

# A study and design Relaxing chair for the elderly

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## Abstract

The objective of designing relaxing chair for elderly 1.) to study elderly behavior, pattern of their living, and needs of chair 2) to generate guideline and design elderly chair for relaxation. This research began with studying multiple journals, papers for generating .In the second phase, researchers conducted a survey in selected area, used questionnaire to discover elders' needs, then, synthesized the gathered data into chair design selection criteria. Later, these 10 selected chair designs were evaluated by specialists, and 3 chosen chair designs were developed further. The result showed that most of elderly had health issues. Results these elders constantly took medicines, which affected their skeletal and muscle systems, reducing their abilities to do usual routine. Therefore, this chair design focused ergonomics of elderly in sitting posture and encouraged them to do other activities. Moreover, the relaxing chair would help in promoting the image and value of the bamboo material.

The result showed that the relaxing chair design with arms, adjustable back rest that elder can lay down, and adjustable leg rest got the highest satisfaction rate ( $\bar{X} = 4.37$ , S.D. = 0.67) Also, The functionality and convenience aspects in this particular type of chairs got highest satisfaction rate ( $\bar{X} = 4.67$ , S.D.=0.58)

**Keywords:** *chair, relaxing, elderly*

## 1. Introduction

Thailand were categorized as aging society since 2005, which number of elderly populations increasing from 10.4 percent of total population in 2012 to 12.6 percent in 2013. In the next 20 years, numbers of elderly will increase to 19 million people which approximately 30 percent of total population. United Nations (United Nation: UN) defined ageing society as one which has more than 10 percent of 60 and above years old on total population.

Older person shows multiple signs of body deterioration which cause performance inclination, increasing risk of multiple deceases, chronic deceases, and injuries, especially diabetes, hypertension, heart decease, strokes, cancers, etc.

Ministry of Social Development and Human Security, National Housing Authorities organization aim to develop low income elderly properties, elevated their quality of life by establishing project called “Comfortable House for Grandparents”. The objective of this project is to refurbish or develop residential building for low-income Elderly in every region in Thailand. The survey demonstrated the large amount of elder still need supports in various matters. Also, majority of elders have underlying deceases, body deteriorations which affected their lives. Moreover, some Elderly could not look after themselves properly in multiple activities e.g. showering, defecation, etc. These elderly people needed to have a close observation on their daily activities. Thai Modern society tends to neglect their seniors due to competitiveness of society. This problem can be solved by using devices that assisted elderly in various activities throughout the day. However, these devices or equipment needed to be imported, which are expensive, also, these devices might not suit Thai Elderly behavior due to differentiate ergonomics, environment, and cultural characteristic.

Researchers are concerned with this problem and recommended that elderly need to have appropriated equipment or methods that assist them on their daily routines. The proposal for this research is to create the chair design that generate relaxation sensation for Elderly. Also, the proposal suggested that local material should be used due to easier to find and assemble. The Chair design should be easy to use, assisted elderly in their daily routine, and encourage self-reliance. Moreover, the proposal can be used as a guideline for developing Elderly related product in other regions.

## **2. Research Objectives**

- 2.1. To study elderly people behavior and lifestyle, also, the needs for elderly chair.
- 2.2. To propose and develop the elderly chair design.

## **3. Research Methodology**

This research divided into 2 sections accordance to research objectives. The sections are as followings;

- 3.1. Secondary Data research
  1. Study on multiple elderly chairs products.
  2. Study on designing related to elderly chair.
  3. Study on material, in this research, focusing on Bamboo material, its property and production procedure.

#### 4. Study on elder behavior and lifestyle.

##### 3.2. Primary data research

1. Study and experiment on bamboo productions and its utilization.

2. Study elderly chair usage requirement. Data was gathered from interviewing rehabilitation Officers specialized in Elderly Rehabilitation.

3. Study the suitable design method for bamboo chair.

##### 3.3. Design Analysis

1. Data gathering

2. Evaluated possibility for chair production, analyzed the obstacles that might appear during production period. The theory used in the design was “The king’s Model”, (Pichai Sotpiban: 2011) which consisted of Approachable, Understandable, and Development sections. Also, generated the design and production protocol.

3. Generated design criteria, created products, and generated 3D modelling. These designing products were evaluated by Designing Advisories and Specialists.

4. Developed selected design, conducted presentation for selected samplings to evaluate the design by using questionnaire.

##### 3.4. Production

Product manufacturing in accordance of the study.

