Resilience Of Toraja Architecture Towards Sustainability Architecture

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Abstract. Indonesia has a cultural heritage of traditional architecture that is environmentally friendly and sensitive to sustainability issues. Toraja architecture, namely tongkonan (traditional house) and alang (traditional barn) are still widely standing. Toraja architecture is not value-free and vulnerable to social, economic, and cultural conditions, so this study aims to reveal how the Toraja people respond to adapt, transform to these influences for the sustainability of Toraja architecture in the future. This study is a type of revealing knowledge with qualitative case study method. Using the Miles and Huberman model analysis technique in the form of descriptive and pattern matching, the results of the study obtained that Toraja architecture has resilience in adapting and transforming to face current social, economic and cultural changes in the form of adaptability to current building material technology, carpentry skills, curved roof shape as Toraja identity, customary rules and adaptive-responsive abilities, social status symbols, low costs, customary preservation, are elements of resilience for the sustainability of alang architecture. The resilience of Toraja architecture is a model for sustainable development of Indonesian traditional architecture.

1. Introduction

Indonesia has a cultural heritage of settlements called traditional architecture spread across the archipelago. Traditional architecture is a storage of local knowledge as well as architecture that is environmentally friendly and has sensitivity to sustainability issues in the environmental themes of ecological design, green architecture or sustainable design. Traditional architecture is believed to implement the core of sustainability, because it uses local materials, produces minimum waste, uses limited resources, either because of the availability of materials and skills or because of economic factors. In many cases, traditional design principles provide rational solutions to harsh climatic conditions [1]. Traditional architecture blends with the lifestyle of its inhabitants, promoting a sustainable and holistic living environment [2].

Traditional architecture, which has an element of sustainability, is vulnerable to collapse due to the use of organic wood or bamboo materials that are not durable. Changes in social patterns of communal kinship to personal and changes in spiritual beliefs also play a role in the disappearance of traditional architecture. This is a threat to the sustainability of traditional architecture including the sustainability of the community's lifestyle, way of life and cultural identity.

Toraja architecture as one of Indonesia's traditional architecture still shows its existence until today. Amid the news about the collapse of some traditional architectures such as Rumah Bolon Simalungun, Jabu Karo Dokan, Jabu Karo Lingga in North Sumatra [3], it can be said that Toraja architecture, namely tongkonan (traditional house) and alang (traditional barn) are still widely standing in Toraja, Rantepao Regency, Central Sulawesi.

Traditionally, Torajans have indigenous knowledge about sustainability that is reflected in the form of Torajan architecture. They have special knowledge about wood, bamboo used to build alang. Alang poles use banga wood, a type of palm. The barns of alang halls use solo' rareng (Albizia shinensis) or uru wood for parande / pegs. The floor uses kalapi wood (genus Kalappia and family Fabaceae). The ceiling uses siru wood. The samborinding, pamiring parts use buangin wood. Bamboo poles are used for the ridge. This diversity in the use of wood materials shows the intelligence of Toraja ancestors in the knowledge of the strength and properties of wood for alang buildings. The concern of replanting wood and bamboo every time one is cut down shows respect with nature and minimizing new resources.

Toraja architecture uses a foundation of umpak and raises the floor of the tongkonan in response to the contoured and humid soil conditions showing a touch the earth-lightly attitude and respect for the site. The alang halls as rice barns are placed on beams strung between poles. The large and heavy weight of the roof presses the halls against the beams. To keep the halls from shifting the beams are pierced so that they are sturdy but still flexible to sway. The building structure is responsive to local climatic conditions, which is termed respect for locality of site.

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Toraja architecture orientates the building towards the north (believed to be the origin of the arrival of the Toraja ancestors) by taking into account the direction of sunlight falling on the building body as natural lighting. Familiarity with the climate in the term working with climate. Toraja architecture is built with the involvement of the local community, showing accommodation to community participation as an attitude of respect for the user. Thus holistically, Toraja architecture has practiced sustainability which is now referred to as green architecture [3].

