Compact Book Rack Made from Kelempayan (*Neolamarkia cadamba*) and Blockboard

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Abstract

Furniture industry in Malaysia has changed over the years. Furniture is very important in our living to fulfil the needs and wants. The objectives of this study are to design a compact book rack made from Kelempayan (*Neolamarckia cadamba*) and blockboard and to produce a compact book rack that suitable for a limited space and limited budget. The design of this product is multifunction compact book rack which is it can be combine into all-in-one furniture which is can be used as a chair, book rack and table. The results show that the correspondent gave a positive feedback regarding on the material used, multifunction and suitable for limited space and limited budget. Overall, this compact book rack is suitable to commercialize.

Keywords: Compact Book Rack, Limited Space, Kelempayan, Multifunction

1. INTRODUCTION

Nowadays, the furniture is very important in our living to fulfill the needs and wants. Starting from sketching, design, assemble and packaging the product. The furniture is very important in our living to fulfill the needs and wants. Starting from sketching, design, assemble and packaging the product. According to John Louis.Feirer, he said the fundamentals of goods design include purpose or function, appearance, materials, and construction. The important part is creating the product with compact product function to reduce and maintain the limited budget and space. Compact furniture is a produce to saving the space with multifunction uses in daily life.

Compact furniture is combination of one or more function in product design into multifunction pieces of furniture into one incredible all-in-one furniture set (Ion, 2011).

2. METHODOLOGY

2.1 Materials and Preparation

The main materials used to produce this product was from Kelempayan wood (*Neolamarkia cadamba*) and blockboard. Both of them are obtained from UiTM Pahang workshop. Mechanical hardware also will be needed, such as nail gun, screw and hinges. All these mechanical hardware also supplied from UiTM Pahang workshop.

2.2 Manufacturing Process

In the manufacturing process of furniture there are few stages of procedures. All method must be done in furniture production to get maximal quality and finally get satisfied from consumer. Procedures become important

strategic to durable and quality wood furniture. The simple flexible furniture can easily fit into tight spaces and offer you the best of compact living (Ion, 2011).
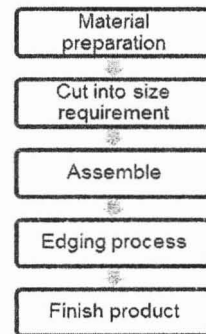

Figure 1: Flow Chart of Manufacturing Process

2.2.1. Material Preparations

Once the design process is completed then proceed to producing the actual product based on actual dimension. Choose the right material and hardware to avoid from any problems occurs. Kelempayan wood was cut into several pieces which is 2 ½ "x 4".

2.2.2 Cut into size requirement

After material preparation process done, is continued on the next step, which is cut the kelempayan (Neolamarkia cadamba) wood into size requirement. Size required is 40mmx40mmx1000mm for leg, 40mmx40mmx500 for seating, side rails 40mmx40mmx400mm, chair seating 320mmx320x18mm and book shelf is 40mmx320mmx15m.

2.2.3 Assemble

Assembling manufacturing process of furniture is combining of the components into finished goods. There some possibility component needs to be assembled before finishing. During the assemble process its using mortise and tenon joint system.

2.2.4 Edging process

After that, proceed on edging process, where the portion of material will be removed from the edge of a piece of wood to make it easy to process. By using clear coating to sustain the color of wood.

2.2.5 Finish Product

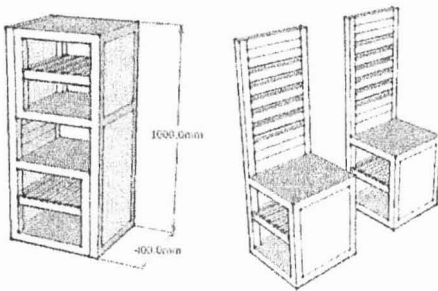After assembling the entire component into one piece of finish goods it become finish product.

Figure2: Finish Product

2.3 Survey Evaluation

After producing the product, then proceed to conduct the survey evaluation activities through giving them the questionnaire that relate to the research objective. These evaluations will dividing into three divisions which is students, lecturers and publics. For the lecturer and students respondent will be choosing randomly from different course program. And for public respondent, will chose them go through their different working sector. The amount of respondent is about 90 correspondents. After collecting all the data, next process is will be go through analyzing process to find the final result of research whether the objective achieve or not.

