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Adaptation Local Ethnic and Inherited Ethnic on Settlements Architecture in Mopugad Village, North Sulawesi

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Abstract

Mopugad village was formed by the transmigration of Balinese people to the Bolaang Mongondow area in 1953. The Balinese who entered Bolaang Mongondow built the environment of their settlement with characteristic features but modernization began to change the character of typical settlements. In non-physical terms, the traditions and religious belief of the Mopugad village community are still very closely linked with Balinese culture and Hinduism because the local community still carries the Balinese way of thinking to their everyday life in the village of Mopugad. On the other hand, in physical terms, any every element of architectural change that is formed based on the adaptation of local ethnic and inherited ethnic is important to learn to know the characteristics of settlement in the Mopugad Village and how its sustainability. This research was carried out with the qualitative method through field observations and rationalistic analysis. The results of this study consist of the characteristics of occupancy in the village of Mopugad derived from the interpretation of the adaptation of local ethnic architecture and innate ethnic architecture as well as elements of change that can continue to survive as a form of sustainability of Balinese architecture in Mopugad Village.

Keywords: Architectural adaptation, local ethnic architecture, innate ethnicity architecture, Mopugad Village.

I. INTRODUCTION

The environment of a given settlement is a place to live and conduct activities to support the lives of its inhabitants such as the relationship between man and fellow man, man and nature, and man with his Creator. Settlements are also a reflection of the socio-cultural influence of society. Settlements are physically not limited to residences but also to a unified structure and infrastructure. This relationship influences and in turn is being influenced continuously from time to time so that there are instructions and rules regarding the arrangement of the environment of a settlement. Therefore, human activities in this particular environment have regulating patterns and maintain a balance with nature. Settlements have their own formation in accordance with the non-physical forces that develop in the community in the form of a socio-cultural system, government, educational level and applied technology that will bring about changes in the physical form of the environment. Mopugad Village is one of the settlements that has been formed through transmigration of ethnic Balinese communities in a different physical and non-physical area. The Balinese people who occupying Mopugad Village situated in the Bola District of the Bolaang Mongondow Regency have had to build their dwellings with various adjustments or adaptations to the traditions they carried with them and their new living environment.

Adaptation in the scope of architecture can be interpreted as a change or adjustment of physical and non-physical elements in a residential or building environment (Alfred et al, 2017). The village of Mopugad can attract tourists through religious traditions that are often performed by its people. In addition, certain forms of typical dwellings with Balinese nuances form the main attraction for visitors. As a result of the entry of these Balinese into Mopugad Village, vacant land was converted into rice fields and made Bolaang Mongondow Regency a rice granary village in North Sulawesi because Balinese people brought their agricultural ideas and patterns and developed them well in this area, turning it productive agricultural land.

From the social side, the activity of the Mopugad Village is still closely linked with Balinese traditions and culture so that every Hindu religious celebration held in Mopugad features a very sacred and full ritual. The occupancy in Mopugad settlements selected as observation units is divided into 2 groups called generation 1 and generation 2. Generation 1 comprises a residence that has not undergone much change since the beginning of the entry of transmigrants who made their residential buildings in Mopugad, and generation 2 consists of modern residences recently built by people who have a higher economic level, but this occupancy has undergone many changes, especially in the layout of residential spaces that have been fused and not separated as before.

This study focuses on the process of adaptation that occurs in the Mopugad Village based on its ethnic groups and seeks the survival of each element of architectural change in the scope of its residential architecture so that the settlement of Mopugad Village in North Sulawesi (though still closely linked with Balinese tradition) can be sustainable.

II. LITERATURE REVIEW

II.I The Concept of Community Cultural Thought Patterns Based on Ethnicity

Human thinking produces messages and all messages produced by humans including ethnic communities consist of syntagmatic and paradigmatic components, according to Ferdinand de Saussure (1996). The syntagmatic component is a linear combination between component messages while the paradigmatic one is the selection of what particular messages are caused to emerge. Syntagmatics are horizontal while paradigmatic ones are vertical. The phenomenon of validity is reflected in the form of a paradigmatic temporary sentence reflected in the form of word choice. Paradigmatic elements depart from the internal community itself while syntagmatic elements depart from the relationship between society and the environment. Syntagmatic elements are caused by environmental and climatic factors because these elements give rise to something that is discrete in form. The choice to combine doors and windows is a syntagmatic choice and is strongly influenced by topography. Paradigmatic elements are more internal and are caused by the way of thinking of the people, the selection of Javanese and Minahasa or Balinese ethnic elements and in terms of residential construction, Bolaang Mongondoow reflects the paradigmatic component.

One specific type of residential element such as the stairs, the location of the door and the location of the living room shows something that is related to the way of thinking of the community.

