



## Characteristics of Balinese architectural flats in Denpasar city

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### ABSTRACT

The construction of flats can be a solution to the increasing need for houses in the Province of Bali and the depleting land area of residential areas. The existence of demands for flats by prioritizing the architectural requirements of buildings according to the Regional Regulation of the Province of Bali Number 5 of 2005 is a unique thing to study. The aim of the research is to find the factors that influence the characteristics of flats with Balinese architecture and to plan a design model for flats in Bali based on the concept of Balinese architecture. This study uses a combination research method model which combines quantitative and qualitative research methods sequentially. In the first stage it was carried out using quantitative research methods and in the second stage used qualitative methods. Sampling using non-probability random sampling, with the sampling convention sampling technique, where the sample selection is free with a sample of 200 respondents. The data analysis technique in this study was univariate analysis by presenting tables, pictures and graphs. The results of the study show that the factors influencing the characteristics of flats with Balinese architecture are the principles of spatial planning with the selection of locations in Denpasar city, the principles of building layout with a 3-storey apartment building height and the selection of building facades in Balinese architectural style, the principles of utilities and facilities with the presence of green open spaces, elevator facilities, traditional and cultural facilities, vehicle parking facilities centered in one place, merchant facilities, health and education that are easily accessible, as well as an integrated and organized waste treatment system, as well as the principles of Balinese architecture, namely based on Tri Hita Karana and Hulu Teben concept. The design model for flats is designed with a type 36 residential type which facilitates the majority of families with 1-2 children.

**Keywords:** Balinese Architecture; Characteristics; and Flats

### 1 Introduction

Along with population growth, every year it has an impact on the city's carrying capacity system in accepting, managing and utilizing immigrants. The increase in the population in the Province of Bali reached 4.32 million people or an increase of 426.65 thousand people with an annual population growth rate of 1.01% [2]. The increase is directly proportional to the need for housing. The construction of flats can be a solution to the increasing need for houses in the Province of Bali and the depleting land area of residential areas. Technically, the existence of flats can be a solution to save land so that the fulfillment of the basic building coefficients in each house construction is easily fulfilled [3]. So far, the city of Denpasar has the highest number of flats in the Province of Bali.

The flats are the Bali Immigration flats, the Brimob flats, the Bali Provincial Government flats and the Bali POLDA flats. Most of the flats are occupied for

the sake of tasks only so that when the service period is over, the ownership regulation process must be replaced [4]. There is still minimal use of flats as permanent residences for the community, especially in Bali, bearing in mind that until now the Balinese Hindu community has not been able to accept the concept of flats as residences. Pros and cons of flats as residential houses are still a problem in Bali [6].

According to Dharmayanty, et al [5] these differences are in the form of the existence of local Hindu culture and the existence of building height factor regulations which are carried out according to aviation safety and security regulations, maintaining the sacredness of holy places, maintaining the comfort of the community and maintaining the competitiveness of the uniqueness of Bali's natural landscape. To be more precise about setting the values, instructions are given, namely Tri Angga, namely Utama Angga, Madya Angga and Kanista Angga

and Tri Mandala, namely Utama, Madya and Kanista Mandala [13].

The demand for flats by prioritizing the architectural requirements of buildings in accordance with the Regional Regulation of the Province of Bali Number 5 of 2005 [10] and the Regulation of the Mayor of Denpasar Number 25 of 2010 concerning the requirements for the Architecture of Buildings in the City of Denpasar is a unique thing to study. This study examines issues regarding the characteristics of flat planning by taking into account Balinese architectural concepts so as to provide comfort for users, especially the Balinese Hindu community, to live in flats.

The research objectives are: to find the factors that influence the characteristics of flats with Balinese architecture and to plan a design model for flats in Bali based on the concept of Balinese architecture.

## 2 Data and Methods

This research leads to urban areas with high population density intensity in Bali, namely in the city of Denpasar. This study aims to analyze the characteristics of flats with Balinese architecture (a case study of flats in Denpasar), using a combination model research method or sequential explanatory design which combines quantitative and qualitative research methods sequentially, where in the first stage it is carried out using quantitative research methods. and in the second stage used qualitative methods. Quantitative research methods in this study collected data using questionnaires related to the characteristics of flats with Balinese architecture. Qualitative research methods collect data by interviews, observation and documentation. It is hoped that the results of the qualitative analysis will produce credible data to complement the quantitative data and then be analyzed using quantitative and descriptive analysis.

