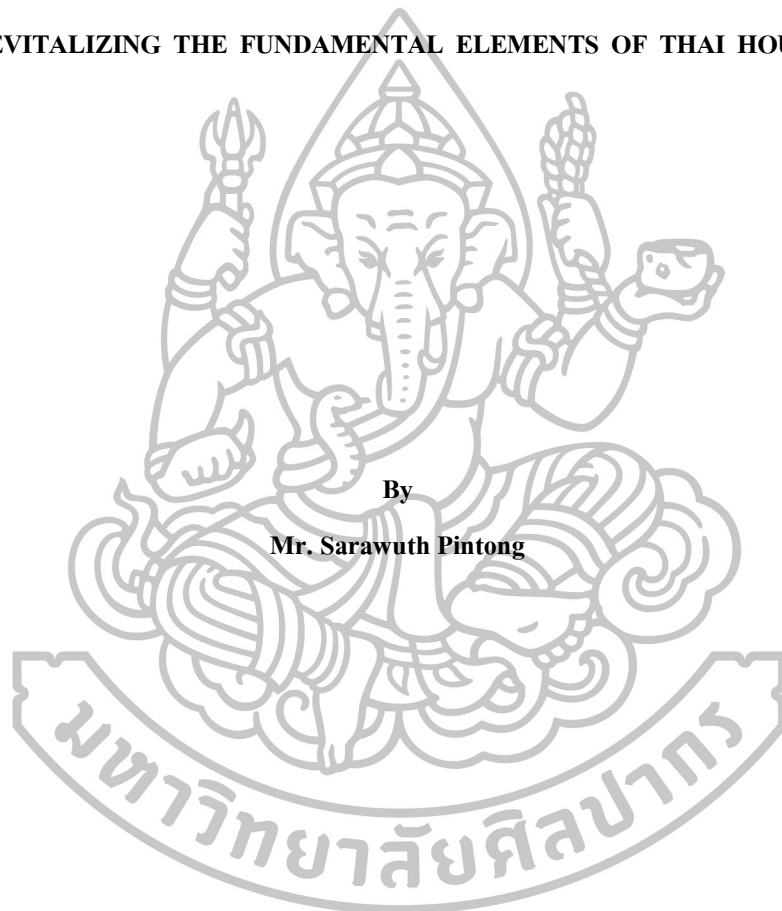




REVITALIZING THE FUNDAMENTAL ELEMENTS OF THAI HOUSE



**By
Mr. Sarawuth Pintong**

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy Programme in Design Arts

International Programme

Graduate School, Silpakorn University

Academic Year 2015

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Graduate School, Silpakorn University has approved and accredited the Thesis Title of “Revitalizing the Fundamental Elements of Thai House” This thesis is submitted by Mr. Sarawuth Pintong as a partial fulfillment of the requirements for the degree of Doctor of Philosophy in Design Arts

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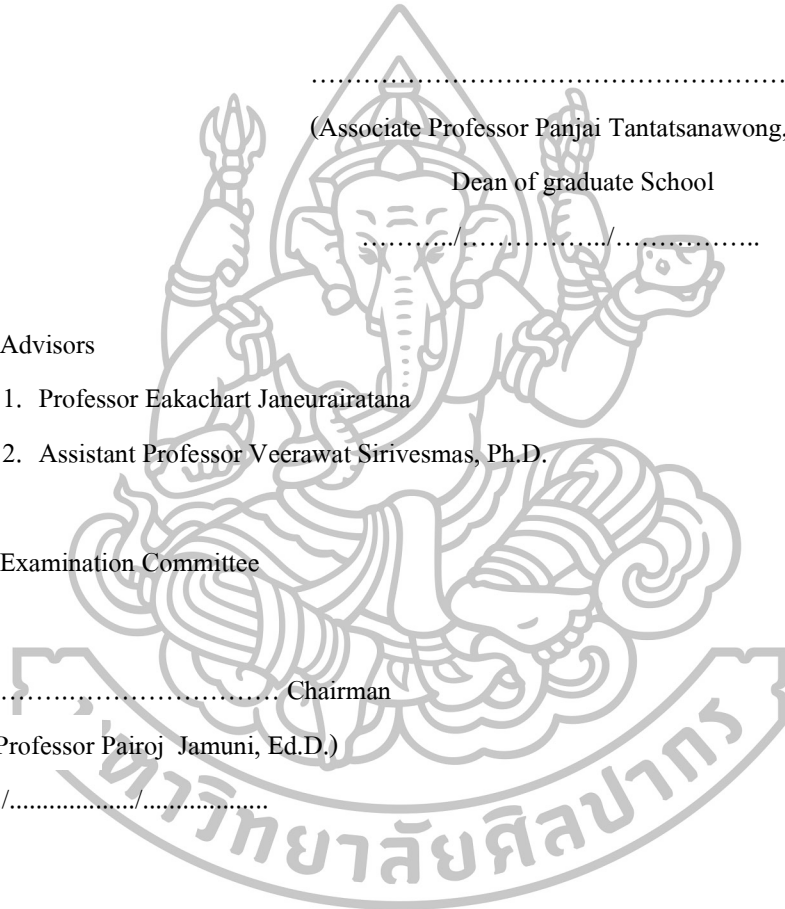
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When most Thais think of “Thai house” or BanThai, the image of Thai traditional houses in the Central plain that is acclaimed as “national symbol” immediately occurs to their imagination. This is something like a stereotype because they “receive” one-sided of distorted information, which only focused on the physical appearance of Thai houses.

Therefore, Thais have seen Ban Thai as an “old aesthetic” that caused limitation and misleading to the development of Thai houses which can only be done by “adapting” some modern materials and construction technology into the Thai traditional form of architecture. Then adopted “alien architecture” (unconformity architectural form: Sarawuth Pintong) as “new aesthetic”, which is incompatible with Thailand’s environment, and as a consequence, it has impacted us in the various forms of unavoidable natural disasters.

The forgotten of “Thai architectural wisdom” which is the core ideology of Thai house that has been improved through time until it becomes “the fundamental elements of architecture for living”, conforming to a place and time among the diversity of Thai cultural landscape. Even though, Thai architectural wisdom is a timeless dynamic equilibrium that composed out of the interrelationship among nature, human, and architecture, it needs to be revitalized.

In order to “Revitalizing the fundamental elements of Thai house”, the research methodology was framed in accordance with Phenomenology theory in order to investigate throughout the research objectives, which are Thai traditional house and also Thai vernacular house empirically. The research methods were chronologically divided in 3 phases which commenced with data collection and observation, then collected data analysis and formed up conceptual design frame work, and then design experiments and implementation.

In conclusion, this research finds that the fundamental elements of Thai house can be found, not in the tangible superficial decorative elements such as “Ngao” (hornlike finial) or “Pan-lom” (windbreak on the gable), or streamline gable roof. Rather in the profound intangible elements which are the senses of living equilibrium among the interrelationship of nature human and architecture. The recommendation of this research is a design method that revitalized and preserved Thai architectural wisdom as a Thai National Heritage.

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Thesis Advisors’ signatures 1. 2.

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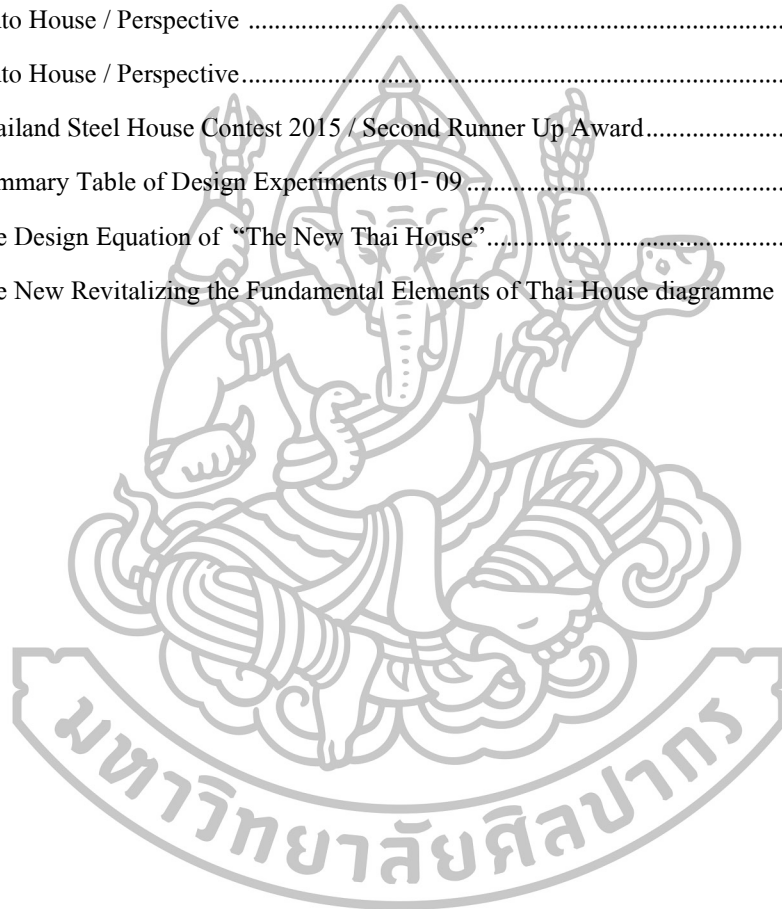
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Chapter 1

Introduction

Significance of the problem

In the midst of natural changes that occurred in various forms of natural deterioration that have increased on a daily basis which has been the consequence of a state of imbalance in the ecosystem. Therefore, when nature displays its immensity over humans, it has been the primary cause of the changes of “thinking” in regards to the way of living concerning the relationship between nature, humans, and architecture. It is because architecture for living is created in order to protect humans from destructive nature and to provide space for various activities. As time passes by, architecture is being developed into some specific characteristic form, which conformity reflected to the uniqueness way of living of each ethnic group among the diversity of cultural landscape. Likewise, architecture for living in Thailand that has also been developed through the intuitionally process of knowledge accumulation through time against limitations, with respectively understanding in the significance of the locality, time, seasons in which everything is united harmoniously with nature.

However, due to the definition of the word- “Thai house” (Ban Thai or Ruean Thai) that has been inherited some deviation and distortion. Therefore, an image of a clustered wooden house raised on stilts with streamlined curves of a gable roof with hornlike finial (Ngao - in Thai) and gable end (Pan Lom - in Thai), with a large terrace will come to mind when they think of Thai house. Such image represents the architectural form of Thai houses in the Central plain of Thailand which acclaimed as the “national symbol” filled with the “myth” attached to Thai custom and traditions and eventually this form of architecture has become a distorted stereotype that has been influenced, dominated, and manipulated the development of Thai house to the aforementioned Thai physical appearance over the time.

Consequently, since Thais have seen Ban Thai as an “old aesthetic”, the status of Ban Thai or Ruean Thai in present day has become more likely a museum for preserving the Thai

architectural form, so that future generations can study the “state patterns” of the residence where Thai people lived in the past. Although the Ruean Thai can still be found as a living place for people, but most of them are old and have been dilapidated and will deteriorate with time. While, the evolution of Ban Thai to date (the newly built) can only be adapted by using modern materials, technology and new construction method, which turned out to be just a “contemporary Thai house”.

In the meantime, architecture for living in Thailand has received the influences from international style and adopted as a “new aesthetic”. Which is being used extensively without any consideration to a connection with the “Thai architectural wisdom” which has been synthesized through time until it becomes a knowledge of understanding conforming to place, time, and seasons which lead Thailand’s ecosystem to the state of “equilibrium”. The outcome that “emerges” from today’s architectural design concept is seriously not suitable for Thailand’s topography, climatic, and social context, particularly in a current situation (2014). Besides, it has created changes in all dimensions especially the primary reason for the cause of Thailand environmental problems and natural changes that as time passes by will increase in ferocity under the present circumstances.

Goals and Objectives

1. To investigate the fundamental elements of “Ban Thai” or “Ruean Thai” (in English- Thai houses) in the areas of its origin, evolution, and turning points that caused the distortion of its meaning and definition. In order to find out an essential element of Thai house that concealed in the Thai architectural form.

2. To synthesize all collected informations and fundamental elements of Thai architectural wisdom in connection with Thai modern context, in order to refine them as the research finding knowledge, then revitalizing it into the form of conceptual design to be used in both, numbers of design experiments, and also in the professional design practice.

3. To propose of the alternative models of design in order to revitalize and preserve the precious Thai architectural knowledge through the new form of Thai architecture for living, and this may be a significant implication that Thai forgotten heritage is coming back for a revival.

Hypothesis

1. Thai architectural wisdom is authenticated that has been continually developed through time. Then, in order to revitalizing its fundamental elements, the relate contexts in the present day are needed to be taken into consideration through the process of refinement which are the reduction of insignificances and strengthening the essences of Thai architectural wisdom to date.

2. The true potentiality of Thai house is not concerning to Thai architectural form, but rather Thai architectural wisdom that profoundly reflected the understanding in the way of living sustainably in the appropriate form of architecture among the specific site of Thailand natural setting.

3. The meaning of Thai house is needed to be reinterpreted and defined, in order to revitalizing the revolution of Thai architecture for living back to revival, since its has been distorted, freeze, and mislead the development of Thai house that supposed to conformity to the diversity of Thailand context for decades.

Scope of the study and limitations

1. The definition of Thai house in this research is based on the house located in the Kingdom of Thailand and the house of Thai people in general.

2. The research objective is only aimed to identify the similarity of Thai house found in the Kingdom of Thailand without taking Thai architectural form (architectural elements, and ornaments of Thai traditional house or Thai vernacular house such as Ngao, Pan-lom, or Ka-lae) and the variety or the differences of ethnic groups or beliefs into consideration.

3. The outcome of this research will be presented as a model of “conceptual design philosophy” derived from the research finding knowledges that could be an alternative direction to continue the development of the new Thai house. Please note that the forms of architecture that appeared in this dissertation are intended to reflect some examples of the finding concept implementation only.

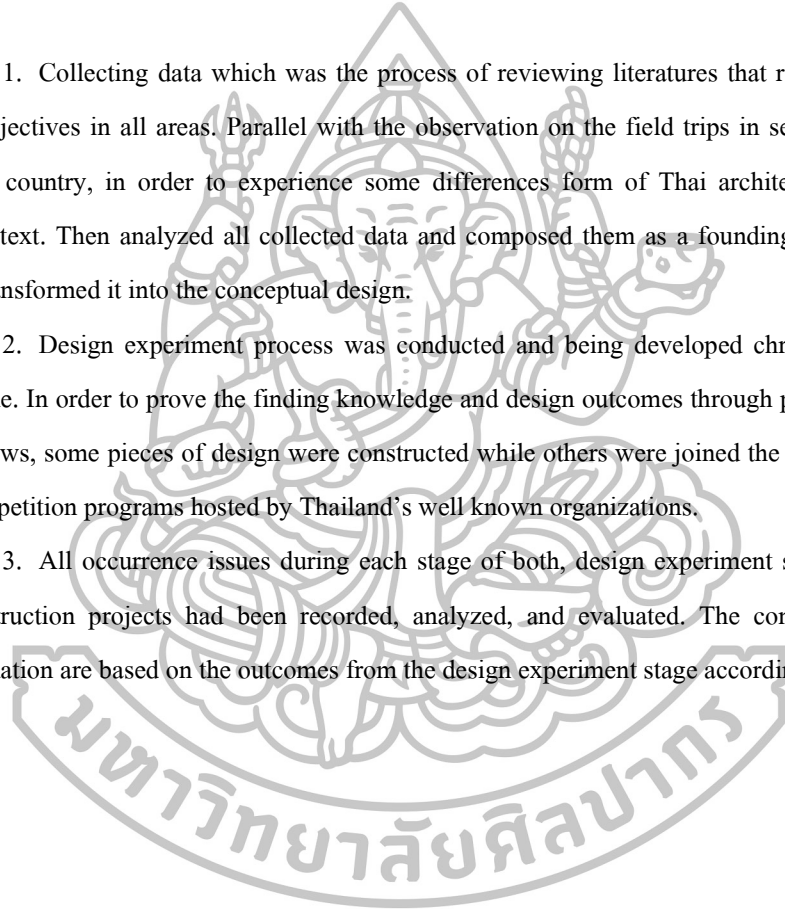
Research Methodology

The research methodology of “Revitalizing the Fundamental Elements of Thai House” was framed in accordance with phenomenology method in order to investigate throughout all of the research objectives which are Thai traditional house and also Thai vernacular house empirically. The research method was divided in 3 phases which commenced chronologically as follow;

1. Collecting data which was the process of reviewing literatures that related to the research objectives in all areas. Parallel with the observation on the field trips in several places around the country, in order to experience some differences form of Thai architecture in the present context. Then analyzed all collected data and composed them as a founding knowledge and then transformed it into the conceptual design.

2. Design experiment process was conducted and being developed chronologically through time. In order to prove the finding knowledge and design outcomes through professionals point of views, some pieces of design were constructed while others were joined the architectural design competition programs hosted by Thailand’s well known organizations.

3. All occurrence issues during each stage of both, design experiment sketches and some construction projects had been recorded, analyzed, and evaluated. The conclusion and recommendation are based on the outcomes from the design experiment stage accordingly.



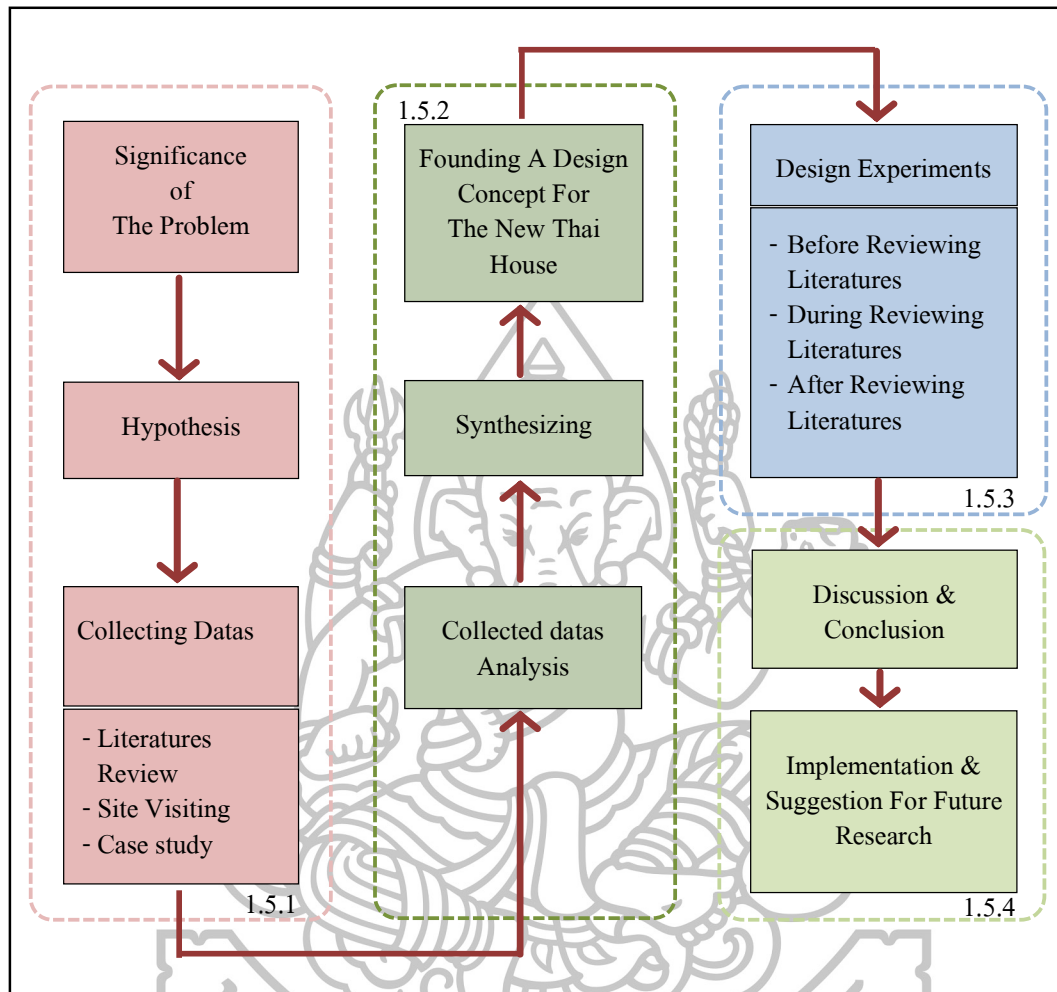


Figure 1 The process of research flow chart

Terminology

The definition of Ban Thai or Thai house in the context of this research refers to the architecture for habitation of people who have settled down in this territory, even before and after that this region is to be known as Thailand in the present day. The period of time and the major turning points that have chronologically impacted to the change of social dimension, which directly lead to the development of architectural form for habitation from the primeval age to the present time are being investigated, in order to connect the stories that are relevant to the Thai house in the dimensions that associate with the hypothesis and scopes of this research.

Therefore, in order to understand the overall context of this research, there are some key words mentioned in this dissertation that need to be clarified as follow;

Thai house	means	Thai traditional House / Thai vernacular house House of Thais The uniqueness characteristic of house that found in Thailand
Ban (in Thai)	means	Village, town, and community Individual house (in the present context) house, dwelling, and residence
Ruean (in Thai)	means	Thai traditional house in the sense of the building only Household
Thai	means	People or groups of ethnic that reside in this region from ancient time until now (include)
Thailand	means	The new country that formerly known as Siam which changed to Thailand in 1939
Interrelationship	means	The connection of Nature Human and Architecture that affect one another
Ban Ban	means	Simple and uncomplicated in Thai language The administration of 4 th classical elements in architecture

Chapter 2

Literature Review

Introduction

Initially, the study of Thai architecture has been started after “the Siamese revolution” in 1932 by a group of Thai pioneer architects who had created number of literatures concerning Thai architecture that define the meaning of Thai House which later becomes the fundamental basis of knowledge to all Thais. Therefore, to review all related area of Thai house, researcher could not focus only on the areas of architecture but some relevant contexts around the research objective have to be taken into consideration as well. This is because the alteration of Thai architecture for living is directly related to all consistency of those surrounding factors such as sociology, economic, and politic undeniably.

This chapter is divided into 2 parts, firstly will be the related data collection which mainly focuses on the meaning and perception of the word “Thai House”, and also related theories and classification of Thai house, in order to clarify the research’s objective thoroughly through the origin of its development and the turning points that caused the distortion of its meaning. Secondly will be the observation part, the characteristic of Thai house and its context will be observed and investigated through the number of site visits across the country. In comparison with some project references that reflects to the movement of Thai house in the present context. After all selected literatures were reviewed, this study found some linkage that could lead to a new body of knowledge that waiting for synthesizing in the next chapter.

Meaning and Definition of Thai house

Generally, “word” and its “definition” could has both, denotation and connotation meanings which definitely depend on specific intention that lead to interpret its meaning according to each context and condition that surrounded among the “word” itself. Likewise the term “Ban Thai” that combines two words which are “Ban” (house in Thai) and “Thai” (people or

country) which the meaning of both words, have been discoursed and also cover the overlapped meanings within meaning. Therefore, word's definition and some specific interpretation are needed to be clarified to create the understanding of the denotation and connotation meanings before the new meaning of Thai house is re-interpreted.

Nowadays, the word "Thai" is a major part of problematic in Thai's society, since its definition has been defined as a "political invention for century. It was created under the nationalism policy with an aim to manipulate Thais perception to understand "Thai" only in terms of nationality, not races".¹ That means all differences and complexity of cultures, languages, and group of peoples are defined altogether in one word. As a results, when Thais thinking about Thai, or Thai-ness (Being Thai or Thai stereotype), it involves some broader meaning in a boundless intangible aspect, which depends on a person who uses this term and mentions it in each situation. Similarly to the combination of the word "Thai + house" has brought into a new word with new meaning;

However, when we talk about Ban Thai (Thai house), an immediate picture appearing is an image of a stilt-raised house featuring a gable roof with hornlike finial (Ngao - in Thai), a gable end (Pan Lom - in Thai), and a veranda, situated on a riverbank or in a paddy field.²

The above reference reflects a general Thais' perception which indicates the characteristics of houses (in the past) that is only founded in the Central Region of Thailand. That could explain on the derivation of myth of Thai house, which assumes that the traditional Thai house is a symbol of "national architecture" that reflects the aesthetics of Thai's way of life and culture, according to the state's convention and the nationalism policy of "People's Party" in 1932. Since then, the distorted meaning of Thai house has permeated the subconscious of Thai

¹ Lukkana Phanvichai, " "Kum Phaga", Thai is Nationality", **Matichon Weekly** 1834 (5-15 October 2015): 97.

² Srisak Vallibhotama, **Thai Traditional House, Thai House** (Bangkok: Muang Boran Publishing, 2009), 70.

society from one generation to another. This occurrence corresponds to the social ideology of Postmodernists; for example, “Roland Barthes” regarding the theory of Semiotics and Mythologies, the study of meaning making through signs and elevated to the level of myth then considered as belief, tradition, and culture.³

Also, “Michel Foucault” in the power of discourse as said; upon the collective consciousness that systematically brain washing to the understanding of some specific definition that being instructed via the education system through time, in order to manipulate the truthfulness for some reason.⁴

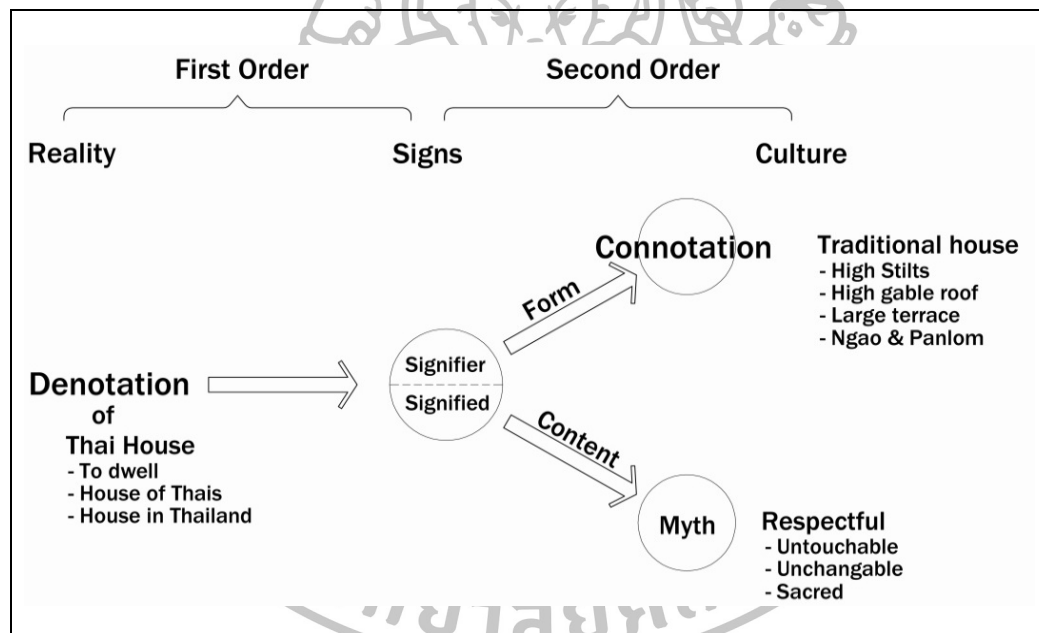


Figure 2 Semiotics and Mythologies Diagramme: The diagramme describe how semiotics and mythologies reflect to the meaning of the word “Thai house”

³ Wikipedia, **Semiotic**, accessed October 29, 2015, available from <https://en.wikipedia.org/wiki/Semiotics>

⁴ Wikipedia, **Discourse**, accessed October 29, 2015, available from <https://en.wikipedia.org/wiki/Discourse>

With such approach, it widely affected the social perception and understanding in terms of the development of Thai houses, which focused on the outer part: a form of architecture (physical appearance), meanwhile overlooking the inner part, a core ideology of Thai architectural wisdom, that is an intangible quality hidden under the myth of a strong characteristic of Thai traditional house. Consequently, this distorted meaning mislead and freeze the development of Thai house in to a state of untouchable and unchangeable form of architecture.

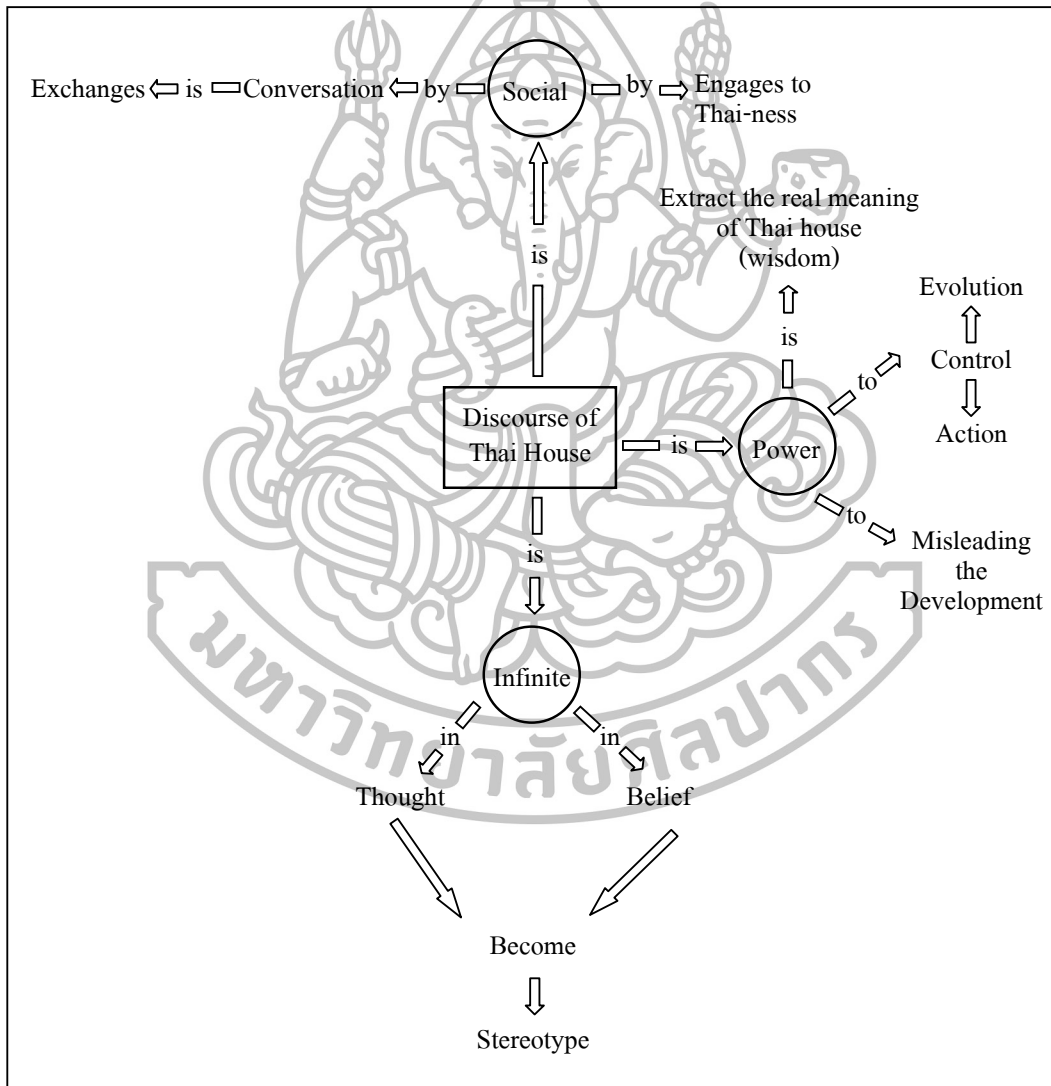
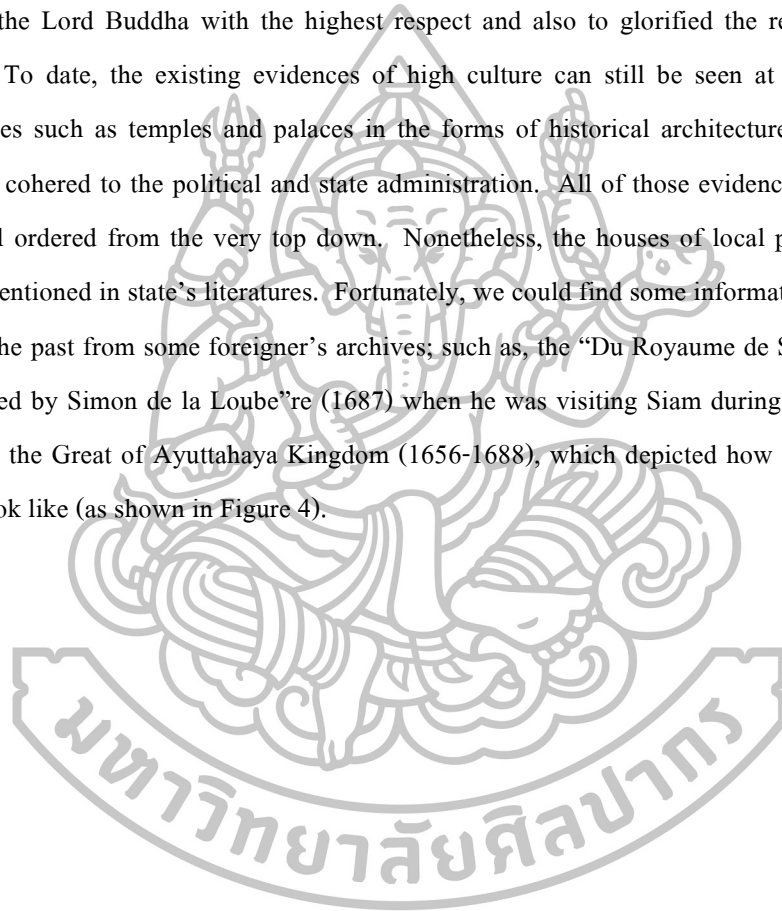


Figure 3 Discourse Diagramme: Shown the consequences that caused by the discourse of Thai house.

Theories of Thai architecture

Initially, the source of information in the areas of architecture for living in Thailand can be divided into two categories. Firstly, “written literature”, which represents the “High Culture”⁵ that usually appeared in the form of historical records, annals, poetics, and mural paintings,⁶ recorded by the “state”. The main purposes of the written literatures are to acclaimed the Lord Buddha with the highest respect and also to glorified the reign of each kingdom. To date, the existing evidences of high culture can still be seen at the national heritage sites such as temples and palaces in the forms of historical architecture which was undeniably cohered to the political and state administration. All of those evidences are in the hierarchical ordered from the very top down. Nonetheless, the houses of local people (folk) were not mentioned in state’s literatures. Fortunately, we could find some information of “Thai house” in the past from some foreigner’s archives; such as, the “Du Royaume de Siam” which was recorded by Simon de la Loubere (1687) when he was visiting Siam during the reign of King Narai the Great of Ayuttahaya Kingdom (1656-1688), which depicted how the house of Siamese look like (as shown in Figure 4).



⁵ Veera Inphantung, “Built a House follows the Earth Placed the living follow the river line,” in **Collective of Journals in Thai vernacular and wisdom** (Bangkok: Faculty of Architecture, Silpakorn University, 2007), 8.

⁶ Nor Na. Paknum (Prayoon Auruchata), **Siamese House**, 5th ed. (Bangkok: Muang Boran Publishing, 2005), 13.

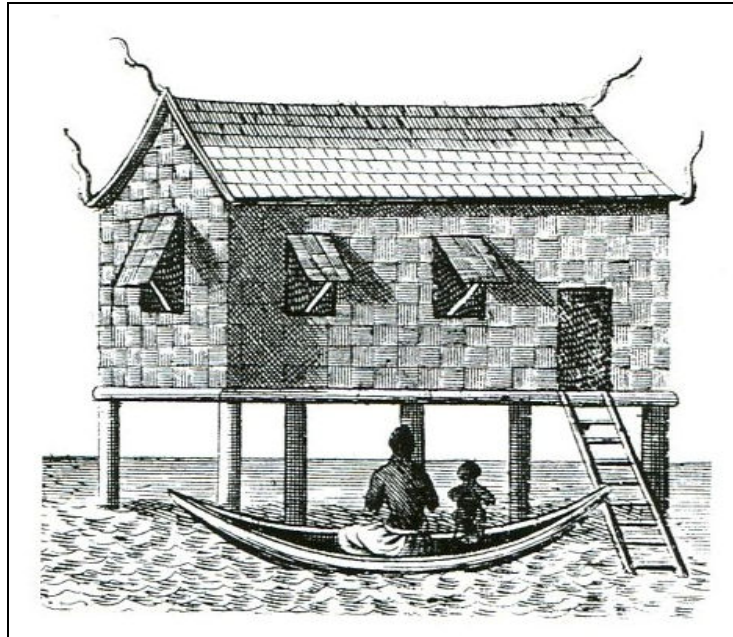


Figure 4 Siamese house, La Loube”re

Source: True plookpanya, **Simon de La Loubère**, accessed October 28, 2015, available from http://www.trueplookpanya.com/new/cms_detail/knowledge/19502-029700

Secondly, “oral literature” which represents “Folk Culture” that usually appear in the forms of myth, folk tales, folklores, and legends. The stories were generally related to “the way of life” and the interrelationship between the living existence and the limitations of surrounding contexts e.g., distinguished landscapes, places and seasons. Most of them are the stories about how to live in harmony with the Mother Nature through the quinine experiences, which are indigenous knowledge and folk wisdom that originate culture, traditions, beliefs and distinctively create unique form of architecture.

Interestingly, this kind of literatures appears in the form of intangible material that has been passed down verbally from one generation to another. Some knowledges might differ from the origin due to the change of limitations through time, but the principle of its philosophy still reflects on the Thai vernacular house. Likewise, “The story of Sibsongbanna’s house” that we can investigate through the development of domestic architecture by tracing from the existing information to the origin.

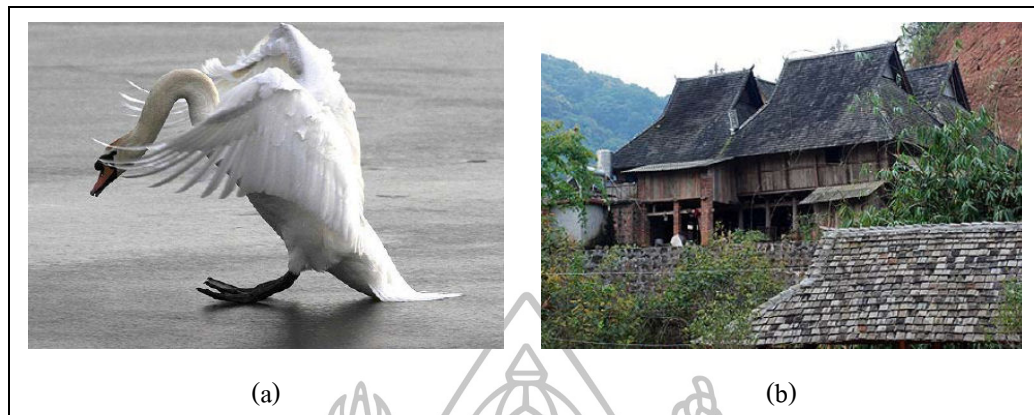


Figure 5 The Heaven Swan: The story of Sibsongbanna's House: Shown the roof form of Sibsongbhanna's house that influenced by the form of nature.

(a) Landing swan

(b) Sibsongbanna's house

Source : World Culture Pictorial, **Mastery of winter: onto ice are skaters, swan, crabapple tree, child & sculptures at International Ice & Snow Show**, accessed October 28, 2005, available from <http://www.worldculturepictorial.com/blog/content/mastery-winter-ice-are-skaters-swan-crabapple-tree-child-sculptures-international-ice-snow-s>

: Bond Street Tour & Travel, **Sibsongbanna's house**, accessed October 28, 2005, available from http://www.bondstreettour.com/9_group_tour_gallery/sipsongpanna/sipsongpanna_03.htm

Actually, the development of architecture for living of High Culture and Folk Culture has been developed in parallel through time. The differences between both cultures are hierarchy and order of the traditional architecture and limitation of accessibility to the construction materials and technology, which depend on both social and economic status of the owner.

However, from the establishment of the first architectural school in 1932 to present, the study of Thai architecture can be classified into two difference approaches: the theory of Thai traditional house (main stream or conservative or old school) and the theory of Thai vernacular house (upstream or progressive or new school). Even though, both approaches have the same objective, which is the study of architecture for living that found in Thailand, however, the scope of study are based on different assumption and approach that conduce to the differentiate of the knowledge outcomes, as follow;

1. The Theory of Thai Traditional Architecture (Mainstream/Conservative)

In 1955, Professor Un Nimmanhemmin established the curriculum of Thai architecture theory with an objective of showing the entire architectural identity of Thai nationality. That is the beginning of systematically collecting information of Thai houses to comply with the Western academic standard, which mainly based on the diagrammatic functionalism”.⁷ Also, there were the two main points from Professor Chote Kalayanamit’s assumptions on the Thai architectural study stating that

the unchanged of Thai architectural characteristics all through many past decades has shown that there must be some kind of concepts lying as a principle hidden here⁸

and “there are three unique identities in the Thai architecture: serenity, lightness, and float, which corresponds to the purpose of Buddhism that is to teach human to be free from suffering”.⁹

Those assumptions refer to the traditional Thai’s way of life which related to the core of Buddhism and Tribhumi paradigm, which can explain the meaning of architecture in accordance with the nationalism policy after the country was renamed from Siam to Thailand in 1939.



⁷ Kitchai Jitkhajornwanich, **TRANSITION Architecture by Laan Design** (Bangkok: D.D. Media Publishing, 2010), 48.

⁸ Choti Kalayanamitra, **Traditional Thai House** (Bangkok: The Association of Siamese Architects under the Royal Patronage of His Majesty, 1996), 20.

⁹ Ibid., 22.



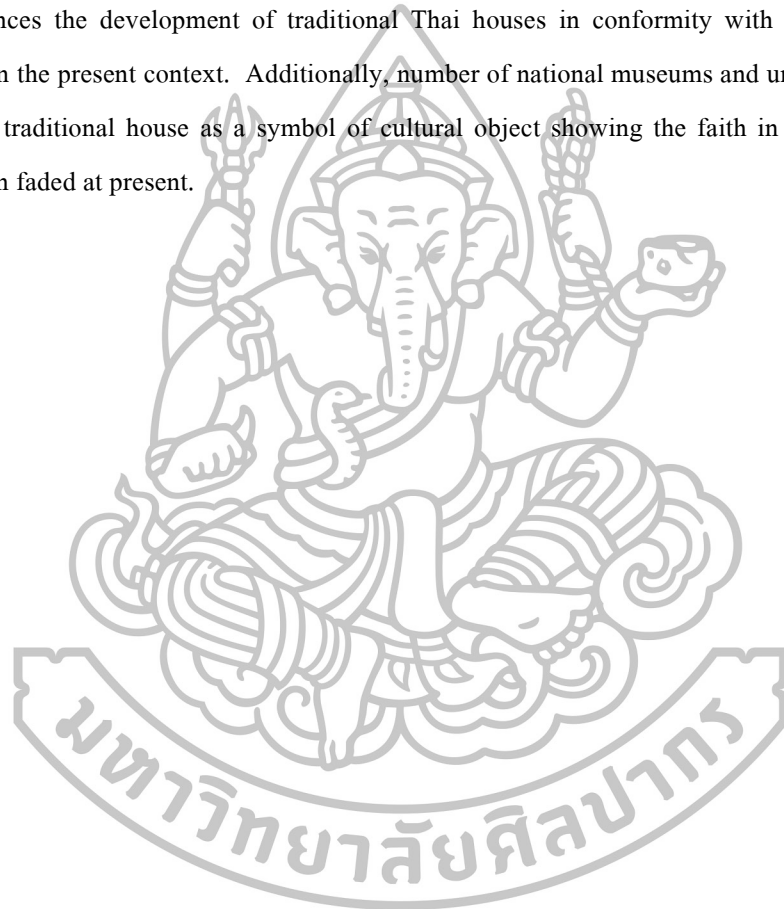
Figure 6 Tub Kwan Palace, Nakorn Pratom: The most beautiful Thai traditional house owned by King Rama VI, which is a prototype of Thai tradition theory.

Source: **Tub Kwan Palace, Nakorn Pratom**, accessed October 28, 2005, available from <http://www.bloggang.com/viewdiary.php?id=phukboong69&month=05-2009&date=05&group=8&gblog=1>

Due to the point of views in analyzing architecture that based on the diagrammatic functionalism, which is an “outsider’s perspective”,¹⁰ that reflects the ideal of centralization and secularization to the content of study which primarily emphasized on the physical appearance, proportion, and architectural components of the traditional Thai house in the Central Region (as shown in Figure 7). The house of a wealthy family or “Ruean Krueang Sap” (hard wood house) has been acclaimed as a traditional Thai house that illustrates Thai

¹⁰ Srisak Vallibhotama, **Thai Traditional House**, 10.

aesthetics in terms of architectural form, craftsmanship, and construction method combining with myth and beliefs which becomes a principle of Thai culture endorsed by the state. This is when Thai houses turned into a stereotype for people both inside and outside Thai society to perceived Thai house as a wooden house raised on stilts high gable roof with an exquisitely delicate “Ngao and Panlom” (hornlike finial and gable end). This grows into a Thai identity that influences the development of traditional Thai houses in conformity with a pattern of residency in the present context. Additionally, number of national museums and universities to build Thai traditional house as a symbol of cultural object showing the faith in the past yet having been faded at present.



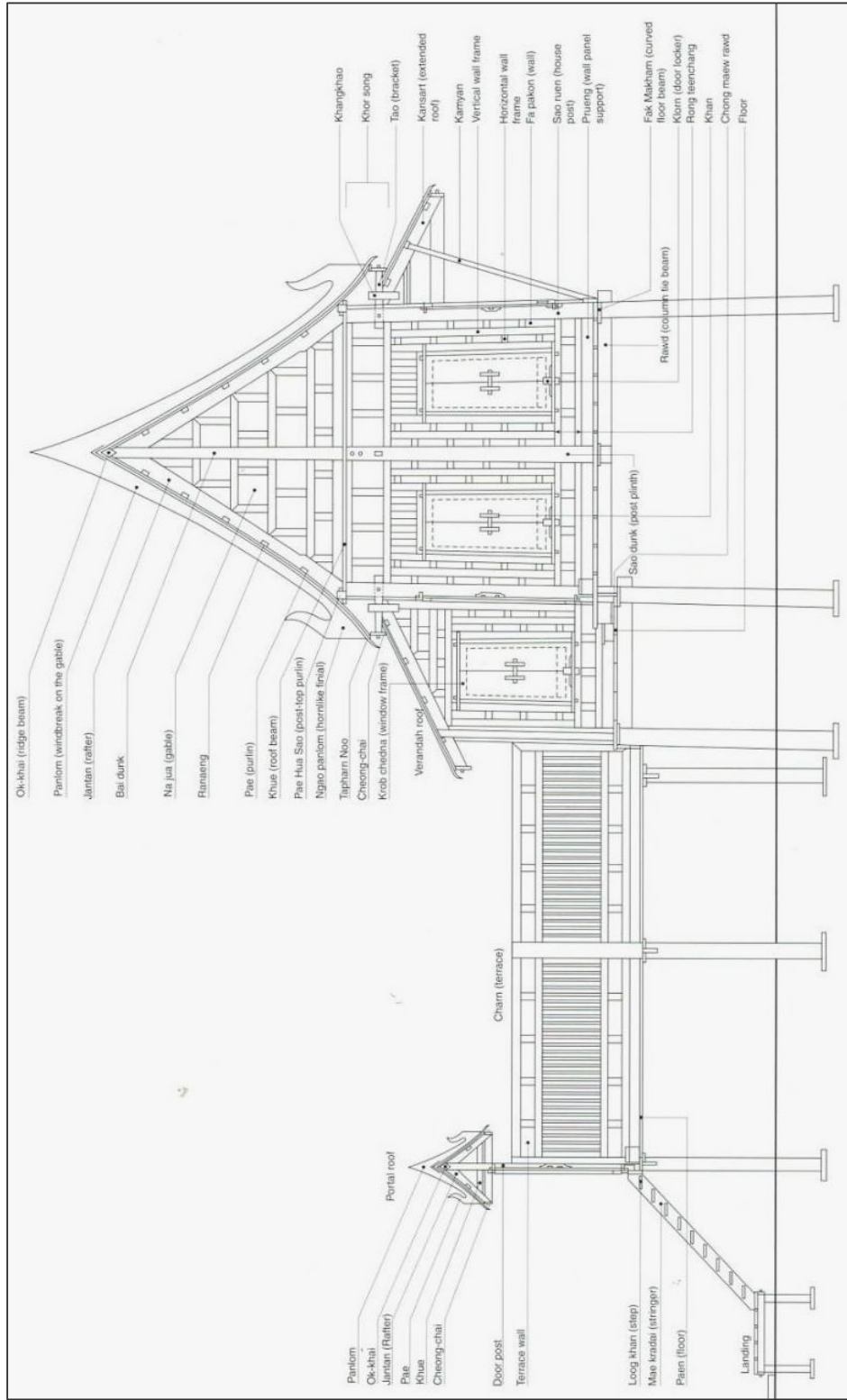


Figure 7 Architectural Ornaments of Thai traditional House
 Source: RueThai Chaichongrak and others, **The Thai House: History and Evolution** (Bangkok: River Books, 2003), 81.

