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Master's Thesis of Architecture

**A Study on the Problems of Altering
Lao Traditional Houses in ZPP-Ua Zone,
Luang Prabang World Heritage Site, Lao PDR**

라오스 루아프라방 세계 유산 대상지 ZPP-Ua 지역의
민가 개량 문제에 관한 연구

February 2018

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**A Study on the Problems of Altering
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Abstract

A Study on the Problems of Altering Lao Traditional Houses in ZPP-Ua Zone, Luang Prabang World Heritage Site, Lao PDR

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As globalization has caused a dramatic change in social economic and cultural areas in the past several decades, the urban environments have also been influenced by global trends as people attempt to adjust their housing designs and construction methods to fit their new needs and desires. This study takes place in Luang Prabang which is considered as an unique ancient city in Laos and Luang Prabang has been named by UNESCO as the first world heritage site in Laos since 1995. Luang Prabang city is rich in both tangible and intangible cultural assets which perfectly reflect traditional customs and cultures continuously inherited over many generations. The main objectives of this study is examine on some significant purposes of various problems that affect the designate Lao traditional houses during three periods including the beginning era of Lao traditional house, French colonized era and transformation houses in the modern.

In addition, this study also provides a glimpse of the cultural living styles and characteristic features of Lao traditional houses in Luang Prabang. Particularly, the architectural elements, materials and main structures of the building which are commonly used in Lao traditional architecture, their functions, and purposes of modifying traditional houses for adapting to the changes of local climate. The harmonious combination of Lao traditional and French architecture during French colonized period as a demonstrated the new values and a prosperity of the city. These unique architectural and construction styles have become valuable and outstanding

identities of World Heritage site in Luang Prabang. Because of this, the styles of this accommodations, buildings and their identities have been conserving until recent days. However, there are still a lot of changes and adaptations in some ancient buildings which are influenced by the needs of socio-economic development factors.

After Luang Prabang city become a world heritage site and the traditional houses have been pressured by the growth of socio-economic needs, the pace of change has accelerated. This study also emphasizes on finding out the main reasons for transformation and modification in traditional houses of Lao people and their influencing factors on transforming or adapting traditional houses for fitting in the globalization trend. In this study, it directly examines on conserving the characteristics of traditional houses and case studies of traditional houses in Luang Prabang are also taken into the research in order to find out and identify the modification and transformation through each period especially elements, components and the basic spatial formation in modifying and transforming traditional houses in Luang Prabang.

The study reveals that there is a transformation and modification in traditional houses because of some significant factors. The globalized trend, regulations, socio-economic factors are main causes in this transformation and modification in traditional houses in Luang Prabang city. The study case also specifically reveals that the changes in traditional houses are influenced and motivated by economic benefits which is an important income generating source for low and middle-income residents in Luang Prabang as well as the growing demand of accommodation of local residents. Additionally, the study shows that the new styles of accommodation and living space are designed and modified based on general functions in daily life which have combined people needs and conserving characteristics of traditional houses during the transitional period.

Keywords: Luang Prabang World Heritage, Lao Traditional House, Modifying of the Lao Traditional Houses in ZPP-Ua Zone, Sustainability in Architecture

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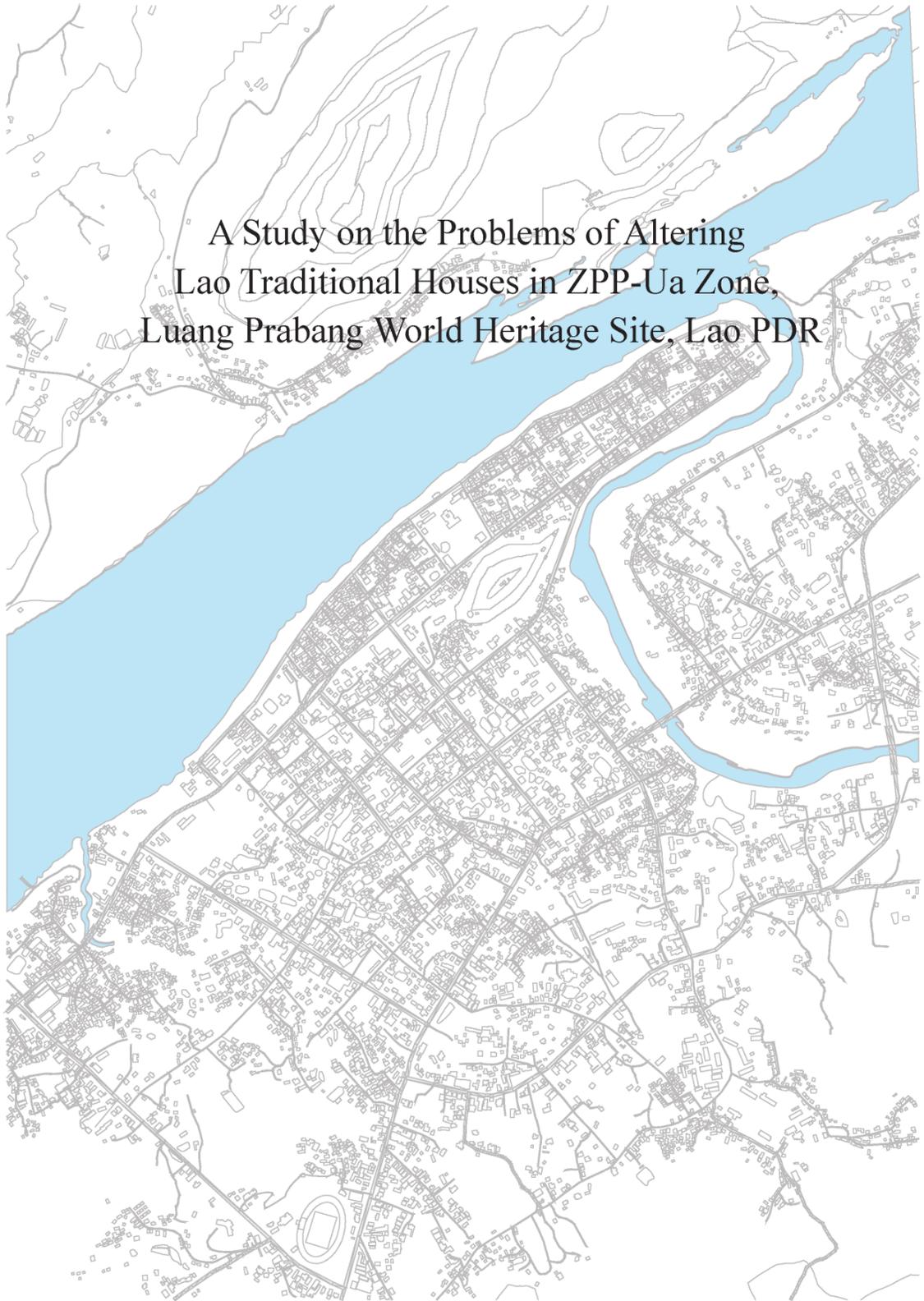
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A Study on the Problems of Altering
Lao Traditional Houses in ZPP-Ua Zone,
Luang Prabang World Heritage Site, Lao PDR



1. Introduction

1.1 Preface

Luang Prabang city, lying at the center of a beautiful mountainous region, is one of the 12 districts in Luang Prabang province and also it is a beautiful city, which is located in the northern part of Laos. Luang Prabang in 1995 is elected to be as the World Heritage site by approving United Nations Educational, Scientific, and Cultural Organization (UNESCO)¹. This town has several heritage sites especially keeping traditional Lao lifestyle and traditional heritage of cultural architectures such as temples and houses. Recently, this town declared that Luang Prabang city is a popular city in Southeast Asia region under location, lifestyles, cultures, zone natural city, Lao traditional architecture with 19th and 20th century Lao-French combining architecture style making the proportion of worldwide tourist has known and increase in the tourism sector and also coming do various investment in this city². Consequently, this city quickly has developed the sector of tourism and socio-economy steadily. At the same time, Luang Prabang world heritage area obviously is affected by alteration of the city environment, socio-culture, especially lifestyle and traditional architecture causing physical loss based the modern lifestyles³. In this case, Luang Prabang city has been experiencing a wide range of challenges from a quick development in socio-economy especially development in urban landscape which is enormously transformed and improved in a short period of time⁴. These transformations generally correspond to alteration in the societal characteristics from one that is based on trust to one that is based on exploitative socio-economic relationship⁵.

The implementation of sustainable development strategies are necessary for future development. The significant effort is being made for cooperation between communities and authorities, especially local people both present and in the future to ensure human well-being, demand relating to population and environment. Furthermore, sustainable architecture with eco-friendly is one of the main objectives of human to create a better life has made the ultimate model for whole their activities.

¹ Reeves, K., & Long, C. (2011).

² Di Giovine, M. A. (2008).

³ Saleh, M. A. E. (1998).

⁴ Leong, C., Takada, J. I., & Yamaguchi, S. (2016).

⁵ Glassie, H. (1990).

On the other hand, development requirements regularly argue about conservation requirements⁶. There are many cultural architectures in the world heritage region that design for their own demand and also does not comply with conservation regulations, for instance, renovation, addition, and restoration. As the same another heritage site, the modification of false architecture in the Luang Prabang World Heritage site is able to risk on their own as well as the socio-economic development is able to transfer building functions, especially unique characteristics of tradition house by renovation and demolition which has a risk to the town environment such as the physical architecture, the daily-life etc. and if these environmental factors has gone, it will destroy and eliminate the identities of Luang Prabang and these failures may lead to falling out from UNESCO World Heritage Site's list of Luang Prabang⁷.

Recently, Luang Prabang World Heritage site issued an urgent warning about possible loss of world heritage sites⁸. Thus, conservation and protection relating sustainable development have to be important for world heritage region in the future. While it is necessary for this heritage site to promote action plans and policies for sustainable development in order to use the heritage values for the local community and develop the knowledge and skills on modifying the usage space, building shapes, original material, sustainable developmental system, and policies. These Knowledge and skills will be an optimal approach for protecting the modification of cultural, environmental and technological development in the future. According to UNESCO's system, cultural heritage divided into 2 categories including Tangible and Intangible Heritage. living cultural heritage or intangible cultural heritage generally include illustrating arts, oral traditions and expressions, rituals, festive events, traditional craftsmanship and practices, social practices and knowledge relating to nature⁹.

⁶ Imon, S. S. (2008).

⁷ Mydans, S. (2008).

⁸ Boccardi, G., & Logan, W. (2008).

⁹ UNESCO (2003).

1.2 Transformation Process of Lao Traditional House in Luang Prabang

Lao traditional architecture has a long history. Its characteristics are based on Buddhism. Buddhist temples across Laos have a strong influence on the pattern of Lao traditions, painting, sculpture, arts, and lifestyle of the Lao people. Bypassing many phases, however, traditional constructions have been damaged in the past. But recently what remain as unique traditional heritage is rich among Asian countries. The history of Lao traditional architecture initiated an era of Lan Xang Kingdom in the thirteenth century. Lao traditional architecture was divided into fourth periods: The original Lao house as the architecture of Lane Xang Kingdom (1353 – 1695) established in the 14th century. In this period, Lao traditional house was influenced by natural environmental and social culture; French colonial architecture (1983-1953) is the first phase for changing Lao traditions, especially traditional architecture, and lifestyle. In this period, Lao traditional architecture and social culture have an influence on French style.

In the second phase of Lao traditional architecture (1953-1995), some building has changing pattern influenced by Soviet, China, and American in this period. In the period (1995-present), the advent of Chinatanakhan Mai (New Imagination) and the New Economic Mechanism (NEM), new office and apartments appeared throughout the main city of Lao PDR. At this time, Luang Prabang City was entered to World Heritage List. And also, the popularity of the ubiquitous 'Greco-Roman Ranch' style house is highly influenced by neighboring, especially Thailand. This popularity has affected the construction of Lao traditional house decreased steadily in urban centers.

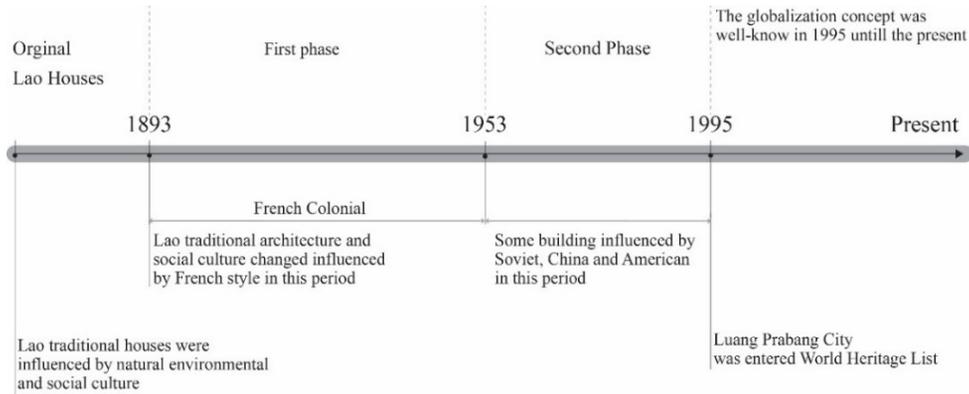


Fig.1- 1 Transformation Process of Lao Traditional House of Luang Prabang

Source: Author

1.3 Lao Traditional House in Luang Prabang City

Based on a long history of Luang Prabang city, the traditional houses are built from wood on posts which embed from the ground. This is the ancient architectural heritage of Lao traditional houses. Traditional wooden houses were built high on hardwood posts and created with soft materials such as woven bamboo or wood¹⁰. The traditional house of Lao people is often built by finely-carved wood and above from ground with hardwood stilts which embed on the stones or ground¹¹. Moreover, Lao traditional house was commonly built in rectangle shape and the roof was made and covered by bamboo or salient thatch and the kitchen was attached to the side of main building. The roof has high gables improved ventilation and long projecting eaves for raining protection. In addition, the ground floor was benefited space, which floor provided security, useful work-storage place and very good place to stay. Furthermore, some report stated that ground floor was used for storing agricultural goods, fire wood and household animals¹².

The masonry structure and traditional houses which are made by wood were constructed on the ground and the ground is leveled to balance the house and all the works were helped by villagers. Both types of architectural systems were found throughout Southeast Asia, especially in Luang Prabang, the world heritage city of

¹⁰ Jeffrey, H. (2008).

¹¹ Clement-Charpentier, S. (1989).

¹² Ahunbay, Z., Ayrancilar, T., Polat, A., & Uray, A. (2014).

Laos. They were existed in harmony and corresponded to their respective land-based background sources and water. Water was based on culture and influenced architecture where it was very suitable and harmonious for an environment which river and rain are dominated, whereas land was based on an architecture such as local and monarchy functions, structures associated with religions which are formal or classic has been gradually adopted and come to be known in the area.



Fig.1- 2 Luang Prabang Traditional Houses

Source: Author

By the early 20th century, French colonial building styles influenced Lao local traditional structures as shown in the current architectural buildings and landscape of Luang Prabang. The buildings were built with an adaptation to tropical climate conditions such as official residences and administration buildings were built with thick-walled by utilizing bricks and stuccos with wooden shuttered windows and pitched tile roofs. The buildings were combined with Lao local traditional structures and French styles. Besides the French historical colonial influenced structures, other foreign structures were also had been influenced. For instance, some shop-houses are also influenced by Chinese housing style. This is also listed as one interesting part of architectural heritage of Luang Prabang.

1.4 Luang Prabang World Heritage Site

Luang Prabang is an aged and ancient town in Lao PDR. This city is resourceful, intangible and tangible values. The various remarkable values comprise colonial and traditional architecture, urban and natural landscape with mountain, ponds, and rivers. Furthermore, the city has numerous traditional customs, cultural arts, and handicrafts, language, food, rituals, festivals etc. Based on these reasons, it was assigned in 1995 to be the first World Heritage City of Laos. Luang Prabang city Heritage zone is selected to be World Heritage Site by approving from UNESCO based on three in ten criteria of cultural heritage site following.

“ii) to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design.

iv) to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.

vi) to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change”¹³.

¹³ Organisation, C. (2008).

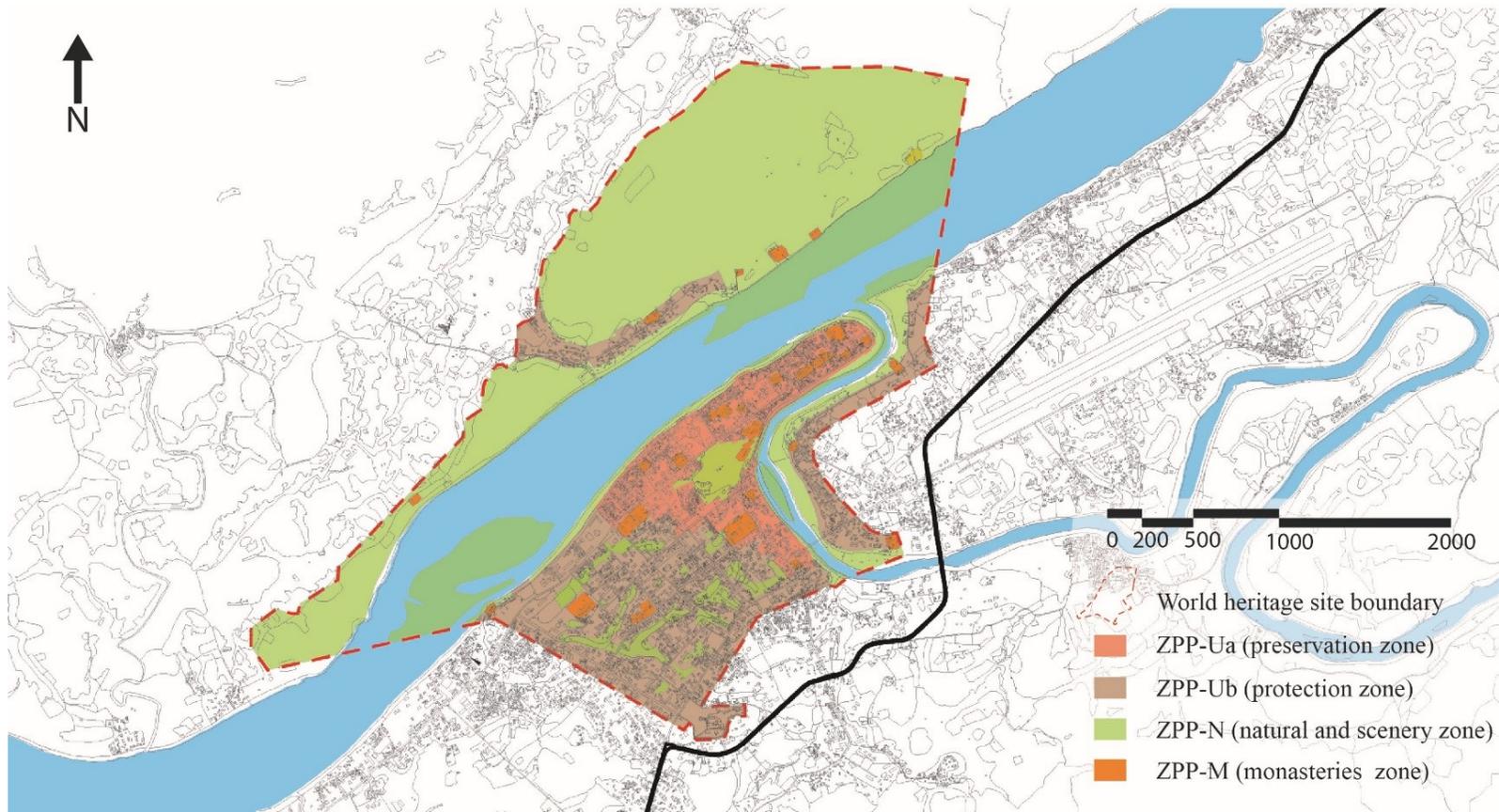


Fig.1- 3 Luang Prabang World Heritage Site

Source: Author

With the PSMV regulation system, Luang Prabang World Heritage site is divided into four main zones as shown in (Fig.1-2) including Monasteries (Secteur des Monastères – ZPP-M, 16.43 ha), Protected Zone (Secteur protégé – ZPP-Ub, 151.32 ha), Safeguarded Zone (Secteur sauvegardé – ZPP-Ua, 67.12 ha) and Natural and Landscape Zone (Secteur naturel et Paysage – ZPP-N, 545.66 ha)¹⁴. The site has a total of 611 buildings, 26 villages and 183 protected wetlands which are registered as the World heritages by UNESCO. The buildings or houses consist of Chinese-style shophouses, Lao traditional houses, main Buddhist temples and French-influenced administration buildings¹⁵.

