

Variation of Functional Types (Space Cell Configuration) on the Architecture of Minahasa Traditional House, based on the Contextual Differences of the Tonsea and Toulour Sub-Ethnics

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Abstract

This article contains parts of the author's dissertation research about the typological variations of the architecture of Minahasa traditional house by considering the existence of Minahasa sub-ethnic, especially the Tonsea and Toulour. This research is driven by the theoretical deduction which states that the context of physical environment and sociocultural background between the two sub-ethnics should be associated with the variations of architectonic formations on each sub-ethnic. Specifically, this article focuses on the variation of the functional types, especially the space cell formation of the Minahasa traditional house of both sub-ethnics (the Tonsea and the Toulour), as well as its association with the physical and sociocultural background of the two sub-ethnics.

The research is basically a descriptive qualitative research. The data used included documentation of some architectural objects in forms of Minahasa traditional houses from both sub-ethnics, selected as samples by purposive sampling technique. Another data is the information concerning the physical and sociocultural characteristics of the two sub-ethnics. Analytical methods used are typological comparative analysis and association analysis.

The result of the study indicates that there are differences (besides the similarities) on the type of the Minahasa sub-ethnic traditional house of the Tonsea and the Toulour, especially the type of space cell formations. The space cell formation that determines the difference is the open terrace which tends to be found only in the Tonsea traditional house but not on the Toulour traditional house. This distinction is associated with the Tonsea physical environment characteristic which is in the lowlands area with high air

temperature and low wind speed compared to the condition of the Toulour area which is in the highlands with low air temperature and high wind speed.

Keywords: Architecture, traditional house, Minahasa sub-ethnic, typology, space cell

INTRODUCTION

According to Habraken (1988), the study of building typology through traditional or vernacular architectural precedents is essential to understand the past design principles as a source of inspiration for the benefit of today's applications. Of the many types of buildings, the type of house is the most interesting type to be studied and given special attention. The type of house is the source of derivation of various other types of buildings. From a house type, essential architectural values prevailing in a cultural community can be explored. A house is typologically viewed as a place that presents the broadest spectrum of life experiences for any member of a particular cultural community, since it is here that one's life span is spent most, from moments of birth, childhood, growing up, marrying, fostering families and raising Children, growing old and even to the death. The house form is typically a representation of culture, social patterns and societal preferences. In this sense, a house is essentially a cultural artifact that is a collective product of a community.

Attention to house type as a primary typology in terms of cultural aspects in various cultural communities as Habraken's understanding has been seriously pioneered by Amos Rapoport (1969) in his book "*House Form & Culture*". On the other hand, the assertion that the house type is the source of

the derivation of different types of buildings is in line with the concept of "*Primitive Hut*" by Marc-Antoine Laugier (1755), which is an anthropological concept of human relations with its natural environment that forms the basis for the urgency of architectural creation as a built (man-made) environment. This is stated in his essay "*Essai sur L'Architecture (Essay on Architecture)*".

Research on the characteristics of Minahasa traditional houses has basically been quite a lot done by researchers before. Nevertheless, existing studies generally tend to see the architecture of Minahasa traditional house as a typical generalization of the cultural artifact of the Minahasa ethnic community in common. The fact that the Minahasa ethnic community actually can still be differentiated over various sub-ethnics that each has different characteristics of the physical and sociocultural environment is still rarely considered in previous studies. This article specifically tries to examine whether this sub-ethnic differentiation of Minahasa is associated with differences in the architectural features of the traditional houses present in different sub ethnic environments, particularly the sub ethnic of Tonsea and Toulour.

THEORETICAL DEDUCTION

A. Minahasa as an Ethnical Community

Minahasa as an ethnical entity has a relatively long historical journey, with cultural developments involving cultural contacts with other cultural communities. As an ethnical community, Minahasa is commonly described to have a number of sub-ethnic communities each is associated with special habitation territory, which includes four major sub-ethnic: 1) Tombulu, 2) Tonsea, 3) Toulour and 4) Toumpakewa (Tountemboan?), as well as a number of other sub-ethnic such as the Bantik, Tonsawang, Ratahan, Pasan and Ponosakan. From the context of the landscape of Minahasa land, the habitable areas of the Minahasa sub-ethnic group basically vary from coastal lowlands to mountainous highlands. The Tonsea specifically is a sub-ethnic group that tends to occupy lowland areas while the Toulour sub-ethnic tends to inhabit upland areas around the Lake Tondano. From the sociocultural context, the apparent differences or variations of the existence of various Minahasa sub-ethnics are differences in terms of language.

B. Architecture as Built Environment

One of the premises in environmental science, is the assertion that humans individually or in groups will always interact with environmental elements that are physical (abiotic), biotic and sociocultural. This interaction requires humans to develop various modes of interaction, in such a way that the interaction can take place in positive patterns for survival in a specific environment. Man with his intellect is motivated to "manipulate" his natural environment so that he becomes friendlier with it in various ways. The creation of tools, clothing and shelter, are all human creative work in addressing patterns of interaction with the natural

environment that is felt unpleasant. In architecture, the presence of "*primitive hut*" as proposed by Laugier, is theoretically a symbol of the prototype of built environment which became the basic conception of architecture as an object of human creation.