Consequently, the adherence to the Thai architectural form of this theory which believes that traditional aesthetic is unchangeable while “the crucial condition of architectural wisdom is functionality, whenever functionality is treated as art, it will be dead”.¹¹

Therefore, the development of Thai house can only be done by applying modern materials and construction method into a form of Thai traditional house. Such development can be considered as a “turning point” that misleads the evolution of Thai architecture for living, this is because, in fact, Thai house has been developed in accordance with both architectural form and architectural wisdom identically, but the mislead development have been focusing only on the physical appearance of Thai traditional house (as shown below).



Figure 8 Adapted Thai House

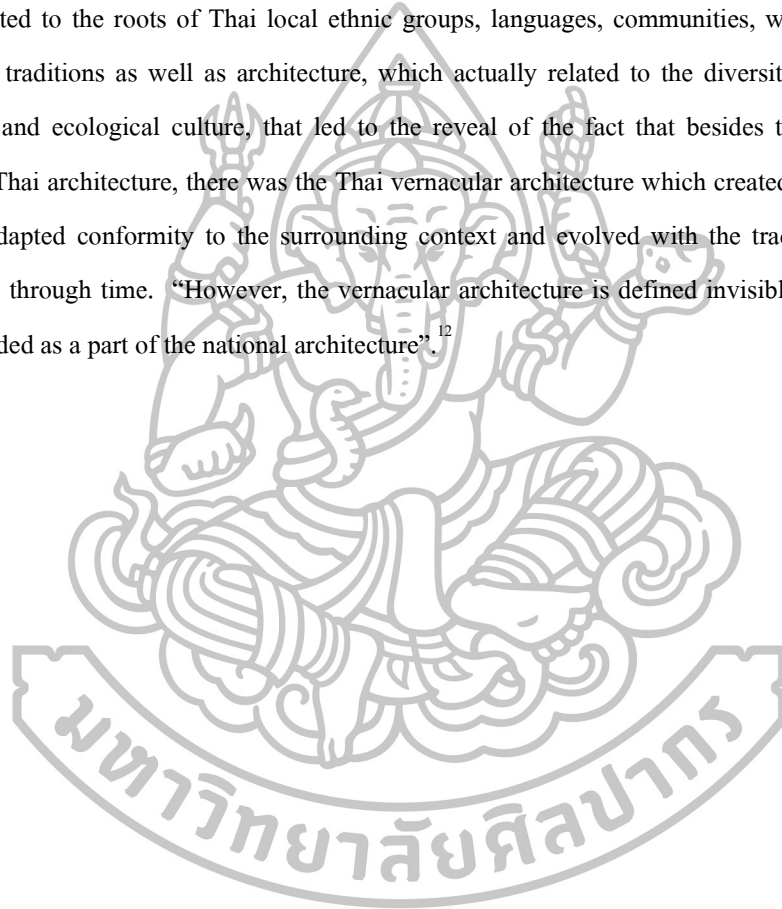
Source: Vladi private islands, **Amanpuri, Thailand**, accessed October 28, 2005, available from <http://www.vladi-private-islands.de/en/rent+amanpuri+thailand+indian-ocean-africa/>

In summary, the theory of traditional Thai architecture has put most effort into the study and develop Thai form, proportions, elements, ornaments and customs, while neglecting the intangible value, which is a philosophy and a fundamental of Thai architectural wisdom that created Thai architectural form, which as time passes by, this theory has shown no sign of connectivity between the Thai traditional form and the present context.

¹¹ Arwut Ankawut, **Architectural Wisdom series 2** (Bangkok: Arsom Silp Institute of Arts, 2010), 148.

2. The Theory of Thai Vernacular Architecture (1995)

Consequently, the outcome of the traditional Thai architecture theory brought into questions and in pursuit of answer by the Thai architectural academics in the latter period. Furthermore, the integration of humanities, economics, architectural, social, and political sciences as the same oneness knowledge led to the initiation of the Thai vernacular architecture theory that interconnected to the roots of Thai local ethnic groups, languages, communities, way of living, beliefs and traditions as well as architecture, which actually related to the diversity of cultural landscapes and ecological culture, that led to the reveal of the fact that besides the theory of traditional Thai architecture, there was the Thai vernacular architecture which created by folk and has been adapted conformity to the surrounding context and evolved with the traditional Thai architecture through time. “However, the vernacular architecture is defined invisible, it was not being recorded as a part of the national architecture”.¹²



¹² Veera Inphantung, “Built a House follows the Earth Placed the living follow the river line” in **Collective of Journals in Thai vernacular and wisdom**, 6.

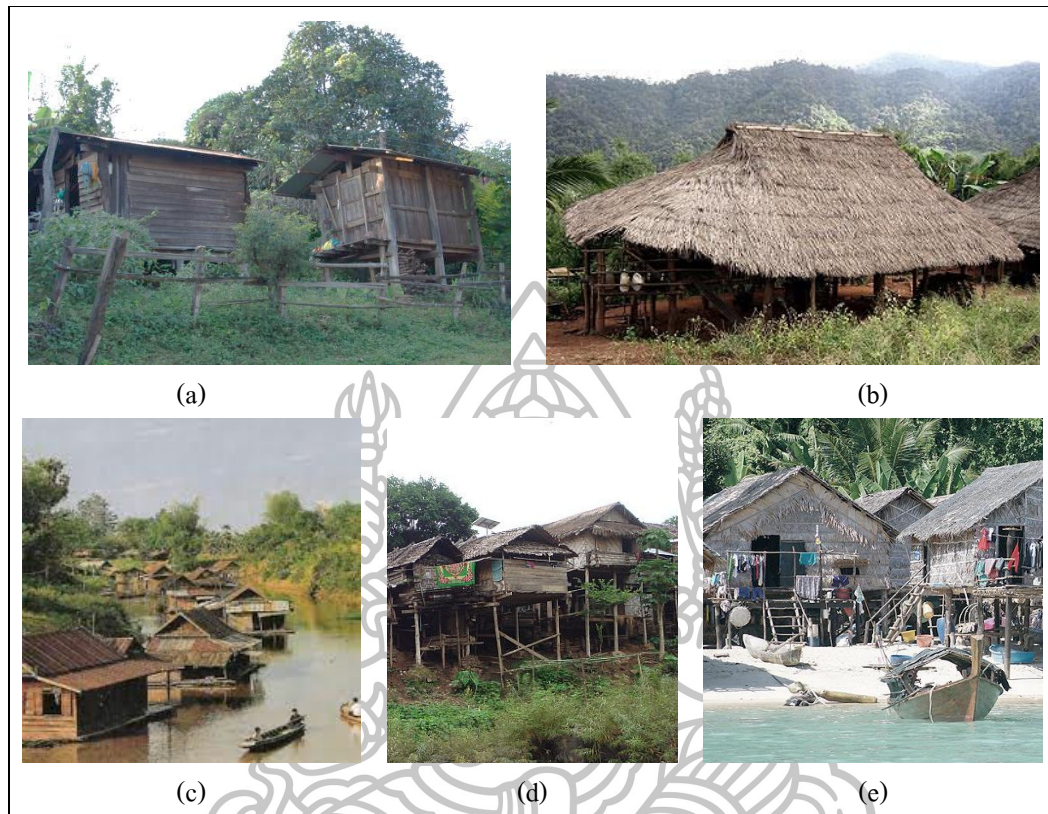


Figure 9 Thai Vernacular House: Folk Culture

(a) Pwa Ka Nyaw's House

(b) Tai Song Dum's House

(c) Raft House

(d) Karen's House

(e) Mogan's House

Source : Thai tour, **Pwa Ka Nyaw's House**, accessed October 28, 2005, available from http://www.thai-tour.com/wb/view_topic.php?id_topic=79

: Manager, **Tai Song Dum's House**, accessed October 28, 2005, available from <http://www.manager.co.th/Travel/ViewNews.aspx?NewsID=9490000006237>

: **Raft House**, accessed October 28, 2005, available from <http://topicstock.pantip.com/sinthorn/topicstock/2012/01/I11524963/I11524963.html>

: **Karen's House**, accessed October 28, 2005, available from <http://www.bloggang.com/viewdiary.php?id=naomichankurobara&month=08-2010&date=26&group=2&gblog=229>

: Matchon Oline, **Mogan's House**, accessed October 28, 2005, available from http://www.matichon.co.th/news_detail.php?newsid=1357877536&grp_id=03&catid=03

In addition, the theory of Thai vernacular architecture shows that the real meaning of Thai houses is not all about a beauty form of architecture but rather the wisdom that shown the understanding of living among nature as reflected through the attitude of reaction in adapting the form of architecture wisely in order to live conformity with nature (as shown in Figure 9 above). Moreover

to study the vernacular architecture, there are so many factors that related to the ideal of creation of the shapes, forms, space and functions of architecture, such as the study of ecological community system and humanities through tradition, customs, and beliefs that somehow reflected to the orientation and planning of each village individually. Furthermore, the study of vernacular architecture gives us tremendous academic knowledge and makes us understand the creativity of the folk wisdom, which can lead to the creation of new architecture based on fundamental knowledge and deep comprehension in the community attributes.¹³

The objective of Thai vernacular architecture theory is to study the different kinds of houses found in Thailand and to research through the way of living in comparison between each ethnic groups in Thailand and South East Asia. In order to conserve and maintain the Thai vernacular architectural heritage amidst the change of social, economics, and cultural in all dimensions. Also, study though the fundamental of the folk wisdom in order to purified the knowledge and then apply on the creation of the modern Thai architectural design concept.

¹³ Ornsiri Panin, **Thai Vernacular House and Villages** (Bangkok: The Association of Siamese Architects under the Royal Patronage of His Majesty, 1996), 9.

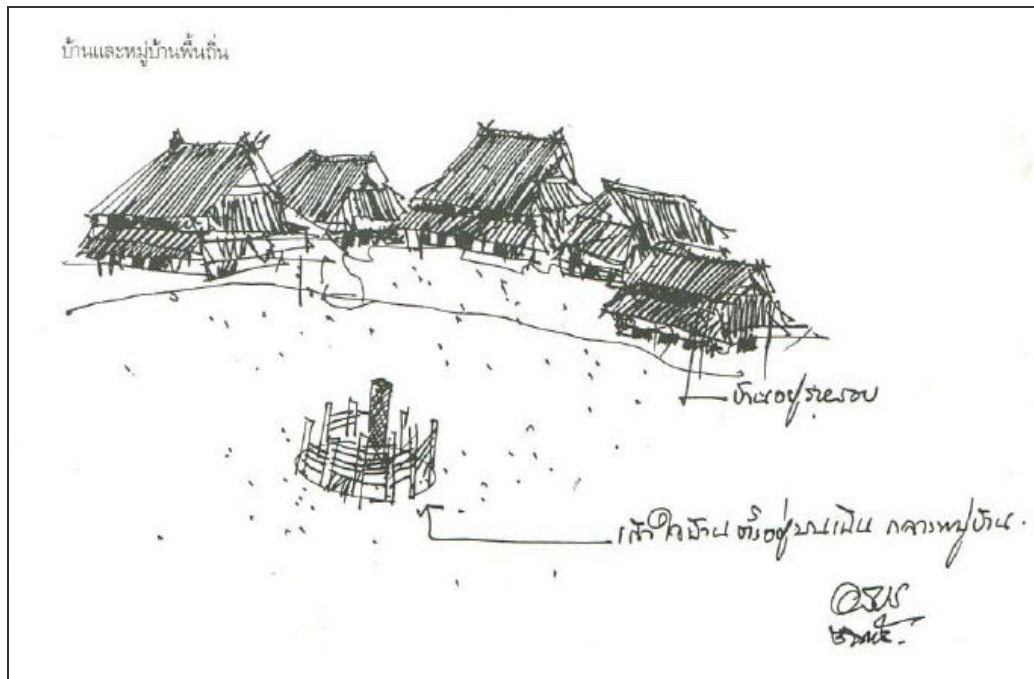


Figure 10 The Study of Thai Vernacular House: The free hand sketch of Ornsiri Panin pioneer of Thai Vernacular architecture theory.

Source: Ornsiri Panin, **Thai Vernacular House and Villages** (Bangkok: The Association of Siamese Architects under the Royal Patronage of His Majesty, 1996), 54.

Although, this theory focuses on the physical appearance of the house as a centre of the study as well as the mainstream theory. However, its surrounding contexts which contain both tangible and intangible values are the core of research, since “the vernacular architecture consists of the environment and context that are dynamically changing through time and occasion under the limitation of each cultural landscape and the accessibility condition to the natural resources”.¹⁴

In terms of the theory of architecture, the principle of concepts and wisdom of Thai vernacular architecture is similar to the ideal of green architecture which is an internationally sustainable concept that mainly focused on environmental concern (see Figure 11). As a result, some Thai architects take the concept of Thai vernacular house to apply with their designs and

¹⁴ Arwut Ankawut, **Architectural Wisdom series 2**, 27.

after all, they all rely on the same fundamental of Thai architectural wisdom. However, the design outcome especially in terms of architectural forms are diversified and pluralism.

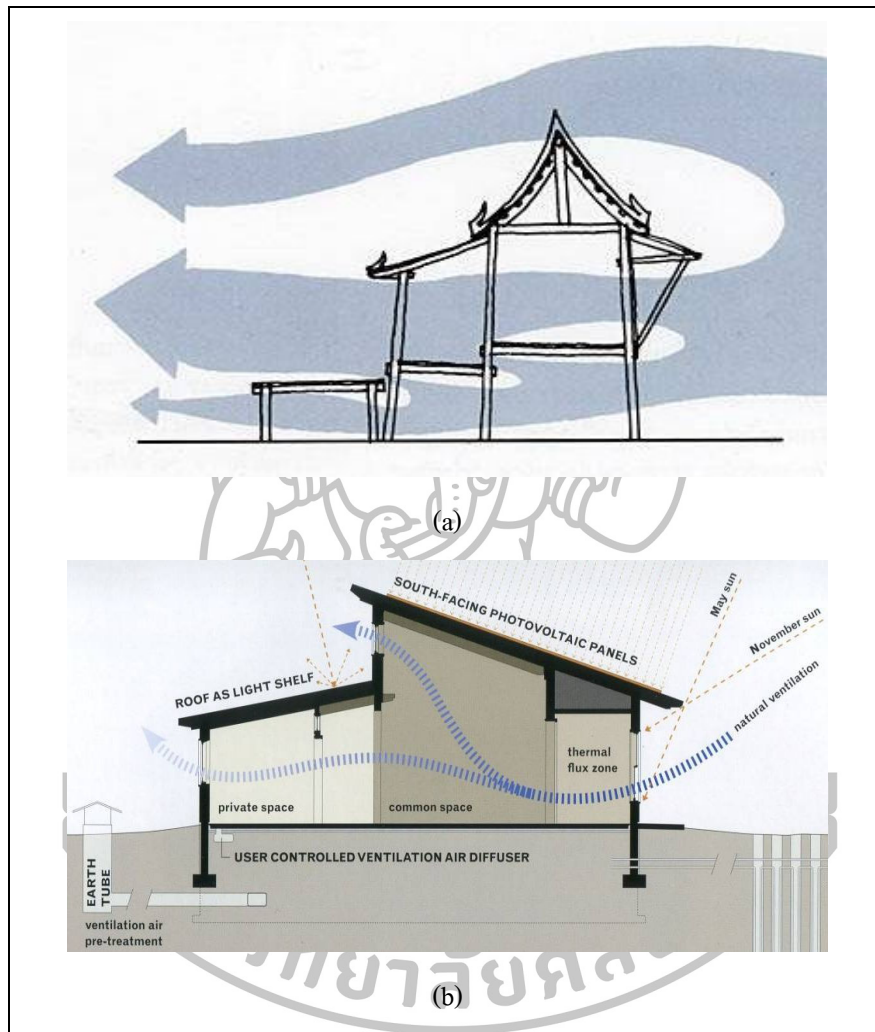


Figure 11 The Comparison cross section of Thai Vernacular House and Green house

(a) The ventilation of Thai House

(b) The Ventilation of Green House

Source: **Laksanathai**, accessed October 28, 2005, available from <http://www.laksanathai.com/book2/p396.aspx>

: Sedat Bayrak, **Aldo Leopold Legacy Center**, accessed October 28, 2005, available from <http://www.sedatbayrak.com/mimar/mimar-infographicler/>

The integration of the sciences in the theory of the vernacular architecture has vastly changed the perspective of Thai domestic architecture; due to the interconnection among the social, culture, environment, ecology, communities, and houses after the study method of the traditional Thai architecture secluded them apart. As a result of viewing as a holistic approach, the image of wisdom came out from a concrete solution of Thai vernacular architecture, which is the process of thinking occurring under the constraints of the living amidst natural environment. However, it still values the significance of simple beauty that blends with the way of living and tradition of folk culture. Which concentrate on how to simply make a living rather than create the materialistically beauty, on the contrary, it is simple and equal.

3. Summary

When considering the development of architecture for living in Thailand, researcher found that the starting point was the traditional Thai architecture theory, later, it was divided into the Thai vernacular architecture theory. Still, both theories share the same objective which is the Thai house, but focused on the different perspective. The first theory concentrated on the study of Thai houses in the Central Region in the context that viewing architecture as a part of the High Culture historiography. Hence, the physical appearance of Thai tradition house has been interpreted by diagrammatic and functionalism method. Consequently, the research conclusion came out in the form of the orders and regulations of traditional Thai architecture guided by size, proportion, and architectural components.

While the upstream theory has extended the scope of objective in wider dimension. Using the research methodology of Thai vernacular theory which focused on the profound study into the origin of the forms of architecture that varied according to the differ conditions of limitation and the way of life, that creates the specific form and unique characteristics of architecture in each local area in harmony with the cultural landscapes and related to place, time and space (as shown in Figure 12 below).

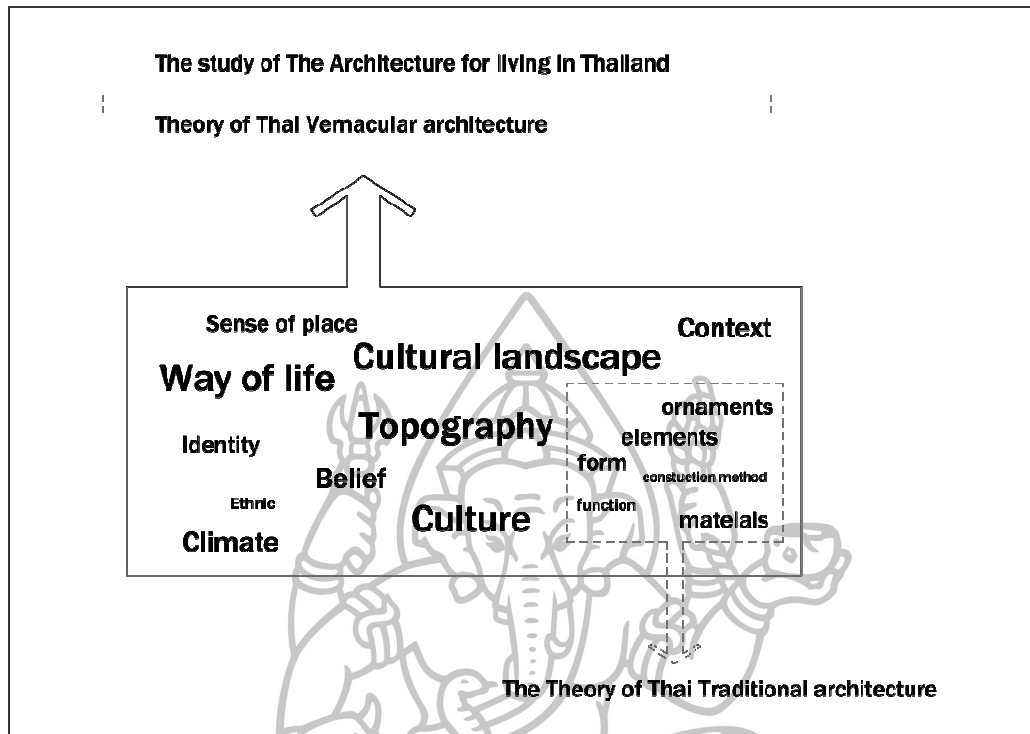


Figure 12 The Comparison of Traditional Thai Architecture Theory and Thai Vernacular Architecture Theory

However, the similarity of these theories is the reflection of architectural wisdom that shows the understanding of how architecture for living should react to nature. Which indicates the architectural evolution against the nature's condition through time; thus, it is the intuition deriving from solving the problems by using simple methods and in-depth knowledge arising from many constraints; such as topology, climate, natural resources, working equipment, custom, tradition and beliefs. All of these have influences on the evolution of forms and spatial functionality in the domestic architecture. From the concept, method and attitude to live with nature that harmonize with the way of life in the midst of the diversity of Thai vernacular houses, in fact, we can truly see the "the art of equilibrium" among the inter-relationship between human and human, human and nature, human and architecture and architecture and nature beautifully.



Figure 13 Inter-relationship Human - Nature – Architecture

Source: Pantip, **Music Video**, accessed October 28, 2005, available from <http://pantip.com/topic/33552706>

Chronology of Thai house

Initially, the evolution of the ethnic groups who resided in the South East Asia were based on the “Wood Civilization”,¹⁵ this is due to its physical appearance that was abundant with woods, which was the origin of using wood to construct the house. Therefore, it had some limitation of the material longevity that had deteriorated and ruined as time went by, which is the reason why there was no hard evidence left to study. Hence, in order to study Thai architectural history is just to conjecture and assume from founded evidences; such as, 1) mural paintings in the ancient sites 2) records in forms of legends, gazettes, and foreigners’ annals and 3) ruins. Based on the research study, the chronology of Thai architecture and its turning points can be summarized as follows;

¹⁵ Sumet Jumsai Na Ayuttaya, **Water: The Origin of Thai Culture** (Bangkok: The Association of Siamese Architects under the Royal Patronage of His Majesty The King, 1996), 82.

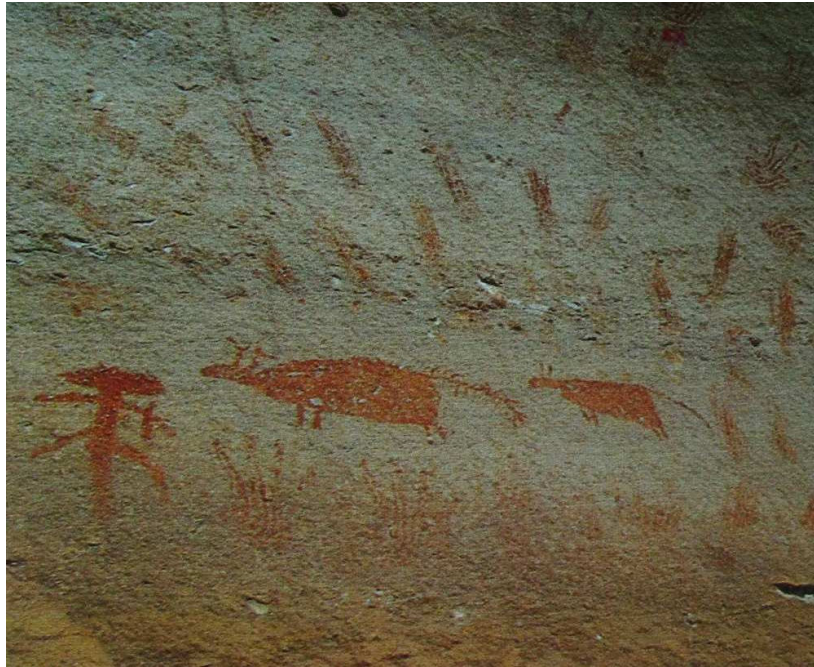


Figure 14 Pre-historic Cave- Art: The great evidence of mankind history.

Source: Kittisak Bhumisak, **Pha Taem, Ubonrajathani**, accessed October 28, 2005, available from <http://www.citizenthaipbs.net/node/4579>

Firstly, before the boundary line, in the primeval age, there are some evidences show that human in South East Asia lived in a cave. Until the agriculture and handicraft began the evolution, they were able to develop more tools that started building temporary dwellings nearby cultivated areas for giving them sheltered (Figure 15). From this assumption, it can be said that “Thiang Na” a temporary bamboo structure for utilities during the day time could be a prototype of architecture in South East Asia.



Figure 15 Thiang Na (Rice-field shelter)

Source: **Thiang Na**, accessed October 28, 2005, available from <http://www.klongdigital.com/webboard3/41678.html>

Since human had learned to cultivate, the settlement began, because they needed to stay in the areas until harvesting time. As time passed by, the size of community were expanded and became more complicated. Moreover, each communities have individually invented some uniqueness form of architecture in order to symbolized their intangible identities such as customs, traditions, culture, and religions, into a tangible identities consistently with the unique way of living and surrounded contexts. For example, the iconic roof forms that shown in Figure 16, which indicate the identities of house in each region (clockwise; North, Central, South, and Northeast of Thailand).

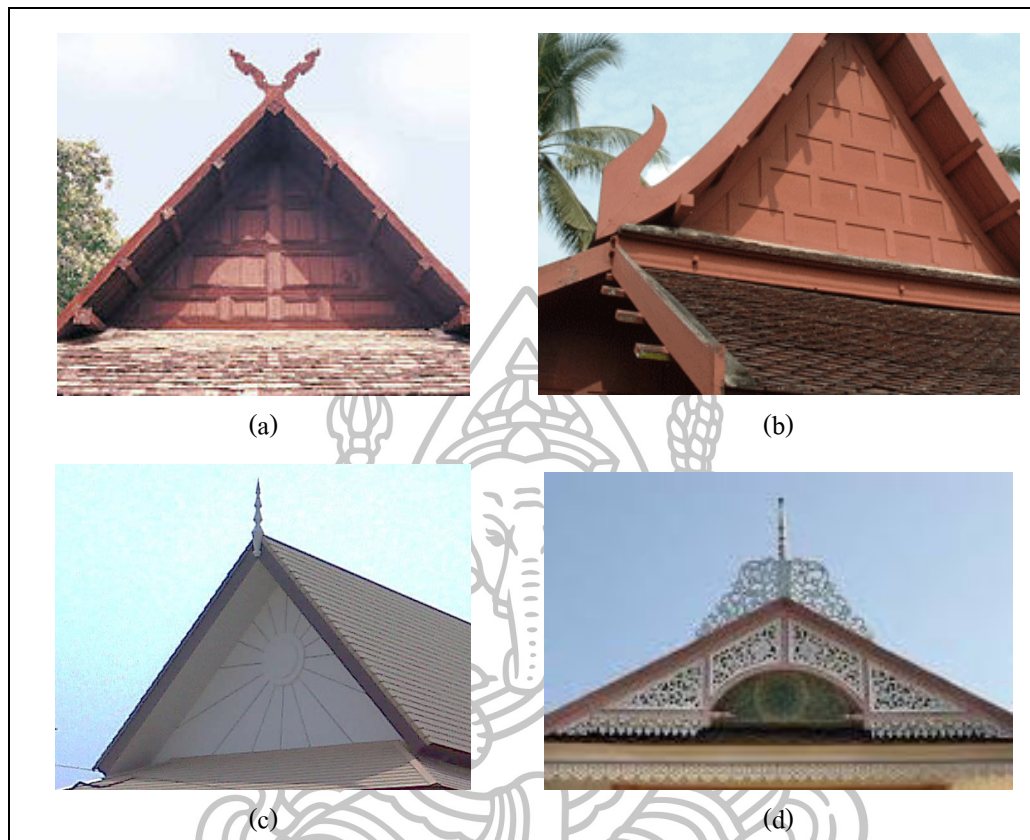


Figure 16 Ethnic Individually Identity

- (a) Kalae
- (b) Ngao
- (c) Sun pediment
- (d) Buva-Himutong

Source: Muslim Chiangmai, **Kalae**, accessed October 28, 2005, available from <http://muslimchiangmai.net/index.php?topic=775.0>

: OK Nation Online, **Ngao**, accessed October 28, 2005, available from <http://www.oknation.net/blog/civil/2007/09/29/entry-4>

: Ubon Ratchathani University, **Sun pediment**, accessed October 28, 2005, available from <http://picpost.postjung.com/m/152477.html>

: **Koom Wongsiri, Prae**, accessed October 28, 2005, available from http://www.comingthailand.com/2015/03/blog-post_73.html

Even though, form of architecture has always changed due to the alteration of its contexts, which mainly related to the change of natural setting and the shift of paradigm that generates beliefs, traditions, culture, religions, politics, and etc. As well as inventions of tools and technologies, all of these have impacted on the tangible appearance and intangible values of architecture depending on which factors that affected people in a society in a certain moment of time.

From the numerous studies, it was found that “the pattern of architecture for living in Thailand is a stilt-raised house, gable roof, made of wood and covered with Ya Kha or Cogon grass (that is where the word-Lang Kha or roof came from)”.¹⁶

Even though, there have been some major incidents; such as, wars, the restoration and rebuilding the new regimes like Krung Thonburi in 1767, and Rattanakosin in 1782, it still maintained the architectural model of the Ayutthaya regime without any change.

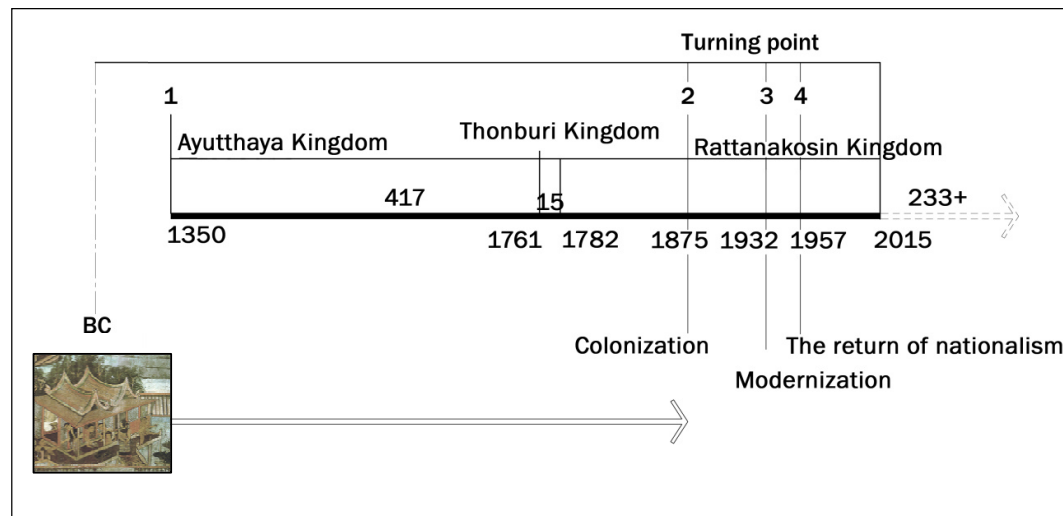


Figure 17 The Chronology of Thai house

From the last 200 years, there were some turning points that have impacted the form of Thai house which can be divided in periodical basis as follows; The first turning point that affected to the architectural evolution of Thai house is the shifted of paradigm from Animism to Trai Bhumi and

¹⁶ Nor Na. Paknum (Prayoon Auruchata), **Siamese House**, 10.

Buddhism. This is because in South East Asia, the belief of animism and supernatural were a root of the rituals and culture in consistent with the way of living. Later, when Trai Bhumi and Buddhist cosmology was adopted and then dominated over the folklore, under advantage conditions of the ruling class. While the commoner had to accept the aforementioned principle for their survival under governmental rule (absolute monarchy), which was the beginning of the separation of art, culture, and architecture into high culture and folk culture.

“Later, Buddhism was adopted into the land of Siam, which affected the Trai Bhumi ideology. Hence, the concept needed to adapt to be a part of Buddhism in order to depict that the world and universe play a role in supporting Buddhism as well”.¹⁷

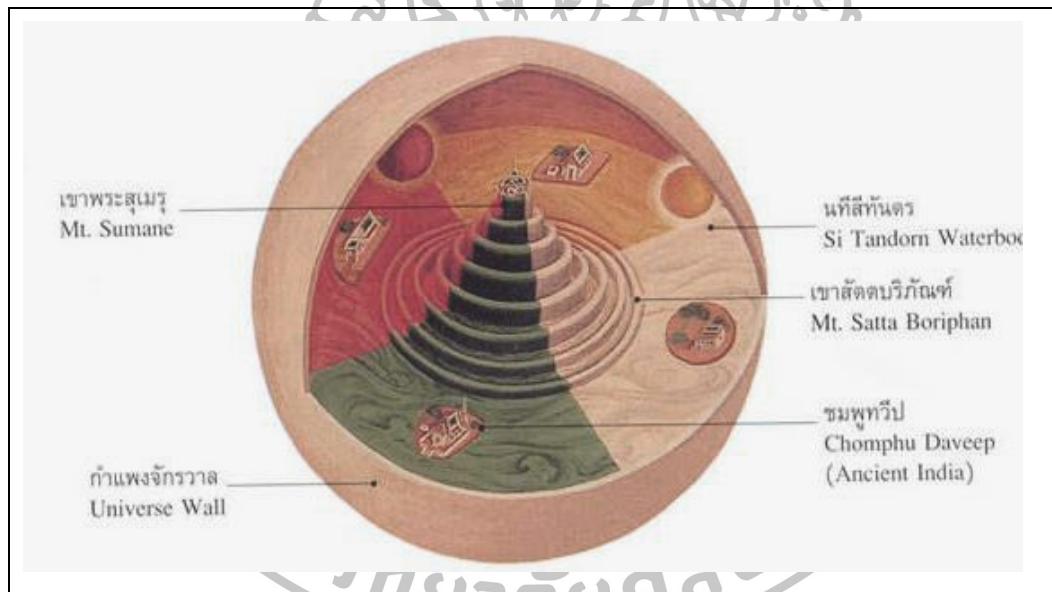


Figure 18 Thai Traditional architecture: Trai Bhumi influenced

Source: Astronomy Education, **Thai Traditional architecture: Trai Bhumi influenced**, accessed October 28, 2005, available from <http://www.astroeducation.com/content/context/mount-sumeru-universal-model/>

¹⁷ Chatri Praktinondakarn, **Sociality and Political in the Arts of Architecture: Siam Era, Adapted Thai Architecture, and Nationalism**, 2nd ed. (Bangkok: Matichon Publishing House, 2007), 20.

Since Buddhism has influenced over the ruler, it affected beliefs, traditions, culture, as well as Thai architectural forms, particularly, religious buildings that represented the faith to the lord Buddha, which was metaphorically interpreted until it became a fundamental of traditional Thai architecture until now.

The second turning point begun during the colonization era in 18th century, the Western set numerous conditions to occupy the areas of the Asian countries. At that time, Siam country laid plans to manage that threat to save the land as much as possible under the most important condition: to preserve the royal prerogative and absolute power of the elite. One of the survival methods was to develop the country to be on a same level with the Great powers. At this point, architecture was employed with aims at shifting paradigm of Siam to be civilized¹⁸ country.

The architectural patterns of this time received all influences purely from the Western (Figure 19). The group of edifices in this period featured temples, the Grand Palace, royal mansions, governmental buildings, courts, monuments, including houses of the elite class. However, in terms of folk architecture, it remained the same with some alterations of forms and materials according to the economic condition rather than the beauty (implying that commoners were getting poorer).

¹⁸ Chatri Prakitnondakarn, **Sociality and Political in the Arts of Architecture: Siam Era, Adapted Thai Architecture, and Nationalism**, 112.



Figure 19 Colonization in Thai Architecture

(a) Ananta Samakhom Throne Hall, Bangkok

(b) Norasingha's House (Government House of Thailand), Bangkok

Source: Twicsy [Pseud], **Ananta Samakhom Throne Hall, Bangkok: Spring News TV**, accessed October 28, 2005, available from <http://twicsy.com/i/eiXQVg>

: Independent News Network, **Government House of Thailand**, accessed October 28, 2005, available from <http://www.innnews.co.th/shownews/show?newscode=462129>

The third turning point is occurred after the Siamese revolution in 1932, when architecture was used as a tool to gain political power between the People's Party and old power. The People's Party used the modern architecture that was torn down the elements of architecture in accordance with the Western trend to be a symbol of equality of people in society under the democratic system (Figure 20). Meanwhile the old power tried to bring the conservative building style to represent its existing power. The fight to win the power and masses between both groups was expressed through the architecture of the public buildings, governmental buildings, religious places, and monuments.



Figure 20 Modernization in Thai Architecture

(a) Democracy Monument, Bangkok

(b) Sala Chalem Thai, Bangkok

Source: Muaythai Thailand Tours, **Democracy Monument: Bangkok**, accessed October 28, 2005, available from <http://www.muaythaithailandtours.com/Thailand.html>

: Pantip, **Sala Chalem Thai: Bangkok**, accessed October 28, 2005, available from <http://topicstock.pantip.com/chalermthai/topicstock/2009/08/A8245439/A8245439.html>

For the architecture for living, some changes in the patterns and methods of construction that came from taking a new aesthetic from the Western occurred. Probably, it took the international aesthetic value from the country's ruling and leading classes in correspond to the homecoming of the students studying abroad, particularly, those who had an occupation in an architecture field, but limited to only in urban area. The big picture of architecture for local living remained the same.

The fourth turning point is begun after the fall of the People's Party in 1947-1957, the return of the old power which, in the architecture, the symbolic fight through the form of architecture ended as well. The large constructions built by the People's Party were destroyed respectively. On the contrary, the Thai traditional architecture returned to play an important role on the governmentally buildings, Buddhism temple, and especially architecture that related to the royal ceremony and customs.

Nowadays, architecture for living of the middle class has emerged in between the traditional architecture and the folk architecture, together with the rise of capitalism economy where capitalists and marketers takes controlled over the aesthetic via different kinds of medias which let to the vast of alienation pluralism architecture that has no connection to Thailand's context, which leded the development of Thai architecture for living in general has no direction, as a result of the distorted perception of Thai house. People do not understand the true meaning of house that is appropriate for living in Thailand which leads to the end of Thai architectural evolution and mislead its development.

Characteristic of Thai house

To study Thai houses, it is important to understand the ideal of settlement, which there are two main points to be considered here; it has to be secure from all kinds of dangers and abundant enough to make a living. Once the location is well selected, there will be the process of a house orientation to suit each specific context. Which, generally, the settlement of the ethnic groups in Southeast Asia, there is no stand-alone house, but it will be a cluster of houses within the kinship system¹⁹ in which we can divide into two types:

1. Tribal Society, which is an ethnic group that has no interaction with other groups outside their community. They make a living in a closed society. Their settlements are usually situated on the high land in the forest or in the forest close to water source; for example, the Karen tribe, Pwa Ka Nyaw.
2. Peasant Society, which is a group of agriculturist, who are generous and support each other. They usually settle on the riverbanks, both basin and plateau, which depend upon their types of cultivation; such as, cropping, gardening or farming.

¹⁹ Chatthip Nartsupa, **Economy of Thailand in the past village community**, 6th ed. (Bangkok: Sang San, 2010), 18.

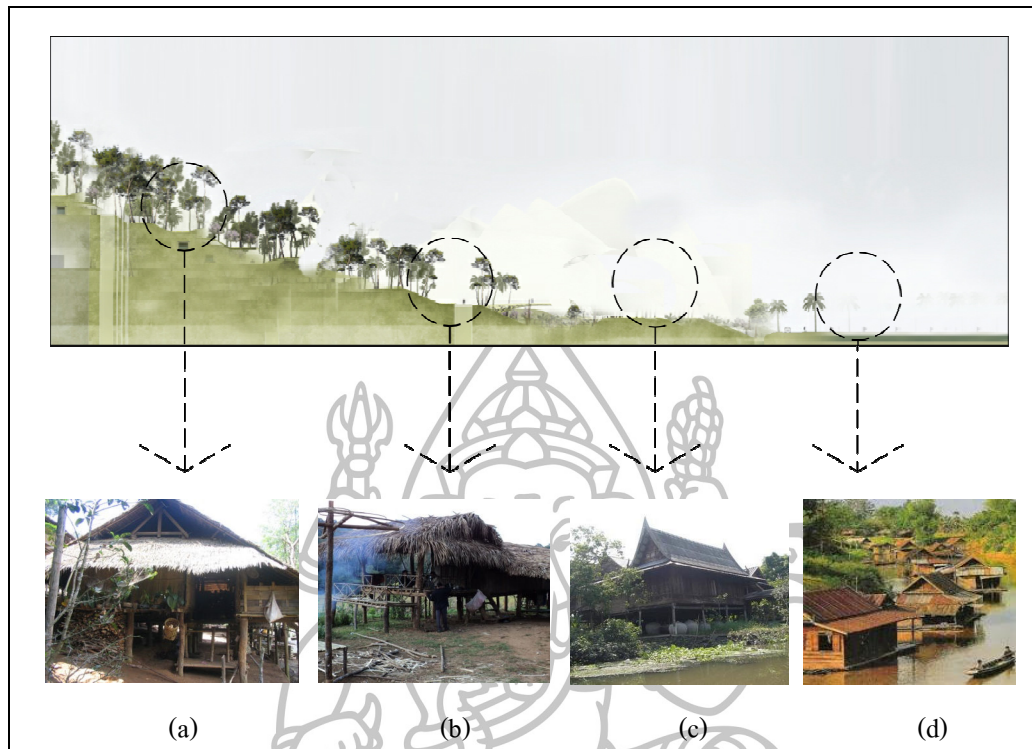


Figure 21 Cross section of Thai cultural landscape

- (a) High Steep Area House
- (b) Slightly Slope Area House
- (c) House in the Central Plain (Basin Area)
- (d) Wet Land House (Raft House)

Source : Maejo Spirit, **High Steep Area House**, accessed October 28, 2005, available from <http://thaimisc.pukpik.com/freewebboard/php/vreply.php?user=sanguanmaejo25&topic=233&page=310>

: Blogspot, **Slightly Slope Area House**, accessed October 28, 2005, available from <http://freestlyeblog.blogspot.com/2011/11/3.html>

: OK Nation, **Basin Area**, accessed October 28, 2005, available from <http://www.oknation.net/blog/kanokrat/2007/11/05/entry-1>

: Pantip, **Raft House**, accessed October 28, 2005, available from <http://topicstock.pantip.com/sinthorn/topicstock/2012/01/I11524963/I11524963.html>

As Thailand is located in Southeast Asia where the fundamental of culture has evolved from the Rice culture “as one can see from a historical evidence of the ancient rice found by archeologists dating back 5,000-7,500 years in Mae Hong Son province”.²⁰ Rice has influenced on people’s way of life, thereby, traditions and culture occur. And that is the beginning of knowledge building that reflects into the wisdom, a foundation of the self-sufficient development in social and economical way of people in this region.

Apart from rice, water is also a criteria of settlement and orientation that directly affected the forms of architecture for living in Southeast Asia as well. This corresponds to the folk wisdom which mentioned that “to build a house, one must follow the nature of earth, to settle, one must follow the nature of water”,²¹ which depicts the respect for mother nature of people in the rice culture, which requires some understandings of the physical characteristics of water in each area which can be divided into three categories:

1. Slightly slope area is where the water spreads out like a sheet from the highland to swamps or lakes during the rainy season. This is a suitable place for house settlement where water cannot reached.
2. Basin area, the water will flood during rainy season and dry in summer. It will be an area full of deposits and minerals that come with water, which help adjust the soil to be fertilized for good rice cultivation.
3. Wetlands; such as, creek, swamp and marsh. It is a source of food. Normally, this area will not be cropped, but reserved for food sources for human. It is obvious that the settlement begins in the plain area nearby the river, “with the understanding of the nature of water, human can control nature for their own living, which means they can do farming without moving their settlement any more. As a result, houses and towns have been formed in that kind of physical characteristic areas”.²²

²⁰ Sujit Wongthes, “ “Sujit Wongthes”, ASEAN's Culture#19 rice culture” **Matichon Daily**, 1812 (8-14 May 2015): 83.

²¹ Veera Inphantung, “Built a House follows the Earth Placed the living follow the river line” in **Collective of Journals in Thai vernacular and wisdom**, 142.

²² Srisak Vallibhotama, **Thai Traditional House, Thai House**, 29.

As we can see, the reason of settlement of people in this region equally harmonized with the way of life, well-being and transportation under the limitation of nature's context, which becomes the origin of various forms of Thai architecture today.

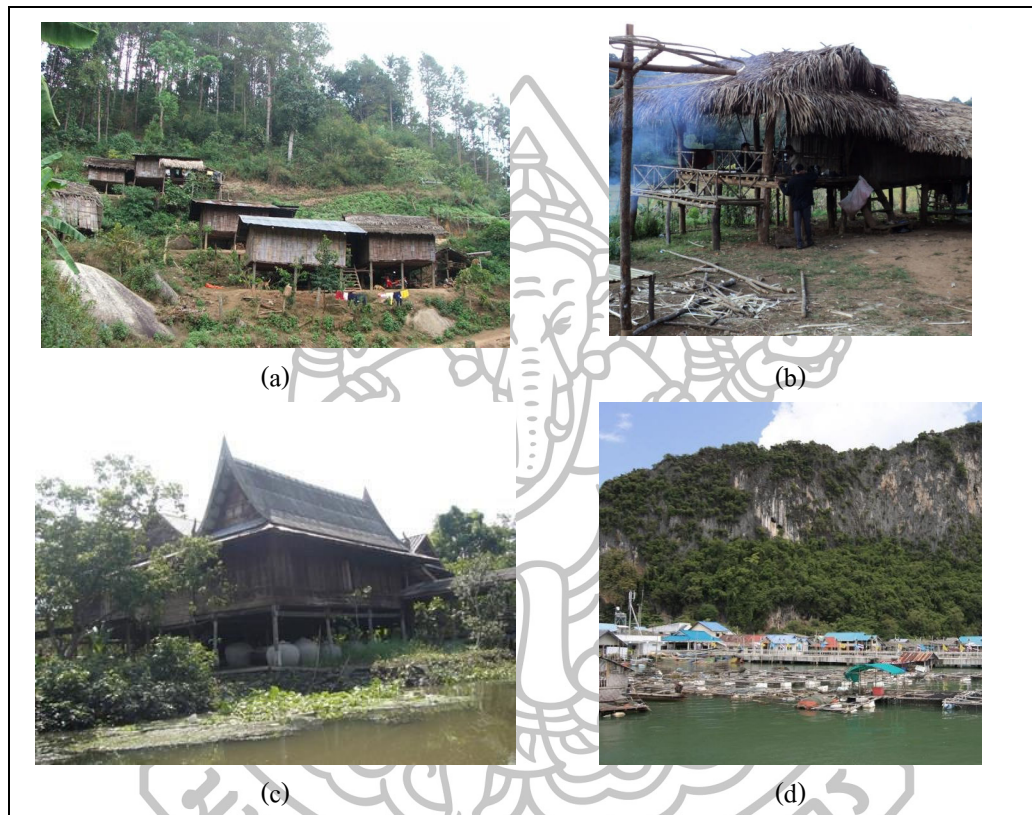


Figure 22 High land, Low land, Wet land, Water architecture

- (a) Karen's House
- (b) Tribe's House
- (c) Stilts House
- (d) Floating Community

Source: Weekend Hobby, **Karen's House**, accessed October 28, 2005, available from <http://www.weekendhobby.com/offroad/trip/shtml/3139.shtml>

: Blog Spot, **Tribe's House**, accessed October 28, 2005, available from <http://freestlyeblog.blogspot.com/2011/11/3.html>

: OK Nation, **Stilts House**, accessed October 28, 2005, available from <http://www.oknation.net/blog/kanokrat/2007/11/05/entry-1>

: Canoeing Trip, **Floating Community**, accessed October 28, 2005, available from <https://canoeingtrip.wordpress.com/tag/panak-island/>

Land Use in the Village

Space in the village can be divided into two parts: firstly, household's space is the area of each family for dwelling and making a living. It comprises houses in communities and plantations next to them. Secondly, common space, which belongs to everyone in the village, includes courtyard, creek, swamp, stream, shrine, temple, cemetery as well as forest nearby the community or far away. This separation does not exactly define territory, but it is defined by the recognition of the territory in each area by the people in the community and live together in a kinship system. That is a unique characteristic of each community, which the villagers have set the rules and regulations as a mutual agreement in forms of custom, and traditions controlled by the sacred supernatural belief. The evidence of this is creating rules on the use of space by considering the harmonious relationship between nature and people. For instance, the space allocation pattern of the Karen tribe, Pwa Ka Nyaw that defines the boundary and accessibility to forest areas in different layers (Figure 23). With the wisdom of water source conservation, they created a sacred area of the village and defined the arable area in rotation for each family in order for the soil stabilization and sustainable fertilization where no one owns the land but everyone in the village owned.