3. RESULTS

The results were obtained from questionnaire survey and then were analyzed. The total of correspondents were about 90 people consist of UiTM lecturers, students and industrial people. Each question given was ranked from 1 to 5, as shown in table 1.

Table 1: Ranking for each question

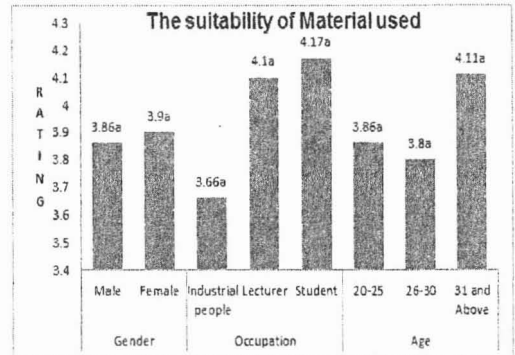| No. of Rank	Rank
1	Strongly Disagree
2	Disagree
3	Moderate
4	Agree
5	Strongly Disagree

Figure 3: The suitability of Material used

3.1 Statistical analysis of compact book rack Compact book rack using Kelempayan (Neolamarckia cadamba) and blockboard were evaluated based on characteristics by lecturers, Students and industrial people in UiTM Pahang. The correspondents were at different place of gender, age and occupation. The questionnaires were focus on materials used, handling, aesthetic, design concept, anthropometric concept, multifunction, saving space and price.

Table 2 show the analysis of variances (ANOVA) on the effects of gender, occupations and age on the product rating (evaluation) which had been obtained from survey (questionnaires). The results show that there is no significant difference in term of material used, handling, aesthetic, design concept, anthropometric concept, multifunction, saving space and price. Only two is significant which is 0.038* (<0.05) in term of handling and 0.017*(<0.05) in term of material of the product. For handling there have a different in term of gender between male and female because assumed that, male and female more like the product is easy to handling, where it is easy to locate or placed due to its function, shape and size of product. For material, there has a different in term of profession between lecturer, students and industrial people. Assumed that, I think most of them are agree using kelempayan as main material and it is suitable to produce the compact book rack. It might be because the kelempayan has light weight which is suitable for

producing light furniture for example chair and book rack (Lim, 2005). Most of the correspondent agreed and accept the characteristics of compact book rack. From the result obtained also it can be concluded that compact book rack was suitable for all range of gender, age and occupation.

Table 2: Analysis of variance effect on gender, age and occupation

Variables	df	Material	Handling	Aesthetic	Design	Ergonomic and anthropometric	Multifunction	Save space	Price
Gender	1	0.171 ns	0.038 *	0.869 ns	0.475 ns	0.604 ns	0.800 ns	0.381 ns	0.099 ns
Age	2	0.664 ns	0.641 ns	0.217 ns	0.682 ns	0.337 ns	0.304 ns	0.630 ns	0.088 ns
Occupation	2	0.017 *	0.193 ns	0.469 ns	0.062 ns	0.929 ns	0.760 ns	0.659 ns	0.127 ns

Note: ns- not significant where p>0.05
         (*)- Significant where p <0.05
         (**)- Highly significant where p<0.01

Figure 3 show that the correspondents have evaluated the suitability of material that used in this product in term of gender, occupation and age rated by correspondents. There are no significant different between different of age, gender and occupation about the suitability of the material used. According to the graph, the majority of the correspondents agreed used Kelempayan as main material to produce the compact book rack. It might be because the kelempayan has light weight which is suitable for producing light furniture for example chair and book rack (Jusoh, 1993).. Besides that, the highest rating was gave by correspondents is student and lecturer which is higher than industrial people. Assumed that, most of the student and lecturer agreed used the kelempayan and blockboard as main material on this product because the kelempayan and blockboard have advantages to use it. It might be because industrial people are less exposed to kelempayan and blockboard compared to student and lecturer who may have more knowledgeable about the material.
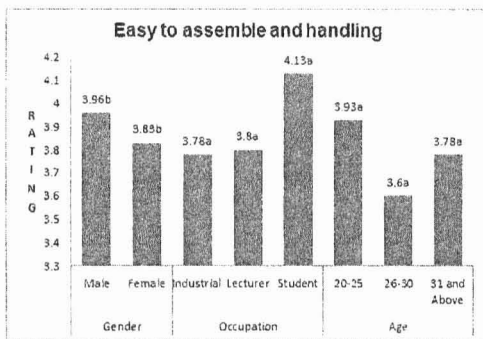

