

# Space Planning Factors of Terengganu Traditional House

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## Abstract:

Due to the importance of designing the internal space in the houses in order to create a space suitable for all family members and their activities, this study applied Principle Component Analysis (PCA) and Cluster Analysis at determining the effect of space planning factors on traditional houses in the state of Terengganu. In order to achieve the objective of the study, a questionnaire was designed as a main tool for collecting data. A total of 350 responses from the Terengganu citizens were obtained but only 325 valid responses were used for the analysis. The study found that there is great importance for space planning in traditional house, the characteristics and forms of architectural spaces greatly affect human behavior, and there is a relationship between the distribution of furniture and internal spaces of the house, and color is an important element in the planning of the interior space of houses, as it affects the sensory and visual perception of individuals.

*Keywords* — Furniture, Floor, Windows, Suitable rooms, Social needs.

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## INTRODUCTION

People's interest in the design of their houses in a beautiful and quiet, stems from the fact that the house is the most place where people spend their time, so people try to provide safe and comfortable houses for relaxation and recreation, where people seek to design houses that maintain their health and autonomy and give a kind of aesthetic to their lives [17].

According to [19] a good, quiet and beautiful home is a goal for all individuals. The individual's ability to reach the home of his/ her dreams is based on many factors, like: economic factors, environmental factors, interior and exterior design, the internal contents of the house such as lighting and others, as well as the social and cultural factors of the place in which the individual lives.

There are many factors that affect the home and the quality of life in it, these factors include: space planning of the house [10] pointed that there is importance of the space planning of the house, which reflects the environmental characteristics of the area, and values and culture of individuals, where the space planning of the home greatly affects the quality of life inside the home and the level of privacy.

Also, air circulation considered important element for improve indoor air quality through providing fresh air and removing indoor pollution concentration, and in order to provide better air quality and suitable temperature indoor there are two ways, first one through energy, while the second one through natural ventilation that consider more use, because of increasing people awareness about energy saving [21]

Although the quality of homes today depends on modernity and style rather than the traditional and cultural characteristics of the residential area, there are still many individuals who prefer to live in traditional homes derived from their environment and cultural and social customs [10]. This can be seen in the state of Terengganu, where there are many houses of traditional character that build from wood and bamboo and be high from the ground. The study points that the reason for the continued construction and use of houses of traditional character is that the quality of housing considers factor that affect the quality life of individuals, therefore individuals like to build houses fit with the nature of their lives.

The study considers that the space planning of the house is important factors in the design and construction of homes, because of its multiple effects on the quality of the home and the individuals living in it. All these reasons motivated the researcher to study and analyse the effect of space planning on the Terengganu Traditional Houses (TTH).

### **PROBLEM STATEMENT**

Terengganu Malay house is characterized by a purely traditional character, where it is a wooden house that is built on high terraces about two meters from the ground, and it contains walls made of wood or bamboo, where the house in Terengganu reflects the creative and aesthetic skills in Malaysian culture, in addition to meeting the needs of individuals social, cultural, economic and because of air circulation for the indoor house, also the traditional house in the Terengganu is flexible in the sense that it is possible to extend the house if needed.

h Many studies, such as [3], [5], [10], [9] have pointed to the importance of interior design including space planning and the level of lighting in houses and their impact on the quality and nature of the lives of individuals living in the house, where it is necessary to focus on the quality of the space planning of the house in accordance with the needs and requirements of individuals, in addition to

focus on the level of lighting at home and its impact on the behaviour of individuals and their mental state.

Through the presence of a researcher in the Terengganu, observed the nature and quality of traditional houses, and noted that the traditional houses lack some characteristics, such as the quality of the space planning of the house, which greatly affect the level of privacy of individuals living in the house.

Many studies have been conducted about the interior design of Malaysian houses as example: [6], [16], [10] but none of the mentioned studies has been examined the effect of space planning of the Terengganu Malay houses. Therefore, this study tries to analyse the effect of space planning as part of interior design on the Terengganu Malay houses. The main question of the study can be summarized as follows: what the extent of space planning factors in the Terengganu Malay houses from the point view of Terengganu population?

### **LITRETURE REVIEW**

The houses represent the place or space that individuals spend most of their time in it, therefore, individuals are very interested in the design of the houses whether interior or exterior, where the design of the house shows the nature, trends and feel of human beings, that's why there are many differences in the designs, colours and lighting of houses, so we can say that house designs represent what an individual feels through the environment in which he/she lives [17].