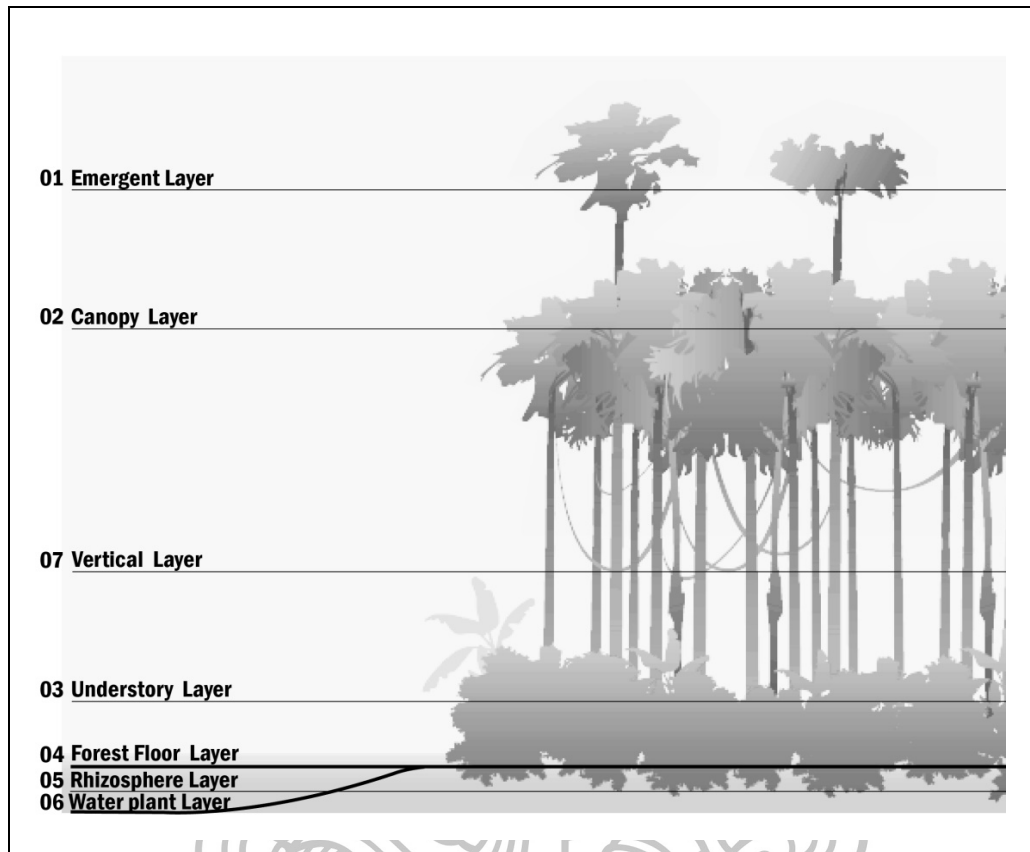


Figure 23 Seven levels forest of Pwa Ka Nyaw / Zoning

Source: BBC, **Vegetation levels in tropical rainforest**, accessed October 28, 2005, available from http://www.bbc.co.uk/schools/gcsebitesize/geography/ecosystems/tropical_rainforests_rev3.shtml

Therefore, the use of space within the village and the orientation of each household has a correlation between the individual and common space allocated without any defined boundary. However, the function of each specific space have been set by the inner people and controlled by the belief of sacred things as a mechanism to control the coexistence of the community in line with the custom, traditions, rituals, and symbolic system that only the insiders will understand which, consequently, the villagers obey and inherit this practice.

Village's essential elements

The village is a place where numbers of houses are settled. Due to the study, each village in Thailand comprises similar compositions, generally found in the communal areas or public spaces where villagers agree to use each specific space to support various kinds of activities, specified as follow;

1. A sacred place, a spiritual space of the community; such as, shrines, and spirit houses. These areas are used for rituals relating to the belief in spirits and supernatural before the time of Buddhism or other religions.
2. Communal space, a utility area where the villagers member can interact, exchange information, goods trading (before the capitalism economies).
3. Living space of each household.
4. Water source is the area where the community makes a living.
5. Watershed Forest or Sacred forest
6. An cultivation area
7. Cemetery and graveyard

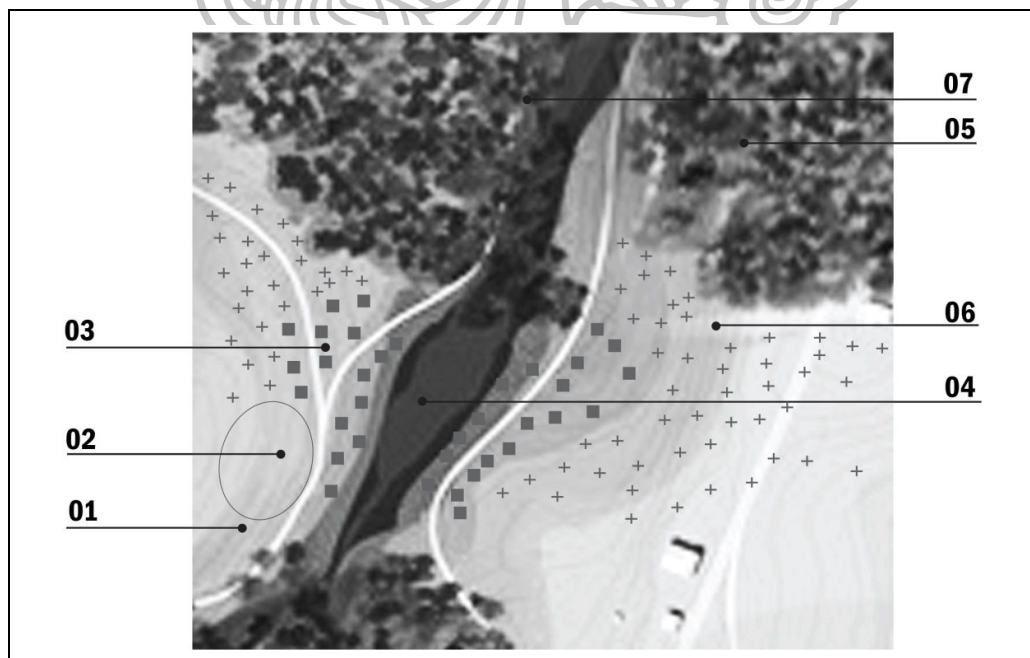


Figure 24 Village's essential elements

These elements are a part of an interrelated system that connects the way of life of the members in the community in a life cycle from birth, growth, living, and death. The importance of these areas is the origin of diversified custom, tradition, and culture depending on the roots of people in each community resulting from cultural landscapes that refine natural context and the way of locals” living in harmony.

The Elements of House

House is a part of a village owned by the villagers whose covering the boundary that is in the possession of each household with mutual agreement of the village members. The recognition of each boundary is signified by the physical landmarks that only the villager members or “the insider” understand and accept in each other territory. For this reason, the space of each house becomes the same oneness in terms of both tangible and intangible aspects.

The house consists of two elements:

1. The house, or “reun”, comprises four basic elements: sleeping unit, kitchen unit, and terrace (outdoor-terrace and semi-outdoor terrace), and the space under the house. However, there are some other elements that may be required due to the change of time; such as, the extension of bed quarter when the family is larger or a “sala” an utilities open air pavilion for recreation purpose that also signify the status of wealth of the house owner.
2. The house perimeter consists of a land guardian or spirit house (Figure 26, normally appear in the miniature form of Thai house), “lann ban” which is a multipurpose open space, home-grown garden, and animal stall. Nevertheless, the most important thing that is very meaningful in tangible and intangible terms for villagers in the Rice culture is the rice granary, which depicts fertility and security of living for a long time after the harvesting season ends.

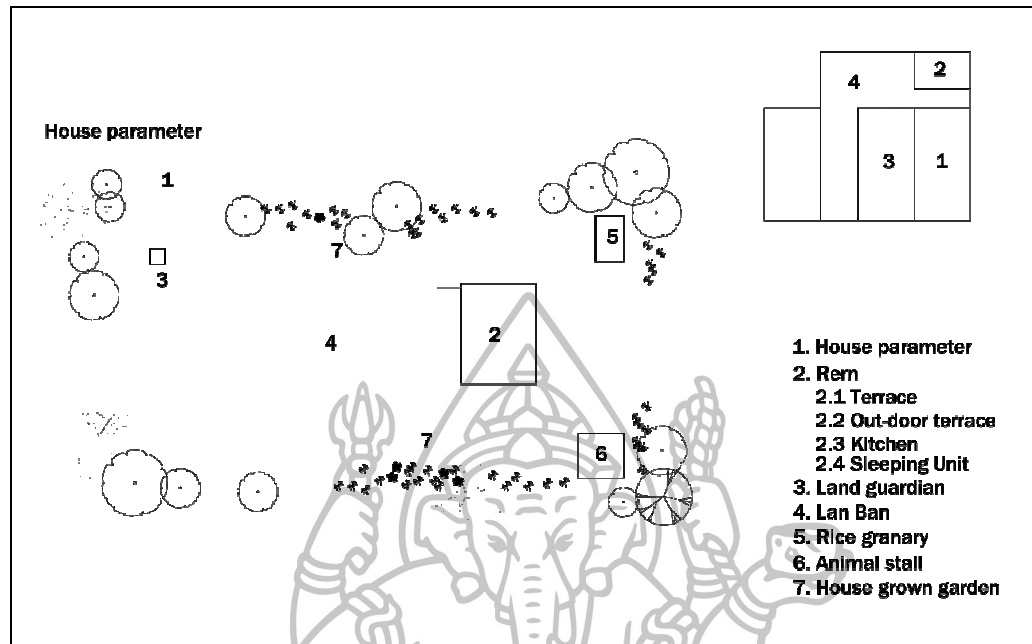


Figure 25 Essential elements of Thai house



Figure 26 Land guardian, Spirit house

Source: OK Nation, **Spirit house**, accessed October 28, 2005, available from <http://www.oknation.net/blog/chinanan/2014/08/06/entry-1>

Physical appearance of Thai house

Most of the houses in Thailand are made of wood because it is easy to find in any local areas. It can be used to build quickly and easy to repair. When tracing back into the past, we can see that Thai houses were always built with wood. According to Professor Chote Kalayanamit, Thai house can be classified into two types that are a temporary house or “Ruen Khrueng Phook” and a permanent house or “Ruen Khrueng Sap” that describe construction method of the house and also show how the house transforms in relation with the life cycle.

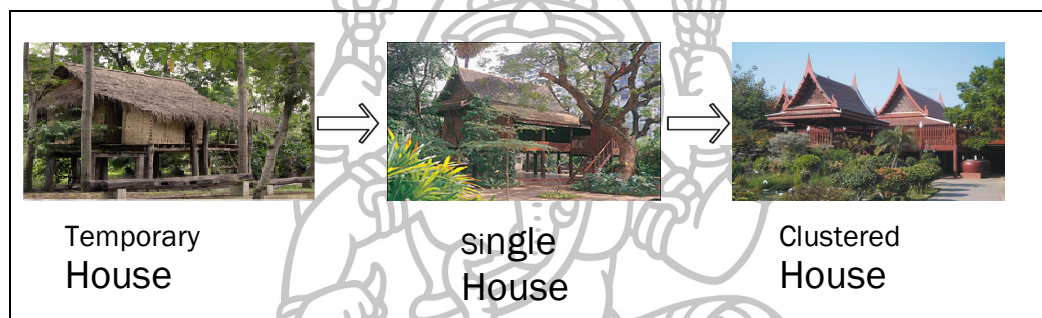


Figure 27 Life cycle of Thai house

Source: Jim Thompson Farm, **Temporary House**, accessed October 28, 2005, available from <http://www.jimthompsonfarm.com/2011/th/isan.php>

: Ladyinter, **Single House**, accessed October 28, 2005, available from http://www.ladyinter.com/forum_posts.asp?TID=55554

: Nation Multimedia, **Clustered House**, accessed October 28, 2005, available from <http://www.nationmultimedia.com/specials/drive/blogger/topics/thailand-central/>

For Ruen Khrueng Phook or “Tie and Knot system”, it is the method of building by tying, crossing, weaving, tightening, and pulling all building materials together. Bamboo is a high potential local material that works well for all purpose utilization, but not for the permanent use; thus, it is considered as the temporary house or the first home of starting a new family, which generally related to the economic and social status of each household. However, some of them have been built delicately by weaving the walls with bamboo strips into exquisite crossing patterns. The method of binding to form a structure with bamboo strips or wicker is applied

orderly. Since folks have time during a seasonal harvest to contemplate their knowledge in regards with their surrounded contexts and also have time to improve their home and utensil; thereby, the homes become so delicate.



Figure 28 Tie and Knot system: Materials and Tools

Source: Pantip, **The Story from Lanna**, accessed October 28, 2005, available from <http://www.topicstock.pantip.com/lumpini/topicstock/L2444730/L2444730.html>

: Blogspot, **Sedap Makan**, accessed October 28, 2005, available from http://alcoholicarchitect.blogspot.com/2010_11_01_archive.html

While a permanent house is constructed by hard wood that requires sharp tools to chop, bark, and sharpen before assembling into the “boltless system” house, which have more complicate process with cultivated details of architectural components. Normally, persons who could build the permanent houses like this are high-ranking officials, royalists, and kings. For commoners, they were able to build the wooden houses for living in the end of the Ayutthaya period. Nevertheless, there were some regulations on building permanent houses; for instance, the Palace regulation prohibited the decoration on the surface of wooden floors or columns, it was allowed to do only in the palaces or royal houses.



Figure 29 Boltless system: Materials and Tools

Source: Jittynueng, **Ban Khao Keaw**, accessed October 28, 2005, available from <https://www.jittynueng.wordpress.com>

: Pantip, **Reurn Thai**, accessed October 28, 2005, available from <http://2g.pantip.com/cafe/home/topic/R7553966/R7553966.html>

In an agricultural society especially the rice culture, water is essential; hence, the settlement of villages and communities are situated near the watershed for cultivation and transportation purpose. According to the analysis of the community characteristics in reference to a case study of the house in the central plain of Thailand, it was found that in one community, it usually comprised various kinds of houses; those are single family houses, stem family clustered houses, wealthy family houses, Kuti or monk's cell, riverside shop houses, roadside shop house and raft houses. Each house has a different form and function, according to the requirement of space, occupation and family's size that characterizes a kinship community as evidenced by the houses built nearby each other without boundary wall.

In addition, Thai houses are categorized by the regions, which are Central, North, Northeast, and South. Even though, there are some differences in details, but they share the same fundamental characteristics which are the stilt-raised house and high inclined roof.²³ The

²³ Ruethai Chaichongrak and Ornsiri Panin, **The Thai House: History and Evolution** (Bangkok: River Books, 2003).

differences of the physical appearance of houses vary with the constraints of topography, climate, occupation, culture and traditions as well as the capability to access natural resources and construction technology.

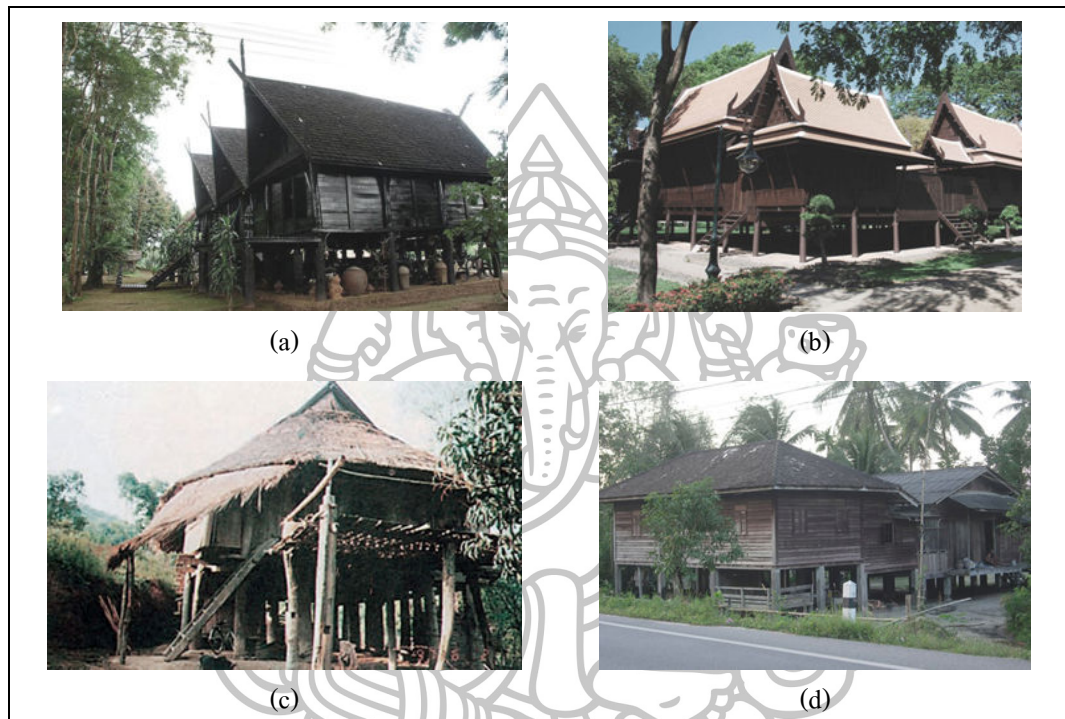


Figure 30 Thai House in 4th Regions

(a) Northern Thailand House

(b) Central Thailand House

(c) North-Eastern Thailand House

(d) Southern Thailand House

Source: Thawan Duchane, **Baan Dam: Northern Thailand House**, accessed October 28, 2005, available from http://board.trekkingthai.com/board/show.php?forum_id=34&topic_no=102110&topic_id=103182

: Ban Idea, **Central Thailand House**, accessed October 28, 2005, available from <http://www.banidea.com/clay-roof-tiles/roof-design-thai/>

: Laksanathai, **Gabled hip: North-Eastern Thailand House**, accessed October 28, 2005, available from <http://www.laksanathai.com/book4/p201.aspx>

: Panoramio, **Southern Thailand House**, accessed October 28, 2005, available from <http://www.panoramio.com/photo/66433311>

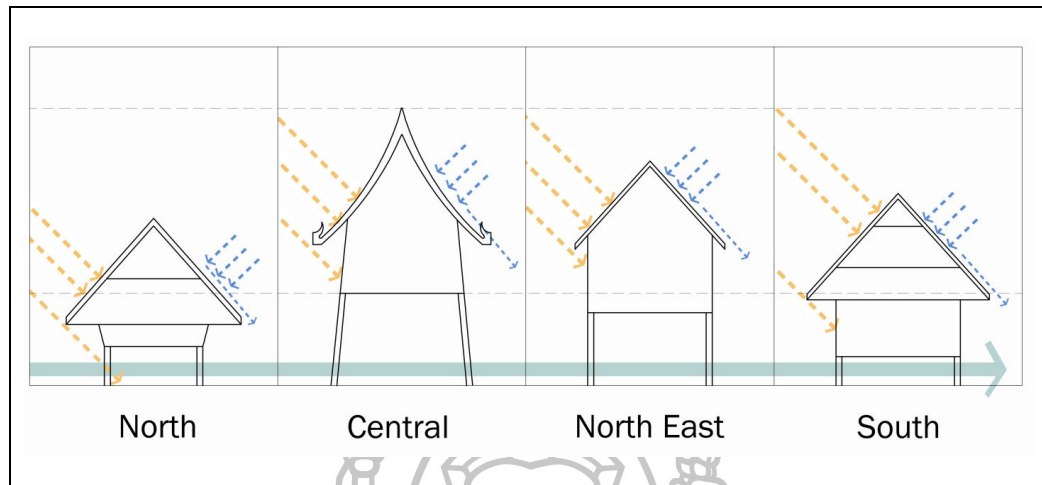


Figure 31 Similarity Table of Thai House in 4th Regions

Experiencing Thai house (Site visit & Case study)

Introduction

Once the data collected from the literature review has been completed, the next stage is the field study in order to explore and collect data relating to the Thai domestic architecture in four regions according to architectural academics divided. After that, it will be the analysis of the case studies based on the present designs by Thai architects who specialize in designing the architecture under the Thai architectural philosophy. The principle objectives of the site visits and case studies include as follows:

1. To experience Thai domestic architecture in order to create an empirical knowledge.
2. To test the collected information from the literature review, then we will bring this information to analyze to find the conclusion of the ideology of the Thai architectural wisdom.

Site visits

Based on the field study to explore the characteristics of the Thai domestic architecture of the four regions: North, Central, Northeast and South covering 24 provinces nationwide,

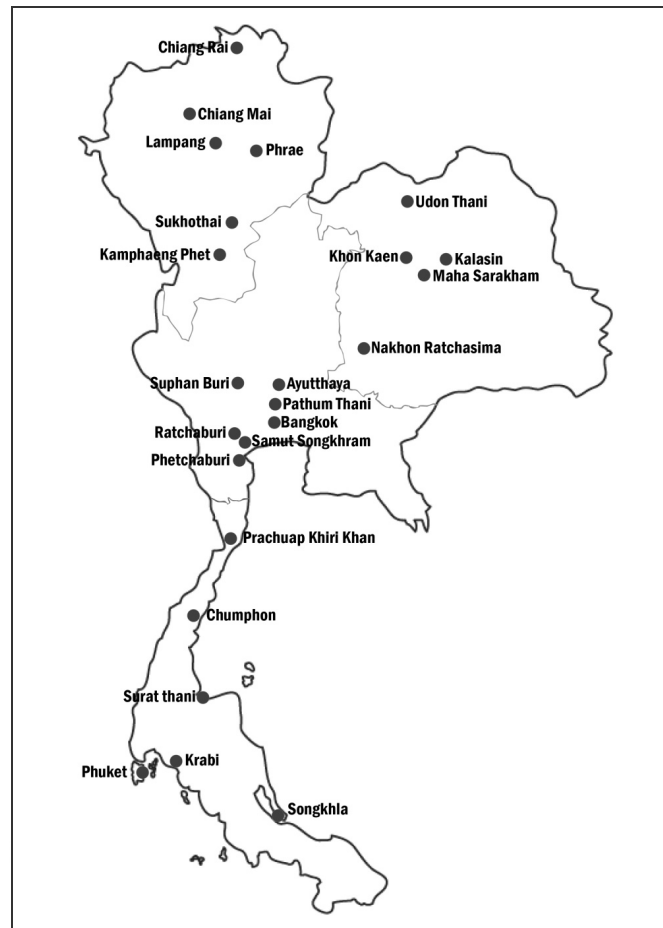


Figure 32 Site visiting area

This research found that there were numerous houses that match the traditional Thai architecture theory and Thai vernacular architecture theory, which could be divided into two groups as follows:

1. A group of local houses in various communities of the research areas. It was found that the settlements of houses and communities are consistent with the lifestyle of people in the communities. Even though they were turning into more of an urban society, the vernacular houses remained applied, as some evidence of the adaptation for usability has been found. However, most of them maintained the same structure; for example, a case of the houses in rural areas of the Northeast region. The space under the house was partitioned in order to make rooms for the elderly and children while the upper floor was empty due to the migration of labour to work in town instead of the agricultural society.



Figure 33 The Utilization of Thai houses in present context (2013)

- (a) North Eastern House, Kalasin Province (September 28, 2011)
- (b) North Eastern Way of Life, Khon Kaen Province (April 15, 2011)
- (c) North Eastern House, Khom Kaen Province (April 15, 2011)
- (d) Central Region House, Petchaburi Province (October 20, 2011)
- (e) Southern House, Prajuabkirikhan Province (October 20, 2011)
- (f) Southern House, Prajuabkirikhan Province (October 20, 2011)

(Photograph during the field trip by Sarawuth Pintong)

2. A group of newly built houses or renovating the original houses into the forms of museums with the purposes of conserving for public learning and tourism attractions. The examples of houses in this group are Thap Khwan Pavillion in Nakhon Pathom province, the four regions traditional Thai houses in Chiang Mai University, Maha Sarakham University, U-thong

National Museum in Suphan Buri province, and Culture Centre of Black Tai at Khao Yoi in Phetchaburi province. In addition, there were some adapted Thai houses that were newly constructed for a living, but not too many of them.



Figure 34 New-Built of Thai Traditional House as museums.

(a) Thai Traditional House, Muang Boran, Central Region house, Samuthprakarn Province (May 6, 2011)

(b) The Interior of Thai Traditional House, Muang Boran, Central Region house, Samuthprakarn Province (May 6, 2011)

(c) Northern Thailand House, Chaing Mai University, Chaing mai Province (May 24, 2011)

(d) Northern Thailand House, Chaing Mai University, Chaing mai (Photograph during the field trip by Sarawuth Pintong)

According to the analysis, it was found that although the architectural characteristics were varied according to topology, climate, way of life, and culture of the community in each area, the reaction reflecting through the architecture was based on the same fundamental which was conformable to the natural environment harmoniously on a tangible aspect; such as, the stilt-raised floor, inclined roofs, ventilation system, and proportion that correlated with the functional space, as well as choosing materials available in that area and blending them with the new materials. For the intangibles, it still remained in the forms of the hierarchy in every scale of architecture, and especially in the sacred spaces according to religious beliefs.

Case study

Introduction

The reference projects were selected for case studies on this research, which aimed at investigating through the conceptual design that reflected in the form of the new Thai house in the present context in order to discover the core ideal and some recognition of modern Thai architects in regard to the Thai house (How they understand Thai house). All selected projects were designed and built within 10 years. All of them were published in general architectural design magazines in Thailand.

Ultimately, the selected case studies are classified in two categories, which are conservative based and progressive based as follows:

1. Conservative based

For this research, “Thai house in Canada” and “Ban Huen Dhamma” have been selected as case studies for the conservative based. This is because the conceptual design of both references has been influenced by the theory of Thai traditional architecture.

Firstly, Thai house in Canada was the masterpiece of Thai architect / national artist “Prof. Dr. Pinyo Suwankiri (1937)”. The house is located in Echo Vally, British Columbia, which is acclaimed as the first Thai traditional house built abroad. A 400 sq.m. 2 storey wooden houses was designed in accordance with the concept design which was to build a Canadian weather resistant house with local Canadian wood in Thai traditional form. Moreover, Prof. Dr. Pinyo also believed that “in order to publicized Thai traditional house, it is not necessarily that Thai traditional house has to be built only in Thailand but everywhere in the world”.²⁴

²⁴ Wikipedia, **Mythology**, accessed October 29, 2015, available from <https://en.wikipedia.org/wiki/mythology>.

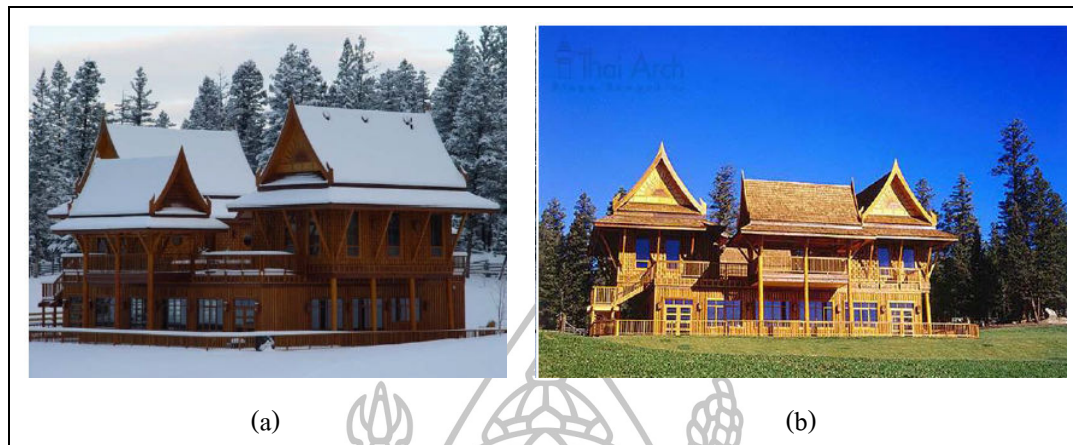


Figure 35 Echo Valley House

(a) Echo Valley House in the Winter

(b) Echo Valley House in the Summer

Source: Pinyo Suwankiri , **Echo Valley House**, accessed October 28, 2005, available from <http://atcloud.com/stories/98427>

Secondly, Ban Huen Dhamma, which is an example of the architectural collaboration between the project owners and Arsom Silp Institute of the Arts. The primary purpose is that the owners required the house to be a place for community living together between human and human and human and nature that could develop through the time. The architects laid out the plan of each house to have a separate functional space according to the owner's request with the Sala Dhamma (public hall) located in the heart of the house as a centre of general activities. The design of this project was based on the vernacular house in the North and applied to the modern usage; for instance, folding doors at the area under the house, Hom Rin, an area between the eaves of the two houses meet with a gutter located in the middle of the house, the wooden panel with an exposed timber structure which were adapted from the rice granary of the vernacular house. Also, there are Chan or a house platform, Toen or a multipurpose area, and corridor as components in every building.

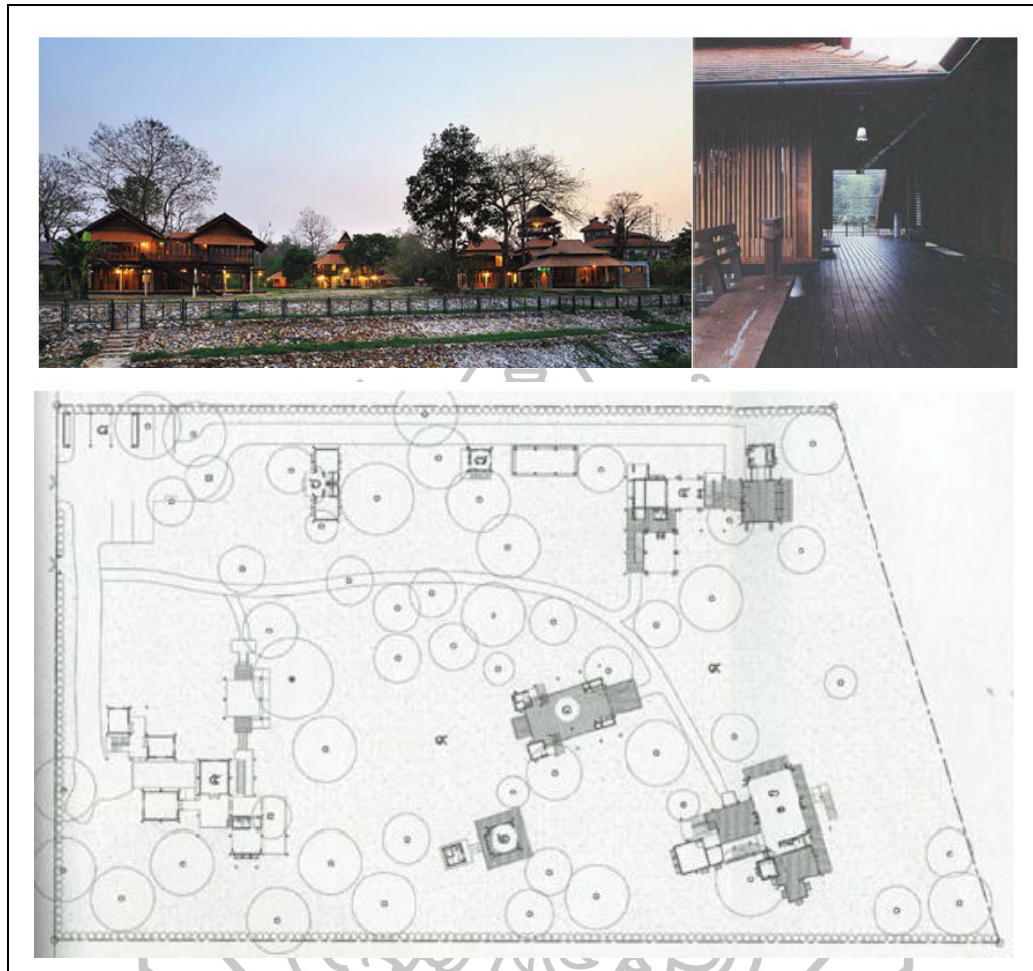


Figure 36 Ban Huen Dhamma

Source: The Faculty of Architecture Chulalongkorn University Alumni Association, **Ban Huen Dhamma** (Bangkok: the Faculty of Architecture Chulalongkorn University Alumni Association, 2011), 111.

In summary, the two reference cases share similarities; such as, a conceptual design which strongly reflected the form and ornaments of traditional house, however the Thai architectural wisdom played insignificant role of the design. The outcome of the first case focused on the form of traditional Thai house only, then adapted the design process to suit the weather condition, local materials, and construction technology. While the second case focused more on the feeling of nostalgia and the sense of the Northern Thailand community in the past

as reflected to the ideal of buildings orientation of the master plan, then adapted one of the architectural characteristic of Northern Thai style into the form of the design outcome, which also reflected the ideal of utilizing space for habitation and religious customary purpose.

Nevertheless, Ban Huean Dhamma depicts that the traditional Thai aesthetics is timeless and able to bring the local wisdom to apply into the present context, especially in regard with the ideal of energy saving, which also preserved the valuable knowledge everlasting. However, the design of the conservative based might not barely bring back the originals form of architecture to date, but rather should significantly consider the direction to revolutionary develop both tangible and intangible values of the Thai architectural wisdom into present contexts sustainably.

2. Progressive based

In the past 10 years, there were some increasing number of houses inspired by Thai architectural wisdom which is clearly shown that there are some attempt at establishing the new era of Thai house by Thai architects for decades. Thus, in order to understand the perception of the Thai architect in regards with Thai house in brief, a book that contained houses projects designed by architects who have been inspired by Thai architectural wisdom called “Thai’s today” (written by Sarayut Sridhipaard and published by Amarin Printing and Publishing Public Co. Ltd., In 2014) has been selected and summarized by researcher as follow;

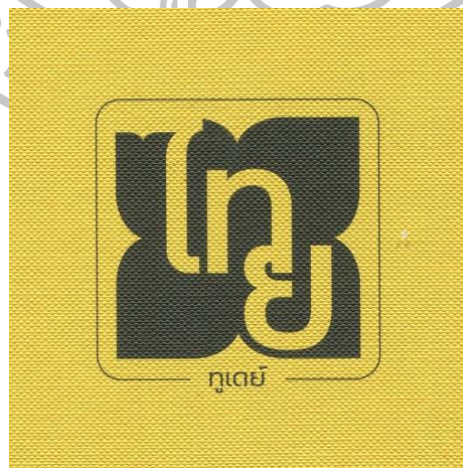


Figure 37 Thai's Today

Source: Sarayuth Srithipart, **Thai's Today** (Bangkok: Amarin Printing and Publishing, 2014), 1.

First of all, the author of this selected magazine has mentioned that only Thai architectural character cannot describe the identity of the Thainess or Thai's stereotype. Rather, 9 suggested elements that reflects today Thai's way of life, which are Thai letter, Thai people, Thai Faith, Thai culture, Thai appliances, Thai food, Thai construction materials, Thai community, and typically Thai family structure should be part of the design concept for the Thai's today house.

Secondly, all selected houses contained in the book reflect Thai's way of life into various forms of architecture. However, apart of the pluralism issue, we may see that all of the designs are attempted to adapt and apply some tangible and intangible value of Thai architectural identities and wisdom into their works, then some Thai architectural characteristics and elements such as large terrace, high gable roof, central courtyard, natural ventilation, wooden panels are integrated into the new form of Thai architecture.

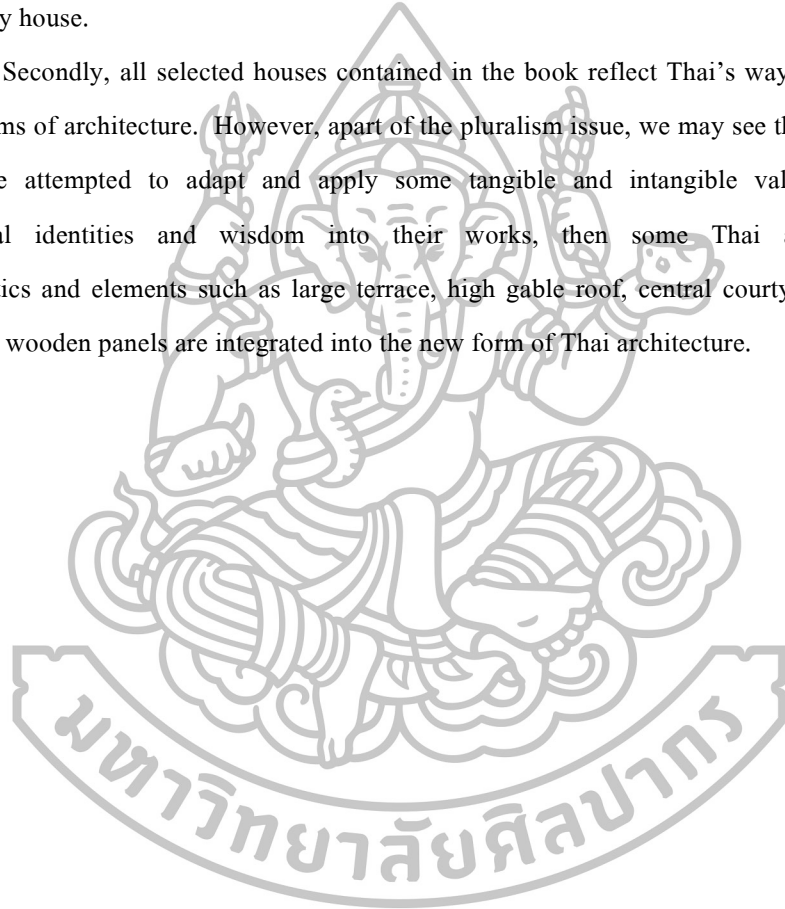




Figure 38 Overall of selected houses

- (a) Ban Yu Yen, Design by Ta-Cha Studio
- (b) Mr. Kittipong Bhuddaponmongkol's House, Design by LYNK Architect Co. Ltd.
- (c) Mr. Chatree Ladarlalitsakul's House, Design by Ton-Silp Studio Co. Ltd.
- (d) Lertvirojkul's House, Design by Thachaphol Lertvirojkul
- (e) Lertvirojkul's House, Design by Thachaphol Lertvirojkul
- (f) Mr. Chatree Ladarlalitsakul's House, Design by Ton-Silp Studio Co. Ltd.

Source : Roommag, **Urban Breeze**, accessed October 28, 2005, available from <http://www.roommag.com/home-ideas-1/house/2279/urban-breeze/>

: Celeb Online, **Modern Home: Thai's Today**, accessed October 28, 2005, available from <http://www.manager.co.th/CelebOnline/ViewNews.aspx?NewsID=9570000126487&Html=1&TabID=3&>

: Roommag, **The Essence of WABI-SABI**, accessed October 28, 2005, available from <http://www.roommag.com/tag/wabi-sabi/>

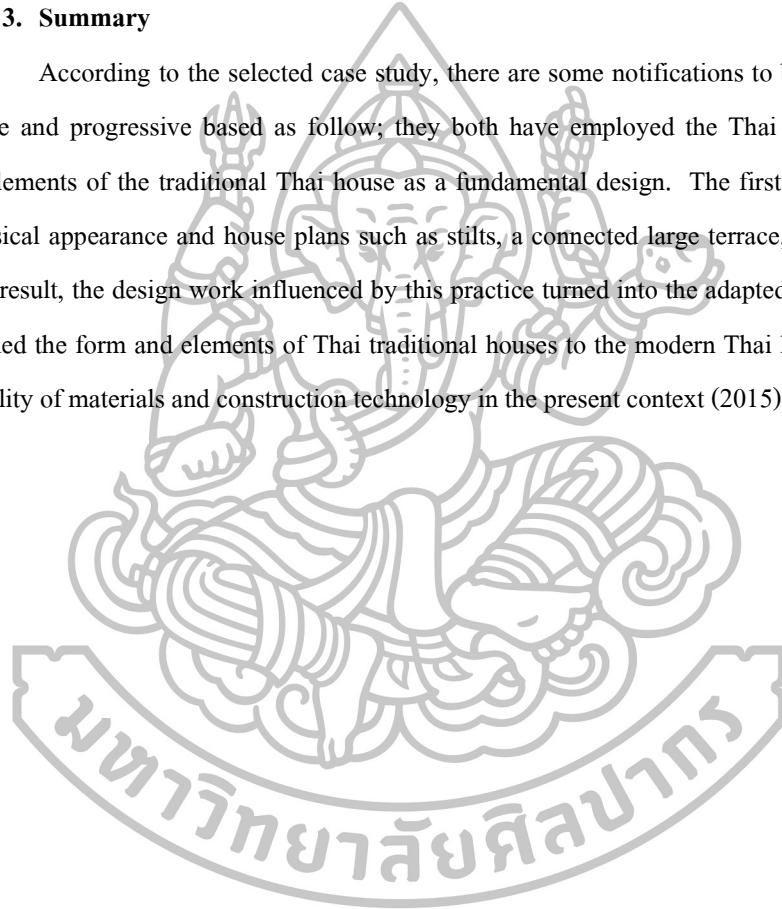
: Chulabook, **Home and Material Design**, accessed October 28, 2005, available from <http://www.chulabook.com/description.asp?barcode=9789742893026>

: Sarayuth Srithipart, **Thai's Today** (Bangkok: Amarin Printing and Publishing, 2014), 187.

Ultimately, all selected works are based on the progressive theory, which is a new direction to develop and apply the Thai architectural wisdom into a new form of Thai architecture. However, most of them seem to adhere to the Thai form and elements that brought to be parts of the design, while not many others are more focused on the senses of Thai house such as serenity, still, and floating in the shape form and space of their work.

3. Summary

According to the selected case study, there are some notifications to both theories conservative and progressive based as follow; they both have employed the Thai architectural form and elements of the traditional Thai house as a fundamental design. The first one focused on the physical appearance and house plans such as stilts, a connected large terrace, and a gable roof. As a result, the design work influenced by this practice turned into the adapted Thai house, which applied the form and elements of Thai traditional houses to the modern Thai lifestyle with the availability of materials and construction technology in the present context (2015).



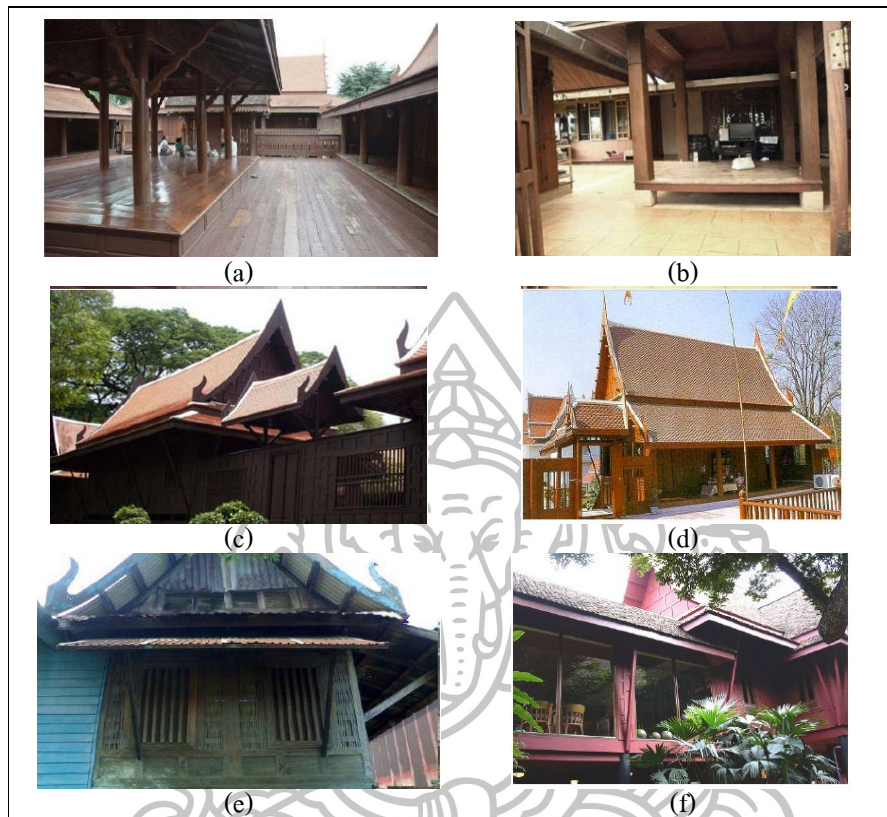


Figure 39 Conservative based Design: Comparison of architectural elements in use between the Traditional Thai house (left) and the adapted that house (right).

- (a) The Interior of Thai Traditional House (b) The Interior of Adapted Thai House
(c) The Roof of Thai Traditional House (d) The Roof of Adapted Thai House
(e) The Window of Thai Traditional House (f) The Window of Adapted Thai House

Source : Panoramio, **The Interior of Thai Traditional House**, accessed October 28, 2005, available from http://www.panoramio.com/user/1549342?with_photo_id=73912035

: CM -Property world, **The Interior of Adapted Thai House**, accessed October 28, 2005, available from <http://cm-propertyworld.com/index.php/en/house4sale/100-200sqw?start=22>

: **The Roof of Thai Traditional House: Sanam Chandra Palace**, accessed October 28, 2005, available from <http://www.bloggang.com/viewdiary.php?id=phukboong69&month=05-2009&group=8>

: **The Roof of Adapted Thai House: Central Region House**, accessed October 28, 2005, available from <http://www.bloggang.com/mainblog.php?id=sivilize&month=08-07-2005&group=11&gblog=1>

: Sinka Online, **The Window of Thai Traditional House**, accessed October 28, 2005, available from http://www.sinkaonline.com/items_postview.php?key=65533#.VjMgybcrLIU

: **The Window of Adapted Thai House: Jim Thompson House**, accessed October 28, 2005, available from <http://www.bloggang.com/viewblog.php?id=travelaround&date=31-03-2008&group=7&gblog=8>

Similarly, the progressive based primarily designed by using a diagrammatic system, which is a fundamental of architectural design method. Then applied Thai architectural knowledge as a conceptual design and then some specific elements; such as, transitional space, wooden panels or battens, breathable roof and panels are used as part of the design.

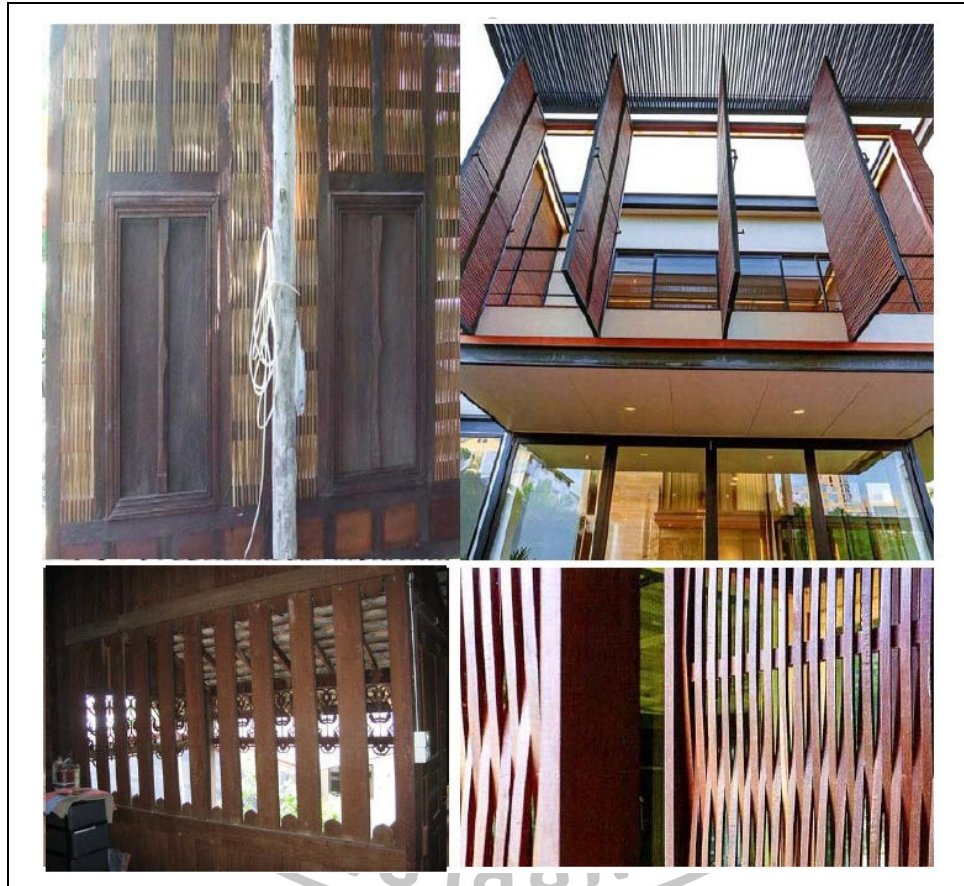


Figure 40 Progressive based Design: Comparison of architectural elements in use between the Thai Vernacular house (left) and the design of progressive based (right).

Source: Old wood house, **Ruean Roong Khum**, accessed October 10, 2015, available from <https://www.oldwoodhouse.net/board-1/62>

: Sarayuth Srithipart, **Thai's Today** (Bangkok: Amarin Printing and Publishing, 2014), 160.

: Go to Know, **Ancient Yong's House: a prototype of Thai modern architecture**, accessed October 10, 2015, available from <https://www.gotoknow.org/posts/543946>

Although both design approaches contained the Thai architectural concept, the results reflected totally different. The first approach used the physical appearance of Thai houses for the aesthetics; therefore, it focused on conserving form of Thai traditional house. On the other hand, the second approach acquiesced in the international aesthetics, while attempted to keep the Thai-ness or Thai stereotype in architecture to solve the problems of the designed programme individually.

Conclusion

According to the literature reviewed, this research found that there are some critical points that freeze the development of Thai house. Due to the secularization of Thai cultural governance and historiography that directly affected to the fundamental of Thai architectural theory which has been discoursed and concealed the real meaning of Thai architectural wisdom and consequently, mislead the development of Thai house for decades.

Since the cultural education in the Thai's context, which is clearly not the study that focuses on the phenomenon of the interrelationship of the social classes, ideals, races, genders, complexion, and ultimately how they define culture in each society, or what element it is made of and categorized. Instead, the cultural education is a study that focuses on comprehending, creating, distributing and incubating the word defining system of many aspects that flow in the society, which is referred to the so-called "emotional structure" that is a core of the pattern of social interactions. The cultural education emphasizes these matters to understand the meaning in each context.

Likewise the word "Thai house" which comprises two components: 1) Tangible quality that means the outer look or physical appearance of the Thai house (form of architecture) and 2) Intangible value, which means a core philosophy or the thinking method of how to live conformity among the natural environment. Actually, the core philosophy of Thai architecture has created the architectural form in harmony with the environment. As time passed by, the form of architecture has become the symbol that enfolded the core ideal of Thai architectural wisdom as the outer shell (Figure 40).

