Inhabitants Consciousness Concerning Detached Houses in the City and Suburbs of Vientiane, Lao PDR
-A Case Study of Students' House at the National University of Laos-

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Abstract
This paper seeks to examine the relationship between detached houses and the consciousness of the inhabitants concerning their house in the city and suburbs of Vientiane in the Lao PDR. The relationship between hardware aspects such as the physical dimensions of the house, and its floor plan are compared to the software aspects, such as the character of family homes and household size, and the usage of the area in each room. The opinions of respondents regarding their own house are also examined. These points can be summarized by the following issues: 1) the character of the type of houses was examined by using the statistic method of Hayashi's quantification theory III; 2) the character of families residing in detached homes and household size; 3) the house size or floor area in each house type; and 4) the level of satisfaction of inhabitants with their houses, which relates to current changes in culture and social concerns. Field surveys were performed to obtain information from students of the Faculty of Architecture at the National University of Laos using questionnaires. The main findings were: 1) single families are living in more modern houses (one-story brick houses) whereas multi-household families are living in more traditional houses (wooden stilt houses); 2) inhabitants of one-story brick houses were more satisfied with the bedroom and other rooms than inhabitants of houses in other types; and 3) inhabitants of traditional houses (wooden stilt houses) complained about the rooms.

Keywords: consciousness; detached house; inhabitant; suburbs

1. Introduction
In the thirty three years since the Lao PDR gained independence, the capital city, Vientiane, has experienced remarkable growth, and multiple modern housing developments have appeared throughout the city and suburbs ². During the period of rapid economic growth in the 1990s, Vientiane became one of the leading economic powers in the country, and the character of both urban and suburban areas surrounding the city was rapidly transformed. In the mid-1990s, however, the cultural heritage sites of Vientiane and other regions in the Lao PDR suffered extensive damage (William S. Logan, C. Long, and R. Hansen, 2003), due primarily to the increased number of foreign tourists and foreign investment. In addition, young people in rural and remote areas gradually migrated to the cities, thus increasing the urban population. These cultural trends created an immediate need for more residential development in Vientiane.

Conventional, unaltered Lao houses are rare in Vientiane. Some of these have been voluntarily modified by inhabitants, while others have decayed over time and were replaced by newer modern buildings. Many conventional houses in Vientiane have undergone significant modifications and have lost their original architectural integrity (C. Sayarath, 2003). As Lao villages are often built near rivers and streams that sometimes flood during the rainy season, conventional houses are frequently raised on stilts and one must climb steps to reach the house. In addition, building the house on stilts can protect the house from mud, floods, as well as wild animals.

In contemporary Lao houses that have been inspired by these older conventional houses, the lower half of the house is often walled in around the stilts and this enclosed area is used as a living area. These houses...
representing Lao architectural heritage are at the highest risk of disappearing (S. Clement-Charpentier & P. Clement, 2003)

Most houses found in Vientiane and other regions are built in a contemporary or modern style, with various design elements. However, there are problems stemming from these modern houses that vary according to the living requirements and culture of the inhabitants, and include a mixture of designs. These problems have been exacerbated by the inadequate current housing design trends of several companies, who even occupy them themselves.

Such changing trends in housing development are the result of rapid changes in economic, culture and societal changes in the way of life of the city's inhabitants.

The aim of this paper is to identify the relationship between detached houses and the inhabitants' consciousness. The authors examine the relationship between hardware aspects such as the physical dimensions and floor plan of houses in each identified type, and compare them to software aspects such as the character of family homes, household size, and the usage area of rooms in each type of house. In addition, the authors examine the following issues: 1) the character of families and household size; and 2) the level of satisfaction of inhabitants with their houses, which relates to changes in culture and social concerns.

2. Method

The questionnaire included the following three items: 1) subjects' awareness of the style of their own house; 2) information on family members; and 3) subjects' satisfaction with the basic function of the house. The survey was administered between October and November 2008.

2.1 Subjects of research

Subjects comprised students in the Faculty of Architecture at the National University of Laos. One hundred and fifty questionnaires were administered to second to fifth year students in the Architecture Design Course, with the assistance of administrative staff, teachers and students. The contents of the questionnaire were explained to the subjects for an hour, after which the subjects took the questionnaire home and returned it one to two weeks later. Altogether, the informants in the present survey include thirteen second-year students, thirty-four third-year students, eight fourth-year students and twenty-nine fifth-year students, as shown in Table 1.

