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Characteristics of Traditional Balinese Buildings in Banjar Cekeng, Sulahan Village, Bali

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ABSTRACT

Traditional Balinese buildings, especially in Cekeng Village, have changed and gotten worse as tourism has grown. Nevertheless, nothing has been said about the layout, building materials, shape, or size of traditional Balinese houses in *Banjar* Cekeng. This study aimed to analyze the characteristics of the traditional Balinese house building in *Banjar* Cekeng, Sulahan Susut Village, Bangli. Qualitative, descriptive research design, where data is gathered through interviews and written accounts of what happened. Data analysis is carried out descriptively. The results showed that the characteristics of traditional Balinese house buildings in *Banjar* Cekeng, Sulahan Village, Susut District, Bangli Regency, in terms of the shape of the building, have changed, especially regarding the height of the building. In general, the layout of the buildings is not that different from the traditional architecture of mainland Bali. There are *paon* (*bale daja*), *pelinggih penunggu karang*, and *tebe* surrounded by bamboo forests. In terms of building materials, it is dominant to use natural materials such as wood (Merbau and camphor wood) and bamboo. However, the lack of bamboo, which is quite a lot, has resulted in people choosing to use other materials. Hence, the uniqueness of the traditional buildings of Cekeng village, in terms of roof building materials, namely, bamboo, has changed to a tile roof, both for *sakanem* and *paon* buildings.

Keywords: buildings, characteristics, construction, layout and materials, traditional Balinese.

1. Introduction

The characteristics of traditional Balinese buildings as part of Balinese architecture are unique because they have a distinctiveness or local wisdom that has an identity. In terms of form, local wisdom has an identity, cultural elements, potential, norms, and beliefs [1], [2]. In today's globalization, the function of the *undagi* is to preserve local knowledge in traditional Balinese development. Layout guidelines, technology and materials, ornaments, decorations, colors, constructions, and construction all feature local knowledge values in the creation of traditional Balinese homes[1], [3]. According to Dwijendra [4], Bali's application of the local knowledge notion is built on the idea of cosmology (Tri *Hita Karana*, *Hulu Teben*, *Tri Mandala*), policy concepts (*Catur Dresta*, *Awig-awig*, and *Perarem*), geographical concepts (*Desa*, *Kala*, *Patra*, and *Desa Pakraman*), *Asta Kosala Kosali* concepts (orientation, layout, ornaments, materials, construction structures, shapes, colors), and building concepts (*menyama braya*, *salulung sabayan taka*, *saling asah asih lan asuh*, *Tat Twam Asi*, and mutual aid) [5]–[10]

Along with technological advances, globalization makes it difficult and dangerous for the Balinese to keep and pass on their local knowledge [11]. Technological advances cause the pattern of life of the Balinese people to unwittingly gradually undergo changes [12]. Habits in everyday life and environmental changes [13], [14]. How building materials are managed and used in Bali has changed because of the way development planning is done there. Previous research revealed significant changes in the pattern of buildings in the yard in Penglipuran Bangli Village [15]. Furthermore, the problem faced in the traditional settlement of Penglipuran Bangli is the modernization process that has begun to erode the values of the local wisdom tradition [16].

The analysis results indicate that tourism's impact has brought significant changes to people's life patterns, one of which is in *Banjar* Cekeng, Sulahan Village, Susut Bangli. A building's structure is an essential part of supporting a building. The roof (top), columns and beams (middle), and foundation (bottom) are unique in the implementation of building construction in Bali in terms of the concepts of *Tri Angga* (head, body, and legs) and *Tri Hita Karana* (*Utama*, *madya*, and *nista*). There is a lack of literature on the models and characteristics of traditional house buildings in *Banjar* Cekeng, Bangli. We seek to present and analyze the structure of the building in more depth to obtain a comprehensive arrangement of the building. This study aimed to analyze the structure of the traditional Balinese house building in Banjar Cekeng, Susut, Bangli.