1.4.1 Typology of Luang Prabang Traditional House in ZPP-Ua Zone

The dwellings in Luang Prabang town that was interspersed at the Mekong River, Khan Riverbank and main road beside of the city center. That was shown the simple beauty and owned characteristics of architecture for preserving the integrity of the built heritage and local building traditions such as traditional materials (wood, brick, tile and local ceramic), Structure, technical construction and the diverse of elemental decorations. In addition, to show the civilization and incorporating between Lao traditional architecture and west architecture of colonist era that is outstanding universal value.

Luang Prabang city has various building types which have the different characteristics, especially unique traditional architecture, Lao-France incorporating and colonial style. Thus, they were divided based on the patterns of roof style and material employment as shown in (Fig.1.4). Moreover, roof styles have four types like House with separate kitchen, Single roof, Double roof, and Single roof with veranda.

¹⁴ Maison du Patrimoine. (2002).

¹⁵ de la Péninsule, A. (2004).

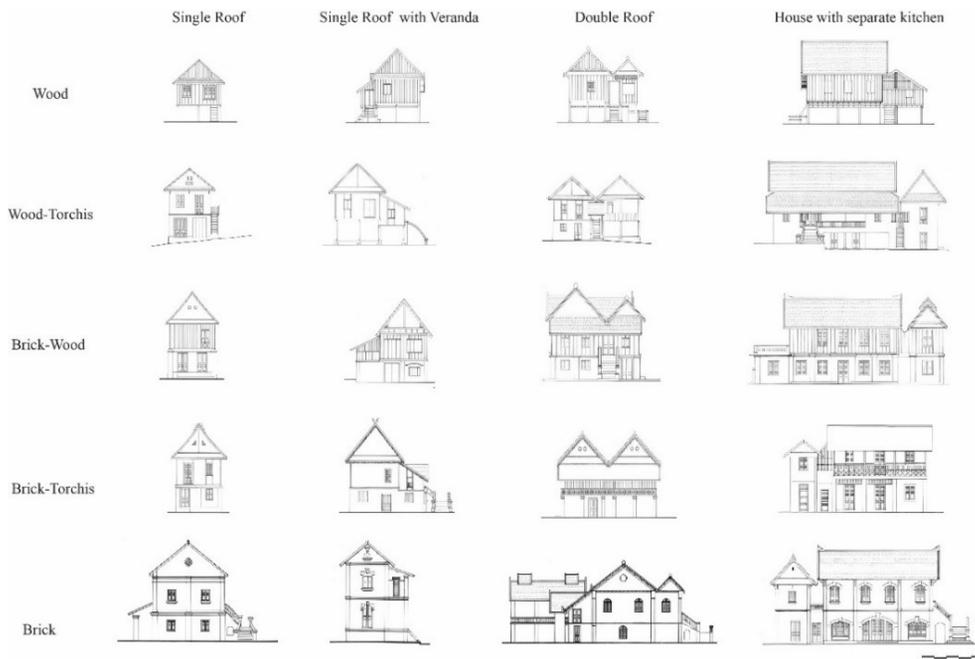


Fig.1- 4 Typology of Lao Traditional House

Source: Department of Luang Prabang World Heritage Site

A. Single roof

A small and the oldest ancient house with has no veranda inside the house. The house has no separated room, it is meant that there is just only one room, but including living room, bedroom, kitchen, and activities can be conducted for any occasion. The house is covered by a single roof. Moreover, original houses in Luang Prabang town had fireplace into the house. This building was built the wall and floor by bamboo, and a part of the roof was by grass mono-leaf¹⁶. In modern day, this type of house can be seen just only a small number in ZPP-Ua zone; due to the expand more spaces for family members and commercial purposes.

¹⁶ Charpentier, S. (1975).

B. Single Roof with Veranda (Heuan Zia)

Generally, the characteristics of Lao traditional house, a small area is built covering the single roof with veranda called Heuan Zia as shown in (Figure1-4). The construction of Heuan Zia includes a single gable roof with a veranda which its extended area is built by linking and paralleling with the main house. The veranda area is lower and smaller than the main house which its built roof is lower than the main house roof having a function for protecting sun-heat and rain and with another hand, the veranda's function is used as a footpath to get to the kitchen or other places within the main house. Moreover, the veranda is an open area for relaxation which its every side of veranda consists of the wooden handrail. In that area, veranda has a stair covering by a roof to go up and down and also veranda area can be used as a footpath to get to the main house.

C. Double roof

This kind of houses have two buildings with separate roof and sometimes the buildings are in same or minor different size. The smaller building is called sub-building which is an open and spacious area suitable for relaxing. And the other building is called main building. It is a closed area that usually serves as a bedroom. The indoor open space is spacious and contains no stuff.

D. House with separate kitchen

It is a building that is developed from single-building house or veranda house. This house has a veranda that serves as a kitchen that makes it more convenient as the smoke from cooking cannot reach the main building. This kitchen is also simply built.

1.5 Problems of Traditional House in Luang Prabang City

Heritage house had been originated via UNESCO-Region Centre-Ville de Chinon Project since 1996. This is a main organization for preserving heritage houses or Lao traditional houses in Luang Prabang city. and then it was changed the name to Department of World Heritage in 2009¹⁷. Currently, a specific threat to the modifying Lao traditional house in Luang Prabang is the loss of “living heritage”. The reason is that some local residents or local communities are automatically forced to move out from the central city to the suburb of the city when the central of Luang Prabang city has been filling up by non-local business people and tourists¹⁸. There are a number of reason that force local people to move out from the city. One of those reasons is environmental degradation or problem which is caused by city expansion and development. Because of a rapid increase in property values in the city, local people choose to sell their property in the city at high price and buy cheaper one in the suburb areas. In fact, Heritage conservation regulation is another reason to force local residents to move out from Luang Prabang. The reason is that some owners of traditional houses cannot afford all maintaining cost or failing in maintaining heritage structure of the houses which is required by Heritage House organization. In some cases, structure’s owners of wooden houses cannot afford the cost of restoration. UNESCO will support all budget for purchasing some expensive traditional materials for building construction or restoration but those houses or building will be used by UNESCO for its own purpose up to 15 years before returning to their original owners¹⁹.

Moreover, another threat to the conserving traditional building houses and techniques is that modern houses are built to replace traditional buildings or houses instead of restoring the original traditional houses²⁰. There are some cases that even though old and ancient houses are retain and rebuilt again, there is still some less

¹⁷ Bushell, R., & Staiff, R. (2012)

¹⁸ Yamaguchi, S., Takada, J., & Leong, C. (2009).

¹⁹ Ackhavong, C. (2008)

²⁰ Boccardi, G., & Logan, W. (2007).

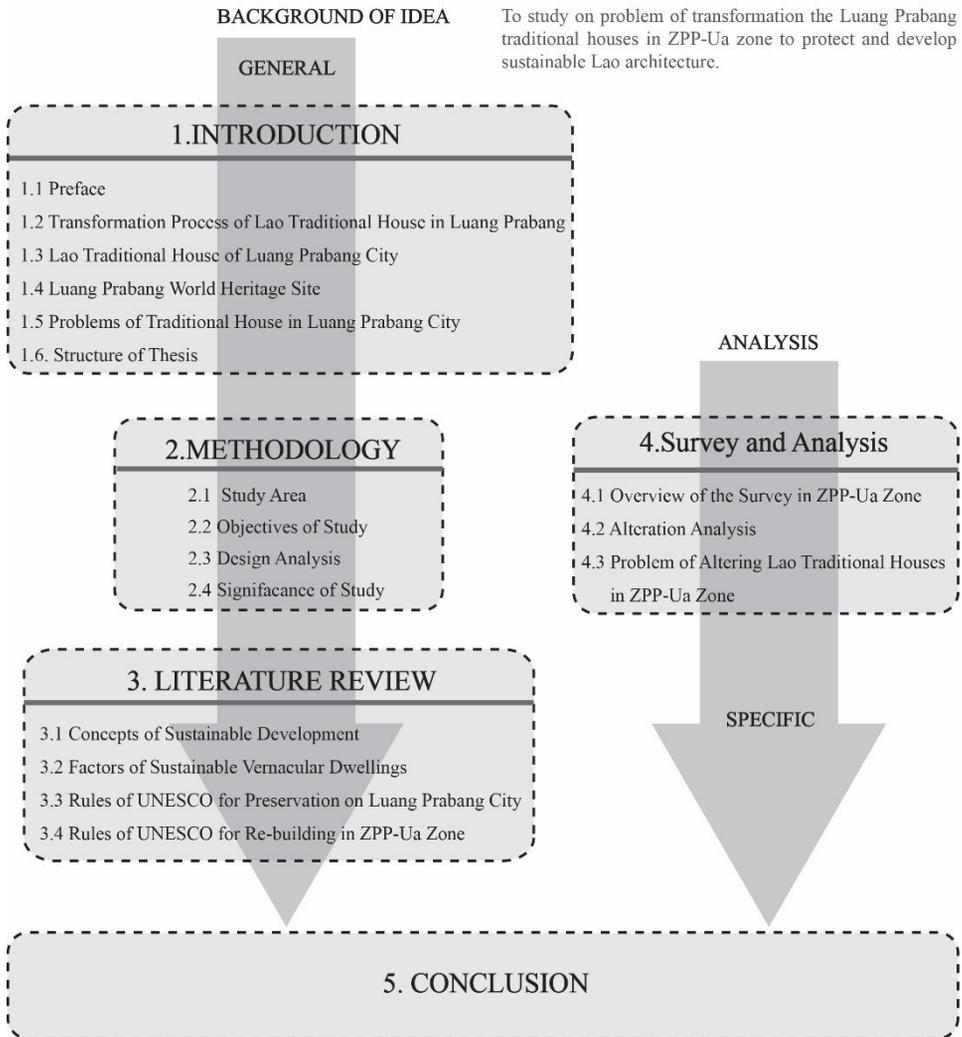
noticeable threats to traditional livelihoods of traditional houses or buildings. The traditional houses and construction has been built through generation to generation through adaptation of livelihood of local people. When the World Heritage suddenly registers the traditional houses or buildings as a part of heritage site, the alternation or adaptation of traditional houses or buildings are not allowed. This also obstructs the evolution of traditional houses and construction. The reason is that the altering and adapting traditional or ancient houses do not comply with the criteria of heritage conservation.

Therefore, this study is to study on the problem of transforming the pattern of traditional houses in Luang Prabang based on the Safeguarding and Valorization Plan, recording characteristics of urban heritage and architectural techniques of Luang Prabang city. According to some parts of Safeguarding and Valorization Plan, the authority of Luang Prabang recognized a number of spaces where to develop is significant while this town has been struggling to grow and face many challenges. There are some problems in preserving traditional houses and heritage buildings in Luang Prabang including lack of coordination among concerning authorities, low capability in managing system, and lack of efficient distributing information channels²¹.

Vernacular houses dealt with the climate in sustainable ways. Recent modifications have made many of these vernacular houses less sustainable, causing greater dependence on also conditioning, and bring the buildings more vulnerable to flooding. By carefully implementing UNESCO guideline, new changes can become more sustainable and more integrated with traditional ways of building.

²¹ Yamaguchi, Y., & Vaggione, P. (2008)

1.6 Structure of Thesis



2. Research Methodology

In order to reach these study objectives, the following procedures put in practice. The first part of this study is the literature review which provides a basic knowledge of traditional architecture's characteristics and some relating theories on global potentials, socio-economic aspect, and political functions. These will generate a basic knowledge regarding the current situation and physical transformations of Lao traditional houses in the Luang Prabang world heritage site is influenced by socio-economic feature, political and globalization aspects.

In second part, this research is about the site which is selected and examined in the study. The research was conducted on ZPP-Ua zone of Luang Prabang World Heritage site where is discussed to be ancient town of Laos. The ZPP-Ua zone expresses a significant local exchange of people values over periods of time within a cultural architectural in regions and the world. In addition, the second-hand data source and the information of direct observation of 10 traditional houses in ZPP-Ua zone are also explained in this part. These information and data sources will be able to provide overall picture and clear perspective on current situation of traditional houses in Luang Prabang

The third part is related to the data collection methodology. The data is basically collected by taking photographs, sketching, and measuring the targeted houses in order to examine the patterns of the construction, function, and materials. Additionally, a face-to-face interview is also used based on the procedure of site survey. This part can contribute to making documentation relating to problems in the cultural heritage conservation in Luang Prabang. The data collection of a traditional house in ZPP-Ua zone carried out by the survey questionnaires which can identify Lao original traditional house and after the traditional house is renovated in order to serve the purpose of supplying housing demand, commercial benefits as well as generating income source from rental service since 1999.

2.1 Study Area

In this study, the ZPP-Ua zone was selected to be a case study about the problem of modifying the Lao traditional house in the Luang Prabang city. Luang Prabang city is the central city of socio-economy, culture and public administration of Luang Prabang Province. This city is site at junction area between Mekong and Nam Khan Rivers. The natural landscape of ZPP-Ua zone as shown in (Fig. 2.1) has a high beautiful mountain in the center of the town named Phousi mountain where on the top can be seen wonderful views around the town. The climate of Luang Prabang province is generally similar to Lao PDR weather as a tropical monsoon climate. Laos has a tropical climate, which is affected by the southeast monsoon that causes important rainfall and high moisture. The climate characteristic is subdivided into two different seasons: dry season (mid-October to April), followed by rainy season (May to mid-October). Mostly, average temperatures of the country in the plateaus such as the eastern and northern mountainous regions are 20°C, especially in the plains 25-27°C. Inhere, the average annual rainfall is generally approximately 1,300 – 3,000 mm²². Preserving cultural heritage sites commonly comprises artifacts, house areas, structures and cultural regions, beautiful, architectural, historic or important nature environmentally (areas of traditional houses and cultural heritage), natural feature precincts of environmental importance or the sites of scenically attractiveness.

This study does not concentrate on general heritage but mostly focuses on the traditional house and its environment. The socio-economic viewpoint is also discussed but it is not main point of study. For instance, mentions on preservation impact on local economy but environment of a traditional house is considered as the main emphasis in the study.

The ZPP-Ua zone of World Heritage site is one of most representatives of tourism zones of Luang Prabang. This study is not cover overall heritage zones of Luang Prabang city, but in case of the ZPP-Ua zone of World Heritage site is some features and characteristics as same as other heritage sites.

²² Lao, PDR. (2009)

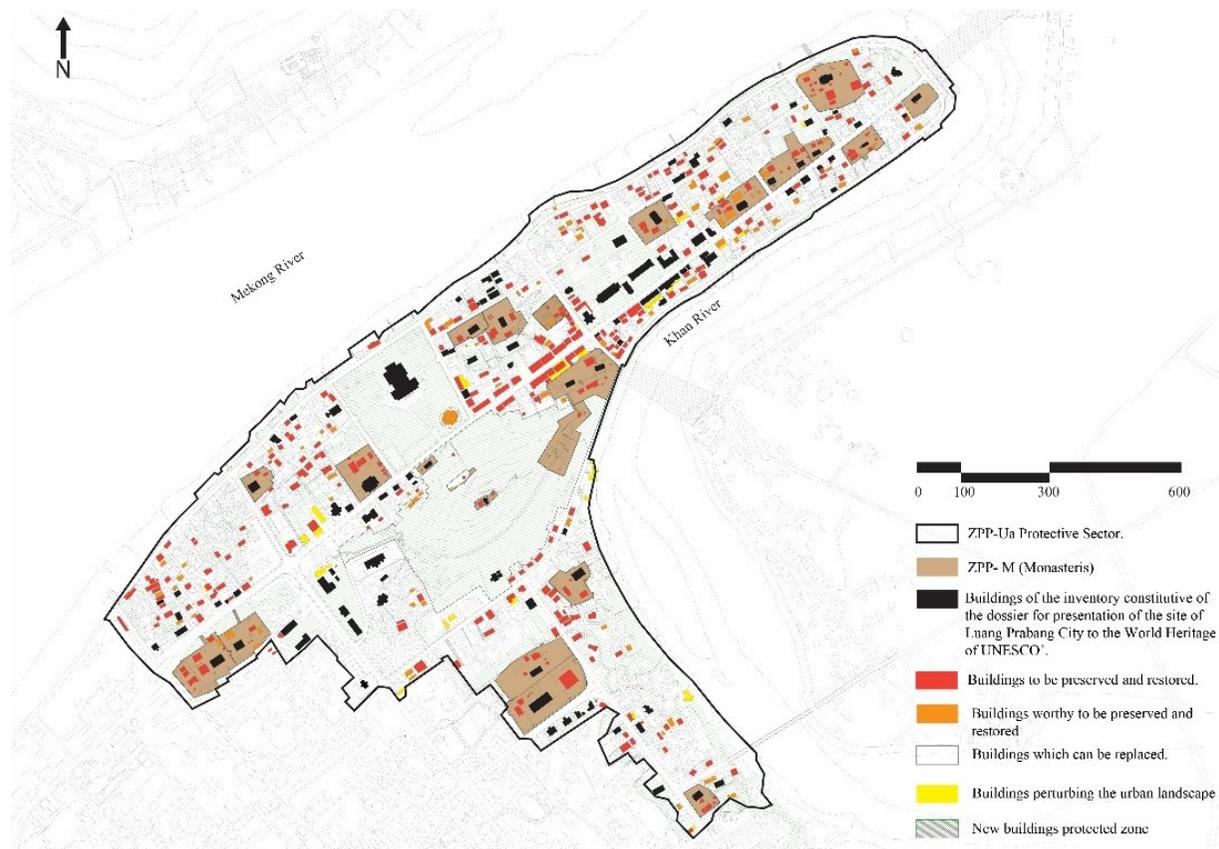


Fig.2- 1 ZPP-Ua Zone, Luang Prabang World Heritage Site

Source: Author

Namely, this study covers buildings of traditional heritage of ZPP-Ua zone in World Heritage site including houses, temples, shops, the surrounding environment, and public buildings. Therefore, the scope of this study will only stick to the zone of ZPP-Ua (Major Administrative Area). The dissertation will focus on four types of building which consist of residential, business house, hotel, and restaurant. The dataset was acquired via field survey and Department of Luang Prabang World Heritage Site was selected to be studied in this dissertation. The ZPP-Ua zone exhibits its own beautiful of Lao unique cultural and traditional architecture based on its structure of traditional materials, technical construction.

