

Tectonic Model of Architecture Tongkonan Toraja

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ABSTRACT

Tongkonan architecture is the heritage passed down from generation to generation through ancestor tradition as a building with its perfect construction and structure capability and has architectural metaphysical values. Its architectural form is built from structural logic capability so that it has systematic tectonic element starting from *sulluk banua* part, *kale banua* to *rattiang banua*. Firmitas element research in architecture can be conducted with tectonic study based on the structure and construction system. Tectonic of architecture Tongkonan Toraja has its own uniqueness and symbolic meaning. The purpose of this research is to find tectonic model of architecture tongkonan toraja tectonic, which represents tectonic as structure, construction and symbol with focus on the study of assembly and unification process of tongkonan parts until it produce a complete tongkonan house. The method used in this research is the qualitative methods to explain or using descriptive analysis to review tectonic of Toraja traditional house. Our findings shows that Toraja Tongkonan architecture has specific tectonic model as the result of piling and unification of tongkonan parts on the structure, construction and tectonic system, generally known as “*tongkon*”

KEYWORDS : “tongkon” tectonic model, piling, unification *sulluk banua, kale banua, rattiang banua*

1. INTRODUCTION

The capabilities of Toraja tribe ancestors to cultivate architectural environment in innovative ways during long period of time had made Toraja traditional house as one of the most expressive architectural heritage and capable in exhibiting philosophical symbolic elements from the house. Tectonics is part of human culture product in their effort to understand architecture and to combine it with structure and construction technology. Toraja traditional house architecture has tectonic uniqueness which by the community made into family unity philosophical symbol. Every part of the building has aesthetics elements and functional structure. There are no wasted building elements in tectonic values. Structural system mechanical forms an architectural system with aesthetic values. The research about tectonic of architecture Toraja Tongkonan can not be separated from the research in tongkonan structure and construction focusing on wood/bamboo construction fusion aspect and its sturdy and elastic structure system. Architecture Toraja tongkonan is one of many buildings in Indonesia archipelago with its architecture, structure and construction uniqueness. This research observed through tectonic, because tectonic is a part of architecture, according to Vitruvius [1], architecture are divided based on its function, strength (structure) and aesthetics. Strength can be understood as structure and construction (tectonic) system as an integral part in architecture.

2. STUDY LITERATURE

Tectonic study started by discussing shape geometry of structure and construction in architecture, and describing the difference of structure and construction definition. Eduard Sekler [2] in his essay, “Structure, Construction and Tectonic”, defined the difference between structure and construction as follows: structure is the principle of the building as a whole, arrangement of parts which hold the weight and construction is the concrete translation from system and it includes choices of material joint method (connection). Heinz Frick [3] described the relation between task, form, construction and building materials in building structure can be defined linearly. In Tongkonan Toraja architecture, column and beam construction and structure made from wood to form horizontal and vertical element, as the common characteristics in traditional architecture, as described by Lullulangi and Sampebua [4].

Architecture geometry rose from natural source of the building, which pointing to neatness or order of the building. This is the process in forming the building, with structural characteristic from construction materials. Norman Crowe [5], stated that the creation of a geometry related with man-made housing comes from two natural sources, first is the order of building process, and second is relationship with the perception of human body. Rob Krier [6] described about the architecture composition, that geometry can categorized into regular form with elements of points, lines, planes, solid, interior and exterior space. Tectonic study can not be separated from geometry shape creation and its relation with structure and construction system in architecture Tongkonan Toraja.

Tectonic has tight relation with the art of material processing, structure and construction with emphasis on aesthetic value aspect produced from a structure system or an expression from a structure empahsized by the capability to use its structure technology. Tandilinting [7] described that Tongkonan Toraja used hard wood material on simple construction and structure, which is to get on the location where tongkonan is built.

Peschken [8], in his essay “*Schinkel’s Tectonics*”, stated that tectonic derived from Greek word, tekton which means “carpentry or builder” or *taksan* (Sanskrit) which means art of carpentry by using axe. Based on the understanding of formation, to present tectonic in arranging and integrating building as stated by Semper in Frampton [9], emphasized building (architecture) classification into two procedure, based on the assembly process. First procedure is tectonic as a light frame consists of linier components forming special matrix or in other words, as a development of construction and structure which are use in forming space. Second procedure is stereotomic stage in which the base part where mass and space volume formed from heavy elements as the processing of connection system on the structure and construction to increase expression on the building by presenting art values.

