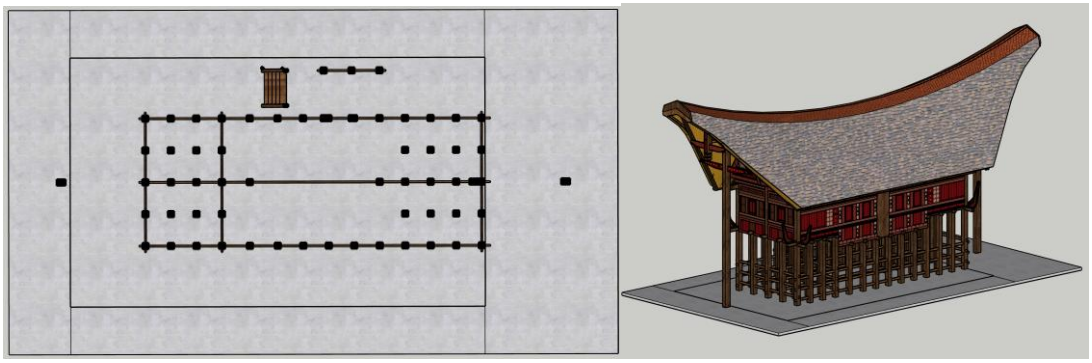

Figure 4. Ground Floor Plan of *Tongkonan* Traditional House Toraja

Figure 5. The Foot of the Church of Toraja Surabaya

Table 2. Observation of Material and Space Function in the traditional *Tongkonan* house and the Toraja Surabaya Church at the foot (*Sulluk Banua*)

Part of *Tongkonan*	*TONGKONAN* TRADITIONAL HOUSE	TORAJA CHURCH SURABAYA	CHANGES THAT OCCUR
− Harvest storage area − Livestock cage − Work Area	**Function:** As a household that functions to store crops (such as rice) and agricultural equipment, as well as a shelter for livestock. **Material:** Sturdy wooden poles (usually *uru* wood) without nails, designed to support the structure of the house and provide air circulation at the bottom.	**Function:** In this room, it functions as a church consistory room, where the kitchen is located under the main stairs. **Material:** The floor of the room has been coated with ceramic, the wall is painted in white, and the structure is made of concrete for the column part, for the wall part is made with layers of bricks and cement.	The changes in function can be seen in terms of structure and function, where the traditional house is used as a livestock cage, but in the church, the Toraja is used as a kitchen and concert area.

Kale Banua (Body Section)

The body part is the main space used for social and cultural activities. The walls are made of wooden boards arranged using a nailless peg system, reflecting traditional construction techniques that are strong but still flexible. The distinctive carvings that decorate the walls have a symbolic meaning and show the social status of the homeowner. In addition to being an aesthetic element, wooden walls also support natural air circulation, creating a comfortable and cool space.

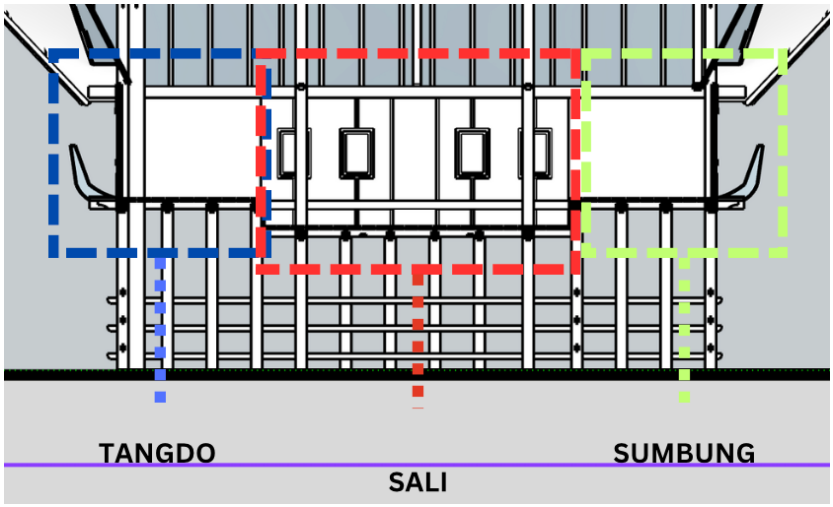

Figure 6. Piece of the Traditional *Tongkonan* House

Figure 7. Perspective of the Body Part of the Toraja Church Surabaya

Table 3. Observation of Material and Space Function in the traditional *Tongkonan* House and the Toraja Surabaya Church Body Part (*Kale Banua*)

Part of *Tongkonan*	*TONGKONAN* TRADITIONAL HOUSE	TORAJA CHURCH SURABAYA	CHANGES THAT OCCUR
– *Tangana' Banua* (Front Room) – *Sumbung* (Middle Room) – *Sali* (Side Room) – *Lego-lego*	**Function:** The main area where the family lives and the center of daily activities, such as cooking, gathering, and practicing traditional traditions. **Material:** Toraja carved wooden walls (with social and spiritual symbols), wooden floors, and roofs made of bamboo or *ijuk* in traditional *Tongkonan*.	**Function:** This area functions as a place of worship for Christians, where the room is filled with long benches for the congregation to worship, there is a pulpit for pastors to preach and chairs for church elders. **Material:** Materials starting from the floor are already coated with ceramics, the walls of the building are made of bricks, using a structure made of concrete, then coated with white paint.	The conclusion of the change shows that the function of the main room of *Tongkonan* has completely changed from a place of residence and social activities to a worship room with congregational benches and priest's pulpits. The biggest change occurred in function and material, while the shape still adapts to the typical elements of *Tongkonan* ceramics. The biggest changes occur in function and material, while the form still adapts the typical elements of *Tongkonan* to maintain cultural identity.