This thought pattern is related to the value of goals, inhabited cultures and traditions. Changes in the way people think will have an impact on changes in the selection of certain elements or can be called influential in the process of adaptation to residential architecture, especially mixed ethnic settlements. In the context of residential settlements formed due to ethnic mixing, syntagmatic elements are reflected in the combination of the use of two ethnic elements in one residential composition whereas paradigmatic elements are reflected in the combination of the use of two ethnic elements in a single occupancy composition, while paradigmatic elements are reflected in the selection of one element from two ethnic groups individually. Table 2.1 can clarify the differences between syntagmatic elements and paradigmatic elements.

Table 2.1 Differences between Syntagmatic Elements and Paradigmatic Elements

	Syntagmatic	**Paradigmatic**
Focus	Pattern	Form
Thought pattern	Relational	Relational
Action taken	Combination	Selection
Process cognition	Elements directed linearly to produce a message.	Elements that can replace a message while the message remains conceptual.
Main factors	Changes in the relationship between ways of thinking and environmental conditions.	Changes in ways of thinking of inhabitants and cultures of dwellers.

	Syntagmatic	**Paradigmatic**
Roles in mixed ethnic vernacular architecture The role in mixed ethnic vernacular architecture	Determine the combination of mixed ethnic elements in occupancy as a whole.	Determine which ethnic elements are to be used at one point where choices can be made.

II.II The Concept of Adaptation to Residential Architecture in the Physical Environment of Settlements

Adaptation comes from the Latin word "ad aptare" which means for compatibility (Douglas, 2006). The definition of adaptation in general is an attempt to make something suitable. Correspondingly, Altman et al (1980) observed three strategies that humans employ to adapt to the environment, namely:

1. Adaptation by reaction is a situation in which humans change their behavior to avoid conflict and build harmony with the environment.
2. Adaptation by adjustment is a situation where humans change their behavior to deal with environmental changes while resulting in environmental changes due to the behavior of the adaptation.
3. Adaptation by withdrawal is the behavior of leaving the environment in response to changes in the environment. This behavior is indicated by displacement or occupancy due to various factors such as conflict, disaster or environmental damage.

Adaptation in the context of architecture can be differentiated into behavioral adaptation and building adaptation. Behavioral adaptation is an adaptation to the environment as stated by Berlyn (in Radhi, 2010), namely that adjusting behavior or adaptation is part of the human response to its phenomenal environment. Phenomena that occur due to nonconformity or being out of habit result in adaptation by humans to achieve balance or compatibility. Behavioral adaptation emphasizes human reactions in the face of incompatibility with the environment while in order to bring about changes in buildings to suit environmental conditions and to keep up sustainability, the concept of adaptation is used.

Building adaptation requires the specific understanding that buildings undergo change over time and require adjustments to achieve balance. Kengo Kuma, in an essay entitled *Weak Architecture* in 2005 in Schmidt, et al (2010) "recognizes the extraordinary strength and longevity of architecture that is" weak "because it demands continuous attention from designers and users, while" strong "buildings are often regarded as "illusion". In achieving this balance there needs to be a change for adjustment. Till (2009) in Schmidt, et al (2010) describes this as "thick time" where architecture is not a static noun but a verb that always moves dynamically following changes in its environment.

Schmidt, et al (2010) stated that success attained in adaptation is not always the capacity of the building itself but also of the user or the capacity of the owner to adapt and many other variables that support the dynamic interaction between building and context. The study of building adaptation in the context of architecture lies in the part after POE (Post Occupancy Evaluation) and BPE (Building Performance Evaluation). POE is "a structured collection of quantitative and qualitative data from building facility managers and users" (Wilkinson et al., 2014). After the POE is completed, BPE will carry out the building cycle. According to Preiser (2005) in Wilkinson et al (2014), building adaptation is carried out when the building is still unfit for proper use, and occurs at the end of the building's life cycle. In the study it can be stated that the adaptation of buildings located in the final cycle of buildings and buildings is no longer appropriate or inappropriate so that changes and adjustments are made.

The building cycle is affected by the period of time set because it can record the building adaptation that occurs. The age of an old building influences changes and adjustments in increasing the capacity and needs of the owner to their maximum. The selection of the research location takes into account the age of the building (over 30 years old) and undergoes a change from the initial period to the present.

Douglas (2006) comments on the level of change in shearing layers that there are six building adaptation strategies namely adjustable, versatile (flexible), refitable, convertible, scalable and movable ones. Each strategy provides a specific correlation between cause (social) and effect (physical) and the period of adaptation of the building to take place. An adjustable strategy consists of a change in equipment or furniture because it adapts to the wishes of the user or owner. A versatile strategy is a change in the physical order of space that is influenced by the existing components and furniture. **A refitable strategy is related to changes in components that affect a building's** architectural elements. A convertible strategy comprises a change caused by an additional function or expansion of space. A scalable strategy stands for the adaptation of buildings related to the construction or addition of structures to meet the needs of users or owners. Finally, a movable strategy is the transfer of the location of the building in case the building no longer meets the needs of the occupants.

Based on the description above, the notion of adaptation can be concluded as a form of change or adjustment of building elements and architectural environment that is influenced by various factors and has a certain time span.

In this study the concept of adaptation in residential architecture is more directed to changes in the elements of residential architecture based on changes in the way people regard settlements and ethnic settlements.

