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Kampus Sungai Petani

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STACKABLE PINEWOOD PALLET STORAGE KEEPER (SPPiKe)

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ABSTRACT

Modern and compact design furniture has gained popularity lately due to the small and limited living or office spaces found in metropolitan and sub-urban areas. The increasing population and high cost of living has made the consumers try to conserve their living space, thus choosing simple yet functional furniture. The rising trend on acceptance of wood-based furniture among the consumers has urged the researchers to produce an innovative multifunction stackable storage keeper from softwood species known as pinewood pallet (*Pinus spp*). Apart from the issue of material shortage, the use of recycled pinewood pallets supports the notion of environment-friendly furniture as well as in support of the government's effort towards sustainable development of the furniture industry. In extending the innovative idea, this study was conducted to further investigate consumers' market acceptance on the upgraded design and use of pinewood pallet in the production of a storage keeper. A total of 213 respondents completed the questionnaires randomly distributed online to the potential buyers who are also the residents of Bandar Jengka, Pahang Darul Makmur. IBM-SPSS version 24 software was used to analyse the survey data including the frequency and descriptive analysis. The results show that the proposed upgraded design and the use of the pinewood pallet have received very good responses from the respondents. On average, they also agreed that the multipurpose stackable storage keeper is suitable to be commercialised. It is hoped that the findings provide further understanding and better picture on the consumers' acceptance and preferences on wooden pallet furniture, thus providing the booster to encourage commercialisation of wood pallet furniture in the furniture industry.

Keywords: pallet, pinewood, storage keeper

INTRODUCTION

The increasing population and high cost of living in limited spaces have made those who have to deal with the issues to be more creative in making the areas more comfortable by saving or conserving the available spaces, thus choosing simple yet functional furniture to maximise the spaces (Kawiaka and Windham, 2003; Yi Xie, 2016). Previous research has also shown that among the most recurring issues of compact living or office spaces are storage areas (Fhilcar, Faunillan and Davidson, 2015) and in line with that, the supply and demand of modern and compact design furniture has off late seen an increase especially in the metropolitan as well as sub-urban areas. As mentioned by Velázquez-Blázquez, Silva-Quituisaca, Nieto-Martínez, Sáez-Gutiérrez, Cañavate & Parras-Burgos (2020), the conceptual design of a new line of modular and stackable furniture used indoors must follow ergonomic, functional, safety and easiness of assembly. Modern furniture still focuses on the basic function of furniture, but with the addition of multipurpose and adjustable furniture concept, which is one piece of furniture can serve two purposes at once, thus greatly increased the high demands and meet the needs of users.

The shortage of natural resources and its high price have been of concern in furniture making. Thus, the increasing awareness of the public to conserve the environment by choosing furniture made from non-conventional materials has urged the researchers to produce an innovative multifunction stackable storage keeper. Market trends have shown that wood-based furniture has been receiving more favourable acceptance among the consumers due to the increased improvement of people's living standard (Kaputa, Barčić, Mat'ova & Motić, 2018; Wu & Feng, 2019). However, the issue of material shortage has led to the reason of alternating the usual hardwood to softwood species known as pinewood pallet (*Pinus spp*). The light colour and natural defects of the pinewood are the reasons why it was chosen as they give aesthetic value to its appearance. Pallet is a wooden material used for handling, storing and stacking objects or goods and has rigid horizontal platforms and easily carried by machine (Buehlmann, Bumgardner and Fluharty, 2009). The recycled pinewood pallet was used as the alternative material as it costs less than the usual hardwood and the use of recycled materials is in line with the effort to conserve the environment. In tandem with Ratnasingam, Ark, Mohamed, Liat, Ramasamy and Senin (2017), this product innovation is more inclined towards cost reductions and in finding alternative raw materials rather than applying new processes or implementing a new design scheme. Meanwhile, the idea of using pallets is based on concepts such as recycling and self-construction (Ganea, 2019).

In support of the innovative idea, this study was conducted to further investigate consumers' market acceptance on the upgraded design and use of pinewood pallet (*Pinus spp*) in the production of a storage keeper which was made to complement confined spaces yet functional and attractive enough to be marketed to the mass. It is hoped that the findings of the survey would provide a better picture on the consumers' acceptance of wood pallet furniture as knowing the preferences of the consumers could benefit the production and business results of the related industry (Dušak, Jelačić, Barčić & Novakova, 2017). The findings could also assist the researchers for future research project that would benefit the wood furniture industry through the effort of promoting the use of recycled materials. The effort was taken in support of the government's effort for green environment as well as in promoting sustainable development of the wood furniture industry.

METHODOLOGY AND DATA ANALYSIS

Methodology (Manufacturing Process)

The issue of material shortage highlighted earlier has led the researchers to come up with an innovative idea of producing storage keeper from softwood species known as pinewood pallet (*Pinus spp*). In the manufacturing process (Figure 1), the wooden pallets with different thicknesses were fed into the thickness gauge to obtain a good finish and similar thickness. Then the wood was cut into similar widths with a table saw. After cutting to the required size using the rip saw, all parts of the pinewood pallet were gathered with Polyvinyl acetate (PVAc) glue and clamped together and nailed using the nail gun. The hinges were installed for the doors and then, the keeper went to the completing procedure known as sanding procedure. The predominant motive of the sanding procedure is to get rid of mill marks, which has been the result of woodworking machines and to get rid of different flaws inclusive of dents and gouges that were induced all through handling. The sanding technique started with coarse sufficient grit sandpaper and once the sanding procedure was completed, timber clear gloss was sprayed. The finishing process was repeated three times to get a good final product. The spraying process must be conducted in open area and during daylight in order for the timber clear gloss to dry easily.