2. Method

This type of qualitative research was used in this study. An analysis of the characteristics of traditional buildings was carried out in *Banjar* Cekeng, Sulahan Village, Susut District, Bangli Regency. Primary data sources are obtained from interviews, observations, and documentation supported by previous literature as secondary data. Primary data were obtained from respondents who became communities in *Banjar* Cekeng, including *Kelihan* traditional villages, *Kelihan Banjar*, and part of the local government. Data collection using purposive sampling by establishing inclusion criteria includes a) *traditional umah* that still has a *bale*; b) *bale* or other buildings in the *umah* that still have a fireplace; and c) a structure that characterizes local wisdom. The data obtained are further analyzed descriptively [17].

3. Results and Discussion

3.1 Characteristics of *Banjar* Cekeng, Sulahan Village, Bangli

Banjar Cekeng, administratively including Sulahan Village, Susut District, Bangli Regency. From Denpasar, the distance is approximately 60 km. *Banjar* Cekeng is one of the *banjars* in Sulahan village. *Banjar* Cekeng is a neighboring village of Penglipuran Village. The coordinates are 08° 25' 17.5" south latitude and 115° 21' 18.4" east longitude. A historical site called Sorkofogus shows that the traditional village of Cekeng is one of the old ones. According to [18], since prehistoric periods, or the age of procrastination, Sorkofagus, the cekeng traditional hamlet, has existed. At this time, funerals with Sorkofagus started, but they were exclusively performed for village chiefs or other leaders. Two Sorkofogus, one at *Pura Puseh* and the other at Wayan Lamud Moor, south of the residential neighborhood of Pura Dalem, are found in *Banjar* Cekeng. They are historical locations of rides once owned by the town and serve as a tourist draw.

The dwellings in the *Banjar* are lined up with the same *angkul-angkul*, which gives them their singularity. There are 29 pieces of *angkul-angkul*, which is the typical *krama's* home gate. As long as there is a village yard, the number of *angkul-angkul* may increase. Twenty-seven pieces initially became 29 pieces. Before population growth, the number of *angkul-angkul* represented the number of families, but according to the interviews conducted, there were 64 families totaling 328 people. Therefore, there is more than one household per resident. The elements of traditional *Banjar krama* There is a conventional *krama* yard and wet soil (rice fields) and dry land (fields) in Cekeng, as well as a traditional *krama pengayah* (*krama* that has yard land only). Ten *angkul-angkul krama adat pengayah* and nineteen *angkul-angkul krama adat* pekarangan make up the total of 29 *angkul-angkul*. Meanwhile, keeping more than one dog is prohibited and must be leashed according to *perarem*, or customary rules, that are regulated to support a tourist community. Another *perarem* has the quality of local wisdom and an identity and a bamboo roof covering.

3.2 Characteristics of Traditional Balinese Buildings in *Banjar* Cekeng

The occupancy pattern of the people of *Banjar* Cekeng is toward sunrise and sunset. Based on the cardinal directions, it faces east (*Kangin*) and west (*Kauh*). In the middle of it, which divides the residential area, is a full road with its parts, such as the shoulder of the road and drainage. At the same time, the layout of traditional house buildings in *Banjar* Cekeng space and buildings is based on the concept of *Tri Hita Karana* (*Parahyangan*: *mrajan*, *Pawongan* (house dwellers), and *Palemahan* (house yards). Additionally, the traditional space or building reflects the concept of Tri Mandala (*nista*: *tebe*/yard house, *madya*: umah/residential house, and the leading (sanctuary/mrajan/*sanggah)*). The parts of the traditional house building in *Banjar* Cekeng that are inhabited by traditional *krama* pengayah are different from the traditional *krama* of the yard. The difference is that the traditional *krama pengayah* residence is equipped with a barn, while the traditional *krama* yard residence is not equipped with a barn. Based on interviews with each *krama*, the traditional *krama pengayah* ancestors got a yard with wet and dry soil, while the *krama* yard only had a yard. Along with population growth and economic improvement, the characteristic traditional buildings are increasingly being eroded. Based on observations, many traditional buildings have been modified, as well as many residential buildings that lead to modernization. Here's the building forms of traditional:

a. *Mrajan*/sanctuary is located in the northeast.