2.2 Study Objectives

Main aim of this study is to understand problems of modifying Lao traditional house in World Heritage site of Luang Prabang. World Heritage site of Luang Prabang city is divided into four main zones based on land-use provision regulation and complex regulatory systems including Natural and Landscape Zone (ZPP-N), Monasteries (ZPP-M), Safeguarded Zone (ZPP-Ua) and Protected Zone (ZPP-Ub). Heritage site of Luang Prabang City was registered to be World Heritage site by approving from UNESCO based on three in 10 criteria of World Heritage site in 1995. Apart from criteria, how listed traditional architectural site assigned for demonstrating significant qualities of authenticity, and it expected scope of heritage property trustfully and realistically exhibits its Outstanding Universal Values and uniqueness. In this research, the ZPP-Ua zone is selected to be the case study due to this zone is the area where it has various ancient traditional architecture, especially Lao traditional origination having a long history and it is very important to conserve the distinction and uniqueness of historical and architectural characteristics of this ancient city. Once more, how differentiates between distinctive housing types and zones of traditional houses in Luang Prabang will be taken into the study and so on. The study will focus on three main elements of the building based on datasets collections including structures, functions, and materials.

2.3 Design Analysis

In this section, the design of ZPP-Ua zone analysis regarding the transformation of Lao traditional house in Luang Prabang city. In this study focus on the analysis of architectural elements of the building including function, structure, materials, and diagram. The acquired data set is divided into four categories following hotel, residential, commercial and restaurant.

These datasets include 2 types, for instance, the first type is primary data which based on a field survey in the ZPP-Ua zone and the secondary data is obtained from theories, paper, and journals. In addition to the process of analysis on the problem of modifying Lao traditional house is needed other factor (religion and wisdom) of local people for indicating the main point which is a major condition for changing pattern of traditional building in the present.

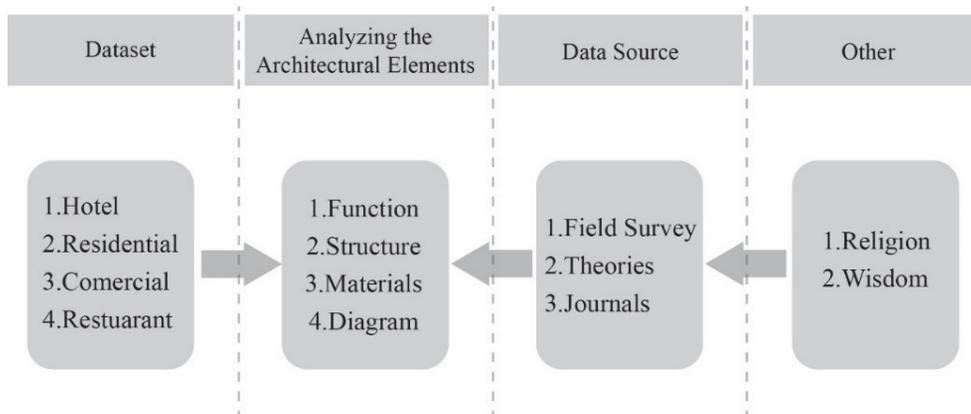


Fig.2- 2 Process of analyzing dataset

Source: Author

2.4 Significance of Study

The significance of this study is from the historical significance of traditional houses of Luang Prabang ancient city. The heritage or traditional house of Luang Prabang ancient city is an interesting example of making a further study. Because of this, the ancient city considered to be one of most outstanding tourist destinations,

and one of most wonderful cities of world heritage site in terms of culture. This place has been accepted and recognized by many significant international organizations, especially from organization of World Heritage Cities and United Nations Educational, Scientific and Cultural Organization (UNESCO). UNESCO declared this old city of Luang Prabang to be cultural heritage city and protected area by organization since 1995 (UNESCO, 1995). The significance of this study, moreover, emphasizes on design of heritage buildings and old city such as a traditional house which makes the old city of Luang Prabang significance for researching its Lao traditional house based on the criteria of cultural heritage. The architecture of heritage houses and old city is focused on preserving and protecting Lao traditional house in Luang Prabang city.

According to Yamaguchi et al., (2009)²³, most of the people move out their houses in the ZPP-Ua zone of Luang Prabang city and transfer to another part of cities, because of the material of house building. This study is significant because it highlights on heritage preservation which generates important revenues to the economic status. According to the literature, revenues of the conservation of the traditional house in ZPP-Ua zone are many. Economic revenues are respected one of them. Numerous studies approved that preservation of traditional history provides important revenues to the economy. In other words, these researchers indicated that preservation of traditional history is discussed to be tool of socio-economic development. Specifically, it gives important revenues to the economy. For instance, Wittayapak (2010)²⁴ compared the concerned costs of traditional house preservation versus new house construction and found out traditional house preservation is able to make more economic sense than new house construction.

Another research by Kellett & Tipple (2000)²⁵ where the scholars obtained the same conclusion by Tarekegn (2000)²⁶. Researchers found that in many cases; it is more proficient and beneficial to conserve house of traditional history than build a

²³ Yamaguchi et al., (2009)

²⁴ Wittayapak, C. (2010).

²⁵ Kellett, P., & Tipple, A. G. (2000)

²⁶ Tarekegn, E. A. (2000)

new house. Furthermore, Tourism Development Department (2012)²⁷ reported (based on an economic study carried out by Luang Prabang Provincial Tourism Office (2006)²⁸ started, "researchers across the country have indicated that conservation of traditional historic value performs as a very powerful economic tool which can generate tens thousands of new jobs in local area and create important household income for local people. On the basic approach, the study is considered as a very significant source because it will be able to contribute to supporting and developing tourism industry and architectural advantage of the traditional heritage through re-applying them and creating a job opportunity. The study significance represents similarly to its main objective. According to discussion, this study tries to develop effective conserving guidelines for traditional houses and cultural heritage in Luang Prabang city. In accordance with the literature, preservation guidelines should develop to control modifications by working preservation on traditional houses of cultural heritage and to protect random preservation works that lead to deterioration of the traditional houses of cultural heritage. A study by UNESCO (2002)²⁹ confirmed that problem of guidance of maintaining traditional houses in cultural heritage, for instance, reaching the official demobilization or addition or alteration or demolition of supplement of traditional heritage house are very significant. Accordingly, guidelines of preservation certify a good method of conserve traditional heritage house. In addition, it is a good tool to prevent zones of heritage presentation. Consequently, this study is respected that it is very significantly.

²⁷ Tourism Development Department (2012)

²⁸ Luang Prabang Provincial Tourism Office (2006)

²⁹ UNESCO. (2002).

3. Literature Review

3.1 Concepts of Sustainable Development

The major architectural movements and environmental prevention began in the 19th century, researchers who are originators of sustainable architecture as Richard Latabi, William Morris, and John Ruskin. In the book namely “*The Seven Lamps of Architecture*” of Ruskin said harmonic sequence initiated in nature, it can be simulated to reach new progress of growth. Morris recommended self-sufficiency can contribute to returning the green area to suburbs and revitalize local industries. Latabi stated his one of research papers of architects should be invited to appreciate natural beauty and its convention. Based on these originators who have shown a close relationship between nature and architecture and the significance of nature in architecture, the most suitable word to describe these ideas might be sustainable architecture. Years afterward, other architects, for instance, Peter Eisenman, Frank Lloyd Wright, and others had continued to make more deep studies and expand these originators’ ideas. The houses should be designed based on the pattern of sustainable architecture and opposed to repair old houses. Based on Richard Rogers, the world ecosystems will be directly impacted by weaknesses and strengths of a house.

Based on commission of Brundtland, sustainable development is type of development which can meet with the requirements of current development and this development does not diminish the capability of the next generations in developing or using resources. Sustainable development is the development process to improve local people’s living standards meanwhile socio-economic development is satisfied and environment and natural resources can be preserved for the future generations. There is a common definition for sustainable development which ecosystems and human health are considered as main course of the development in order to make sure that the future generations can also meet their needs. Because of the objectives of sustainable development, environmental problems and the close relationship between nature and architecture that challenges the future of human existence have been encouraging architects put more efforts in finding solutions.

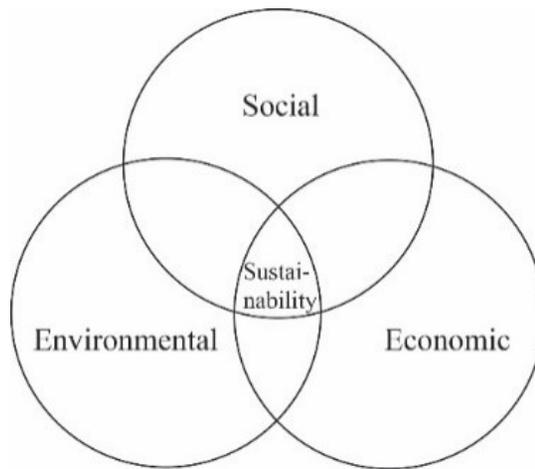


Fig.3- 1 Graph of sustainable development indicators

Source: Loo & Mahdavinejad (2017)³⁰.

The concept of sustainable development has emerged in 1970s as the result of acknowledgements in global environmental problems and environmental movement in 1960s and the publication of some academic paper such as ‘limitations of growth’. And then the first conference on Development and Environment organized by United Nations was held in Stockholm in 1972. In terms of lexical meaning, Sustainability means ‘can continue in the future’. Additionally, sustainable development’s concept can be possibly explained in several different ways but main idea of sustainable development is development which is able to balance between socio-economic requirements and environment. Currently, worldwide building companies are competing in finding newer sustainable methods and techniques. Mostly, hundred percent of residents do their buildings based on air-tight. They use the large mechanical device to disclose their accommodations. These inclinations are infallible and they are indicating the human endeavor to reduce the environmental traces which human left. So, the definition of the concept of sustainable architecture should still keep in minds, it does not just refer to individual building but it includes all processes and life cycle of the building such as construction, design, sourcing

³⁰ Loo, L. D., & Mahdavinejad, M. (2017).

materials, site selection, decoration, work operation and decommissioning³¹. The concept of sustainable development is a development which accords the current requirements without impact on human's ability in future to respond their own requirements³². The environment currently is polluted and degraded by unsustainable development. As a result, there are many constraints and social inequality which limit perpetual growth in terms of practice³³.

Based on the report of United Nations Environment Programme (UNEP), global effect of buildings environment is following: 1/3 of global GHG emissions are from building sector; 40% of global energy utilize; 40% of waste produced by volume; 25% of global water using; 40% of global material resources and 60% of worlds electricity used in commercial and residential buildings. These figures are a significant part to help people to aware more about how seriously building industry can affect the environment and encourage people to bring back some traditional techniques which are considered as friendly-environmental techniques for building houses and other construction.

3.1.1 Architectural on Sustainability Concept

The meaning of 'Sustainability' refers to the status of something that can be continuously existed and implemented in the future. Therefore, the concept of sustainability in architecture does not mean that people build or construct buildings and those building can be existing and using for hundreds years but those buildings cannot fit with current requirement of environments or people needs. Architecture which can be named as sustainable development must be also fit with the requirements of people and environmental factors. In connection with pursuing sustainable architecture, reducing environmental degradation and saving energy, architects attempt to select and use more materials which are friendly-environmental and suitable climate and environment. Sustainable buildings are respected buildings

³¹ Gunnell, K., Du Plessis, C., & Gibberd, J. (2009).

³² Brundtland, G. H. (1987).

³³ Salim, E. (2007).

which have “*least damaging impacts on the natural and non-natural environment, the space instantaneously nearby and around them as well as their whole perspective. Sustainable houses have consideration to overall a building lifecycle, environment with high worth, good illustration in the future*”

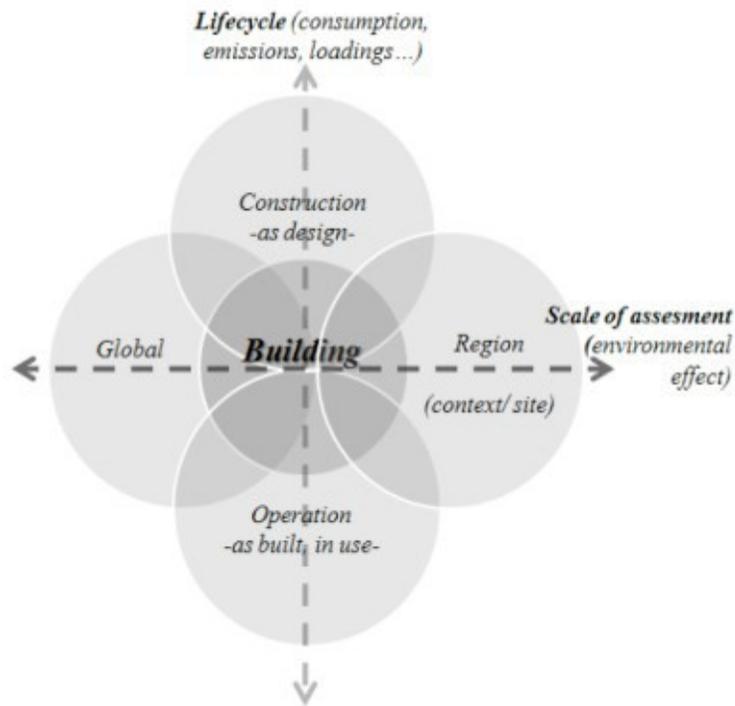


Fig.3- 2 The diagram describing the border between the environment and building.

Source: Poveda (2009)³⁴

3.1.2 Design on Sustainable

In suggested explanations for sustainable plan, occasionally the notion of environmental sustainability on architecture focused more. For instance, the explanation as follows: sustainable house is the house that has the lowermost undesirable impact on the environment of natural feature in the existence of house with global and regional establishment³⁵. In the first time, word called

³⁴ POVEDA, M. G. Z. (2009).

³⁵ Kibert, C. J. (2016).

sustainability in the United Nations is identified by World Commission on Environment and Development following “*Sustainability is seeing the requirements of the current generations without wrapping the capability of future generations to see their own requirements*”. The word namely sustainability in spaces of town life is recommended in the 3 disciplines of environmental, socio-economic sustainability. To reach an environmental sustainability, architects in the past few decades are looking for expanding principles and approaches which realize design of sustainable feature for sustainability in architecture and green architecture. Presently, the ozone layer and global warming are damaging and also, they had admitted as well as fact. In some case, mostly air pollution is caused by flaming fossil fuels in the procedure of energy reproduction for living town.

Much of atmospheric pollutants caused of environmental dangers are able to be ascribed for house procedure directly. For instance, 50 percentage of world's fossil fuel expenditure is associated with services and employ of houses directly; these 2samples generate only 50 percentage of carbon dioxide in the world that comprises more than a quarter of greenhouse gases. On the other side, growth of urbanization conducted in pattern of generates numerous numbers of resource, pollution consumption etc. And also, it has been resulted a quick increase of urban destitution. Therefore, owners and users of houses by suitable selection of appropriate equipments, utilizing procedure of ecological responsible and design care about houses usage, decrease the environmental significance of growing urban. To obtain concepts of sustainable and ecological architecture, have no required traveling as far, architectural kind is able to see vernacular architecture in the past. Nevertheless, maybe solution of contemporary environmental issues is not able to be looked for architectural kind and thus new methods have to apply. One of methods is recommended by Jang Jin Kim, the University of Michigan affording 3 laws of sustainability in architecture including design of life cycle, economic resources and human. Jang Jin Kim determined 3 laws of sustainability following “*life cycle design is methodological type to explore house procedure with environment effect; economic resources associated with recycle and reuse of natural resources entrance*”

to house; Human design emphasize on interaction of people and world nature". That is clear by architectural resources demand and economic recovery including building materials, houses, land, energy, etc. In this pattern, it raises architectural impact of ecosystem in the world comprising an organic material, organisms, and inorganic elements. The objective of sustainable design is an architectural clarification that is able to assure coexistence and prosperity of 3 groups. To reach target, have no break out beside regulations and rules formulation of beneficiaries, architect and implementers with regard to achieve objective of sustainable determination referring starting, green architecture exactly, buildings view and cities that are more human. In fact, clarifying theories support everybody, rather than resisting and standing up against nature. It is only not supervised but it also like offering and strengths to our architectural utility. Mainly, design of sustainability includes 3 ways for reacting among user, nature and architecture.

3.1.3 Criteria of UNESCO

To be entranced by World Heritage List, sites must have the outstanding universal value. At least it has to lay on one out of 10 UNESCO criteria. The criteria describe in the "*Operational Guidelines for the Implementation of the World Heritage Convention-OGIWHC*". Besides convention text, it is the major functioning tool on World Heritage. These criteria are commonly reviewed by the World Heritage Committee with consider estimation of the World Heritage principle itself. In 2004, World Heritage sites elected foundation of six cultural criteria for 2002 and 2005 including (i), (ii), (iii), (iv), (v) and (vi); and four natural criteria comprise (i), (ii), (iii) and (iv) for 2002 and (vii), (viii), (ix) and (x) for 2005. In the improved OGIWHC agreement, there is only one set of 10 criteria exists.

“Selection criteria include following:

1. *To represent a masterpiece of human creative genius;*
2. *To exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;*
3. *To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;*
4. *To be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;*
5. *To be an outstanding example of a traditional human settlement, land -use, or sea -use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;*
6. *To be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);*
7. *To contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;*
8. *To be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;*
9. *To be outstanding examples representing significant on - going ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals; and*
10. *To contain the most important and significant natural habitats for in - situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation."*

3.1.4 Goals of the World Heritage 2012-2022

“Goal1: The Outstanding Universal Value of World Heritage sites is maintained

Goal2: The World Heritage List is a credible selection of the world’s most outstanding cultural and natural heritage

Goal3: Heritage protection and conservation considers present and future environmental, societal and economic needs

Goal4: World Heritage maintains or enhances its brand quality

Goal5: The Committee can address policy and strategic issues

Goal6: Decisions of statutory meetings are informed and effectively implemented³⁶”

The goal 3 that is conservation and protection of the UNESCO in present and future. Therefore, the socio-economic and infrastructure development etc., consisting architecture is under the practice law of the regional urban and UNESCO. From the development requires to a follow the UN Sustainable Development Goals (SDGs) to rectify architecture for a sustainable in the future.

3.1.5 The United Nations Sustainable Development Goals (UNSDGs)

In practice, the applied the UN Sustainable Development Goals foundation, some recommendations of what architects may be acting in practice to better engage with the ethical discretions encouraged by the Sustainable Development Goals, together with some worth resources for ideas and information. While the ethical procedure has positive impacts on the environment and humane, it likewise benefits of architects and their customers.

The following are concepts for the ‘basics’ of employing the UN Sustainable Development Goals in practice. They are the beginning points within each of the four overarching issues. There are various references to emerging a policy or strategy

³⁶ Labadi, S. (2007).

on special themes. To be proficient, this development has to concern full consideration of, and appointment with, each theme; more effectively, ‘developing’ a strategy or policy entails committing it to writing so that it can be cited to, disseminated and entrusted upon.

In September 2015, as an unexampled three-year deliberation, overall 193 Member States of the United Nations employed a plan for reaching a better future for overall (Agenda 2030). At the main point of the plan are the Sustainable Development Goals (SDGs) which obviously determine this vision. Consequently, the environment is one of four overarching problems of the Sustainable Development Goals such as:

- 1) *Businesses should support a precautionary approach to environmental challenges;*
- 2) *undertake initiatives to promote greater environmental responsibility; and*
- 3) *encourage the development and diffusion of environmentally friendly technologies*³⁷.