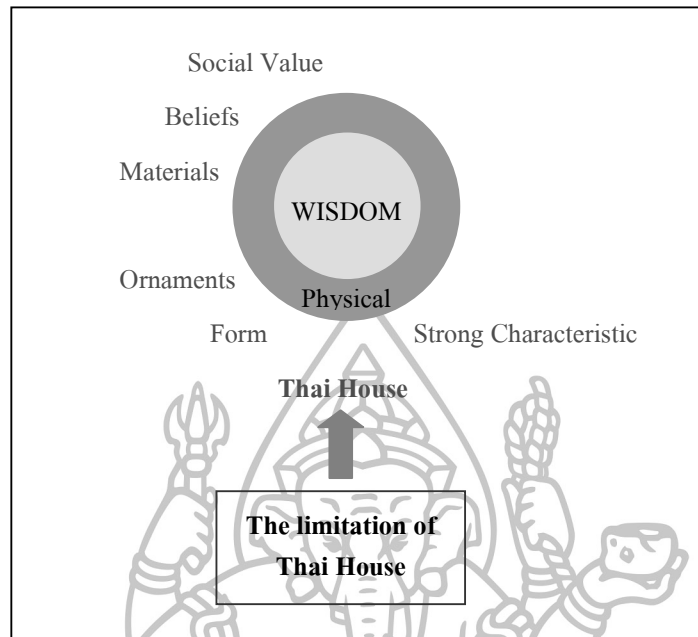


Figure 41 The Limitation of Thai house

An evidence of this is the architectural characteristics generally found in Thailand have the method of dealing with the constraints of nature and adapting itself, according to the surrounding context with no exception of the differences in social status because the factual concept relates to how to live together with the dynamic nature that always changes according to various factors (Figure 41). Hence, the evolution of Thai architecture has been continued for long and deeply rooted in the spirit of living with the well-understanding of the mother nature.

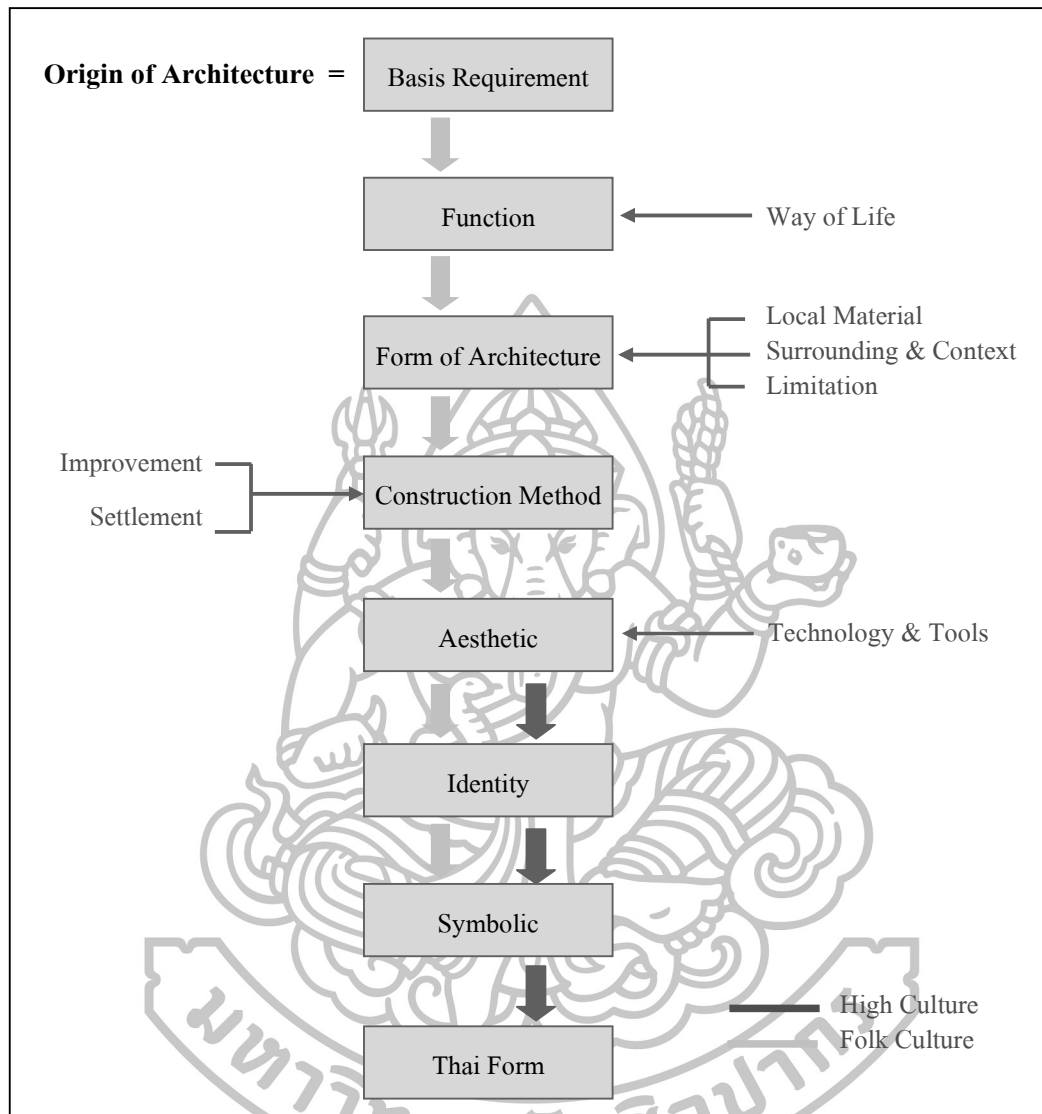


Figure 42 The related factors that influenced form of Thai architecture for living

Nevertheless, the continuity of evolution has been interrupted when Thai architecture confronted with the secularization crisis, the external and internal change of the social structure that expands from the centre of political, government, economic and social aspects from cities to towns and rural areas, which is to say that centralization influences decentralization which rapidly affected to the Thai's way of life. Furthermore, the distorted definition of Thai houses which is the result of receiving one side information that is physically focused on the form, proportion, and elements of the traditional Thai house, caused the unchangeable form of Thai house that has been

acclaimed as a stereotype of national symbol; however, both mentioned issues are obviously conflicted to the Thai architectural philosophy that acquiesces the change of architecture, which is able to adjust with the dynamic context of nature and artificiality.

Consequently, after desert the fundamental wisdom of Thai architecture as Thais have seen Ban Thai as an “old aesthetic” and admire the alien architecture as a new aesthetic which is incompatible with Thailand’s environment, it has impacted us not only in the various forms of unavoidable natural disasters, but also the main purpose of architecture for living in the capitalism era have been changed “from the house that serves people, it turns into people serve them²⁵”.

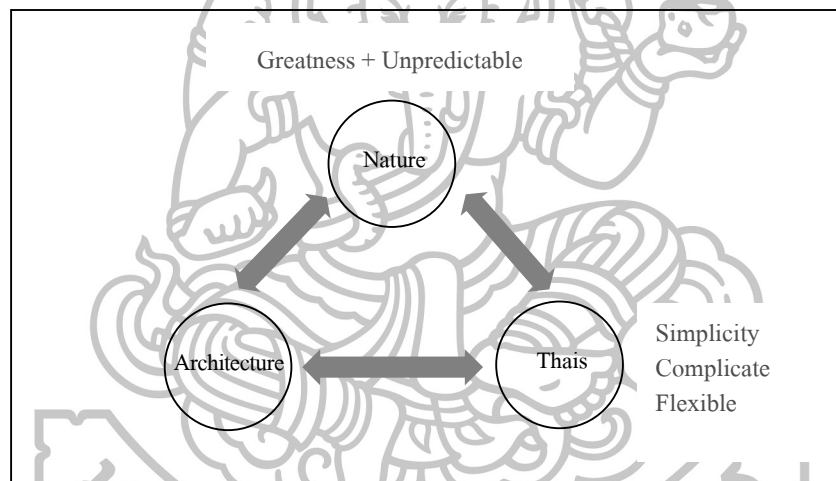


Figure 43 The Inter-relationship of 3 factors Nature – Human – Architecture

Researcher, thereby, focused on presenting the way to revive and recover the knowledge of Thai architectural wisdom in a profoundly understanding in its hierarchy in relation to the natural environment, and the method of living with nature in the state of “Equilibrium”. This is the origin of the living philosophy in the residential architecture that can bring back the sense of Thai architecture which are serenity and peaceful.

²⁵ Arwut Ankawut, *Architectural Wisdom series 2*, 27.

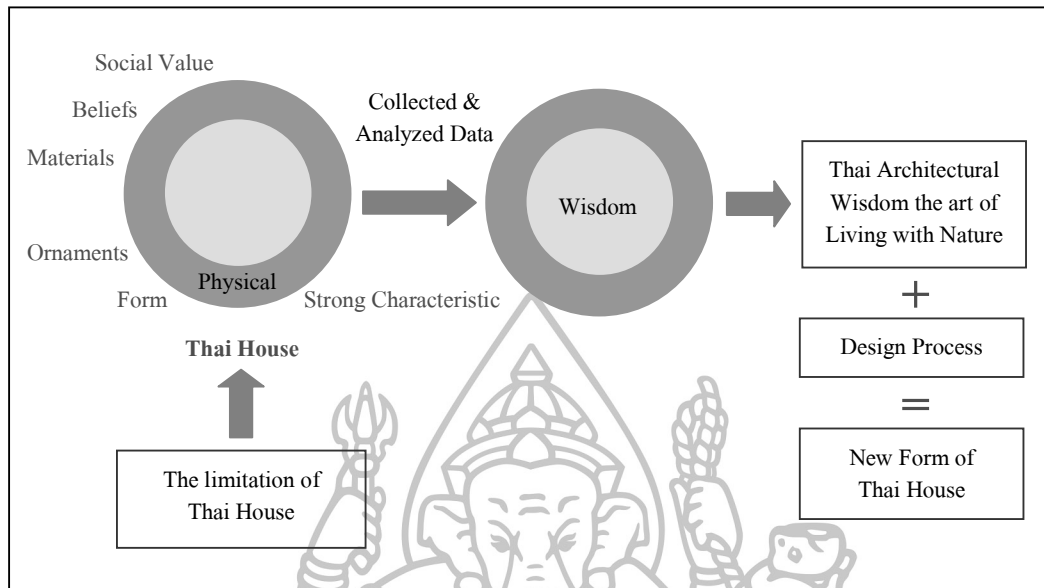
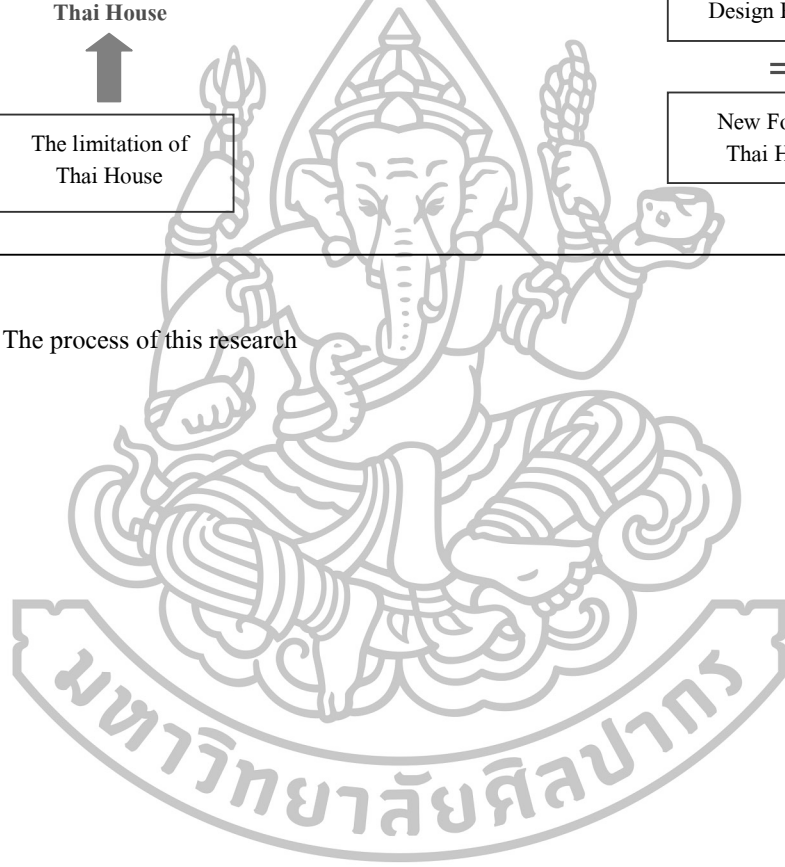


Figure 44 The process of this research



Chapter 3

Research Methodology

Introduction

From the literature review, site survey, and case study, we have found that the shapes of domestic architecture in Thailand are not the same in terms of forms and identities of houses found in different areas. However, behind the physical differences, there is a hidden philosophy that illustrates how to create architecture on a fundamental of the understanding of the nature of places, seasons, as well as the pattern of livings in balance under the different conditions of surrounding contexts, materials, and methods of construction including the householder's way of life. Thus, it can be said that the essence of Thai house is the design concept, not the architectural form.

Previously, the study and development of Thai domestic architecture has been limited only to the forms of architecture, as a result of the creation of myth or discourse and semiotics causing an illusion that has affected the Thai house evolution's direction. In addition, an influence of the conservative-based approach has disconnected Thai houses from Thais, and turned to be prestigious and distance, which has not been compatible with a daily life of Thais today. Indeed, it is one of the reasons that Thai architectural wisdom has been abandoned and finally led to the new aesthetics that does not fit in the Thai's context.

However, the principle of Thai architectural wisdom is to create a balance of architecture between a relationship of humans and nature. This is an excellent concept and a timeless truth hidden underneath the shell of Thai architectural forms, but it is necessary to be modernized to match the dynamic of the present time. This chapter, thereby, will discuss the method of revitalizing the fundamental elements of Thai houses in order to refine the essences of Thai houses in terms of philosophy that influences the Thai architectural forms. The outcome will be applied to the design concept of new Thai houses in the next chapter.

The Ideology of Thai House: The State of Equilibrium of the Interrelationship

Considering the shapes of roofs, house panels, and the height of stilts, ventilation, as well as construction materials, which vary according to the environment of a house's location in each region of the country, namely the North, Central, Northeastern, and South, those are similar on the differences. That is to say, a similarity in regard to the reaction exhibiting via the architectural forms that blend with the nature in each place, surrounding context, as well as the way of life and well-being including the differences of the identity of each ethnic group. From the study of mutual characteristics that influence the concept of architectural designs in each region, it was found that the architectural shape of houses in every region is a result from the factors relating to the major three elements: nature, human, and architecture.

Nature creates human to be part of nature, in which human has to adapt to the law of nature. In like manner, human creates architecture to be part of human (House is one of the four requisites because people need a shelter to protect and accommodate themselves from all kinds of dangers) in response to the need of livings among the changes of nature subject to the availability of construction materials and technology.

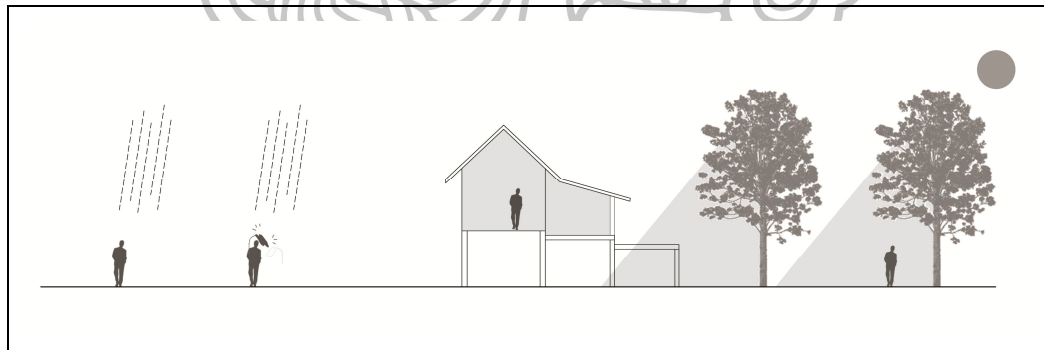


Figure 45 Nature, Human and Architecture

Therefore, it can be concluded that people live their life in the architecture that is in harmony with the nature. As can be seen from the adaptation of the architecture of traditional Thai houses in each local area, they all correspond to the surrounding contexts. For example, floating houses, and fishermen's houses. Those houses can indicate the relationships of the three elements that exhibit the reaction to stay with nature in balance very well. As such, the shapes and

elements of the architecture of domestic Thai houses are the outcomes of the solution to the limitation of surrounding contexts. See the summary of each building as follows:

The steep roof is suitable for Thailand's climate, a tropical climate; thereby, the country has been exposed to a strong sunlight and has a lot of rainfall. In addition, the materials for making roofs in localities; such as, vetiver grass and shingle have a limited lifetime; hence, it is necessary to have a steep roof to protect from the sunlight and to have an efficient drainage, in other words, it means function comes before form.

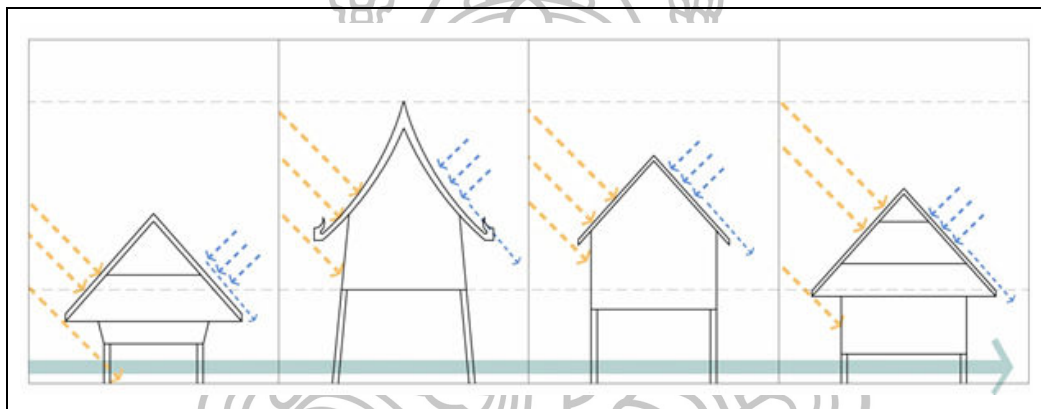


Figure 46 Picture of various types of roof

Apart from high stilts that correlate with people's life in the rice culture where water has influenced their livings, it is inevitable that architecture has to correlate with water level in the monsoon season. The local wisdom has been reflected by raising houses above water. Since Thailand is located in a tropical zone with a regular rainfall, to build a stilted house above the normal ground level help avoid the damage caused by the rising of water. Obviously, from the local wisdom that expressed through the stilted-house architecture in correlation with the water level, it brings the advantage that is a functional space underneath the house platform has been added. It offers protection from the dangerous animals and thieves as well.

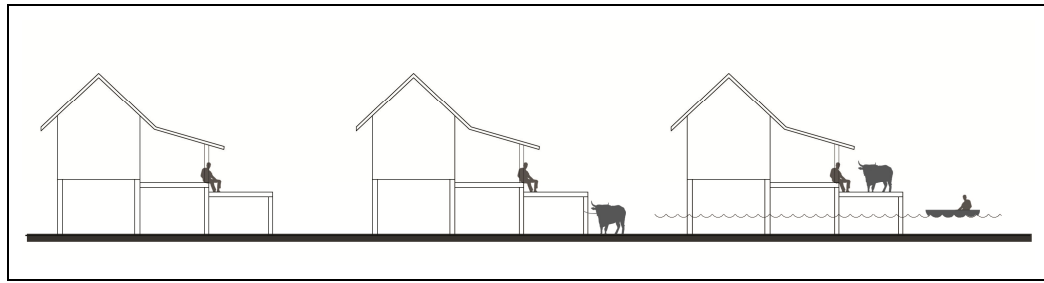


Figure 47 Graphic of stilted-houses

Veranda, consisting of outdoor and indoor terraces, serves not only as a multi-purpose area for various activities in the regular and rainy seasons but also, in regard to designing, but also as a centre connecting the outer and inner spaces together equally in terms of tangible and intangible dimensions. Moreover, it acts as a transitional area for adjusting a temperature.

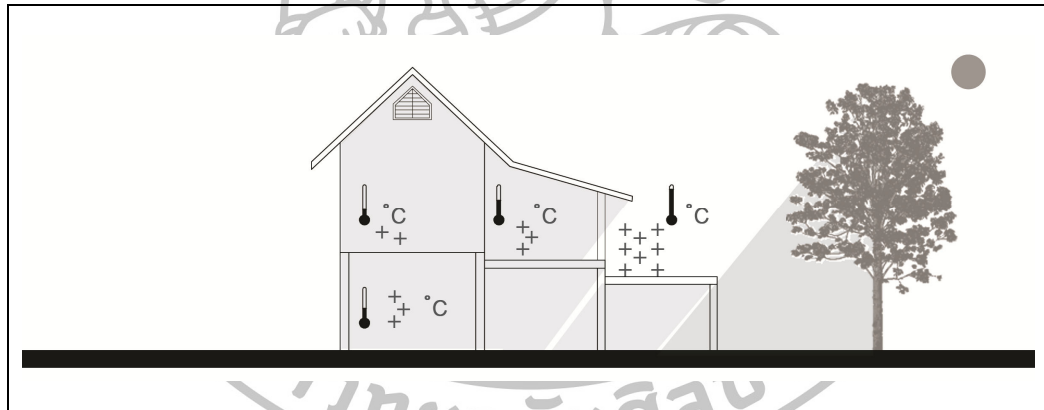


Figure 48 Pictures of veranda - sun/shade

Ventilation

Traditional Thai houses in every region employ the method of ventilation that is suitable for the climate in each local area as shown through the architectural elements, including the use of a vent on breathable wall panels and the use of an air gap, air ventilation and air insulation in every dimension to create a comfort zone that reduce the heat transfer effectively as quoted as Thais' saying "Yu Yen Pen Suk" (living in serenity happily).

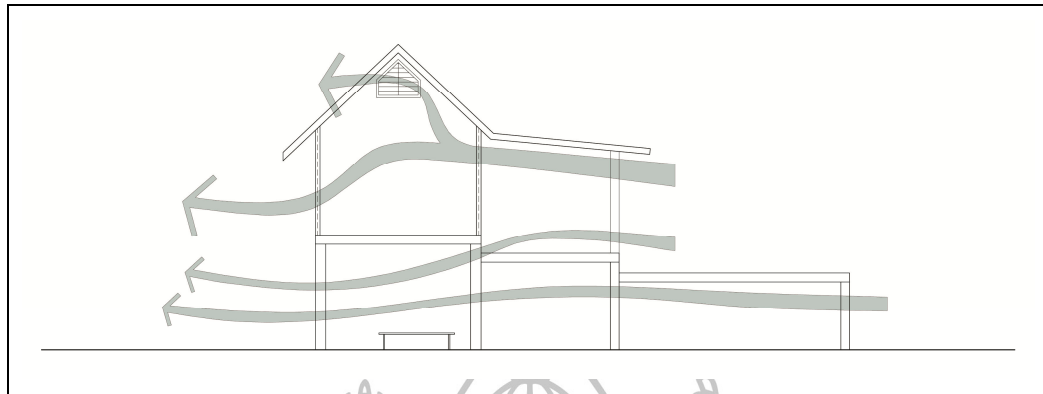


Figure 49 Pictures of different types of ventilators

Somehow, the change of traditional Thai architecture has come from the given definition and interpretation that focus on the shapes of architecture, leading to a wrong direction in development. Consequently, the state of equilibrium of the interrelationship has been disconnected from nature. The remains are human and architecture without balance. Although there has not been much impacted from this disconnection at an early stage; however, when time passes by, a number of unbalanced architectures have been quickly increased and extensively affected a normal state of nature. Finally, the consequences of the mentioned unbalance of nature have inevitably come back to humans.

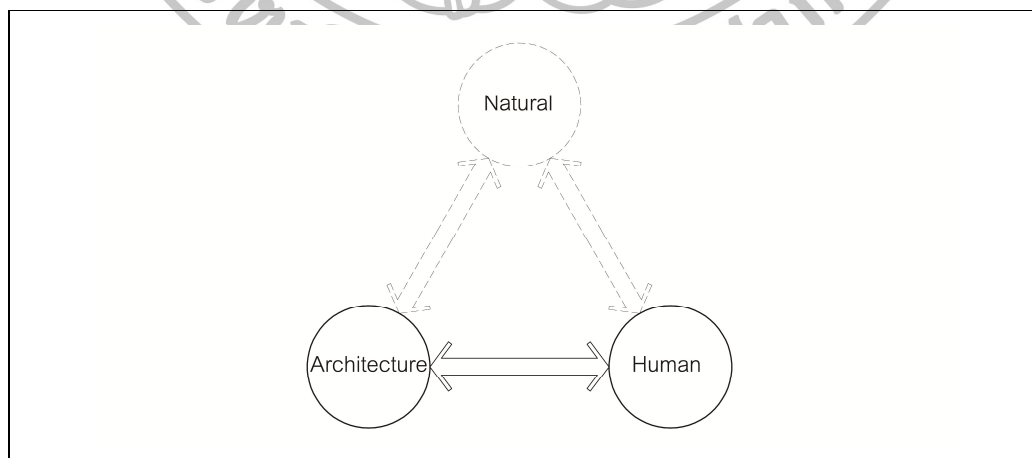


Figure 50 Disconnected (Thai) architecture

From the research's assumption, the key of the Thai house's philosophy is to build the equilibrium of the interrelationship, comprising nature, human, and architecture, which have now been disconnected. Therefore, to revitalizing the fundamental elements of Thai house, we need to reconnect the mentioned interrelation by re-creating the state of equilibrium in architecture. To prove this assumption, we need to study the three elements of nature, human and architecture to find out what are the correlated links among these three elements in order to bring those links to synthesize for redefining Thai house in the next step.

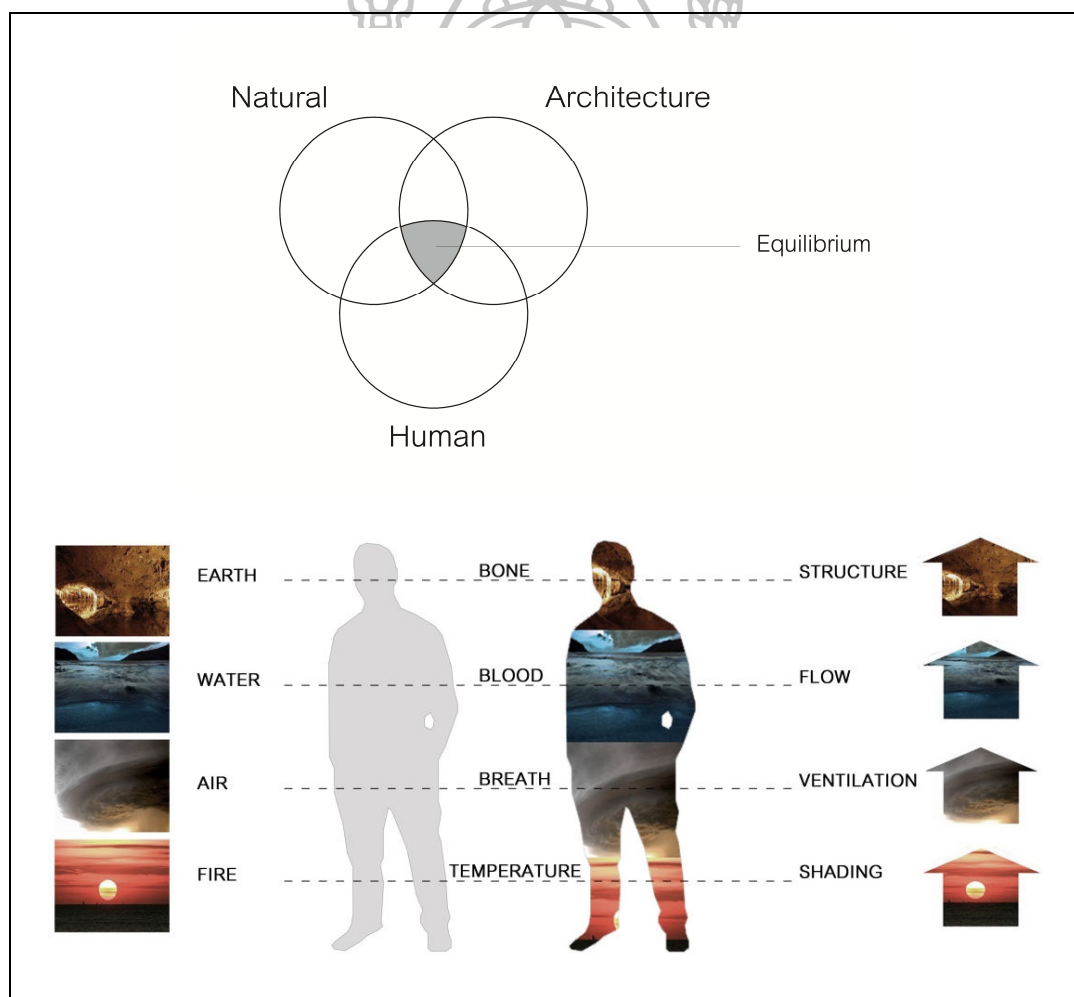


Figure 51 Equilibrium of the interrelation and the 4th Elements in Nature / Human / Architecture

The Correlated Links

Earth holds water. Water gives moisture to the earth, Water and air circulate and exchange, Fire gives the warmth. All are working in balance; thereby, the life begins.

Thousands of years ago, many world's greatest philosophers; such as, Plato, Aristotle, and Hippocrates said that the four classical elements were the composition of everything in the world. Since then the four classical elements: earth, water, air, and fire, have become an ideal that influenced the Western culture as a cornerstone of various fields; such as, philosophy, science, medicine, etc.

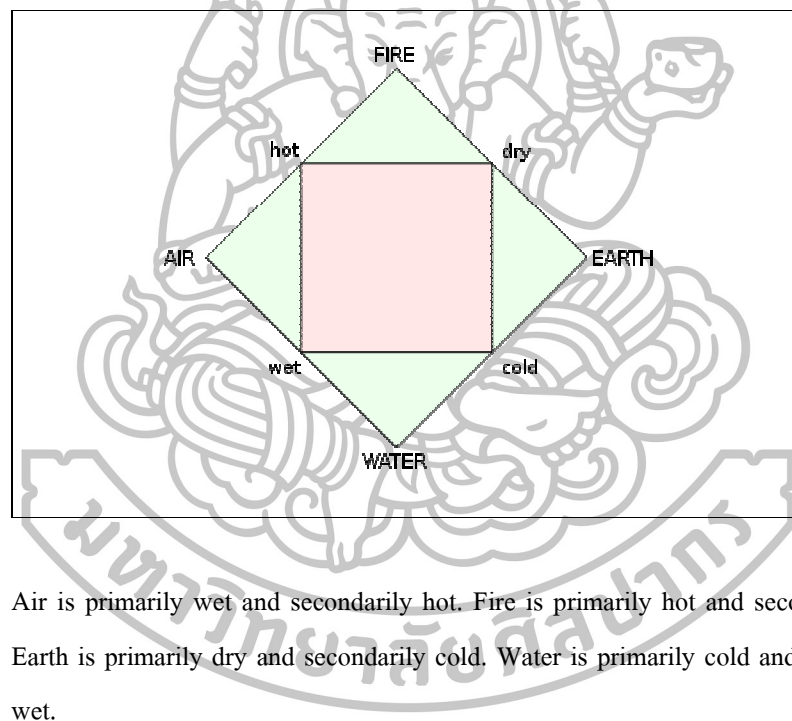


Figure 52 Air is primarily wet and secondarily hot. Fire is primarily hot and secondarily dry. Earth is primarily dry and secondarily cold. Water is primarily cold and secondarily wet.

Source: Wikipedia, **Classical elements**, accessed October 28, 2015, available from <https://en.wikipedia.org/wiki/Triplicity>

In Buddhism (Eastern Culture), Mahabhuta Rapa defines the four great elements: earth, water, air, and fire, as a fundamental basis of understanding that leads one to be detached from materiality (Rupa) to the state of emptiness (nirvana: complete extinction of all passion). In terms of the canonical definitions, they are referred to both “external” and “internal” elements, which mean everything outside and inside human body.

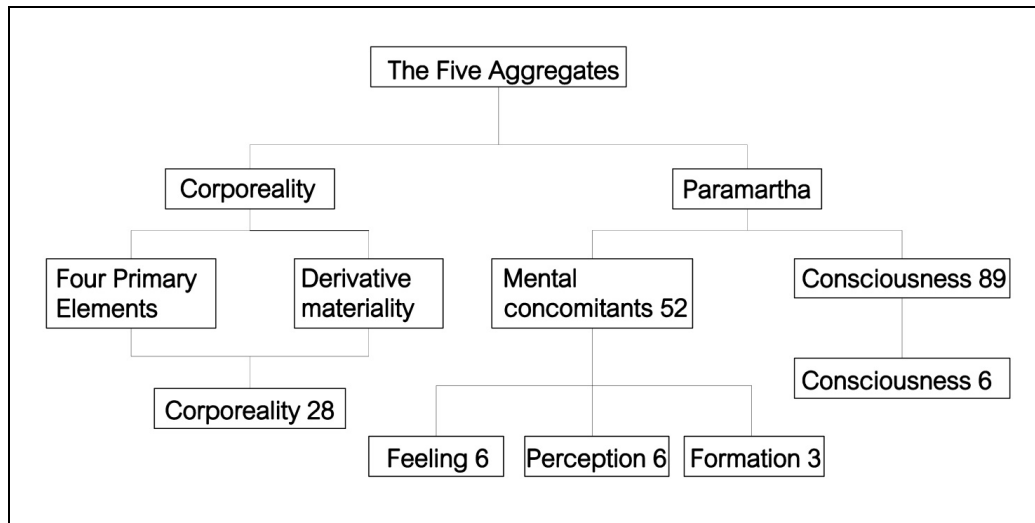


Figure 53 The diagram of Mahabhuta Rupa

Source: Nithee Siripat, **Mahabhuta Rupa Diagram**, accessed October 28, 2015, available from <http://www.siripat.com/93.%20Righteousness-to-Begin-the-Mental-Development-2014.asp>

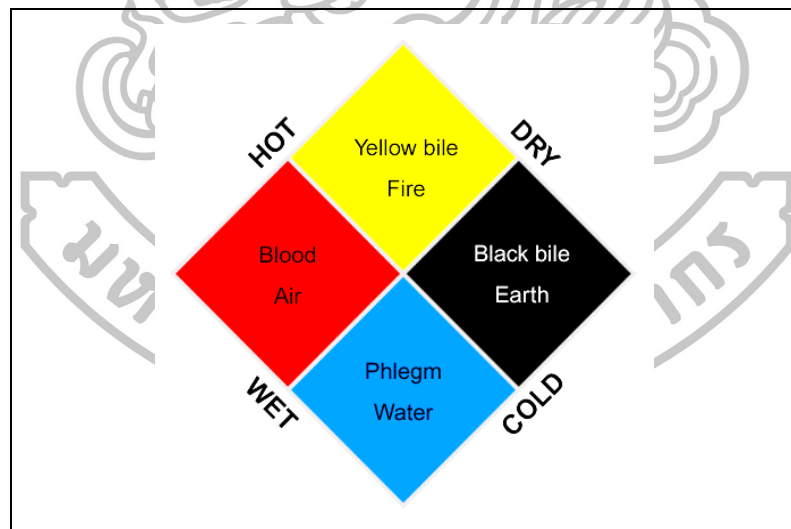


Figure 54 The classical elements were used in describing the human body by Hippocrates of

Kos: yellow = fire, black bile = earth, blood = air and phlegm = water

Source: Wikipedia, **Humorism Diagramme**, accessed October 28, 2015, available from <https://simple.wikipedia.org/wiki/Humorism>

In respect to Thai architecture, the four elements: earth, water, air, and fire are hidden among the surrounding contexts of architecture in both tangible and intangible aspects. The obvious evidence that reflects the correlation between the three compositions in the Thai architectural principle is using the word “Pluk Ruean” to define the method of house construction, in which “Pluk” in Thai means to plant, to cultivate or to grow something on the mother earth (Phra Mae Thorani or Goddess of the earth), which is the origin of the universe, according to the belief of people in the rice culture and South East Asia. Hence, using the word “Pluk Ruean” significantly implies the understanding of a house as a thing that can be born, grown, and decayed by the time conditions, not just as a lifeless construction. For this reason, Ban Thai (Thai house) has an intangible meaning, particularly, in the context of a creature that does not stop moving, but adapts for its existence among the conditions of change whether nature or man-made.

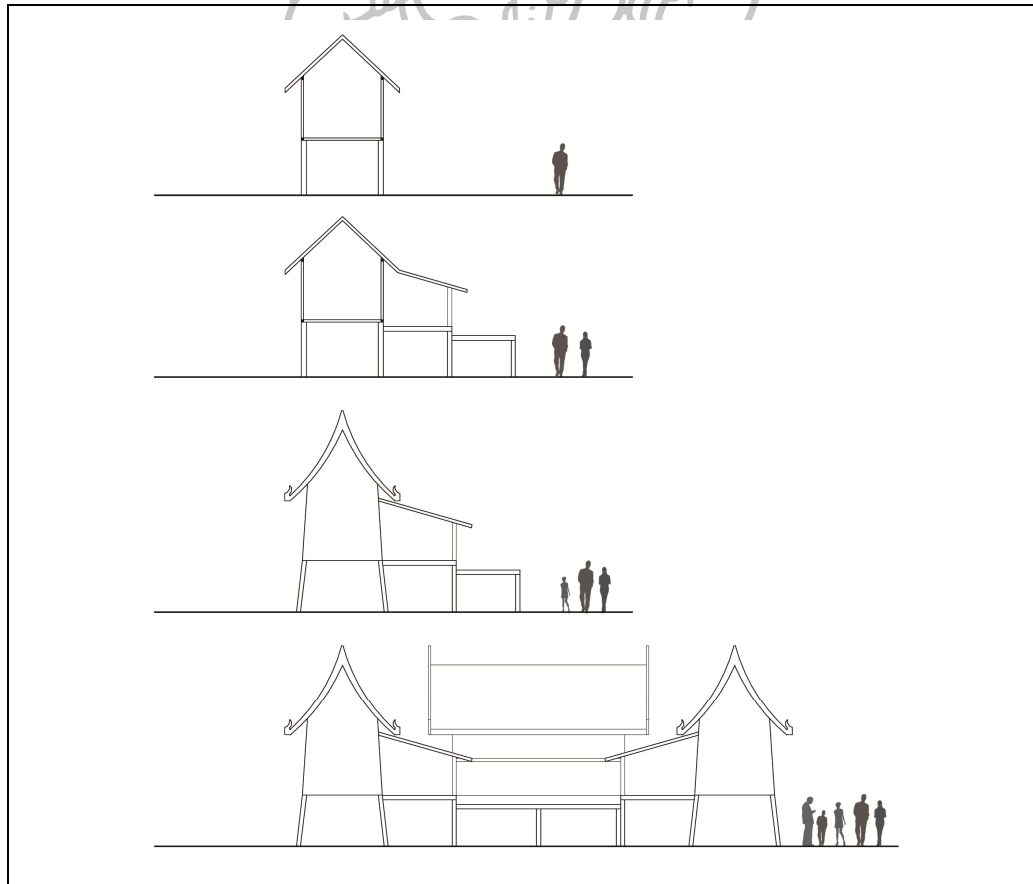


Figure 55 Pictures of Ruean Khrueng Phook / Ruean Khrueng Sap illustrating the growth of life

Earth

“Earth” for Thai houses does not only mean a piece of land, but also building materials; for instance, wooden stilts, wooden panels, wooden terraces, clays or thatched-roof tiles, etc. All of these are derive from earth. Moreover, the plantation and common areas in the compound, especially, the rice granary symbolize the wealth of the family prospect as a gift of mother earth.



Figure 56 Earth in Thai house, Tangible / Intangible

Water

Water is closely associated with Thai culture is a pair. The physical relation of water and architecture, apart from the use for consumption, water is also used for agricultural, cultivating and animal farming purposes, which could be related to the orientation and settlement and problem solving caused by water in the flood and monsoon seasons. This is the reason why the architectural forms of Thai houses feature raised-platforms, wide terraces and steep roofs.

For an intangible meaning, water is simply defined with a deep meaning in two implications; one as refreshment and one as hospitality. To illustrate this, it can be seen from one of the architectural elements of Thai houses, “Ran Nam”, a drinking water station – a platform for a drinking water container for guests, located at a small corner in front of the house. In addition, there is also a small water container for cleaning feet before entering the house.

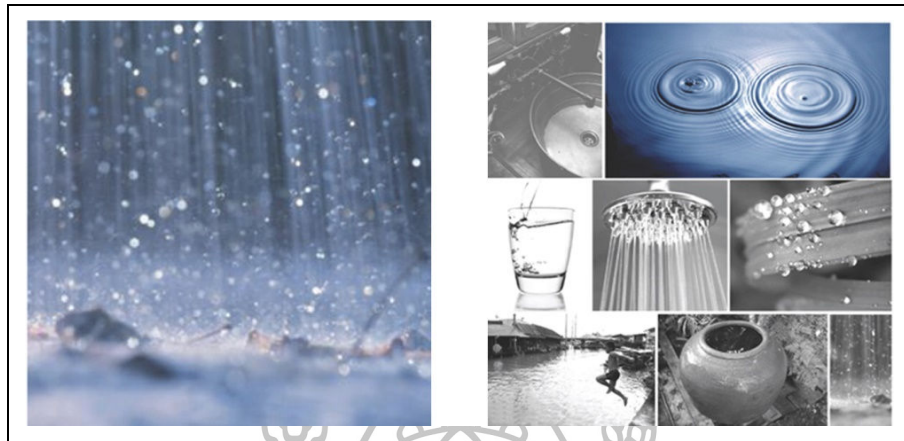


Figure 57 Water in Thai house, Tangible / Intangible

Air

For Thai houses, air is related to the ventilation system. Since Thailand is situated in a tropical zone, heat and humidity seem to be major problems. The insulated materials have not only been applied, but also the air ventilation has played an important role in this regard, as evidenced from Thai houses in all regions.



Figure 58 Air in Thai house, Tangible / Intangible

Air gap and transitional space are created in various parts of Thai houses; such as, in breathable panels, floors, large semi-outdoor terraces and even on the roofs for the heat transfer

and create a comfort zone. For Thai architecture, air is a core; even though, it is invisible, we can feel it as a Thai proverb, “Rom Yen Pen Suk” (shade and cool and being happy).

Fire

In Thai architectural terms, fire can have two metaphoric meanings; first meaning is a heat, which is a primary concern that needs to be prevented from and corrected as the first priority of the Thai architectural designs (on the contrary, the architecture in the western countries requires warmth). Meanwhile the second meaning is power and light, a positive side that can be chosen to apply in the architectural design.

Traditional Thai houses have a method of heat protection to the buildings in a subtle way which exhibits the wisdom on the integrated solution of architecture, that is to say, it is a problem solving of many issues simultaneously. For example, the use of a space underneath the house platform for relaxation or and many activities during the daytime, as a result from raising a house on stilts to avoid floods. The large terrace is an area for sunlight all day. Therefore, the semi-outdoor terrace will be a transitional area for primarily adjusting temperature before entering the enclosed space at night. Furthermore, the fact that the shape of roof is a high gable roof that can reduce space to absorb heat and release the accumulated heat indoors through the air ventilation and roof tile materials. However, in some cold weather areas, the solution has turned out to be the use of accumulated heat on the ground during the day to create warmth at night.



Figure 59 Fire in Thai house, Tangible / Intangible

Obviously, fire, in an architecture term, is something to be prevented and avoided from. Nonetheless, because of the deep understanding of nature that creates Thai wisdom, it not only delivers the mentioned solution, it also brings the fire to be utilized both directly and indirectly (for instance, sun-dried food preservation) in an efficient way.

From the above-mentioned research study, it leads to the conclusion that the four classical elements: earth, water, air, and fire are correlated links of the interrelationship: nature, human and architecture. In general, the change of nature under normal circumstances will vary to places and time within the conditions of balance among the four elements. However, despite the fact that humans and architecture are just the small units of the interrelationship system, they turn out to be a cause of the state of the imbalance among the four elements, which has an impact on the natural phenomenon, the largest unit of the system. This leads to several direct and indirect consequences overall.

Hence, to reconnect the interrelationship system of the three elements, the state of equilibrium of the four elements should be created within architecture in order to satisfy humans, who reside in, to live in a comfortable condition in both tangible and intangible meanings. This is the beginning of returning balance to the nature where everything is logical and united as one.

Ban Ban Method

To revitalizing the fundamental elements of Thai houses, we need to create a new definition of Thai houses by revising its core (Thai architectural wisdom), in other words, is to create the state of equilibrium among earth, water, air and fire. Due to the fact that the development of Thai houses today only focuses on maintaining the form of Thai houses, it has been proved to be inapplicable to the present circumstance because the vital principle has been abandoned. From the research findings, it has brought to the method of reorganizing of the four elements in the architectural design to create the equilibrium, which is a restoration of the principle of Thai architectural philosophy in harmony with places and time to be more practical in present environment.

The creation of architectural design concept called “Ban Ban”, which is Thai’s idiom that means a thing that can be commonly done easily and not too complicate but gives the senses of functionally cozy. This concept is based on a design by employing Thai architectural wisdom

that is wisely beautiful and simple along with the application of new technology and innovation as necessary to produce the architectural work that conforms with nature as much as possible; it has to be practical in present circumstances as well. The outcome could be a prototype of the new Thai architecture for modern times, which is dynamic according to modern livings, meanwhile it reflects the beauty value in a sense of Thai houses that is “Rom Yen” = “Pen Suk” (shade and cool = happiness) in terms of tangible and intangible values in a very simple way.

Since the fundamental of Thai architecture has conformed with the context of places and time, apart from the analysis of the project’s site, sunlight and wind’s directions including other factors that could affect the buildings being used as factors in designing, orientation, as well as designation of the size of the appropriate functional spaces, the beauty of the building’s shape including the structural system and materials selection, it needs to consider and understand the nature of the four elements then blends them together to create a balance between the human’s activities and natural environment with architecture as a mediator. The details of the concept could be explained as follows:

Earth

The Ban Ban Method has applied a concept of Thai houses on land utilization for maximum benefits. Starting from dividing a proportional usage of land into two parts that are 40% of the functional space indoors and 60% of the open green area – in this part, it will be divided into 15% of recreational area, 15% of home-grown vegetable area, 10% of indoor plants for filtering harmful toxins and pollutants from the air, 20% of useful trees. During the day, through the photosynthesis, almost every kind of trees can produce oxygen and absorb pollutants from the air, and building including toxins releasing from humans; therefore, we can choose the kinds of trees that have several benefits featuring beauty, flowers, ornamental trees, shading trees, edible and fruits plants, herbs, and household vegetable gardens as we want. Especially, we can choose the plants that are good at absorbing pollutants; such as, lady palms, yellow palms, bamboo palms, coral vines (type of climbers), snake plants, Janet craig, Bengal trumpets, dumb canes, devil’s ivy, and Dendrobium Orchids, which can be grown indoors and outdoors. These plants can be utilized to increase the efficiency of carbondioxide absorption. The plants landscaping will spread around the areas of the project’s site, supported by other architectural

compositions; for example, bamboo wicker fences and vertical gardens. In addition, it gives the shades to the houses.

For the functional space of the interior building, it will be designed in a cluster type which is connected by a terrace. The size of rooms and orientation will match the sun and wind directions, and accessibility (depending on the individual needs of the functional area of each user). Moreover, the main building will be moderately elevated to provide some space on the basement, which not only allows rainwater to flow through (during the flood season), but also adapts to be an empty space for engineering building system and for storage.

In respect to the mentioned-proportional area, it is the maximization of land usage; hence, the waste from soils rarely occurs, in case of any, it can be demolished by natural methods.

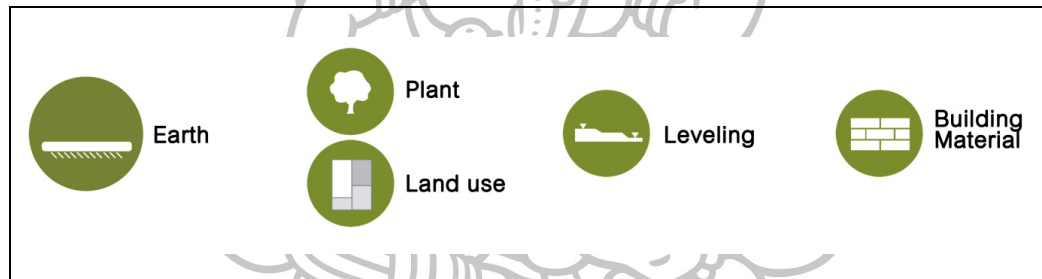


Figure 60 Ban Ban Method / Earth

Water

With the Ban Ban method, the water resource management in every part relating to the house will focus on the rainwater retention with a gutter system and pass it through a simple filtering process before being stored for future consumption. The wastewater coming from every part of the household will be collected before being sent through the grease trap, and filter systems then will be kept in a tank for watering trees. For the outflow sewage that has been passed the treatment system in a treatment tank, it will be retained in a sedimentation tank before being released to a constructed wetland in which the plants that can absorb heavy metals like cattails, Indian shot, and umbrella plant have been grown. After that, it will be discharged into an irrigation ditch as one of the supports on returning a balance to the ecosystem.

In short, the cold water, sewage, and wastewater systems from the indoors usage will be managed with the 3R principles: reduce – to determine the areas that are necessary to apply, reuse – to bring the wastewater into a treatment process before using it within appropriate activities, and recycle - this part will be in a water treatment before releasing to a nature system.

