The Characteristics of Structure and Construction of Barns (Landa') of Duri in Enrekang Regency

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Abstract

Landa‘is the term used for the barns of Duri Tribe, which is different from the barns over the archipelago. It contains numerous architectural metaphysical values. Landa‘ presence in Enrekang Regency can be only found over three villages. One of which is in Kondan Village, which later became the location of the research this current study, since the highest number of Landa‘people is in this village which still preserve their ancestral customs. This study aimed to uncover and discover the characteristics of Landa’s structure and construction. The research method was a qualitative approach with a descriptive analysis technique. The results of the study revealed that the Landa‘is vertically divided into three main parts, namely: the first part of the bottom side (bala Landa‘), which used a column frame structure system. In addition, the construction system used a pile and punching system, the second part of the body / middle (kale Landa‘) that uses the siamna structure and construction system, and the third part of the head / top (dea Landa‘) that used a beam frame and a construction system using a stacking system, notches and punches. Such knowledge and the process of design of landa contain a high variety of values and local wisdom that are considered responsive to disasters.

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Keywords: Landa’, Barns, Structure, Construction, BolaLanda’, KaleLanda’, DeaLanda’

Background

Enrekang Regency is one of regions in South Sulawesi Province located approximately 235 km in the north of Makassar, located at coordinates between 03° 14’ 36” - 03° 50’ 00” South Latitude and 119° 40’ 53” - 120° 06’ 33” East Longitude. In general, it has such topographical conditions varying in the form of hills, mountains, valleys, and rivers with an altitude of 47-3,293 meters above the sea level. Duri tribe is one of three sub-tribes in Enrekang Regency (so-called Massenrempu’u) namely Maiwa, Enrekang, and Duri. The traditional house construction of Duri is almost similar to the houses in the archipelago, mostly in the form of a stilt house, consisting of three levels of space division in house construction such as the lower structure/upper structure/alignment with the division of the cosmos into three philosophical words, namely the underworld, human world, and the world above. Such previous publications (e.g. AS, 2013) revealed that traditional houses of Duri are built in the form of stilt houses consisting of vertical and horizontal shape, spatially formed by vertical and horizontal columns. The initial form of a Duri’s traditional house is small but has many pillars. The shape of its house is rectangle with a symmetrical, or so-called bulap ‘pa’ (rectangular) pattern. The very first version of Duri house only consisted of 1 (loud) plot of size 2 x 3 fathoms with 4 main pillars (ariri pengindo’na) on each side and between the 2 ariri pangindo’na are placed 2 supporting pillars (ariri aids).

Such interesting fact about this traditional Duri house is that there is an additional space in the form of a barn (Landa’) serving as a place to store red rice and red sticky rice (pulu ‘mandot). According to Sato (2014), the barn is symbolically far more important than the home, for instance, as a place to store
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valuables goods, the territory of the Gods, the center of ceremonies, instructions for dignity, meeting venues and so on. The existence of barns is most commonly found along the Pacific islands, and plays an important role for the community. Koji Sato is one of those who has conducted research related to barns in the Pacific islands and then published in the 2014 journal Anthropology Indonesia entitled Occupying Granaries: Some Considerations regarding the Origin of Stage Houses Construction in the Pacific Islands. Sato, in his study, revealed that the barn is an important part of the house since the house is the result of the development of the barn. Koji Sato only investigated Toraja barns (alang) in South Sulawesi, although there were still other barns that form and placement different from alang, which is granary of Duri tribe in Enrekang Regency, which is commonly known as Landa’.

Figure 1: The Visualisation of Duri dan Landa’ House
Source: [AS, 2013]

The forming elements of Landa’ house cannot be separated from the elements of form, space and structure that support with each other. Krier (2001), for instance, emphasized that both construction and function cannot be separated from the overall architecture. The concept of space in the field of architecture is also related to the structure of buildings. It is a concept of space organization that has been described demanding the completion of an appropriate structure. Each element in the landa’ house will greatly affect the visual character, spatial character, and structural character. The author throughout this existing study will uncover the characteristics of the structure and construction of the barns (traditional house) of the Duri house.