Thus, from the above environment problems what architects can do such as:

- Review business policies to determine how environmental stewardship is currently being addressed and how it supports local regulation and guidance.
- Develop sustainability strategies addressing sustainability considerations at all stages of projects, taking into account global issues as well as any particular focus of the local community.
- Promote greater environmental responsibility through training and selection of staff, and through exchanging information with other construction industry professionals, contractors and clients.
- Enter awards related to environmental sustainability, raising awareness and gaining knowledge and expertise.

³⁷ UN SDGs, (2015).

- Assist local charities and community groups on sustainable building projects in a pro bono capacity.
- Explore and recommend sustainable building solutions³⁸.

Sustainable development assigned that “*development that encounters requirements of present without compromising capability of generations in future to respond own demands*”. In every country, the industry construction is both a major contributor to the socio-economic development and major natural resources and energy user; consequently, its association is important to obtain sustainable development in our society.

3.2 Factors of Sustainable Vernacular Dwellings

Vernacular dwellings are sustainable in overall areas, due to vernacular cultures created spaces and buildings which are associated with nature and reflect the ecological entirety of place. Kazimee (2009) declared that the building technologies and resources restriction, the vernacular architecture utilized methods and solutions which were most affordable and proficient³⁹. These conditions resulted in complicated and innovative building models and design techniques which are culturally adaptable and environmentally sustainable. Furthermore, he explained that living art in accordance with nature and the pretty usage of vernacular materials and technology reduce our responsibility on the limited energy resources and protect the environment from more degradation. The vernacular buildings offer us with a big repository of cultural and natural heritage that indicate a symbiotic and absolute relationship with the soul of a special space.

Krishana KDhoteetal. (2002) have carried out a research on the tribal settlement of Central India and researchers assigned that the tribal people of remote areas are geographically following indigenous vernacular character of habitat and settlements. Residences require thermal and visual well-being in decreased resource

³⁸ UN SDGs, (2015).

³⁹ Kazimee, B. A. (2009).

utilization. According to this research, the sustainability in the settlements are reached through “*Finite-size of the settlements, planning spatial area is managed by social groups created facilities of shared community, topography, ethnicity and fertile land availability as same as channels of movement and water sources; Existence a group of different cultural character guides to setting of working community and living reflecting the settlement diversity and better social cohesion*⁴⁰”. The climate sensible characters of the vernacular dwellings are the main factors of contributing to these dwellings sustainability. These characters are in conditions of building orientation and model, size and design of materials and openings usage etc. The adoption of this climate sensible or solar passive characters results in the less energy application for offering convenient indoor thermal environments.

3.2.1 Sustainable Architecture Principles

The design principle of buildings and choose supplies is one of most significant problems affecting human houses in the future. Green architecture is impliedly based on 4 methods: (a) wind protection, energies of water and other natural resources; (b) environmental health arrangement; (c) growth of economy in country and (d) arranging high quality of people’s life. All methods are subcategories of structural proficient factors in sustainable architecture: (a) vernacular architecture; (b) culture and (c) geography. The objective of the study tests the methods of architectural design and procedures support design of sustainable house such as discovering typology explained in texts of elected key which is able to recognize spectrum of approaches for sustainable design and concerned series, but it is different approaches relating factors of environment and socio-economic feature. Van der Ryn and Cowan proceed 5 methods in Ecological Design⁴¹ defined several study and exercise years. In aspect, transformation is more encompasses of sustainable world for renewing method of products and house design. Also, it will integrate an awareness of ecological approaches. These approaches relate to an integration and

⁴⁰ Dhote, K. K., & PREETI, O. (2012, March).

⁴¹ Ryn, S. V. D., & Cowan, S. (1996).

sharing or engagement of knowledge across various sectors. The idea of individual living is able to self-sufficient about own energy and resource requirements. For instance, recycling waste and harvesting rain explained in exuberant book *Autonomous House*⁴². In *Green Architecture*, some years later, authors explained 6 principles of fundament in “*green design*” procedure⁴³.

Altering climate and the significance of designing resilient houses relieve derogation of environment. These are adaptation capability that it leads to crisis planning scenario on *Adapting Cities and Buildings for Climate Change of 21st century in survival guide*⁴⁴. Author explained that requirement of house is resilient for altering climate and it designed to long life by gathering low energy. Holistic method of sustainability achieves, except houses for surrounding sustainable communities and lifestyles⁴⁵.

3.2.2 Sustainable Design Principles

Realizing Place - Sustainable design starts with a deep realizing of place. If a human is sensible to the changes of place, the human is able to live without destructing it.

1. Realizing place helps define design practices, for instance, solar orientation of a house on the site, conservation of the natural environment, and entry to public transportation.
2. Linking with Nature - Whether the design space is a building in the internal city or in a more natural setting, linking with nature brings the designed environment back to life. Proficient design helps report us of our space within nature.
3. Realizing Natural Processes - There is no waste in nature. The byproduct of one organism transforms the food for another. In other words, systems of

⁴² Vale, B., & Vale, R. J. D. (1975).

⁴³ Vale, B., & Vale, R. J. D. (1991).

⁴⁴ Roaf, S., Crichton, D., & Nicol, F. (2009).

⁴⁵ Grierson, D., & Moultrie, C. M. (2011).

nature are made of closed loops. By working with living procedures, people regard the requirements of overall species. Participating procedures which create rather than deplete people become more alive. Making natural cycles and procedures obvious brings the designed environment back to living.

4. Realizing Environmental Effect - Sustainable design tries to have a knowledge of the environmental effect of the design by estimating the space, the collected toxicity and energy of the materials, and the energy proficiency of materials and construction, design techniques. The negative environmental effect can be moderated through use of sustainably gathered house materials and finishes, materials with low toxicity in manufacturing and installation, and recycling house materials while on the job site.
5. Holding Co-Creative Design Processes - Sustainable architects are finding it is significant to listen to every voice. Cooperation with systems engineers, consultants, and other experts occurs early in the design procedures, instead of a footnote. Designers are also listening to the voices of local communities. Design charities for the end employer (neighborhood residents or office employers) are becoming a standard practice.
6. Realizing People - Sustainable design must discuss the broad level of religious habits, cultures, and races of the human who will be used and living the house environment. This needs sensitivity and attention on the requirements of the human and the community.

3.2.3 Sustainable Housing Design

Everybody is familiar with sustainable determination employed by researching from World Commission on Environment and Development (WCED) in 1987 that developing sustainability means conference involves of current without compromising capability of future generations for seeing their study on affordable and sustainable building advices. Sustainable development is balance between human requirement, for instance adjust of feeling well-being and lifestyles. Other hand, conserving ecosystems and natural resources are depend on the total

population of nowadays and future⁴⁶. The idea of sustainable development was at first understood as a term most pertinent to macroeconomic development. It is merely more than newly which it has used to the discretion of development quality of people settlements and housing⁴⁷. Begin with the idea of the human settlements sustainability, and also, we will consider way into housing problems. To be initiatives of sustainable building have to economically be practicable, socially be receptive, technically be possible and environmentally be corresponding. Environment prevention is based on feature of sustainable development. It comprises modification of biological diversity, procedures of significant ecology and natural resource foundation.

It has been noted that there is an important movement in the last twenty years to new strategies of house design which consider sustainable discussions. Though, most countries, sustainable houses are still at an initial development phase. The increasing awareness of sustainable house's potential to decisively affect environmental problems pushes realization to the forefront⁴⁸. As stated that definite policies in five spaces must be implemented and devised to reach sustainability in the building sector. Thus, have no anything in building like universal reliability "*best practice*". The reliability of best practice is easily replacement for analytical idea. The first spaces of these policies are community relationship in whole steps which related to plan, construct and maintain by planning recognition. The second policy space relates to secure which those create building. People are firms of private sector or self-builder. They have entry for good material quality of house at a prize where people are able to pay. The third policy relates house standards and the fourth policy needed is in the area of housing finance and the last set of policy problems relates the basic issues of land⁴⁹. Lastly, we can summarize that without considering through building policies and fundament them on sustainability criteria, there is no

⁴⁶ Nair, D. G., Jagadish, K. S., & Fraaij, A. (2006).

⁴⁷ Choguill, C. L. (1999).

⁴⁸ Halicioglu, F. (2012).

⁴⁹ Choguill, C. L. (2007).

opportunity of obtaining success in, “rebounding the needs of present without compromising tomorrow generation’s ability for seeing their own needs”.

Framework on sustainable building relates to integrating socio-economic and environmental objectives. Some significant problems to think comprise: energy consumption during building and utilization, measures of energy efficiency, the utilization of renewable energy; environmental sustainability of house materials; quality of indoor environmental; potable water consumption, water recycling and efficiency measures; waste recycling and management facilities; entrance to public cycling and transport facilities; atmospheric emissions, waste surface water and water discharges run-off; local ecology, land use, visual impact, community and contextual fit relations (David Richard Oxley III 2006).

In this discussion, vernacular architecture illustrates sample solutions for the sustainable problems due to it has important environmental intimately aspects which respond to sustainability such as techniques of low-energy to offer for people health, approaches which are important to the model, materials, and orientation that are achieved from local resources. Therefore, in present years, professionals have started to discover vernacular architecture aspects because the rising challenges regarding offering sustainability in a house environment. Studying environment receptive perspectives of vernacular architecture will provide important insights and lessons to architects relating development of environments for sustainable building in the future.

3.2.4 Sustainable Features in Architectural Design

Before clarifying in methods on design of sustainable architecture, it is suitable for interpreting sustainability means. Overview of sustainable concepts is offered by Andrew Dobson including 4 questions following: 1. What to sustain; 2. Why; 3. for Whom; and 4. Substitutability⁵⁰. So, the term of “*Sustainable is regularly*

⁵⁰ Dobson, A. (1996).

*employed to describe technology of lower environment and effect of single environmental issue (e.g. water resource use and climate change etc.). It is quantified in terms of decreased pollution emissions or resource usage such as a percentage or fraction*⁵¹. Sustainability has to illustrate complicated relationships between socio-ecological systems⁵². The most well-known conceptual description gained World Commission on Environment and Development. It determined definition of sustainable development “*development sees recent requirements without compromising capability of generations in future for seeing their requirements*”⁵³. As activities of the building have a big effect of the environment, human health and whole economy. Due to different house features contribute environmental issues using sustainability aspects for sector of significant construction. One of the most associated design samples of sustainability is Ezio Manzini’s “Sustainable everyday life” philosophy⁵⁴. One of most design associated with sustainable sample as Ezio Manzini’s philosophy of “*Sustainable everyday life*”⁵⁵. Manzini’s theme is Sustainable Guidelines, Ethics and Design for transition phase applied design definition based on International Council of Societies of Industrial Design (ICSID) explained “*Design was determined as an innovative activity which aims at setting up the multi-faceted qualities of processes, objects, services and their systems in the all life-cycle*”⁵⁶. Also, activity of assigned generative “which is an indication of selecting between distinct possibilities”. Furthermore, Manzini expresses 2 basic theories for architects: low material-energy strength and high re-creative possibilities⁵⁷. Theories are most associated with principles of sustainable architectural design.

International Union of Architects (UIA) in 2009 illustrated a significant idea on “*Sustainable Architectural Design named Copenhagen Declaration on 7th*

⁵¹ Levin, H. (2015).

⁵² Ostrom, E. (2009).

⁵³ WCED, (1987).

⁵⁴ Keitsch, M. (2012).

⁵⁵ Keitsch, M. (2012).

⁵⁶ Manzini, E. (2006).

⁵⁷ Ibid., 88-108

December 2009". It began to process assignment for accomplishing "*Sustainable by Design*" theories following:

- Starts the earliest phases of project and needs obligations between overall stakeholders: authorities, designers, clients, owners, engineers, contractors and community.
- Incorporates overall features of the building and future usage under full analysis and management of life cycle.
- Increases proficiency by design.
- Realize that overall planning and architecture plans are complicated part of interactive system, connected natural environments and reflect culture, social and heritage values in community's daily life.
- Looks for completed materials on strong buildings, respectful land-use, and beautiful sensitiveness which motivate the community.
- Purposes to importantly deduct carbon imprints, technologies of hazardous and materials; and overall undesirable human impacts on creative and natural environment.
- Attempts rectify of life quality, support fairness both globally and locally develop economic prosperity and offer opportunities of community's empowerment and engagement.
- Understands local and vagrant interdependence on overall human.
- Ensures UNESCO's pronouncement on cultural variety and source of creativity, innovation and exchange are significant nature for people and biodiversity⁵⁸.

It is obvious that strategy of sustainable architecture design includes 3 significant pillars, for instance social, economic and environmental contexts. Furthermore, design of architecture attempts to admit the concept of environment, it is not distinguished specification of building environments with community's social and economic data. As aspect, this is appropriate to clarify meaning socio-economic

⁵⁸ UIA, (2009).

sustainability for perspective of architectural design. Young foundation explains about social sustainability following: Procedures of generation of sustainable successful space encourage well-being, realizing humankind requires from spaces that work and live. The social sustainability merges between design of physical region and design of social world – basic structure assists cultural and social life, social handsomeness, and systems for people participant and space for human and spaces on evolution⁵⁹.

In accordance with social sustainability covers empowerment notions, participation, sharing, equity, cultural characteristic and accessibility. It requests to conserve environment based on growth of economy⁶⁰. Look at these definitions, significance represents that sustainability of social characteristic is strongly connected to economic sustainability. Sustainability of economy indicates that production system satisfies current levels of consumption without impact of future requirements. However, realization has currently appeared, but natural resources are not endless. This strained human in life for applying sustainability every point.

As McLennan explained "*sustainable design begins with understanding of people purpose*". In this case, it is able to say easily about theories of sustainable design existing of vernacular architecture already⁶¹. Besides that, in vernacular architecture, obvious typology and guiding architectural theories, buildings are shaped by conceptual summary which develop aware realization to urban and conditions of environmental and societal persistence as well. Traditional buildings are real architectural exhibition which offers convenient their living conditions of all distinct climates. While some designers like new possibilities of sustainable architecture. It was constructed in past. And other is inspired philosophy, especially behind humanistic and environmental approach.

⁵⁹ Woodcraft, S., Hackett, T., & Caistor-Arendar, L. (2011).

⁶⁰ Kahn, M. (1995).

⁶¹ McLennan, J. F. (2004)

3.2.5 Features of Vernacular Architecture

The building, as house, can be discussed like physical area which supports awareness of human being. House is not just to use spatial materials which see individual physical requirements, but it also reacts to its emotional, requirements of social and cultural feature⁶². People maybe have to carry out overall procedures of design, usage, construction and structure demolition. From this point, people request for guarding because of conditions of natural environment where exist in. Design of constructs and users are at the same time in vernacular architecture. Furthermore, people apply continuous and improvable design procedures to live in their own house environment that people increase following their requirement. Requirements of occur and disappear are quickly considered by users in house design. In view of vernacular architecture, requirements cannot display aesthetic relations. People have relations with environment which will permit to carry on their life, before aesthetic responsiveness builds their houses. Building of Vernacular house is easy and simple to understand and also it can mix into the nature easily. Building of forms can shape special parameters, for instance local materials based on socio-economic facts in term of natural environment, community or eventual reflection in social memory.

In accordance with some ideas that obtain favoring in architectural aspects, for instance prefabrication, sustainability, house elements standardization, parts of moving and flexible house, ventilation, floor heating and daylight control have occurred in examples of natural architecture⁶³. For example, controlling natural daylight had a common factor for years in users of natural architecture. It emerged to design criteria of sustainable vernacular architecture nowadays.

⁶² Salgın, B., Bayram, Ö. F., Akgün, A., & Agyekum, K. (2017).

⁶³ Rudofsky, B. (1964).

3.3 Rules of UNESCO for Preservation on Luang Prabang City

For Luang Prabang city was inscribed in 1995 for UNESCO World Heritage list under three criteria (ii), (iv) and (v)⁶⁴. In Luang Prabang city was managed by the Heritage Preservation and Development Master Plan under the World Heritage Site of UNESCO. According to three different classifications are employed by first two subdividing with coding of map color, yielding five subdivisions and related stipulations of physical adjustments. The first classification includes houses listed in the PSMV that are matter of most rigorous requirements. The second classification comprises houses without in the PSMV inventory that are a matter of many guidelines. The third consist of archeological traces that are related to on a case-by-case foundation. Furthermore, there are some international organizations for instance ICOMOS (International Council on Monuments and Sites) and UNESCO focus on the vital culture roles in the achievement of sustainable development⁶⁵.

The preservation issue and efforts: This part tests some of the problems regarding the natural preservation, cultural and built heritage and many of the projects being undertaken.

Natural Heritage and Landscape

As an important section of Luang Prabang's feature, the city's natural heritage requires being preserved. The main projects carried out in doing this have emphasized on the protection and management of the urban wetlands due to in current years these wetlands have been invaded upon for dwelling, irrigation, and roads canals. A project has started and being process by funding from the European Commission's Asia Urbs Programme, which is for researching and mapping these developing and wetlands ways in which they are able to be restored to their initial condition. Wetlands are being presented in order to capacitate better awareness of the ecological operation of the natural environment of the historic city for residents and visitors similarly. It is expected that by increasing local understanding, measures

⁶⁴ Organisation, C. (2008).

⁶⁵ Hosagrahar, J., Soule, J., Girard, L. F., & Potts, A. (2016).

of sustainable conservation are able to be supported. Since 1992, there have also been conservation attempts in the culturally significant caves in the area all around Luang Prabang city, discussing their architectural and natural significance as well as their archaeological consequence.

Built Heritage: Religious Buildings

A UNESCO program entitled ‘Cultural Survival in Luang Prabang’ is recovering traditional building crafts and temple arts within the Laotian Buddhist sangha. Monks, novices and local artisans are taking part in these programs, which focus on skills training to ensure the survival and continued economic and social relevance of the traditional system of fine arts in Luang Prabang.

Built Heritage: Residential Buildings

Most of the restoration attempt aimed at inhabited houses has targeted Luang Prabang’s French-inspired inhabited houses. Several have been changed either from private residences or civic buildings into restaurants or guesthouses to underlie for the city are increasing tourism industry. Always these programs have related to joint ventures in which foreign investment has advocated the reparation work. Luang Prabang’s historic Customs House, which was established in 1925, was reconstructed with foundations offered by the French Government (1998 - 1999). The Customs House nowadays roles as offices for La Maison du Patrimoine and buildings its diverse land conservation and urban planning programmers. The power interest in conserving the colonial-era houses in Luang Prabang has not profited the traditional wooden houses and Vietnamese shop houses, which have yet to obtain much concentration from either the private or government sector, and also there are some are nowadays in a severe state of bad condition. The requirement for methods of cheap and modern construction defined another intimidation to the traditional sensual architecture of Luang Prabang. ‘Modern’ houses are regularly built from mainly resemble and concrete modern Thai buildings, with a little citation to Luang Prabang’s traditional architectural and local words.

3.4 Rules of UNESCO for Re-Building in ZPP-Ua Zone

Presently, in Luang Prabang city, the tourism houses focus on the landscape is associated with relate undermining of days of town landscapes. This procedure was directly followed by construction growth focused on tourist capacitated by UNESCO directions for building within ZPP-Ua Zone created by PSMV. Together with they are both literally and figuratively background daily social life and activities which are relatively connected to the house environments in villages or buildings construct stage set on local lifestyle nowadays becomes an exhibition of tourists. While no have local tradition thoroughly explains this more than larger given noticed earlier. In smaller ways, it happens all over zone of heritage.

To realize how daily is destructed until new construction of buildings and existing renovation of structures. It is significant to know about diverse establishment replaced individual house within UNESCO which specified Preservation Zone (ZPP-Ua).