Mrajan or sanggah is a place to do prayer activities. Each traditional *krama*, whether it is a traditional *krama* or a yard, has a complete *mrajan* with several types of *pelinggih* (Fig. 1a). The location of the *mrajan* in the northeast. Each yard also has a coral monument, *pelinggih*, located to the west on the north side (Fig. 1b), and there is a holy place with a yard or coral temple, located between *Mrajan* and *Bale Meten* or *Paon* (Fig. 1c).

Figure 1 Buildings and holy places in the yards of residents' houses in *Banjar* Cekeng. (a) *Merajan* (left); (b) *pelinggih penunggu karang* (center); (c) *pelinggih duwe karang* (right).

b. *Bale Dangin* is located south of *Mrajan*

Bale Dangin or *Bale Sakanem* because the number of *saka* or poles is six pieces. The function of the building is the *Pitra Yadnya* and *Manusa Yadnya* events. The number of bales consists of 2 chambers or two sides. The eastern booths are used only for *pitra yadnya* and *manusa yadnya* ceremonies. However, the other cubicle can also be used for the bed of an aged person. If it has not been used for ceremonies, each cubicle functions as a place to place proper tools (Fig. 2).

Figure 2 *Bale dangin* building (east)

c. *Bale Meten* or *Paon* is located to the north

A *paon* is a place used for cooking, which consists of a fireplace. *Paon*, also called *bale meten*, functions as a bed, so in addition to there being a place to cook, it is also equipped with a simple bale. Based on interviews with the owner of the traditional courtyard house, the shape of the *paon* will remain preserved (Fig. 3a). However, there is also a modified form of *paon* between the modern *paon* and traditional *paon* (Fig. 3.b). The deformed *paon* is found in the traditional dwellings of the *pengayah* (Fig. 3.c and Fig. 3.d). There is a fireplace furnace in *Paon* equipped with modern cooking utensils such as gas stoves and traditional cooking utensils. The modified function of the pawon is only for cooking, while the traditional *paon* has two functions: as a place to cook and as a bed.

Figure 3 *Bale Meten* or *Paon*. (a) Traditional *paon*; (b) a modified form of the traditional *paon*; (c) stools equipped with modern cooking utensils such as gas stoves; (d) *paon* equipped with traditional cooking utensils, namely, a hearth furnace (cangkem *paon*).

d. *Angkul- angkul* (entrance to the house)

The *angkul-angkul* is located in the front, which symbolizes the traditional *krama* yard. Each *angkul* has similarities between each *angku*l. Almost all of the *angkuls* have been renovated (Fig. 4).

Figure 4 *Angkul- angkul* (entrance to the house)

e. *Granary* (rice/grain storage)

The granary has the function of storing the harvest by traditional *Krama pengayah* farming, and then the harvest is in the form of rice. For the customary manner of the yard, the residential building is not equipped with a barn (Fig. 5).

Figure 5. *Granary* (rice/grain storage)

f. *Aling-aling* (house divider)

The earrings serve as a diversion to the entrance so that the entrance is not straight in but sideways. Aling-aling underwent changes, which used to be just *polpolan* land. Today, every dwelling of *the traditional house* is furnished with aling-aling decorated with a statue of Ganesha. Based on interviews, the Ganesha statue is believed to be a *repellent* to the bala, so the traditional *krama*, offering offerings every day to plead for the safety of the inhabitants of the house (Fig. 6).