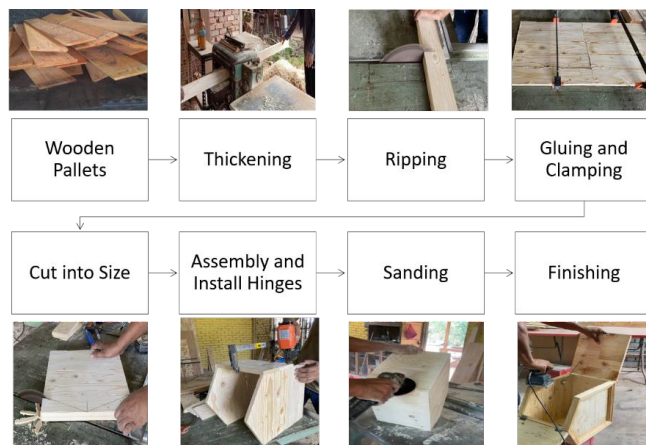


Figure 1. Manufacturing Process

In response to the comments received during the first introduction of the keeper to the market, the door of the keeper has been given a “facelift” by maintaining its natural colour and wood finishing was added as a frame to the door. A "see through" mini window has also been incorporated to enable easy observation of the insides of the keeper (Plate 1).



Plate 1. Old Version versus New Version

Data Analysis

Due to the restricted Movement Control Order of Covid19, the introduction of the stackable pinewood pallet storage keeper to the potential market in Bandar Jengka, Pahang Darul Makmur was only done through online sharing of its images. Selected respondents from various backgrounds were given a set of questionnaires to fill out via Google Form which was distributed primarily through the social media applications. The questionnaire was divided into six sections; Section A consists of Respondents' Background, Section B consists of Design (six items), Section C consists of Material (three items), Section D consists of Function (five items), Section E consists of Price (three items) and Section F consists of Commercialisation (three items). The questions of Section B, C, D, E and F are in a seven Likert-scale format ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). The completed questionnaires were tested for its reliability using Cronbach's Alpha at the minimum value of 0.7 (Awang, 2015). The results show that all the sections met a minimum value of requirement (Design = 0.944, Material = 0.869, Function = 0.891, Price = 0.914 and Commercialisation = 0.937).

A total of 213 potential buyers responded to the questionnaire and achieved the minimum requirement total number of respondents based on Hair, Anderson, Tatham and Black (2010). The data was analysed using the IBM-SPSS version 24 software including the frequency and descriptive analyses in order to achieve the objective of the survey that is to investigate the consumers' market acceptance on the upgraded design and use of pinewood pallet in the production of a storage keeper.

FINDINGS AND DISCUSSION

In total, 93 (43.7%) males and 120 (56.3%) females aged more than 18 years old were involved in the market survey of stackable pinewood pallet storage keeper (SPPiKe) product. The majority of them (106, 49.8%) have less than RM2,000 monthly income which suited to the recommended price range of SPPiKe. A total of 209 (98.1%) respondents owned wood furniture and 175 (82.2%) have wood storage keeper either in their home or office.

The upgraded design of the SPPiKe product had received a very good response ($M = 5.73$) including its recommended size and shape which directly led to space saving. The issues of limited space in home or office as highlighted by Kawiaka and Windham (2003), Philcar et al. (2015), and Yi Xie (2016) made the storage keeper as the recommended product. The average response from the potential buyers indicates that the upgraded design is more acceptable compared to the previous design. The result is supported by the most important factor of the upgraded design of SPPiKe which is material used ($M = 5.84$). The finding proves that the usage of pinewood pallet in the SPPiKe production is in very good recommendation and could

also reduce production cost as stated by Ratnasingam et al., (2017). The natural beauty of natural wood colour makes the product look more attractive. Besides that, the multipurpose concept of SPPiKe indicates that its function and suitability for home or office also has received very good responses ($M = 5.81$) which is in line with Velázquez-Blázquez et al. (2020). Their study found that the criteria to be considered to produce stackable furniture are ergonomic, functional, safety, and also easiness of assembly. This survey also shows that the product attracted the interest of the respondents very much as their opinion towards product commercialisation is in very good response ($M = 5.64$) and it is competitive enough to be marketed with other existing storage keepers. The recommended price range proposed by the researchers also received positive feedback among the respondents since it has been classified as affordable and the product as worth buying ($M = 5.38$).

CONCLUSION

In conclusion, the findings of the study have shown that stackable pinewood pallet storage keeper (SSPiKe) proved to be a good alternative solution to the issue of material shortage and problem of storage keeping for confined and limited living and office spaces faced by the majority of people today. It is hoped that the findings would provide further understanding and better picture on the consumers' demand and preferences of wood pallet furniture, in particular, the wooden storage keeper, thus providing the booster to encourage commercialisation of wood pallet furniture in the furniture industry. The researchers believed that upon commercialisation, the industry could maximise the use of the wood waste, thus help conserve the environment. It is hoped that the effort of promoting the use of recycled materials would further support the government's effort for green environment, thus creating sustainable development of the wood furniture industry in Malaysia.

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