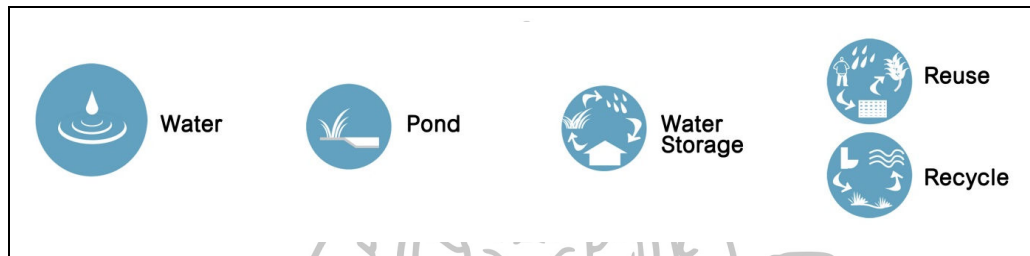


Figure 61 Ban Ban Method / Water

Air

The architectural design concept of Ban Ban focuses on the natural wind utilization to create a comfort zone on the project's site. Thus, to separate building units, raise houses on stilts, elevate floors, make doubled-layer roofs, a two-layered panel on the sunlight exposure side, sliding panels, and breathable panels, all of these are the simplest methods to increase the ventilation capacity and heat transfers to minimize differences between the temperature indoors and outdoors. In addition, the terrace area not only serves for a purpose of a lot of activities, but also acts as a temperature adjustment between interior and exterior of the buildings. Furthermore, trees not only can be used to absorb heat and protect the sunlight reflection to the house's wall, it also creates a pleasant and shady atmosphere around the house. When the house has efficient ventilation, it helps save the energy.

The Ban Ban method tries to avoid the use of air-conditioning; however, when necessary due to the condition of the locations not compromising to the state of natural comfort, we can use the appropriate size of rooms and reduce the heat accumulation in the buildings that make an air-conditioner consume less energy and produce less carbon footprint. Hot air caused by an air-conditioning operation can be transformed to store in a form of battery power. Nevertheless, this is an innovation; the cost may be high when considering if it is a worthwhile investment.

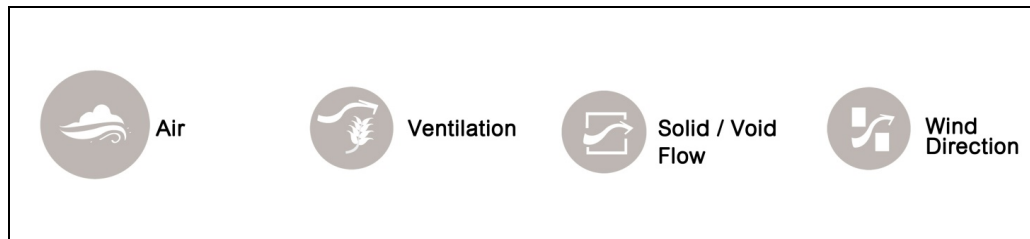


Figure 62 Ban Ban Method / Air

Fire

Fire, in respect of architecture, it includes power, that is a heat which features both advantages and disadvantages. Besides providing light, it is a part of a photosynthesis that creates oxygen. The heat from the sun can be stored for energy usage in many parts of the buildings (by photocell and solar cell). It is useful for killing germs, drying clothes, and preserving food at a household level. Nevertheless, the disadvantage is the heat that flows into the building will increase the accumulated temperature; consequently, a lot of energy is required for air-conditioning. However, this problem can be solved and prevented by using trees and roofs, as well as reducing hard surface areas as much as possible to decrease the heat absorption and reflection into the buildings. For the electrical power saving, we can choose energy saving light bulbs and appropriately designate the right spots for lighting and electrical power systems, as well as appropriately design the sizes of rooms to match the use of air-conditioners in some areas, which are the ways to learn to live with nature in harmony.

The waste from fire comes in a form of energy loss; therefore, the principles of prevention are to utilize the natural light for the maximum benefits during the daytime, as well as to store the energy by implementing the solar cell system. The most important thing is to reduce the amount of electrical power usage with the design concerning the actual uses and determining the areas that are necessary to apply.

It can be said that the Ban Ban concept is the way to create a balance among earth, water, wind and fire in architecture by combining fundamental of the Thai architectural wisdom with the architectural design principles for energy saving in a passive method. The outcome is a new Thai architecture that has been redefined to its genuine meaning which is the architecture of equilibrium within the interrelationship system.

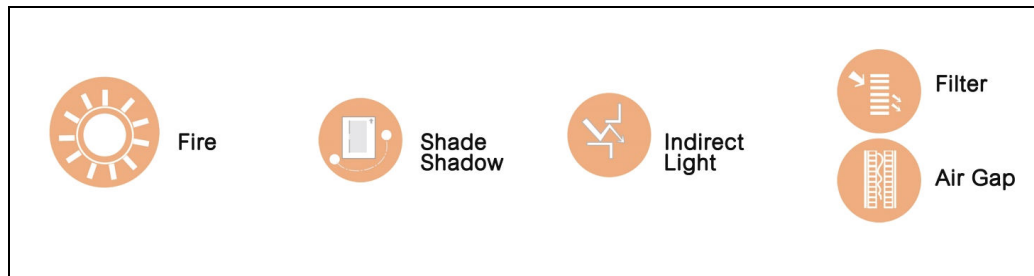


Figure 63 Ban Ban Method / Fire

Summary: toward the new meaning of Thai house

From the Thai house-related study to find out what is the true core that has been brought to develop the pattern of domestic Thai houses and what causes the real meaning of Ban Thai having been distorted, and from the in-depth data analysis, and synthesis, it appears that the research result leads to the method of creating a new definition of Ban Thai with the “Ban Ban method” as a tool to create the state of equilibrium in architecture that links to the context involving nature and the way of living at the present time. At this stage, the founded method will be applied into the series of experimental design process, which will be explained in the next chapter.



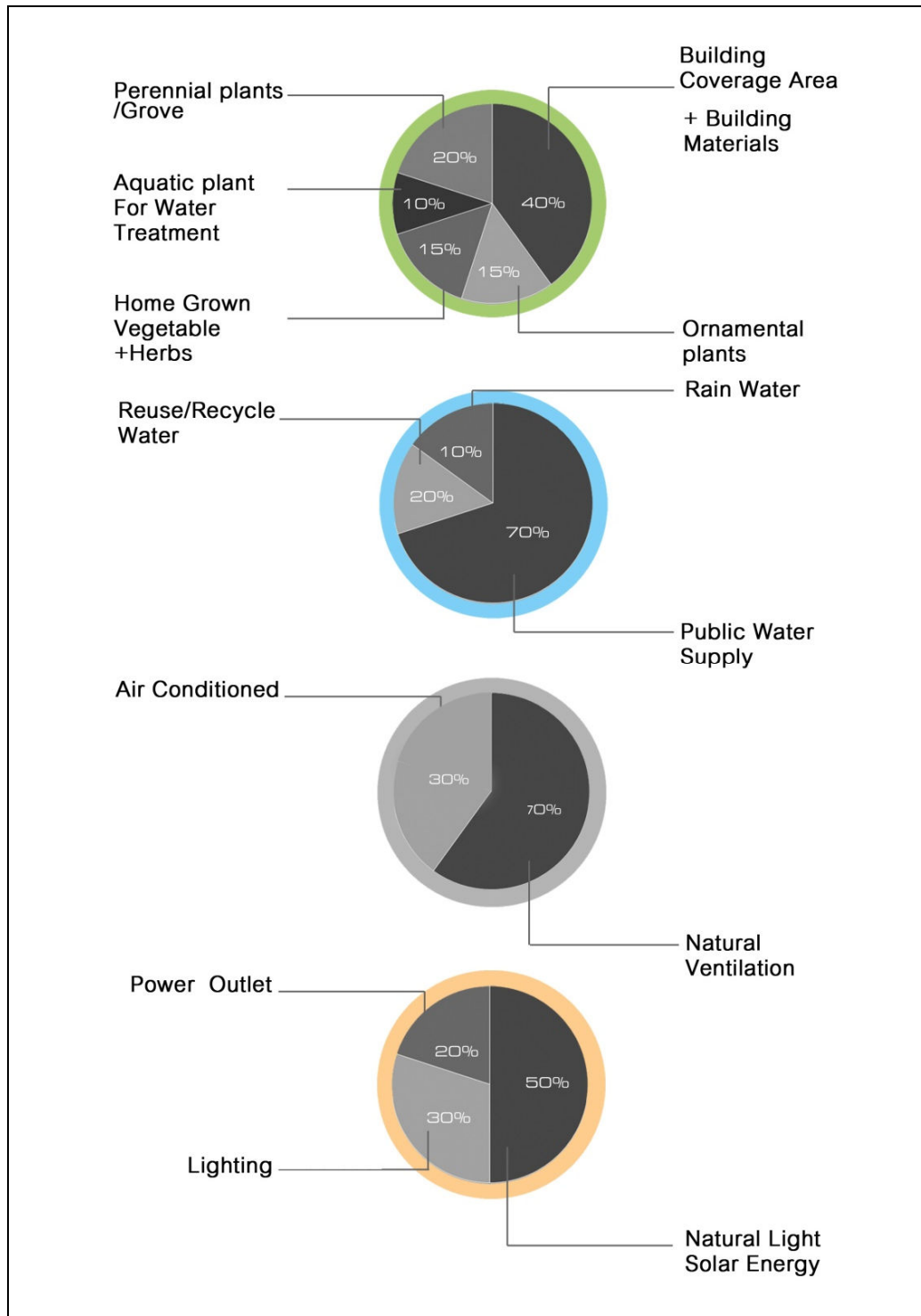


Figure 64 Ban Ban Method, The administration of 4th elements in architectural design process

Chapter 4

Design Experiment

Introduction

This chapter is focused on the series of design experiments, which the researcher has been practicing simultaneously will be presented. All pieces of design reflected the empirical knowledge gained from this research through time. The design experiment stage was divided into 3 phases: before, during, and after reviewing literatures. In terms of the design outline for this research, limitations and programme were set under the two significant conditions with the aim of obtaining the most accurate outcome of the experiments and those conditions are:

1. The design project has to be built on the real space, in real environment for real users. In compliance with the design experiment's conditions, the researcher has chosen a plot of an empty land of 100 squarewa situated in the allocated property in TambonPuekTian, Phetchaburi province. The project's site faces the south, featuring a rectangular shape land with a measurement of 16 metres wide x 25 metres deep in equivalent to an area of 100 square wa or 400 square metres. The details and analysis on the project's site are presented in the graphics as shown in Figure 65, 66.

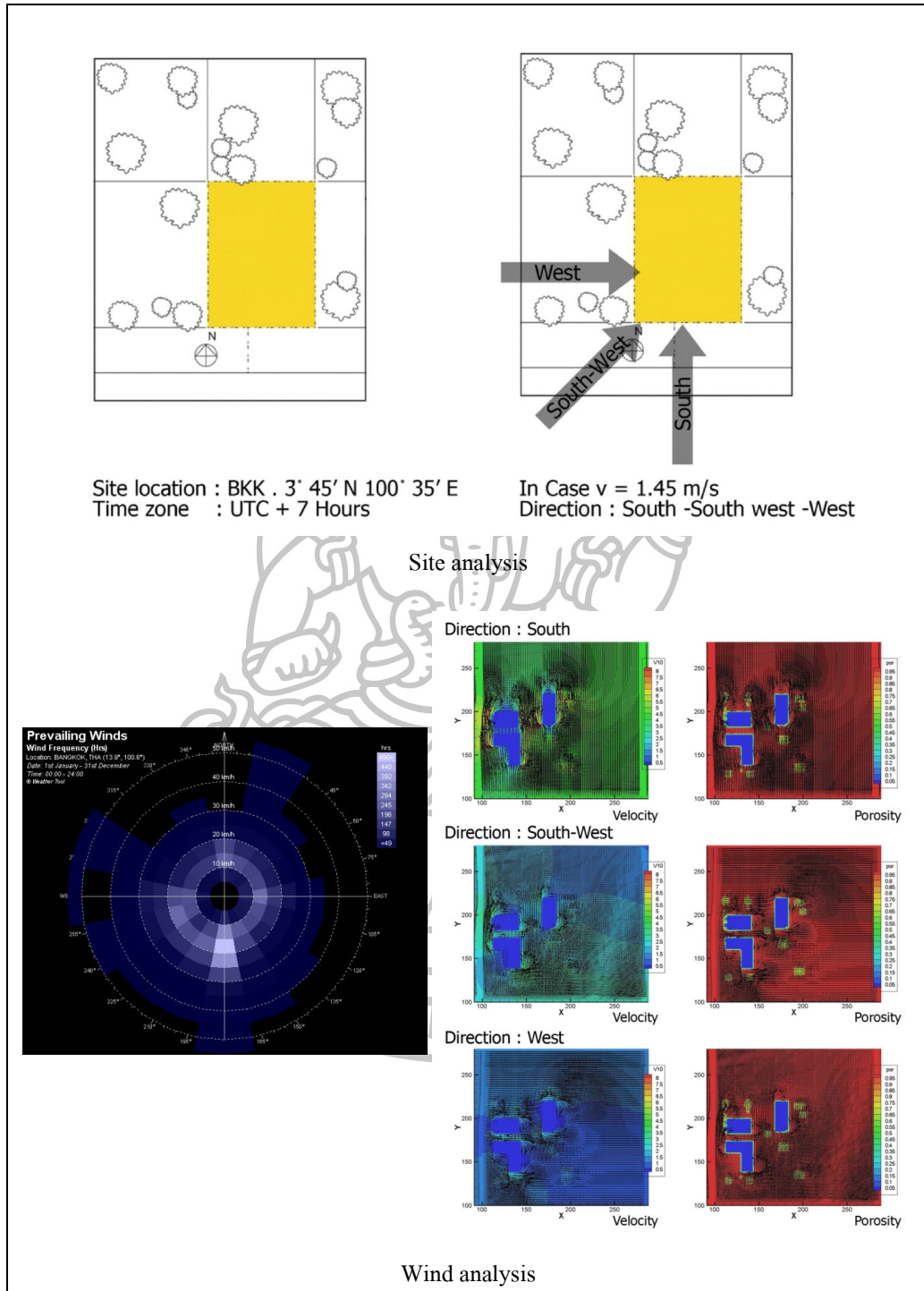


Figure 65 Analysis graphic

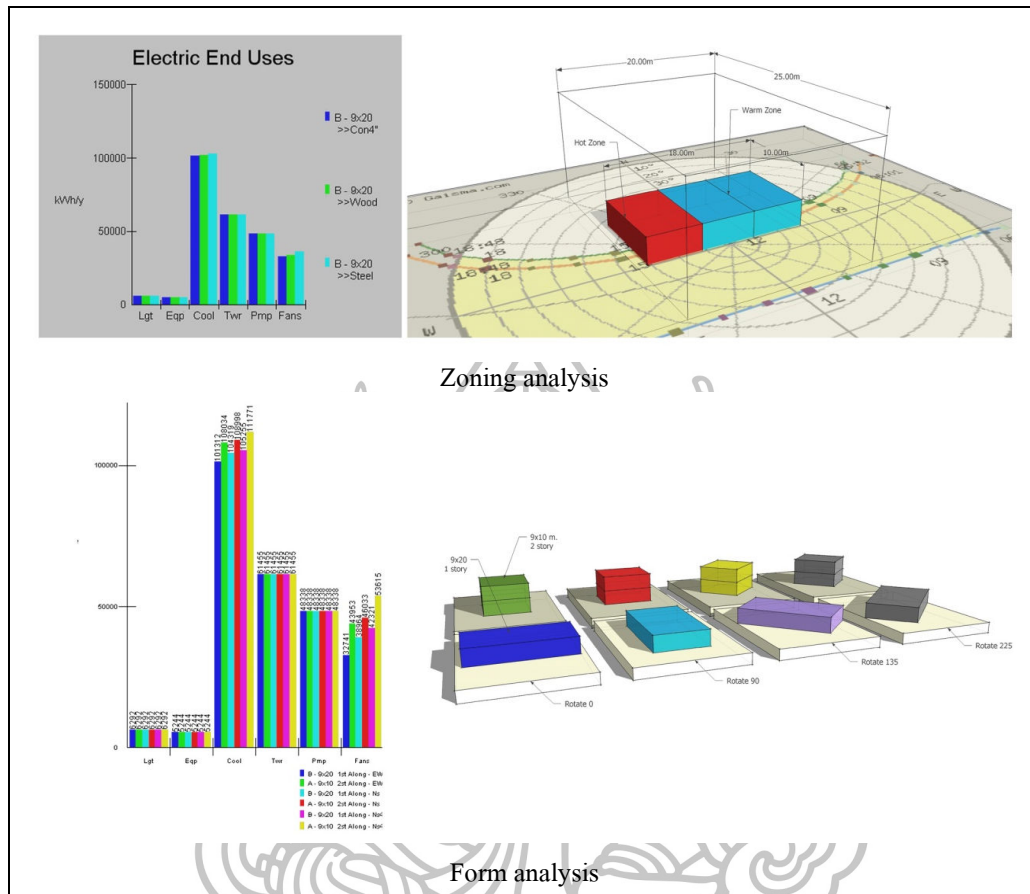


Figure 66 Analysis graphic

This selected site would be used as a base for the design experiment 1, 2, and 4; however, it would vary in terms of the design objectives and programmes.

2. The design experiment has to be seen, evaluated, and given feedback by the outside parties for further development. Therefore, this research had applied for the architectural design contests organized by various institutions in Thailand during 2011 –2013 in order to work on the design programmes that were set the regulations by others. The architectural expert committee, comprising domestically and internationally accredited members, was invited to judge the contestants' designs of which the researcher's was one of them. The committee's feedback and suggestion on both weaknesses and strengths would be compiled for further design development. In addition, the feedback was also a good indicator as guidance to revitalizing the fundamental elements of Thai houses.

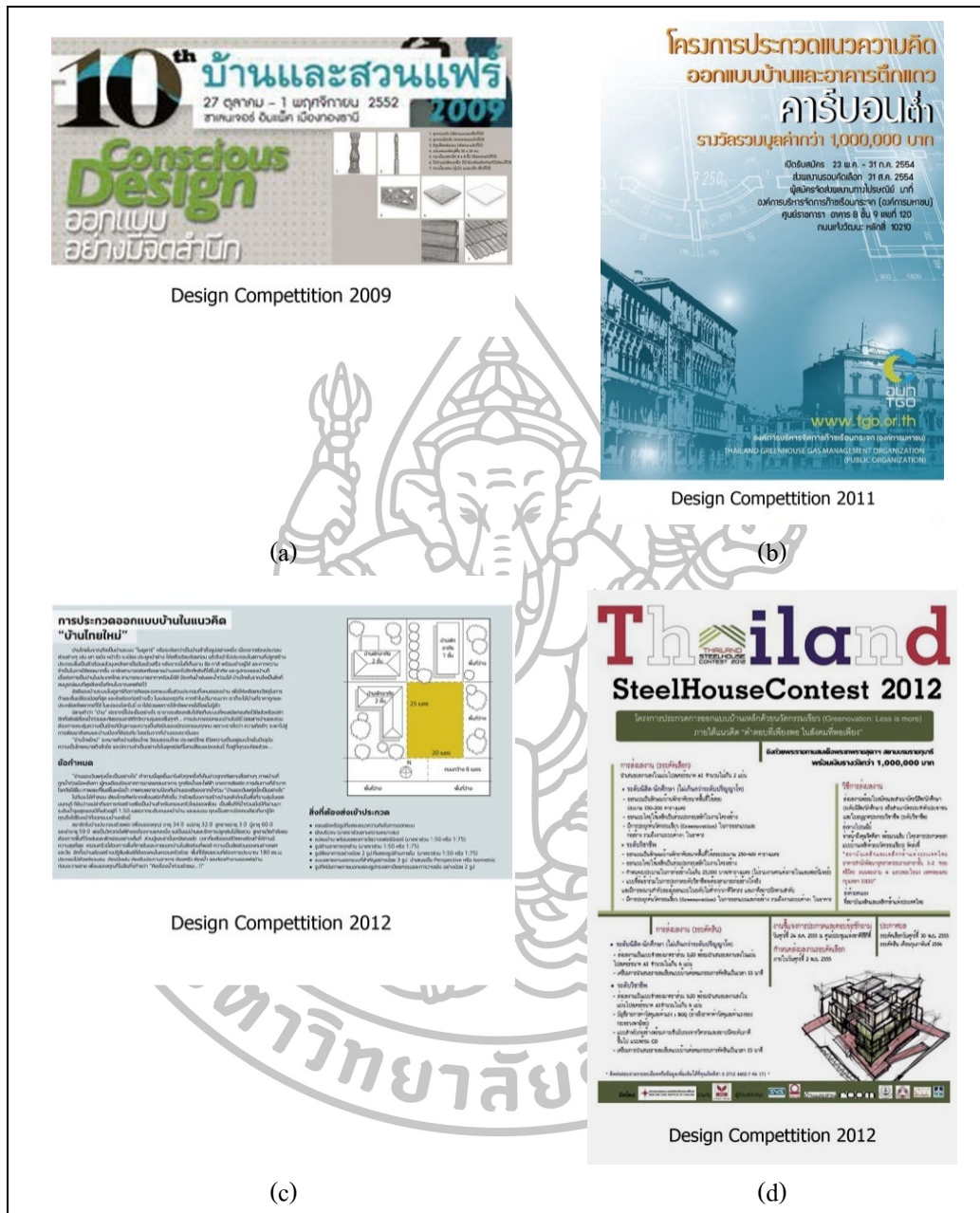


Figure 67 Participated Design Competition Programmes

- (a) Design Conscious
- (b) Low Carbon House
- (c) New Thai House
- (d) Thailand Steel House

There are totally nine pieces of the design experiments. The design experiment 1 had been created before the research began. This one was presented in the Design Conscious Contest organized by Home and Garden Magazine. The design experiment 2 had been tested during the literature review. The selected site was in Amphoe Cha-am and the constraints came from the real demand of the project owner (Professional Practice). On the phase three, the design was created after the research of knowledge had been conducted that was the concept of Ban Ban, which resulted in the design experiment 3. After that, the researcher had divided the experiment into 2 parts: the actual designs –the design experiment 4 and 5 that were developed by based on the outcome of the design experiment 3 in the mean time the researcher also participated in another two contests, which brought into another 4 designs –the design experiment 6–9. The details of the objectives, design processes, implementation, and notifications are as follows:

Before the Litature Review

Design Experiment 1

With an impression on the concept and philosophy of Thai architecture, which is a former knowledge that we have been learning from the school of architecture, the researcher had a question in mind if it was possible to design an architecture that reflected a traditional Thai house style with a contemporary form that was completely different from the Thai architectural form. Based on this assumption, it led to the design experiment 1 as follows;

1. Objective/ based on the researcher's experience

In 2009, Home and Garden Magazine organised the architecture contest with the title, Design Conscious. The programme regulation was to create a budget countryside house in consideration with the selected local materials; such as, wooden balustrade, ventilation block, wooden plank, and fibre cement corrugated roof tile of which most of these common materials had been set by the programme, and 5 of them must be parts of the design.

The expected outcome was a house for a small migrant family, who needed a nice modern house that could be built by a local builder with local materials. Then the functional bases that were necessary could be set by the contestants as long as the area was not larger than 250 square metres and the design outcome must reflect the architectural sense of consciousness in a way.



Figure 68 Conscious Design contest programme

After studying the programme contest, it interested the researcher because this would be an excellent opportunity to present the architectural design that was based on the personal interest.

2. Conceptual design

The conceptual design for this competition was influenced by the characteristics of “Ban/Ruean Thai” (traditional Thai houses) in the researcher’s perception before the literature review. Those consisted of high stilts, veranda, a gable roof, Pa-lai or transitional space, and simple functional space orientation in which it could serve various activities, an open-air area, and good ventilation. Moreover, Thai houses featured the refinement of the size, proportion, and shape and prefabricated structure that could be easily taken down, assembled and shifted. The researcher has used the physical characteristics of “Ban/Ruean Thai” as a basic thought in the design experiment. To begin with, the data from the site analysis was used for the building

orientation and functional areas connected by the areas of “Lan Ban” (courtyard) and veranda. In addition, the design focused on an open-air area covered by roof that connected with empty spaces around the building to serve the complexity of activities (similar to the veranda and courtyard of Thai houses in the past).

In terms of an architectural form, it was quite simple and focused on the connection between external and internal space to make a balance, tranquility, and harmony with respect for the nature. It had aesthetic value that truly derived from the structure of architecture and reflected the beauty in Thai style. That was a harmonious beauty.

3. Design outcome

From the conceptual design and programme analysis, it led to the design process and design outcome, which was a simple 2 storey-steel structured house with a large terrace that connected all usage area together (as shown below).

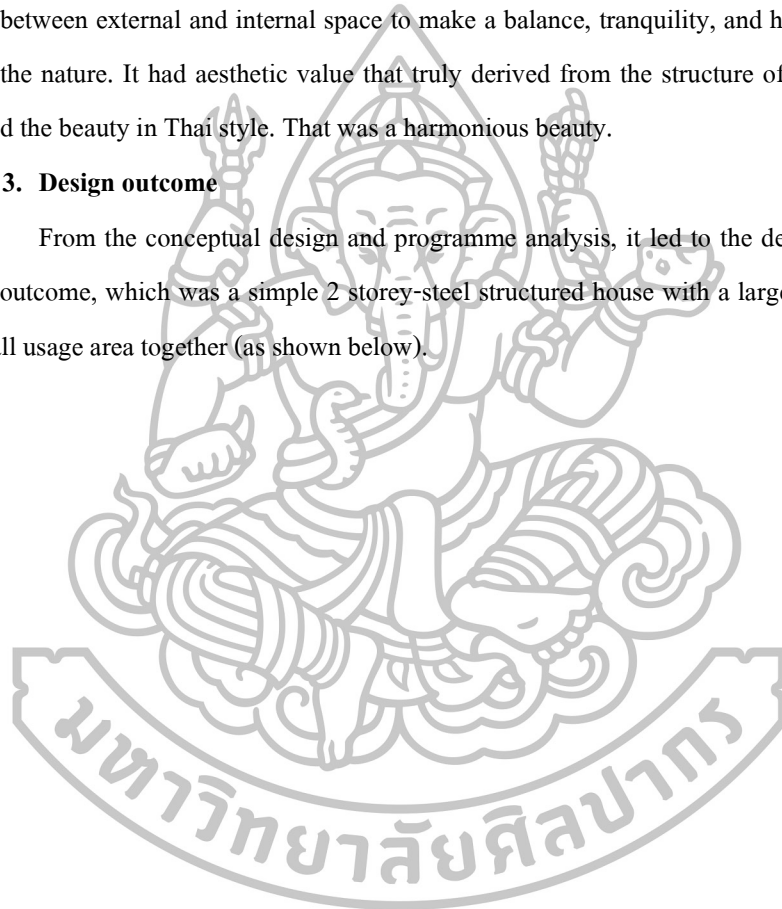




Figure 69 Plan: Open plan provides flexibility to utilize the same space for various activities.

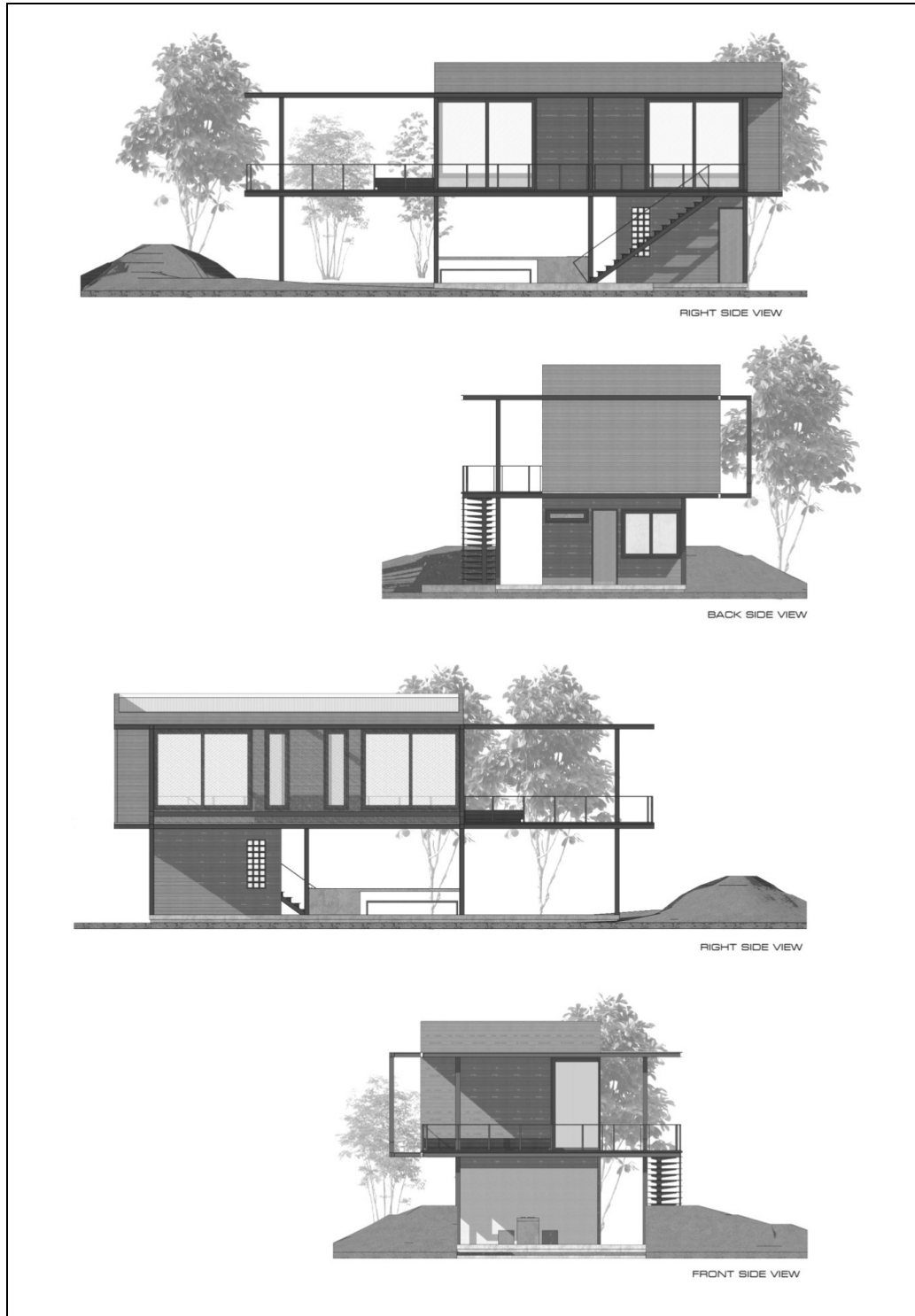


Figure 70 Elevation 1-4: the elevation shown the harmony between the house and its context.



Figure 71 Section 1-2



Figure 72 Perspective / Architectural Details



Figure 73 Perspective / Architectural Details

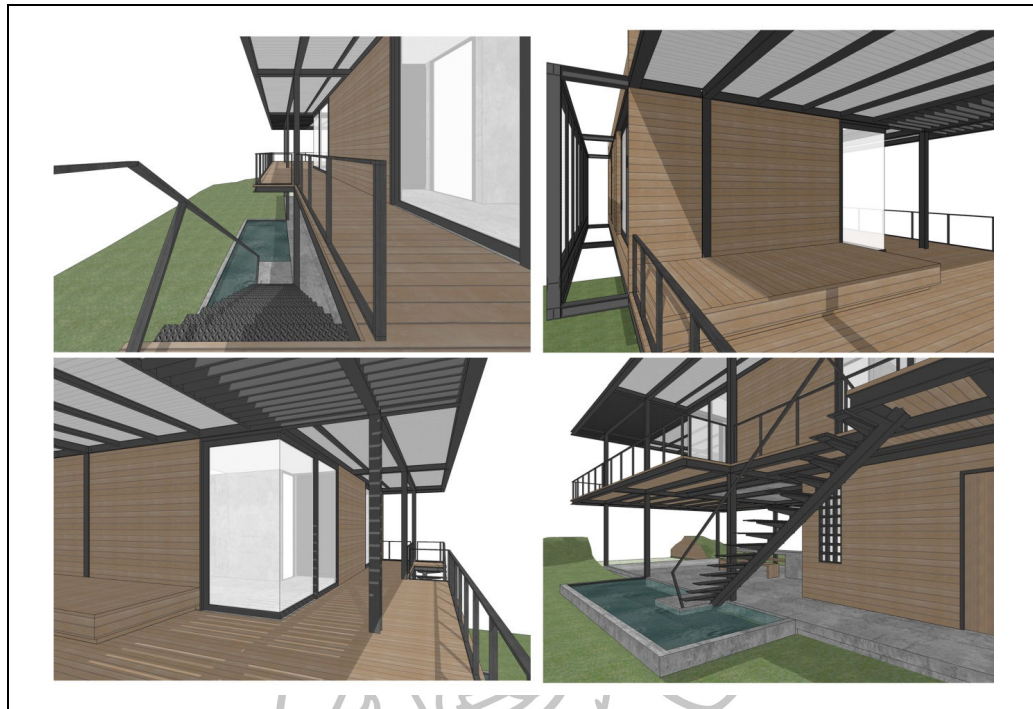


Figure 74 Perspective / Architectural Details

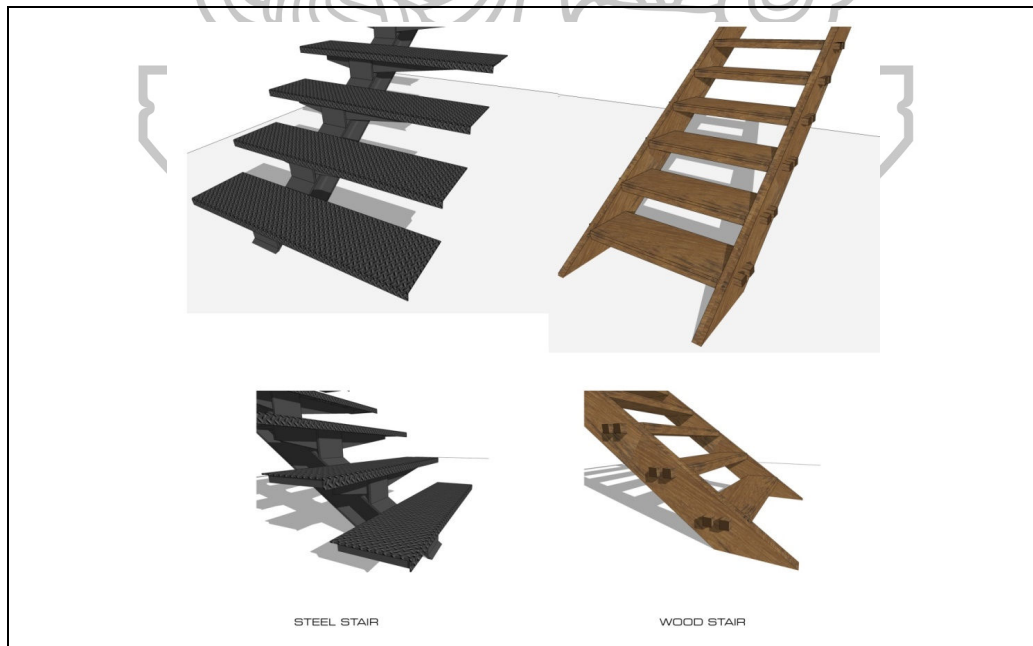


Figure 75 Architectural ornaments and details, The comparison of wood and steel

4. Conclusion and Notification

The conclusion of the design experiment 1 can be divided into two topics: one is the contest result and the other is the outcome learned from this experiment.

First, this design experiment has been selected as one of the twelve designs to the final round. The researcher had a chance to present the work to the committee. Although this was the closest point this piece could reach, the lesson learned was the exchange in the points of view of committee and the researcher on the topics; for instance, using steel as a main structure of a new Thai house design or the ambiguous meaning of the word “Thainess”.

Second, the lesson learned from the design experiment 1 is to know the direction and possibility to offer the Thai architectural pattern in a new way. That is to say it will bring a knowledge body of Thai architectural wisdom to apply in the present context. Since this design was based on the new interpretation of the researcher’s former knowledge about Thai houses and received some recognition from the committee to some extent, it would be a starting point of the Thai house study and research in the latter time.

The notification on this design experiment is that an architecture based upon traditional Thai houses is simple, straightforward, flexible and united with the nature. It has a beauty from its own structure that does not require unnecessary elements. Nonetheless, some parts of it need to be further developed, especially, on the issue of how to live with nature in balance.

During literature review

Design experiment 2

The design experiment 2 of this research was created during the time of reviewing literatures that mostly were conservative based. The acquired data related to “Ban/Ruean Thai” (traditional Thai houses) were synthesized and used as a fundamental of this design experiment with the aims of looking for the possibility to adapt the characteristics of Ban/Ruean Thai including other architectural elements with the domestic architectural design at the current context (2011).

1. Objective / Based on Traditional Thai Architecture Theory

The key objective of this design experiment was to apply all identical elements of Thai houses into the design programme. The sources of the main elements of Thai houses came from data collection and field study to find the common elements of Thai house architecture that could be seen in general. Then they would be concluded as a basic thought of the design experiment by using the same site and programme as the experiment 1 in order to compare the differences of the architectural form of new Thai houses.





Figure 76 Identical Elements of Thai House, The above table shows the tangibly essential elements of Thai house that concluded by researcher, all 15 elements could be generally founded in Thailand.

The expected result from this experiment was to learn whether or not when all essential elements of Thai houses were used as the main elements for architectural design, the physical appearances of the design outcome would distinctively reflect Thai characteristics or not and how it would affect the public's perception.

2. Conceptual design

The conceptual design of this piece was to apply the principles and elements of Thai houses from which the information were collected from the study; for example, the building orientation, space allocation of the interior and exterior as well as functional space allocations in order of the accessible priority. The building form would be focused on the simplicity, directness and compatibility with the 15 essential elements of Thai architecture that would be applied as major elements on this piece of work.

3. Design outcome

With the principles and composition orientation of Thai architecture, the design outcome was a clustered house which comprised a multi-purposed unit and a bed unit that were separated from each other but connected with the terrace that ran parallel to the central courtyard.

The multi-purposed unit was a two storey building consisting of a kitchen, a dining room, a recreational room and a service area. The bed unit was a single level building nearby. Both units were surrounded with the green area, which was divided into different zones to classify various kinds of plants; such as, flowering, and ornamental plants, backyard garden, home-grown vegetable, and medicinal plants.

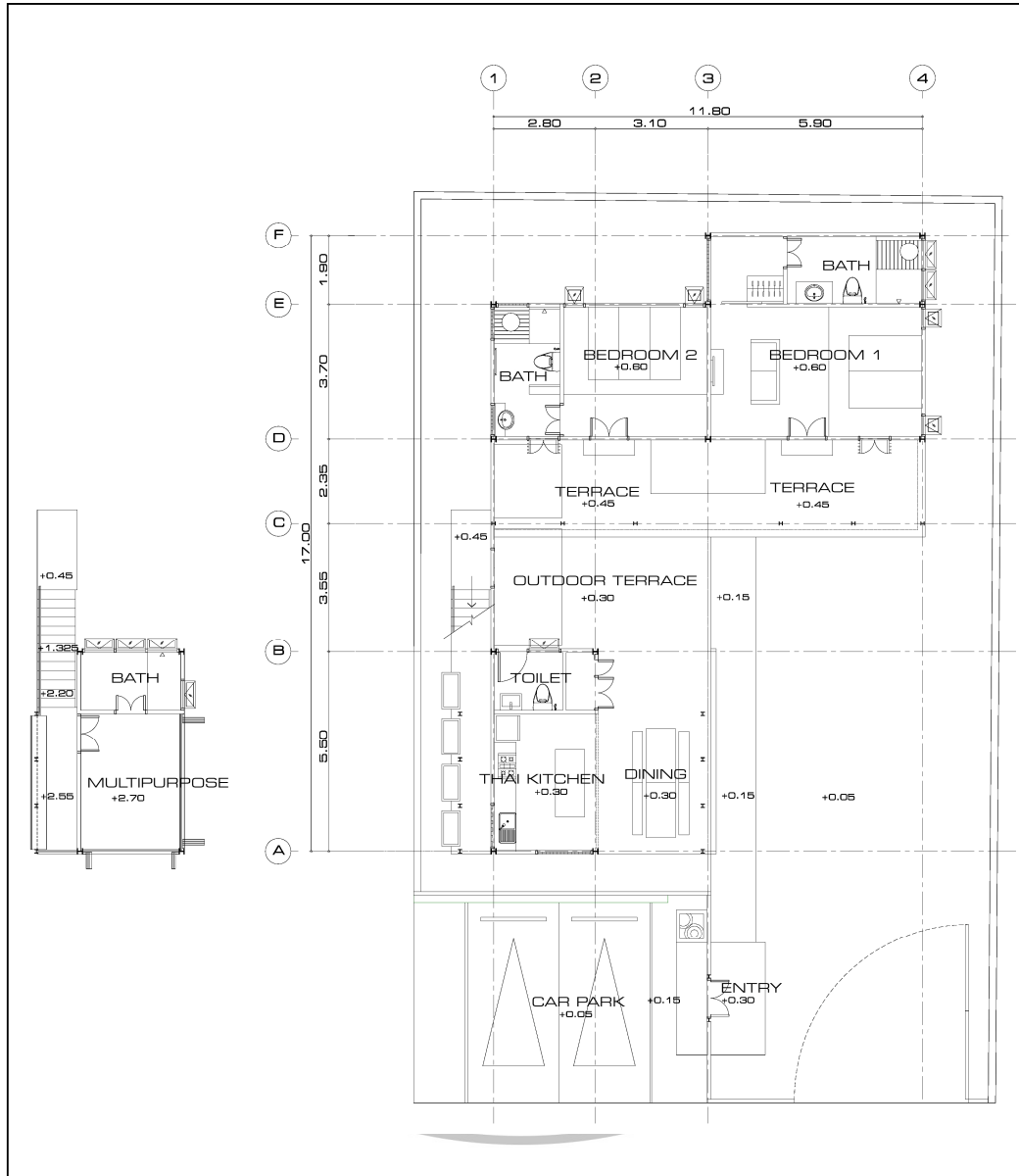


Figure 77 Plan: Clustered house separated public zone and private zone connected by terrace



Figure 78 Elevation 1-4: the elevation shown the roof form Thai influenced by Thai traditional house.



Figure 79 Section 1-2



Figure 80 Perspective

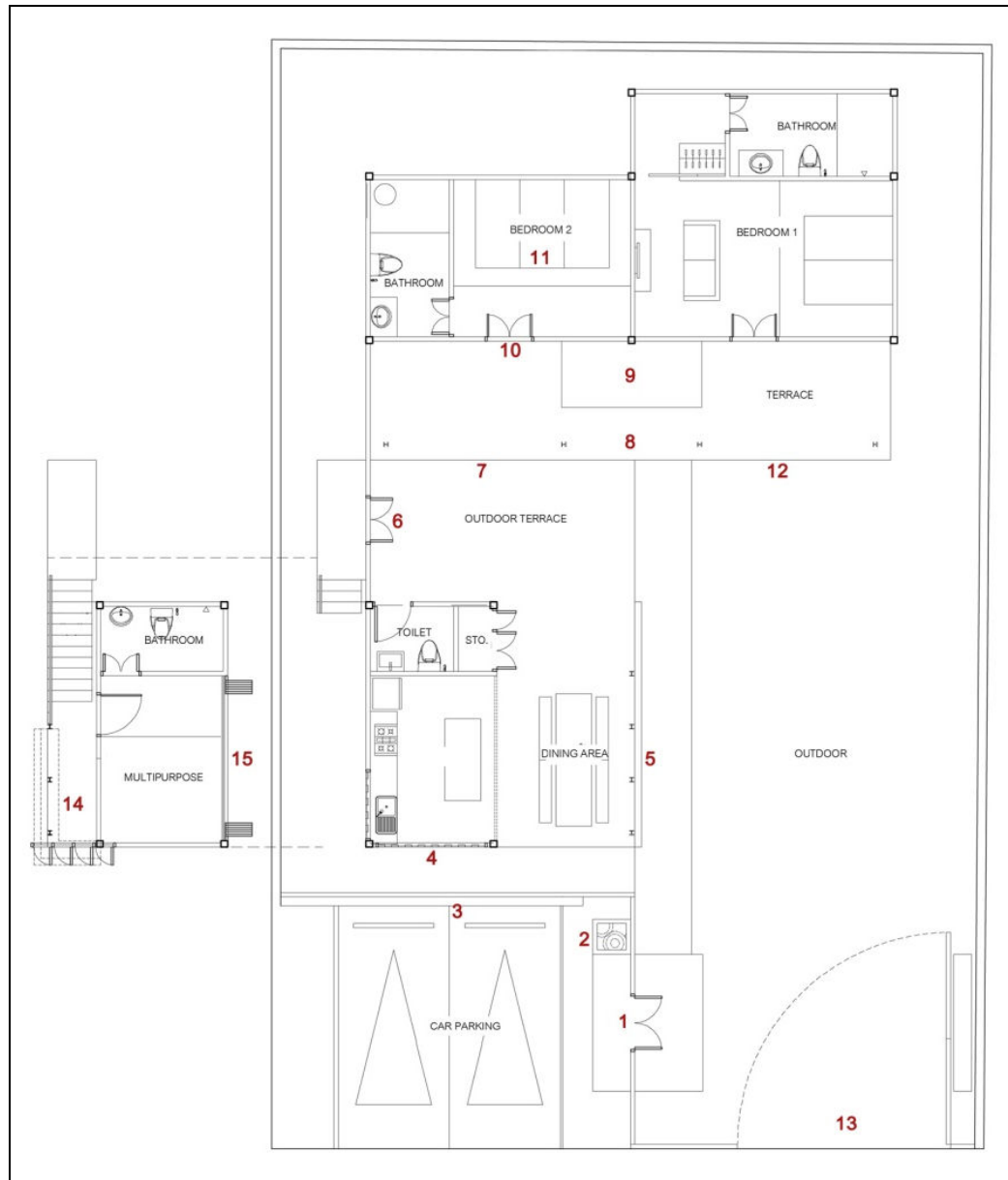


Figure 81 Essential elements in use

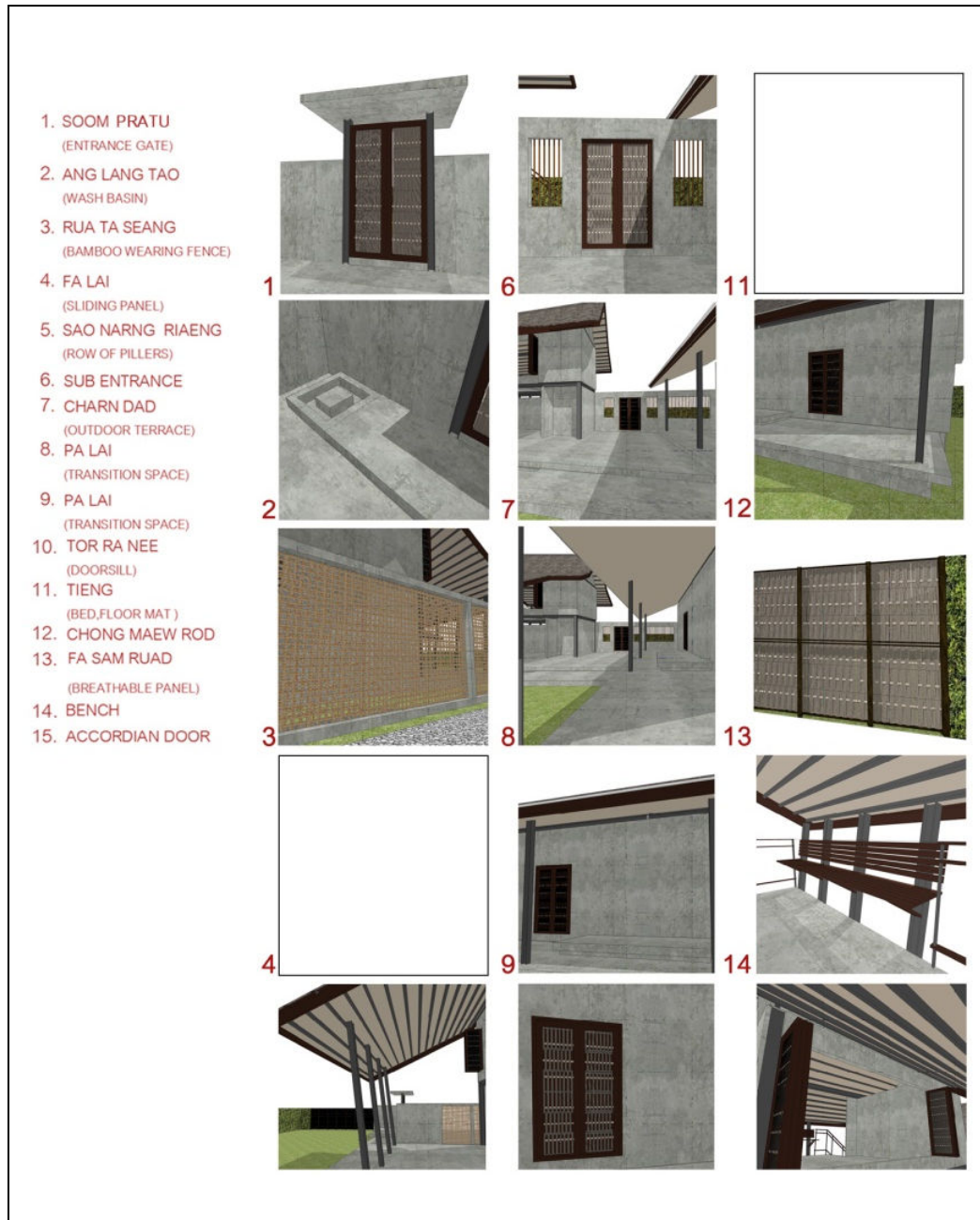


Figure 82 Essential elements in use



Figure 83 Plantation zone

4. Conclusion and Notification

According to the objectives of the design experiment 2 and the conceptual design during the literature review which were influenced by the conservative based literature including the essential elements of Thai houses, it can be said that this design experiment is clearly an adapted Thai house in terms of the roof form, building proportion designed according to the principles of serenity, calmness and afloat (ChoteKanlayanamit's concept), including space planning, and accessibility to the building's zones. Every part of this piece had to be in the Thai house style with the 15 primary elements, which had an impact on creating the perception of the physical appearances and architectural form. The management of information for this design experiment was scattered, that is to say data or body of knowledge related to Ban Thai that was known and learned from the literature review by the researcher had been applied in the process of design at the same time; for instance, the use of steel structure (same reason as the design experiment 1, on the quality of removing, assembling and prefabricating), and choosing materials that feature cushion, and light weight qualifications.