Literature Review

The character of architecture is such particular or diverse that has architectural features, or a structured arrangement of basic elements that makes an architectural object of a different quality than other architectural objects (Fajarwati, 2011). According to Iskandar (2004), the character of a building can be traced through a type review consisting of three major things, which are: 1. The basic form, namely the identified geometric elements; 2. The basic nature, namely the impression caused by the basic formation on the building; and 3. The process of developing basic shapes up to their current form. Samsudi (2000) further revealed that architecture is formed from two aspects, which are: 1. Physical aspects: spatial characters that are formed from building patterns, plan and orientation forms; and 2. Non-physical aspects: changes that occur in buildings and concepts of building structure systems. According to Antariksa (2017), architectural characters can be found by means of two stages, first looking in a building how the patterns formed by the basic elements, and the next stage is by looking for interrelationships between these patterns within the framework of the principles of regulation and itsunit.

According to Antariksa (2017), the building characters are divided into three main characters, i.e. visual characters, spatial characters, and structural characters. Within this study the structural character will be particularly discussed. The house structure is closely related to the understanding of the anatomy of the building from the bottom up to the top; sub-structure (lower structure / stands of the building); superstructure (middle structure/building body), and upper-structure (upper structure / head of the building).
According to Kier (2001), there are three principles of the building construction, namely: 1. Construction of massive walls, this type consists of a system of massive supporting wall elements made of beam structures and other monolithic materials, especially bricks; 2. Frame construction, the beams is physically free from the outer cover wall. The whole frame can stand alone and does not rely on its fillers; and 3. Mixed construction, mixing of both skeletal techniques and massive walls can be formed by a combination of massive walls on the outside with supporting columns in the building or vice versa. The frame can be the transition boundary between outer and inner space, while the massive wall becomes the clear boundary of the environment in the building.

Granary in the archipelago has its own uniqueness in each region, although each may have similarities both from physical and non-physical aspects. The existence of barns is not only a complementary element of a house, but it further becomes an important element for the house residents. Sato (2014), however, stated that the houses are the result of granary development. Generally, barns have halls under the floor construction. The function of the barn is not only as a place for storing rice but also as a sacred space. The Barns (i.e. kelumpu, pinkie, jineng) are used as rice storage facilities and ritual worship of Dewi Sri (Tiaga, 2014). Toraja and Mamasa barns (alang) are not only functioned as a place to store rice. Sali alang (lower alang floor) is a very important place. It plays a role when a new person arrives directly seated in the alang while waiting for the host to invite up to the top of the house. Likewise, at certain times, old people or traditional leaders sometimes discuss important matters inalang, or at the rituals of Rambu Tuka and Solo Sali Alang, which play a very important role (Lullulangi, 2017). The existence of these functions will certainly affect the formation of the structure and construction of the granary itself.

The barn of Duri Kendenan community is commonly called landa’. Its orientation is the same as home orientation (bola), namely North-South, but it can be situated in front for landa’ house, or back, left or right side of the house. The landa’ placement can be grouped at a certain point, such as on a hill that is believed to be sacred by the local community. There are also those near rice fields, essentially following the land of the owner, the topography of the land and making it easy for access to Landa’. There are three types of barns used by the Duri community, according to AS (2013) as follows: 1. Pa’pak, it is round, made of woven bamboo with a diameter of ± 100 cm and a height of 1.2 m. This Pa’pak used by the Duri Buntu Batu, Curio, and Masalle communities. This type of barn is however not used by the Duri Kendenan community; 2. Batutu, in the form of a rectangle with 4 pieces from po’tung (large and thick bamboo) similar to Landa’ but the roof does not up forward. All used materials use bamboo, such as poles, floors and walls. Especially for the roof using a Bangkawan roof material (weeds) that is combined with bulu’ (palm fiber). The batutu is however not found anymore nowadays; and 3. Landa’, rectangular with a skeletal and siamma structure system. It has 4 pieces of banga wood, about 40 - 60 cm above the surface of the land functioned as sali (halls), where the community conducts social interactions. The roof sharpens forward but the material of the roof had experienced a slight change. It used to have a thatch roof, but now has a roof. There are such decorations on the petuo and pesapii beams in the form of ornaments and on the lindopara of the bareang in the form of buffalo horn carvings. This landa’ s location is near to the house, placed either in the front, back, right, or left side of the ball.