Toraja architecture which is rich in sustainable architecture knowledge still shows its existence until now. Amid the news about the collapse of several traditional architectures such as Rumah Bolon Simalungun, Jabu Karo Dokan, Jabu Karo Lingga in North Sumatra [4], it can be said that Toraja architecture, namely tongkonan (traditional house) and alang (traditional barn) are still widely standing in Toraja, Rantepao Regency, Central Sulawesi. Toraja architecture, which has many elements of sustainability, is vulnerable to collapse due to the use of organic wood or bamboo materials that are easily weathered. Changes in the social pattern of communal kinship to personal and changes in spiritual beliefs also play a role in the extinction of Toraja architecture due to changes in social, economic, cultural conditions, the purpose of this research is to reveal the resilience efforts of the Toraja people in the development of Toraja architecture and how the Toraja people respond to adapt, transform to these influences in today's architectural design. The results of this study will be useful as a factor or element that forms the sustainability of Toraja architecture so that it is useful for modeling the preservation of traditional architecture in Indonesia.

2. Research method

In accordance with the research objective of revealing the knowledge of resilience of a special case in Toraja architecture, the case study method was used as a qualitative research [11]. This case study method examines the specificity and complexity of a single case and reveals the case in a particular context, situation and time [12] capturing the significance that occurs in a particular community [13]. Data were obtained using observation techniques in the form of photo recordings and interviews with selected resource persons with open-ended questionnaires.

Data analysis techniques using the Miles and Huberman model [14] with cross sectional tabulation using Microsoft Word and Excel applications consisting of stages, namely data reduction, data presentation, drawing conclusions and verification in the form of descriptive analysis and pattern matching analysis. This analysis compares empirically based patterns with predicted patterns to strengthen the internal validity of the case study [15]. Pattern matching analysis compares initial predictions or assumptions that will occur with the actual facts in the field. Validation of pattern matching is done by comparing the facts in the field and other research references with the source triangulation model.

3. Results and Discussion

3.1. Learning from Alang - Toraja’s architectural resilience model

Seeing that Toraja architecture is still standing today, it is necessary to see the resilience of the Torajan people as a support to sustainable development. Resilience (resile, resilio) means to jump or bounce back, relating to the ability of systems to recover and the ability to change from adversity or disruption [16,17,18]. Resilience is the ability to create new things after disruption or transformation [19].

This research looks at Toraja's ability to respond to disruption in the form of coping actions, namely the
ability to use available skills and resources, adaptation, namely adjustments in natural and human systems facing disruption and transformation, namely changes to create a fundamental new system when the existing system cannot be maintained [20]. Those who create collective identity and mutual support are also considered as an index of resilience (open space and cultural heritage) [21].

The shape of alang has many variants. The diversity of alang is distinguished by the number of poles, the shape of the carvings, the type of roof and the type of roof covering material that produces certain types of alang.

The variety of alang shapes symbolizes the status of success and pride of the descendants of the tongkonan family. The many variants provide ease of construction options. This ensures the sustainability of economic affordability. Sustainability of design variations according to the needs of the architectural function. Flexibility and affordability. The resilience of Toraja architecture supported by the uniqueness of local building materials and local community skills is believed to enhance the preservation of material resources and create uniqueness and identity in each regional architecture as stated by Winchip [24].

Tongkonan is a cultural object built with rituals and traditional rules. During the inauguration of the tongkonan, a mangrara banua party is held accompanied by pa'gellu dance. The tradition of building a tongkonan requires a lot of money, time and energy. This is quite different from alang, which is built without complicated rituals. The construction of an alang allows for a variety of forms from the simple to the beautifully carved (Alang Sura').

The tectonic changes in the structure and construction of alang are relatively easier for local craftsmen to do because the dimensions of alang are smaller than those of tongkonan. Alang can even be made in a matter of weeks. The installation of alang carvings takes a little longer. In one tongkonan complex, there can be several alangs according to the number and financial capacity of the descendants of the tongkonan family. There is an organic process of alang construction that continues to grow and is still preserved today.

Fig 2. Alang [22]

Fig 3. Pa'gellu dance at the Mangrara Banua event [23]

Fig 4. Variant of Toraja Alang

3.2. Alluk Tadolo beliefs, shaping the resilience of Torajan architecture

Alang buildings made from organic materials are vulnerable to weathering. The belief of alluk tadolo is that the alang building is a cosmological representation of the three worlds ruled by the deities sullu banua, kalle banua, rattiang banua. The alluk tadolo ritual periodically performs an offering ceremony for the three parts of the building, namely the lower part: the foundation of the stairs and poles, the middle part: the barn, the top of the roof and the longa. Respect for these three parts indirectly has a positive impact because it gives attention to the construction of buildings that are believed to be inhabited / controlled by the spirits. This adds motivation to the belief and obligation to maintain the alang building for the welfare of the alang owner's life. Neglect of alang maintenance brings bad consequences for welfare. A wisdom of how humans must synergize with the natural environment.