Table 3. 1 Building designations and regulations of Luang Prabang UNESCO preservation zone
(La Maison du Patrimoine, 2001).

Building Classifications	Subdivision	Map color coding	PSMV prescription and regulations
Inventoried in the PSMV	‘Buildings of the inventory constitutive of the dossier for presentation of the site of Luang Prabang City to the World Heritage of UNESCO’	Black	‘Rehabilitation work to keep identical to original, possibility for evolution to be determined case by case, on the consent of the La Maison du Patrimoine. Demolition prohibited. In case of demolition by accident or malevolence, reconstruction to keep identical to original’
	‘building[s] to be preserved and restored’	Red	‘Rehabilitation work to keep identical to original, possibility for evolution to be determined case by case, on the consent of La Maison du Patrimoine. Demolition prohibited. In case of demolition by accident or malevolence, reconstruction to identical’

Buildings not included in the inventory of the PSMV	‘Buildings worth[y] [sic] to be preserved and restored’	Light orange	‘In case of preservation or transformation, the works should be conceived in reference to the constructive mode and concerned typology. Extensions will be authorized in reference to articles of the regulation relating to the density, coverage, and height authorized. In case of reconstruction, respect of original typology and volumetry’
	Buildings which can be replaced’	White	These are buildings that can be torn down and replaced provided that the new construction applies ‘the rules relating to construction possibility and architectural prescriptions’
	‘Buildings perturbing the urban landscape’	Yellow	This designation is reserved for buildings or parts of buildings that obstruct or otherwise take away from the character of the aforementioned buildings
Archeological vestiges		Noted (not colored)	Destruction is prohibited and ‘restoration and improvement work to be determined case by case of consent of La Maison du Patrimoine’

UNESCO determinations and these classifications that suggest the reconstruction, rehabilitation or buildings demolition are keys both an evolution of commodified tourist landscape within the ZPP-Ua Zone and undermining of daily life. Commodified landscape and this procedure in fact are indivisible and perform in mutual relation. PSMV determinations, associated with physical city structure, default the social and cultural structures of larger urban and village's landscape. These determinations, moreover, default the modifying of house usage. This is serious exception because of house usage directly is connected to mixing of special construction into local community's life. Therefore, house usage connects the social structure of the intangible environment and space in Luang Prabang.



Fig.3- 3 Guesthouse, Kingkitsalat Rd at Ban Khili.

Source: Dearborn & Stallmeyer (2009)⁶⁶

The new house, illustrated in Fig.3-3, supports only a temporary feature to a primitive fabric. For contacting guesthouse owners, the lacking of connection between the construction realities and PSMV were obvious. Owners noticed that the PSMV commanded about applying special materials and forms in the construction. For the tile roof, it is not employed a room material overall building. In fact, original corrugated metal roofs of various buildings are more ordinary style for building as referred by number of remaining samples. However, roof tile helped a favor by

⁶⁶ Dearborn, L. M., & Stallmeyer, J. C. (2009).

maintaining from the local authority due to its climatic suitability (UNESCO, 2004). On the other hand, owners need to rebuild house employing traditional methods and materials of Torchis, as well as climatically supported favor, but they cannot do because of contractors building are indisposed to create employing methods.



Fig.3- 4 Building under construction, Ban Khili.

Source: Dearborn & Stallmeyer (2009)⁶⁷

The guesthouse as illustrated in Fig.3-4 is typical of the expansive readjustment or re-establishment of buildings which are classified as "worth physic to be preserved". In fact, this construction was perfectly recreated with up-to-date methods and materials. The house has incurred expansive modifies during the rebuilding procedure consisting modify in roof material and modify in the roof pitch to see PSMV needs, and displacement of the traditional house and Torchis material. Moreover, house is no larger than village dwelling, but houses instead nowadays by eight guest rooms for tourists.

Here, suddenly behind a "black-coded" as shown in Table, house once set a house coded in Zone of Preservation maps in light orange and thus "preservation-worthy". This house nowadays transferred and substituted with the house as illustrated in Fig.3-4. As this image illustrates, house created as same as most new

⁶⁷ Dearborn, L. M., & Stallmeyer, J. C. (2009).

buildings in the town such as brick and concrete infill. At outside of house will maybe see a letter from the PSMV needs which new house built by considering features in one of those architectural models cataloged which assign approved types architectural model. It is far off reaching the goal of UNESCO heritage preservation based on reproducing original styles of construction and the procedure is ongoing methods of traditional house.



Fig.3- 5 Ban Xiengthong was inventories to be building 100 by PSMV

Source: Dearborn & Stallmeyer (2009)⁶⁸

The abovementioned overall new house nowadays surrounds the ‘black-coded’ house illustrated in Fig.3-5 on the major north-south highroad over the city, Sakkaline route. The west roadside is lined with the colonial-era school complex and many complexes of temple (wat). Overall of these complexes comprise house assigned as important in UNESCO documents, the majority coded red, light orange and black as shown in Table 3.1.

⁶⁸ Dearborn, L. M., & Stallmeyer, J. C. (2009).

The east roadside is lined with the commercial house and dwelling paces with high focusing "black-coded" houses accordingly amount of "red-coded" and few "white-coded" houses. House on this main route, particularly those of importance has nearly completed over to tourist usages, high-end hotels, restaurants, internet cafes exist almost overall the "black-coded" houses. These and other tourist-oriented houses were several periods dissipated with costly repairing which is truly protecting the physical, but they are not the social area of Luang Prabang.

As these components of the contemporary architecture are guided into the rural areas and slowly admitted by the local people living there, the pertinacity of the traditional built model is being undermined⁶⁹. In houses with main structural issues, replacement of deteriorated timbers and restoration of cracked walls are essential. Destroyed walls sections are demolished and rebuilt with the same technique materials. In the twentieth century, human-altered their lifestyle and attempted to adjust their building along with new requirements. They increased bathrooms, kitchens and toilets to their houses, besides windows are expanded. During current investigation for rehabilitation, unsuitable additions destructing structures integrity and original model were represented on the cross and plans sections, with a purpose to transfer them during restoration⁷⁰. Architecture can help to build environments which contribute those who are active to alter and suggest others to take into alteration. *"Lifestyle change cannot be imposed, but it can be encouraged by good design"*⁷¹

⁶⁹ Lim, J. Y. (1987).

⁷⁰ Ahunbay, Z., Ayrancılar, T., Polat, A., & Uray, A. (2014).

⁷¹ Edwards, B., & Turrent, D. (2000).

4. Survey and Analysis

4.1 Overview of the Survey in ZPP-Ua Zone

4.1.1 Housing in ZPP-Ua Zone, Luang Prabang City

Sixty photos of Luang Prabang house, selected from four types (Figure 4-1) which was defined from UNESCO such as Double roof, Single roof, House with separate kitchen and Single roof with veranda. Therefore, in this survey, we choose the Sixty cases to study from four categories such as residential, commercial, hotel, and restaurant.



Fig.4- 1 Photographs of Single roof house

Source: Author



Fig.4- 2 Photographs of Single Roof with Veranda house

Source: Author

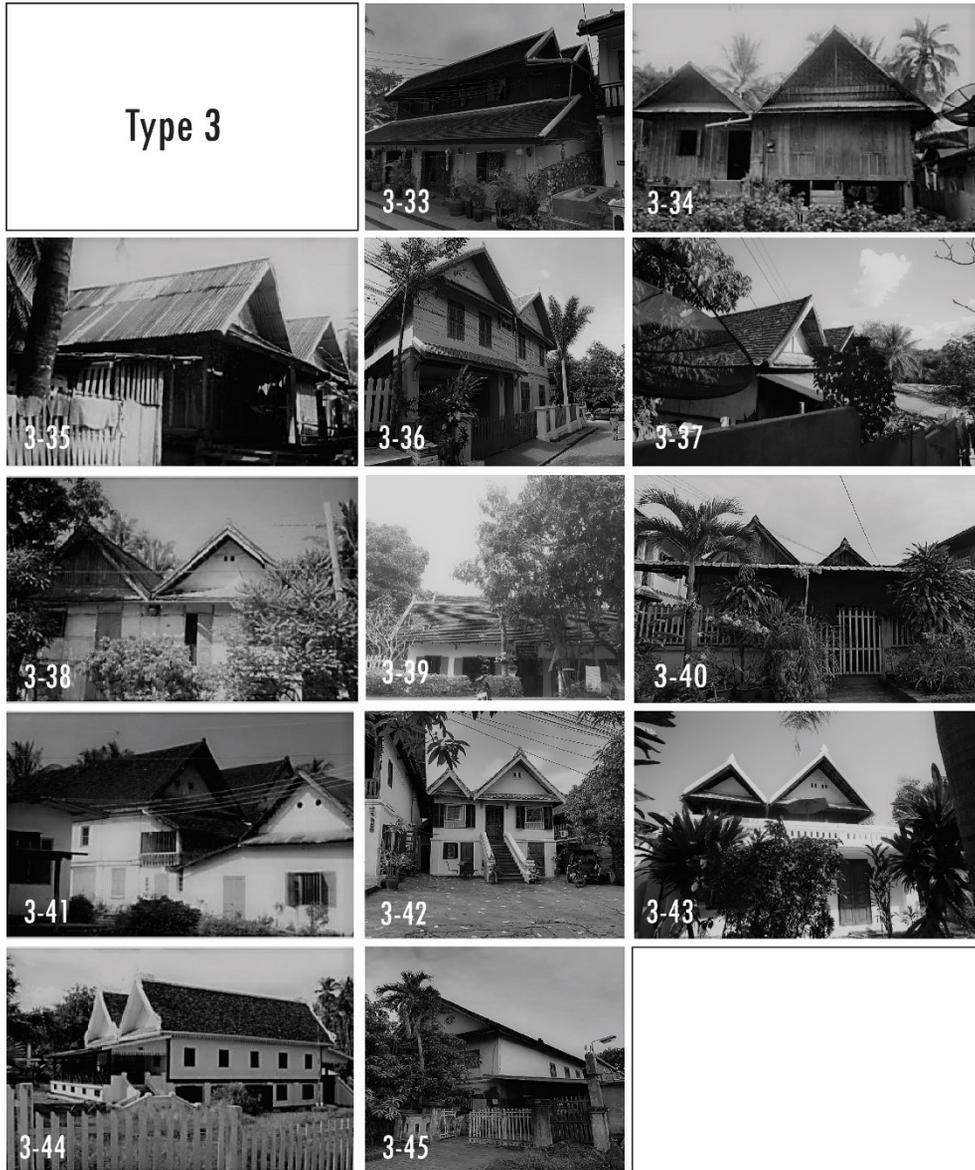


Fig.4- 3 Photographs of Double Roof house

Source: Author



Fig.4- 4 Photographs of house with separate kitchen

Source: Author

4.1.2 The Changing of Material and Function

The figure 4-2 shows the process of development and renovation of building in ZP-Ua Zone, which was followed by globalization as seen from a number of change such as building materials, roof materials, building usage and structure of the building. This is of special interest to the study because it is expected that the developmental and preservation issues in-house design is the impetus to continued housing transformation.

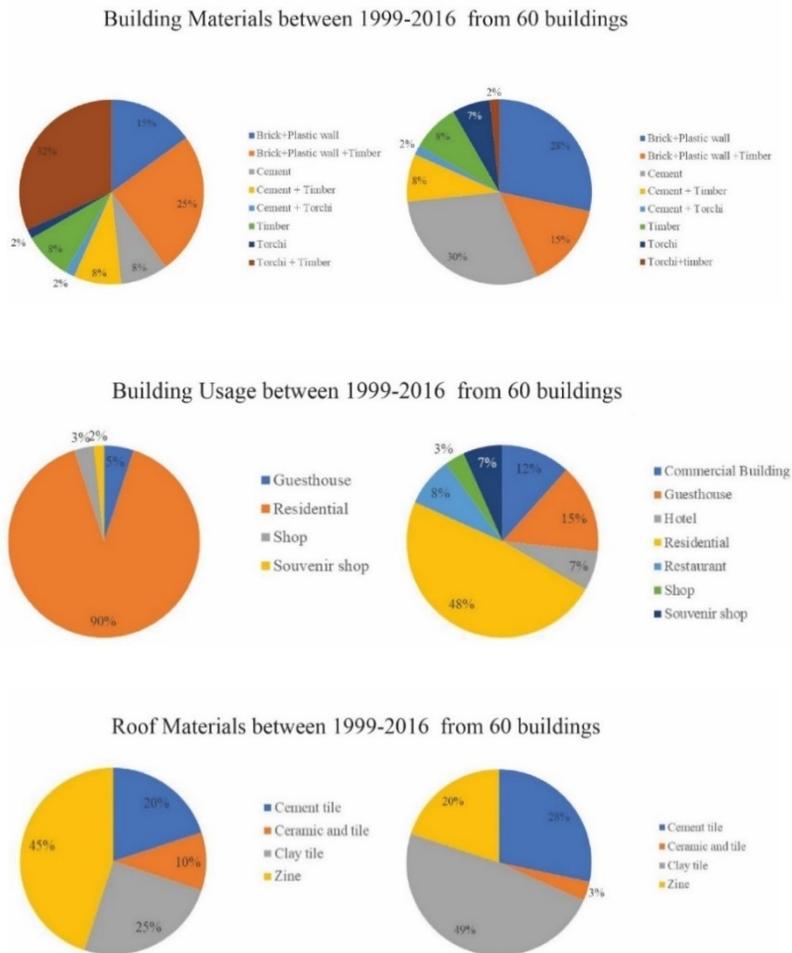


Fig.4- 5 Proportion change of material and function

Source: Author

4.1.3 Spatial components Lao Traditional House of Luang Prabang

In several areas, the value of historic houses, whereas the kitchen, are employed alternately for purpose varieties. Therefore, the definitive particular differentiation in the traditional Lao houses are not defined by the usage specificity or the furniture, but rather determined by the residence's architectural characteristics, for instance, balustrades, multiple roof planes, wall panels and multiple floor planes. The following diagrams as shown in (Figure 4-6) illustrate the major spatial categories contain in the Lao traditional house. These spatial categories comprise the ground space under the residence, the living area, family room, bedrooms, dining area, bathing area or washing and the veranda.

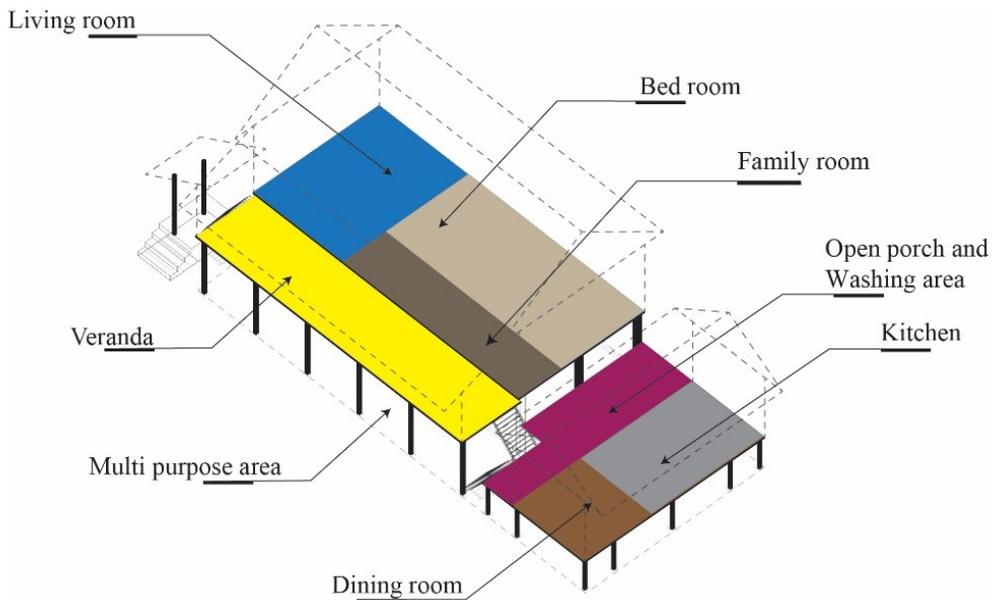


Fig.4- 6 Lao Traditional House

Source: Author

The ground area

Typically, space is left open without architectural or other enclosure components to divide the area, excepting the stilts which bear the essential living platform. The height from the ground to the principle living platform ranges from just over 1.8 to 2.5 meters, which allows sufficient room for people to conduct daily or walk around activities without feeling too uncomfortable. The ground space in a traditional Lao house is typically provoked earth flooring, which resulted spontaneously from the normal usage and bodyweight. Employing such ground space is versatile. During the monsoon season, which goes on about half a year, the ground space may be inundated by regular moisture and rains protection. During the dry season, this space is able to be employed for keeping agricultural tools, for instance, plow and cart, weaving equipment or fishing and so on.



Fig.4- 7 Ground area Lao Traditional House

Source: Author

Even though ground space is shaded by the platform, but we can see from every direction surrounding the house. It supplies an appropriate place for amusement during the daytime as well as informal reaction with visitors. Any guest or passer-by maybe pause for a conversation with friends or families assembled together for relaxation and rest⁷². The utilization and condition of the ground space in about 95% of the adjusted residences examined.

⁷² Vongvilay, X., Kang, Y. H., & Choi, J. H. (2015).

The Veranda

The verandah is an essential circulation area between the deeper and entrance areas of the rooms, the foyer and the living compartment. Several activities are carried out in this space, including family relaxing, it's also considered as an informal space for family living, the verandah is occasionally employed or welcome intimate guest. The verandah is normally covered by the roof eaves extended from the essential living unit. The height of the expanded eaves is about 1.50-1.80 m above the verandah floor, which with the overhead height of a Lao person during that era was just high adequate for a person to walk under without banging one's head.

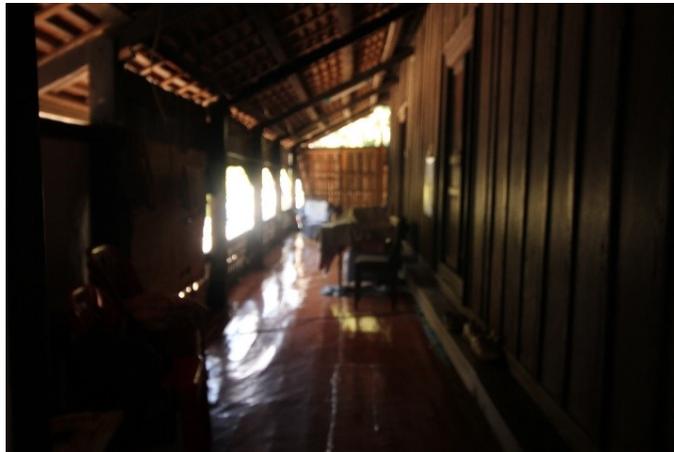


Fig.4- 8 Veranda area Lao Traditional House

Source: Author

Bedroom

The sleeping space is all the time sited in the upper floor. It is a closed place with a small number of windows and is not reachable for visitors. Sleeping quarters comprise a prayer room, storage, and a small altar. In most houses, people sleep on mattresses laid over pallets and covered by mosquito nets.

For during daytime, mosquito nets, pillows and mattresses are rolled up along the wall. In a traditional house, overall members of the family sleep in the same sleeping area, with excepting for a divided room offered for daughters who are old

sufficient to be married. During summer, sometimes, sleeping may be going on in the verandah. Consequently, the condition of sleeping area is favored rather than bedroom because the activity might take place in other areas besides bedrooms.