The existence of a built environment will always be associated with a specific location that has its specific environmental features, both in the context of the physical, biotic and sociocultural environmental components. As a built environment that mediates human interaction with his environment, an architectural object has to be seen as a contextual response to a location with specific range of environmental conditions. In different locations the problems of human interaction with the environment will also present with different contexts, so that the solution of the formation of an architectural object will also be present with a diverse pattern. In architecture, this variation of environmental context is seen as one of the determinants of the presence of various types of architectural objects.

In architecture, typological diversity of architectural objects is commonly seen as the evolution of the primitive hut concept which is related to the history of human habitation in different locations and environments. The dynamics of human distribution in various habitable zones across the earth is believed to have implications for the diversity of typological forms of architectural objects. Environmental aspects that are considered as determinants of architectural typology include the physical and the socio-cultural characteristics.

C. Architecture & the Physical Environment

Architecture as Stimulus Modifier

Human interaction with the physical environment is possible only because of the stimulus field produced by the physical environment on the one hand and with the existence of the human senses on the other. The human senses are receptors to the stimulation sourced from the environment. In environmental science, the stimulus field is categorized into light, sound, heat and odor. It is also understood that the capabilities of the human senses to the intensity of the stimulation from the physical environment have limitations. Humans tend to feel uncomfortable, insecure and unpleasant when faced with the stimulation of their physical environment, especially when the intensity of stimulation is at a level that surpasses its induced adaptability. This situation encourages people to present a built environment that will functionally "modify" the natural stimulus intensity from the environment so that it is compatible with human adaptability and in turn presents an interactive situation with safer and more comfortable patterns.

Physical environment as resource and hazard

The physical environment and all its elements are potential resources that can be utilized by humans to undergo various activities. The main resources that the physical environment provides to support human activity are the energy, water, land, and other natural resources. A physical environment and all its

components have a double meaning whenever in an interactive situation for human habitation needs. Certain physical environments can be positively and constructively meaningful to human activity on a certain side but on the other hand can be negative and destructive for human activity. In this context, the presence of a built environment in a particular place can be seen as an effort to optimize the potential of physical environment resources as well as efforts to reduce potential threats of existing hazards.

Physical Environment as a Determinant of Architecture

Architecture as a built environment is essentially a result caused by the characteristics of the physical environment in which it is presented. Physical environment conditions in the form of the geology, hydrology, topography, soil stability, climate, view, habitation of local biodiversity, et cetera, are various physical environmental attributes that constantly affect the performance of an architectural object as the built environment present in a particular place. It is in this sense that the igloo of the Eskimos has geometry that tends to be an aerodynamic half-ball in relation to the threats of strong and cold winds, as well as the wall material in the form of ice blocks and animal skins leather, which are abundantly available in the polar regions of Eskimos' habitation. In building science, the Igloo is one of the climatic design types that associates with the polar climate, together with the Courtyard House as the type for dry tropical climate, and some other types associated with certain climatic areas.

In her research about architectural typology and building physics using the Greek vernacular settlement as research object, Vissilia Anna-Maria (2008) describes how the local old-type adobe dwellings preserved respond to the local climate and environment by optimizing material use and construction techniques.

D. Architecture and Culture

Culture can be differentiated into three dimensions: ideas, actions and artifacts. The cultural development of a human community can be seen isolatively as well as in the context of contact between one cultural community to another. In isolation, the cultural development of a community is determined by the physical environment inhabited by the community. The physical environment is the determinant of the physiological development of humans inhabiting the zone. In this thought, the popular theory of evolution based on natural selection proposed by Charles Darwin is the main supporting premise. It can be associatively assumed that the physical environment will indirectly become the determinant of the development of the ideas, the activities and even the cultural artifacts of the community concerned. On the other hand, the cultural development of a community is also determined by the presence or absence of interaction between the community and other cultural communities. Through the contact between these cultures, it is possible to "exchange" the system of ideas, activity systems and even artifact models that will determine the direction of cultural development of each community that has cultural contact.

Referring to the two understandings above, the existence of a cultural form in a particular community can be seen in two possibilities. The first is that the culture is the "indigenous culture" developed by the community, and the second is that it is an adaptation or a combination of certain cultural forms resulting from contact with other cultural communities. The existence of similar cultural forms in two distinctly different cultural communities can be interpreted as follows: 1) the culture is developed independently by each community or 2) the culture is adapted / imitated by a cultural community from other community.

Architecture can be specifically viewed as part of the culture. Architecture is often lined up as a form of cultural artifact that is a representation of the system of ideas / values and the activity system of a cultural community. In this view, the diversity of architectural forms can be interpreted as a logical consequence of the diversity of human cultural hues on this earth. On the other hand, indications of "similarity" of architectural form in some different cultural communities, especially in terms of the territorial background of habitation, can also be viewed in the two perspectives as described above. In first perspective, it can be said that this similarity occurs by "chance" because each cultural community is able to develop the architectural form independently departing from the similar system of ideas / values and systems of activities due to physical characteristics of the environment is also relatively similar. On the other hand, in the second perspective, it can be said that the similarity occurs because of the sharing / exchanging system of ideas / values and activities among these communities because of cultural contact.