Methodology

This study was conducted through a qualitative research using unstructured observation methods. The data collection technique was a field survey, supported by in-depth interviews with key informants consisting of the Head of Kendenan Village and traditional leaders. Data was also collected through a literature review related to the granary. This research is a descriptive analysis, using data explanation in the form of research object conditions that have been obtained through the results of field surveys, namely observations and interviews (Antariksa, 2017). The research location was in Kendenan Village, Baraka Subdistrict, Enrekang Regency, and South Sulawesi. This location was chosen since in the Duri Complex area, Kendenan Village is still carrying out its customs. Also, among three villages that have landa, this village has the highest number of landa’, about 510 landa’.
Results and Discussions

The Duri people, especially in Kendenan Village, used *landa* to store rice, not above *tapan* (loft) such as *rasakkeang* (roof) on traditional Bugis or *pamnakkang* over traditional houses in Makassar for a number of reasons, including preventing groceries from eating rice. This is the main reason for using *bangga* wood (*piggafetta elata*) as a pillar, because it is believed that using this wood welders cannot climb this wood, since the wood is shaped round, on average ± 50 cm in diameter. The community of Duri Kendenan also believes that if rice is stored on the roof, it can result in itching for the community. This is indeed very reasonable because their habit of storing rice is not included in sacks, they rather directly store dried rice stems inside certain ties to *landa*. If this treatment is also applied to the *tapan*, there is a part of the rice that falls into the middle of the body of the house. This small part of rice can make the house dweller itchy.

The embodiment of *landa* is the manifestation of respect (gratitude) to the creator (Goodness) which gives abundance of sustenance. Here, rice is a symbol of life and the one who gives life is the creator, thus rice should not be placed under the house. It however must be put as high (sacred). This then triggers the form of the *landa* as the form of a stage. *Landas* is also a symbol of well-being, so that every single unit of *bola* (a house) has at least one *landa*, the more they have *landa*, the higher the prestige value is possessed by the *landa* owner. According to local beliefs, when they want to establish a *landa*, all used building materials should not be stepped on by the residents because it will cause mice to rise to *landa*. The process of making *landa* is such unique, where the first stage is making of *kalelanda* and then *dealdanda* After everything was finished including the ornamentation, it was then lifted and mounted on four wooden pillars, which were placed on the stone. The size rule used is the inch and feet to measure short and fathoms (8 inches) to measure length.

![Diagram showing the size and height of Landa](image)

**Figure 2:** The size of shape and height of *Landa*.
Source: (Author, 2019)

The vertical structure of *Landa* is similar to the vertical structure of a traditional Duri house, which is divided into three main parts, as follows:

1. **Bottom (bala *Landa*)**
   The bottom part of this barn functions as *sali* (halls), the space for social interaction within the community. *Bala Landa* uses a system of column frame structures (*ariri bangsa*) and beams (*pattolo* *garasang*) which are reinforced by the use of supplement blocks (*tuma baka*).

2. **Body part / middle (kale *Landa*)**
   The middle part of the barn is used as a place to store red rice and red sticky rice (*pulu* "mandot*). Kale *Landa* uses a structural system so-called as *siamma* (Sir, 2015). This system has the same function as the load bearing wall, the difference is the material and constituent of this wall is made of board arrangement,
3. Head/top (dea Landa’)
   The upper part of the barn functions as a cover for the entire Landa’ structure. The system structure is using the beam frame.