The conclusion of this experiment is all 15 essential elements of Thai architecture have an impact on the architectural form and visual perception as a contemporary Thai house. The objective of this research is to study the core of Thai architectural knowledge, which is underneath the outer look that displays only the physical appearance. The conclusion of the design experiment 2 will be fundamentally developed for the next design experiment.

After literature review

Design experiment 3 - Ban Ban

The design experiment 3 was created after completion of the literature review process. According to the research founding knowledge, which was a concept, synthesized from the core ideal of Thai houses that came from the adaptation to the surrounding environment and three compositions: nature, human and architecture. Therefore, the method to preserving Thai architectural wisdom and knowledge is not just to focus on the architectural characteristic but to create the state of equilibrium within the architecture itself through the four mutual elements that are significantly located within the interrelationship.

1. Objective / Based on Thai Vernacular Architecture Theory

In 2011, Thailand Greenhouse Gas Management Organization (Public Organization) (TGO) organized the contest of Low Carbon House. The reason for this contest was the fact that currently, the real estate sector tended to continuously cause an increase of the greenhouse gas level as a consequence of the change of society and the housing construction, according to the social values without realising the nature of Thailand's climate. As a result, the global warming became more severe. TGO, hence, initiated the Low Carbon House Design Project Contest to promote the design of houses and buildings that could help reduce the greenhouse gas and adapt to the climate change as well as utilise the resources that were environmentally friendly. The winner's design would be a prototype for the local administration organizations and general public. It was also a campaign for professional architects and developers to realize and give an importance to the domestic design that support the greenhouse gas reduction.

Once learning about this contest, it was the same time that the researcher finished the literature review and drew the assumption on how to redefine Thai houses. Hence, the researcher decided to apply in the contest with two objectives: 1. To design the domestic architecture in reference to the data found from the study of both conservative based and progressive based, in particular, the concept of creating a balance through the four elements: earth, air, water, and fire. 2. To evaluate the designing method, according to the fact finding by using the rules of the contest to be aware of the trend and direction for developing the design experiments to redefine Thai houses next times.

2. Conceptual design

The design concept of this experiment (Ban Ban method Chapter 3) was based on the Thai architectural wisdom, which featured prudence, beauty, and simplicity incorporating the application of new technology and innovation to create a sustainable Thai architecture that had conformity and harmony to unite with the nature as much as possible. It should be also an architecture that could be practical in reality. Therefore, an analysis of the contest's programme and other factors that could affect the design in all areas such as sun path and wind direction analysis would be taken into consideration, especially the low carbon design issue, which was the goal of this competition that was to reduce the carbon footprint as much as possible. The design and plan of this experiment must include building orientation, utilising space, determining suitable proportions of the function usage, architectural aesthetics, structural system and a practical range of environmentally friendly materials selection.

These were main processes used for design. Meanwhile it needed to consider and to understand the nature of the four elements: earth, air, water and fire (as clarified in Chapter 3) and the design programmatic. The two principles were then brought to combine to create a state of equilibrium between human activities and natural environment with a help of architecture as an intermediary to connect the architectural design concept of the Ban Ban style (which is just only a small single unit among those majority of architecture). The concept focused on having architecture for re-balancing the nature by adapting itself to be part of the Mother Nature. When this small architectural unit reach a majority group (middle - lower class), which is huge, it could be the beginning of returning balance to the Great nature through the small architecture as once which was not so long ago, Thai house in the past did.

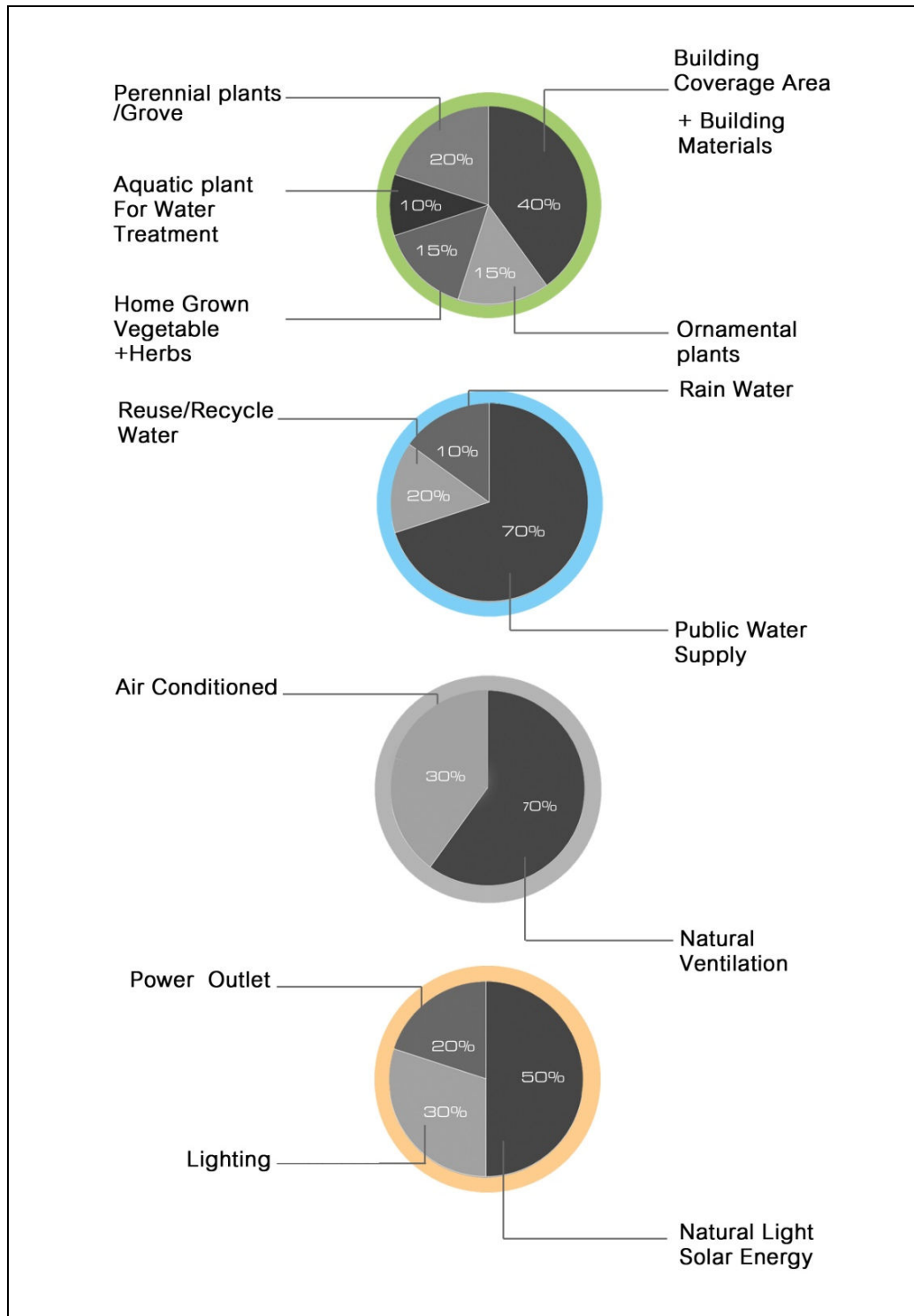


Figure 84 Design concept

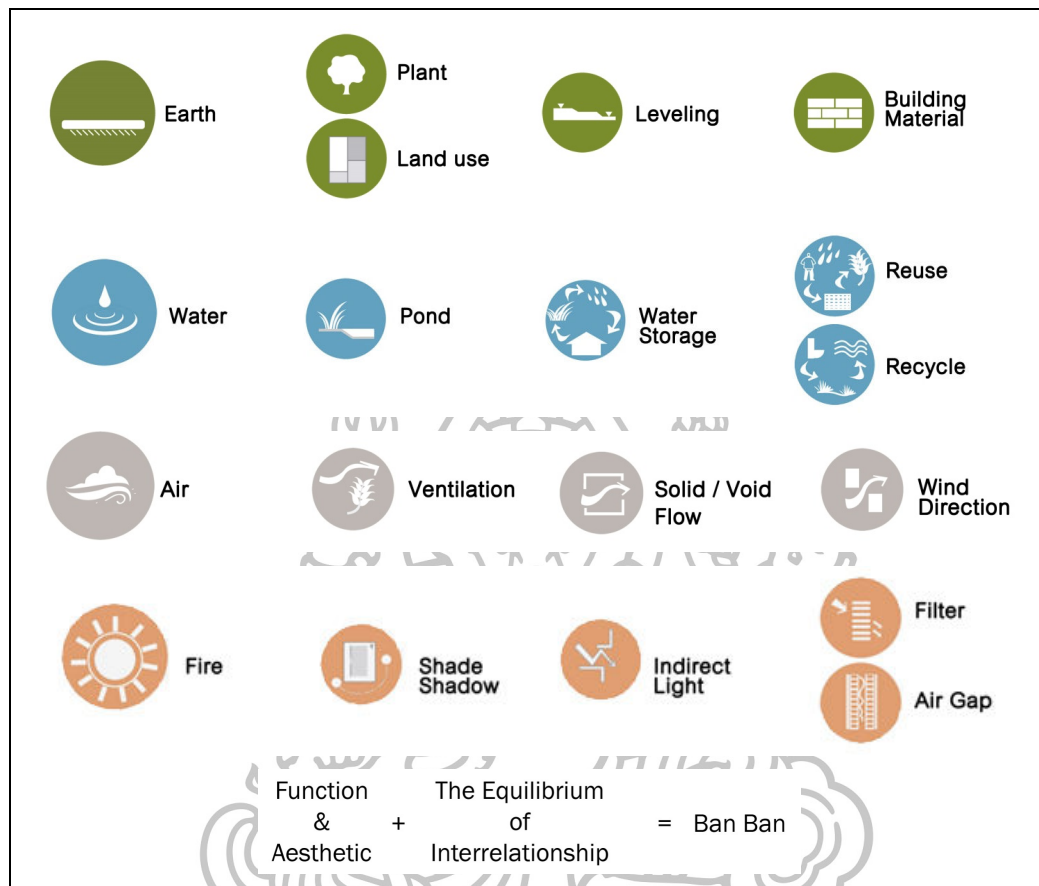


Figure 85 Ban Ban method

3. Design outcome

The design outcome of this design experiment was divided into 2 stages according to the regulations of the competition. 1. The qualifying round. In this round, the conceptual design would be presented. The committee would select the qualified works to the final round. The contestants had to submit the prototypes and models, present the concept and give details on their works as well as answer the questions from the committee.

On this contest, the researcher submitted the design work named Ban Ban, meaning cushy /comfortable and easy in English. During the first phase of the experiment, the researcher spent time to understand the design principles for the carbon footprint reduction in combination with the Ban Ban method that incorporated the four elements in architecture. It was found that to reduce carbon efficiently, it should be done within the design process. For the design outcome in the first round, it was designed to be a clustered house with one-storey elevated steel structure

surrounded by the green area. The building was divided into three parts consisting of guest, multi-purpose, and sleeping units. The three units were separated from each other but connected by terraces and corridors and the whole area was surrounded by the green area. (see the Figure 86)

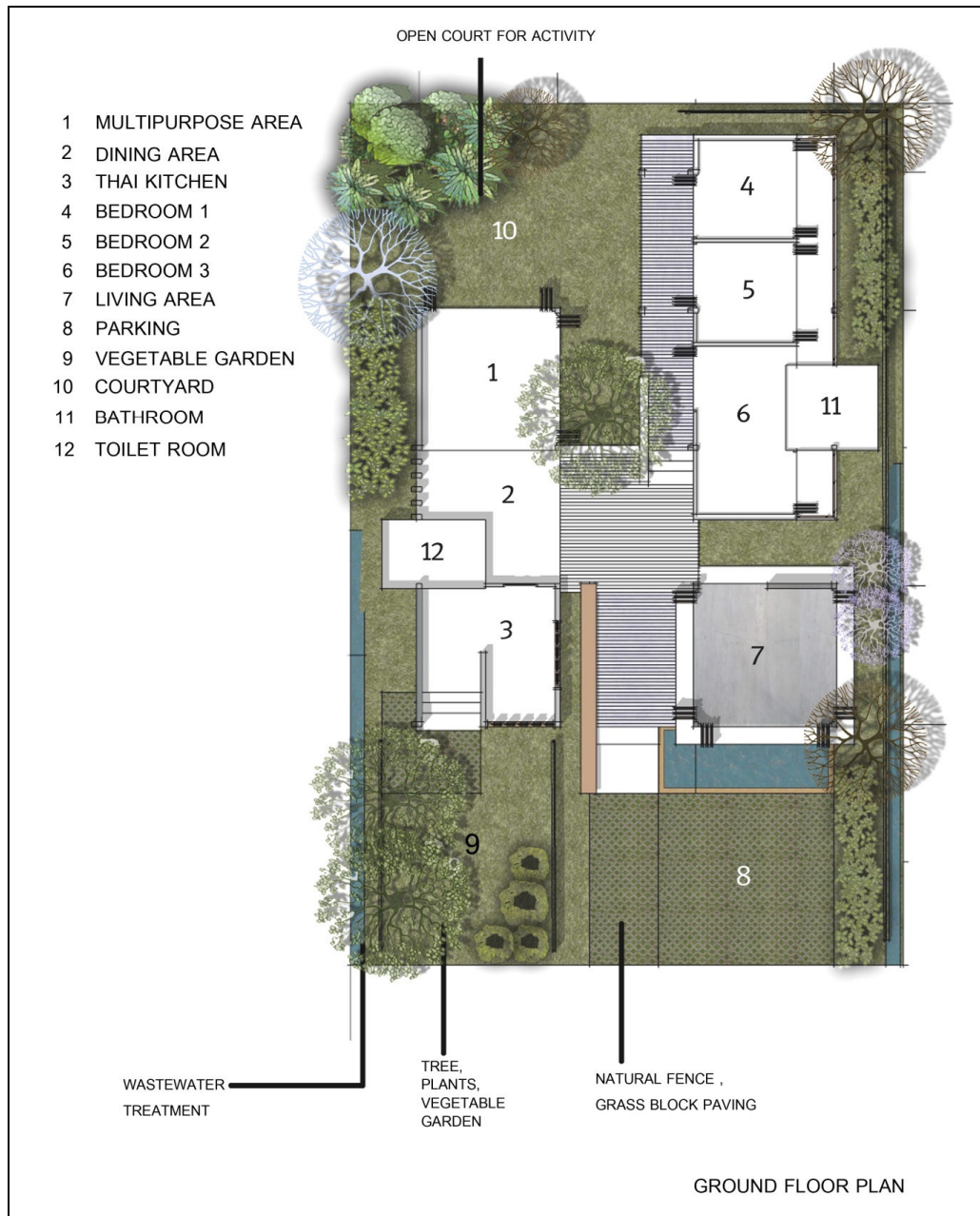


Figure 86 Plan: Clustered house separated public zone and private zone connected by terrace
(1st round)

Each part of the building was designed to be conformed with the internal environment of the project's site and linked to the Ban Ban method that incorporated the managing principles of earth, water, air, and fire to the design (as shown in Figure 88).



Figure 87 Elevation 1-4 (1st round)

The architectural form of this experiment in the first round was simple and direct. Every architectural element was implemented under the conditions of the necessity and problem solution rather than of the beauty.

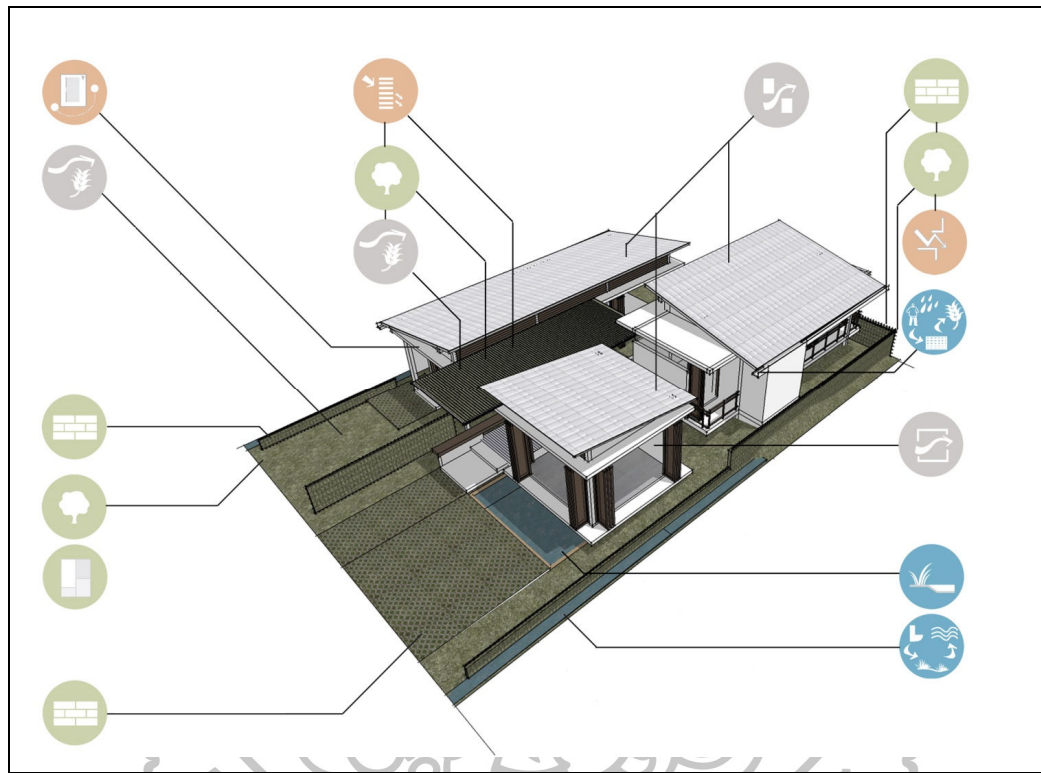


Figure 88 Axonomatic shown how Ban Ban method works. (1st round)

Once the design experiment 3 was chosen to the final round, the next step would be the development on the sketch, which had been improved and adjusted its master plan to be more complete and suitable. The details of the Ban Ban method was given including the selection of plants for absorbing pollutants, design of imitate wetland and application of the Thai essential elements (from the experiment 2) to this experiment; such as, Fa Lai, Fa Sumruad, which were breathable panels to improve air ventilation.

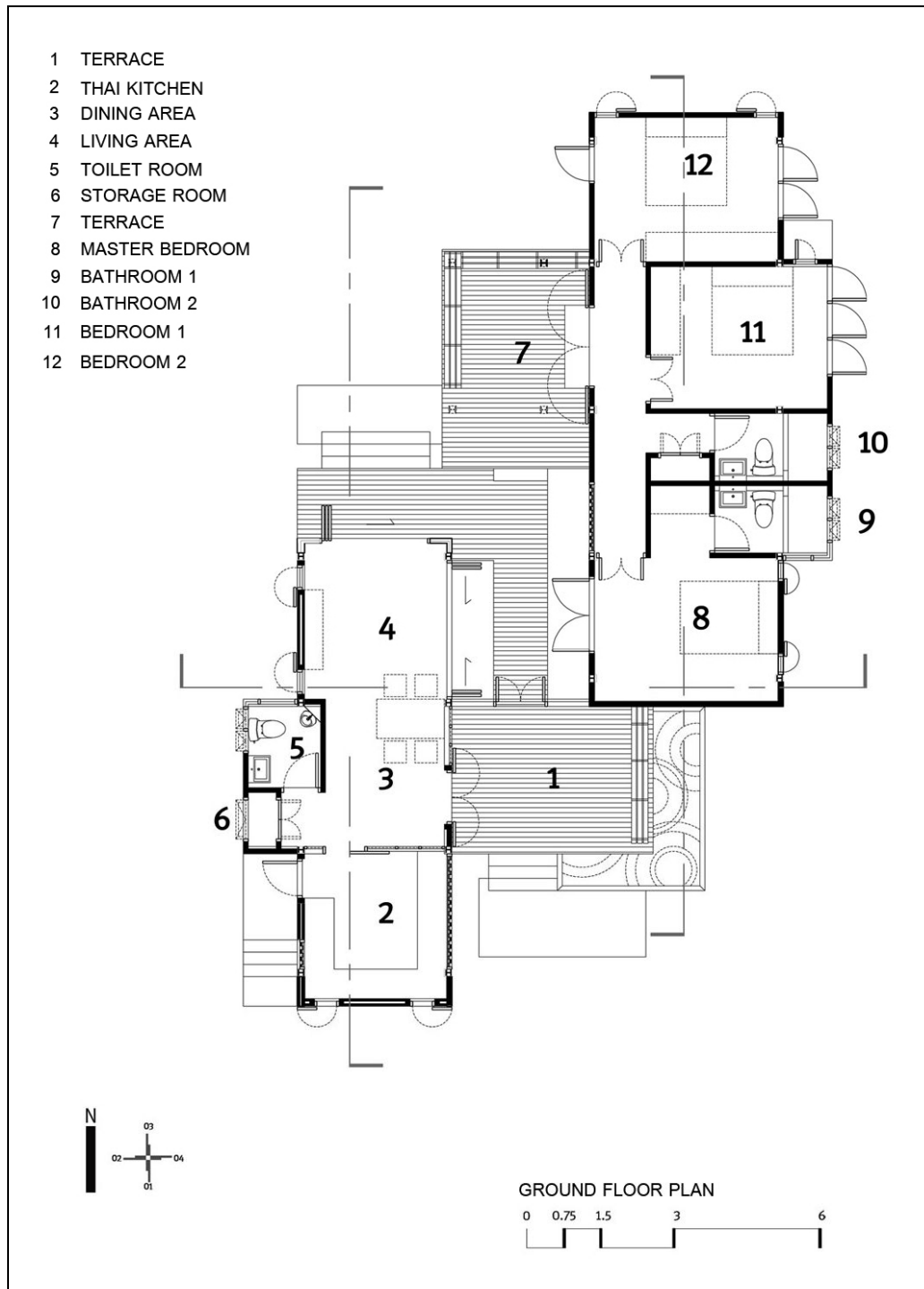


Figure 89 Plan :Clustered house separated public zone and private zone connected by terrace
(Final round)

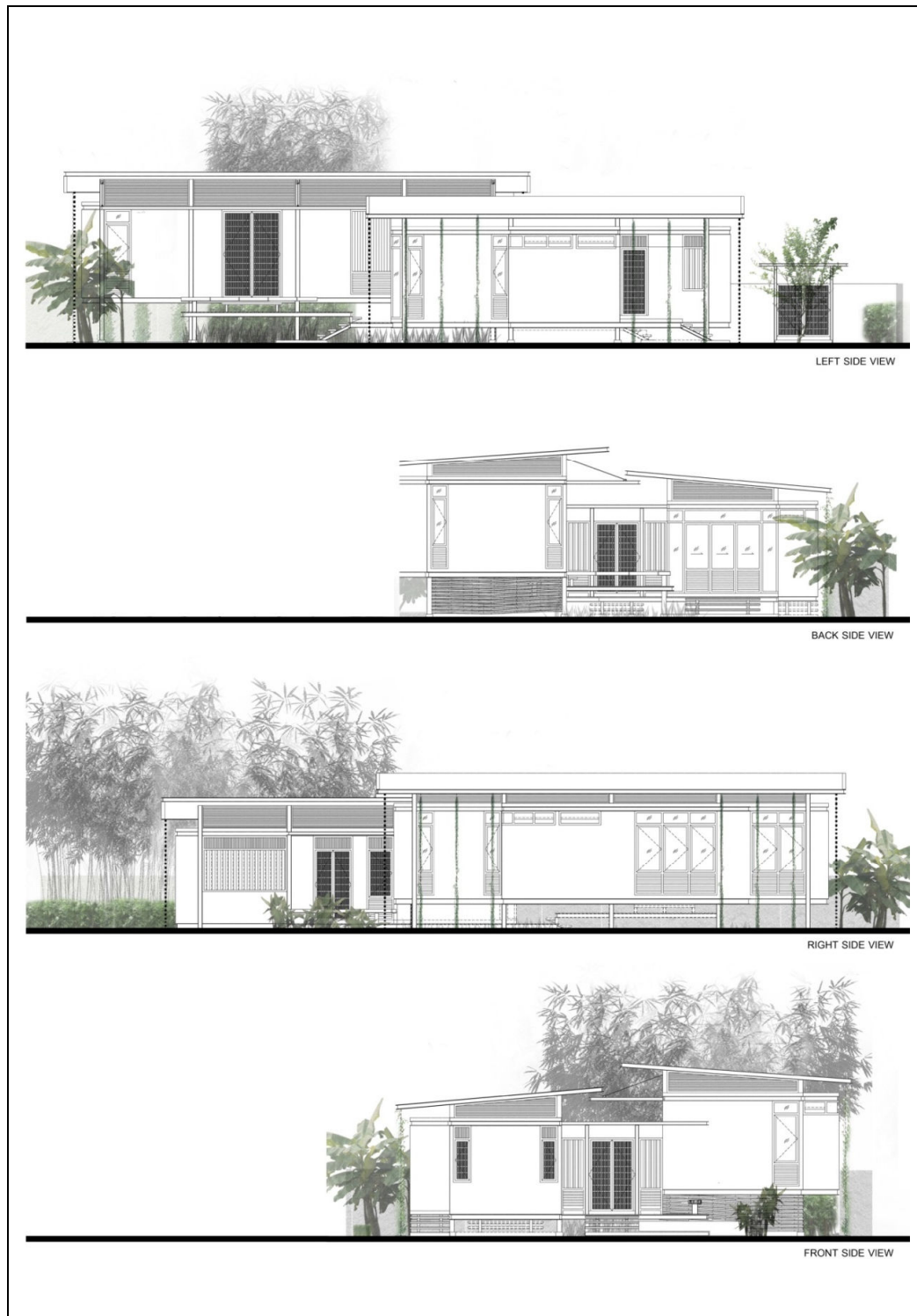


Figure 90 Elevation 1-4 (Final round)



Figure 91 Section 1-4 : the section shown how Ban Ban method works. (Final round)



Figure 92 Perspective (Final round)

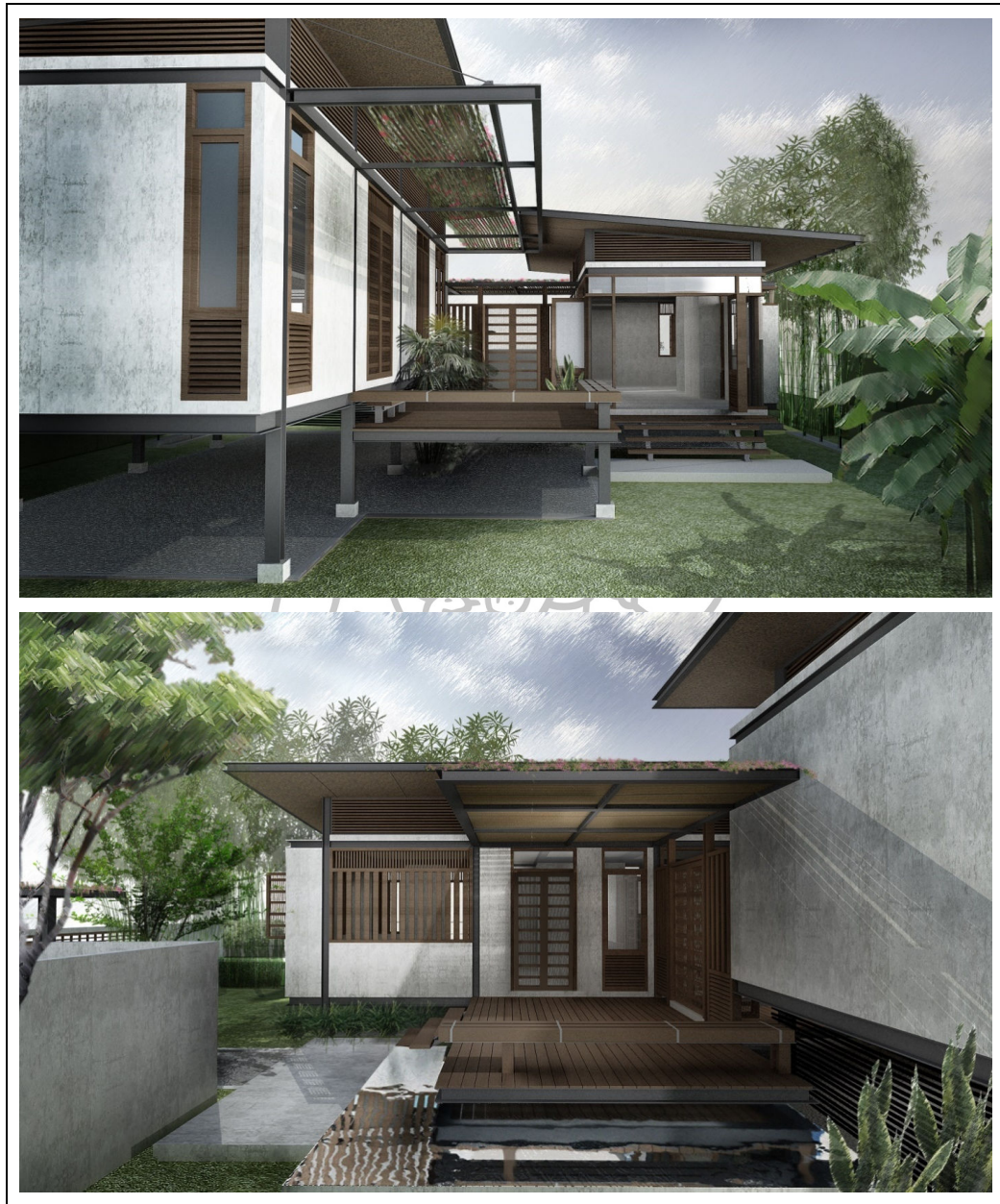


Figure 93 Perspective (Final round)

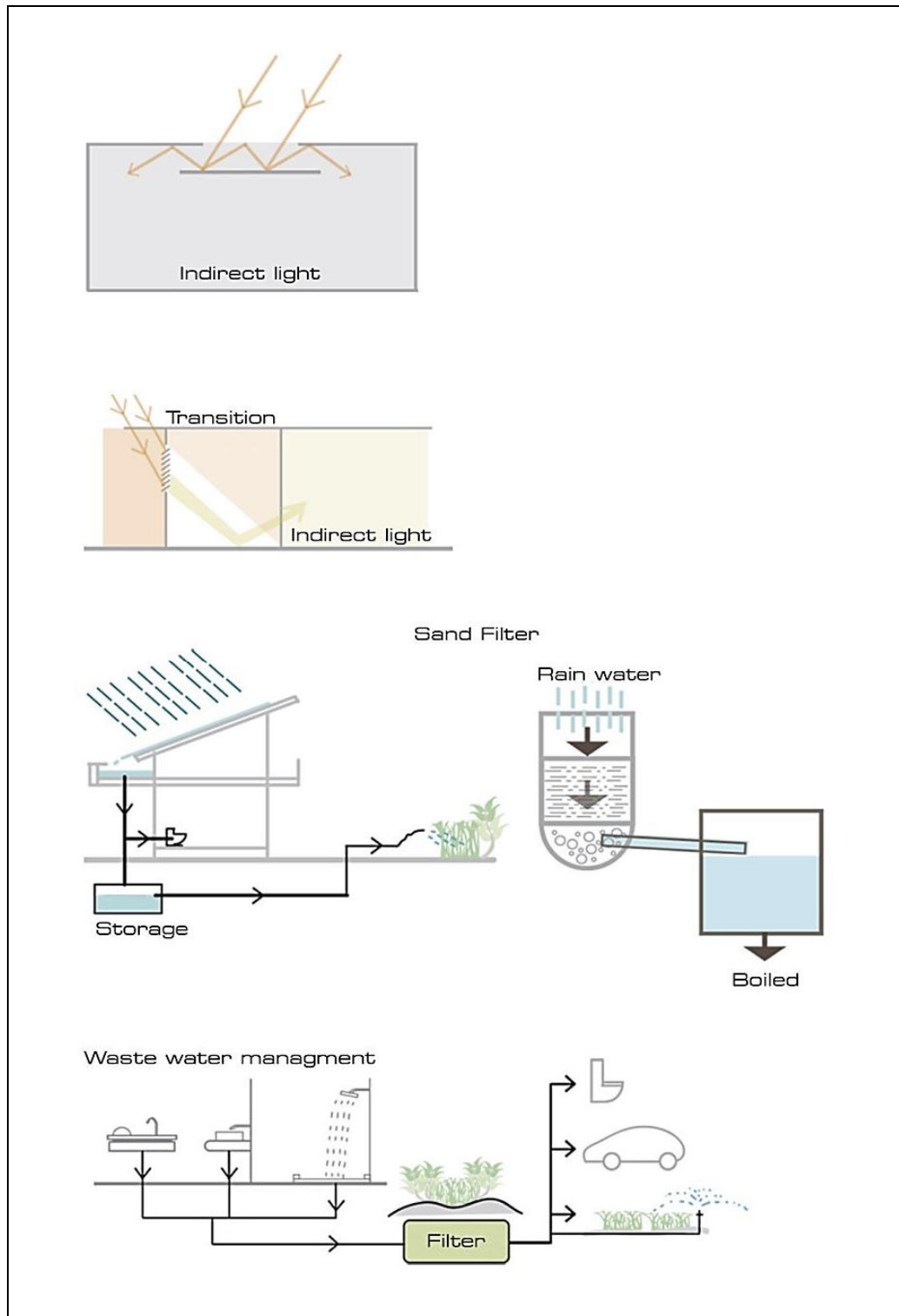


Figure 94 Ban Ban method (Final round)



Figure 95 Plantation zone (Final round)

4. Conclusion and Notification

The design experiment 3 that had been submitted in the Low Carbon House Design Contest was chosen to be in the final round. After having been developed from the first round's work and presented to the committee (see the list below) it was considered to be the best compliance with the contest's objectives because this work not only reduce the carbon footprint the most, also provide the beauty and values of the Thai architectural wisdom in respect of creating balance of the architecture and suited for the present circumstances. For this reason, the design experiment 3 has won the contest in the category of general public (and professional architects). The work has become a prototype and been distributed to the Local Administration Organisations nationwide to be made available to the people, who are interested in building the low carbon house.

From the result, it was proved that the Ban Ban method derived from the body of knowledge as the core of the Thai architectural wisdom could be cleverly applied in the architectural design based on the conditions of the current context. Therefore, it could be concluded that the design method to redefine Thai houses could be well implemented with the Ban Ban method as a fundamental of creating the architectural design of the equilibrium.



Figure 96 Presentation and Award Ceremony

Design experiment 04 -T107-3, 05- Chez Pipli

After finishing the design experiment 3, there was an opportunity to work as a professional architect on 2 projects at the same time: one was the design experiment 4, a single level residential house located in a suburb of Bangkok, the other one was the design experiment 5, a boutique resort in Amphoe Cha-am, Phetchaburi, which was the site of the design experiment 1-3. The two mentioned experiments were conducted simultaneously starting from the steps of designs until the construction part that would be explained later.

1. Objective

The objectives of the two projects were set under the service terms of professional architects. Thus, the designs had to comply with the project owner's requirements and other constraints; such as, the environment of project's site, building related laws, construction materials as well as construction's budget. Furthermore, the design concepts of this two projects had to reflect the knowledge learned from the research, especially, the principles of Thai architectural wisdom and the application of the Ban Ban Method, which was related to the four elements management: earth, water, air and fire in order to create a state of equilibrium in architecture and adapt with the actual works.

The researcher had set the targets of the above mentioned works to comply with the objectives of the applications of both buildings. That is to say, the design experiment 4 was a residential house for a daily living; hence, the framework would focus on the appropriateness of creating a comfort zone and Thai house design in a new definition under the present circumstance. In the meantime, the design experiment 5 was a resort for rent which would be used on the weekend; therefore, it would focus on the interrelationship between inner and outer space, designation of the proportion of functional areas including the experimental use of local materials in combination with the current construction method (2013).

2. Conceptual design

The design experiment 4 and 5 were based on the concept developed from the previous experiments. However, this time it would be the actual construction, which would give the researcher an opportunity to study the advantages and disadvantages as well as the ideas of solving problems to use as the information reference for developing the designs for redefining Thai houses. The design concept of these two pieces, thereby, would incorporate all knowledge learned from this research to apply in the experiments. The design experiment 4 would bring the Thai folklore as quoted as saying Rom Yen = Pen Suk to interpret and transform to be an

architecture, which featured simplicity and balance among the surrounding context that was harmonious with the current lifestyle (2013).

At the same time, the design experiment 5 would bring the principles of Thai house planning, which had a sequence of hierarchy to blend with the space design for serving various types of activities and to correlate the context of inner and outer spaces according to the conditions that varied in each period as well as would refine the Thai essential element patterns to be more exquisite and modern.

3. Design outcome

The design outcome of the experiment 4 was a one-storey steel structure house, employing the prefabricated method, which was the concept evolved from the traditional Thai house's construction technique in the past. Therefore, the preparation on the steel structure part could be done at the same time as the ground work. For the design experiment 4, the floor was elevated above the ground level about one metre to avoid the damage from the flood in the rainy season (refer to the picture of Wang Daeng, National Museum). The functional space covered an area of 180 square metres. Since this job would be built on an vacant land behind the existing main house, the architectural form of this project had to be conformed with the overall existing project that was the modern tropical architecture. Nonetheless, the Ban Ban Method including the use of earth, water, air, and fire elements was also adapted to create a balance in this building as follows:

Earth: For the earth part, it would be the utilisation for the maximum benefits of the space, and the layout of functional area in harmony with the present context.

Air: Apart from the benefit of an elevated floor that helped release the moisture underneath the building, the breathable panels alongside the space under the house platform were added to prevent harms from dangerous animals. In addition, the space underneath would be used for storage that made it look in order and nice. For the space under roof, it was designed to be a double-layered roof to have a vent under the roof for the air ventilation and accumulated heat reduction.

Water: The Ban Ban Method had fully applied the water concept on this experiment, which included retaining the rainwater for consumption as well as retaining the recycle water to pass through a simple treatment system before reusing it according to the 3R principles (Reduce, Reuse and Recycle).

Fire: On this design work, the researcher brought the natural light to use inside the building for the energy saving purpose. Moreover, the double walls were designed to be located on the south direction that was exposed to the sunlight in the afternoon in order to reduce the heat transfer.



Figure 97 Plan



Figure 98 Sanitary system diagramme

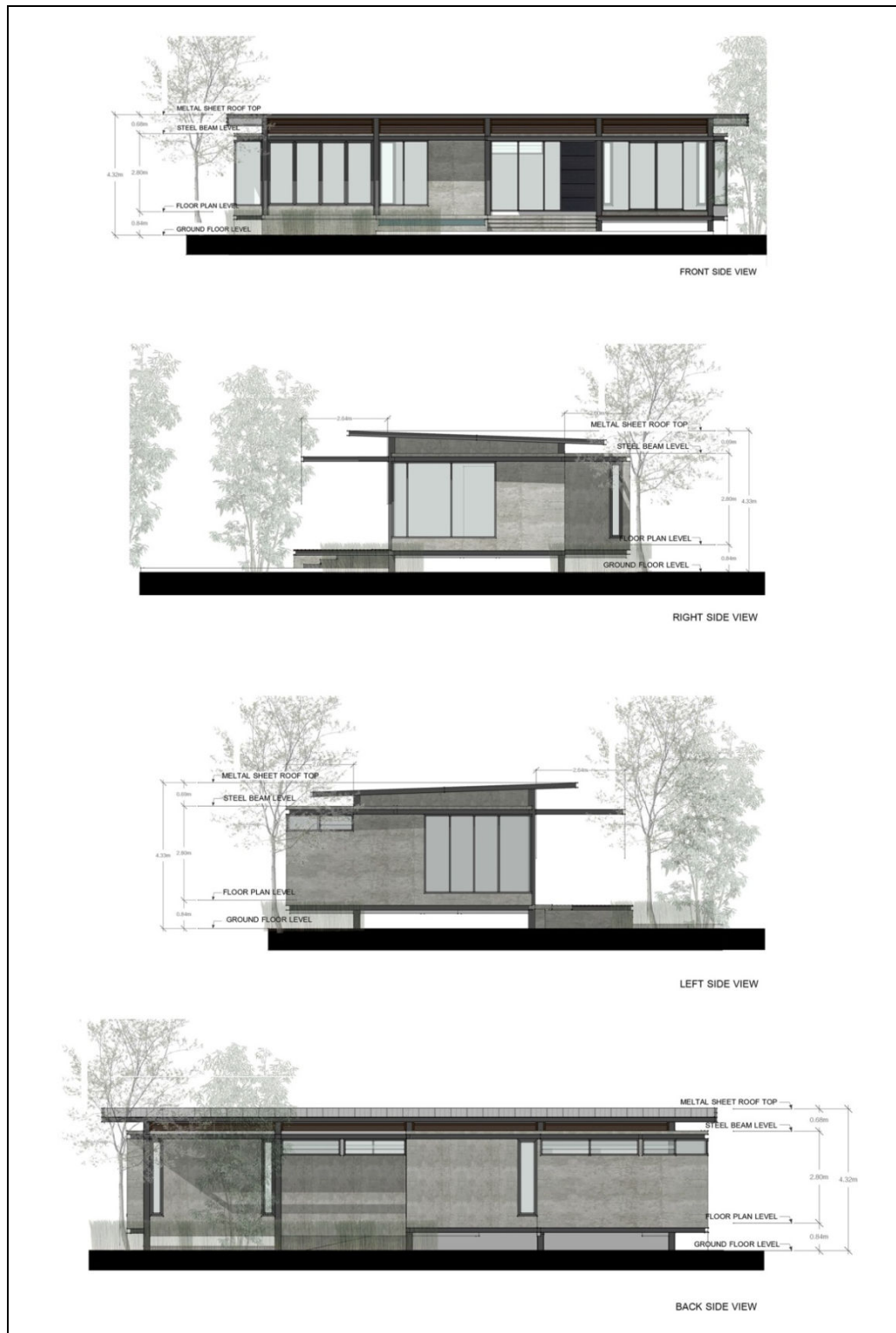


Figure 99 Elevation 1-4



Figure 100 Perspective

For the design experiment 5, it was based on the Thai vernacular theory. That is to say, not only was this experiment implemented by the building layout of a clustered house, which divided the areas into different zones and space utilisation that connected both inner and outer spaces together to serve various kinds of activities in different periods, but also was a learning experience to work with local workers who had skills of using bamboo canes, a material that can

be found anywhere in local areas to combine with the modern design method; for instance, in order to keep the bamboo's quality, it needed to be immersed in the water for two weeks before being cut and dried completely, then it would be applied the wood shields onto before being transformed into various parts of the house; such as, fences, walls, doors, floors, and ceiling.

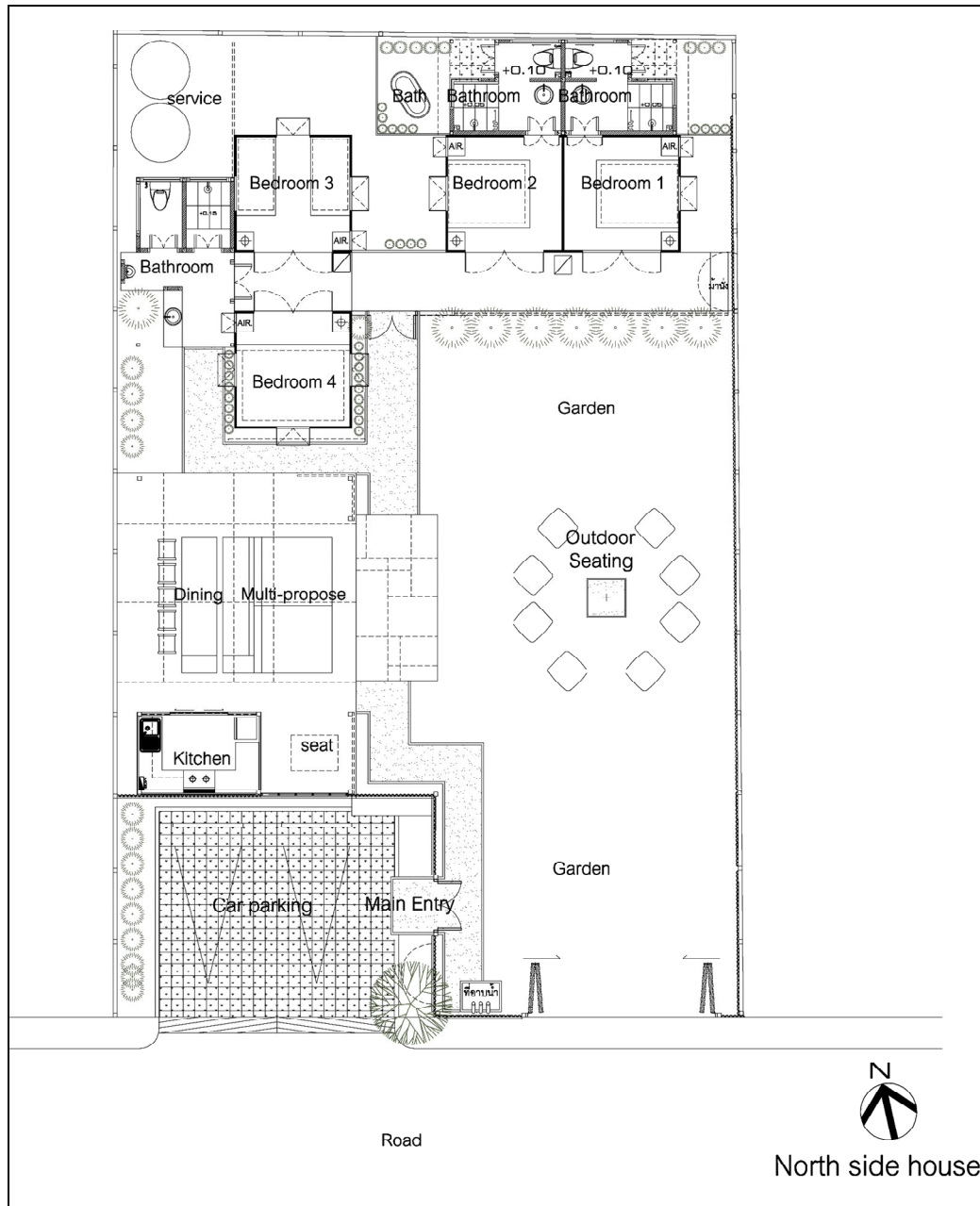


Figure 101 Lay-out / Plan

For the underground structure, it was referred to the folk wisdom, which adopted a simple foundation method that was the use of timber piles instead of reinforced concrete piles; however, the above ground structure employed the steel structure together with the use of fibre cement board and woven bamboo panels, as so called “Fa samruad” or a breathable panel, which helped reduce the heat transfer to the building and ventilate air as well.



Figure 102 Construction process

Furthermore, the essential elements of Thai houses; such as, thresholds, bamboo fences (Rua Ta Saeng), breathable wooden panels (Fa Lai), woven bamboo panels (Fa Samruad), outdoor terrace (Chan Dad), and transition space (Pha Lai) were brought into this design. However, the drinking water station (Ran Nam), another Thai house’s element, which implied a sense of hospitality had been replaced with the greenery space. In the researcher’s point of view, refreshing the body as the way people did in the past was a courtesy that could be substituted by building the green area at the courtyard to refill the cool into the mind through the visual perception as a result of the change in the people’s way of living.