If in anthropology architecture is positioned as part of the dimension of cultural artifacts, then in theory of architecture the relation of culture and architecture tends to crystallize on the premise that architecture is a form of cultural symbol. Architecture as a cultural symbol is one of the conceptions of architectural functions put forward by various theorists such as Hillier & Musgrove, Christian Norberg Schulz, Geoffrey Broadbent and others.

The concept of architecture as cultural symbol simply states that a functional architecture should be presented as a symbol system that reflects a particular culture. Cultures symbolized by an architectural object are usually associated with the culture of the party presenting or using the object. In line with this understanding, the relevant derivative premise is that the presence of an architectural object in a particular sociocultural environment tends to be different from the architectural objects present in different sociocultural environments. On the contrary, although the architectural objects presented in different sociocultural environments are physically identical, the symbolic meaning may be different. In understanding that architecture function as a symbol system that is full of meaning, then the concept of architecture as a cultural symbol is often associated with the theories of semiotics.

E. Process / Method of Architectural Objects Creation

According to Geoffrey Broadbent (1973), historically and chronologically the method of development of architectural

formations in human civilization can be categorized into 4 (four) methods namely the pragmatic, iconic, analogical and canonical methods. Pragmatic methods referring to the trial and error process, by utilizing various resources that exist in such a way as to meet the intent to be achieved. This method is seen as the first way humans do in creating an architectural work. This method is substantial in the term vernacular architecture. Once a form has been successfully developed pragmatically, this formation will undergo intensive iteration within a certain cultural sphere of society. The form is no longer created pragmatically, but by reference to a pre-existing formation. Repeated imitations will eventually lead to the emerging of such an image or mental schema in the society concerned that the formation is an ideal form for them and needs to be maintained. This way is called the iconic design process. In this context the terminology of traditional architecture becomes significant. Creation of architectural formation by analogy approach can be explained as a design effort that departs from a "presupposition". Architectural objects or certain architectural elements are described as something else specific. The canonical method is the method of creating an architectural formation based on certain rules, such as the object geometrical aspect, the proportion system, the module, the pattern, and so forth, which in Francis D.K. Ching's terminology is called "order".

F. Architectural Typology

In a typological frame of mind, all architectural objects can basically be classified into a number of types based on the similarities of certain "formal structure" among them. An architectural object will be said to have the same type to another if both of them share similar certain formal structure. What are the "formal structures" as the basis for the classification of architectural objects, has become Raphael Moneo's attention. According to Moneo, the idea of type as a formal structure is intimately connected with reality - with a vast hierarchy of concerns running from social activity to building construction. In this sense, the space organization, the geometry, the construction techniques as well as the historical and cultural background of an architectural object all can be seen as the "formal structure" – the basis for categorizing the type of architecture. Departing from Moneo's understanding, each architectural object can basically categorize according to its functional type, its geometric type and its stylistic type. Specific architectural objects will be declared a set in functional type perspective if their physical features indicate the same use. In this context, the usual comparative variable of concern is the presence of the "space cell" that these objects possess and their properties associated with the patterns of activity that can be accommodated in units and groups of space cell in those objects. In the context of geometric type, architectural objects will be declared a set if certain architectonic formations of these objects appear to have similar geometrical characteristics. Architectonic formation variables that are commonly concerned in this context are the configuration or the morphology of the building form or mass. In the context of historical cultural type, architectural objects tend to be declared the same type if they have the same stylistic performance. Objects present in

an era and cultural background or any particular "-ism" are likely to be categorized as one type because they share the same visual characteristics.

Almost in line with Moneo points of view, Habraken mentioned that the typological search for an architectural object, including the type of house, can be done with three approaches or perspective, namely:

- 1) Type as a spatial organization
- 2) Type as a physical system
- 3) Type as a stylistic.

These three approaches can be seen as mutually independent approaches to one another.

G. Architecture and Architectonic Formation

Theoretically, an architectural object is seen as a "collaboration" of various "architectonic formations". If architecture is viewed as a systemic unity then the architectonic formation is seen as a sub-system unit that becomes aggregate to the presence of a systemic unity of architectural objects. Independently an architectonic formation still can not be seen as architecture. It will become architecture, if it is merged "symbiotically" with other architectonic formations to form a complete systemic unity. Thus in an architectural object, an architectonic formation must be seen as a complementary component of other architectonic formations. The architecture itself must be seen as a totality of various architectonic formations. In a simplistic way, architectonic formations of an architectural object are often described by various terms such as the site development plan, building mass configuration, indoor space layout (floor plan), structure and construction systems, utility systems, building envelope, etc. Independently, each of these architectonic formations carries a certain functional value that synergizes with each other. This understanding is in line with the concept of "architectonic multifunctionality" proposed by Jan Mukarovsky.

PROBLEM STATEMENT / RESEARCH QUESTIONS

Referring to the above theoretical description deductively can be put forward some thoughts that can be seen as hypothetical premises that encourage authors to conduct a new study in order to enrich the understanding of the characteristic of the Minahasa traditional house architecture. The main points of thought are as follows.