### **OVERVIEW OF TERENGGANU HOUSE**

The house is one of the wealthiest heritage components in Terengganu. It is designed and built by the users themselves according to the needs of the users with the integration of nature and the environment in the design, and is used in the building of local resources and raise the house on solid wooden substrates to solve the problem of wetlands and wet tropical climate and also With rain that often leads to flooding [4].

While modern design is an important point in achieving what is required, so it is a developmental process that helps to enhance the function of internal spaces in order to improve the quality of life and increase the proportion of privacy within the home while preserving the civilization of the target community in the study [5]

House is not only a place to get rest and do activities but also treated as a pride for the Malay community. The values contained in the spatial layout of the house have specific meaning to the owners. This makes the Malay house becomes the symbol of pride to uphold the “tuah” and dignity of the owner [18], where most modern housing developments in Malaysia built under the new standards and regulations have been planned on a gridiron layout to maximize the use of the land and hence building densities. To maximize the use of land evermore, most of the houses are built in terrace form. This sort of housing development pays little respect to the local landscape and thus causes a negative impact on the environment. Unfortunately, terraced housing represents the most common type now being built in urban areas [11.]

The traditional Malay house is an important source for the creation of a Malaysian identity in architecture because it reflects and expresses the way of life of its users and was evolved by the Malays over generations adapting to their needs, culture and environment [11].

[12] analysed the obstacles which face the reinventing Traditional Malay House for Sustainable Housing Design, also the study try to provide some of proposed Solution. In addition investigated factors of developers reluctant to build the Traditional Malay House and correct the public misconception toward the housing perception. This study adopted a quantitative methodology survey questionnaire and in-depth interview were conducted. The results indicate that costing is the major problem for housing developers to construct Traditional Malay House.

[16] studied the process of redesigning traditional Malaysian houses according to the elements of comfort designs used in modern homes. The study was based on a set of interior design elements, such as thermal comfort, interior Design Area, lighting and ventilation, the method of observation and the method of interviews and some research visits were used in order to achieve study objective, the study was carried out on traditional houses in the Malaysian state of Selangor and on one modern building, the Ministry of Energy and Green Technology and Water, the study reached a number of results: there are similarities between the thermal comfort of traditional Malay house and modern building in Malaysia, the comfort design elements used in modern buildings in Malaysia are better than the design elements used in traditional homes, as they maintain temperature and ventilation adequate.

#### *A. Interior Design (Space Planning)*

The focus of interior design is to use interior elements, furniture, and other design tools to create a unique space that meets the physical and psychological needs of those who will live there. However, it is not just a case of painting walls and hanging a few curtains. One important component of interior design is to understand how those who inhabit a space perceive it based on a wide range of factors. Interior designers use tools and resources to help create a space that appears the way it is intended to be seen by the designer and the user, regardless of the constraints of the space or the way it appears prior to the work of the designer [2].

Also, Design is an important point in achieving what is required, so it is a developmental process that helps to enhance the function of interior spaces in order to improve the quality of life and increase the proportion of privacy within the home while preserving the civilization of society in the study [20].

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Interior design is defined as the process of planning and design of interior spaces, which aims to harness the material, spiritual and social needs of the people, in addition to ensuring the safety of the building. The interior design consists of technical and planning aspects, as well as aesthetic and artistic aspects [8].

In addition, the interior design expresses the ability to create the place to perform the job assigned to it with the least effort, as it represents the art of processing the place by exploiting all the elements available in a way that helps to feel comfortable and help work, by contributing to the creation of non-traditional solutions suitable for the place and choice of materials And appropriate colours [1].

Space planning is a complex process; it includes a variety of information, elements and processes related to the organization and construction of buildings, such as: environmental monitoring techniques, and the use of the principles of the Building code. In addition, space planning needs a lot of requirements whether in small or large buildings, as it is impossible to avoid these requirements in all types of buildings [15].

[4]analysed the impact of roof colour on the temperature inside the house, the study was applied in Hadhramour region in Yemen, the questionnaire was used into cases, first case is before painting the house, while the second case after painting the house, in both cases the white collar used, also air temperature taken every 3 hours, the study found a number of results, the most important of which is that the white colour significantly affects the temperature inside the house. The white colour reduces the internal air temperature from (0.1 to

2.3°C). In addition, the use of white reduces air temperature Indoor.

The interior space is in fact a space of three important dimensions, the content is the fourth dimension and these dimensions are [14].