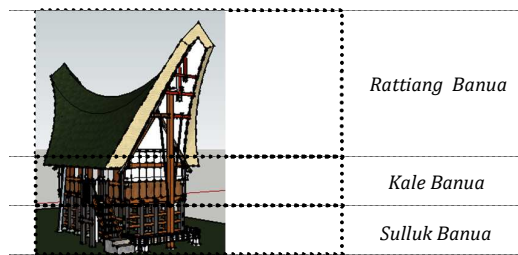
A mix of shape geometry, construction materials and integration/connection of construction elements beautifully (aesthetic-artistic) to produce a sturdy structure system (technical-technological) is the focus of tectonic. Tectonic expertise and skill are all about “assimilating and arranging”, starting from the most simple technology to the most complex one, by way of : piling up, polishing, binding, weaving, putting pegs, flanking and coating.

3. RESEARCH METHODS

Our research used qualitative method which tends to explain or to give descriptive analysis to outline the tectonic of Toraja traditional house. Data acquired from literature study and field observation. Data classified into two big groups, which are technical object and symbolic object. Technical object directly related with construction technique and element formed to empashized static role or culture status, while symbolic object related with beauty of construction and structure which are hidden (symbolic) in Toraja people toward Tongkonan house and aesthetic value produced from structure and construction system.

4. RESULTS AND DISCUSSION

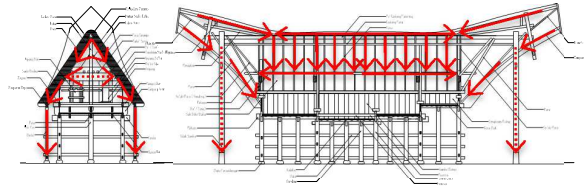
Based on view of aluk todolo ancestor religion and Toraja Traditional House cosmology, Tongkonan vertical structure and structure system could be divided into three main parts [7]. This division is caused by the obvious and firm separation of those three parts. Structure system on these three parts have separated systems, structure unification of each parts forming compact structure system, the entirety of the elements are interwoven and shows solid and complete structure tectonic



Picture 1.
Vertical division on Tongkonan

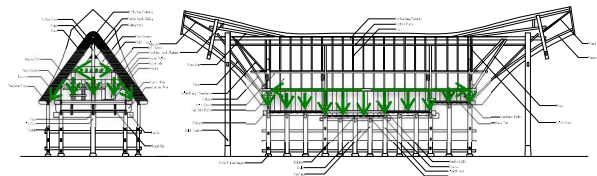
Structure system of Tongkonan on its three parts is an independent structure system. The unification and arrangement of these three parts are conducted by placing one part on top of the other part. Placement of column-beam frame system in *sulluk banua* on top of pedestal foundation (*batu paradangan*), *siamma* structure system [10] on *kalle banua* placed on top of the column-beam frame system on the *sulluk banua* part. On the *rattiang banua* part there are two structure systems. Plane system on the roof is placed on top of column-beam frame system and both of these systems on *rattiang banua* are placed above *siamma* structure system on the *kalle banua* part. There are three structure systems which is independent of each other. Structure systems between each part are also different. From process of structure system unification from bottom to the top, we can conclude this as gradual hierarchy, where simple structure system support the more complex structure system, as well as the complex structure support the more sophisticated system.

Research and study results of structure on Office of Makassar Traditional Housing Technology Development in 2010 showed that the size of the form and the weight of the roof dominated the weight of the building as a whole causing the building center of gravity located higher than $\frac{1}{2}$ of Tongkonan house height [11]. Structure and construction system in Tongkonan is plural structure; reaction force of structural part became the active force on the structural part that holds it. Finally, a structure system must safely channels all structural parts' weight to foundation (*batu paradangan*) and then to the ground. The main structure system in Tongkonan house is a frame system. Floor upper part frame is a part of the walls and also functions as roof weight bearer. The weight of the walls in body part of the building is channeled to foot frame column and most of the weight is channeled through pedestals to the ground.