- If the Minahasa ethnic group can be significantly differentiated by sub-ethnicity, the architecture of Minahasa traditional house other than (definitely) has the same physical features, should possibly be differentiated by the variations of typology based on the sub-ethnic differences. In other words, the existence of Minahasa traditional houses in various sub-ethnic communities should have typologies that are described by both similar and different architectonic formations.

- If the existence of Minahasa sub-ethnic group can be described by the differences of their physical and sociocultural inhabited environment, and if the architectural typology of an ethnical community is believed to be an evolutive response associated with its physical and sociocultural inhabited environment, then the typology of Minahasa traditional houses based on its sub-ethnicity should also be seen as "the effect" of the different physical and sociocultural aspects existed in each territorial habitation of each sub ethnic.

From both hypothetical premises above, and by limiting the scope of observation on two sub-ethnics of Minahasa (Tonsea and Toulour), which tend to have contrast physical and sociocultural background, two research questions can be formulated as research substance, which are as follows:

- What kind of variations (similarities and differences) exists concerning the typology of Minahasa traditional house architecture which present at different Minahasa sub-ethnic community backgrounds, especially the Tonsea and the Toulour?
- Can it be justified that the existing variations (within a certain architectonic formation level) is a "result" of the different aspects of the physical environment and sociocultural as determinant factors?

RESEARCH OBJECTIVE

The purpose of the research as a whole is to identify the architectural variations of the Minahasa traditional house in the context of its presence in two Minahasa sub-ethnics namely the Tonsea and the Toulour, which each has physical environment of habitation and sociocultural aspects that tend to differ from one another. Specifically in this article, the research objectives whose answers are elaborated are limited to the identification of variations of functional types, particularly in the variable of the space cell formation in the traditional house of the two sub-ethnics. The result of this study is expected to enrich the knowledge of the architectural characteristic of Minahasa traditional house especially on sub-ethnic point of view, concerning the logical relation between architectural object and the physical and the sociocultural environment in which the object exists.

RESEARCH METHODS

Referring to the hypothetical premises and research questions presented earlier, the following is the description of the research methods to be applied. In general, this research can be categorized as a qualitative descriptive research. The description of the research method in this section will cover the research method concerning the identification of typological variation of Minahasa traditional house based on sub-ethnic background of Tonsea and Toulour as well as its association with the difference of physical and sociocultural characteristics of both sub-ethnics. The research will be aimed at identifying various types of Minahasa traditional houses as research objects located in the sub-ethnic areas of Tonsea and

Toulour as research locus as well as assessing whether there are some associations between the types identified and the characteristics of the physical and sociocultural environment of those both sub-ethnic areas. Thus, the research agenda will cover two main activities which are as follows.

A. Comparative Identification of the Tonsea and Toulour Sub-Ethnic Traditional House Types

In this first activity, the research method used is the typological studies that depart from theoretical approach by Raphael Moneo, with the strategy that compares various samples of research object in both research locus. In this article, the identification of the object's typology will only be carried out within the path of functional typology, in exception of the other two approaches (geometric typology and the cultural-historical typology). Within this path of identification the variables observed are:

- Space cells existence. A space cell, in general can be defined as the smallest individual functional space that can accommodate certain pattern of activities of the user.
- Characteristics of each space cell boundaries. This variable is related to the physical features that act as the framework of the space cell.

In this stage the required data input is some samples of object representing various forms of traditional houses in the two areas that became the research locus. The data collection technique used is basically field observation by applying the purposive sampling strategy.

The identification of the space cells and their physical boundaries will be executed by decomposing the floor plan of each sample object.

B. Identification of the Associations between the Types and the Characteristics of the Physical and Sociocultural Environment

Starting from the previous analysis, the typological variation of the traditional houses of the two sub-ethnics will be assessed for their possible association with the different characteristics of the physical and socio-cultural environment of the two sub-ethnics concerned. In this stage of analysis, the method of analysis used is the method of association analysis conducted descriptively and qualitatively, based on the rationality of the relationship between the typological characteristics of the existing types of the traditional houses with the specific characteristics of the physical and socio-cultural environment of the two sub-ethnics studied. Broadly speaking, the observed variables in the physical and socio-cultural aspects to be recorded at the two sub-ethnics areas are as follows:

- Physical environment variables include climatic conditions (temperature & humidity, wind, rainfall, solar radiation), geological conditions, hydrological conditions, conditions of elevation relative to sea

surface, topographic conditions, and biodiversity conditions (plants and animals).

- Socio-cultural environment variables include the religious system, kinship system, community system, livelihood system, language, arts, and customs.