II.III Physical Changes in the Built Environment as a Result of Adaptation

Habraken (1983) in his book entitled *Transformation of the Site* states that transformation or changes in the built environment can occur in three settings according to Habraken (1998), namely physical order, territorial order, and cultural order (cultural order). The physical transformation order is a change that occurs in the building element

of the built environment called nominal classes, from the lowest level (the utensils) to the highest level, namely the major artery. The second order is territorial transformation, which stands for a transformation of space formed from the configuration of elements in nominal classes, as a result of changes made by by powerful agents at every level of the built environment. Finally, the third order represents a cultural transformation that not only involves physical elements but also understanding and consensus from the agents involved. The unity of the physical elements forms the built environment, the spaces formed from the configuration of physical elements, as well as the understanding of a community group concerning the physical altogether are the forms causing cultural transformation in the built environment (Habraken, 1998). Following below are the variables of transformation analysis or changes in built environment based on Habraken's theory (1983 and 1998).

Table 2.3 Environmental level hierarchy as developed by Habraken (1988)

No	Physical Order	Spatial Order	Cultural Order
F	*Major artery*	*City structure*	*Neighborhood*
E	*Roads*	*District*	*Block*
D	*Building Elemen*	*Building*	*Built space*
C	*Partitioning*	*Floor plan*	*Room*
B	*Furniture*	*Interior arrangement*	*Place*
A	*Body & utensils*		

Each column number shows that the order of levels starts from the bottom up, where level A is lower than level F. Column 1 shows the classification of the elements forming the built environment. These elements are physical elements that make up a built environment, and this part is also called a solid part. Column two displays the configuration of the elements at the same level mentioned in column one. Configuration of physical elements produces spaces between them, so that there is a void part in the built environment. Column three shows the unity of what is mentioned in columns one and two. This column also shows that a unit level is formed from a combination of two physical levels forming the built environment.

As mentioned earlier, the transformation of the built environment includes three orders, namely transformation in the physical, territorial, and cultural order. Transformation of the building elements in the built environment listed in column one is a physical transformation in the built environment. The second order in the transformation of the built environment is a territorial transformation that refers to spatial changes because of the user's control over the space resulting from the configuration of physical elements in column one. However, this study only discusses physical formations in the built environment without directly relating to the user, so that adjustments are made to the transformation in the territorial order by not analyzing the aspects of control of the

users. Therefore, in this study the transformation that occurs in the space units contained in column two is expressed as spatial transformation, that is to say changes in the physical form of space. On the other hand, the transformation of the unity of elements and spaces mentioned in column three is a cultural transformation.

This study describes an analysis of each case study with three main variables taken from Habraken's (1983) theory of transformation or changes in the physical system, spatial system and cultural system. While in the neighborhood of residential buildings, each case study was analyzed based on a physical system, a spatial system, and a stylistic system.The variable transformation of the physical system consists of mass blocks, furniture, building blocks, building elements, and the achievement of constructing buildings and roads in the area. Variable transformation of the spatial system consists of the spatial layout, physical space in the area, building figures in the area, territory and circulation patterns in the region. Variable transformation of the cultural system consists of the way of thinking of the community, the meaning of the place, as well as the addition of space and environment around the settlement area. Furthermore, the elements of the above-mentioned change variables are interpreted with Rapoport's theory of defense to determine the survival of mixed ethnic settlements as a rationale for the development of sustainable settlement and ethnic settlement environments.

II.IV Resilience Elements of Change in Residential Architecture in the Adaptation Process

Rapoport (1982) developed a theory which states that the system of activity in an environment can be observed through 3 elements, namely: (a) Fixed feature elements are elements that are static or fixed and cannot be eliminated, like most standard architectural elements such as walls and ceilings. (b) Semi-fixed elements (semi-fixed features) are elements that are free in nature, are the result of changes such as furniture, curtains and other equipment are ones that may be classified as free, as is a room resulting from changes such as furniture, curtains and other equipment. (c) Non-fixed features are elements that are free in nature as a result of change, this is tightly bound to humans as the inhabitants of a place, the relationship of space transfer (proxemics), position and posture (kinesics).

The study of the sustainability (tenacity) of the form and space of architecture employing the theory developed by Rapoport has been carried out in several studies such as Heath and Benneth (2000) in studying change and survival from the shape of the courtyard space of African-Americans in 1790-1812 and research conducted by Fisher (2009) who studied monumental buildings dating back to the Bronze Age in Cyprus.

The main elements of the building are said to be fixed elements because they are important parts such as structure and space. However, in the process of architectural adaptation that is said to be a fixed element this can change. Changes in fixed elements (both in residential and residential buildings) are a response to existing environmental conditions as stated by Wilkinson et al (2014), namely that fixed elements can be

changed to respond to climate change and efforts to be sustainable. This means that changes in the form of settlements and residential buildings are part of the process of architectural adaptation.