These three parts of the Landa’ structure system is classified as structural systems that can stand alone and support with each other. The unification and preparation of these three parts is done by means of: each part is seated onto the other part. Placement of the bangau wood frame system in bala Landa’ was seated on the umpak foundation (pa’tumpak batu). The siamma structure system in the kaleLanda’ was seated in the wooden column frame system in the Landa’ section. In parts of dea landa’, there are two structural systems, namely the roof field system seated in the beam column frame system, and both systems are seated above the siamma structure system in the kale Landa’ section.

**Figure 3:** Burden Illustration of Landa’
Source: (Author, 2019)

**Figure 4:** Shape and Structure of Landa’
Source: (Author, 2019)
Such structural burdens of Landa’ are the gravitational burden that work vertically on the structure. This burden includes dead and living burdens caused by the presence of the earth’s attraction. The lateral burden from wind and earthquakes are considered as living burdens that work horizontally on the structure. When a burden occurs due to gusts of wind, the structure will sway into the side. When an earthquake occurs on where the Landa’ structure is established, it will sway quickly into the side. The large earthquake forces work on structures when the mass of the structure holds a sudden lateral force. The structural elements of free-standing Landa’ will remain stable even though they have a very heavy burden.

1. Sub Structure

![Figure 5: Landa’ House and its Sub-structure](image)

Source: (Author, 2019)

The structure and construction systems of Landa’ house use frames, where each column and beam reinforce with each other. The process of making Landa’ house’s structures is the third stage or the final stage of the entire Landa’ making process. The structure and construction of the lower Landa’ consists of 4 pieces of round wooden bangga (pignafeta elata), which are reinforced by longitudinal gara’sang beams and pattolo beams lying from the direction of Landa’. The use of bangga wood as a pillar because it is believed that this wood is very difficult to ride by miling animals. Ariri bangga/ pillars were seated above the pa’tumpak batu functioning as a free foundation and also as a barrier, so that the pole does not directly touch the ground which can accelerate weathering of the wood. Balok tuma’bak is placed free on the gara’sang beam which is parallel to the pattolo ‘beam as the foundation of the sali tapan (wooden plank floor) or sali ta’tak kajao (bamboo floor), which functions as a space for social interaction within the community.

2. Super Structure

The shape of kalelanda’ is the rectangular with structural and construction systems. It stands alone bearer wall system, separated from the Landa’ structure system. The kalelanda’ section is seated on the Pattolo ‘beam which is connected with ariri bangga. The strength of its structure and construction comes from the relationship of the combination of siamma with the pair of walls. Such elements that make up the space from kalelanda’ are mutually binding and resting on one another. The bara’nu beam relies on the pa’dongko beam with a notch system, where each corner is given a curved notch as an aesthetic element. Each of these beams is connected with pesa’pi blocks with a connecting system and an open hole, which functions as a clamp beam from the rinding bangga (bangga wood wall). There is an aesthetic element on the pesa’pi beam placed in each corner of the kale Landa’.

At the top right of KaleLanda’ there are bareang (doors) which have motifs like buffalo horns and rice balls. However, not all of them are given motifs of carving depending on the wishes of the owner of landa’. The use of buffalo horn as a carving motif is because the teaching of aluk tojolo (ancestors’ belief). They believe that buffalo is a sacred animal that will be used as a vehicle to the heaven. It is also as a symbol of respect for buffalo's thataided farmers' working on their fields. The buliran carvings are only a symbol that Landa’ ‘is a place to store rice. At the bottom of the bareang is a transverse beam that has a hole in the center as a place for pa’joli panglacak (door lock item). This kind of beam functions as a reinforcement of the pesa’pi beam. The floor, furthermore, useda wooden board material
whose right corner uses a wooden board, that is more prominent to the front as a place for the back of the carpet (stairs) and as footing spot before entering the Landa’. This spot is temporarily, and thus, after being used it can be placed on the right side of the Landa’ near to the pattolo beam.