##### 3.5. Conclusion and recommendation

1. Research conclusion and discussion on problems and obstacles which occurred throughout the study period.

2. Research Proposal and presentation.

#### 4. Results

The result had been divided into 2 parts according to research objective are as followings;

1. Data analysis on Elderly behavior and the needs of elderly chair.

Researchers conducted survey on top ten highest rank provinces by ageing index,

which are Singburi and Chainat province. (Ministry of Social Development and Human Security.2556). In Thachang district in Singburi province, Suppaya and Nong Mamong district in Chainat province, the research conducted on 344 elderly persons on these selective areas, discovered that 36 persons, consisted of 27 female and 6 male needed assistive walking equipment. The data also showed that 38.2 percent received education only on grade 4, 39.9 percent have Hypertension, 31.2 percent had Visions problems. The cause of injury that occurred in Elderly people most is the fall, which is 20.8 percent. Elderly spend time in Living space and Bedroom most which are 34.1 and 25.6 percent respectively. (Trirat and others. 2548)



Pic.1 Relaxing activities that elderly did during the day. Source: Pronpan Kruaaronrat (2016)

The interviewing with Elderly revealed that the Elderly assisted equipment in general did not suits their needs due to differentiate environment, behaviors etc. which increasing risk of injury.



Pic 2 : Elderly chair that had been used during relaxing activities and their environment in multiple locations. Source: Pronpan Kruaaronrat (2017)

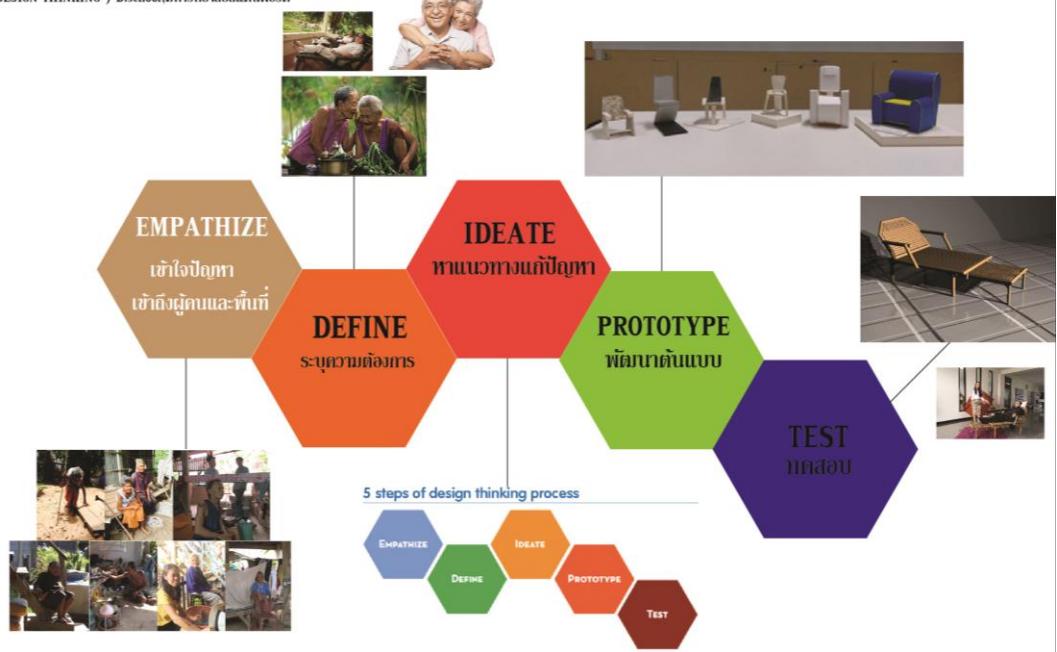
From the problem stated above, design criteria should consider in multiple aspects, the designing product should assist elderly on getting up in various furniture, e.g. bed, chair, wheelchair, and etc. The study of Elderly chair design should be conducted to help caretakers reducing their workload, encouraged Elderly on daily basic and also, the study of Elderly chair does not appear to have been conducted properly. Moreover, this research could be the prototype furniture for future society.

## 2. Data analysis on Elderly chair design and development.

The result of design and development of the elderly chair are as followings;

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(DESIGN THINKING ) D.school, Stanford University



Pic 3: Design thinking for Elderly Chair using King's Model (Pichai Sotphiban.2554)  
 Source: Pronpan Kruaaronrat (2017)

Researchers considered Elderly Movement and activities are main factors for chair designing which are eating, washing, cooking, watering plants, and meeting with friend. These activities considered as close-ranged movement or indoor movement; therefore, design criteria focused on these activities by generated the adjustable back panel and wider seat for transitional gestures, and activities, Elderly can lay down when they tired. Also, the design should consider comfortability and safety for Elderly.



Pic 4: Elderly Chair design sketch and idea development using King's Model theory (Pichai Sotphiban.2554) Source: Pronpan Kruaaronrat (2017)

These design criteria are constructed using product design theory, (Udomsak Saribut.2006) contained multiple aspects, which are Functionality, Product form, Structural stability, Material, Production, Maintenance and Safety, Cost Estimation. Therefore, the design had been conducted according to the theory, then 10 drawings and models were developed for evaluation.