The three Rapoport classifications concerning elements of an environment can be simplified into two parts, namely building elements and behavioral elements. Building elements include fixed elements and semi-fixed elements while behavioral elements are non-permanent elements. In the concept of adaptation these can be referred to as building adaptation and behavioral adaptation. Building adaptation is aimed at modifying or changing buildings and behavioral adaptation is directed at human aspects in an effort to respond to environmental conditions in building their settlements or residences. Behavioral adaptation occurs at the beginning of the formation of a settlement (Alfred et al, 2017).

III. RESEARCH METHODE

This research can be classified as qualitative research using the descriptive method. The data obtained through the results of field observations have been processed and analyzed based on three change variables taken from Habraken's (1983) theory of physical systems, spatial systems and cultural systems in the scope of settlements and physical systems, spatial systems and stylistic systems in occupancy. The analysis of the data has been made by way of the rationalistic qualitative method.

Rationalistic according to Muhajir (2002) refers to a way of thinking not only derived from empirical understanding but also from argumentation as a part of construction of thought patterns.

The next stage of the research results consists of interpeting the outcome in the light of the theories selected so that the findings abstracted by linking the variables analyzed with the research objectives that yield research conclusions are obtained.

IV. RESULTS

The results of this study were analyzed based on Habraken's change theory because adaptation is a process of change. Habraken's theory is described by the results of the analysis of field observations and is interpreted by Arge's adaptation theory and Rapoport's sustainability theory. The analysis of this research is divided into analysis of the scope of settlements and analysis of the scope of occupancy.

IV.I Process and Results of Adaptation to the Mopugad Village Settlement Environment

a. Physical System:

Table IV.I Process and Result of Adaptation of Environmental Physical Systems in Mopugad Village

Elements Of Change	Figure	Analysis
Mass Layout	 **Fig 1**. Mass Layout	Mass blocs in the Mopugad Village area are irregular because in accordance with the pattern of settlements that spread adapted to Balinese settlement patterns that spread to their livelihood sectors. Residential masses spread in various places in the Mopugad Village area so that there are vacant lots that are large enough between residential blocks of mass.
Furniture	 **Fig 2**. Furniture	One of the pieces of furniture found in Mopugad Village is a monument situated in the middle of a crossroad in the village. This monument is a religious symbol for the people of Mopugad Village and is also considered to be a village guard. Besides, trees that are given a circular cloth wrapping are also one of the unique characteristics that adaptation to the traditions and culture of the Balinese community.
Building Baffle	 **Fig 3**. Building Baffle	The part of building insulation in the Mopugad Village area is diverse. There are only two bamboo or wooden fences in residential buildings that adapt to local dwellings, some are in the form of concrete fences with carvings on Temples and Village halls as well as some dwellings that describe the occupant's social status. Part of the baffle with concrete material is generally in the form of carving fences adapting the traditions of Balinese people

Building Formation Elements	 **Fig 4**. Building Formation Elements	Several building elements of residential buildings such as roofs, structures and constructions, enclosures and other components in the Mopugad area used local materials that were available during construction but they still feature Balinese ornaments, especially in the building elements of the Pura Temple building.
Regional Roads	 **Fig 5**. Regional Roads	There are primary and secondary roads in the Mopugad Village but there are no street names, so it is rather difficult to find relatives who have never been visited by their next of kin. The main road accessing Mopugad has a width of 8-12 meters while the road in the area itself spans only about 4-6 meters. The spread of occupancy patterns causes the roads in the area to be disconnected and as a result, there are many dead ends. There has been no adaptation process in this part of the road. The primary road in the area is in the form of an asphalt road while the secondary road is still in the form of pavements.

b. Spatial System

Table IV.II Table of the Process for Adapting Environmental Spatial Systems for Mopugad

Element of change	Analysis
Land Use	The land use of lots in Mopugad Village in the Bolaang Mongondow District has been developed as residential areas and fertile land for agriculture and livestock. The form and mass in Mopugad vary according to the (Hindu) caste and social status of the occupants. The Pura Temple buildings and dwellings dominate the building mass in the region.
Physical Space	The space in the Mopugad Village area can be grouped into three parts, namely the public open space, the scope of supporting facilities and residential groups. Supporting facilities for residential areas such as houses of worship or temples, meeting halls, village offices and schools are scattered across several

	separate places. The settlement pattern that spreads across the Mopugad Village area causes irregularity in occupancy group layout and support facilities. There are houses of worship or temples in every environment
Building Shape	There are several building shapes to be encountered in the Mopugad Village area such as elementary and junior high schools, places of worship or main temples in the village and in every neighborhood as well as every dwelling. Each residential building and supporting facility highlights the physical form of the original building in Bali because each and every one of them adopts the shape of its ornaments. Some residential buildings and school buildings do not look like residential buildings and schools in general but have Balinese characteristics on the fence and always there are offerings every morning in front of the building.
Regional Territories	There are several private areas and public areas in the Mopugad Village area. The residential group area spreads into private areas in the area while the field and supporting facilities form public areas. Areas of places of worship or temples can be characterized as semi-private because even though they are open to the public, this area is held sacred and one cannot enter and leave any time one pleases. There is also an open public space in the area in the shape of a field and some in the form of a *Bale Banjar* which consists of a roof and uncovered poles.
Circulation Pattern	Mopugad Village has a poor circulation system because the road is still narrow, especially secondary roads in the area that are only 4-6 meters wide. There is no special parking space in the area and the road in the area cannot be used as a parking lot because it will disrupt the circulation.