Figure 4: Portability and easy to handle product

Figure 4 shows the mean of product is easy to assemble and easy to handling. There are has significant different

between different of age, gender and occupation rated by correspondents. Assumed that, this product has own value where it can be accepted by any different age, gender and occupation. The use of kelempayan and blockboard makes the product lighter than other types of furniture. The data show, the majority of the correspondents agreed that product is easy to assemble and easy handling. Other than that, the highest rating was gave by correspondents is student, followed by the lecturer and the industrial people. The student more agreed than lecturer and industrial people because assumed that, the student more like that the product is easy to move because with those characteristics it will help the student to arrange after use it.
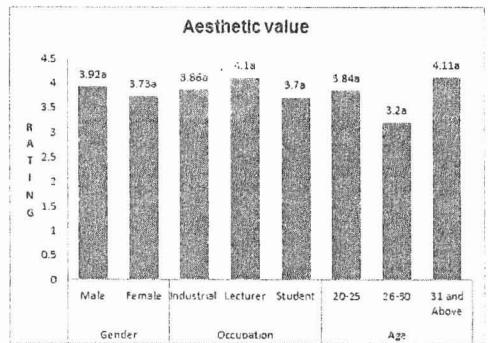

Figure 5: Aesthetic value of the compact book rack.

Figure 5 shows the mean of Aesthetic value of the compact book rack by using the kelempayan and blockboard. There are no significant different between different of age, gender and occupation in term of aesthetic value of this product rated by correspondents. According to the graph, the data show the majority of the correspondents agreed and give positive feedback for the Aesthetic value of this product. Assumed that, this might be due to design that is simple and modern looking because it was use natural color of wood by using clear coating and its can combine into one single pieces of furniture whether used it as chair, book rack or simple table. In addition, the characteristics of the product that has more than one function and also simple concept which is can catch eyes of the correspondents.
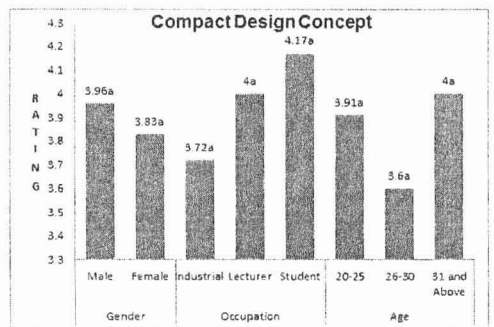
Figure 6: compact design concepts

Figure 6 show the different mean in term of compact design concept based on compact book rack design. There are no significant different between different of age, gender and occupation in term on compact design concept rated by correspondents. According to graph, shows the highest rating is student 4.17a followed by lecturer and industrial people (4.0a and 3.72a) respectively. Assumed that, this might be due to functions its can combine into one single pieces of furniture whether used it as chair, book rack or simple table. At range of 26-30 age, most of them are not agree maybe for them the product is does not have any value to them.
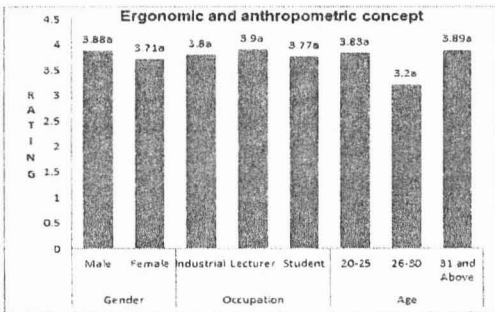
Figure 7: Ergonomic and anthropometric concept

Figure 7 show the different mean in term of ergonomic and anthropometric concept based on compact book rack design rated by correspondents. There are no significant different between different of age, gender and occupation in term of ergonomic and anthropometric. According to Norsuraya (2007), anthropometric is very useful for designing the product for height, clearance, grips and reaches of workplace and equipment. By referring to the graph, the data show the majority of the correspondents agreed and give positive feedback for the ergonomic and anthropometric concept. Assumed that, this is might be due to its design which is simple and suitable for everyone.
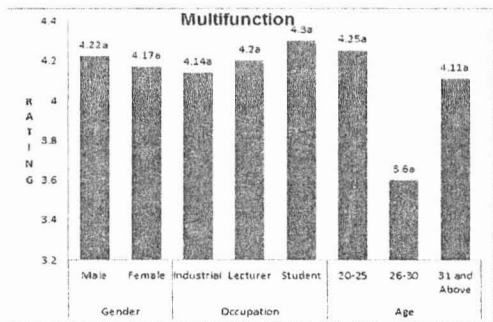