In order to honor the deatas in their place of power, they do not allow the construction to deteriorate. Rituals
repair the place of the deata so that the alang does not have time to decay. If the owner of the alang dies and there are no descendants to succeed him, it is inevitable that the alang will soon collapse.

![Fig. 5. Old alang marked bamboo belt](image1)

3.3. Material construction technology, shaping the resilience of Toraja architecture

From a design economy perspective, the ease and practicality of building an alang (relatively without elaborate traditional ceremonies) is advantageous as it can be done by local experts and carpenters. The cost of erecting an alang is relatively cheaper and more affordable. It is because of this ease and affordability that many Torajan alangs are still being built. The cost elasticity of alang construction is supported by technological advances in the replacement of roofing materials from bamboo to zinc and cheaper artificial bamboo fiber listplanks. So it appears that alang has a resilience that is quite resilient in the face of the times because its role socially, economically, culturally and technologically is quite supportive of its preservation. Toraja architecture demonstrates harmony as a vernacular architecture built on inherently sustainable principles such as resource limitations imposed by economic or natural factors, yet manages to offer rational solutions to the harsh climate and human needs [25].

![Fig. 6. Alang with bamboo-like roof and zinc listplank](image2)

3.4. Roof shape, resilience of Toraja architectural identity

The curved shape of the alang roof characterizes the roof in Toraja. The shape of the roof is an analogy to the shape of boats, oceans and waters. It is believed that the ancestors of Toraja originated from the north and came in large boats across the ocean to Toraja. Maritime intelligence seems to be the basis for the inheritance of tongkonan design skills. The curved shape of the Toraja roof is a strong element that forms the resilience of Toraja architectural identity.

![Fig. 7. Structure of Toraja alang](image3)

These boat arch forms further acquire symbolic meaning beyond function and aesthetics; they become part of "cultural memory". As Harry Francis Mallgrave put it, “the image of one's memory of an architectural style is recognized as being built upon the image of one's cultural style and this image gradually acquires progressive clarity or strengthening, giving rise to greater excitement as the particular style progresses” [26]. The boat curved shape which then becomes a
marker of identity is seen to be "Identity has a permanent nature, the permanence is supported by the natural and cultural environment, such as natural topography, materials and culture which includes views and habits. The shape of this roof is an element of resilience of identity sustainability. As is known, the nature of sustainability is an important part of recognizing identity" [27].

3.5. Social status, shaping the resilience of Torajan architecture

In the social life of the community, alang has a central role as a public building. A fully carved alang is a marker of the social status of the alang owner. During traditional ceremonies, alang is a representative guest room. Alang is a place to receive temporary guests (transitional room). Alang is a gathering place for the community. Customary rules require that the seating position under the stepping board in front of the alang barn door is to'parenge (the most respected figure), then the position for people with lower status rotates to the back. Alang has rules of social etiquette for its users.

The luxury of alang is distinguished by the ornamentation of carvings, namely alang sura' (carved barns) established by the nobles and alang tang mesurra' (barns without carvings) are the barns of the common people. Carving as a marker of social ownership identity

3.6. Ornaments, forming the resilience of Toraja architectural identity

On the front of the alang there are Toraja carvings with symbolic meanings. There are four carvings used, namely pa' barre allo carving which symbolizes divinity and unity, pa' manuk londong which symbolizes the rule of law, pa' tedong which symbolizes the symbol of prosperity, and pa' donbolu which symbolizes respect and brotherly love. These carvings are not just ornaments but represent the lessons of Torajan social ethics as well as the identity of Toraja locality. Place identity can be realized by unique and distinctive human works [29]. Toraja mesura ornamentation is also a means of communication and learning local ethical knowledge.

3.7. Adaptive re-use, shaping the resilience of Toraja architecture

Changes in beliefs other than allok tadolo, advances in technological practicality and limited craftsmanship have changed the current form of alang. There has been a change in the use of alang which was originally a barn to a rest area. The commodification model of alang becomes a rest area building.

Toraja architectural ornamentation is the result of limited resource availability that appears historically and without modern means, it can be seen as an extraordinary effort in producing architecture that has a distinctive character and identity within limited means [30].