c. Cultural System

Table IV.III Table Depicting the Process for Adaptation of Cultural Systems in the Environment of Mopugad Village

Elements of change	Analysis
The Way of Thinking	Culture and traditions of the Mopugad Village are still very closely linked with their ethnicity brought from Bali.The Mopugad people who entered Bolaang Mongondow initially were allocated a place to live in the refugee barracks and were subsequently given a share of agricultural land. The agricultural land and land for erecting buildings provided by the government for this ethnic Balinese community were quite a long way from the kampongs in Bolaang. As a result, it was rather difficult for this community of transmigrants to interact with the locals. Balinese customs and traditions that had been deeply embedded in their own community provided cultural input for the Mopugad Village community in the

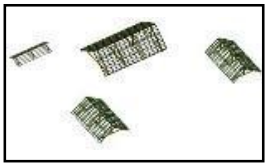
	process of erecting buildings. The Mopugad villagers set up their own residential buildings by adapting their way of thinking to the provisions of Balinese dwelling customs and traditions but taking materials that were locally available as their residential building material.
The meaning of the place	The people of Mopugad Village generally carry out activities in Pura temples and on agricultural land. They just go home to enjoy a leisurely rest. Both men and women all carry out agricultural and livestock-related activities. Occupancy in the village of Mopugad can be seen physically in the form of ordinary housing in general, which is described by the occupant's social status through the use of building materials. What is typical in residential areas in Mopugad Village is the layout of space and ornaments in it. Communities in Mopugad Village usually receive guests outside on the terrace and the residential entrance is always closed. This is because in Balinese dwellings the place to receive guests already has its own specific building which only consists of columns and uncovered roof poles. Even though the residential spaces in Mopugad Village are not as complete as those in Bali, the tradition in determining the layout of the dwelling is still considered, as the location of the room must follow the direction of the wind. The Mopugad Village Community takes the spatial layout into serious consideration as this affects their lives from the spiritual side. Good fortune and bad luck in the family are also believed to arise due to the layout of the residential space they built so that they really pay attention to the layout of space and the provisions of tradition according to their beliefs.
Addition of Space	Additional space is found in the scope of settlements and residences. Additional space in the scope of occupancy is found in the public open space that is not only found on land or plots that have been designated as public space by the local government but also vacant land belonging to the community that have not yet been built on is also used as public spaces by the community as a gathering place. Additional space occurs in the second generation of residential buildings in Mopugad as well. Those already constructed under one roof have additional spaces serving as connections between the existing core spaces.
Surrounding Environment	The Mopugad Village is located in the southern Bolaang Mongondow area and is the third Bali transmigrant village after Werdhi Agung and Kembang Merta. The environment around Mopugad Village is also surrounded by several mixed ethnic settlements such as Mopuya Village in the east and Tumokang Village in the west. Mopuya Village is a mixed Balinese-Javanese ethnic settlement because it is also a transmigrant village from Java and Bali. Tumokang Village is a mixed area of Javanese, Balinese

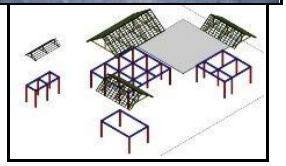
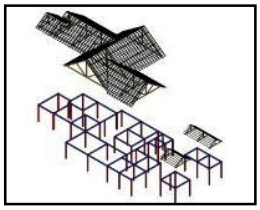
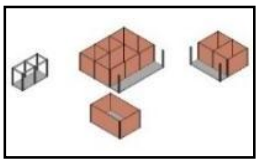
	and Bolaang Mongondow ethnic groups. In the south there is Toraut Village, which is the original village of Bolaang Mongondow. The northern part of the settlement is in the form of a mountain range which provides a beautiful sight when entering this region.

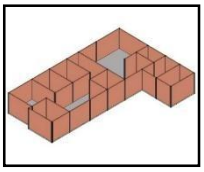
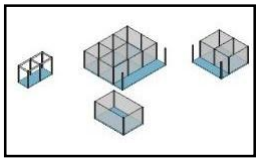
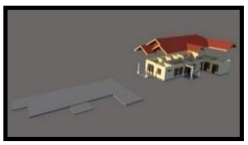
IV.II Process and Results of Adaptation of Mopugad Village Residential Buildings

a. Physical System of Mopugad Village Occupancy

Table IV.IV Table Depicting the Adaptation Process for Physical Systems of Occupancy in Mopugad Village

Elements Of Change	Figure	Analysis	
		First Generation	Second Generation
Roof	  **Fig 6**. Roof First Generation   **Fig 7**. Roof Second Generation	This residential uses a roof made of corrugated iron (zinc) material on the main building and sago palm leaves covering the kitchen. The roof is in the form of a combination of the saddle-shaped type and *limasan* (pyramid-shaped) and consists of several stackings adapting the roof to the Bolaang Mongondow dwelling.	The roof of 2nd generation residential buildings is generally the same as the one in the first-generation dwelling which is a combination of a gable and *limasan* roof. The only difference can be found in the roof material, where corrugated iron sheets/zinc has been replaced by tile. Residential roofs in first-generation buildings are separated according to their space, but in the second generation all rooms have been covered under one roof.