Figure 8: Multifunction design

Figure 8 show the different mean in term of multifunction concept based on compact book rack design rated by correspondents. There are no significant different between different of age, gender and occupation in term of multifunction. Referring to the graph, the data show the majority of the correspondents agreed and give positive feedback for the function of this product except at rate 26-30 age are not agree. Assumed that, most of them are know how to use this compact book rack by rating at range agree (>4). This compact book rack not only used for book shelve, it also can combine into one single pieces of furniture whether used it as chair, book rack or simple table.
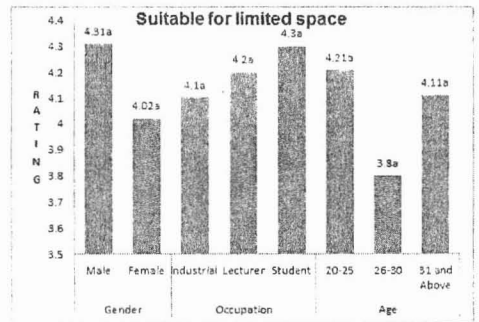

Figure 9: Suitability for limited space

Figure 9 show the different mean in term of suitability for limited space concept based on compact book rack design rated by correspondents. There are no significant different between different of age, gender and occupation in term of suitable for limited space. According to the graph, the data show the majority of the correspondents agreed and give positive feedback for the suitability for limited space of this product except at rate 26-30 (3.8 range) age are not agree. Referring to the graph, shows the highest rating is student 4.31a followed by lecturer and industrial people (4.2a and 4.1a) respectively. Assumed that, most of student at different gender (male 4.31a) is agree on this product is suitable for limited space because maybe male student more like the product which is simple and can save space. Hence, as students they need to save space in their home because most of them live in rent a house which is have limited space. As for the lecturer, those who living with families they for sure do not want their house to become smaller after they have installed the others furniture.
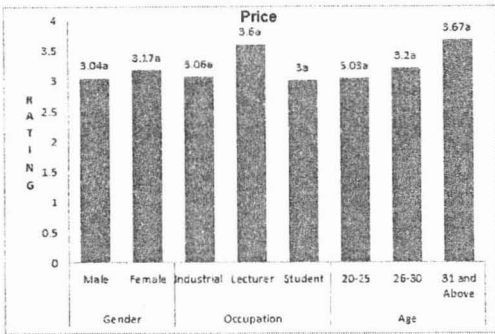
Figure 10: Price of the product

Figure 10 show the different mean in term price of the compact book rack design rated by correspondents. There are no significant different between different of age, gender and occupation in term of price. Based on the data show the majorities of the correspondents agreed and give positive feedback for the price of this product. It might be, the prices is suitable and can be commercialized in the market.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 ConclusionS

As a conclusion, the concept of compact book rack furniture was accepted by correspondents (customers), as it has many advantages and suitable to be commercialized. Compact book rack using Kelempayan (Neolamarckia cadamba) and blockboard were evaluated based on characteristics by lecturers, Students and industrial people in UiTM Pahang. The total of correspondents were about 90 people consist of UiTM lecturers, students and industrial people. It was found that, based on the data analyze the correspondent gave a positive feedback regarding on the material used, multifunction and suitable for limited space and limited budget. This could be due to the design of compact book rack that is simple and multifunctional. Overall, this product is suitable be made from kelempayan and blockboard due to its properties, characteristics and light color. Its multifunction characteristic also made this compact book rack really suitable for limited space.

4.2 Recommendations

Based on feedback from questionnaire survey, all the correspondents have a suggestion and recommendation. The popular recommendation is about price and the appearance of compact book rack. For the price this product between RM200-RM250 is cheaper. They suggested price between RM300-RM350 because this book rack has two pairs chair and because due to its materials using 100% solid wood kelempayan. Another recommendation, the correspondent said should add some more color to make it look more interesting.

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