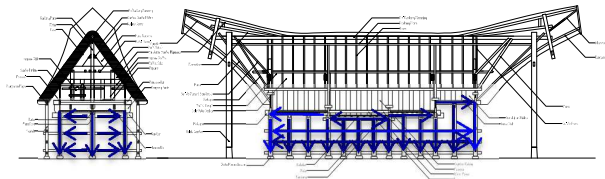
Picture. 2

Illustration on cross-sectional and longitudinal weighting of *Rattiang Banua*



Picture 3

Illustration on cross-sectional and longitudinal weighting of *Kalle Banua*



Picture 4

Illustration on cross-sectional and longitudinal weighting of *Sulluk Banua*

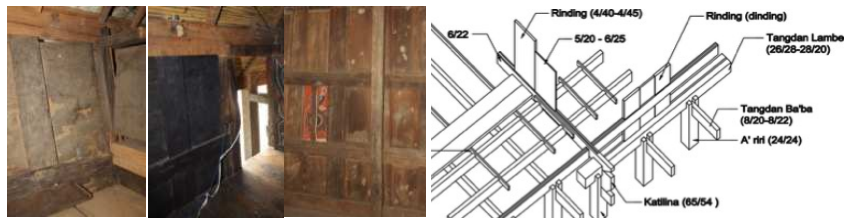
Tectonic on Tongkonan has the ability to adapt structure and construction system of the building into basic form of aesthetics as a specific thing. The overview by using tectonic expertise and skill to “assimilating and arranging” starts from the simplest way. Tectonic of Toraja architecture until it become a complete building can be observed from arrangement system in each part (*sulluk banua*, *kalle banua* and *rattiang banua*) based on the theoretical approach stated by Semper.

a. Sulluk Banua Assembly

Structure and construction system in *sulluk banua*, is a frame structure system where columns and beams strengthening each other until it produced a rigid and sturdy strength to be able to hold both vertical and horizontal weight held by *lengtong alla* and *roroan*. Another element to make *sulluk banua*, but not as structure or construction elements, is the *a' riri posi* as the pole in the middle as a symbol of life for Toraja people [6]. This pole usually decorated with carvings to add philosophical importance on Tongkonan.

b. Kale Banua Assembly Process

Structure and construction system from *kalle banua* is an independent system, as the system separated from the systems in other parts. Placement of *kalle banua* on tongkonan as connected part with two other parts, *rattiang banua* and *sulluk banua*. This system, based on the forming understanding, to bring in tectonic in arranging and integrating building which based on the assembly process is the stereotomic stage where mass and space volume formed from the massive and heavy elements. Space maker element made from walls with structure and construction system *siamma* [10]. *Kalle banua* part is a part of tongkonan where there are a lot of carvings. Because of its position in the middle on the division of structure and construction system in Tongkonan, *kale banua* has joint/connection with the *sulluk banua* and also *rattiang banua* part.



Picture 5.

Structure and construction system on *kale banua*

c. Rattiang Banua Assembly Process

The study on structure and construction system on *rattiang banua* part, described as the tongkonan parts placed in the most upper part and functions as roof cover of the building as the roof frame structure system (this system consists of beams and frames arrange to make one structure system to hold roof weight). Roof structure system from bamboo made from piles of bamboo cuts with different sizes. Structure and construction system of *rattiang banua* is more varied compared to *sulluk banua* and *kalle banua*.



Picture 6.



Picture 7.

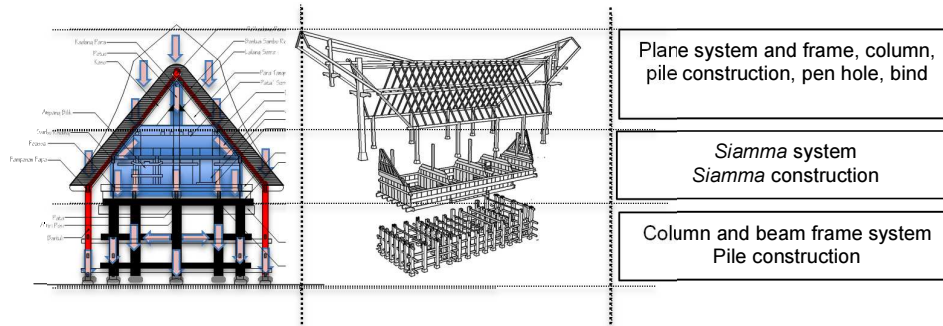
Structure and construction system on *rattiang banua* Structure and construction system on *Tulak Somba*