Ratiang Banua (Head Section)

The head or roof of *Tongkonan* has a curved shape resembling a boat, symbolizing the ancestral journey of the Toraja people. The roof structure is composed of large wooden beams assembled without nails, using a traditional peg and tie system. The main material consists of bamboo and *ijuk* which functions as a roof covering, providing resistance to the weather and supporting natural ventilation in the building.

Figure 8. Three-Dimensional Sketch of Tongkonan House Toraja

Figure 9. the roof of Toraja church Surabaya

Table 4. Observation of Material and Function of Space in traditional *Tongkonan* house and Surabaya Toraja Church body part (*Ratiang Banua*)

Part of *Tongkonan*	*TONGKONAN* TRADITIONAL HOUSE	TORAJA CHURCH SURABAYA	CHANGES THAT OCCUR
− Heirloom storage room − Rice Storage Room	**Function:** As a place to store heirlooms, social status symbols, and valuables belonging to the family. *RatiRatiangua* also has a spiritual meaning because it is considered an area that is close to the ancestors. **Material:** High quality wood for the frame and wall, the roof is also made of stacked bamboo and covered with *rumbia* leaves or *ijuk* as the main cover. as well as carved decorations that symbolize prosperity and honor.	**Function:** Transformed into a symbolic or decorative vaulted ceiling; no longer used for heirlooms. Its role shifts from ancestral significance to aesthetic and identity preservation in a religious context. Material: Reconstructed using modern materials—light steel framing and concrete, metal, or composite roofing suitable for Surabaya's hot, humid climate; often overlaid with bamboo-like pipes for visual continuity. **Material:** Using light steel as a roof frame to increase the strength of the structure. Roof covering using concrete tiles, metal tiles, or composite materials that are more resistant to Surabaya's hot and humid climate compared to Toraja. On the outer roof we can see that there is still a layer similar to bamboo, but made of pipes.	The main difference between the roof of the *Tongkonan* traditional house and the Toraja Church in Surabaya lies in the material used. *Tongkonan* traditional houses maintain natural materials such as bamboo and *rumbia* leaves, while Toraja Church in Surabaya uses modern materials to adapt to environmental conditions and urban building regulations.

Based on the findings of this research, the adaptation of the traditional *Tongkonan* house in the Toraja Church of Surabaya has undergone significant changes in terms of materials and function, while the form has largely been preserved as a symbol of cultural identity.

In the lower part (*Sulluk Banua*), which in traditional Tongkonan houses functions as a storage area for harvests and a shelter for livestock, there has been a major *transformation* in both function and materials. In the Toraja Church Surabaya, this area is now used as a consistory room and kitchen, and the original materials—wood and natural stone—have been replaced by reinforced concrete, brick walls covered with plaster, and ceramic flooring, which are more durable in an urban context.

The middle section (*Kale Banua*), originally the main space for daily living such as cooking, gathering, and conducting traditional ceremonies, has been completely transformed into the main worship hall, featuring rows of pews and a pulpit. Materials that once consisted of carved wood and natural wooden flooring have been replaced with reinforced concrete structures, brick walls, and ceramic floors. Nevertheless, some traditional elements—such as wood carvings and spatial layout—are still preserved to maintain the aesthetic value and identity of *Tongkonan* architecture.

More significant changes are found in the upper section (*Ratiang Banua*). In traditional Tongkonan, this space served as a storage area for heirlooms and rice, holding deep spiritual meaning. In its adaptation to the Toraja Church in Surabaya, the function of storing sacred items has been removed, and the roof now serves only as protective cover for the church building. The roofing material, previously made of bamboo and *rumbia* or thatch, has been entirely replaced with lightweight steel framing and concrete or metal roof tiles, which are more suitable for urban climate conditions. Despite the change in materials, the distinctive curved roof shape—resembling a boat—has been preserved as a strong symbol of Torajan cultural identity.

Overall, the most substantial transformation occurred in materials, shifting from natural elements such as wood, bamboo, and thatch to modern ones like concrete, steel, and metal tiles. The function also changed significantly—especially in the lower and middle sections—from a residential dwelling to a place of worship. Meanwhile, the architectural form has been carefully maintained, especially in the roof structure, which retains the signature *Tongkonan* silhouette.