Figure 103 Perspective

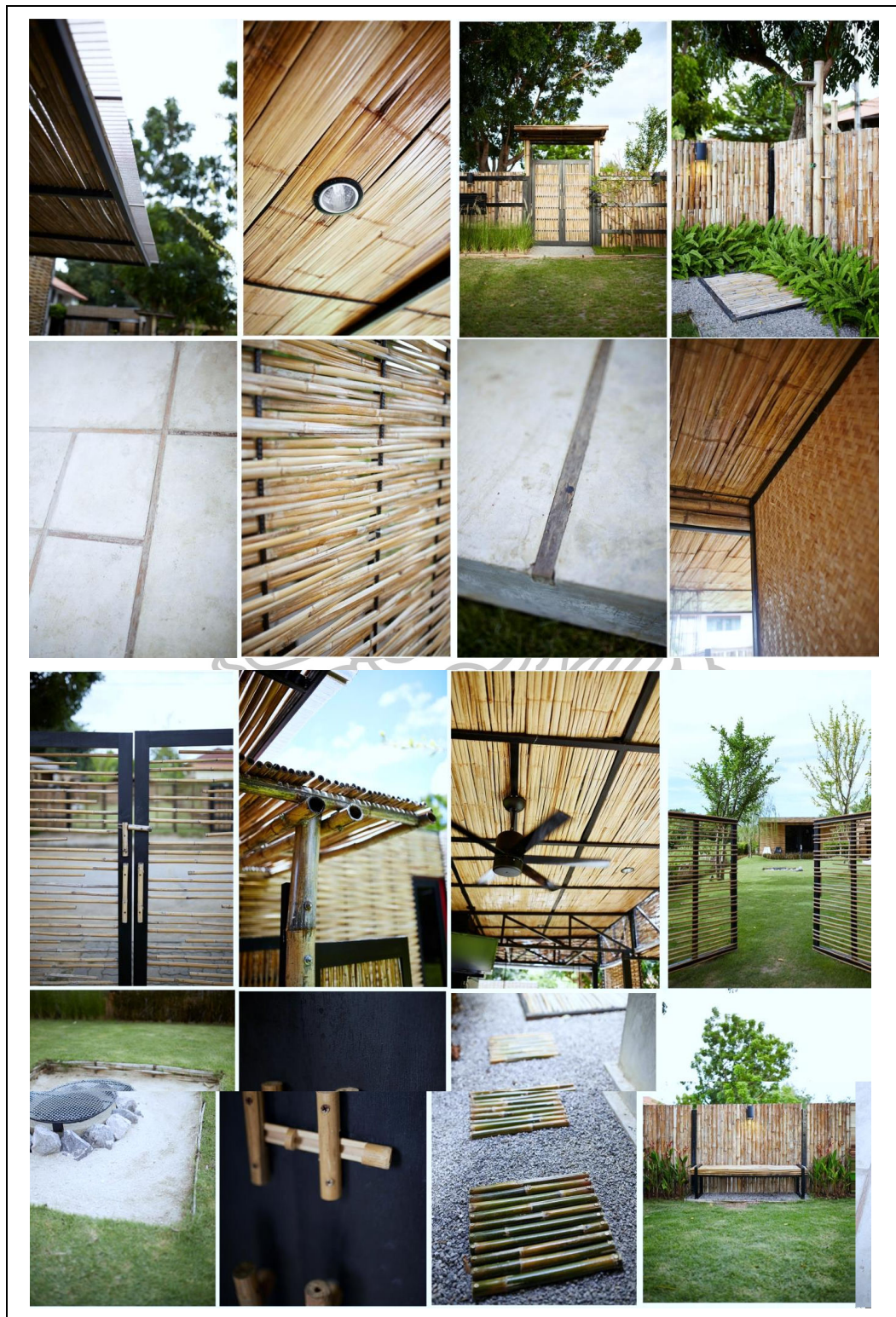


Figure 104 Architectural Details

4. Conclusion and Notification

Working on the design experiment 4 and 5 have truly contributed to the research since it gave an opportunity to learn of advantages and disadvantages including the way to develop the design concept for redefining Thai houses in respect to the design that referred to the Thai architectural philosophy Rom + Yen = Pen Suk (shady and cool = living happily) to become a living architecture that suited and conformed with the needs of using functional space by users nowadays under various constraints, which included the building code, budget, skills of the workers, etc.

In terms of the material study, it is noticed that the steel structure method at the present time has become the work that does not require skilled workers. On the other hand, it becomes a basic work that we can employ local workers who have skills for steel structure. Nonetheless, it is difficult to find the experts at working with bamboo, which is a local material. At this point, it can be observed that perhaps because the lifetime usage of bamboo, a natural material that is inexpensive and easy to find, has a short life cycle, it will require the knowledge how to maintain wood correctly, which takes some time to prepare. This might be a reason that people adopt the modern construction materials to replace local materials because they are more convenient and believed to be more durable.

From the step of thinking process to the actual work building, from the theory to the real practice, the researcher has a chance to see, observe, learn and solve problems from the real experience. It becomes the knowledge accumulation, which has been crystalized to be an understanding for developing the design experiment to redefine Thai houses with a clear direction in the future.

Design experiment 06 - 07 Thai Yu / Thai Tri

The design experiment 6 and 7 were the pieces created in 2012 at the same time as the design experiment 4 and 5 had been in construction. It was also one of the most critical times for the Thai architectural design field as a result from the mega flood disaster in 2011, which brought into the retrospective trend. That is to say, as a matter of fact, Rucan Thai (traditional Thai house) is the most suitable architecture for places and seasons. However, due to the fact that the Thai architectural wisdom has been long abandoned, there has no connection between the tranquil past and dynamic present. There is a question in mind that what kind of “Ban”(house) that is the most suitable for living in Thailand should be.

Even though the researcher was not the one who had been affected by the incident, there were some encounters that the researcher shared experience with the victims and saw the real situations, problem solving as well as their thoughts which voiced in a sentence “Only if I knew, I had better built a house with high stilts like the old fashion, flood came so fast that we could not escape in time’. This sentence had shown the innocence and being unable to keep the situation update, as a result from the fact that human and architecture secluded themselves from the interrelationship until the time that they had to surrender to the power of the Great nature.

When the Home and Garden Magazine organised the house design contest with the theme “Ban Thai Mai’(New Thai houses) with the objective to ask the questions of “What would be the house for tomorrow?’, “What would be the new definition of a house from now on?” We might have to think back to the system the ancestor had already well designed or not. Traditional Thai houses were classified as a modular house system or they could be called prefabricated houses since several elements of the houses; such as, pillars, walls, gables, verandas, doors and windows had to be assembled before installed on site for building the body of houses, roofing, and then they were assembled. After the small details; such as polishing and paintings had been done, they would be ready for the moving in. In case it was necessary to use more functions, we could still add or extend several units with unlimited numbers. In addition, the Thai house form fitted in the kind of house for living in Thailand since it could efficiently ventilate hot air, safe from the rain and flood. Therefore, traditional Thai houses were the most perfect invention that our ancestors had created.”

With the objective of the contest, it was another chance the researcher could conduct experiment and present the idea of design related to the research to collect data for other further research. The details of working on the design experiments 6 and 7 will be elaborated in the next topic.

1. Objective

The programme of the contest in the theme “Ban Thai Mai” was a challenge to the researcher because the contest topic matched what Researcher had been studying. After learning all details of this contest, the plan to submit the design works was begun with the analysis of the project’s details and the use of conceptual design based on the Ban Thai architectural philosophy. Then the directions to present the design concept were divided into two aspects: first, it would concentrate on the tangible elements of Thai houses; such as, the building orientation, forms of

architecture, and construction methods. Second, it would focus on the intangible elements of Thai houses; such as, a sense of place + time + space, a sense of serenity, peacefulness and tranquillity.

In short, these two design experiments (6 and 7) would have the same working process, starting from using the same basic concept, same design principles and same elements, especially, the Ban Ban Method. The differences were the architectural forms and work presentation; the design experiment 6 would focus on physical appearance while the design experiment 7 would concentrate on the consciousness, value, and definition of Thais' living in a modern way.

The main objectives were divided into two directions: to learn about how to present the design concept for redefining Thai houses and how to create the equilibrium within the architecture with the Ban Ban Method of which direction would interest the judge committee and for what reasons, and the answers would be brought for developing the next design experiments.

2. Conceptual design

As mentioned above in regard to the work divided into two directions, which was the working on the design experiments 6 and 7 would be run parallel. Ban Thai Yu was named for the experiment 6 in which, the researcher believes, is the house that Thai people should live in. The introduction approach of this work focused on the tangible elements of Thai houses. To live in Thailand, as the researcher mentioned, we could bring what our Thai ancestries had created, that was the knowledge + intellect of architecture of the place. It was the direction that led to the method of the way of people's living. Those people meant persons who lived and resided in Thailand. That method was appropriate with a context of topography and climate including the way we lived and had gone through a learning process and application until it became a pattern of architecture that fitted our living place. Nevertheless, as the time went by, the direction of the wisdom that has been replaced with new knowledge, which has no connection with a context of the place we are living in at all until there was a disaster that affected us (Thai people) tremendously resulting in the arising of a consciousness and a call for a meaning of the architecture of place.

However, this time, the return of Thai architectural wisdom lacked of connectivity from the past to the present. The concept of the Ban Thai + Yu was based on bringing the characteristics of the architecture of place, which was the wisdom of the traditional Thai house architecture to transform in regard to the present context by using the main principles of the

traditional Thai houses. Those principles were an orientation, a plan of building featuring a flexibility under the conditions of space and time beneath the simplicity (complexity within simplicity) and the ability to adapt for living in harmony with surrounding nature in order to get an architecture that was suitable for us (Thai people) in the present context.

At the same time, the design experiment 7 was named as Ban Tri Thai or Thai Tri house, meaning a house consisting of three elements (nature, human and architecture). The introduction would talk about the consequences of an imbalance condition in a natural system that showed its great power over human, and the fear instinct for natural disasters had encouraged a reflection that was how human should live together with the nature.

Followed by the origin of the architecture, it was actually built with the primary objective of protecting vulnerable human from the cruel nature. Therefore, an important role of architecture was initially set for responding to the needs for space usability and serving a variety of activities of human's livings. Through the time, architecture had been continuously grown dynamically along with the human evolution and when human's social state had come to the point that everything was tranquil, and secure, aesthetics became influential over the architecture resulting in the architecture representing as a symbol. This symbol displayed a status of human in society and as an indicator of the level of the development of a country. With this development, it had pushed human and architecture to separate from the nature.

The Tri Thai house had a design concept that focused on creating the state of equilibrium among the three elements: human, nature, and architecture by using architecture as a correlated linkage. That is to say to build a consciousness of being Thai, which connected the interrelationship of the three elements to become one, again. To do this, it brought the wisdom of Thai architecture, which had gone through the learning process, accumulation, scrutinization, syndication, and crystallization to become a deeply understanding in the meaning of place, time, and seasons that everything was interrelated equally as a unity according to the system of nature. It can be observed that the design concept of both experiments has a foundation from the interrelationship between the three elements: nature, human and architecture. The dissimilarities would be the way of the story telling and the chosen subject described. The experiment 6 focused on the physical appearances that represented the Thai house's identities while the experiment 7 told the subject of the consciousness of the interrelationship and a sense of Thai houses in terms of an abstract.

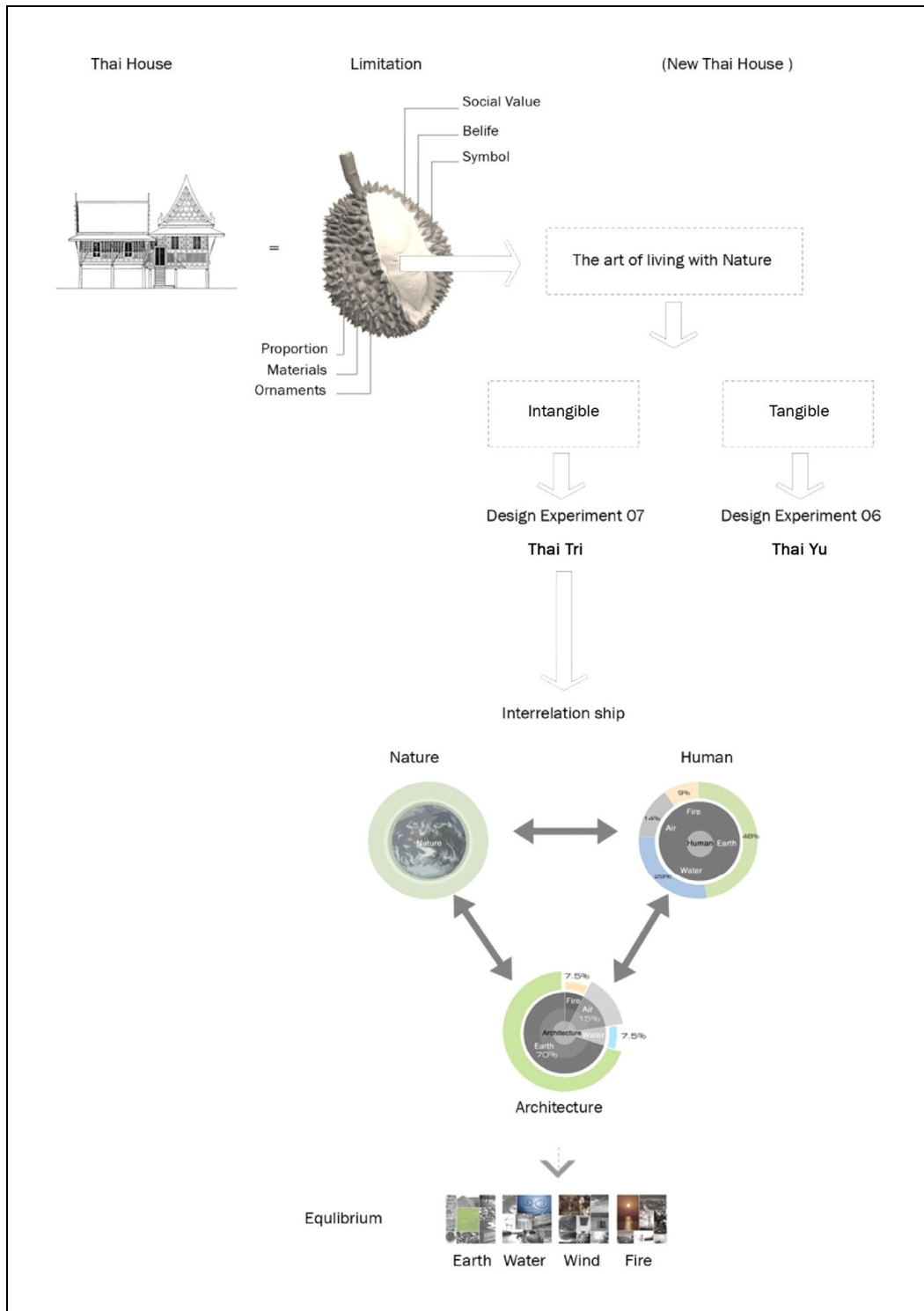


Figure 105 Design Concept of Ban Thai Yu/Ban Thai Tri

3. Design outcome

The design outcome of these two experiments had a similarity in that both works featured an elevated steel structure house with one-storey covering about the same size of the functional areas and the parts that followed the contest's rules, which was the modular system design. Therefore, the researcher had designed in respect to the size of the grid-line that made both works comply with the standard size of local materials; for example, the length of steel, sizes of floor, wall, roof, and ceiling board materials, sizes of doors, windows, floor tiles, wall tiles and other available materials relating to these designs.

In regard to the Ban Ban Method, the concept that was applied in Ban Thai Yu (design experiment 6) will be explained as follows:

Earth: The building orientation occupied a functional area of 40% (of the total land), which lined in the linear orientation from the north to the south connected by a central terrace as a foyer that linked all functions together. The remaining 60% of the area would be used as the green area. Each area performed its different functions according to the Ban Ban Method.

Water: For this design, it would be applied in terms of developing the idea of retaining the rainwater for consumption by the butterfly roof. The wastewater that was used in many parts of the building would be collected for a treatment through the simple filtering system before being kept in the reserve water tank for the irrigation system later.

Air : Due to the fact that the building was lifted 1.5 metres above the ground to avoid being damaged by the flood during the rainy season, it gave additional benefit that was good ventilation as well. The building wall was designed as an open-air for ventilation together with the use of breathable panels and wooden louver above the ceiling board to reduce the heat transfer into the building. The analysis of the wind flow direction was made through the Eco-Tech programme. (as shown in Figure 109 below)

Fire: For this part, it would concern about the method to keep the heat from radiating into the building as much as possible by optimising the uses of the roof and natural lights along with energy saving light bulbs and controlling the numbers of electrical lighting and electrical power systems to match the application in the building. The data analysis of the sunlight reflection and direction as well as the possibility of shade in the area was made through the Eco-Tech programme for calculation figures. (as shown in Figure 109 below)

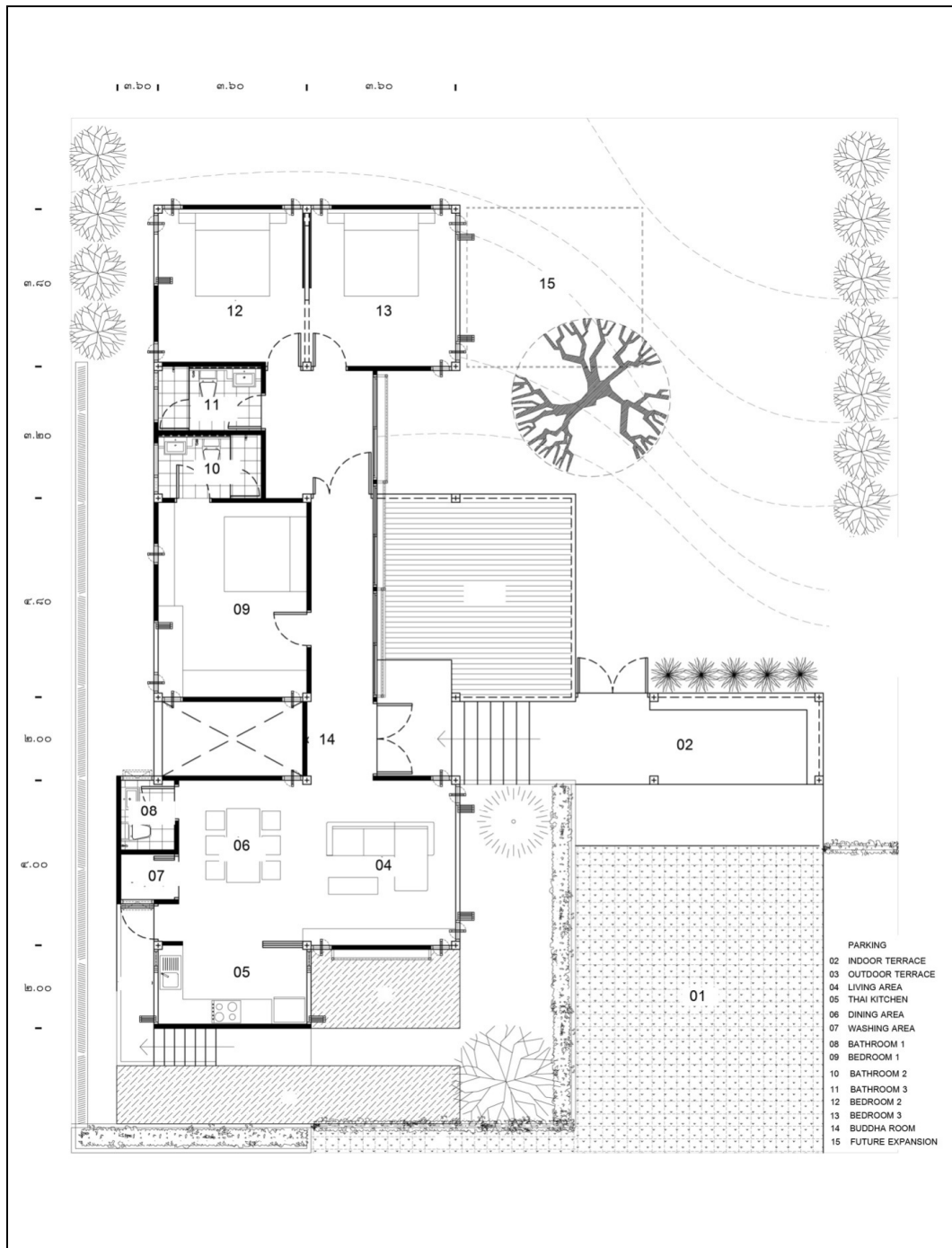


Figure 106 Lay-out / Plan. Ban Thai Yu



Figure 107 Elevation 1-4, Ban Thai Yu

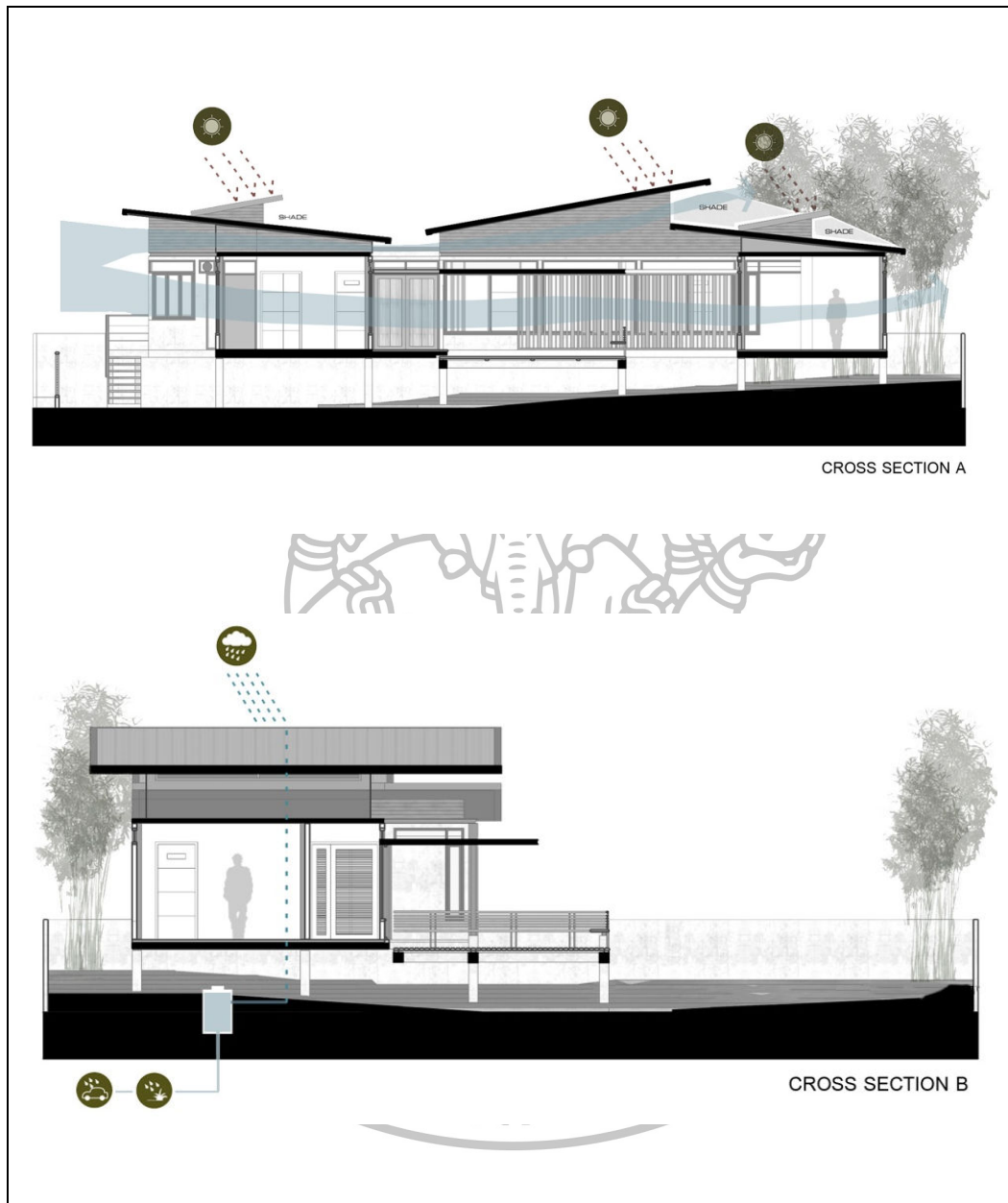


Figure 108 Cross section, Ban Thai Yu

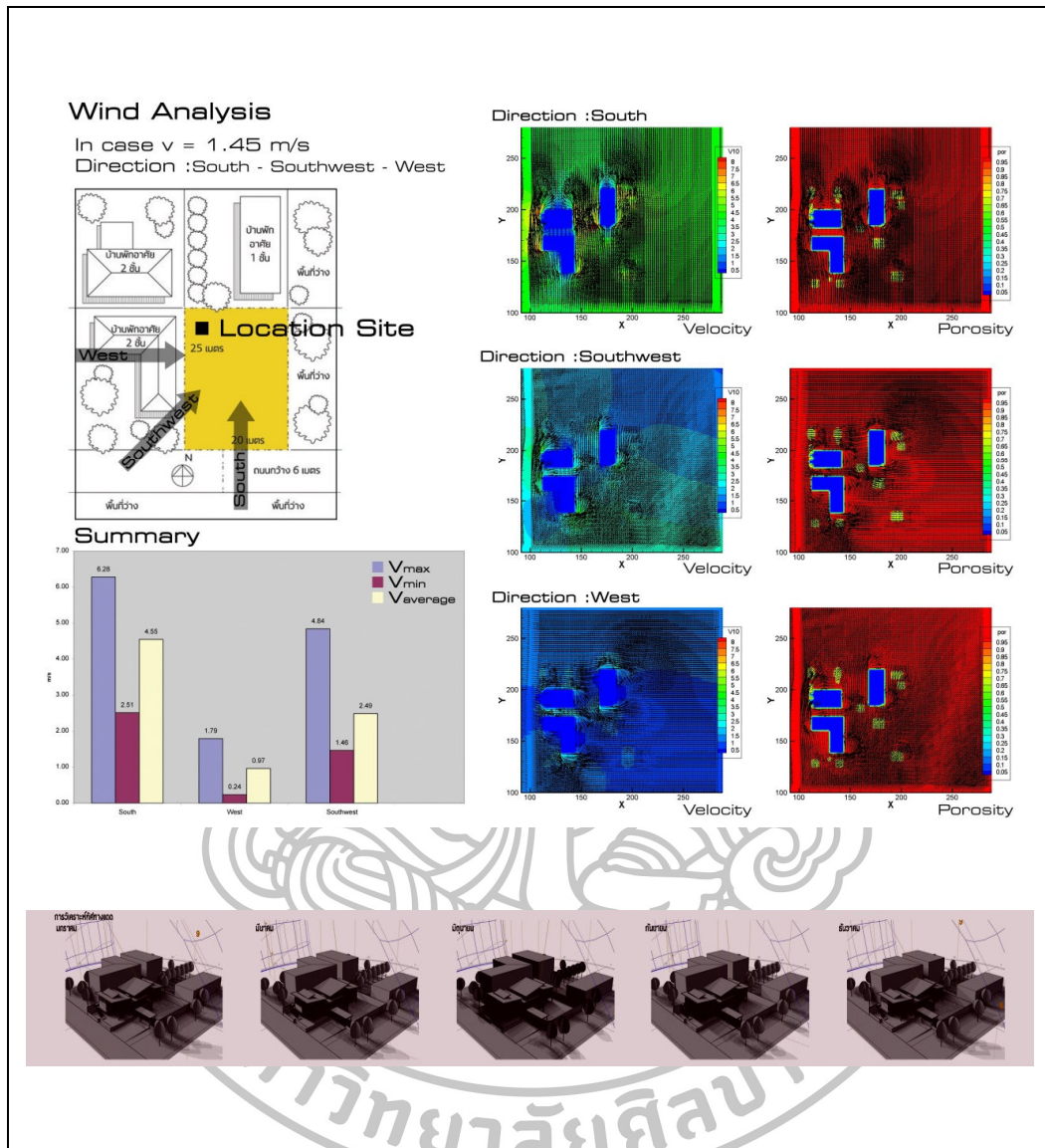


Figure 109 Program & site analysis

In regard to the design experiment 7, the layout of the building was designed as a clustered house surrounding a central court. The utility building comprising a living room, dining room, and kitchen would be put on the west end of the property. The residential building would stay on the north side of the land. Both buildings would be connected by a large terrace.

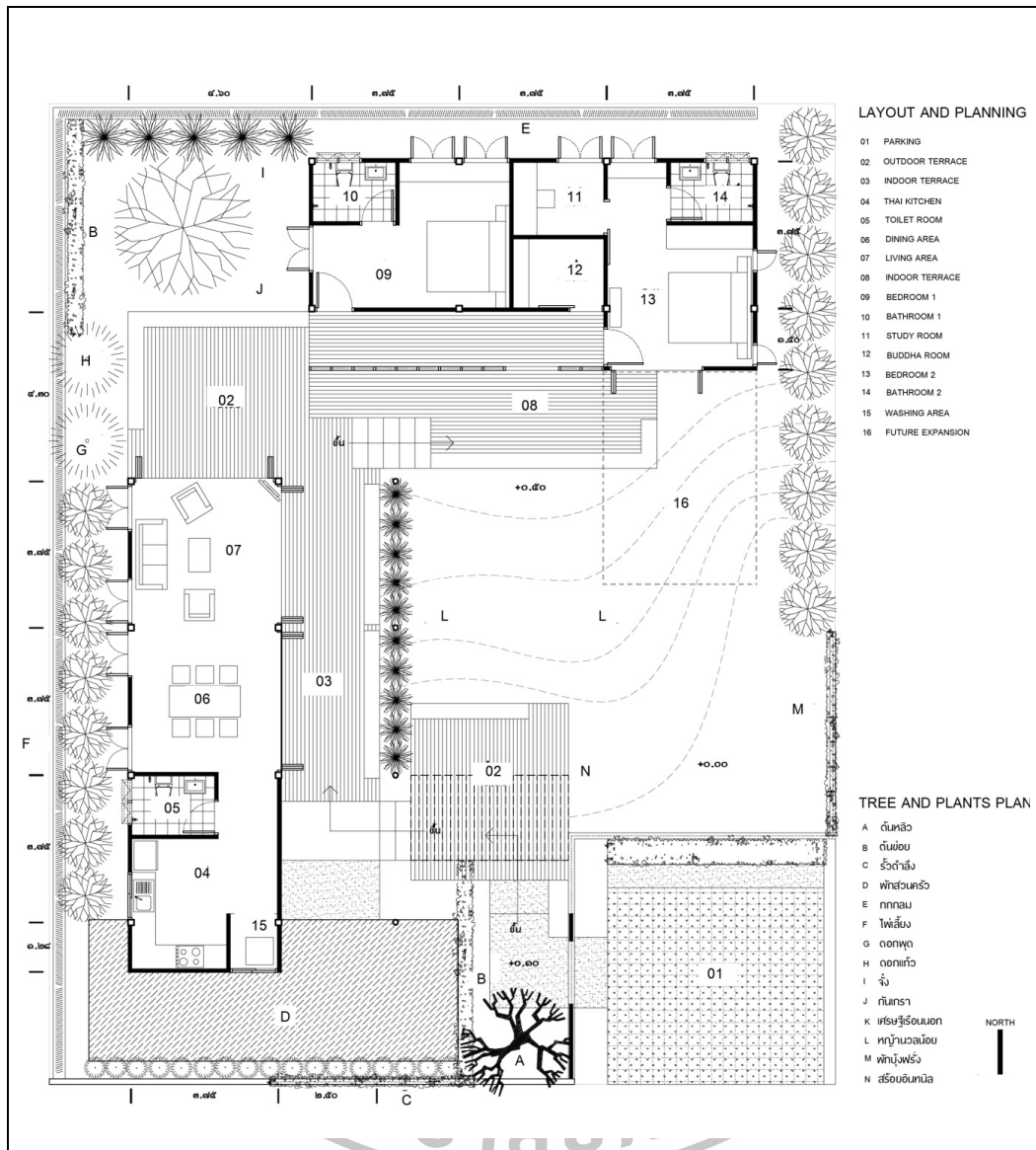




Figure 111 Elevation, Ban Thai Tri

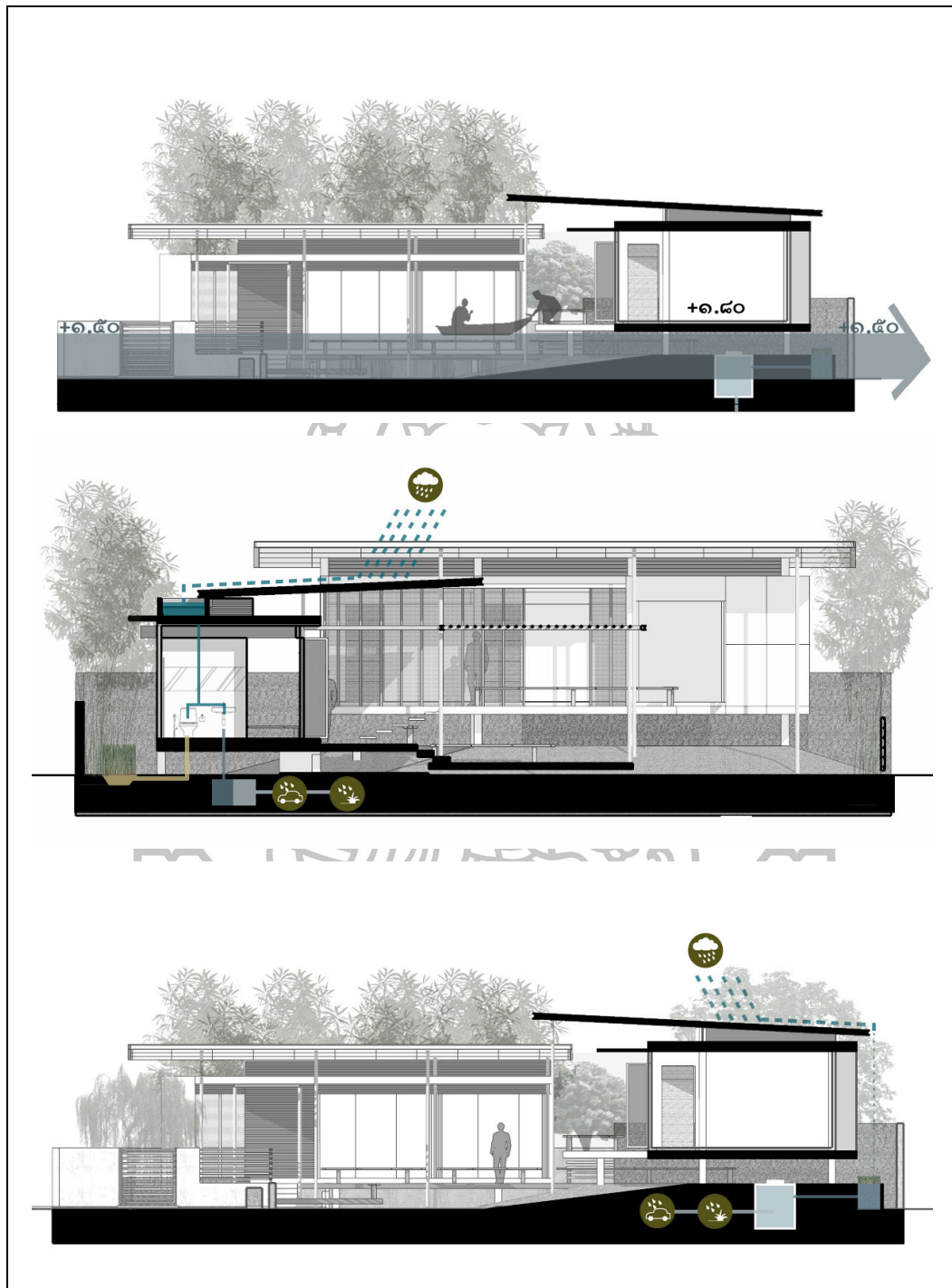


Figure 112 Section, Ban Thai Tri

The building itself was divided into two parts according to the physical characteristics, which were the underground structure and the above ground structure. The dry process was applied according to the modularity as stated in the competition programme. (as shown in Figure 113 below)



Figure 113 Axonometric shows the construction process and modularity of Ban Thai Tri

Apart from the Ban Ban Method that had been applied with the four elements in the architecture as mentioned above, the distinct point of the Thai Tri House was the interrelationship to become united with the nature. There are two major compositions: a courtyard and a terrace that linked the inner and outer spaces together to serve various kinds of activities that would take place according to the time and space.



Figure 114 Detail of terrace and courtyard, Ban Thai Tri

In addition, the design on the functional space layout that separated the building apart not only was the way of saving energy in accordance with the rule of air buffer, but also was a strategy for occupants to interact with each other and the surrounding nature including neighbour or even strangers. An example of this is the design of Rua Ta Saeng (bamboo fence), which was a simple architectural element but contained the deep meaning because it illustrated the relationship between the three elements: nature, human and architecture. At this point, it was the dissimilarity to the present house style which isolated humans from nature and from humans themselves.

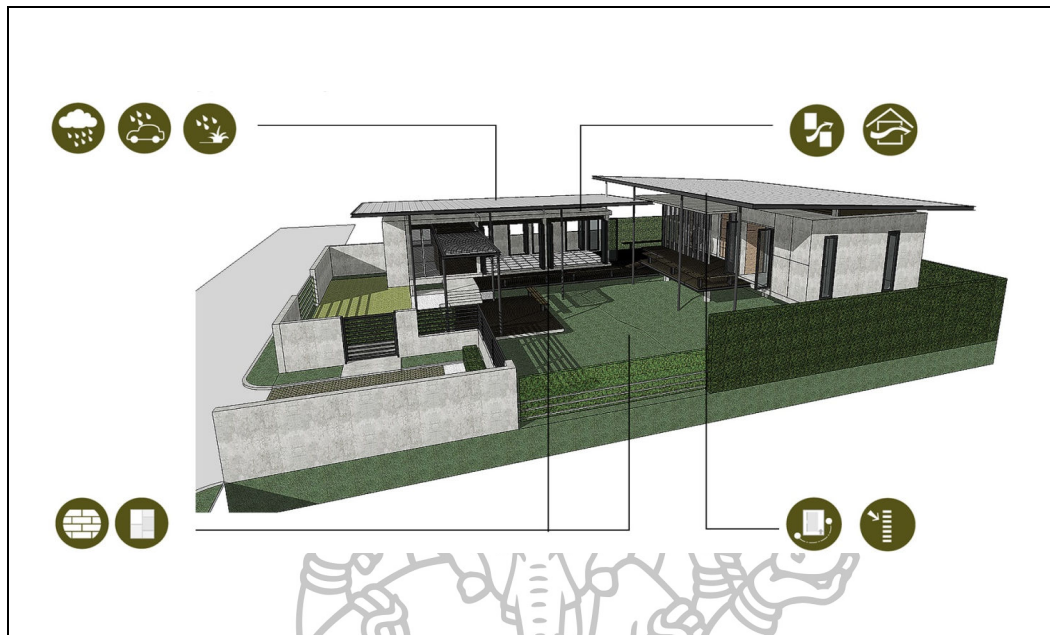


Figure 115 Ban Ban method

4. Conclusion and Notification

With the contest organised by Home and Garden Magazine that the researcher submitted the design experiment 6 and 7 with the titles “Ban Thai Yu and Ban Thai Tri”, the result was that Ban Thai Tri was selected to the final round. In the final round, the researcher had a chance to present the design work to the committee. The presentation started from the starting point of the Thai architectural form, the concerns on the Thai house evolution, and the way to bring the Thai wisdom to apply in the present context. Ban Thai Tri is an example of the work that applied the Thai architectural philosophy to the design on both tangible and intangible dimensions combining with the Ban Ban Method as a tool for creating balance within architecture and as a solution for the flood problem which shows the understanding of the water nature as well as sharing among people.



Figure 116 Facing the commentators

After the presentation, the researcher answered questions from the committee on the topics of Thai architectural form, the creation of the equilibrium under the three interrelationships including the architectural management of the earth, water, air and fire. Finally, the last question was how the Ban Thai Tri and Ban Thai Yu were related. This is because in the first round, the committee found that both works had shared similarities of the concept and presentation. At this point, the researcher explained the background of works and the reasons of presenting two designs that shared the same basic thought but differed in the presentation approach.

The final result was the Ban Thai Tri won the Honourable Mentioned Award. This research found that these two design experiment mission had perfectly achieved their purposes. Because the researcher had a chance not only to demonstrate the way to revitalizing the fundamental elements of Thai house and the Ban Ban Method to the public, but also to receive feedback and suggestion from the committee, which were the viewpoints of the outside parties that gained some knowledge to this research and to be used in order to develop the next design experiments.



Figure 117 Design Competition Award Ceremony

Design experiment 08 - 09 The Truth House /Ban Pin To (Tiffin house)

In August 2012, Iron and Steel Institution of Thailand (ISIT) organised the project of “Thailand Steel House Contest 2012 Greenovation: Less is More” under the concept of “A Minimal Answer to the Sufficiency Society” with an aim of developing the design for living at a national level in reference to the principles of the Green Building Design that concerned on the three points: environmental friendliness, the resource and energy management on the interior and surrounding of buildings, and well-being of residents or building users.

After studying the project’s details in consideration with the terms and regulations of this contest, the researcher found that this design sketch contest would be suitable for the design to redefine Thai houses in respect to the balance creation within the architecture with the scheme of the passive design for sustainable architecture. This would be an opportunity to further develop from the earlier design pieces; hence, the researcher submitted two designs in this contest in the student category for the design programme of the residential house with an area of not more than 200 square metres, that would be the design experiment 8 and in the professional category for the design programme of the residential house with an area of not more than 400 square metres, which would be the design experiment 9. The details will be explained later.

1. Objectives

These design experiments 8 and 9 had been exercised after the fact findings of the design for redefining Thai houses were derived, which was the method of creating the equilibrium within the architecture. This would be the origin of the links of the interrelationship between the three elements: nature, human and architecture, of which, the researcher believes, it is an ideology of Thai houses through the Ban Ban Method, the way to manage the four elements: earth, water, wind and fire in the architecture to create the state of equilibrium.

Since the fact findings had been proved in the previous design experiments, it occurred to the researcher to find which direction of the concept development should be. For these experiments, the objectives of the works would focus on the intangible value dimension in conjunction with the use of the concept of Ban Ban at a larger scale in order to know the possibility of the improvement of the design concepts that consisted of larger and more complex programme structures.

Therefore, this design programme, design experiment 8 was interpreted by the researcher as a place for retreat and adjusting the way of life in a sustainable way for while the design experiment 9 would be a building for a small community, so called the co-housing that featured more complicated structure and more complex conditions of users with the objective of learning how to adjust the equilibrium in a larger scale of architecture.

2. Conceptual design

Since the objectives of the design experiment 8 were to communicate the concept of returning a balance to the nature via architecture by focusing on the critical points in Thai society, the way of life and architecture as a consequence of the influence of Capitalism, the conceptual design would illustrate this subject and explain the origin of this design concept as follows:

Nowadays, Thai society gives an importance on the material value rather than spiritual value, which results in the desire, greed, and restlessness of people. They have been neglecting things they already have. As a result, this materialism society has changed the way of life of Thai people and society to become a society that is superficial and distracting from morals. The above mentioned problem can be fixed by fostering and growing a consciousness of sufficiency through a family institution, which is the smallest unit in the society by employing architecture as a medium to create the Thai society to return to the path of sufficiency.

The Truth House (name of design experiment 8) had a design concept that featured the calmness, still, and lightness by embracing the concept of Trizikha or the threefold training: morality, concentration, and wisdom to be a reminder for one to keep practicing in order to be free and go to nirvana. The concept emphasised on the building design, which had appropriate proportion and sufficiency for the real functions, that was not too much, and not too little in order to be able to respond to the highest functional use in cooperation with the design of an empty space that connected the functional space. This was to create an interaction between human and nature via architecture to restore the unity of modesty and sufficiency as well as to serve the occupants' activities with the simplicity and directness.

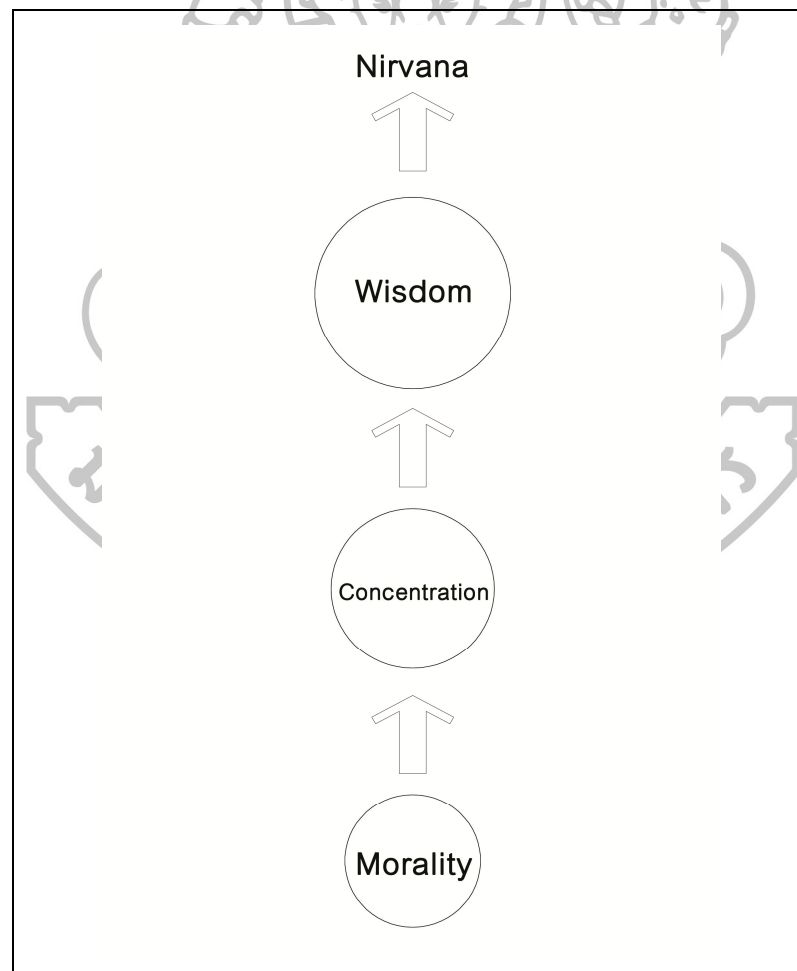


Figure 118 Trizikha– Buddhist Threefold Training

The concept of the design experiment 9, namely “Ban Pin To” (Tiffin house) had a starting point from the social environment of capitalism as well. In 2012, everything had its price; thus, it was not easy to build up by ourselves or own a house. The Pin To House showcased a new way of residential home style that met requirement of economic and social conditions at the present by adapting the metaphor of the concrete and abstract characteristics of a tiffin. That was a showcase of a house style where there were three families living together in the same area. It adopted a concept of sharing and helping in every aspect to build the relationship that would later become a little society. This little society combined the characteristics of sufficiency, completeness and adequacy, which conveyed the hospitality from a little to big society and finally, led us to the society of sufficiency.

The concept of utilising space was that supposedly, when each of three families wanted to build a house, it would require a lot of money for each family to build a house to fulfil their needs; however, if all three families had contributed money to build a house to live together, the result would be an adequacy of space. The reason of this was that each family could share the overlapping functional spaces; for example, a passage, kitchen, dining, living, washing, and storage rooms, in which could be adjusted as the mutual functional space. The personal space of each family would be designed to have a clear proportion and suffice for the needs. At the same time, the interaction among three families would not be apart, like a tiffin carrier in the same set.

Furthermore, Ban Pin To implied the social thought in this design, which meant it created an internal society among the house members to have social interaction for exchanging and learning the way of living, consequently, it cultivated hospitality and kindness to the family and society.

The open area outside was like a learning space that linked the surrounding nature, human and architecture to become united through the architectural elements. An example of this was at the Rua Ta Saeng (woven bamboo fence) nearby, it had been utilised as an area for growing non-toxin vegetable, together while creating social interaction among the neighbours through sharing and exchanging. Moreover, the green area helped refreshing society and community, creating a consciousness of saving the planet with this shared green area. It could be said that this was the way to return nature to community at larger level.

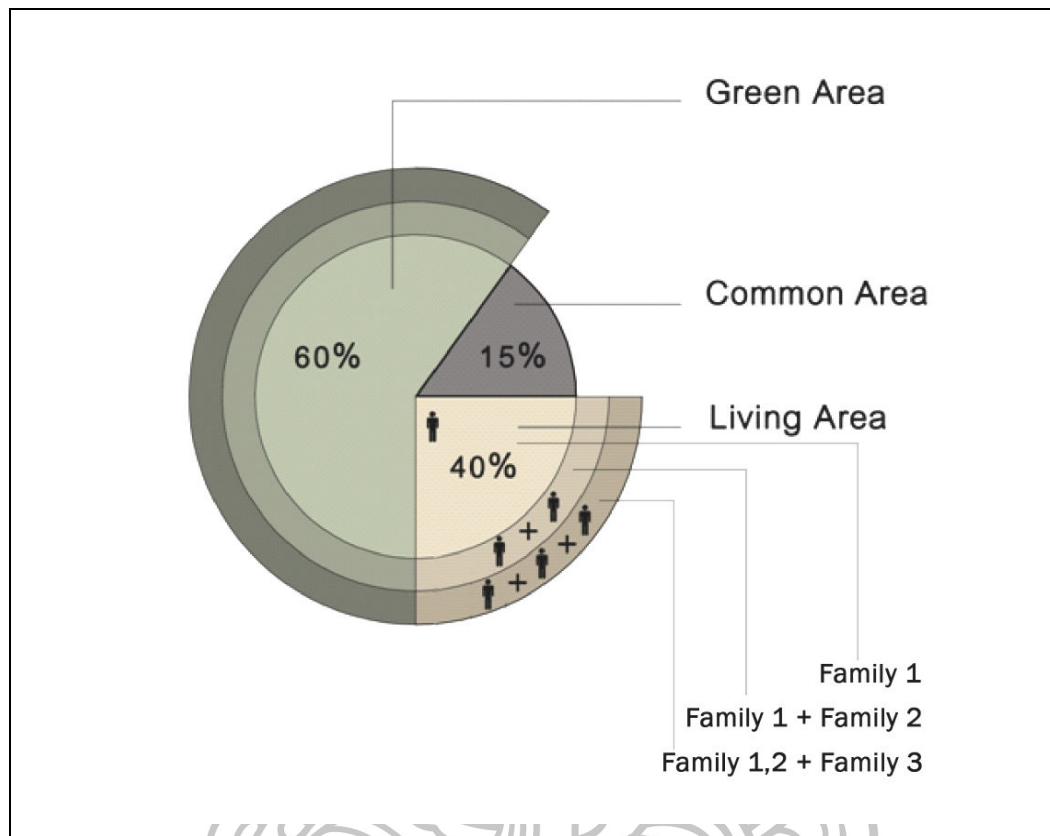


Figure 119 Design Concept of Pinto House

The concept of both design experiments was based on the same origin. Design Experiment 8 was an interpretation of the Buddhist philosophy that turned to be a consciousness space of the sustainable architecture. Design Experiment 9 adapted the complex of social dimensions as a foundation for the design for solutions. The key design of this work was the word “sharing”. Nevertheless, these two designs still employed the Ban Ban Method that had been developed through the time as an essential part in the design experiment for redefining Thai houses with an aim of having the architecture of equilibrium.