Table 1: Design Development

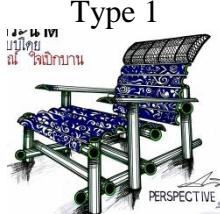
Type 1 	: Concept and Development: Bamboo was used as a main structure of the chair by cut bamboo in half, then assembled. This design had arms and head rest, also, back seat had a wavy pattern accordance to the bamboo texture and arrangement
Type 2 	Concept and Development: Steel rod was used as a main structure of the chair. Bamboo is used on seat and head rest, arranged in longitudinal direction. Also, the used of whole bamboo for uncomplicated production and for its stability.
Type 3 	Concept and Development: Wood was used as a main structure of the chair. The design had wider seats and head rest, created comfortability in sitting and other movement.

Table 1: Chair Design and development. Source: Pronpan Kruaaronrat (2017)



Pic 5: Design Evaluation by Design Advisories and Specialists.

**Table 2:** Design Evaluation form Design Advisories and Rehabilitation officers, specialized in Elderly Rehabilitation.

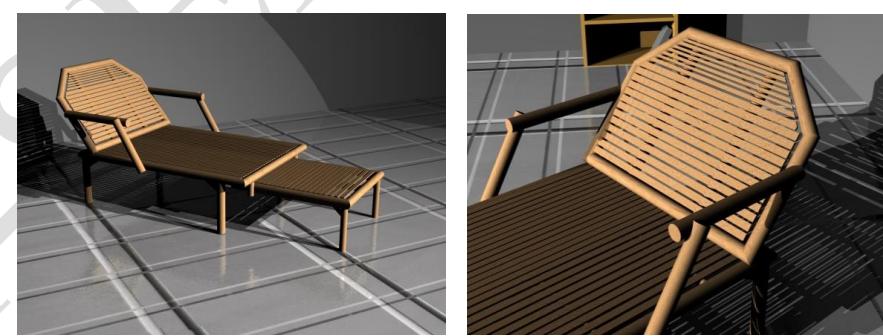
Main Criterion						
	Type 1		Type 2		Type 3	
	N = 3		N = 3		N = 3	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
1. Attractive Design	4.67	0.58	3.33	0.58	3.67	0.58
2. Material Characteristic	4.00	0.00	3.33	0.58	4.33	0.58
3. Material generated attractiveness in the product	4.33	0.58	3.67	0.58	3.33	1.15
4. Material usage suits for furniture production	4.33	0.58	4.00	0.00	3.67	1.15

5. Appropriated apply material into design	4.33	1.15	4.33	0.58	4.00	1.00
6. Maintenance	4.00	1.0	3.33	1.15	3.67	0.58
7. Transportation	4.00	1.00	3.33	1.15	3.33	0.58
8. Functionality	4.67	0.58	3.67	0.58	4.00	0.00
9. Structural Stability	4.67	0.58	3.67	0.58	3.67	0.58
10. Comfortability	4.67	0.58	3.67	0.58	3.67	0.58
<b>Mean</b>	4.37	0.67	3.70	0.65	3.73	0.69
<b>Rank</b>	1		3		2	