Figure 6 *Aling-aling* (house divider)

3.3 Patterns and Characteristics of Traditional Balinese Buildings in *Banjar* Cekeng

The layout plan of the traditional courtyard building still applies to traditional buildings and is only inhabited by one household. The yard width is 16 meters, and the yard length is 32 meters, not counting the bamboo

tebe. Each yard, both traditional and modern, has a *tebe* planted with bamboo trees. Traditional house buildings in *Banjar* Cekeng consist of only *bale dangin* and *pawon/bale meten*, while there are other buildings with an increase in occupants. Fig. 7 is a picture of the layout plan of the residential area of the traditional *Krama pekerangan*. It was made from the results of the survey and measurements. *Bale dangin* or *bale gede* consists of six (6) saka, poles, or columns. The shape of the building is rectangular. The longitudinal distance between 210 cm consists of three (3) sakas, while the transverse distance of 122 cm consists of two (2) sakas with a height of 270 cm. The dimensions of the wooden column are 10×10 cm. Each column below is decorated with joints, measuring 23×23 cm and 7 cm high. Among the main structures, there are adobe walls decorated with carvings, plastered and painted, and then painted over. The length of its walls between the outer sides is approximately 595 cm, and its width is 320, including up to the limit of the asu squat. The simple easel roof structure consists of wooden beams measuring 6*x*12 cm; the roof frame is wooden beams, usuk 5/7, and battens 2/3. In addition, the batten is installed below. The roof covering is made of bamboo. The plan and elongated pieces of *Bale Dangin* (*Bale Sakanem*) are presented in Fig. 8.

Based on measurements, the shape of the building is quadrangular. The cross-section consists of 2 practical columns; the distance between the columns is 220 cm. The elongated cut consists of 3 poles, between which practical columns are installed. The distance between the columns was approximately 150 cm. Therefore, the size of the building structure is 300 cm x 220 cm. The dimensions of the column are approximately 10 x 10 cm. The height of the column is 2 meters. The *Paon* comprises one door with a width of 67 cm and a height of 160 cm. The roof frame consists of 5/7, and the batten is 2/3. For the roof frame, the material used is wood and bamboo with a diameter of 8 mm. The roof covering is tile. The *paon* wall is made of woven bamboo slats, commonly called bedeg. The floor plan and front view of the *paon* are presented in Fig. 9. Judging from the shapes of traditional buildings in *Banjar* Cekeng, the basic shape of a quadrangle and a triangular shape on the roof dominates. The shape of the building reflects the owner, which is based on the proportions of the owner's body, and the most distinguishing thing is the height of the building. Nevertheless, based on observations in the field of the characteristics of the shape of the building, most have already undergone changes associated with the height of the building. Characteristics based on local wisdom began to erode and did not maintain authenticity. Before changing, the height of the building corresponded to the size of the body proportions, but now it uses the measures commonly used in building houses. The shapes of the buildings in the village have been adapted to the needs of the present [11], [19]. In this layout, the characteristics of the sanctuary or family place of worship are located in the northeast. On the other hand, the coral monument is located in the back, on the north corner side. Each customary yard has a *duwe penunggu karang* located between *Mrajan* and *Paon*. *Paon* is located in the north; *Bale Dangin* or *Bale Sakanem* is in the south. Based on the interview, the location of the *paon* is in the north because the *paon* also serves as a *Bale Daja.* Considering that the weather in Bangli has cold temperatures, in ancient times, *Bale Daja* was equipped with a fire furnace that serves as a heater.