Fig. 8. Alang sura’ and alang tang messura’ [28]

Fig. 9. Carved alang ornamentation

Fig. 10. ‘alang’ as car parking

Ne'gandeng hostel in Rantepao a Tongkonan complex for tourist lodging facilities in the form of inns, restaurants, museums, photography objects, menhir stones, and buildings for death ceremonies. The building layout is in the form of clusters of single buildings with longa arch roofs in the Toraja style.
The tongkonan ne’gandeng Toraja complex teaches Torajan art, culture and architecture. Here, the customary rules and traditions of Torajan architectural establishment in the alluk tadolo version can still be told. The Toraja alang building underwent a transformation with an adaptive re-use model from a house complex activity to a tourist attraction. There is a change in the material of the alang building, the number of sali (floors) becomes two-story, concrete foundation, brick pillars, zinc roof covering. While what remains unchanged is the longa curved roof shape and ornamentation. What remains unchanged is the longa arch roof form and ornamentation. The resilience of these forms and ornamentation requires creative transformation of their cumulative values to the next generation by incorporating contemporary values that did not exist before [31].

The external layout has changed, no longer paying attention to the tradition of north-south orientation. There are stone monuments and a stage for the traditional Rambu Solo’ funeral ceremony. The rante courtyard, which should be located to the west of the tongkonan, no longer has a sacred atmosphere but rather an artificial landscape for photo memory tourism activities. Traditionally the rante is a sacred place for funeral ceremonies and ritual animal slaughtering. In this rante area, large memorial stones called menhirs/megalith-style stones called simbuang batu were erected. There was a resilience of the rante to change function.

The alang roof form is iconic in the land of Toraja. The commodification of alang into commercial objects has led to a simplification of the form. Alang Toraja is degraded in an eclectic way that does not pay attention to structure, composition, spatial scale and is more of an identity patch. This composition is found in many modern buildings in Rantepao city. The curved roof culture of alang Toraja falls into iconic objects no longer symbolic for reasons of pragmatic practicality or just a mask.

Looking at the updating of Toraja architecture, it can be said that this act of regionalism reflects local features related to the place, culture, climate, and technology of a particular era; the result is timeless architecture [32]. But if imported materials and high technology are not used intelligently, then architecture, as a place-maker, will lose its connection with the surrounding region and environment [33]. Some of the above approaches to resilience in Toraja architecture show that tradition is not always ancient and is not synonymous with stagnation. Modernity does not always mean liveliness, and change is not always for the better. On the other hand, there are situations that require innovation" [34]. The act of eclecticism in the use of roof forms in modern Toraja buildings shows that modern lifestyles and advanced technology require innovation; however, innovation and creativity must be a well-thought-out response to changing circumstances and not just a whim [35]. The resilience of Toraja architecture in the framework of sustainable architecture does not indicate a movement to return to the old way of life as pure nostalgia; the resilience provides inspiration for responsible and long-term use of technology and design that is the root of sustainable design thinking[36].

The results of the analysis of the resilience of Toraja architecture in order to achieve sustainability are summarized in the following table 1.

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<th>Sustainability</th>
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<td>Eklektisism of Roof shape</td>
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4. Conclusion

The existence of traditional Torajan architecture shows its resilience in adapting and transforming to the current social, economic and cultural changes. When the
alok tadolo tradition was lost, alang buildings had the power to 'live' by adapting to today's technological building materials, craftsmanship skills are still widely mastered by the community including young carvers in Toraja. alang's unique curved roof shape as a Torajan identity supports the preservation of Toraja alang architecture.

Socio-economically, the sustainability of alang architecture is maintained by customary rules and adaptive-responsiveness. The high motivation that the establishment of alang is a symbol of social status is a motivator for the sustainability of alang. The development of alang architecture with affordable construction costs, traditional ceremonies and easy and simple alang establishment permits determine the sustainability of alang.

How Toraja architecture survives by utilizing elements of resilience derived from knowledge of materials and their interactions; knowledge of construction, craft techniques, skilled technicians, and available resources; and continued commitment to regional identity through sustainable approaches requires a deep interpretation of the core values of the heritage that goes beyond "imitation" and visual metaphors of traditional forms and architectural features and ornaments.

This act of resilience is not about nostalgia for ancient artifacts but an appreciation of their sustainable value and response to the climate, natural environment, and locally available building materials.

Looking to the future, due to the challenges of cultural change and technological advances, it is necessary to explore and document well so that the deposits of authentic Toraja alang architectural design expertise can be maintained as local knowledge of archipelago wooden architecture with character and identity of Toraja and become a sustainable heritage legacy.

References


https://javamilk.com/2015/07/05/Ayo-Wisata-ke-Toraja/