3. Design outcome

The design outcome of the experiment 8 and 9 differed in terms of the design programmes. The design experiment 8 was submitted in the contest under the regulations of student category of which the researcher had set the functional space of 170 square metres. The design outcome was a 2-storey steel structure house with a simple form.

Earth: The land was divided into two parts: the functional area interior covering 40% of the total area, which consisted of living and dining areas, service function, a large terrace on the ground floor and two bedrooms on the upper floor.

The space outside the building occupied 60% of the whole area, in which the empty space had been divided into various sections for gardening plants; such as, ornamental, flowering, and fruit plants, home grown vegetable, herbal plants and absorbing pollutant plants.

In regard to the steel structure part, it was designed to have beautiful proportion in parallel with the specifications of size and building proportion including architectural elements; such as, battens and Rua Ta Saeng to be in line with the modular system and standard size of the local construction materials for the purposes of reducing the greenhouse gases.

Water: To build comfort zones for the design work, the Ban Ban Method had been brought to apply which included the rainwater preservation for consumption, the wastewater reuse as well as wastewater treatment with a natural method before releasing to the irrigation system.

Air: The application of air by using the Ban Ban Method would be the ventilation of the accumulated heat inside the building by using natural wind. The double-layered roof was designed to allow an air gap underneath and, for the void of the building, it was designed to be folding doors to have the open-air area at most for connecting the inner and outer areas of the building. It also helped on the air ventilation.

Fire: The application of this part was the design of the roof shade length to prevent house from sunlight and the use of turf blocks to reduce the hardscape area and protect the building from the sunlight reflection, which helped increase the green area as well.

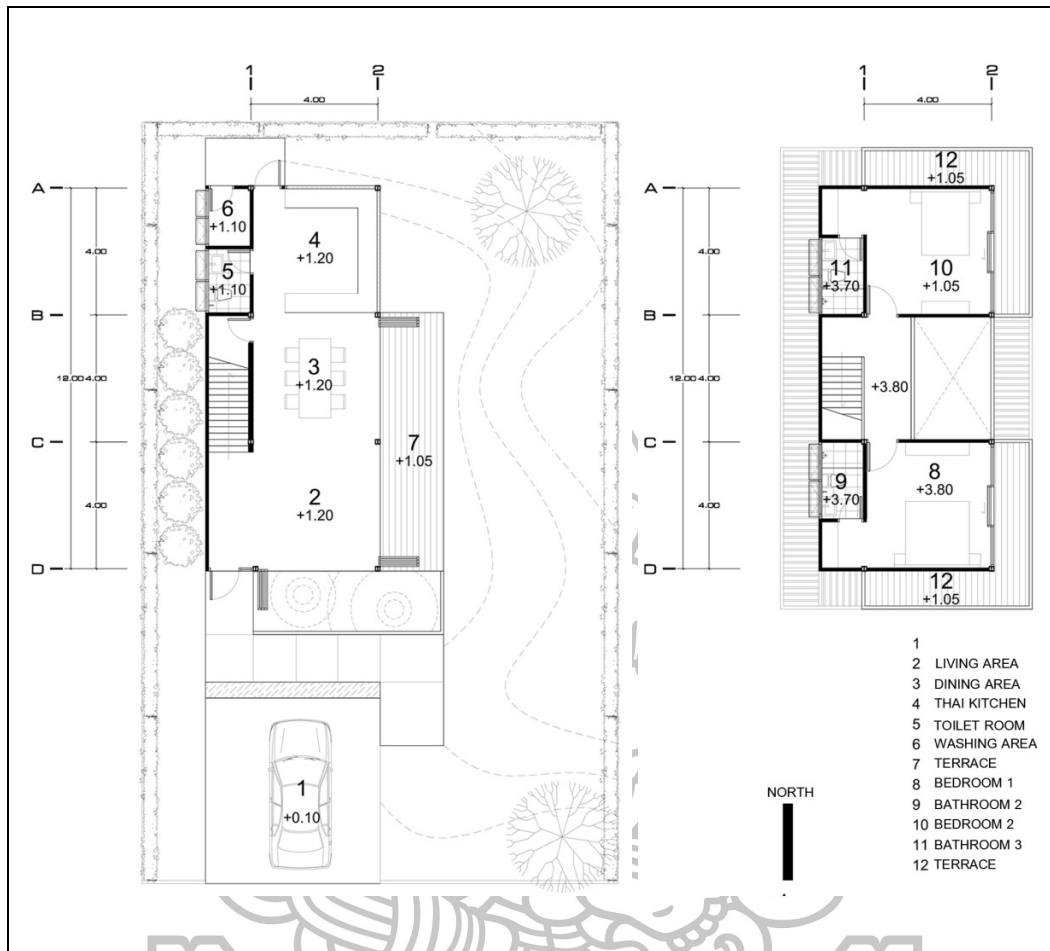


Figure 120 The Truth House / floor plan

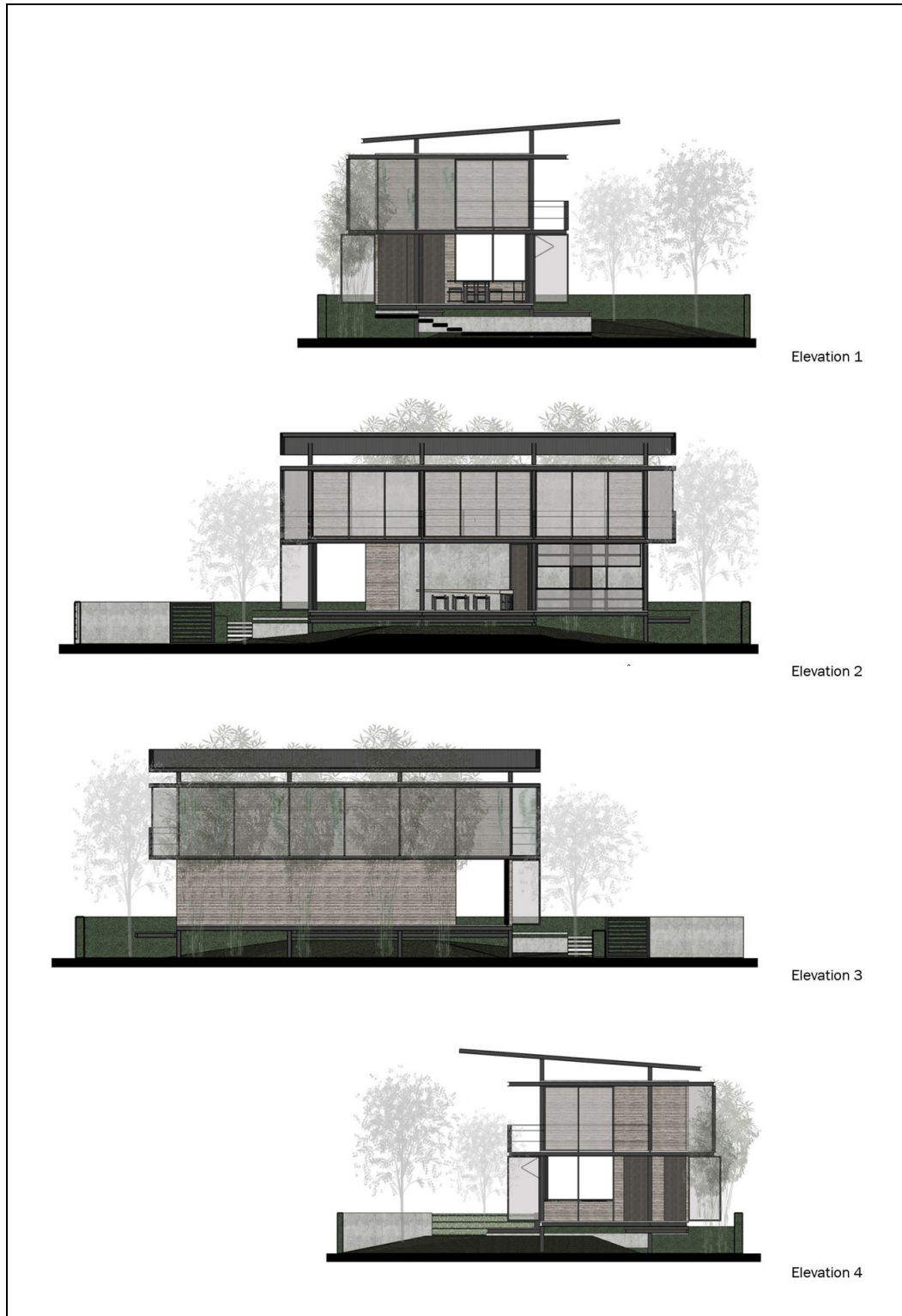


Figure 121 Truth house / Elevation

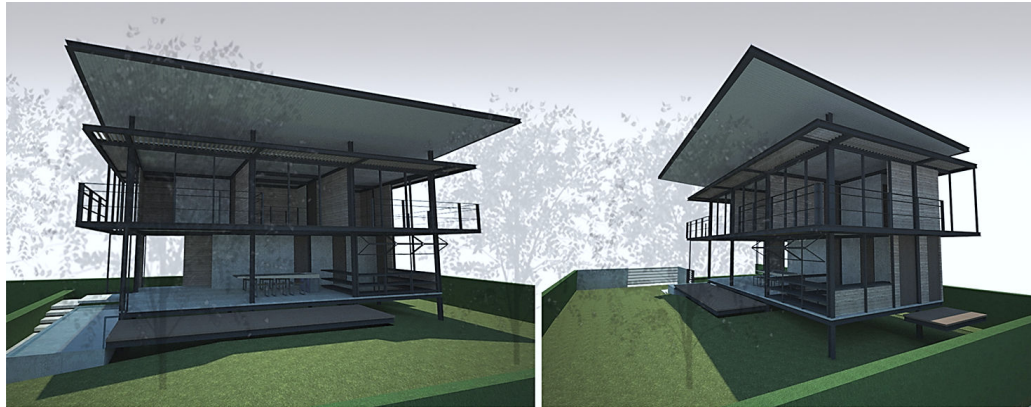


Figure 122 Truth house / Perspective

The design outcome of Ban Pin To (Tiffin House) was a 3-storey steel structure house with a large green area. Since the building was the co-housing, the building zones had been properly divided. For the section of the public use and sharing space; such as, a living room, dining room, and kitchen, it was designed to have a connection with the main hall and main staircase, which were the centre of the building in order to easily access to every functional area. In the private zone of each family, there would be a terrace as a buffer. When entering the private zone, we could find the sub zones of each family which would be in moderate sizes.

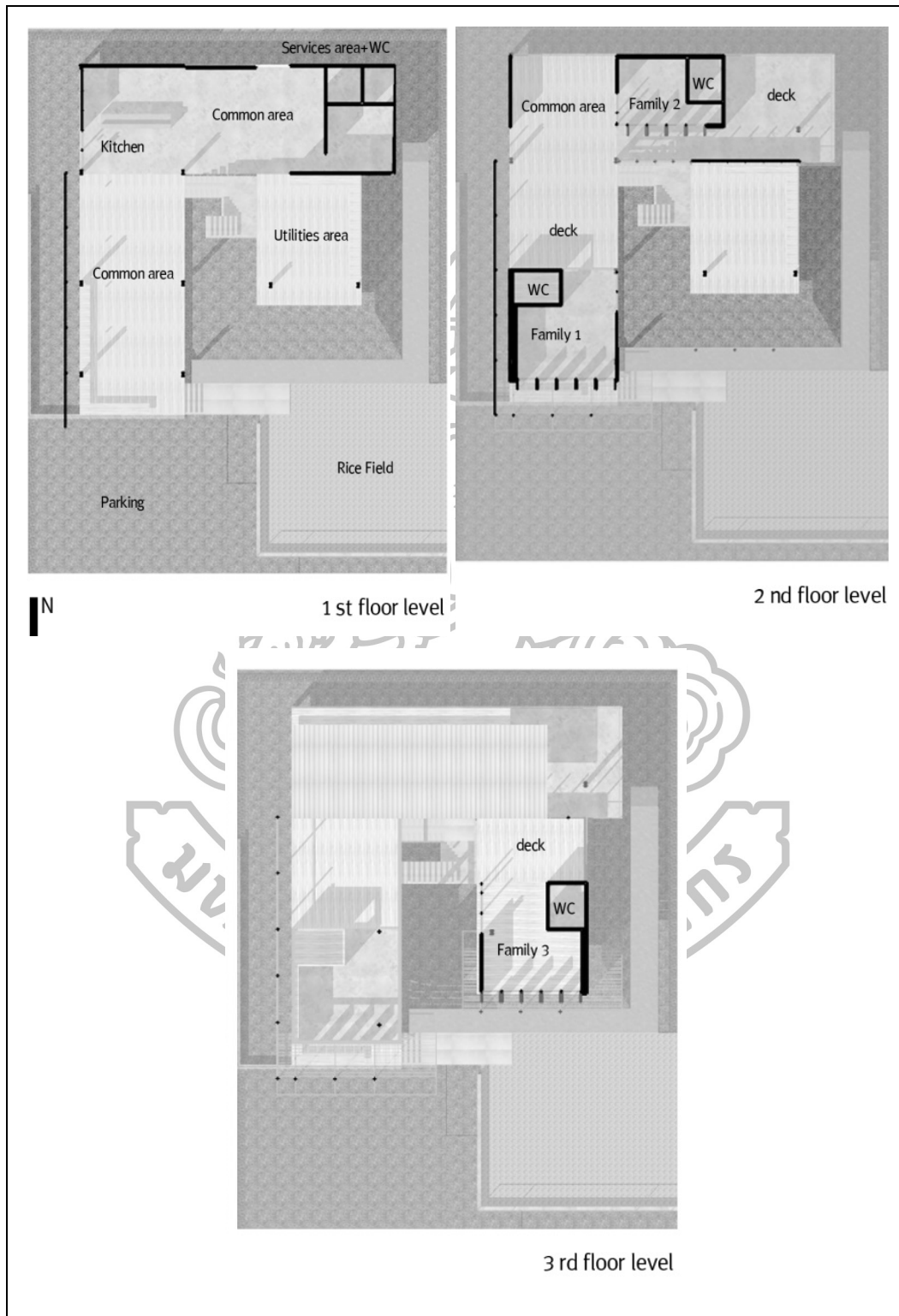


Figure 123 Pinto house / Floor plan

The architectural form of Ban Pin To was not complicated but direct. The house was built to be tall, open and spacious with the central courtyard located in the main hall and main staircase area. The building was surrounded with the green area and terrace covered with roofs in each unit. The solid panel used in Ban Pin To was rarely seen. It would be used only for partitioning the closed areas.





Figure 124 Pinto house / Elevation

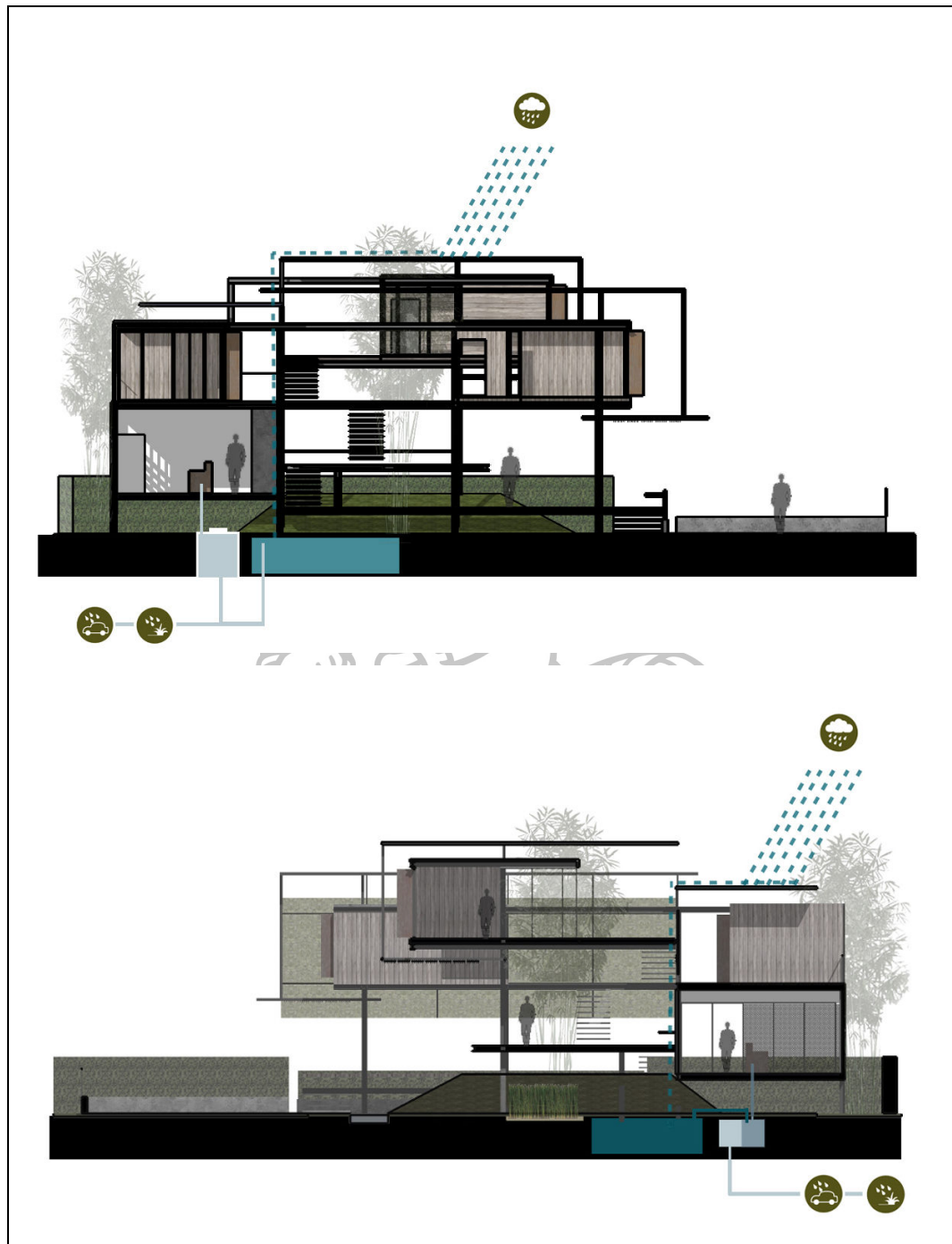


Figure 125 Pinto house/ Section

The Ban Ban Method was fully implemented in this design. For the earth part, the proportion of the covered area to open space was 40:60 in which the 60% of the open-air area was used for creating the internal ecological system by applying plantation zoning, vertical gardening, wetland imitation model for wastewater treatment inside the project as well as small rice farming.

Water: The rainwater from the roof was retained. Some water would be passed through the dripping irrigation system for vertical garden. Some part would be contained in the water storage tank for consumption. The wastewater from the building usage would be treated in the primary filter and secondary filter prior to reusing in the next suitable activity. The excess of water from the treatment system would be released into the artificial wetland, which was an elevated open tank (influenced by check dam). It was a wastewater retaining with the method of water excess in which the toxin absorbing plants would be grown in the water then the water would flow into a small paddy field and the remaining would be sent to the irrigation system.

Air: The design of this piece focused on the open area of the floor plan to let every part of the building wrap by air like a vertical clustered house that had the overlapping of mass vertically with the wrap of cool air. In addition, the space underneath the elevated house could help relieve the moisture underneath. The building roof was lifted as a double roof to keep the building cool. The vertical garden that was allocated on the southwest would receive the wind for ventilation but could filter the heat by natural way.

Fire: Fire in Ban Pin To had been applied in forms of various energies in terms of energy saving, using natural light during the day by using the skylight for distributing light in the area of the main hall and central court in conjunction with the design to prevent the building from the sunlight by employing different architectural elements; for instance, vertical garden, eaves, and shutters. Furthermore, the researcher selected double walls with air insulation for the building walls on the south and west sides that were exposed to the sun in order to prevent the heat transfer at night.

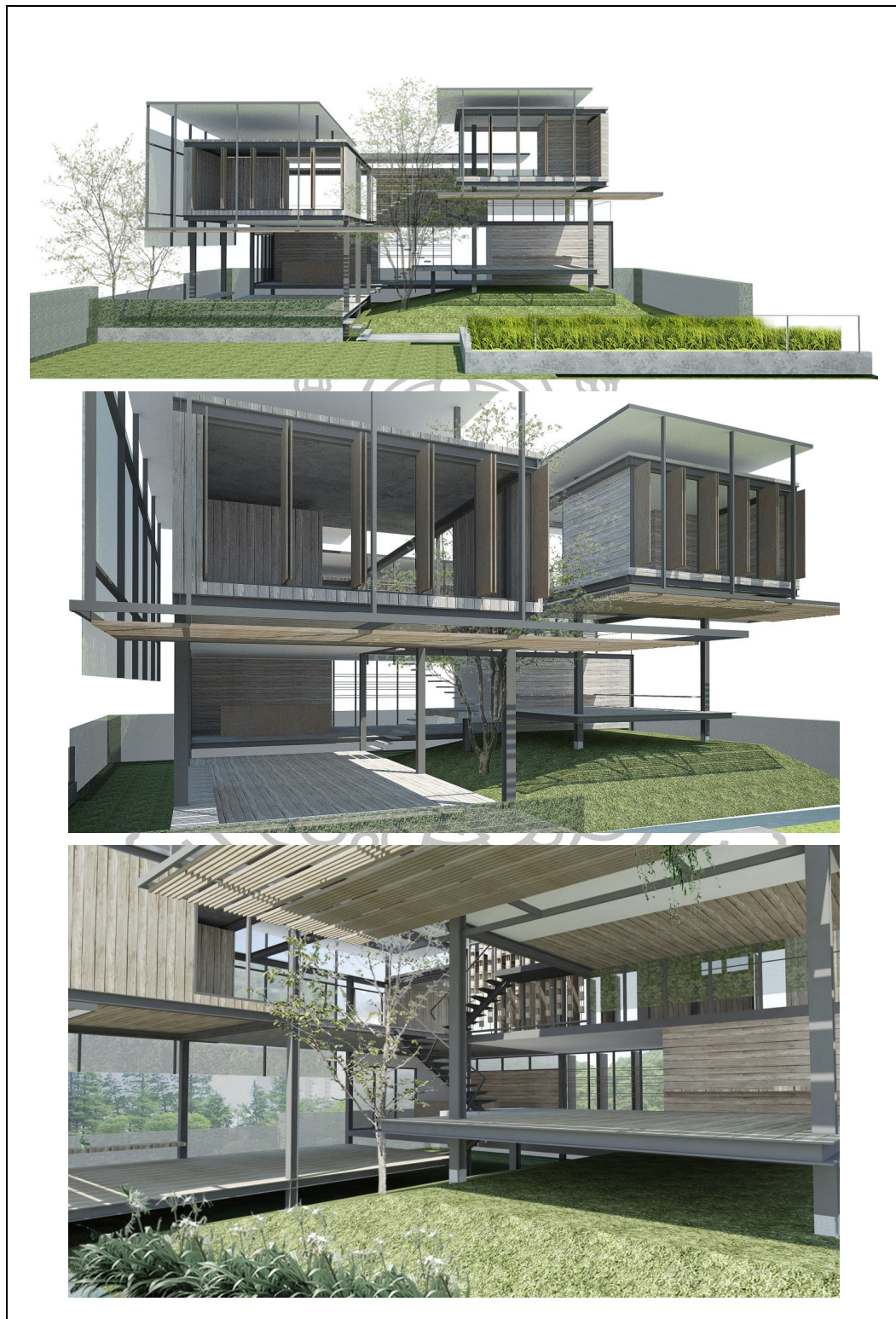


Figure 126 Pinto House /Perspective

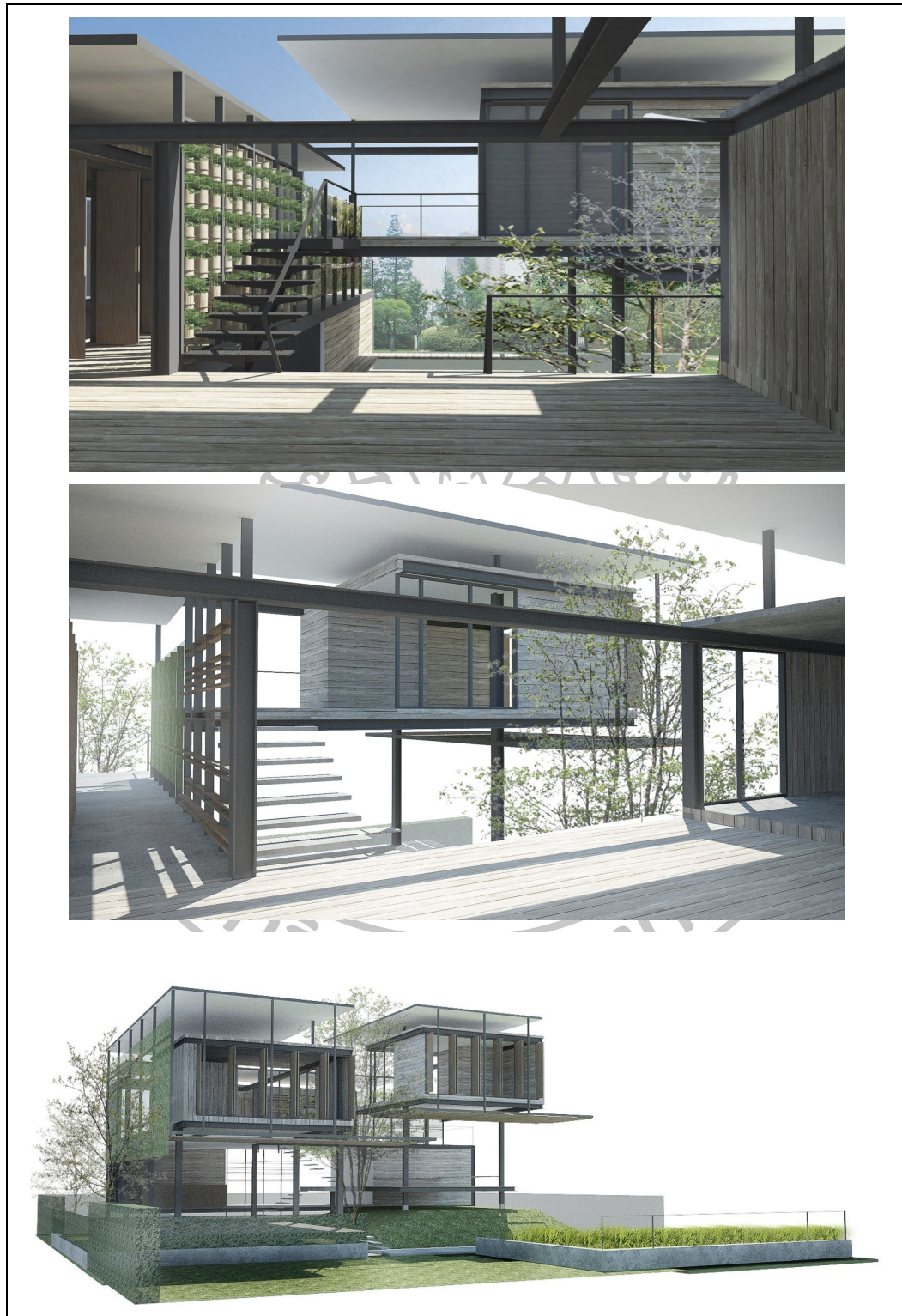


Figure 127 Pinto House /Perspective

4. Conclusion and Notification

The result of the experiment 8 and 9 submitted in Thailand Steel House Contest 2012 was that Ban Pin To, the design experiment 9 had passed to the final round. The researcher took this opportunity to present the work and its concept. After exchanging opinions and receiving recommendation from the committee who are the experts in architecture and engineering fields including the experts in designing for energy saving, it appeared that Ban Pin To won the Second Runner up Award from this contest.



Figure 128 Thailand Steel House Contest 2015 / Second Runner Up Award

It can be said that the fact findings from this research is forming the fundamental elements of Thai architectural wisdom in to the Ban Ban Method which is the administration of the four elements: earth, air, water, and fire that create the state of equilibrium in architecture. It is also reconnected the interrelationship among nature. Once again it was proved to be beautiful and harmony with the social context and the way of Thai people's living at the present time (2012).

Interestingly, the mentioned knowledge could be applied in the programme of the architectural design in a broader scope with more complicated constraints and conditions. Hence,

it could be noticed that past knowledge of Thai architecture that had been synthesized could be developed and practiced in the real situation. Also, it could be more beneficial to people in the society when we compared to the development of the Thai architectural form that could preserve only the skin of architecture (physical appearance) in terms of culture dimension.

Summary

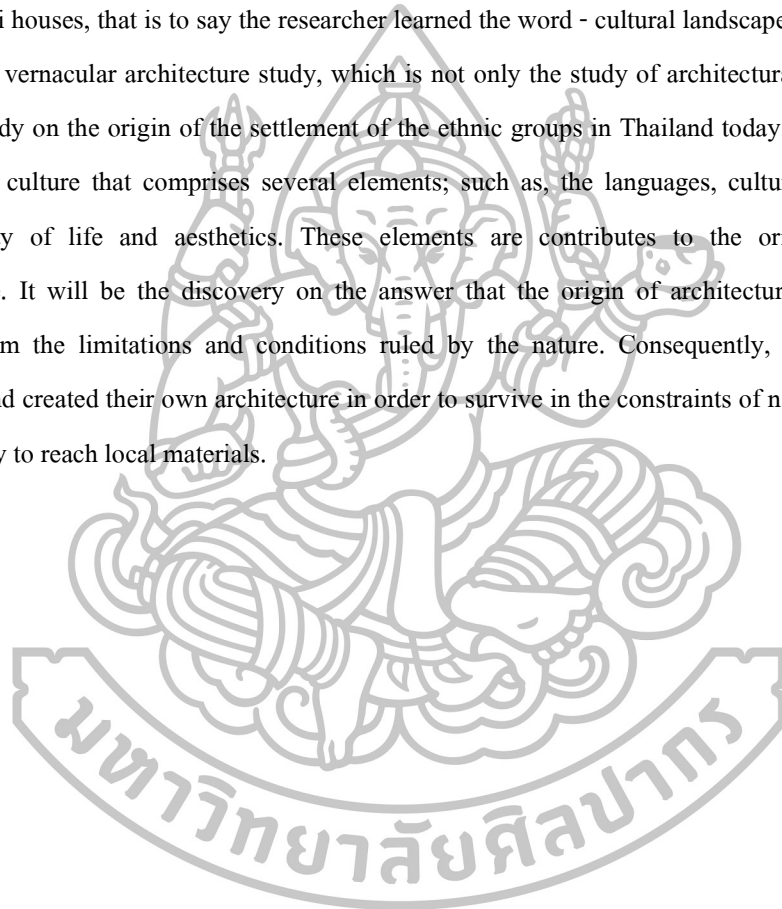
The conclusion that have been drawn from working on the design experiments can be wrapped up in 3 phases: before, during and after the literature review, which resulted in the nine design pieces. All these works have reflected the development of the design concept of revitalizing the fundamental elements of Thai house in the three periods as described below:

Firstly, before literature review is the time of questioning and answering that begins with the impression on the former knowledge of Thai houses, which the researcher has learned from the school of architecture. However, it is just a primary knowledge that mostly are the characteristics of the physical appearance; such as, a wooden house raised on stilts, high gable roof pit, prefabricated house, and mobility, etc. When the mentioned basic knowledge was applied in the design experiments of Thai houses that were developed from the Thai architectural wisdom, not Thai forms, the design outcome seemed to be possible to elaborate. Nonetheless, it was a superficial knowledge since it lacked an intuition to explain the concept at a deeper level. Anyhow, the design experiment 1 could be the starting point for the research on the design to redefine Thai houses in the latter time.

Secondly, during literature review, this research found that there were not so many textbooks on traditional Thai houses available. Most of them are written by based on the State Decrees (Rat Ni Yom in Thai), which focus on the conventions, traditions and culture centred by the Central region. Therefore, when the researcher had studied traditional Thai houses in details and summarized the essential elements of Thai houses, a collection of distinct architectural elements that can be found in traditional Thai houses in all regions, the mentioned elements have been applied in the design experiment 2. It was found that the essential elements of Thai houses are like the identities of Thai architectural form which resulted in the design of contemporary Thai house style as the design outcome.

In essence, it can be said that the traditional Thai architecture theory that focuses on the Thai architectural form and elements is an approach that influenced the design concept and the direction of architectural form.

Thirdly, the design experiment after the literature review has been implemented after studied the Thai vernacular architecture theory, which had an impact on this research viewpoint toward Thai houses, that is to say the researcher learned the word - cultural landscape, a key word of the Thai vernacular architecture study, which is not only the study of architectural forms, but also the study on the origin of the settlement of the ethnic groups in Thailand today. This is also the root of culture that comprises several elements; such as, the languages, culture, religions, beliefs, way of life and aesthetics. These elements are contributes to the origins of the architecture. It will be the discovery on the answer that the origin of architectural form was derived from the limitations and conditions ruled by the nature. Consequently, human have designed and created their own architecture in order to survive in the constraints of nature and the accessibility to reach local materials.



No.	PROJECT	PICTURE	CONTEST	CONSTRUCTION	REMARK
1	Conscious house		<input checked="" type="checkbox"/>	<input type="checkbox"/>	2nd Round Baan Lae Suan Competition
2	Thai house		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	Ban Ban house		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Winner Award 2011 Low Carbon House Competition
4	T107/3 house		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5	Chez pipli		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
6	Thai yu		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7	Thai tri		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Honorable Mention Award 2012 Baan Lae Suan Competition
8	The Truth house		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9	Pinto house		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Second runner-up Award 2012 Thailand Steel house Contest ISIT

Figure 129 Summary Table of Design Experiments 01- 09

After this fact had been realized, it came to the enlightenment that brought into the discovery of the Ban Ban concept, meaning the method that creates the state of equilibrium in architecture in a simple way that people in general can practice. From the mentioned fact findings, it led to the series of the design experiment from 03-09 that each design outcome would vary according to the selected design contest programme the researcher participated in. From the design experiments, which have been continuously developed through the time, the lesson learned from mistakes, the exchanges of viewpoints with the committee who are the experts in architecture, engineering fields and experts at designing the energy saving buildings, the knowledge learned from folk craftsmen, and users in the design experiments and actual construction, all of these are the empirical experience that this research has gained from the design experiments.

Finally, the last part of this chapter will be an explanation on why the design outcomes in all nine design experiments are steel structure houses. The reason for using steel structure is that steel is the material that can be easily substituted wooden structure since its behavior can tolerate the compression as that of wood. Moreover, steel can be prefabricated, assembled and reassembled. In terms of beauty, the steel work can create beauty as the same way the wooden work could do in the past (as shown in Figure xxx below). Steel is also a material that has an environmentally friendly production process with 3R qualifications: Reduce, Reuse and Recycle. Once the architectures are no longer required or expired for any reasons, steel has remained the value itself since it is movable and can be recycled.

The reason for the design in a clustered house style is to insulate the building by letting the air wrap around and it will increase efficiency when using with the breathable walls and panels. For the dry process construction, it is used to conform with the modular system, which helps reduce carbon footprint during the production process and reduce the waste volumes from the construction as well as it is a precaution on the effects from the rising cost of skilled labours. Therefore, the dry process and modular system will help non-skilled labours to be able to repair or extend the house with the DIY method in the future.

For the design with the lean to metal sheet roofing, this research did not reject the use of gable roof to avoid the characteristics of traditional Thai houses. The reason is the conditions of materials, weight and beauty have changed over the time. The fact that Thailand is situated in the tropical zone, it is unavoidable to face the extreme change of climate that are extremely hot and heavy raining. In the past, the materials used for the roof had to be durable for the weather

conditions. With this limitation, the word for roof in Thai should be thatch roof. The roof in Thailand is necessary to be steep for an efficient drainage otherwise the roofing materials will have a short lifetime usage. With the same reason, the function of the roof shape today is still to prevent the sun and rain; it can be adjustable according the roofing materials. In the researcher's point of views, using a high gable roof is not worth spending for its structure and materials because of the heavy weight. There are many options to protect the sun and rain, which include the ventilation of the accumulated heat under the roof like double roofing.

All the above mentioned is the knowledge called the empirical experience that the researcher acquired through the working process since the beginning of the design process until the final stage of construction with the real experience as a user. This experience creates the perception and deep understanding of all the time this research has been conducted, the shift in paradigm from the thinking process of the researcher has been crystallised and become the architectural design concept of the Ban Ban Method which reflected in the forms of the design experiments including in the professional work in the latter time.

In conclusion, from the research and design experiments, this research found that the core of Ban/Ruean Thai in the past was the true understanding in the law of nature and surrounding context, which resulted in the beauty that derived from the genuine comprehension. The key of designing new Thai houses is the architectural design with moderation and understanding on Thai houses which is the art of living in equilibrium among the nature under the concept of creating new things with the deep understanding on the existing things. With this in mind, it was hoped that new Thai houses today (2015) will be the valuable old objects when the time passes by as quoted as saying that:

Before we find the form of Thai architecture that does not imitate the old one, we should clearly understand Thai architecture and vernacular architecture, learn about the origin and root of the culture that have been established in the vernacular architecture. Later, we might have new ideas of the architecture that represents Thai spirits not just the outer looks.¹

¹ Ornsiri Panin, **Thai Vernacular House and Villages** (Bangkok: The Association of Siamese Architects under the Royal Patronage of His Majesty, 1996), 89.

Chapter 5

Conclusion and Recommendation

Introduction

This chapter is divided into 2 sections, the first one is the conclusion of this research where all research knowledge and the outcome will be discussed in brief. The second one will be the recommendations which are some models that this research has applied the research knowledge in the professional field and in some occasions in the educational field as a guest lecturer.

This is to demonstrate that the outcome of “Revitalizing the Fundamental Elements of Thai House” research has assuredly reflected the essence of Thai architectural knowledge and possibilities to bring back the Thai architectural wisdom to revival. Also some useful suggestions are made in order to provide alternative direction for some future research.

Research outcome

This research had been investigated through the development of Thai house from past to present and found out that actually, the different architectural appearance reflect the diversity of each identity of ethnic groups who reside in the boundary of Thailand are not only physical matter. Beyond those differences form, there is a similarity that is “Thai architectural wisdom and knowledge” which wisely reflect into the simplicity form of architecture, depending on limitation of each cultural landscape.

Unfortunately, the study of Thai architecture approached the classification of Thai house and put lots of effort on the study of Thai tradition house especially those houses of the central plain which has been centralized, synthesized and valued as a “national symbol”. As a result, the definition of the word-Thai house (Ban Thai or Ruean Thai) has inherited some deviation and distortion and consequences are the development of Thai house has been frozen and abandoned because of the lack of understanding.

However, the research found some trace that could revitalizing the fundamental elements of Thai architectural wisdom, because this knowledge is a timeless truth and still up to date but definitely need to be modernized in order to fit in today's Thais way of life. To modernize this ideas, this research is mainly focused on the tangible and intangible values of the interrelationship between three main factors; nature, human, and architecture. Then, analyzed and decoded them in depth, and the outcome of this research is the conceptual design ideology named **“Ban Ban Method”** that integrate all related architectural design factors in order to create the state of “equilibrium” into the new form of Thai architecture for living practically.

Moreover, Thai architectural aesthetic and the characteristic of space in Thai house is generally related to a variation between space and time. The flexibility of space is created in order to support various kinds of activities that overlap and take place in the same space due to the moment of time and occasions. Then, in order to accomplish the design of the new Thai house, apart from Ban Ban method, there will be some refined invisible elements of Thai house that needs to be perceived as follow;

Invisible elements of Thai house

Actually, it was 18 years (now 2015) of self impression, when the researcher has first got into the real space of both Thai traditional house and Thai vernacular house during the field trip back in 1994. There was a feeling that can not be explained in words that how man could create such a living space that harmonized with its surrounding beautifully.

However, the answers are some invisible elements of Thai house that conceal under the skin of Thai architecture that the researcher has revealed and refined them from the process of Redefining Thai house as listed below;

1. Simplicity
2. Thoughtfulness
3. Respectful
4. Peace and Tranquility
5. Equilibrium

The above are the invisible elements of Thai house that create the identical characteristic of form and space. Each element reflects thinking method of Thai architectural

philosophy that is always associated with the interrelationship (nature, human, and architecture) as the same oneness.

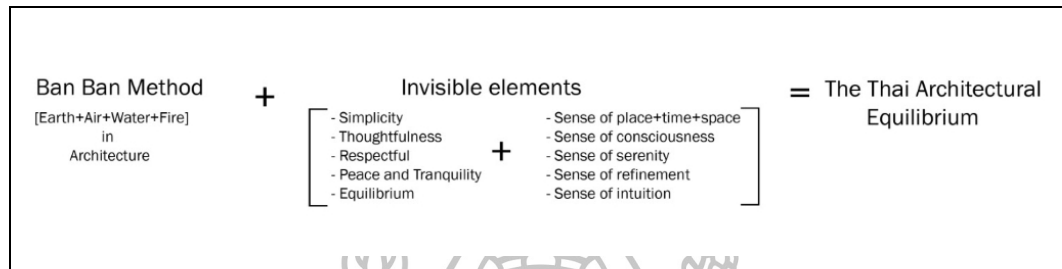


Figure 130 The Design Equation of “The New Thai House”

Sense of Thai house

Generally, human use their eyesight to perceive things at first. And to know thing more clearer they need to use their “sense” which is the recognition methods of perception which are sound, sight, touch, smell, and taste. Senses provide them datas of perception which is mean the ability to know thing. But to understand, they need to be deep in thought.

So is Thai house, to have a profound understanding of the Thai house, eyesight only can not be used to recognize Thai house, cause it can provide the perception of the physical appearance of Thai house only. Then, some senses need to be collaborated with some individual experience in order to understand the Thai house from the insight.

Nevertheless, to develop the ideology of Thai house, there are some “senses of Thai house” that need to be considered before experiencing Thai house as listed below;

1. Sense of place + time + space
2. Sense of consciousness
3. Sense of serenity
4. Sense of refinement
5. Sense of intuition

The sense of Thai house mentioned above are sort of invisible elements that need to be used as a concentration that drives the design to reach the expectation of Thai architectural wisdom.

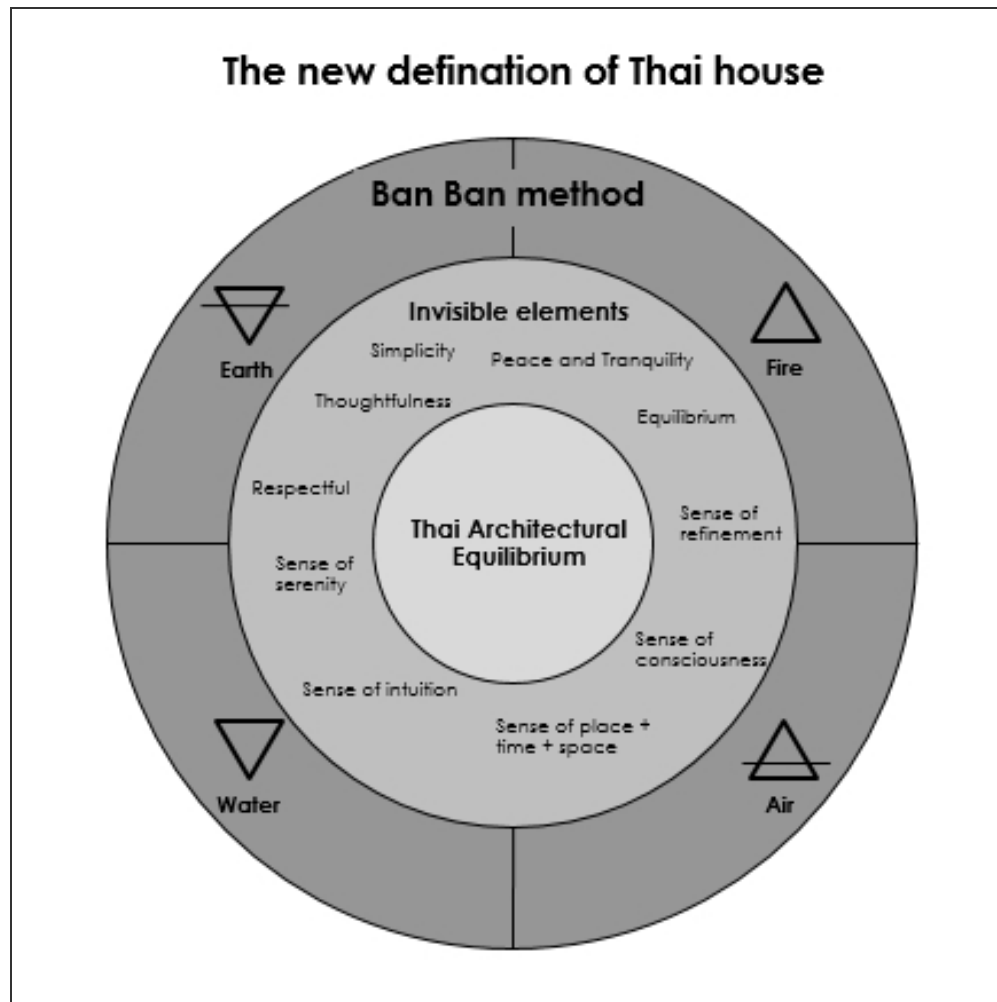


Figure 131 The New Revitalizing the Fundamental Elements Of Thai House Diagramme

Recommendations

As a result of the research, the outcome had derived in a form of Thai architectural ideology. Then an implementation of this found knowledge can be applied in various areas such as in the architectural profession field and the educational field as follow;

Professional field

Influence of the research outcome inspired researcher's way of thinking in many way, especially in the professional field as an architect. Distinctively, in the area of design process where sense of place and sustainability in design projects are crucially concerned consistently

with the programme and some relate contexts in order to create the architecture of place. For example, a design concept of The Pier avenue project in Rayong reflects the ideal of simplicity and the sense of Rayong by combining locality (sense of place and people way of life) with the modernity of architecture as the same oneness.

In addition, some research ideal has been developed from the ability of “Thai architectural wisdom” to be a living product named “MagicBloc”. The used shipping container converted to a small architecture can be used in various purpose. Modularity and mobility have been combined in the Ban Ban method and the outcome is a simple sustainability container architecture which can be installed on site within 6 weeks.

Moreover, there is some possibility to apply the ideal of Ban Ban method in the real estate field. In late 2015, Ban Ban method was presented to a developer in Bangkok, the ideal of utilising Earth, Water, Air, and Fire in the development area in order to create a sense of community in a larger scale.

In summary, the research knowledge and the design method can always be applied in various fields such as architecture, product design, business strategy, urban planing, and etc. This is because not only the research outcome that is discovered but also the method of thinking in deep that totally improve the researcher’s perception successfully.

Educational field

Occasionally, researcher was invited as a guest lecturer, to share some knowledge which had been collected through both as a researcher and architect. The first time was a class of 3rd year design students from the Faculty of Design and Decorative Arts, Silpakorn University, Bangkok. The topic was “The theory of Thai vernacular architecture in modern design context” which was directly related to the research. The beginning of Thai vernacular architecture and its development through time was shared briefly before the point of using the local materials such as “Bamboo” in the modern design context was raised, followed with questions.

Second one, after Ban Ban method had won the competition of the Low carbon house design contest in 2011, the design was adopt by the faculty of Architecture Chulalongkorn University and responsible for a set of architectural drawing as a prototype for all Subdistrict Administrative Organization (SAO). The Ban Ban method was presented to all SAO

representatives for them to understand how the method worked before handing the design prototype to all SAO office countrywide.

The last one was a conference hosted by Silpakorn University, researcher and others were selected as representatives in the Ph.D. programmes in Arts of Silpakorn University. Each researcher presented their research individually to the Board of Graduate School of Silpakorn University and the Board of Thailand Research Fund (TRF) in order to present some research potentiality of Arts students that also impact to the sociality as equally as scientific researches.

In summary, the study of Thai architectural wisdom is a lifetime study because it is related to “people” which mean “change”. Then when people change, architecture change, and theory and the study have to be changed.

Future research suggestion

There always are questions about “Thai house” and its development and its conservation whether in terms of its form or its philosophy awaiting for answers. Even though, there is neither exact right nor wrong, in the researcher’s opinion, Thai house is a “timeless beauty” based on the assumption of both conservative based and progressive based. However, to develop the ideal of Thai house, all of those essential elements and the sense of Thai house refined from this research should be taken into consideration instead of Thai architectural form and ornaments. And once the ideal of Thai architectural wisdom is perceived, there will be the unlimited directions to apply and conserve Thai architectural philosophy sustainably.

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