Based on those data, furthermore through association analysis it can be identified whether the similarities or differences in

the typical characteristics of the traditional house of the two sub-ethnics are basically correspond to the similarities and differences in characteristics of the physical and socio-cultural environment of the two sub-ethnics. The results of this analysis will be the final output of the first phase of this research. Schematically, the methodological flow of the first phase of the study can be described as follows:

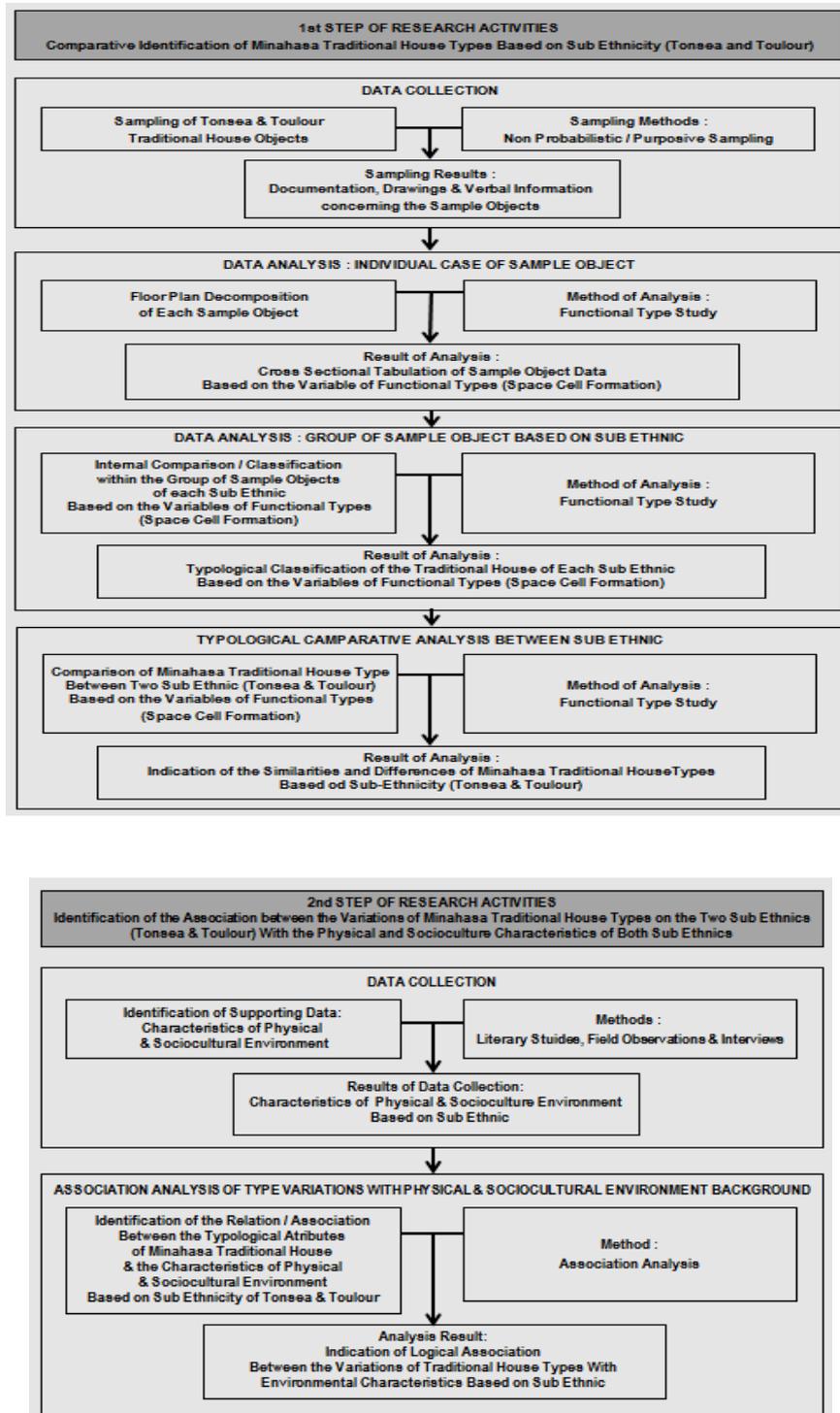


Figure 1: Research Method Scheme

RESULT & INTERPRETATION

As mention earlier, the objective of this research is to identify the typological variations of Minahasa traditional house in its association with the different characteristics of the physical and sociocultural environment concerning the habitation area of the two sub-ethnics which are the Tonsea (lowland area) and the Toulour (highland area). As a whole, the identification of the typological variations will include the variations of architectonic formation in the three courses of typological analysis: function, geometry and stylistic performance. However, as mentioned earlier, in this paper, the substance revealed is still limited to the typological analysis on the variable of space cell formation which is part of the identification of the functional typology. The following description is the result of initial research that has been done by the author.

A. Decomposition of Space Cell Formation on Sample Objects of Minahasa Traditional House on Both Sub-ethnics

In accordance with the standard method of typology study, to identify certain types of architectural object, a number of comparable objects are required in order to explore the similarities of particular architectonic formations which will become the parameters of classification of the architectural object types. In this research, also has been done data collection of a number of Minahasa traditional houses on both sub-ethnics area to be compared, which became the samples of the study. Referring to the data compiled, an interpretive analysis of each sample object has also been conducted by decomposing the architectonic formation of the floor plan of each sample object to identify especially the formation of the space cells embodied within. The information in the following tables shows the data from three samples of Minahasa traditional houses in each of the Minahasa sub-ethnic areas concerned, as well as the decomposition analysis of the space cell formation of each sample object.