Primary data, namely data obtained from: 1) The results of observations from several flats in the City of Denpasar in the form of the characteristics of existing buildings and facilities; 2) Surveys of residents and managers as potential respondents, to obtain information about their opinion of the place they live in, as well as things that are considered satisfactory, unsatisfactory or even unsatisfactory as well as clarification as a basis for making the results of the questionnaire later; and 3) Interviews were conducted with key informants such as traditional leaders, religious leaders, Ida Pandita (Sulinggih) as well as informants namely community leaders, professional associations and academics to obtain information regarding their views on planning flats based on Balinese architecture. While secondary data, namely data obtained from: 1) Regulations related to the planning of flats and Balinese architecture; and 2) Previous studies related to the problems of flats in Bali and the characteristics of Balinese architecture.

## 3 Results and Discussion

### 3.1 Factors Affecting the Characteristics of Flats with Balinese Architectureables

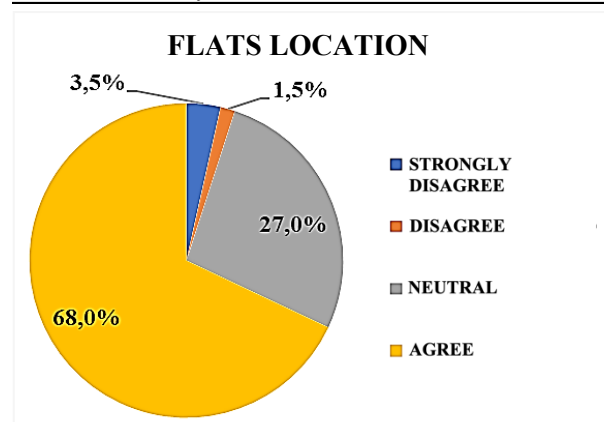
Based on the output of the SPSS analysis results, several conclusions were obtained regarding the factors that influence the characteristics of flats with Balinese architecture insight in the city of Denpasar in the form of:

#### a) Spatial Principles

Based on spatial planning data for the City of Denpasar, the area that meets the land for building flats is in the North Denpasar area.

**Table 1.** Output of SPSS in Flats Location frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	136	68	68	100



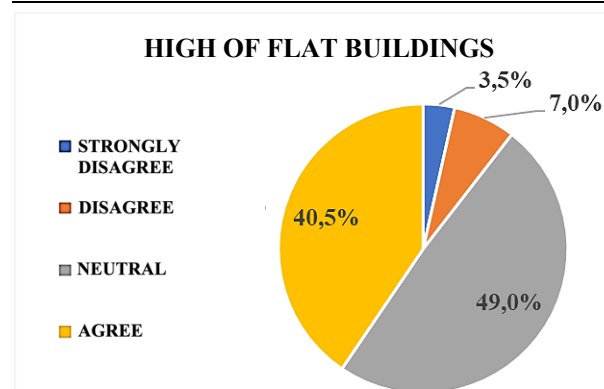
**Figure 1.** Graph of Flats Location Frequencies

#### b) Building Management Principles

The selection of the mass pattern is of course adjusted based on the needs of each occupant in accordance with the activities or activities in the apartment building. Referring to the Regional Regulation of Bali Province Number 16/2009, concerning Spatial Plans for the Province of Bali, in article 95, it is stated that buildings in Bali cannot be higher than 15 meters [7-8].

**Table 2.** SPSS output in high frequencies of flats

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Netral	98	49	49	59.5

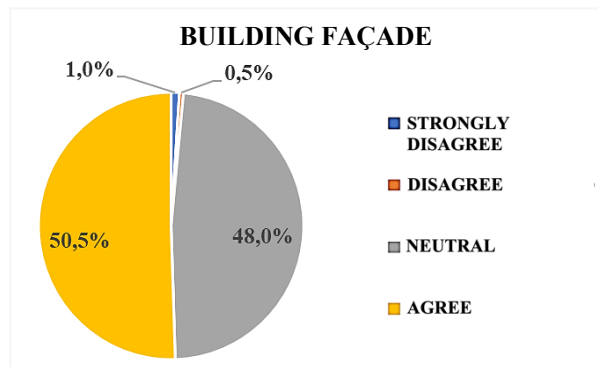


**Figure 2.** Graph of High Frequencies of Flat Buildings

According to the Regional Regulation of the Province of Bali Number 5 of 2005, the requirements for the appearance of buildings must apply the norms of traditional Balinese development by taking into account the forms and characteristics of Traditional Balinese Architecture [11].