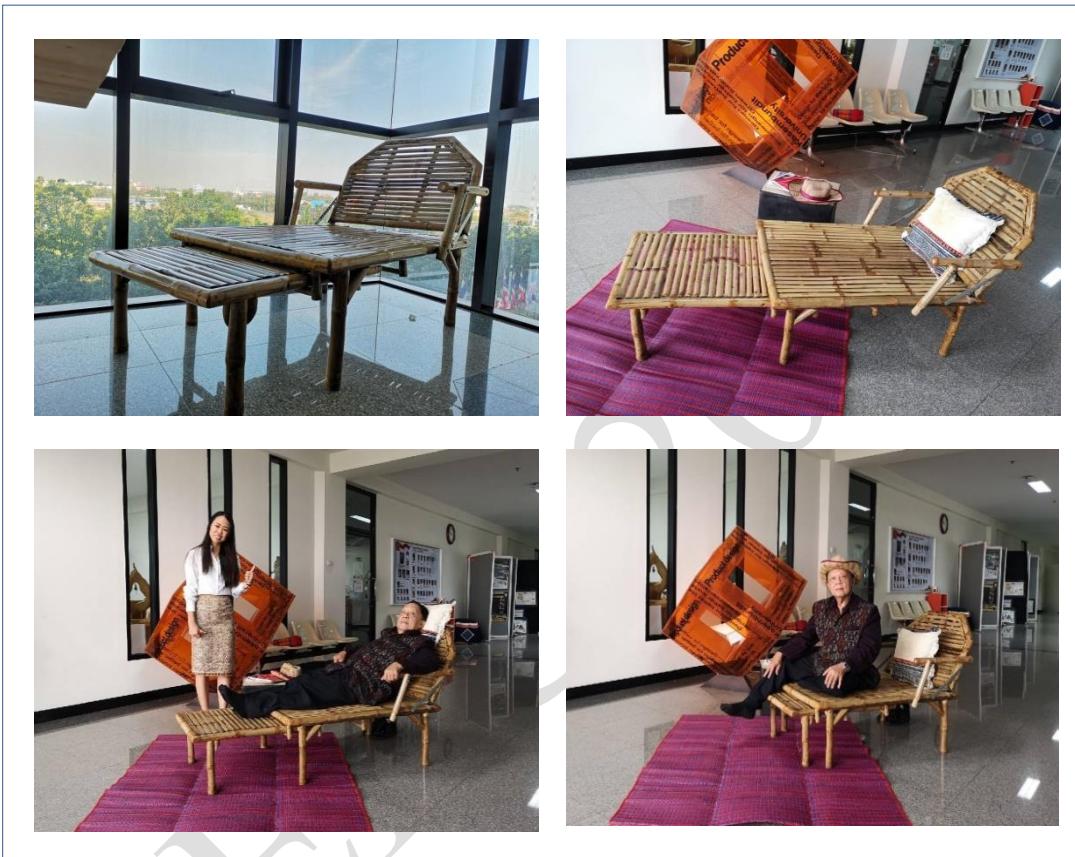
From table 2, the result demonstrated the most appropriate chair design was type 1

which had means score of 4.37. The most appropriate design categories in Design type 1 were attractive design, Functionality, Structural Stability, and Comfortability. ( $\bar{x} = 4.67$ , S.D.= 0.58), then Material (( $\bar{x} = 4.33$ , S.D. = 0.58). The least appropriate design categories in Design type 1 were Maintenance, and Transportation ( $\bar{x} = 4.00$ , S.D.=1.00). There are slightly differentiate in Mean score and S.D. due to the design strongly focusing on elderly usage. The type 3 ( $\bar{x} = 3.73$ ) and type 2 ( $\bar{x}=3.70$ ) tends to have less appropriate design respectively because of unbalanced structure and material, less safety especially in ergonomic design.

From the result, the selected design was developed in multiple aspects to suit the Elderly needs, which were adjustable backseat, added 2 arms, wider seat for elder to adjust their gesture during various activities, also the movable leg rest for Elderly to lay down.



Pic 6 : Elderly Chair design sketch and idea development using King's Model theory



Pic 7 : Elderly Chair design sketch and idea development using King's Model theory

## 5. Conclusion and Discussion

The study of Elderly behavior, lifestyle, and space requirement for relaxing indicated that

50 percent of elderly occupied indoor space for relaxing. Majority of elderly had health issues, underlying disease especially diabetes, hypertension, joints pain, muscle weakness, therefore, these prevented elderly to wander outside their houses. Also, the side effect of taken various medicines affected their bone and other systems causing the movement struggling. The design needed to be considered in functionality, ergonomics, comfortable usage aspects for elderly in various activities. The space that Elderly used most was living room which was 34.1 percent and bedroom was 25.6 percent respectively.

The study and development of Elderly chair used the King's Model (Pichai Sotpiban: 2001)

as a design framework. The research methodology and Concept design process used the research development process (Earle. Reference from Nirat Sudsang.2000:29) which consisted of 1. Problem analysis approach problem directly 2. Understand problems, analyzed into design and development outline. 3. Analyzed design, focusing on users experience and usage. 4. Analyzed overall product and its valuation. 5. Decision making in selected design and developed, approaching to final step.

From design evaluation, the result indicated that design Type 1 had the most satisfaction rate especially in attractive design, functionality, structural stability, material usage suited the furniture production process categories

. In conclusion, the need of Elderly chair should consider suitable ergonomic design for users' activities, can be adjusted in order to assist Elderly in sit, lay down, and other gestures. The design should not be complicated for manufacturing process, simple technology should be applied for easier assemble, structural stability, easy to maintenance.

## 6. Recommendation

The study and development of Elderly chair; case study in Tachang district in Singburi province, Nong Lamong and Suppaya districts in Chainat province was developed for Elderly relaxation activity which need to be correlated with environment, Elderly daily routine, to assist Elderly and created comfortability. Researchers recommended this journal

can be used as the in-dept data. The research demonstrated the importance of users' behavior and space usage. The design evaluation showed that the design should focused on performance and effectiveness, easy to maintenance, intertwining with local communities, generated deferent design which will affected design in long-term.

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