Table 1. Subject of Research

<table>
<thead>
<tr>
<th>Subject</th>
<th>Apply</th>
<th>Response</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second-year students</td>
<td>30</td>
<td>13</td>
<td>9%</td>
</tr>
<tr>
<td>Third-year students</td>
<td>35</td>
<td>34</td>
<td>23%</td>
</tr>
<tr>
<td>Fourth-year students</td>
<td>32</td>
<td>8</td>
<td>15%</td>
</tr>
<tr>
<td>Fifth-year students</td>
<td>53</td>
<td>29</td>
<td>19%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>84</td>
<td>56%</td>
</tr>
</tbody>
</table>

Subjects were divided into two groups: those living with parents or relatives were assigned to Group 1, while those living alone were assigned to Group 2. In the questionnaire, subjects in Group 1 were asked to provide information about all of their recent residences and all family members with whom they were living. Subjects in Group 2 were asked to provide information about their parents' houses (or the house where they lived as a child) and all family members that they used to live with. The result of response rate in Group 1 was 75%, while that in Group 2 was 25% as shown in Table 2.

Table 2. Response Rates for Groups 1 and 2

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of responses</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>63</td>
<td>75%</td>
</tr>
<tr>
<td>Group 2</td>
<td>21</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>100%</td>
</tr>
</tbody>
</table>

3. Result and Discussion

3.1 Housing groups

Sixty photos of Laotian houses, selected from six types, were included in the questionnaire (Fig. 1.). Students were asked to choose five photos that were most similar to their house.

According to Komoto et al., house types consist primarily of the following five types: 1) one-story brick houses; 2) earth floor houses; 3) stilt houses; 4) two-story houses (half-brick and half-wooden, previously stilt houses); and 5) two-story brick houses (J. KOMOTO S. SITTHIVAN K. YOSHIDA, 2004). However, the above five types of houses that were selected by Komoto are the types of Lao-house found in suburban areas of Laos (in the middle region of Laos about 150km north of Vientiane). In this study the authors applied a questionnaire to students who live in both rural and urban areas. They found that there are also other types of housing in urban areas, particularly in Vientiane. Therefore, a sixth type of house was identified; the shop house, which is often found in the city. Therefore, this was added to the questionnaire.

Type 1, one-story brick house: A contemporary modern house constructed using modern materials such as concrete, bricks, and tiles. This kind of house is often found in urban areas.

Type 2, earth floor houses: A typical house built on the earth with typical materials such as bamboo strips for the walls, and thatch or thick woven leaves for the roof. This kind of house is often found in the mountainous and rural areas.

Type 3, wooden stilt house: A typical house built on stilts. There is one or two walled off rooms at the back or side of the house. Bamboo slats are used for the floor and woven mats of thin bamboo strips are used for the walls. The house might be built of wood with a corrugated tin roof. People who can not afford to buy materials construct their house with wood and bamboo they get from the forest. The roof can be made
of thatch, or a thick covering of leaves layered over the top of the house. Wooden stilt houses are typical structures in remote rural areas.

Type 4, two-story houses (half-brick and half-wooden, previously stilt houses): Formerly a stilt house, with the lower half of the house walled in around the stilts by brick and floored with cement. The lower enclosed area is used as a living area and as an extension of the bedroom, kitchen and toilet.

Type 5, two-story brick house: A contemporary modern house constructed using the same materials as Type 1, but with two stories.

Type 6, shop house: A structure consisting of shops on the ground floor, opening up to a public arcade, and residential accommodation upstairs. Shop houses usually form rows with a regular facade, firewalls and adherence to street alignment.

According to S. PHONGSAVANH and H. ABE, type 2 and type 3 houses reflect the traditional Lao style, while type 5 houses represent a more modern style; type 1 and type 4 are transitional stages between the traditional and the modern house (S. PHONGSAVANH and H. ABE, 2008). In the questionnaire used in this study, subjects were asked to range five photos in order of similarity to their own homes. The results are shown in Table 3.

When the authors checked the students' responses, Hayashi's quantification theory type III (Kasai TOSHIHARU, 2008) was applied to estimate the similarity, using the binary data of the 84 students. In using this method, similar items are closely plotted in the graph.