1. Space dimension: represents the standard dimensions of space.
2. Architectural dimension: represents the aesthetic perception of space and its formation.
3. Social dimension: represents the appropriateness of space for the user socially and psychologically to
4. practicemultiple activities, the user may be an individual or a group.

**METHODOLOGY**

This study is quantitative in nature, where quantitative approach was adopted in order to establish a framework of conservation principles for space planning in Terengganu traditional house (TTH).

The following figure represents independent and dependent study variables:

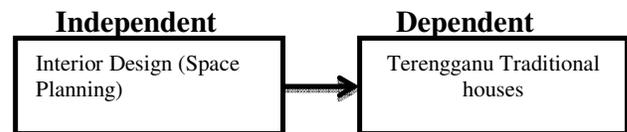


Fig.1: Study Model

Table I: Descriptive statistics of space planning attributes

	N	Mean	Std. Deviation
Interior Space Needs	325	4.5828	.59340
Interior Space Elements	325	5.2123	.64968
Space Planning	325	4.8975	.53934

**A. Study Respondents**

The respondents of the current study are Terengganu citizen, where the reasons for choose this respondents stem out from their knowledge and culture about the topic of this study. This sample comprised (350) individual's that selected

in randomly way from total of Terengganu population, for apply the study instrument.

**C. Study Instrument**

The researcher in the current study relied on the questionnaire as a main tool for collecting data. The questionnaire, based on the Likert scale which consisting of seven choices ranging from strongly agrees and strongly disagree to a relative weight (1-7). The questionnaire divide into two main sections, the first concerned with the personal data of the respondents, while the second about the subject of the study and includes a set of paragraphs that relate to space planning.

**D. STATISTICAL METHODS**

For the analysis of the study data analyzed by SPSS program (23), through: descriptive statistics (arithmetic mean and standard deviation), Principal Component Analysis (PCA), and Cluster Analysis.

**DATA ANALYSIS AND DISCUSSION(SPACE PLANNING)**

In this section, the researcher offers the results according to the statistical analysis of the collected data. The findings of the research were tackled with regard to the research question. Therefore, the researcher employed different statistic formulas (descriptive analysis, principle component analysis, and cluster analysis) to show the final results of the collected data.

To answer this section the researcher used Principle Component Analysis (PCA) as follow:

The above table showed the mean and standard deviation for each space planning attributes; where the mean for whole section (space planning) was (4.8975), and the standard deviation was (.53), also the (interior space elements) attribute got the highest rate of approval among the other attributes with mean (5.21), then (interior space needs) came at second rank with mean (4.58). The following figure explains the mean bar graph of space planning.

The following figure describes the screen plot graph for space planning factors.

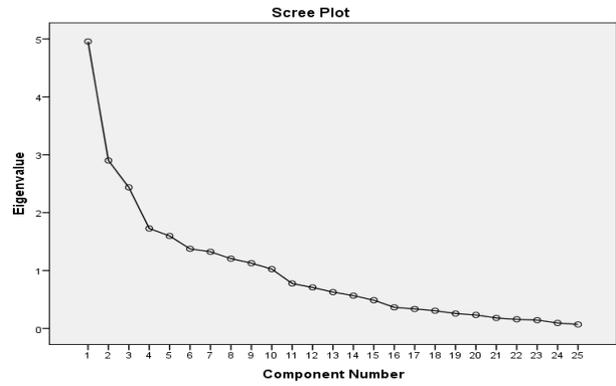


Fig.2 :Screen plot graph of culture heritage

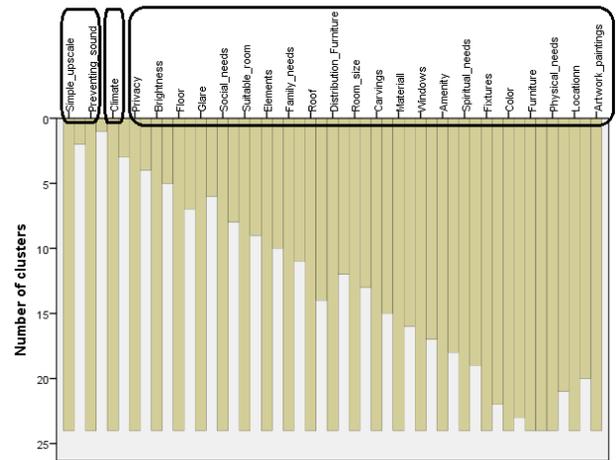


Fig. 3: Vertical Icicle

The scree plot is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. It can be seen that the curve begins to flatten between factors 10 and 11. Note also that factor (11) onwards have an eigenvalue of less than 1, so only (10) factors have been retained.