Fig.4- 9 Bedroom Lao Traditional House

Source: Author

Washing area

This space for cooking materials, washing dishes including vegetable, foods before and after having a meal. Space is an open area without any scene. Water blisters are put on half of the area for keeping the water supply.



Fig.4- 10 Washing area Lao Traditional House

Source: Author

Kitchen

The kitchen space usually is sited at the tail of the house. The kitchen is spatially divided from other enclosed areas because there is too much smell and smoke to cook inside, ashes and dirt produced from charcoal and firewood usage.



Fig.4- 11 Kitchen Lao Traditional House

Source: Author

Dining Area

Activities of having are flexible. Breakfast and dinner hold either on the open terrace or veranda space. In a new house, having area is assigned to space near to the living room or the kitchen. People, in general, have lunch outside the house, at work, in neighborhood food shops or in the field. If people have lunch at home, a balcony held in the under-floor area is a having place.



Fig.4- 12 Dining area Lao Traditional House

Source: Author

Living room

This space is multipurpose space regularly employed for official even and for welcome formal guest from another place for a visit, the guest employed this space including sleeping and living. Besides, it is religion ceremony place of Lao people, for instance, demise, nativity, and traditional welcome ceremony etc.



Fig.4- 13 Living area Lao Traditional House

Source: Author

4.2 Alteration Analysis

4.2.1 Comparing between Lao original traditional House and Alternative traditional House.

The case studies illustrate a comparison of twelve models of original house and adjusted ones of Lao traditional houses or buildings. All types of the houses have been registered by UNESCO as world heritage items since 1999 until now in the preservation ZPP-Ua zone.

Those houses will be compared and identified based on four main areas such as the function of the buildings or houses, and structure system, building materials, and Diagram. The following tables and diagrams will show the appearances of each house category for comparing the house models and characteristics before and after the houses are transformed or innovated. In order for examining the factors which significantly influence the modification or alternation of the houses in each category, the diagram will show both before and

after transformation of the houses' images. By doing this, it might be easier to understand transforming processes and factors including the current pressure of housing space demand inside the houses, generating income source, the influencing trend of modern house and increasing choices in terms of building materials in construction. It is interesting to find out the degree and flexibility of transformation and innovation under some social aspects and the regulations of urban heritage conservation which constrain the freedom of the house owners to transform or modify the physical space, styles, functions and construction materials in order to meet their needs.

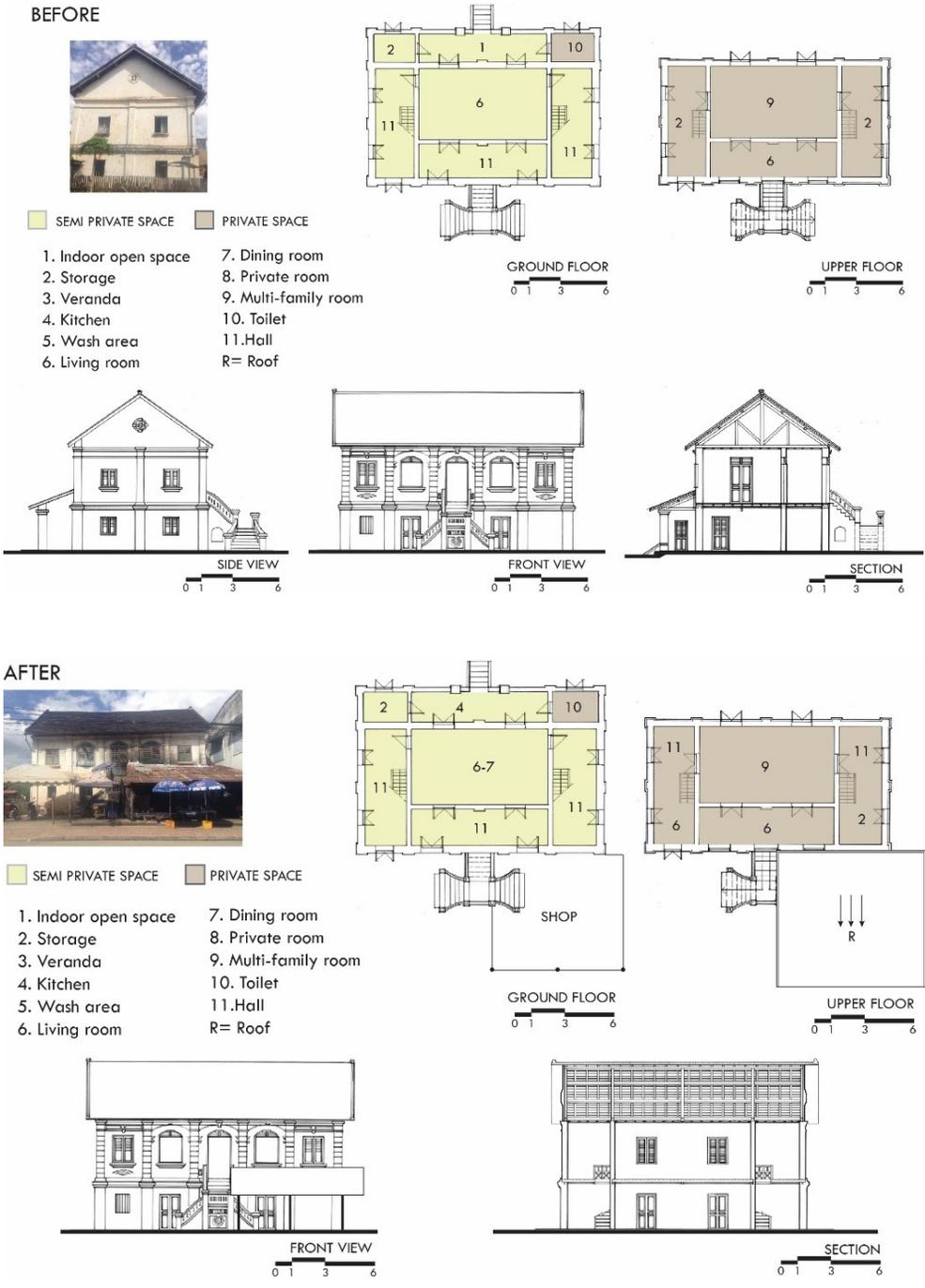


Fig.4- 14 Case Study H01-13

Source: Author

Table 4. 1 Comparison Lao Traditional House and Altered House H1-13

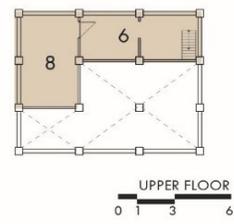
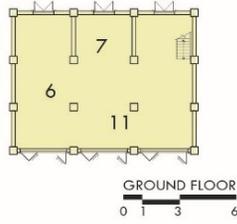
H01-13	Original	Transform	Viewpoint on altering the building
Function	<p>Ground floor: Enclosed floor</p> <p>Upper floor: Private room and multi-function</p>	<p>Enclosed floor with specific area and add a shop area in front of the building</p> <p>Private room</p>	<p>Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required</p>
Materials	Brick + Plastic wall, and Clay tile roof	Brick + Plastic wall, and Clay tile roof and Zinc roof at front building	
Structure	Wood and load-bearing wall	Wood and load-bearing wall, Structure extension at front building	
Diagram			

BEFORE

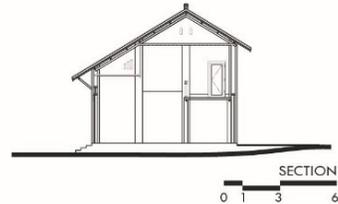
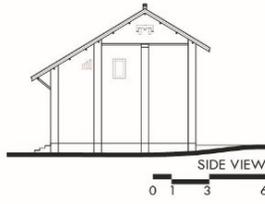
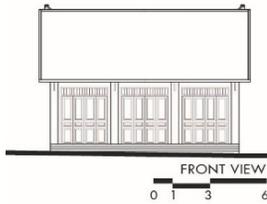
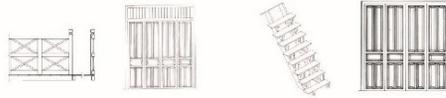


SEMI PRIVATE SPACE

PRIVATE SPACE



- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



AFTER



SEMI PRIVATE SPACE

PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |

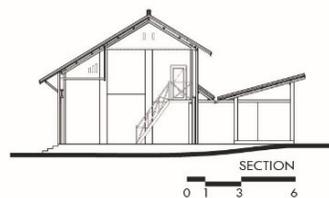
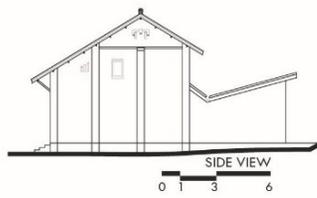
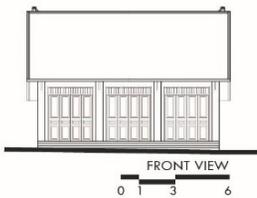
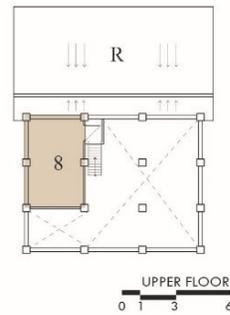
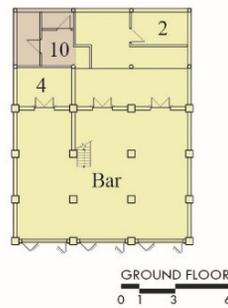


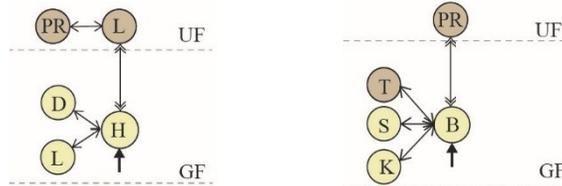
Fig.4- 15 Case Study H01-15

Source: Author

Table 4. 2 Comparison between Lao Traditional and Altered House H01-15

H01-15	Original	Transform	Viewpoint on altering the building	
Function	Ground floor	Enclosed floor	Enclosed floor, Re-arrange inside space from residential to Bar and add toilet, storage inside	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, it must be identically reconstructed as original ones.
	Upper floor	Living room and private room	Remove living room	
Materials	Brick + Plastic wall, Torchi, and Cement tile roof	Brick + Plastic wall, Torchi, Cement wall and Cement tile roof		
Structure	Wood and load-bearing wall	Wood and load-bearing wall		

Diagram



- K = Kitchen
- B = Bar
- PR = Private room
- H = Hall
- L = Living room
- D = Dining space
- T = Toilet
- S = Storage
- UF = Upper floor
- GF = Ground floor
- ↕ Go up stair
- ↔ Connecting

BEFORE

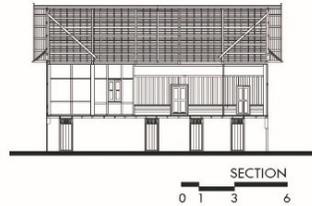
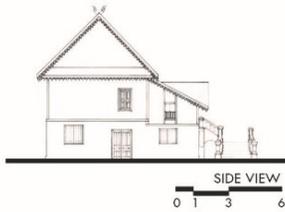
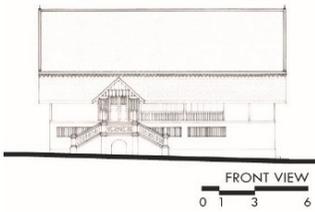
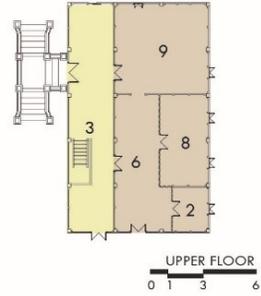


SEMI PRIVATE SPACE

PRIVATE SPACE

1. Indoor open space
2. Storage
3. Veranda
4. Kitchen
5. Wash area
6. Living room

7. Dining room
8. Private room
9. Multi-family room
10. Toilet
11. Hall
- R= Roof



AFTER



SEMI PRIVATE SPACE

PRIVATE SPACE

1. Indoor open space
2. Storage
3. Veranda
4. Kitchen
5. Wash area
6. Living room

7. Dining room
8. Private room
9. Multi-family room
10. Toilet
11. Hall
- R= Roof

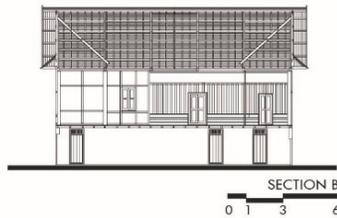
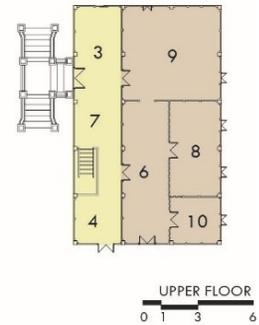


Fig.4- 16 Case Study H02-31

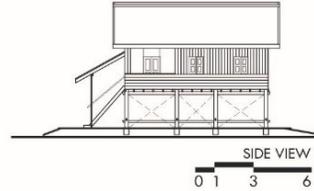
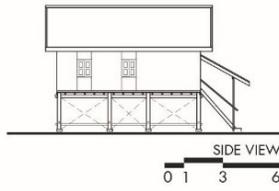
Source: Author

Table 4. 3 Comparison between Lao Traditional and Altered House H02-31

H02-31	Original	Transform	Viewpoint on altering the building
Function	<p>Ground floor: Enclosed floor</p> <p>Upper floor: Enclosed floor, Multifunction room</p>	<p>Re-arrange inside space from multifunction to office</p> <p>Enclosed floor and increase kitchen and toilet inside</p>	<p>Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.</p>
Materials	Brick + Plastic wall, Timber and Clay tile roof	Brick + Plastic wall + Timber and Clay tile roof	
Structure	Wood structure	Wood structure	
Diagram			

- K = Kitchen
- CV = Cover Veranda
- PR = Private room
- M = Multi-family room
- D = Dining space
- L = Living room
- O = Office
- T = Toilet
- S = Storage
- UF = Upper floor
- GF = Ground floor
- ↕ Go up stair
- ↔ Connecting

BEFORE

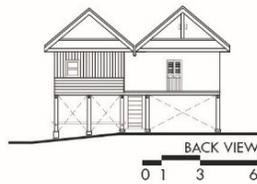
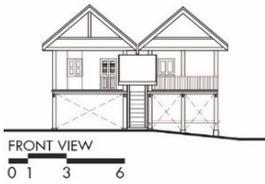
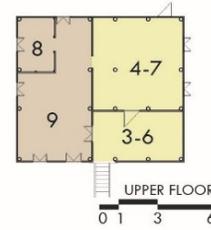
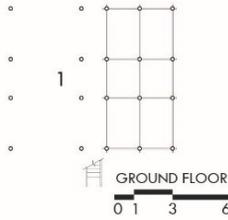


SEMI PRIVATE SPACE

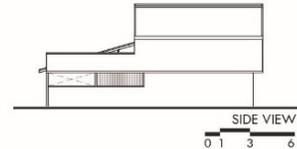
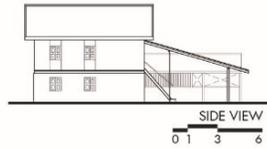
PRIVATE SPACE

- 1. Indoor open space
- 2. Storage
- 3. Veranda
- 4. Kitchen
- 5. Wash area
- 6. Living room

- 7. Dining room
- 8. Private room
- 9. Multi-family room
- 10. Toilet
- 11. Hall
- R= Roof



AFTER



SEMI PRIVATE SPACE

PRIVATE SPACE

- 1. Indoor open space
- 2. Storage
- 3. Veranda
- 4. Kitchen
- 5. Wash area
- 6. Living room

- 7. Dining room
- 8. Private room
- 9. Multi-family room
- 10. Toilet
- 11. Hall
- R= Roof



Fig.4- 17 Case Study H03-36
Source: Author

Table 4. 4 Comparison between Lao Traditional and Altered House H03-36

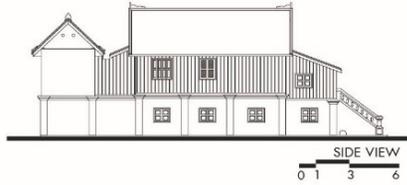
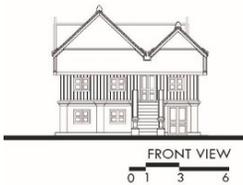
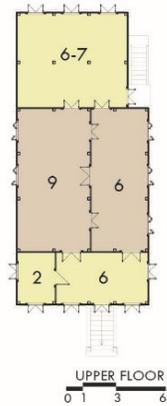
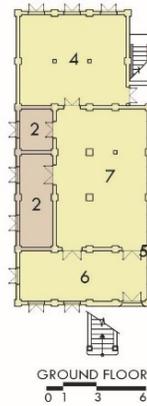
H03-36	Original	Transform	Viewpoint on altering the building	
Function	Ground floor	Open floor for multiple Purposes activities	Enclosed floor, addition particular area and built indoor open space of the building	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, it must be identically reconstructed as original ones.
	Upper floor	Enclosed private room and Multifunction		
Materials	Torchi + Timber and Clay tile roof	Torchi + Timber and Clay tile + Zinc roof and cement wall		
Structure	Wood structure	Wood structure, Extension Structure roof beside and front building		
Diagram			<ul style="list-style-type: none"> KD = Kitchen/Dining space CV = Cover Veranda PR = Private room M = Multi-family room L = Living room I = Indoor open space T = Toilet W = Wash area S = Storage UF = Upper floor GF = Ground floor ↕ = Go up stair ↔ = Connecting 	

BEFORE



SEMI PRIVATE SPACE
 PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



AFTER



SEMI PRIVATE SPACE
 PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |

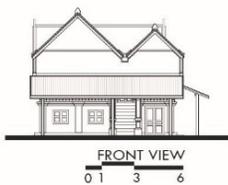
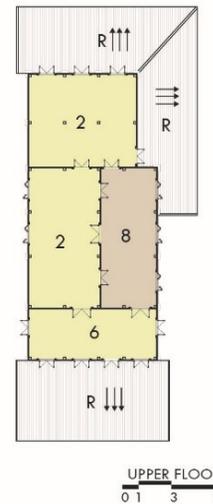
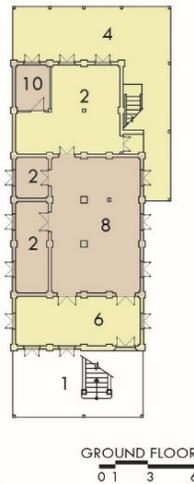


Fig.4- 18 Case Study H03-40

Source: Author

Table 4. 5 Comparison between Lao Traditional and Altered House H03-40

H03-40	Original	Transform	Viewpoint on altering the building
Function	Ground floor	Enclosed floor	Enclosed floor, add toilet inside and extension indoor open space on the building and kitchen
	Upper floor	Multifunction room	Increase more storage replace from multi-family room
Materials	Timber + Torchi, Brick+Plastic wall and Clay tile roof	Timber + Torchi, Brick+Plastic wall, Clay tile, Zinc and Ceramic and tile roof	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, it must be identically reconstructed as original ones.
Structure	Concrete and wood structure	Concrete, wood and add the steel structure for Zinc roof	
Diagram			

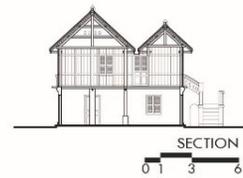
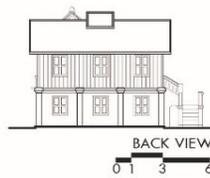
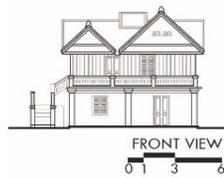
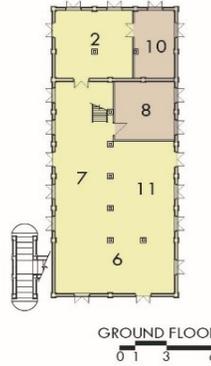
- K = Kitchen
- PR = Private room
- M = Multi-family room
- D = Dining space
- L = Living room
- I = Indoor open space
- T = Toilet
- S = Storage
- UF = Upper floor
- GF = Ground floor
- ↕ = Go up stair
- ↔ = Connecting