Table 1: Data & Analysis of Space Cell Formation on three Samples of Minahasa-Tonsea Traditional House

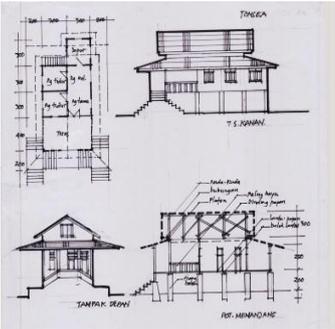
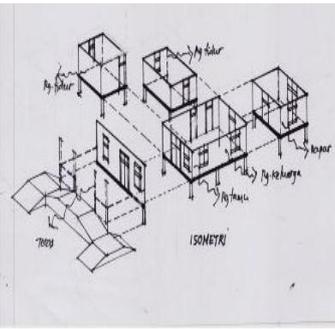
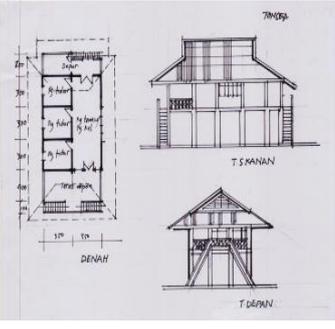
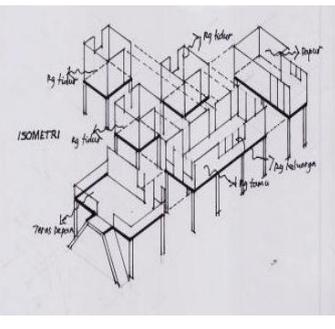
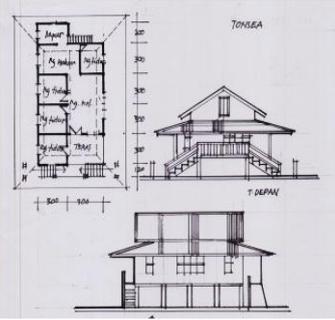
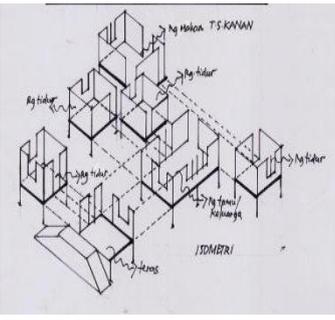
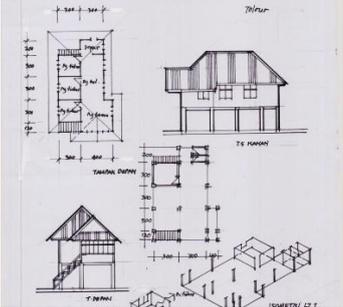
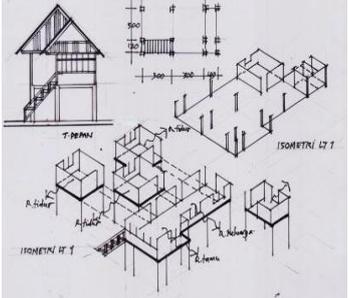
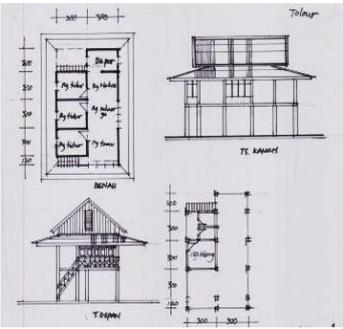
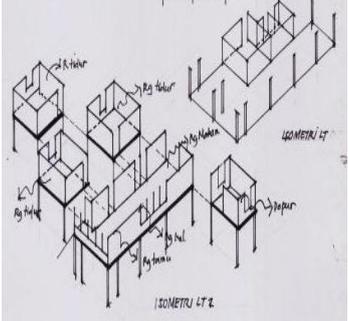
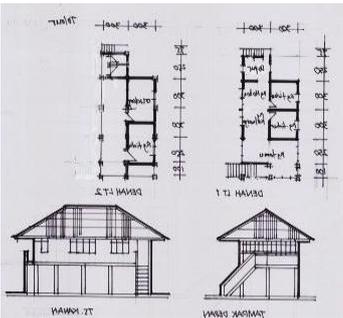
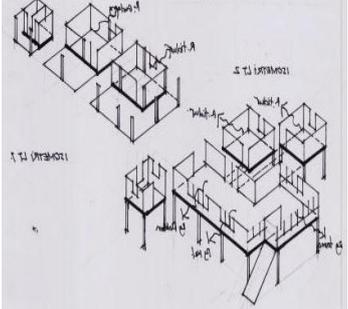
Sample Object	Documentation / Information	Object Sample Drawing Representation	Space Cell Identification by Decomposition
1	 <p>Owner : Goliot-Sendow Family Location : Lembean, Kauditan, North Minahasa Built : At least 1920</p>		
2	 <p>Owner : Auri Singal Family Location : Airmadidi Bawah, North Minahasa Built : At least 1930</p>		
3	 <p>Owner : Auri Singal Family Location : Airmadidi Bawah, North Minahasa Built : At least 1930</p>		