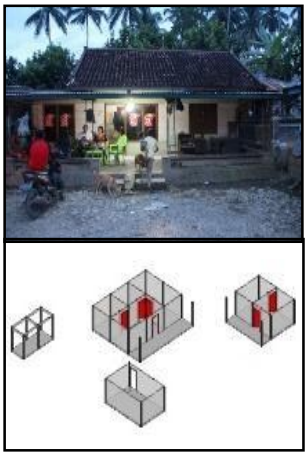
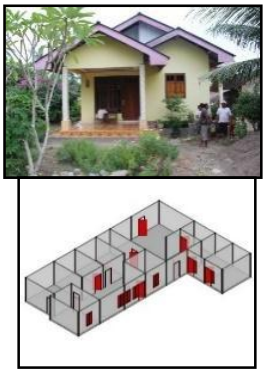
Structure	  **Fig 8**. Structure First Generation   **Fig 9**. Structure Second Generation	The structure and construction of generation 1 residential buildings made use of wood material with a connection of notch columns and posts or pens such as vernacular residential buildings in general. The foundation of residential buildings takes the form of river stone or pebble foundation with the floor directly connected to the soil.	The occupancy structure of the second-generation Mopugad Village is still the same in adopting the Bolaang Mongondow residential structure with a river stone foundation. What is different in the second- generation occupancy is the column material and beams that were in the column and beam material which used to be wood material is converted with concrete material adjusting the residential walls that are now concrete and thus give a more modern impression.
Walls	  **Fig 10**. Walls First Generation	The walls of the Bolaang Mongondow and Bali dwellings were originally both made of board and bamboo material which later developed into concrete, but in Balinese dwellings ornaments were added that matched their traditions. This residence uses plank walls made of wood. This type of	Occupancy in the second generation of Mopugad residential buildings shows that walls have changed their material from wooden walls to concrete walls. The walls began to be adorned with polished ornaments that characterize Balinese customs and Hinduism. The wall of the family temple located in the eastern part is also

	  **Fig 11**. Walls First Generation	residence has no ornaments on the walls.	made of concrete with full ornaments. In addition to these ornaments there are decorative items in the form of offerings that are often placed on the wall and in certain parts of the dwelling.
Floors	  **Fig 12**. Floors First Generation   **Fig 13**. Floors Second Generation	This residence has a floor that is directly attached to the ground like the floors observed in Balinese dwellings. In the main room, a concrete floor has been made while the kitchen is still left on the ground floor. The middle to lower class occupancy of the entire floor both in the main room and supporting room is still in the form of soil. In the middle class the residential floor is in the form of concrete floors in the main room and ground floor in the kitchen.	The second-generation residential floors in Mopugad Village have mostly made use of ceramic tiles. Forms of housing that are more modern are considered not suitable anymore, using concrete floors only. The use of this floor material can also be a social marker.

b. Mopugad Village's Occupational Stylistic System

Table IV.V Adaptation Process for Residential Stylistic Systems in Mopugad Village

Elements Of Change	Figure	Analysis	
		First Generation	Second Generation
Appearance	 **Fig 14**. Appearance First Generation  **Fig 15**. Appearance Second Generation	This residence adopts the layout of Balinese space but the shape of the dwelling looks like a residential community in Bolaang Mongondow in general. If separated by vertical lines, it appears that the occupancy is not symmetrical because the layout of the residential space is separate and if the horizontal line appears, the dwelling consists of one triangular part and two irregular square sections.	Apparently, the second-generation dwelling in Mopugad Village looks quite significantly different from the appearance of the first-generation residential dwelling. This is due to the connection of spaces in the dwelling and the more modern appearance of the chosen form so that the vernacular impression given by occupancy begins to disappear. The visible shape if divided vertically and horizontally remains asymmetrical because the spatial arrangement still follows the layout of the Balinese residential space even though it is already integrated under one roof.