The system on *rattiang banua* based on the forming and assembly process can be classified into both *tectonic* stage and *stereotomic* stage. *Tectonic* stage can be found on roof frame. *Stereotomic* stage where mass and space volume formed from heavy and massive elements can be found on the arrangement of bamboo roof, piling from bottom to the top.

d. Tongkonan Assembly Process

Assembly process of all part of Toraja Tongkonan until it become one complete entity called as the process to place each part on top of other part, within this order: *sulluk banua* part of Toraja tongkonan stands above *batu paradangan* which functions as foundation, with column and beam frame structure system brought together with pen-hole construction. Above the *sulluk banua*, *kale banua* is placed with *siamma* system to represents structure and construction system where the strength of building

walls functions as structural walls to hold and channel the structural weight. *Rattiang banua part* is placed above the *kalle banua*, with roof structure system which is a mix of column-beam frame system and plane system on the roof. Beam elements can be found on *pekadang panuring*, *kadang para*, *ba(teng)* and *kaso*. Column elements can be found on *tulak somba* and *lentong garopang*. Roof is plane structure system by using bind and pile system (especially on bamboo roof material) and column-beam structure using pen-hole joint/connection and *takik*, as seen in picture 8.



Picture 8.
Tongkonan Assembly Process System in each part

5. CONCLUSION

Structure system of Tongkonan on its three parts is an independent structure system. The unification and arrangement of these three parts are conducted by placing one part on top of the other part (In Toraja language called as “tongkon”). Placement of column-beam frame system in *sulluk banua* on top of pedestal foundation (*batu paradangan*), *siamma* structure system on *kalle banua* placed on top of the column-beam frame system on the *sulluk banua* part. On the *rattiang banua* part there are two structure systems. Plane system on the roof is placed on top of column-beam frame system and both of these systems on *rattiang banua* are placed above *siamma* structure system on the *kalle banua* part. Every part has its own weighting, structure and construction systems. The discussion and study of Tongkonan to find tectonic model of architecture Toraja Tongkonan, has shown that “*tongkon*” is the tectonic model of architecture Tongkonan

REFERENCES

- [1] Vitruvius., 1914, *The Ten Book of Architecture*, Havard University Press, Cambridge.
- [2] Eduard F. Sekler. "Structure, Construction, Tectonics" https://kepler.njit.edu/ARCH264000S11/SupplementalDocuments/sekler_structureconstructiontectonics.pdf unduh feb 12, 2011
- [3] Frick, Heinz, 1980, *Ilmu Konstruksi Bangunan*. Yogyakarta : Kanisius
- [4] Mithen Lullulangi M dan Sampebua' O., 2007, *Arsitektur Tradisional Toraja*, Badan Penerbit UNM Makassar
- [5] Crowe, Norman; 1997; *Nature and the Idea of man-made World*; MIT Press, Cambridge, Massachussetts.
- [6] Krier, Rob. 2001. *Komposisi Arsitektur*. Edisi Terjemahan. Jakarta: Erlangga Indonesia.
- [7] Tangdilinting L. T., 1978, *Tongkonan (Rumah Adat Toraja) dengan Struktur, Seni dan Konstruksinya*, Yayasan Lepongan Bulan. Tana Toraja.
- [8] Peschken,G.1999., *Schinkel's Tectonics*, Friends of Schinckel, Minnesota
- [9] Frampton, Kenneth., (1995). *Studies in Tectonic Culture*. The MIT Press, Cambridge
- [10] Mochsen Sir Mohammad, Shirly Wunas, Herman Parung, Jhon Patandu. 2014, *Tectonic Architecture Tongkonan Papa Batu Toraja*, International Convergence on 15th Senvar 2nd Avan, November 2014, Makassar Indonesia.
- [11] Balai Pengembangan Teknologi Perumahan Tradisional Makassar., (2010) “*Kegiatan Penelitian Teknologi dan Konstruksi Rumah Tradisional Toraja*”. Study Result Report, Makassar.
- [12] Said, Abdul Azis. 2004. *Toraja Simbolisme Unsur Visual Rumah Tradisional*. Yogyakarta: Ombak.