Table 2: Data & Analysis of Space Cell Formation on Minahasa-Toulour Traditional House

Sample Object	Documentation / Information	Object Sample Drawing Representation	Space Cell Identification by Decomposition
1	 <p>Owner : Pangemanan Roring Family Location : Kinar, Tondano, Minahasa Built : At least 1920</p>		
2	 <p>Owner : Mamuaya Mangkey Family Location : Tataaran Tondano, Minahasa Built : At least 1920</p>		
3	 <p>Owner : Supit Turangan Family Location : Tataaran Tondano, Minahasa Built : At least 1920</p>		

B. Identification of Space Cell Formation Types of Minahasa Traditional House on Both Sub-ethnics

In accordance with the research method, after the space cell formation of each sample object is identified, the next step is to conduct a comparative analysis of cell space formations of all sample objects representing the two sub ethnics concerned. This comparative analysis is required to obtain the typical abstraction of space cell formation of Minahasa traditional house on the both sub-ethnics in question. The following description shows the results of the comparative analysis that leads to typical abstractions of space cell formation in Minahasa traditional house for both sub-ethnics (Tonsea and Toulour). From the description, it can be seen that from the point of view of the typology of function, especially on the variable of space cell formation, the Minahasa-Tonsea traditional house can be distinguished into two types, while for Minahasa-Toulour sub-ethnic only one type.

1) Typical Space Cell Formation of Minahasa-Tonsea Traditional House

According to the result of the analysis, the typical space cell formation in Minahasa-Tonsea traditional house can be differentiated into two types, which can be described below.

- **Type – 1**, has characteristics as follows :
 - ~ Has 5 (five) distinct space cells, which are the terrace, the bedroom, the guest / living room, the dining room and the kitchen.
 - ~ The terrace is a space cell that is used as a place to receive public guests as well as an alternative place for relaxing. This space cell has two essential physical boundaries, namely the floor and the ceiling/roof, while the wall is not essential. From this space cell there is an access to the ground level through stairway.

- ~ The bedroom is a space cell for resting / sleeping. This space cell has complete physical boundaries including the floor, the wall and the ceiling/roof. One part of the wall has a connecting access (a door) to the guest / living / dining room, and the other part has an opening for ventilation, fenestration and view toward the outdoor space.
- ~ The guest / living room is a composite space cell that accommodates two basic functions (place where special close guests are received and where the owning family relaxing). This space cell has complete physical boundaries including the floor, the ceiling/floor and the wall. Some parts of the wall are equipped with doors that provide access to the bedroom(s) and the terrace, while some other parts equipped with openings for ventilation, fenestration and view toward the outdoor space.

provide access to the bedroom and the kitchen, while the other walls are barriers to the outdoor space which are equipped with openings for ventilation, fenestration and view.

- ~ The kitchen is a space cell that act as the place to prepare / cook food. The physical boundaries of this space cell mainly are the floor and the ceiling/roof. The existences of walls are not essential. Some walls are presented half complete in order to provide optimum ventilation and fenestration. From this space cell there is an access to the ground level through stairway.
- ~ As an addition, the space cell for bathroom / restroom / laundry room tends to be built separately from the main building, located on the ground level.

• **Type – 2**, has characteristics as follows :

- ~ Has 4 (four) distinct space cells, namely the terrace, the bedroom, the guest / living / dining room and the kitchen.
- ~ The characteristics of the terrace, the bedroom and the kitchen are similar to characteristics of the same space cells of the type - 1.

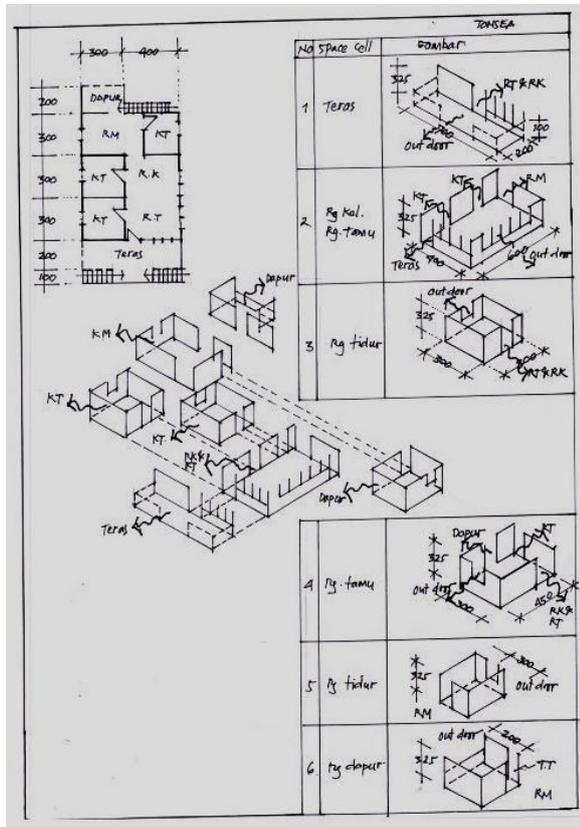


Figure 2: Space Cell Formation of Minahasa-Tonsea Traditional House – Type 1

- ~ The dining room is a space cell that is actually an extension of the guest and living room, but is considered to be an independent space cell with respect to its configuration in the floor plan that shifts from the expanding axis of the guest and living room. The space cell is used by the family to enjoy their meal. This space cell has complete physical boundaries including the floor, the ceiling/roof and the wall. Some parts of the wall have doors that