The result is shown in Fig.2. X-axis refers to traditional or modern design and Y-axis refers to rural or urban location. Numbers 1 to 60 of the photos distributed in Fig.2., were closely grouped, and the
authors assigned them to 5 groups in the graph, such as; type 4 (Fig.1.; numbers 6, 10, 11, 26, and 27; type 1 (Fig.1.; numbers 28, 29, 30, 39, 40, 41, and 42); type 5 (Fig.1.; numbers 31, 32, 33, 34, 35, 36, 43, 44, 45, 46, 47, and 58); and type 6 (Fig.1.; numbers 37, 38, 48, 49, 50, 51, 52, 53, 54, 56, 57, 59, and 60). However, there was no difference between type 2 and type 3. It is likely that students were not able to distinguish between these two types; these houses (Fig.1.; numbers 1, 2, 3, 4, 5, 7, 8, 9, 13, 14, 18, 19, 20, 21, 22, 23, 24, and 25) were assigned collectively to the same type as type 2 and 3. Therefore, house types were adjusted so that 5 types could be clear. Moreover the authors focused on 4 types without type 6 to the next analyzing process, since detached houses are discussed in the following section of this paper.

3.2 Households and Families

The terms "household" and "family" do not refer to the same thing. A household is composed of one or more people who occupy a housing unit, and, as such, not all households contain a family. Under the US Census Bureau definition, family households consist of two or more individuals who are related by birth, marriage, or adoption, although they may also include other unrelated people. Normally, households consist of people who live alone or who share their residence with unrelated individuals.

In this study, average household size (number of family members) in the investigation area was 5.5 persons, the same as the average household size for the whole of the Lao PDR. The character of the subjects' households was determined based on the relationship between household members. Households were divided into the following types, indicated by gray shading in Fig.3.

A: Single household family: A family comprised of a couple with or without one or more children.

B: Extended household family: A single household family who lives with grandparents and/or the spouses of married children.

C: Multi-household family: A family comprised of multiple single household families, including

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Fig.2. Distribution of Houses based on the Student's Choice Pattern in the Questionnaire

Fig.3. Household Family Character
grandparents, uncles, aunts, grandchildren, spouses of married grandchildren.

Fig.4. illustrates the proportion of each household type for the four types of houses. Multi-household families (C) were most common in type 2 and 3 (wooden stilt houses), relatively rare in type 4 (mixed wooden/brick houses) and type 1 (one-story brick houses) and common in type 5 (two-story brick houses). Single household families (A) were most common in type 1 modern (one-story brick houses). Extended household families (B) were rare in type 2 and 3, somewhat more common in type 4 and type 1, and somewhat rare in type 5. These results suggest that single families are living in modern (one-story brick houses), while multi-household families are living in traditional (wooden stilt houses).

Household size in type 1 is smaller than that of type 2 and 3: as 5.22 and 6.55. Household size for other types (type 4 and type 5) are in between type 1 and type 2 and 3, as 5.8, 5.85 respectively. Basic statistical data revealed a decrease in the household size in all of the Lao PDR from 5.7 to 5.5 between 1995 and 2005. From this data, it may be predicted that the single household family and house type 1 will increase in the future.

Table 4. Average Household Size for Each House Type

<table>
<thead>
<tr>
<th>House Type</th>
<th>Household size (person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>5.22</td>
</tr>
<tr>
<td>Type 2 and 3</td>
<td>6.55</td>
</tr>
<tr>
<td>Type 4</td>
<td>5.85</td>
</tr>
<tr>
<td>Type 5</td>
<td>5.80</td>
</tr>
</tbody>
</table>

3.3 House and room size

In this section, house size (i.e. floor area) was examined using floor plans sketched by students. The authors show an example of floor plans for each house type as follows:

Plan of type 1: Fig.5. is the floor plan of house type 1; the smallest in range with a gross floor area of 135.60 m² as a one-storey brick house, there is only a ground floor which offers space comfortable for living.

Plan of type 2 and 3: Fig.6. is the floor plan of house type 2 and 3: this wooden stilt house property has an open space under the house. The gross floor area is 173.37 m² and the stilt house is accessed by stairs to the balcony. The toilet and bathroom in the stilt houses are usually separate, although traditional Lao houses often have no toilet or bathroom as people bathe in the rivers and use the forests near the village as a toilet.

Plan of type 4: Fig.7. is the floor plan of house type 4; house type 4 has a floor area of 195.09 m². It is a mixed wooden/brick house, which was formerly a stilt house. The lower part of the house is surrounded by a wall, and the entire lower area is floored with cement. Areas such as the living room, dining room, kitchen, and toilet/bathroom were built in. There is only one bedroom on the first floor.

Plan of type 5: Fig.8. is the floor plan of a type 5; house; type 5 is a contemporary modern two-story brick house that is more expensive to build. The floor area is 223 m² and is the largest in range compared to the other types. The composition of the room area is more complicated than the other types.