The function of *bale daja* has been used as a *paon* with fireplace equipment with local wisdom. In general, the layout of the building is not much different from the traditional architecture of mainland Bali (*Majapahit*). However, there is an additional function of the *bale daja* as a *paon*. This *paon* layout in the north is unique in the village. Along with the current modernization, the layout of the building has undergone changes, and local wisdom has begun to erode. Most of the *paon* that characterized local wisdom began to erode. For example, the change from a traditional fireplace that uses firewood to a modern fireplace using a gas stove. Hence, the building layout is mainly *paon*, some are located in the north, and some are also in the south. Some even have two kitchens/*paons*; the traditional *paon* is located in the north, and the modern *paon* is in the south. For the back, some are equipped with rice barns for residents for the traditional *krama pengayah*, and each traditional *krama*, both the *pengayah* and the yard, has a *tebe* (open space located in the back). *Tebe* is planted with bamboo trees, so the village is a bamboo producer. *Banjar* Cekeng is a bamboo producer, so almost all traditional *krama* can make *bedeg* and even a livelihood to help meet the family's needs. The function of the *bedeg* is as a building wall in the *bale sakanem* and a ceiling. Hence, the characteristics of the layout of the buildings in the village, in general, correspond to the parts of traditional Balinese architectural buildings. One thing that distinguishes it is the first *bale daja*, which also functions as a *paon*. In keeping with its function as a *paon* equipped with a fireplace furnace, and *bale* for bedding. The second is the presence of duwe *penunggu karang* located between *Mrajan* and *Paon*/*bale Daja*. The term "*duwe peninggu karang*" is the one that has a yard. Moreover, the third is a *tebe* surrounded by bamboo forests.