Therefore, the adaptation of *Tongkonan* architecture in the Toraja Church Surabaya leans more toward modernization in terms of materials and function, while still preserving the architectural form as a representation of Toraja cultural identity and heritage.

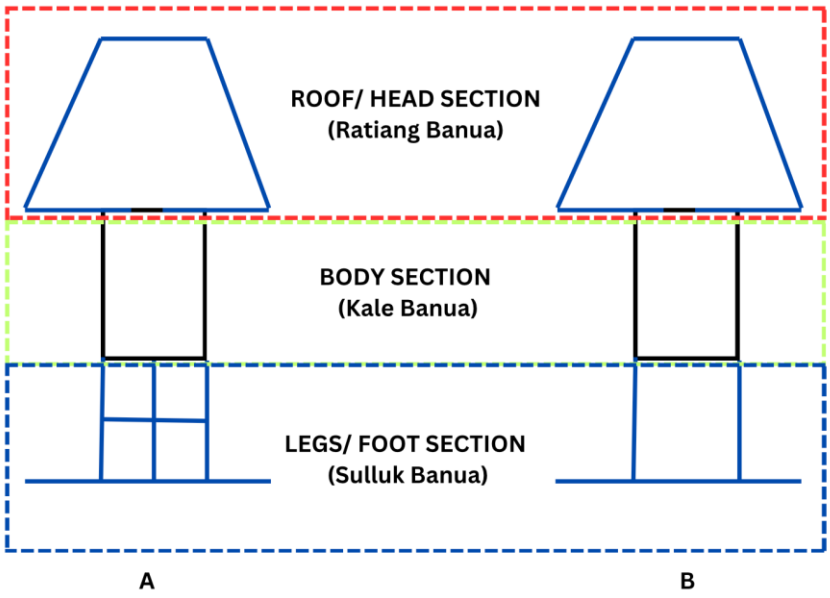

Figure 10. Schematic Picture of Traditional *Tongkonan* House(a) and Toraja Church Surabaya(b)

CONCLUSION

This study examined the transformation of the function, form, and material of the traditional *Tongkonan* when adapted into the Toraja Church in Surabaya. The findings reveal a nuanced negotiation between cultural preservation and modernization.

In terms of function, the *Tongkonan's* role as a residential and ritual center in Toraja has been redefined into a religious and communal worship space in Surabaya. While its original domestic and ancestral roles are no longer present, the building continues to embody collective identity and social cohesion for the Toraja diaspora.

In terms of form, the most iconic feature—the curved boat-shaped roof—has been largely preserved as a symbol of cultural identity. However, other spatial and tectonic elements, such as elevated stilts and cosmological orientation, have been modified or lost due to urban site constraints and regulatory demands. The form has therefore been selectively emphasized to retain symbolic meaning while accommodating new functions.

In terms of material, the most significant transformation has occurred. Traditional, renewable materials such as wood, bamboo, and thatch have been replaced with reinforced concrete, steel, and ceramic or metal tiles. These substitutions respond to Surabaya's hot, humid urban climate and comply with modern construction standards. Yet, the ecological sustainability inherent in the original *Tongkonan* has been compromised, raising critical questions about balancing durability with cultural authenticity.

Taken together, the results suggest that the adaptation of the *Tongkonan* into the Toraja Church in Surabaya is characterized by a strategy of selective preservation: form is retained symbolically, function is reoriented communally, and material is modernized pragmatically. This reflects both the resilience of cultural identity and the pressures of urban architectural practice.

Limitations

This research is limited to a single case study in Surabaya, which restricts the generalizability of its findings. The scope also does not fully capture other modern implementations of *Tongkonan* architecture across Indonesia or within international diaspora communities.

Recommendations for Future Research

Future studies should include comparative analyses of multiple adaptations of *Tongkonan* architecture in different urban contexts to evaluate broader patterns of transformation. Further exploration into hybrid or sustainable materials—such as engineered bamboo or prefabricated wood panels—could provide alternative solutions that reconcile cultural authenticity with environmental and regulatory demands. Longitudinal studies may also be valuable in tracing how such adaptations evolve over time in response to shifting community needs and urban pressures.

RECOMMENDATIONS

To preserve cultural identity within the adaptation of *Tongkonan* architecture, there must be conscious efforts to maintain the essence of the original design, even when materials and functions are modified. One potential strategy is the use of alternative materials such as engineered wood and laminated bamboo, which mimic the aesthetic qualities of traditional materials while offering greater durability and compliance with modern construction standards.

In addition, when adapting its function, the original spatial layout of the *Tongkonan* should be maintained as much as possible to retain its philosophical and social values. The application of sustainable design principles should also be considered, particularly in areas such as natural ventilation and energy efficiency, which are among the strengths of traditional *Tongkonan* architecture. Future research is encouraged to explore how modern technologies can be integrated to uphold sustainability without compromising the architectural character of the building.

In conclusion, the adaptation of *Tongkonan* architecture in urban environments such as Surabaya should not merely aim for modernization, but also strive to respect and preserve the cultural values embedded within its traditional design.

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