BEFORE



SEMI PRIVATE SPACE PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11.Hall |
| 6. Living room | R= Roof |



AFTER



SEMI PRIVATE SPACE PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11.Hall |
| 6. Living room | R= Roof |

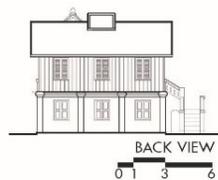
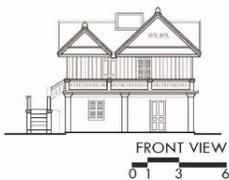
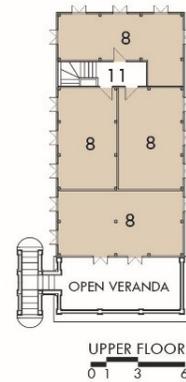
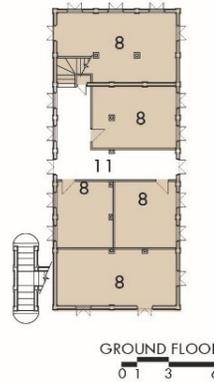


Fig.4- 19 Case Study H03-43

Source: Author

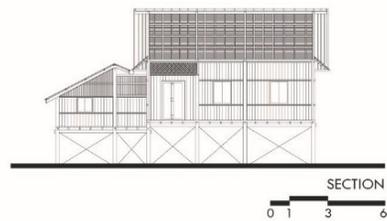
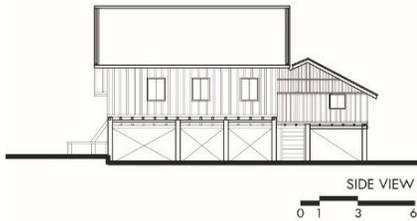
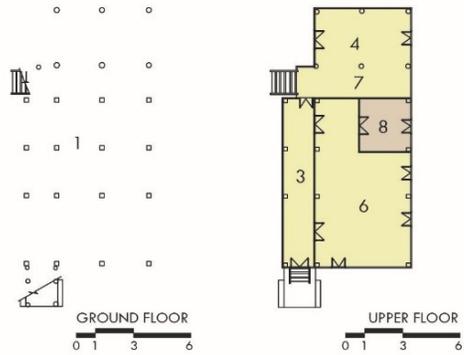
Table 4. 6 Comparison between Lao Traditional and Altered House H03-43

H03-43	Original	Transform	Viewpoint on altering the building
Function	<p>Ground floor: Enclosed floor</p> <p>Upper floor: Open veranda for relax and Enclosed floor</p>	<p>Re-arrange inside space and add private room from residential to Hotel</p> <p>Open veranda for relax and add more private room</p>	<p>Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine.</p> <p>Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.</p>
Materials	Timber, Brick +Plastic wall, and Clay Tile	Timber, Brick +Plastic wall, and Clay Tile	
Structure	Wood and add Concrete Structure	Wood and add Concrete Structure	
Diagram			
			<p>K = Kitchen</p> <p>OV = Open veranda</p> <p>PR = Private room</p> <p>M = Multi-family room</p> <p>D = Dining space</p> <p>L = Living room</p> <p>H = Hall</p> <p>S = Storage</p> <p>UF = Upper floor</p> <p>GF = Ground floor</p> <p>↕↕ = Go up stair</p> <p>↔ = Connecting</p>

BEFORE



- | | |
|---|--|
| SEMI PRIVATE SPACE | PRIVATE SPACE |
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11.Hall |
| 6. Living room | R= Roof |



AFTER



- | | |
|---|--|
| SEMI PRIVATE SPACE | PRIVATE SPACE |
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11.Hall |
| 6. Living room | R= Roof |

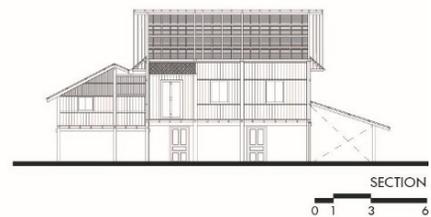
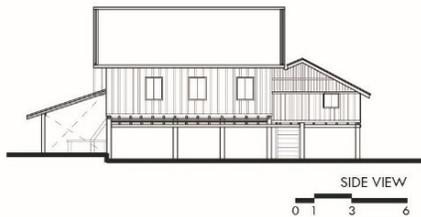


Fig.4- 20 Case Study H04-47

Source: Author

Table 4. 7 Comparison between Lao Traditional and Altered House H04-47

H04-47	Original	Transform	Viewpoint on altering the building
Function	Ground floor	Open floor for various purposes activities	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine.
	Upper floor	Private room and multi-function	
Materials	Used wood, clay tiles roof	Wood, cement wall, Zinc roof, and tile floor	Demolition is not allowed. In case of the demolition happens accidentally or malevolently, it must be identically reconstructed as original ones.
Structure	Wood structure	Wood structure, Structure extension of front building	
Diagram			<p>KD = Kitchen/Dining space CV = Cover Veranda PR = Private room M = Multi-family room L = Living room I = Indoor open space UF = Upper floor GF = Ground floor ↔ Go up stair ↔ Connecting → Entrance</p>

BEFORE

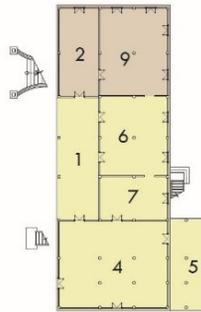


SEMI PRIVATE SPACE

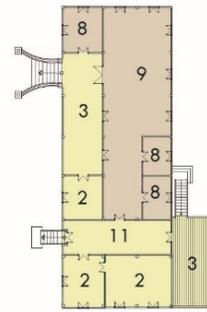
PRIVATE SPACE

1. Indoor open space
2. Storage
3. Veranda
4. Kitchen
5. Wash area
6. Living room

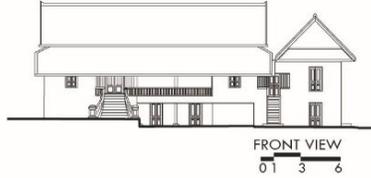
7. Dining room
 8. Private room
 9. Multi-family room
 10. Toilet
 11. Hall
- R= Roof



GROUND FLOOR
0 1 3 6



UPPER FLOOR
0 1 3 6



AFTER

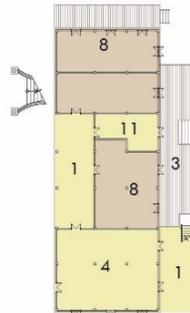


SEMI PRIVATE SPACE

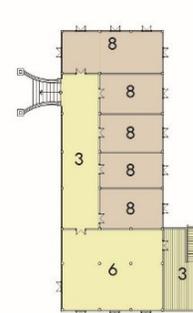
PRIVATE SPACE

1. Indoor open space
2. Storage
3. Veranda
4. Kitchen
5. Wash area
6. Living room

7. Dining room
 8. Private room
 9. Multi-family room
 10. Toilet
 11. Hall
- R= Roof



GROUND FLOOR
0 1 3 6



UPPER FLOOR
0 1 3 6

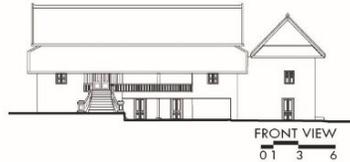


Fig.4- 21 Case Study H04-49

Source: Author

Table 4. 8 Comparison between Lao Traditional and Altered House H04-49

H04-49	Original	Transform	Viewpoint on altering the building
Function	Ground floor	Enclosed floor	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.
	Upper floor	Enclosed floor	
Materials	Timber + Torchi and Clay tile roof	Timber + Torchi + Cement wall and Clay tile and Flat roof	
Structure	Wood and load-bearing wall	Wood, load-bearing wall and Concrete structure	
Diagram			<ul style="list-style-type: none"> K = Kitchen CV = Cover Veranda PR = Private room M = Multi-family room L = Living room I = Indoor open space D = Dining space SS = Souvenir Shop H = Hall T = Toilet W = Wash area S = Storage UF = Upper floor GF = Ground floor ↕ = Go up stair ↔ = Connecting

AFTER



SEMI PRIVATE SPACE
 PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



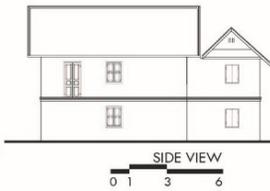
GROUND FLOOR
0 1 3 6



UPPER FLOOR
0 1 3 6



FRONT VIEW
0 1 3 6



SIDE VIEW
0 1 3 6



SECTION A
0 1 3 6



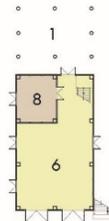
SECTION B
0 1 3 6

BEFORE

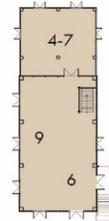


SEMI PRIVATE SPACE
 PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



GROUND FLOOR
0 1 3 6



UPPER FLOOR
0 1 3 6



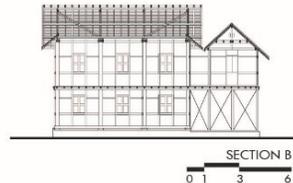
FRONT VIEW
0 1 3 6



SIDE VIEW
0 1 3 6



SECTION A
0 1 3 6



SECTION B
0 1 3 6

Fig.4- 22 Case Study H04-52

Source: Author

Table 4. 9 Comparison between Lao Traditional and Altered House H04-52

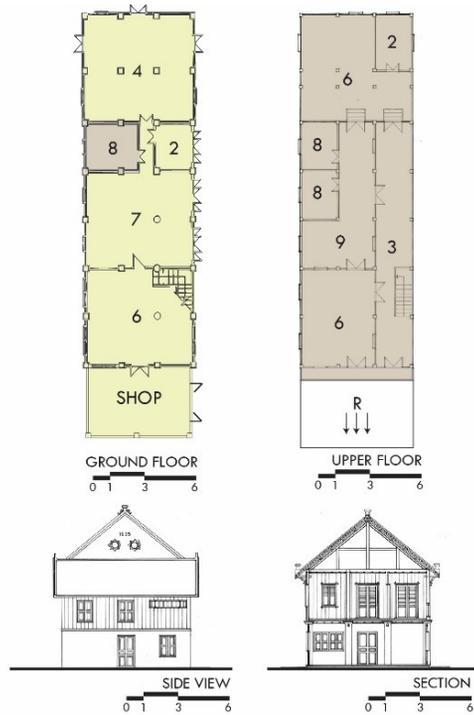
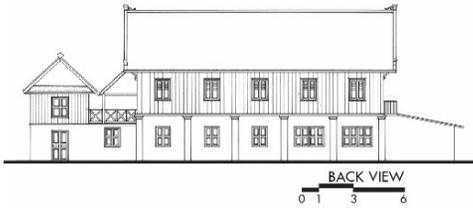
H04-52	Original	Transform	Viewpoint on altering the building
Function	Ground floor Open floor Enclosed floor	and Change from residential to office, Re-arrange inside space and Add toilet inside	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, it must be identically reconstructed as original ones.
	Upper floor Enclosed private room	Re-arrange inside space and add more toilet	
Materials	Torchi + Wood and Zinc roof	Torchi + Wood and Clay tile roof	
Structure	Wood structure	Wood structure and add wood structure for Clay Tile	
Diagram			<ul style="list-style-type: none"> K = Kitchen CV = Cover Veranda PR = Private room M = Multi-family room D = Dining space L = Living room I = Indoor open space O = Office T = Toilet S = Storage UF = Upper floor GF = Ground floor ↕ = Go up stair ↔ = Connecting

BEFORE



SEMI PRIVATE SPACE PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



AFTER



SEMI PRIVATE SPACE PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |

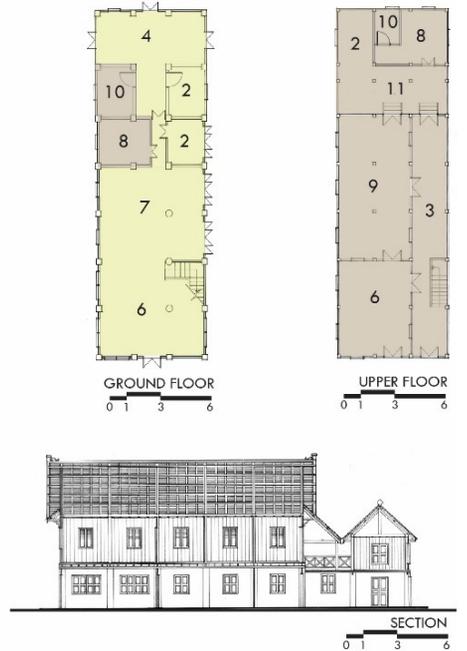


Fig.4- 23 Case Study H04-56

Source: Author

Table 4. 10 Comparison between Lao Traditional and Altered House H04-56

H04-56	Original	Transform	Viewpoint on altering the building
Function	Ground floor	Enclosed floor	<p>Enclosed floor and has to remove shop from residential to the front of building and add toilet, storage inside</p> <p>Remove private room from main house and add a private room at storage room and toilet inside</p>
	Upper floor	Veranda, Living room and private room	
Materials	Brick + Plastic wall, Timber, and Clay tile roof	Brick + Plastic wall, Timber, Cement wall and Clay tile roof	<p>Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed.</p> <p>In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.</p>
Structure	Wood and cement	Wood and cement	
Diagram			

- K = Kitchen
- H = Hall
- SH = Shop
- M = Multi-family room
- L = Living room
- V = Veranda
- D = Dining room
- P = Private room
- S = Storage
- T = Toilet
- UF = Upper floor
- GF = Ground floor
- ↕ = Go up stair
- ↔ = Connecting

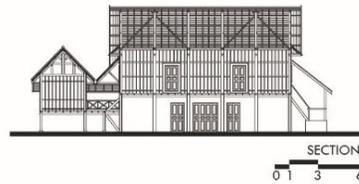
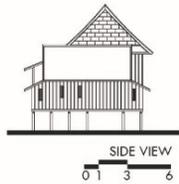
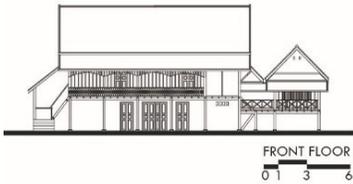
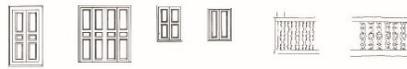
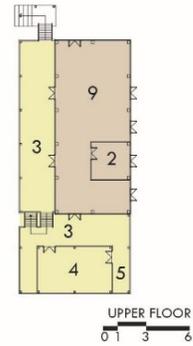
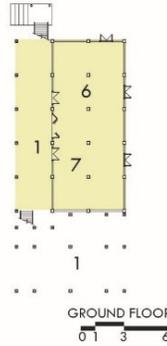
BEFORE



SEMI PRIVATE SPACE

PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



AFTER



SEMI PRIVATE SPACE

PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |

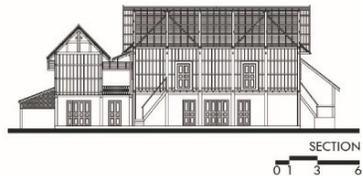
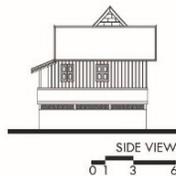
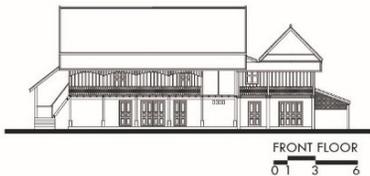
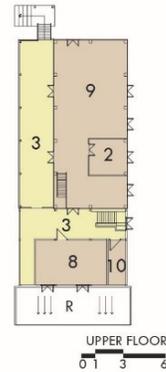
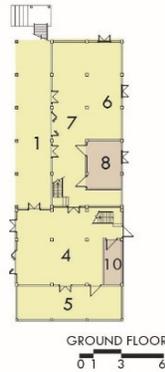


Fig.4- 24 Case Study H04-57

Source: Author

Table 4. 11 Comparison between Lao Traditional and Altered House H04-57

H04-57	Original	Transform	Viewpoint on altering the building
Function	Open floor and Enclosed floor	Enclosed floor, add private room, kitchen, toilet and wash area inside and used indoor open space for commercial	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.
	Upper floor Multifunction room	Increase more private room and toilet inside	
Materials	Brick + Plastic wall +Timber and Clay Tile	Brick + Plastic wall +Timber and Clay Tile	
Structure	Wood structure	Wood structure and add Concrete column for kitchen	
Diagram			<ul style="list-style-type: none"> K = Kitchen CV = Cover Veranda PR = Private room M = Multi-family room L = Living room I = Indoor open space D = Dining space T = Toilet W = Wash area S = Storage UF = Upper floor GF = Ground floor ↕ Go up stair ↔ Connecting

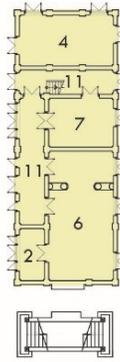
BEFORE



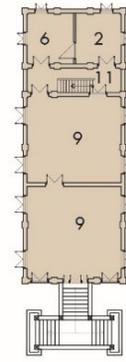
SEMI PRIVATE SPACE

PRIVATE SPACE

- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



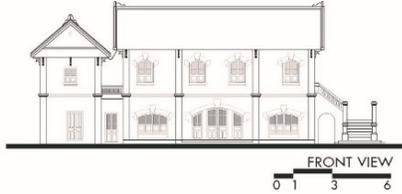
GROUND FLOOR
0 1 3 6



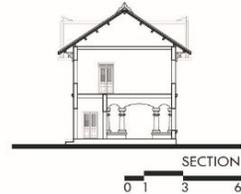
UPPER FLOOR
0 1 3 6



SIDE VIEW
0 1 3 6



FRONT VIEW
0 1 3 6



SECTION
0 1 3 6

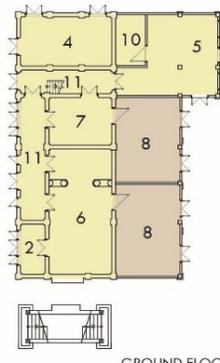
AFTER



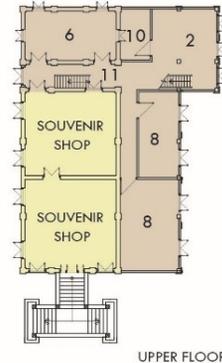
SEMI PRIVATE SPACE

PRIVATE SPACE

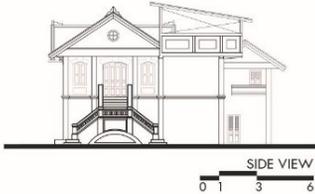
- | | |
|----------------------|----------------------|
| 1. Indoor open space | 7. Dining room |
| 2. Storage | 8. Private room |
| 3. Veranda | 9. Multi-family room |
| 4. Kitchen | 10. Toilet |
| 5. Wash area | 11. Hall |
| 6. Living room | R= Roof |



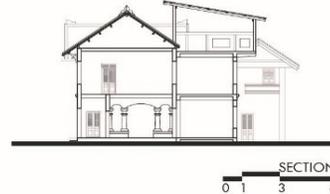
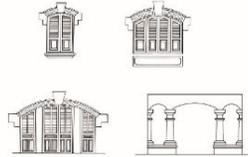
GROUND FLOOR
0 1 3 6