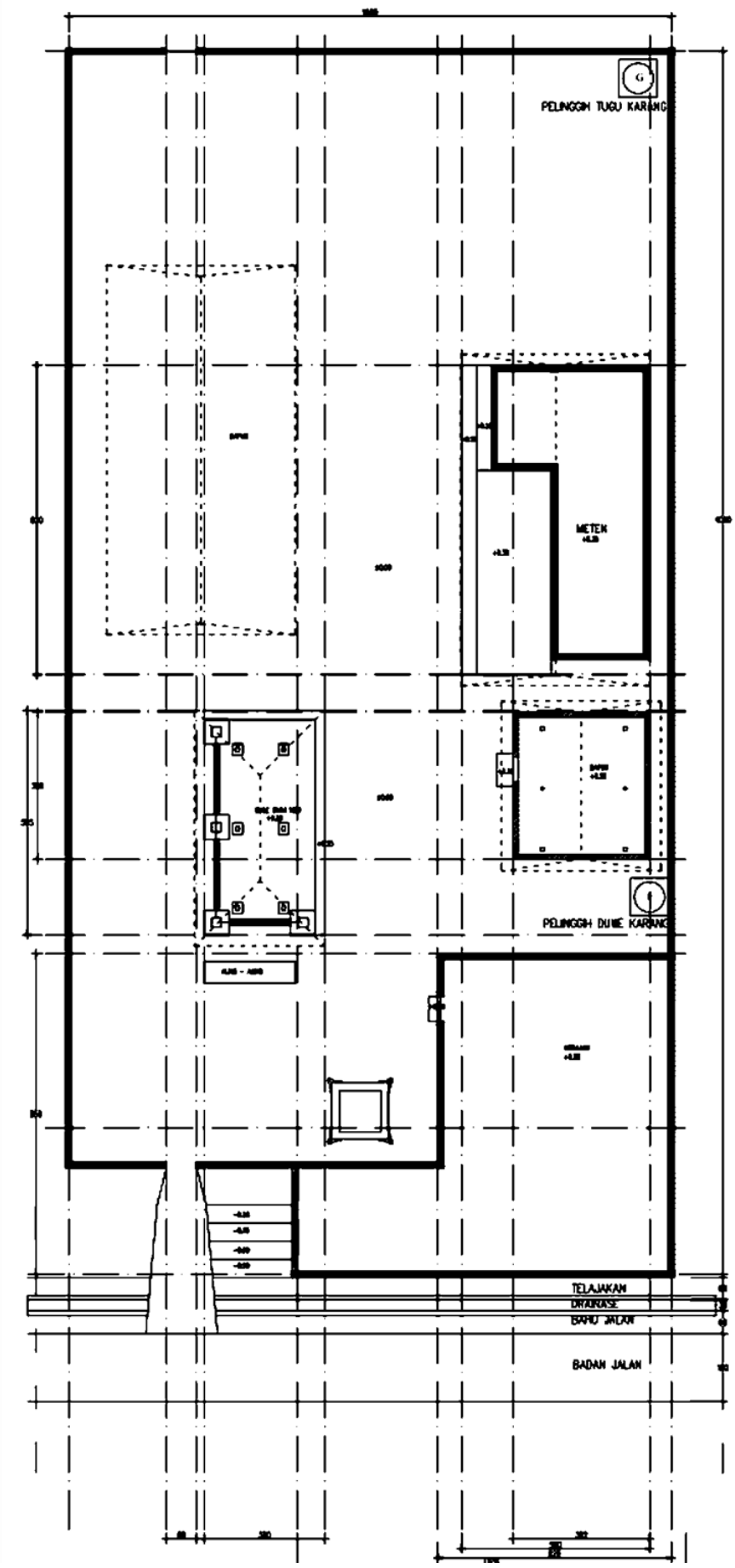

Figure 7 Layout Plan of Traditional House *Krama Adat Pekarangan*.

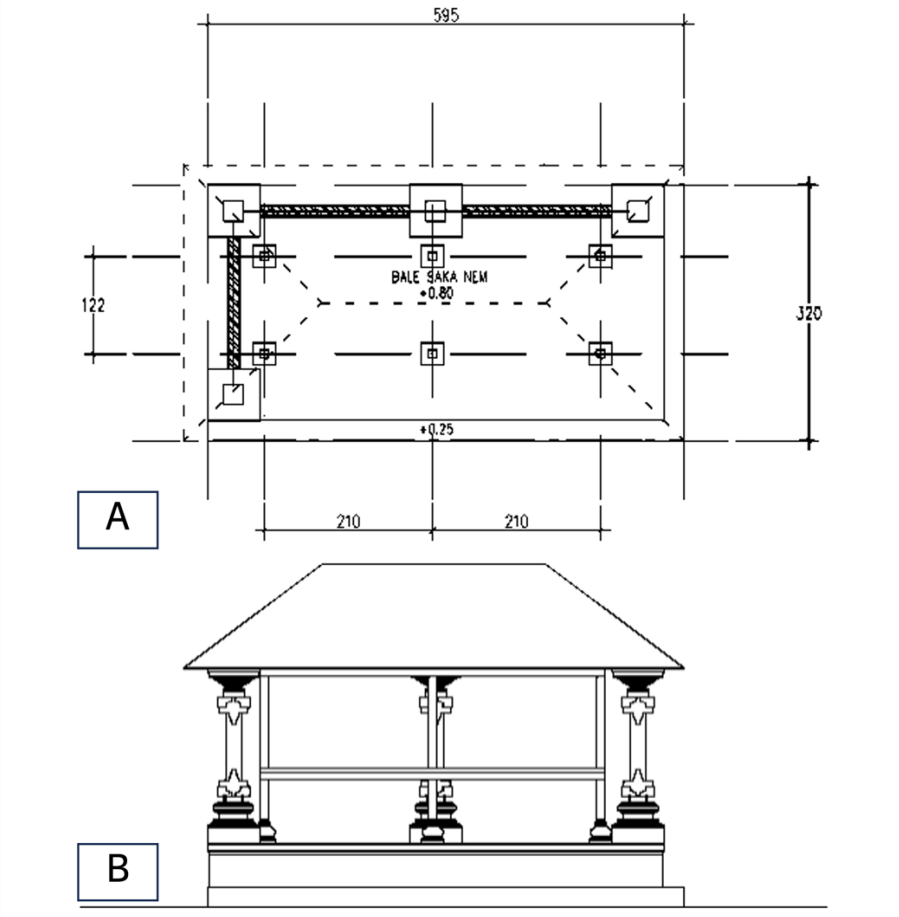

Figure 8 (a) *Bale Dangin* Plans and (b) Elongated Pieces (*Bale Sakanem*)