**Table 3.** SPSS output in Building Façade frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	101	50,5	50,5	100



**Figure 3.** Building Façade Frequencies Chart

c) Principles of Utilities and Supporting Facilities

Availability of infrastructure facilities such as holy places, meeting places (Balai Banjar), parking lots and other supporting buildings.

**Table 4.** SPSS output in the open space frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	107	53,5	53,5	100

**Table 5.** SPSS output in the frequencies of the Lift Facility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	87	43,5	43,5	100

**Table 6.** SPSS output related to Balai Banjar Facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	89	44,5	44,5	100

**Table 7.** SPSS output related to Indigenous and Cultural facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	109	54,5	54,5	100

**Table 8.** SPSS output related to parking facilities in one place

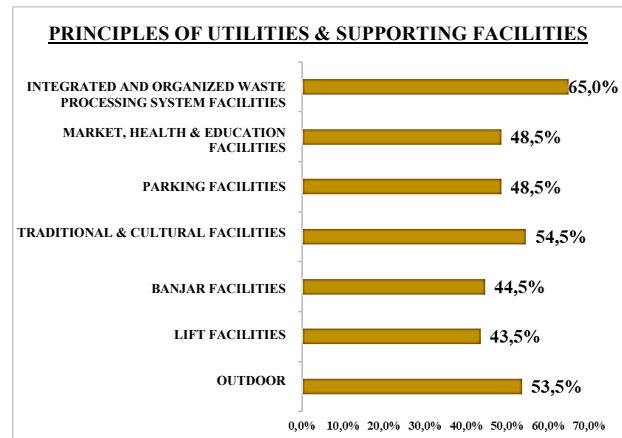
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	97	48,5	48,5	100

**Table 9.** SPSS output related to Trade, Health and Education facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	97	48,5	48,5	100

**Table 10.** SPSS output related to Integrated and Organized Waste Treatment Systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	130	65	65	100



**Figure 4.** Graph of Frequencies Principles of Utilities and Supporting Facilities

d) Principles of Traditional Balinese Architecture

The principles of respect for the ancestors that guide the design in traditional Balinese architecture are inherited until now, starting from the older mountain Balinese traditional architecture in the form of Hulu/kaja (mountain direction/highest value), Teben/kelod (sea direction is valuable). despicable and includes plain Balinese architecture with the addition of the Hulu/Kangin direction (the direction of sunrise is of primary value), Teben/kauh (the direction of sunset is of low value) [13-15].

**Table 11.** SPSS output related to the Hulu Teben concept in residential arrangement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	99	49,5	49,5	100

**Table 12.** SPSS output is related to Hindu typology in relation to the plangkiran position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	100	50	50	100

**Table 13.** SPSS output is related to Hindu typology in relation to the position of the room placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	99	49,5	49,5	100

**Table 14.** SPSS output related to religious ritual facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	109	54.5	54.5	100

**Table 15.** SPSS output related to religious ceremonies after the flats were completed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	116	58	58	100

**Table 16.** SPSS output related to the position of the clothesline

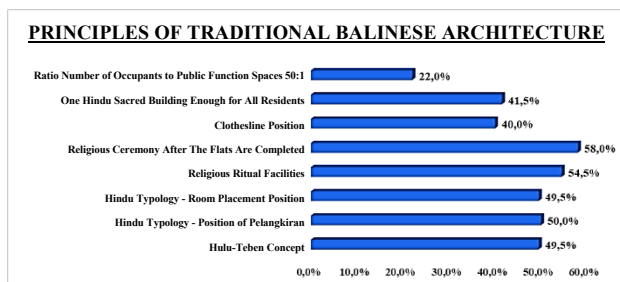
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	80	40	40	100

**Table 17.** SPSS output of regarding sacred Hindu buildings is only one for all occupants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	83	41.5	41.5	100

**Table 18.** SPSS output related to the ratio of the number of occupants to public function spaces is 50:1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	44	22	22	100



**Figure 5.** Graph of Frequencies Principles of Traditional Balinese Architecture

### 3.2 Flats Design Models in Bali Based on Balinese Architecture Concepts

#### A. Building Display Design

The appearance design of the building is based on spatial principles, namely location, site layout, unit layout, space allocation, individual spatial planning, even the building façade must be determined using the sacred profane concept. The Hulu-Teben idea is very similar to the sacred profane idea [1]. The orientation of building arrangement and placement of rooms in the design of flats follows the Hulu-Teben concept and Balinese building typology [9].

Based on the principles of building layout, namely the design of buildings using local architectural elements, especially Tri Angga, (Head, Body and Feet). Tri Angga in the architecture of houses and residential areas can be interpreted as spatial arrangements for comfort, harmony and

harmony between humans and their environment both at the house (umah) and housing (village) scale.