From the above table and figure can indicate that there are (10) factors, as follow:

First Factor: This factor represents (19.824) of the total variance. This ratio indicates that this factor is of great importance. This factor includes (10) attributes (Artwork painting, location, amenity, social needs, physical needs, fixtures, furniture, windows, color, and room size) with a saturation of

(.578, .667, .543, .507, .714, .554, .667, .620, .526, .603) respectively.

Note that all the common attributes in the first factor relate to the psychological and health situation of individuals, as the paintings, color, and amenities all affect the psychological state of individuals, by giving some kind of positive thinking and moving away from negative things. While, the quality of furnishings, the size of the room and the windows affect the health of individuals by providing comfortable seating and adequate lighting for the lives of individuals in their homes.

Second Factor: This factor represents (11.604) of the total variance. This ratio indicates that this factor is of great importance. This factor includes (4) attributes (Simple upscale, floor, brightness, and elements) with a saturation of (.521, .599, .562, .550) respectively.

Third Factor: This factor represents (9.745) of the total variance. This ratio indicates that this factor is of great importance. This factor includes (4) attributes (Privacy, family needs, distribution furniture, and roof) with a saturation of (.588, .624, .656, .630) respectively.

Fourth Factor: This factor represents (6.906) of the total variance. This ratio indicates that this factor has some importance. This factor includes (1) attribute (floor) with a saturation of (.518).

Fifth Factor: This factor represents (6.388) of the total variance. This ratio indicates that this factor has some importance. This factor includes (1) attribute (glare) with a saturation of (.513).

Sixth Factor: This factor represents (5.498) of the total variance. This ratio indicates that this factor has some importance. This factor includes (1) attribute (climate) with a saturation of (.669).

Seventh Factor: This factor represents (5.297) of the total variance. This ratio indicates that this factor has some importance. This factor doesn't include any attribute.

Eighth Factor: This factor represents (4.823) of the total variance. This ratio indicates that this factor has a little importance. This factor includes (1) attribute (simple upscale) with a saturation of (.675).

Ninth Factor: This factor represents (4.513) of the total variance. This ratio indicates that this factor has some importance. This factor includes (1) attribute (preventing sound) with a saturation of (.546).

Tenth Factor: This factor represents (4.102) of the total variance. This ratio indicates that this factor has a little importance. This factor includes (1) attribute (suitable room) with a saturation of (.504).

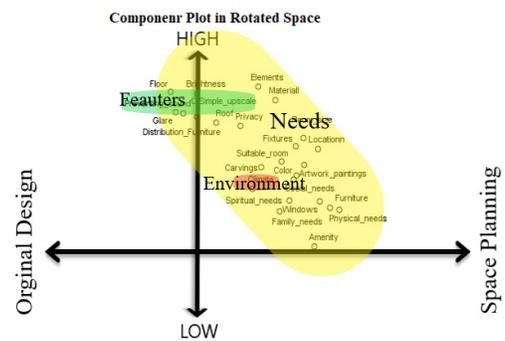


Fig. 4: Component Plot in Rotated Space in 2-dimensions

The Component Plot in Rotated Space in two-dimensional form of validation questionnaire as shown above in the Figure had stated that there are three cluster involved, including needs, environment, and features group. The above figure indicated that, the most of the keyword were located in the first quadrant had shown that the positive outcomes where it is indeed a very good and positive result.

There are 2 keyword involved in the first cluster or also known as the features group, including: (preventing sound and simple upscale) keywords. Features help individuals to highlight the beauty and elegance of the house, and add some kind of vitality to the place, especially as it is subject to change, which makes them eliminate boredom and monotony and give the members of the house a sense of renewal.

There is 1 keyword (climate) involved in the second cluster or also known as the environment group, where environment conditions such as climate is the first reason for individuals to build houses, where houses help individuals to protect them self from heat and cold.

The needs group as the third cluster that consists of 22 keywords, including: (artwork painting, family needs, amenity, furniture, location, glare, privacy, suitable room, floor, fixture, material, elements, roof, carving, colour, room size, and windows) which is the majority of the keyword located in the first quadrant which is positively good result and reaction form the chosen respondents. The needs of family members are the main and important factor in the design of internal spaces and without them are not completed the elements of interior design, it is the mediator between architecture and its users, as we move in the form and scale between the interior space and human, and human needs have evolved significantly and marked over the ages.