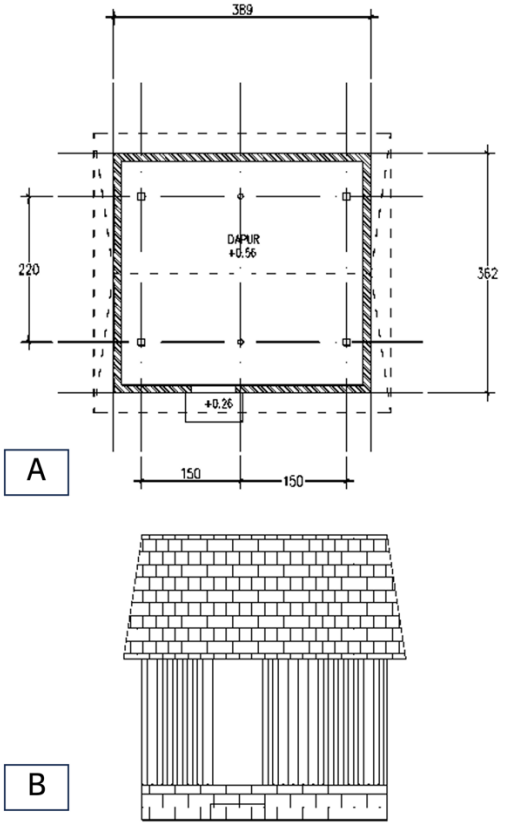

Figure 9 (a) *Paon* Plans and (b) Front View

3.4 Analysis of Traditional Balinese Building Characteristics of Building Materials

Wood and woven bamboo skin, two of the building materials employed, are presented in this examination. The foundation at *Bale Dangin* (*Bale Sakanem*) is constructed from kali stone, squat asu, or bataran stone material padas, plastered, painted, and then painted with *paras* paint. Tiles cover the floor. Wood is primarily used in middle-building materials such as poles and saka. Merbau wood is utilized for saka, whereas camphor wood is used for emblems, canggahwang, ribs, and *bales*. A building constructed with six poles, or saka, lined up three-to-three on either side of the length is called a s*akanem*. The pitra yadnya and manusa yadnya ceremonies are performed on one of the two *bales* that make up the distinctive *bale dangan*. The *teben*, however, is used for bedding. At the same time, bamboo shingles cover the roof.

Natural building materials such as wood and bamboo are frequently used in traditional construction. According to observations, the qualities of building materials have changed due to the degradation of materials and local knowledge, such as floors that previously could only be polished with clay. The material utilized for the separating wall is adobe, which is plastered, sheathed, and then painted. The bamboo shingle roof cover and the *bedeg*-covered *bales* used as building materials both still exhibit traits of the *Banjar* Cekeng. The qualities of saka (Merbau) wood. Merbau wood functions as a pole or column that transfers the weight of the entire building to the foundation based on its intended use. The column will support the loads coming from the roof. Therefore, the material used as a column or saka should not be chosen randomly. Merbau wood has the following distinguishing features: a) Reddish brown, brownish yellow, and slightly blackish-brown tint. The hues resemble those of teak wood. Because teak wood is expensive, Merbau wood is an alternative. a) Merbau wood has a very high level of hardness; b) Durability level: Because Merbau wood has a very high level of hardness, it also has durable durability from various conditions, such as resistance to fungi, termites, and weather; c) Shrinkage rate: Because Merbau wood has a very low moisture content, there is a possibility of shrinkage [20]. Merbau wood is ideally suited to be utilized as an alternative building material to teak, which serves as the column or saka in *bale dangin*/*bale sakanem* structures, based on its qualities. The woods that should be used as saka, according to Janantaka's lontar, are teak, taep, breadfruit, and embossed wood. The Patih class is the wooden class. Due to their high cost and limited availability, these Patih class woods are rarely used as building materials; instead, Merbau wood, an alternative wood with the same strength and durability as teak wood, is used. Merbau wood can therefore be used as a substitute for wood. *Canggahwang*, *bales*, and coats of arms are all made of camphor wood. According to the following, camphor wood has the following qualities: it is a) categorized as durable and durable, strong class I and durable class II; b) has a medium level of shine; and c) has a texture that is moderately rough. There is no question about the high quality of this wood based on its classification; d) it has a strong resistance to pests, making it more durable and long-lasting [21].