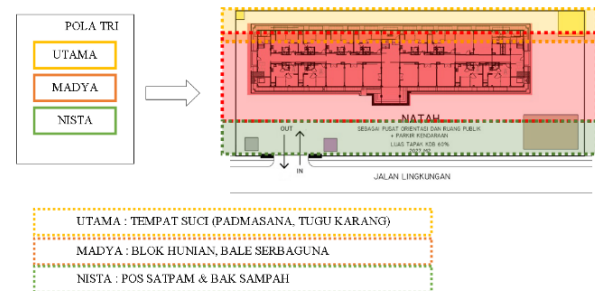
The direction of these values vertically and horizontally is called the Tri Mandala. The value system is based on the earth's axis (kaja gunung, kelod laut), giving the main value in the direction of kaja (mountain) and nista in the direction of kelod (sea), while based on the sun axis the main value is in the direction of sunrise and nista in the direction of sunset.



**Figure 6.** Application of the Hulu-Teben Concept



**Figure 7.** Application of the Tri Angga Concept



**Figure 8.** Flats Spatial Principle

The principle of utility and ergonomics is that the waste management system uses a disposal system through the waste shaft. The placement of the garbage shafts is also so that they do not cause environmental pollution, both odor pollution and garbage scattered everywhere [12]. This is also anticipated by the existence of a special room for garbage canals/shafts to buffer odors and pollution caused by garbage. The concept of the entrance/entrance to the apartment with Balinese architectural insight consists of one entrance where the entrance and exit are combined.



Figure 9. Entry Concept

The division of residential unit zones is based on user activity. For shared facilities in residential buildings, they are on the 1st floor, such as the living room in the lobby of the flat. The concept of residential flats per floor is arranged based on age group. For the concept of flats on the 1st floor, it is provided for elderly residents (40-50 years and over), can be seen in Figure V-48. For the concept of flats on the 2nd floor, it is provided for adult/family residents aged 30-40 years, can be seen in Figure V-49. Meanwhile, the concept of flats on the 3rd floor is provided for young residents around the age of 20-30 years, as can be seen in Figure V-50. The order of the placement concept is based on the age group, so comfort is guaranteed and people can live a good life.



Figure 10. Floor Plan 1



Figure 11. Floor Plan 2



Figure 12. Floor Plan 3

The exterior concept of this flat is adjusted to the needs, where its position is combined with the living street, because of its nature which accommodates various activities while these activities are not always routine, so they must be combined with other functions so that they are still used for activities.

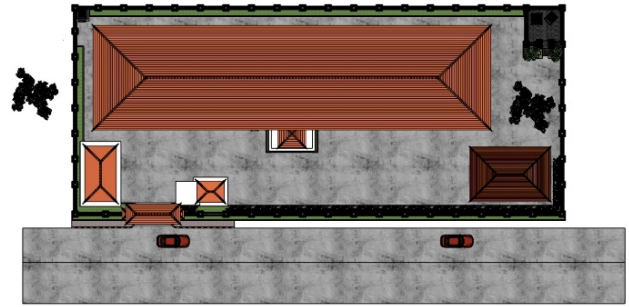


Figure 13. Flat Layouts



Figure 14. Flat Front View



Figure 15. Side View of Flats

**B. Residential Block Unit Design**

In this flat there are 2 types of residential units, namely type 36 (Family Type Residential) and type 24 (Studio Type Residential). It can be concluded that the space requirements needed in this flat with Balinese architectural insight are family-type housing with 2 bedrooms and 1 living room. 1 dining room, 1 kitchen, 1 drying balcony and 1 toilet where the total area of the residential unit is 36 m<sup>2</sup>. In addition to family-type housing, the design model also provides an alternative to studio-type housing intended for a capacity of 1-2 people. The studio residence has a total area of 24 m<sup>2</sup> with 1 bedroom, kitchen and bathroom facilities.