Fig.9. illustrates the proportion of floor area for each house type. The results revealed that the sleeping area is the largest. Whereas, type 2 and 3 and type 4 are similar in proportion, type 5 had a large sleeping area and type 1 had a large living room.
In addition, Table 5 illustrates the floor area and standard deviation. The total floor area of house type 1 is smaller than the other types. Single household families (A) were most common in type 1 (Fig. 4.). The household size of type 1 is the smallest (Table 4.), and the total floor area of house type 5 is the largest of the 4 types. However, multi-household families (C) are not living in type 5 houses. Instead, they are living in type 2 and 3 houses that have a floor area of 135.60 m² that is the second smallest of the 4 types.

The social issue of traditional houses in Laos is that many persons are living in a smaller size house.

3.4 Consciousness of Inhabitants

Students were asked to choose five photos of houses that they liked and disliked. The results are shown in Fig. 10.

Almost 48% of subjects liked type 5 houses (two-story brick houses), whereas only 8% disliked this type. Type 2 and 3 houses (wooden stilt houses) were favored by 22% of subjects whereas 35% of respondents disliked these types. Twelve percent of respondents liked Type 1 houses (one-story brick houses) and only 5% disliked them. Less than 10% liked type 4 (mixed wooden/brick houses) and only 2% disliked them. Type 4 showed a lower rate of interest in both figures suggesting that subjects were generally uninterested in mixed wooden/brick houses.
In contrast, type 2 and 3 houses (wooden stilt houses) were disliked by many students, whereas type 5 houses (two-story brick houses) were the type of house liked by most students. Thus, while most people continue to appreciate traditional Lao houses, wooden stilt houses do not effectively address the needs of people living in urban areas.

The overall satisfaction of inhabitants in regard to the basic components (rooms) of each house type was examined. Fig. 11 illustrates the satisfaction of inhabitants concerning their respective house type. The graph reveals that inhabitants of house type 1 and type 4 were more satisfied with their houses than those living in house type 2 and 3, and type 5.

Inhabitants of type 1 house (one-story brick houses)
Inhabitants of this type were more satisfied with the bedroom and other rooms than inhabitants of houses in other types. The average household size in type 1 was smaller than in the other types, and single household families were more prevalent in type 1 than in the other types. The survey also found that inhabitants of this type, especially young couples, are satisfied with separate bedrooms in modern houses.

Inhabitants of type 2 and 3 houses (wooden stilt houses)
Inhabitants of this type complained about the rooms. Type 2 and 3 are smaller in size in spite of more people living there (multi-household families). This type was disliked by many students (inhabitants). The main reason was the small size of the house. However, in this type, the living room gave more satisfaction than the other rooms. This suggests that the living room of traditional houses is more comfortable for the Laotian's life-style.

Inhabitants of type 4 house (mixed wooden/brick houses)
Inhabitants of this type were the most satisfied with all the rooms. Type 4 is transformed from the type 2 and 3 houses (wooden stilt houses) by a wall surrounding the stilts. The inhabitants reported more satisfaction with this type of house, with a larger living area and the extension of the bedroom, kitchen and toilet.

Inhabitants of type 5 house (two-story brick houses)
Although this type is the largest house size and was liked by many students, the inhabitants of type 5 (two-
story brick houses) complained about all the rooms. The reasons for this are unclear but may be due to the floor plan of this type of house or may be due to other factors such as the inhabitants’ character. These issues will be examined in more detail in a future study.

4. Conclusion

Analysis of the inhabitants' consciousness concerning detached houses revealed the following results:

1. Single families are living in modern houses (one-story brick houses) whereas multi-household families are living in traditional houses (wooden stilt houses).
2. Single-families are living in smaller modern type 1 houses while multi-household families (C) are living in smaller type 2 and 3 houses. This relates to the social issue of traditional houses in Laos where many inhabitants live in a smaller size house.
3. Inhabitants of type 1 houses were more satisfied with the bedroom and other rooms than inhabitants of other types of houses. The average household size in type 1 houses was smaller than in the other types, and single household families were more prevalent in type 1 houses than in the other types.
4. Inhabitants of type 2 and 3 houses complained the most about the rooms. These types of houses were among the smaller sizes in the survey. Although more people lived in type 2 and 3 houses (multi-household families), this type was disliked by many students (inhabitants) due to house size. However, the living rooms of type 2 and 3 houses were more satisfying than the other rooms. This finding suggests that the living room of traditional houses is the most comfortable for the Laotian life-style.

This paper is one of the few studies that have attempted to investigate the relationship between well-being and house design in Laos. This preliminary study has used a small, discreet sample size (i.e. select group of students) and while absolute conclusions are difficult to state with certainty the trends in the data support the findings of this paper. Future work is planned to expand to a more general urban population and as a result increase the number of subjects.

References