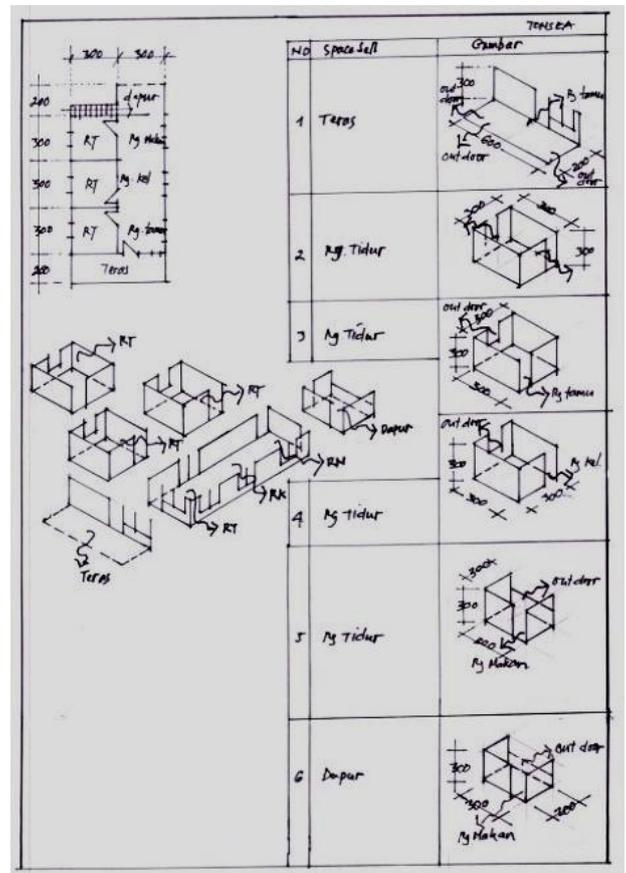


Figure 3: Space Cell Formation of Minahasa-Tonsea Traditional House – Type 2

Table 3: Comparative Characteristics of Physical & Sociocultural Environment of Tonsea & Toulour Sub-Ethnics

	Tonsea Sub Ethnic	Toulour Sub Ethnic
Characteristic of Physical Environment	Relatively high level of air temperature and humidity, low level of wind speed, high intensity of rainfall, high intensity of solar radiation,	Associate with the characteristics of highlands environment with relative low level air temperature, high wind speed and high air humidity.
Characteristic of Sociocultural Environment	<p>Below are some sociocultural characteristics of Minahasa-Tonsea sub ethnic:</p> <ul style="list-style-type: none"> • From the religious point of view, most of the residents in this area are Christians. Small parts are moslems and other religious group (Hindu & Budha). • Historically, the major professions of the people are farmers, fishermen and carpenters. Nowadays, some parts of the residents work as state employees. • The most common and genuine cultural value is the spirit of “mapalus” which is the idea of mutual cooperation among the people to live together in harmony. • The other basic value is the motto “<i>si tou timou tumou tou</i>” which means people live to enliven others. • The language used is the “tonsea” language, which is slightly different with the language of the other Minahasa sub ethnic community. 	<p>Below are some sociocultural characteristics of Minahasa-Toulour sub ethnic:</p> <ul style="list-style-type: none"> • From the religious point of view, most of the residents in this area are Christians. Small parts are moslems and other religious group (Hindu & Budha). • Historically, the major professions of the people are farmers, fishermen and carpenters. Nowadays, some parts of the residents work as state employees. • The most common and genuine cultural value is the spirit of “mapalus” which is the idea of mutual cooperation among the people to live together in harmony. • The other basic value is the motto “<i>si tou timou tumou tou</i>” which means people live to enliven others. • The language used is the “toulour” language, which is slightly different with the language of the other Minahasa sub ethnic community.

CONCLUSION

In accordance with the description of the results and interpretation section, here are the things that can be drawn as a conclusion in this article:

- The main difference lies in the existence of the “terrace” which is a space cell with non-essential wall that tends to be present in the typical formation of Minahasa-Tonsea traditional house but is less likely to be present in the Minahasa-Toulour traditional house.
- Another difference lies in the variation of the composite space cell configuration in the form of guest-living-dining room, which in the typical Minahasa-Tonsea traditional house tend to be differentiated due to the variation of separation of the dining room space independently and separated from the of quest- living room.
- The apparent association between the type of space cell configuration and the characteristics of the environment on both sub ethnics lies mainly in the existence of the open terrace, where in the typical Tonsea traditional house this space cell is present and associated with the characteristics of this sub ethnic physical environment that is in the lowlands with relatively high air temperature and low wind speed. This is in contrast to the absence of this space cell on the typical Toulour traditional house which is associated with its physical environmental characteristics in the highlands with relatively low air temperatures and high wind speed.

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