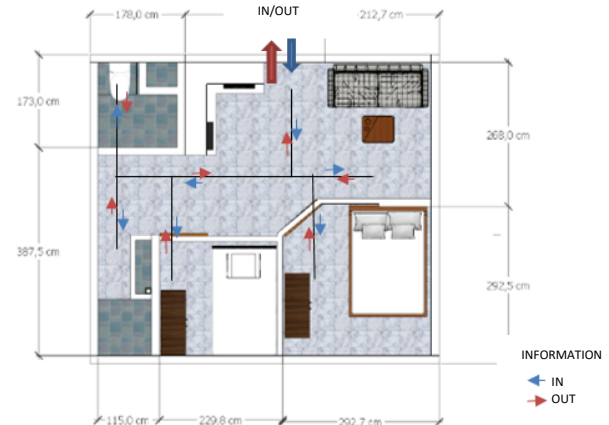
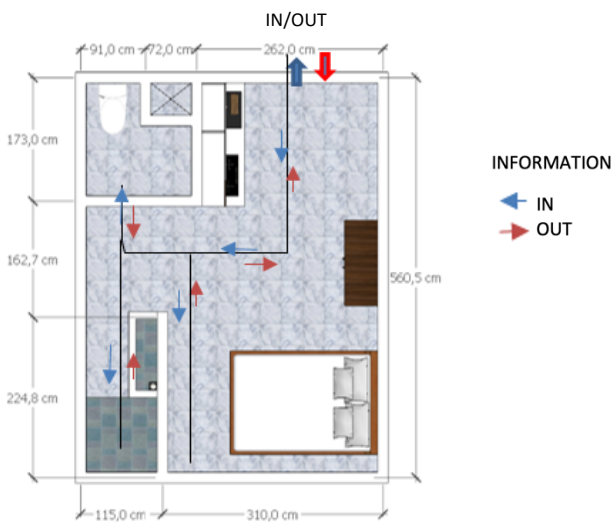


Figure 16. Floor Plan Family Type Residential Plan Blocks



**Figure 17.** 3D View of Family Type Residential Plan Blocks



**Figure 18.** Floor Plan Block Plan Residential Type Studio



**Figure 19.** 3D View of Studio Type Residential Plan Blocks

#### 4 Conclusion

After distributing questionnaires, data processing and in-depth observations and interviews regarding flats with Balinese architecture in Denpasar, in this study several conclusions can be drawn, namely:

1. The factors that influence the characteristics of flats with Balinese architecture insight can be described as follows:
  - a. The principal factors for spatial planning include choosing the location of an apartment in the center of Denpasar City so that it can be an alternative choice for a comfortable place to live and facilitate the needs of the Hindu community in carrying out social-religious activities.
  - b. Principles of building planning, including building height in the selection of a linear building mass pattern with a 3-storey flat building height with a total building height of not being higher than 15 meters. As well as the selection of Balinese architectural style building façades that use local materials such as brick or sandstone.
  - c. The principal factors of utilities and facilities, to facilitate activities in flats, namely green open spaces, elevator facilities, Balai Banjar facilities, customary and cultural facilities, vehicle parking facilities centered in one place (2 and 4 wheeled vehicles in the same location), facilities easily accessible traders, health, and education, as well as an integrated and organized waste treatment system.
  - d. Factors of the principles of Balinese architecture, in the embodiment of flats based on Tri Hita Karana, the Hulu Teben concept in residential arrangement, private perlangkiran in each unit according to Balinese house typology, room placement plans following Balinese house typology, availability of general Hindu ritual facilities such as padmasana and coral guards, ceremonies for completing flats, drying positions, one Hindu sacred building for all occupants, and the ratio of the number of occupants to public function spaces is 50:1.
2. The planning of flats building design models with Balinese architectural insight is realized by building appearance designs and block unit designs.
  - a. Building view design
 

Spatial planning principles include integration and harmony with the environment, yard spatial planning, village spatial planning and urban spatial planning based on Tri Hita Karana which is realized by dividing the area into Parahyangan, Pawongan and Palemahan. The principle of

building layout is the shape of the head of the Balinese building, the shape of the body of the Balinese building, the shape of the legs of the Balinese building using the Tri Angga concept. The principles of utility and ergonomics by processing waste using a disposal system through the waste shaft, as well as the concept of the entrance of the flat consists of 1 entrance with a size of 6 meters.

b. Residential block unit design

There are 2 residential block unit designs, including: family type residential block plan design with 2 bedrooms, 1 living room, 1 dining room, 1 kitchen, 1 drying balcony and 1 toilet where the total area of the residential unit is 36 m<sup>2</sup>. The second is a studio-type residential block plan with an area of 24 m<sup>2</sup> with 1 bedroom, kitchen and bathroom facilities.

### Acknowledgement

The suggestions that can be developed related to further research include:

- 1) This study examines the concept and embodiment of Balinese architecture into the design model of flats in the city of Denpasar. Furthermore, a broader study can be carried out so that there are variations in the results of the flat building design model.
- 2) Further research is needed regarding the rental costs of flats which are adjusted to the income of the community, especially in the city of Denpasar.

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