Figure 6: Super-structure landa’
Notes: 1. garasang, 2. pattolo landa’, 3. pattolo, 4. sali banga, 5. pesa’pi, 6. rinding banga, 7. Bareang
Source: {Author, 2019}

3. Upper Structure
The roof of landa’ looks like a saddle with each upper protrudes forward, so it will be like trapezoidal when viewed from the side, or shaped like a hexagon when viewed from above. The construction system of dea landa’ uses frame system and arranged fields, producing a structural system that can carry out the load from the roof. The dea landa construction system consists of joint notches, ties and holes.

Figure 7: Shape, Structure and Construction of Landa’ Roof
Notes: 1. petuo para, 2. lindo para, 3. tanduk kelang, 4. bara’na, 5. balo petuo, 6. kaso, 7. passambo.
Source: {Author, 2019}

The arrangement of the Landa’s structure consists of a kaso beam that relies on the bara’na and passambo beams with connective joints. To support and strengthen the passambo beam, there is a petuo beam with a perpendicular notch system resting on the pa’dongko beam and tandukkelang horn (the beam is arranged in a triangular shape) on the front and rear faces of the roof, which also functions as a clamp beam as a front and rear cover roof. The horn beam relies on the lindo para which has the motif of carving buffalo horns and rice granules. To support the roof that protrudes forward, there are petuo pararelying on the pattolo ’up to the lindo para to the passambo beam. At the front of the petuo, there is a balo petuo which has a curved thread motif, function both as an aesthetic element and as a locking beam between the lindo beam and the petuo para. The materials for roof cover usesbangka dea (thatch roof) which are usually combined with dea bulu’ (palm fiber roof) on the ridge section.
Conclusion

Landa’ is familiarly known as the ethical house of Duri Kendenan Tribe. It is a rectangular with 4 pieces of wood from bangko, ± 40 - 60 cm above the surface of the land, functioned as sali (halls) where the community conducts social interactions. The roof jutted forward but the material of the roof had experienced a change, which in the past used a thatch roof while now it uses a zinc roof. There are several decorations on the petu and pesa’pi beams in the form of ornaments and on the lindo para and bareang in the form of buffalo horn carvings. This landa’ s location is near to the house, either in the front, back, right, or left side of the ball.

There are three stages in making landa’, which is different from the stage of making most barns or houses. The first stage, the granary body is made, then the roof. After the body part and roof are put together, then the part is lifted and seated on a pole of wood which rests on the pat’tumpek batu as the third stage. Vertical Land’as divided into three main parts, namely: the pillar / bottom (bala landa’), the body part of the barn / middle (kalelanda’), and the head / upper part (dea landa’). Pillars / lower part (balalanda’) functions as sali (halls), space for social interaction from the community. Balalanda’ uses a system of column frame structures (ariri bangko) and beams (pattolo’ garasang), which are reinforced by the use of supplementing blocks (tuma’ bak). The construction system uses a pile and punching system. The middle barn (kalelanda’) part serves as a place to store red rice and red sticky rice (pulu ‘mandoti). KaleLand’ uses the siamma structure and construction system. This system has the same function as the load bearing wall. The difference is the material and constituent of this wall made of board arrangement. The head / top (dea landa’) functions as a cover for the entire Landa’ structure. Dea Landa’s structural system uses beam frames and fields. The construction system uses a stacking system, notches and punches. Knowledge and design process from landa’ is full of local religious values, including response to disasters.

Structural burdens on landa’ are the gravitational burden that work vertically on the structure. This burden includes both dead and living burdens triggered by the presence of the earth’s attraction. The lateral burden of wind and earthquakes are living burdens that work horizontally on the structure. When a burden occurs due to gusts of wind, the structure will sway into the side. Also, when an earthquake occurs the land where the landa’ structure is established, it ‘will sway quickly to the side.

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References