The data in the above table showed that, if the factors divided into three clusters, where first cluster contains four group the factors will distributed into these groups, where (17) factors came at first group, while one factor came at second, third and fourth group, then when the factors move to the next cluster the location of last three factors changed, which means that this change describe the steps of collected factors together.

The following graph describe the demonstrate how to figure groups, and provides a metric to distance link.

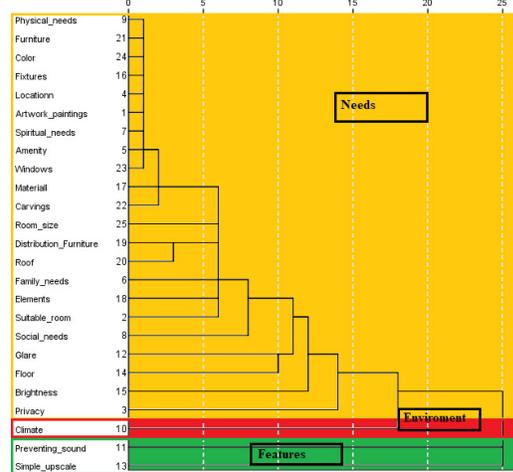


Fig.5:Dendrogram

E. INTRODUCTION Cluster Analysis

Table II: Cluster Membership

Case	Cluster		
	4Cluster	3Cluster	2Cluster
Artwork paintings	1	1	1
Suitable room	1	1	1
Privacy	1	1	1
Location	1	1	1
Amenity	1	1	1
Family needs	1	1	1
Spiritual needs	1	1	1
Social needs	1	1	1
Physical needs	1	1	1
Climate	2	1	1
Preventing sound	3	2	2
Glare	1	1	1
Simple upscale	4	3	2
Floor	1	1	1
Brightness	1	1	1
Fixtures	1	1	1
Material	1	1	1
Elements	1	1	1
Distribution Furniture	1	1	1
Roof	1	1	1
Furniture	1	1	1
Carvings	1	1	1
Windows	1	1	1
Color	1	1	1
Room size	1	1	1

From the Figures (10) and (11) it can be noted that the factors or groups that were linked together were identified in each step of the analysis, where can note that, at the first step there were (11) factors collected together in the first step through a number of partial groupings among factors to produce one group, also the data showed that, factor (climate) joined the first group at second step to produce the second group, and finally the factors (preventing sound and simple upscale) joined the second group at third step to produce the third group.

There are three cluster involved in the Dendrogram as shown in Figure above that had been generated from Cluster Analysis of the SPSS software. Firstly, there are 2 keyword involved in the first cluster that been named as the features group that been highlighted in the green colour. The highest mean score in the features group is the keyword of

(preventing sound). While the second highest mean score in the accessories group is the keyword of (simple upscale) which is stated that majority of the respondents seems agreed on the importance of interior space elements, and they believe it's can succeed in the future.

Second cluster involved four keyword in group that been named as the environment group that been highlighted in red color. The highest mean score and the only keyword in the environment group is the (climate) keyword that had means score value of (3.96). Man works continuously to maintain his comfort and physical and psychological health, and the importance of homes and their impact on the health and well-being of the human, must be concerned with the climate of the house and the elements that affect it. The availability of elements of the climate at a comfortable level in the dwelling is the focus of people's attention at all times of the year, especially in times of heat and cold. People are working to mitigate the effect of low or high temperatures using the means of cooling in the summer and the means of heating in the winter season, Climate from state to state, and within the areas of concern for the home province of human purity of air at home because of the impact on his health and rest.

There are 22 keywords involved in the third cluster that been named as the needs group. The highest mean score in the needs group is the (color) keyword that had been classified as the main need for design an interior space suitable for family member, and the suitable space for family activities can help to improve the individuals' abilities and awareness about the life.

## CONCLUSION

This study aims to determining the effect of space planning on traditional houses in the state of Terengannua. Based on the PCA and cluster analysis results through SPSS software, the study found that there is great importance for space planning in traditional house, and the space planning factors such as colors, room size, and windows play an essential role in the internal space. Moreover, the

findings of this study recommended that there is no doubt that the importance of architecture and its success is as much as it provides for the needs of human beings and securing all spaces that satisfy his requirements and achieve his interest. The concept of housing is more than the presence of a person or a group of people in a group of walls or rooms, but it is much more than it is life, feelings, interaction, growth and mutual influence, and the more attention gave to space planning as much as gave us a rest and a sense of civilization.

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