The *bale dangin* or *sakanem* construction, which serves as a sign/beam, canggahwang (stiffener between beams and columns), is particularly suited for use since it has the qualities of camphor wood. However, if the study is based on Janantaka's lontar, camphor wood is a substitute for particular wood classified as patient-categorized wood rather than including certain wood. In addition to wood, bamboo has long been utilized as a building material. Examples include formwork columns and plates for reinforced concrete buildings, housing columns, walls, doors, and ceilings. Bamboo is a *bedeg* material that serves as walls and ceilings in *sakanem* structures. *Bedeg* is a sliced and mashed form of woven skin or bamboo flesh. "*Bamboo shingle roofing*" refers to bamboo as a roof covering. Bamboo has benefits and drawbacks. The fibers are elastic, nonpolluting and have a life cycle of fewer than six years. They also have the advantage of being simple to split, cut, and shape. While its lifespan is relatively short and the procedure is challenging, such as splicing techniques between bamboo or other materials, its drawbacks include being susceptible to weathering, not fire and rain resistant, and susceptible to mold, moss, and termites. Bamboo as a roof covering is utterly at odds with the nature of bamboo, which should not be in direct contact with the sun or rain, based on the benefits and drawbacks of bamboo. As a result, bamboo, used initially to cover roofs, has undergone several alterations. According to the interview, the adjustment was made because the bamboo roof covering needed to be replaced with tiles. After all, it had become weathered and deteriorated.

The *paon* foundation in the *paon* (kitchen) is constructed of adobe and kali stone. Saka, ribs, and even walls are natural building elements for dominant construction. Bamboo and wood are prevalent. However, the reinforced concrete columns that make up its structure have 10 cm x 10 cm measurements. Previously covered with bamboo shingles, the roof is now tiled. The fireplace in the *paon* with local wisdom is a defining feature

of using a fireplace for cooking over firewood. The floor is made of clay, and the walls are *bedeg*. Accordingly, each has drawbacks and advantages depending on the properties of the building materials utilized. According to interviews with traditional people, they vehemently favor *Banjar* for village tourism [14], [22]. Hence, what is distinctive will be preserved just when locally appropriate materials such as bamboo are not used too often. Traditional homes that formerly had bamboo roof coverings are now switching to tiles since bamboo, which has the drawback of being a roof covering, cannot stay for very long because bamboo is susceptible to mold and not exposed to precipitation [23], [24].

3. Conclusion

The characteristics of traditional Balinese house buildings in *Banjar* Cekeng, Sulahan Village, Susut, and Bangli Regency are in terms of the shape of the building. Its characteristics have changed, especially regarding the height of the building. In terms of building layout, in general, it is not much different from the traditional architecture of mainland Bali in terms of the existence of *bale daja*, which functions as a *paon*, *duwe penunggu karang*, and the presence of *tebe* surrounded by bamboo forests. In terms of building materials, it is dominant to use natural materials such as wood (merbau and camphor) and bamboo. However, the lack of bamboo, which is quite a lot, has resulted in people choosing to use other materials. Hence, the uniqueness of the traditional buildings of Cekeng village, in terms of building materials for the roof, namely, bamboo, has changed to a tile roof, both for *sakanem* and *paon* buildings. A thorough analysis of building structures is needed in the future, and there are efforts to find alternatives to maintain traditional buildings in *Banjar* Cekeng.

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5. Conflict of Interest

The authors declare that there are no conflicts of interest.

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