Doors and Windows	 **Fig 16**. Doors and Windows First G  **Fig 17**. Doors and Windows Second G	The typically Balinese window is one featuring a variety of unique carvings and ornaments. The windows in the Bolaang Mongondow occupancy consist of several rows of large openings. The windows in this dwelling consist of only two rows in the main residential building and one row in the kitchen section including ornament signs.	As for second-generation residential doors and windows in Mopugad Village, their layout adapts the form of a new, more modern dwelling because the space in the dwelling that had been separated from 1st generation dwellings has become a single unit under one roof. Doors and windows still use wood materials and Balinese ornaments have been added.

c. Spatial Occupancy of Mopugad Village

Table IV.VI Table of Process for Adaptation of Occupational Spatial Systems in Mopugad Village

Elements Of Change	Analysis	
	First Generation	Second Generation
Teras (Baler Daje)	In the Mongondow dwelling, the front room is called the *lesar* which is the place where the tribal chief or customary leader gives information to his people. The	The second-generation residential terrace has adopted a modern terrace shape with ceramic tile floors. The terrace dimension is larger than the previous one

	second part is referred to as the *sekey* or front porch, walled and located behind the entrance serving as a place to receive guests and organize traditional ceremonies and functioning as a place to entertain the invited guests who attend events. The terrace on the Balinese dwelling is not made to function for certain activities and exclusively serves as an overlay on the *Bale Daje* room. This residence has a terrace on the *Bale Daje* which is used as a place to receive guests.	because in the second- generation the residential terrace is made to function as a place to receive guests.
Ruang Tamu (Bale Daje)	The living room in a Balinese residence or *bale pole sanga* usually consists of a separate room and is located next to the exhibition hall or place of worship. In the Bolaang Mongondow residence the living room is integrated under one roof with other rooms and is located right behind the front porch. In Mopugad the living room is in the *Bale Daje* but this guest room is not made to function as a reception room because most of the residents prefer to receive guests on the terrace.	In the second generation residence the living room has been arranged better to receive guests unlike the first-generation residence which has a living room but is not used as a room to receive guests but to store goods. The function of the living room in second-generation residential buildings is used as it ought to be, with a larger dimension of space.
Bedrooms (Bale Daje)	Bedrooms in Balinese dwellings are separate rooms from other rooms and become private spaces. in the Bolaang Mongondow dwelling the bedroom is also a private space but still integrates with other rooms in the dwelling. in 1st generation residences in Mopugad Village, bedrooms are still separated from other rooms and can only be accessed by residents. The bedroom only consists of a parent's bedroom and a child's bedroom.	There are additional bedrooms in second-generation dwellings. This is because residents have adult children who are married and still live in one house with their parents. In addition, there are also some residents who have many children so they have to give their own bedroom for each child. The second-generation residential bedrooms remain restricted to a 3x3 meter dimension.

Pawon	Kitchen (Pawon) The kitchen in the Balinese dwelling is called *paon* which must be located in the south. In the residential Bolaang Mongondow the kitchen is located at the back of the dwelling and the bottom does not blend with the house on stilts. This residence also has a *pawon* which is located in the southern part which serves as a cooking place for families. The kitchen in the second-generation residence remains separate from the main building. Although the second- generation residential form has been modern, the kitchen part still uses wood board material as a scaffold and has concrete floors.	The kitchen in the second generation residence remains separate from the main building. Although the second generation residential form has been modern, the kitchen part still uses wood board material as a scaffold and has concrete floors.

IV.III Interpretation of Analysis Results

Table IV.VIII Interpretation Table of Elements of Architectural Change in Light of the Concept of Adaptation and Resilience

Elements Of Change According To Habraken	Adaptation Strategy According To Arge	Adaptation Of Interpretation	Resilience
• Physical System	Scope Of Settlement		
Mass Layout	*Fleksibility*	Overall Adaptation Of Inherited Ethnic	Semi Permanent
Furniture Building	*Fleksibility*	Overall Adaptation Of Inherited Ethnic	Permanent
Building Insulation	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
Elements of Building Formation	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
Achievement of Buildings	*Fleksibility*	Partial Adaptation	Semi Permanent

		Of Local Ethnic	
Regional Roads	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
• Spatial System	Scope Of Settlement		
Spatial Planning	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
Physical Space	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
Building Shape	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Permanent
Territorial Area	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
Circulation Pattern •	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
• Cultural System	Scope Of Settlement		
Community Thinking Pattern	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
Meaning of Places	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Semi Permanent
Addition of Space	*Fleksibility*	Partial Adaptation Of Inherited Ethnic	Tidak Permanent
Environmental Space in the Area	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
• Physical System	Occupancy Scope First Generation		
Roof	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
Structure	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent

• Stylistic System	Occupancy Scope First Generation		
Appearance	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
Doors and Windows	*Fleksibility*	Partial Adaptation Of Local Ethnic	Permanent
• Spatial System	Occupancy Scope First Generation		
Terrace	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
Temple (Pura)	*Generality*	Overall Adaptation Of Inherited Ethnic	Permanent
Living Room	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
Bedroom	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
Kitchen	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
• Physical System	Occupancy Scope Second Generation		
Roof	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
Structure	*Fleksibility*	Overall Adaptation Of Local Ethnic	Permanent
• Stylistic System	Occupancy Scope Second Generation		
Appearance	*Fleksibility*	Partial Adaptation Of Local Ethnic	Semi Permanent
Doors and Windows	*Fleksibility*	Partial Adaptation Of Local Ethnic	Permanent
• Spatial System	Occupancy Scope Second Generation		