UPPER FLOOR
0 1 3 6



SIDE VIEW
0 1 3 6



SECTION
0 1 3 6

Fig.4- 25 Case Study H04-59

Source: Author

Table 4. 12 Comparison between Lao Traditional and Altered House H04-59

H04-59	Original	Transform	Viewpoint on altering the building
Function	Ground floor	Enclosed floor	Rehabilitation work is needed in order to keep identity as the same as original ones. There is a possibility in evolution but that evolution must be determined case by case and on the agreement of La Maison du Patrimoine. Demolition is not allowed. In case of the demolition happens accidentally or malevolently, reconstructing to keep the identity as the same as original ones is significantly required.
	Upper floor	Enclosed floor	
Materials	Timber + Torchi and Clay tile roof	Timber + Torchi + Cement wall and Clay tile and Flat roof	
Structure	Wood and load-bearing wall	Wood, load-bearing wall and Concrete structure	
Diagram			<ul style="list-style-type: none"> K = Kitchen CV = Cover Veranda PR = Private room M = Multi-family room L = Living room I = Indoor open space D = Dining space SS = Souvenir Shop H = Hall T = Toilet W = Wash area S = Storage UF = Upper floor GF = Ground floor ↕ = Go up stair ↔ = Connecting

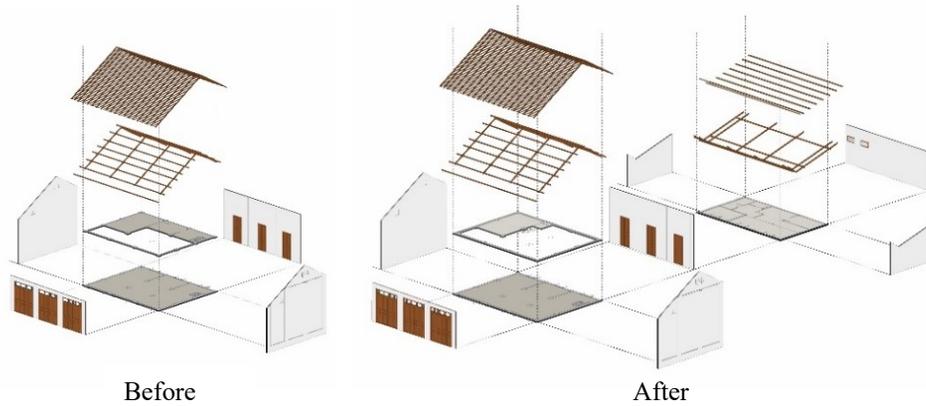


Fig.4- 26 Process of Alteration Case Study H01-15

Source: Author

4.2.2 Summarizing House Alteration

When the original houses and transformed houses are compared among 12 case studies, it shows that there is a lot change in space arrangement inside the house which is previously built based on geometric rules but the space of those houses are currently adjusted based on the land parcel's geometry. The multifunctional spaces of the houses are adapted into single-function spaces or rooms. Secondly, the sharing private space and closed living spaces are modified and adapted on the spaces of semi-open, open and closed space of houses which are used to be the spatial diversity of the houses. Thirdly, the balconies of the housed which functions as combining between closed spaces within houses often are transformed into rooms. Besides this, some spaces of original houses are lost or replaced by other additional spaces which are used to serve new functions. In some cases, new materials are used and new structures are additionally built.

Table 4. 13 Summarizing the comparison results between altered and original houses

Categories	Original House	Transformed House	Remark
Function	The first floor on ground	It is an open-space for multi-functions such as chatting place for neighbors other community members during day-time, gathering family members, public works or activities, etc.	The multi-functions are designed but there is increasing trend in building private rooms or spaces for eating, cooking, and other family-oriented activities and it is more often used in the night-time. Additionally, some buildings or houses are transformed into stores, guesthouses, hotels, etc. for serving commercial purposes or generating more income source.
	Upper floor	The upper floor is commonly used as cooking, eating, sleeping spaces or family-oriented activities during day-time	The main function of the upper floor is mostly used as sleeping rooms attached with toilet. This area is considered as more private area than before.
Materials	Locally available materials and some modern materials are used	There are many kinds of materials are used and combined together such as brick, concrete, clay tile roof, timber structure, brick walls with plastering and Zinc.	
Structure	Used Traditional methods, engineering and architecture techniques in building houses.	Mixing between traditional and Modern engineering and architecture techniques in constructing buildings or houses	

The transformation of house functions is normally converted houses from fewer spatial categories into more spatial categories within a house. This means that the house with more flexible and homogeneous spatial utilization is often replaced by specific spatial types for specific functions or more privacy. This change or transformation is influenced by increasing needs in economic benefit, privacy, convenient life as well as new cultural influence and global trends in-house designs and preferences. Due to the lack of control of regulations in transforming or innovating the functions of traditional houses, some traditional house' spatial characteristics are lost or destroyed. It is possible to say that economic pressure and struggling for the better living condition are the main reasons which drive the transformation and changes in traditional houses during this globalization era.

Because of flexible and dynamic building in construction, there is a huge transformation in housing structures and materials. Due to the fact that the traditional house is mostly built by wooden materials with traditional styles and techniques, the traditional house is easily transformed or modified in order to meet the needs of occupants. In addition, permanent and static construction materials are used instead of traditional materials with more modern construction techniques and durable. For instance, cement and brick are increasing used in the ground floor or reinforcing the existing house structure in the construction. New construction technology, availability of new construction materials and globalization trends are main causes of all innovations and transformations in traditional houses.

4.3 Problem of Altering Lao Traditional Houses in ZPP-Ua Zone

Based on the outcomes of the comparison in Table 4.11, there are a number of factors which influence the transforming and innovating actions in traditional houses of Lao people (Heuan Lao) in Luang Prabang. These factors can be grouped in three significant groups including socio-economic demand, globalization trend in housing, and regulation pressure. These three main factors play a key role in influencing the transformation and changes of Lao traditional houses in Luang Prabang city.

4.3.1 Globalization

The globalization trend is considered a major factor which can influence or force the changes and transformation in Lao traditional houses in Luang Prabang. The reason is that the evolution of traditional houses is greatly influenced and facilitated by new technology and modern life style trends. Globalization term is often heard and become common word for many people. Globalization creates a wide range impacts around the world. In fact, globalization is publicly used to describe the ability of publics to access to huge information around the world because of a quick development in technology and communication system. This directly impact big cities on the earth. The basic conflicts between modern (new) and traditional (old) are also sharpened by the globalization trend. The globalization can be possibly classifying into three main areas including new global materials, global technology and global lifestyles. As mentioned in the remarks of Table 4.11, the transformation of traditional houses is mainly influenced by the modern technology in construction techniques and constructing materials. Under the pressure of modernization and globalization trend, houses are also adapted by people in order to facilitate their desires and needs. Because of this, there are a lot of changes in both physical and morphological appearances.

The expectations and needs to modernize traditional houses are also caused by the possibility and availability of modern building materials. In the process of house transformation, a modern house style has appeared. The transforming in the physical appearance of houses often leads to contradiction to the original characteristics and traditional context of houses. There are many cases which heritage values and aesthetic quality of traditional houses are reduced or damaged by house modification or transformation. Therefore, it is possible to conclude that globalization can lead to negative and positive impacts on traditional houses and local communities. And the trend of globalization can rapidly influence traditional houses and traditional culture of houses.

4.3.2 Regulations on Urban Heritage Conservation.

Another factor that has a great influence on transforming traditional houses in Laos is urban regulations and the regulation of UNESCO on world heritage site. These regulations have shaped and controlled the freedom of transforming traditional houses of Local residents in Luang Prabang. The original characteristics, structure and architecture of traditional houses are not allowed to transformed or adapted based on the mentioned above regulations. In addition, all transformation of traditional houses must be under control of regulation on urban heritage conservation. The UNESCO and government regulations directly contribute to protecting and conserving the uniqueness and identities of traditional houses of Laos under pressure of economic-dominant trend and globalization era. In order to conserve the heritage values and manage the transformation of traditional houses and urban expansion in Luang Prabang World Heritage zone, the regulation on conserving traditional houses and heritage buildings which is called “Plan de sauvegarde et de mise en valeur de Luang Prabang⁷³” is approved by the government in 2001.

Historic buildings and traditional houses can effectively contribute to promoting the sustainable development of local residents and their cultural identities through modern times which can create a huge change in human traditional custom and cultures. The historic buildings, traditional houses and their surrounding environment should be efficiently and professionally protected and conserved in the original location. In many cases, ancient or the oldest buildings or constructions are located in the less and least-developed area in terms of social-economic development. This situation has directly posed a threat to both the buildings and protection measures due to the careless intervention and lack of support in conserving measures from the concerning authority. In some cases, the cultural and traditional values of those ancient and old buildings are destroyed and damaged. Because of this, professional conservation is needed to protect buildings from losing cultural and

⁷³ there will be more details at La Maison du Patrimoine (2001) Plan de sauvegarde et de mise en valeur de Luang Prabang. Luang Prabang. Lao PDR.

traditional values. And the effective conservation measures can possibly protect the traditional houses from modernization processes and globalization trends. The cultural values of traditional houses might be threatened by globalization trends and modernization processes. Conversely, local economy and the life quality of local people can be improved and supported, if there is continuous maintenance in ancient and old buildings or construction. The reason is that it can draw attraction of tourist's other commercial services to the areas. In the same vein, a good and effective management system for conserving ancient buildings can lead to poverty reduction as well as maintaining cultural identity and values for the next generations.

4.3.3 Socio-Economic

Another significant impact factor for transforming traditional houses in Luang Prabang is socio-economic pressure. This factor also significantly influences the motivation of transforming or modifying traditional houses as it is expected. The reason is that modern lifestyle has been gradually overlapping traditional life style. Because of this change, some traditional and cultural practices have been lost and some significant characteristics of traditional houses and spaces are diminished, as indicated in Table 4.11. The majority of local residents are categorized as Buddhism. So, traditional houses are also influenced by Buddhist context as well in terms of social aspect. The constructing techniques and structures, materials of houses are still influenced by surrounding environments and culture. Because of this, houses can reflect the relationship between surrounding environmental factors and local culture well. Due to the fact that house design and functions are significantly influenced by cultural ideas and values, people with different cultural background might experience different housing styles and designs. In Laos, the traditional house formation is also guided by religious factor which is one of the most important factors in guiding house construction or formation. There is a specific process of daily life that includes surrounding environments, reality of daily life and existing human being of people in social dimension (Lawrence, 2000). Social cultural factors are considered as an important influence to shape people's needs and views on

building and forming houses⁷⁴.

The economic influence is the third factor which has a potential force on transforming the traditional houses in the city of Luang Prabang. Because of continuous growth in tourism industry and economic pressure in local area, the local residents attempt to transform traditional houses for commercial purposes such as stores, hotels, guesthouses, etc. Based on the comparison between original and transformed traditional houses in Table 4.11, it shows that the majority of transformed traditional houses or buildings are transformed into office, shops, guesthouse, hotels and restaurants for the purpose of income generation. There are many cases that traditional houses are transformed in order to facilitate commercial purposes and generate income source for family because it is lack of guidelines and rules for transforming traditional houses or buildings for the purpose of enterprise in small scale. This kind of income generation in the local community is considered as an important and effective method for diminishing and reducing poverty. And this is also a significant strategy for survival. In some circumstance, subletting rooms can also generate income, but it is often criticized for causing poor quality living. Some house transformations for the commercial purpose would be possible and it is up to the physical layout of the construction plans and house designs. However, they are mostly neither compatible nor cost-effective.

⁷⁴ Lawrence, R. J. (2000).

5. Conclusions

This study reveals how the domestic experience and the physical attributes of the house in Luang Prabang have been transformed due to their needs of new modern lifestyle and adapting the conservation regulation of Luang Prabang world heritage city. The traditional houses with delicate styles and delightful architectural features have not been completely changed socio-cultural values. The traditional houses have been modified for fitting the needs of local people and residential occupants as the social environment have been rapidly evolved. The 'Place Model' can be used to summarize the impact of these social changes on the domestic lives and housing styles in Luang Prabang. For instance, the traditional house with open-air design has been modified and transformed into a traditional house with enclosed and sealed off from the elements⁷⁵. This may be the consequence of increased concern for household security along with increasingly isolated homestead type settlements. This is a plausible explanation for why several architectural features of historic homes such as see-through fences, balustrades, and foldable terrace doors have been replaced with fixed and solid walls.

The changing in living style with the availability of modern amenities and conveniences have resulted in a huge change in the interior space of the transformed houses such as specificity in the spatial types and number of spaces, and use of walls and other barriers as social insulation among spatial types. Some spatial types, for example, washroom or toilet is added in order to provide convenience for residents; while another type is that open-kitchen or storage area has emerged as a consequence of modern necessity or unintended deviation from a traditional design. By comparing to the original traditional house with a relatively homogeneous spatial type where most spaces except the kitchen are empty of furniture and it can be converted to fit with multi-functional uses. The spatial categories of the transformed houses have become more specific, and less conducive to contracture alteration due to the conscious utilization of furnishings in a new era as obstructions. In short, the difference between the original traditional houses and the transformed houses might be greater when they are evaluated at the level of the overall appearance. The

⁷⁵ Canter, D. (1977).

pattern of space in both types still encourages family activities although the needs for privacy seems to be increasing in the modified houses.

The wave of transforming traditional house has begun when the city of Luang Prabang was listed as World Heritage city by UNESCO in 1995. From that historically remarkable event for all Lao people; there is a huge and rapid change in terms of living and housing styles of local people in Luang Prabang. There have been a huge improvement and renovation in the traditional houses in the area in order to facilitate commercial purposes and tourist services. However, the improving and renovating traditional houses of local residents to fulfill the economic needs are still under a certain degree of flexibility. During the traditional period, the forms and styles of the houses were designed to fit people's needs in daily life. Currently, houses are built and designed based on new social-economic trend and new lifestyle in the modern world.

In the case studies in this research, it also shows that housing demand and generating income for low and middle classes have a close relationship with the changes in traditional houses in Luang Prabang. Because of increase in living cost and economic growth in the local area, the traditional houses have been adapted and transformed by their owners for providing services for tourists and local visitors. In order to transform and adapt traditional houses to meet the economic demand and the needs of people, modern building materials and new technology in construction are used. As a result, the new styles and designs of houses appear through the processes of transforming traditional houses in Luang Prabang. According to the results of this study, it indicates that traditional house is forced to transform itself because of a number of factors such as globalization trend, local authority's regulations, economic needs, and social factors. These factors are main and significant causes in transforming and modifying traditional houses in Luang Prabang. The influence of modern trend and globalization in housing architecture, construction, design, and construction have a marvelous impact on daily life and traditional houses. However, the dwellers and local residents of traditional houses

can still maintain the historical and traditional culture and values of traditional houses.

In order for conserving Lao traditional house' values and diminish the damage of its unique characteristics, authorities have strictly enforced regulations and laws by issuing and enforcing some regulations on urban heritage conservation. In addition, the transformation and modification of traditional houses are also controlled by the heritage conservation regulations in Luang Prabang city. This regulation directly functions as controlling measures for coping with globalization trends and economic demand which are considered as main threats to Lao traditional houses in Luang Prabang. The cultural values and main characteristics of traditional houses are protected by urban heritage conservation regulation. Because of this, the local residents cannot transform the traditional house to meet all their needs or freely. However, the driving forces of economic needs, social trend, and globalization influence can cause some significant changes in Lao traditional house's style, identity, and characteristics. And then the combining between traditional and modern houses also emerges at the same time. And this new change or transformation has become a significant development in architectural sustainability. Even though there are a huge change and transformation in Lao traditional houses, the main physical appearances and functions of traditional houses should be harmoniously fit with traditional values, new lifestyles and socio-economic needs in a new era of the human community. Otherwise, the traditional and cultural values which are inherited by many generations of humankind will permanently disappear from our society and the world without effective management in transforming and modifying traditional houses.

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국문초록

라오스 루앙프라방 세계유산 대상지 ZPP-Ua 지역의 민가 개량 문제에 관한 연구

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세계화는 지난 수십년 동안 사회-경제 및 문화적 분야에서 극적인 변화를 일으켰고, 도시 환경 또한 새로운 수요와 욕구에 부응하도록 사람들로 하여금 주택의 디자인과 건설 방식을 변화시키도록 하면서 세계적 동향에 영향을 받아왔다. 이 연구는 1995년 이후 유네스코에 의해 라오스의 첫번째 세계유산 대상지로 지정된 독특한 고대 도시 루앙프라방을 대상으로 한다. 루앙프라방은 여러 세대에 걸쳐 계속해서 계승되고 있는 전통 풍습과 문화가 완벽하게 반영된 유·무형 문화재로 가득하다. 이 연구는 라오스 민가의 초기, 프랑스 식민지 시기 그리고 현대에 걸쳐 라오스 민가에 영향을 주는 다양한 주요 요소들을 분석하는데 목적이 있다.

그 외에도 이 연구를 통해 루앙프라방 전통 민가의 문화 생활 양식과 특징도 엿볼 수 있다. 특히, 지역 기후 변화에 적응하기 위한 라오스 전통 건축물에서 흔히 사용되는 건축적 요소와 재료 및 주요 구조에 대한 목적과 기능을 살펴볼 것이다. 프랑스 식민지 시대 동안의 라오스 전통 건축과 프랑스 건축의 조화로운 조합은 이 시기의 새로운 가치와 번영을 보여준다. 이러한 독특한 건축 및 건설 양식은 세계유산 루앙프라방 지역의 가치 있고 중요한 정체성이 되었다. 때문에 숙박시설 등 건축물의 양식과 정체성은 최근까지도 잘 보존되어 있다. 하지만 사회-경제적인 개발 수요가 있는 몇몇 고대 건축물들은 여전히 변화하며 이를 수용해왔다.

루앙프라방이 세계유산 대상지로 지정되고 전통 가옥들이 사회-경제적 필요에 의해 개발 압력을 받게 된 이후, 변화의 속도는 더욱 빨라졌다. 이 연구는 또한 라오스 민가의 개량과 변형의 주요 원인과 세계화 추세에 맞도록 전통 가옥을 개량하는데 영향을 미치는 요인을 규명하는데도 주안점을 두고 있다. 이 연구에서는 전통 가옥의 특성을 보전하기 위한 직접적인 조사와 더불어 루앙프라방 전통 가옥의 사례 연구를 통해 전통적인 가옥 구조의 변형과 개량을 찾아내고자 했다.

이 연구는 라오스 전통 민가의 변형과 개량에는 몇가지 중요한 요인들이 있다는 것을 보여 준다. 세계화 추세, 규제, 사회-경제적 요인들은 루앙프라방 전통 주거의 변형과 개량의 주된 원인들이다. 또한 이 연구의 사례는 루앙프라방의 저소득층과 중산층 주민들에게 중요한 소득을 가져다 주는 경제적 혜택과 지역 주민들의 숙박 수요 증가에 따라 전통 주택의 변화가 영향을 받으며 동기 부여 된다는 것을 보여 준다. 그 외에도, 이 연구는 과도기 동안 전통 가옥 특성의 보존과 수요에 의한 변화가 결합되는 일상적 생활을 바탕으로 새로운 형태의 숙박 시설과 주거 공간이 설계되고 변형된다는 것을 시사한다.

키워드: 루앙프라방 세계유산, 라오스 민가, ZPP-Ua 지역의 라오스 민가 개량, 지속 가능한 건축

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