Temple	*Generality*	Overall Adaptation	Permanent
Terrace	*Fleksibility*	Partial Adaptation	Permanent
Living Room	*Fleksibility*	Partial Adaptation	Semi Permanent
Bedroom	*Fleksibility*	Partial Adaptation	Semi Permanent
Kitchen	*Fleksibility*	Partial Adaptation	Permanent
Additional Space	*Fleksibility*	New Adaptation	Semi Permanent

Based on the results of the analysis above, it can be concluded that the influence of the way people think about their ethnicity is Bali is very strong. This also influences the adaptation process of settlements and residential buildings that they place in the Bolaang Mongondow area, North Sulawesi. The location of residential land provided by the government is quite far removed from the environment inhabited by many indigenous people so that the contact of transmigrant communities with the latter is sorely lacking. This has caused the Mopugad Village community to be more closed-minded or reserved toward the indigenous people.

Even so, several contacts of the Mopugad Village community who are still at school require them to leave Mopugad for schools outside the village area because there was no school available at the beginning of the formation of the village and until now there are only elementary and junior high schools in this area. This caused the wider association of the Mopugad Village community specifically among the young so that many locals began intermarrying the indigenous people of Bolaang Mongondow who were Muslims.

If the latter get married and choose to embrace Hinduism, they are allowed to stay in the Mopugad Village area, while if they choose a religion other than Hinduism, they must find a place to live outside Mopugad. Therefore, since its establishment until now the Mopugad villagers are all Hindus and the house of worship which is inside the village area can only the Pura temple.

The temples in this area are divided into 3, namely the Village Temple which is the largest and functions as the Main Temple, and the Neighborhood Temple that can be found in every residential environment which is divided by clan and the Family Temple that is encountered in each dwelling. Generation 1 of the residential occupants ofMopugad Village consist of those formed at the beginning of the entry of the Balinese transmigrants to Bolaang Mongondow, all of whom were farmers, so that agricultural land was provided for each family head.

Based on the results of their agriculture, they built their homes with the knowledge they had brought in accordance with their traditions. The people of Mopugad Village built their own dwellings by utilizing the materials available at their place at that time so that

they built dwellings with makeshift material but still paid attention to the traditions of residential development based on their belief in Hinduism.

The spaces in their homes were separated from each other, and their layout follows the direction of the wind. In second-generation residences, the residential buildings are more modern when viewed from their physical appearance.

This is because the economic development factor of the Mopugad Village community is not only aderived from farmers but many have become civil servants and traders or business entrepeneurs with a company of their own. The form of dwelling where all the rooms are under one roof makes dwellings in thesecond generation look very different from the ones owned by the inhabitants falling under the first. Even though it has used more modern underlayers and materials such as concrete and tiled floors, the layout of the residential space still follows the direction of the wind. Since residential spaces in the second generation have become a single unit under one roof, there are several additional spaces that appear as a link to the existing core spaces. These additional spaces have been made to function as dining rooms and family rooms.

V. CONCLUSION

Based on the results of the analysis it is found that the process of architectural adaptation influences the architectural products that exist in the settlement of Mopugad Village. Every architectural element in the dwelling is part of the results of behavioral adaptation and building adaptation. Forms of behavioral adaptation by reaction do not occur in Mopugad Village but adaptation by adjustment occurs mostly in the first and second generation Mopugad Village elements, most of which adopted elements of ethnic origin and local ethnicity with little change to meet the needs of its inhabitants. The form of adaptation by withdrawl applies to the people of Mopugad Village who choose to marry a different ethnic group and embrace beliefs other than Hinduism as practiced by the people in Mopugad Village who are all Hindus. The concept of flexibility adaptation can be seen in first-generation residences that did not fully adopt the form of Balinese dwellings because they adapted to the availability of materials and the economic capacity of the community so that changes only occurred on a small scale. The concept of elasticity in terms of adaptation can be found in the second generation Mopugad Village residences that has added space as a connecting space that integrate the rooms in the residential area of Mopugad Village under one roof.

Occupancy in Mopugad Village has retained more of its rituals in residential arrangement as can be discerned in the structuring of the layout of the residential space and its orientation. The shape of the building does not play an important role in the construction and development of their homes. Occupancy in Mopugad Village in generation 1 and generation 2 shows a significant difference in terms of form because in the first generation residential spaces appear to be separated from each other while in the second generation all residential spaces are integrated under one roof. However, the second-generation dwelling still maintains the layout of its space where the kitchen must always be situated in the south and the Pura family temple is always placed in the

eastern part of the dwelling. There is only the addition of a space function that fills additional spaces are connectors between the separate spaces so that they are integrated as one part under one roof. The building material has also followed the material that was widely encountered at this time so that what can be maintained in these residential areas of Mopugad Village is only the layout of the space and its ornaments.

Elements of architectural change that persist above, can be the character of residential buildings in Mopugad Village. The findings of these architectural elements that persist can be input for the local government and knowledge for the community for the development of a sustainable Mopugad Village.

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