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EVALUATION OF DESIGN PARAMETERS OF A MULTIFUNCTIONAL CROSS-LAMINATED FURNITURE FROM *COCOS NUCIFERA* (COCONUT) FOR UNIVERSITY HALL OF RESIDENCE

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ABSTRACT

The growing demand for space-saving furniture and the underutilization of *Cocos nucifera* (coconut) wood in furniture production prompted this study to evaluate the design parameters of a multifunctional cross-laminated upholstered furniture for university halls of residence. Four research questions guided the study. A survey research design was adopted. The study population comprised 22 participants, consisting of 17 lecturers and 5 instructors from the Department of Technology Education, Emmanuel Alayande University of Education, Oyo. Total enumeration sampling technique was employed because of the manageable population size. Data were collected using a 60-item structured questionnaire titled “*Multifunctional Furniture Questionnaire*” (MFQ), developed on a modified 4-point Likert scale. The instrument was face and content validated by three experts. A Cronbach Alpha reliability coefficient of 0.85 established the internal consistency of the instrument. All 22 copies of the questionnaire were retrieved and analyzed using mean and standard deviation. The findings revealed that the environmental sustainability measures of *Cocos nucifera* were moderately sustainable (Mean = 3.08), the mechanical design parameters of the proposed furniture were moderately functional (Mean = 3.23), the ergonomic performance was moderately comfortable (Mean = 3.27) and the aesthetic qualities were moderately suitable (Mean = 3.14). The study concluded that multifunctional cross-laminated upholstered furniture has considerable potential for use in space-constrained university residence by integrating functionality, comfort and aesthetics. It was recommended that *Cocos nucifera* be further utilized as a sustainable furniture material and that the mechanical, ergonomic and aesthetic features of multifunctional furniture be continuously improved.

Keywords: *Cocos nucifera* (Coconut), Design Parameters, Evaluation, Multifunctional Cross-Laminated Furniture

1 INTRODUCTION

In spatial design, saving space is important to optimise energy usage, thermal and visual comfort especially for tiny homes which emphasize smaller spaces for more sustainable lifestyles. Low-spaced dwellings can significantly lessen their environmental effect with the use of flexible and efficient equipment or furniture that are foldable, modular, space-saving and/or multifunctional (Bonvoisin et al., 2016; Lim & Ng, 2021; Oyewole, et al., 2010). Multifunctional furniture items are among the trends of modern-day furniture design (Lim & Ng 2021). The vast majority of people in some of the most highly populated cities live in small buildings or flats mostly due to lack of space (Knauf, 2015). By considering multifunctionality in a furniture design coupled with the importance of ergonomics and anthropometric principles, a furniture item would not only become more portable but also more convenient to use, especially in limited spaces. Likewise, cross laminated furniture uses the anisotropy of wood to its advantage by placing laminations across the grain (Akinbami et al., 2023). This elegant solution has led to cross laminated timber being among the most significant recent innovations in timber engineering. The improvement in anisotropy, modularity and multifunctionality in furniture design addressed several problems which is not limited to inadequate spaces at homes, schools, offices, hotels and university hall of residence.

A multifunctional cross-laminated upholstered furniture in the context of this study is a single unit of furniture comprising of bed, chair and drawer designed to suit safety, comfort, ease of use, productivity/performance and aesthetics. However, upholstery-making is the art of producing functional cushioned or padded sitting furniture for homes and offices. Upholstery furniture making basically involves the skills in the design of upholstery patterns, skills in handling the hand tools to convert wood in the construction of carcasses, forming of the platform for sitting and backing; webbing with strong felts, cording the edges of the carcass for aesthetics; padding with the foam material for comfort and covering with fabric for beauty and style (Utuk, Udofia & Udo, 2019). The furniture industry uses wood as its primary raw material and largely consumes natural resources from forests generating tonnes of waste (Lins, et al., 2020).

The coconut tree *Cocos nucifera* is one of the most extensively and widely used palm trees. Although, the case is different in furniture industry because it has been neglected over other hardwoods in constructing furniture thereby classifying the tree as a burning wood. Human have been cultivating a wide range of coconut trees around the world. The average air dried and oven dried density of coconut stem were 400 and 460 kg/m³, respectively. The modulus of elasticity in bending (MOE) and the modulus of rupture in bending (MOR) values for air dried and oven dried conditions were 2374 and 2633 N/mm² and 27.30 and 30.44 N/mm². The compression strength in parallel to grain and perpendicular to grain for air dry and oven dry conditions were 12.41 and 12.85 N/mm² and 9.28 and 9.64 N/mm², respectively (Rana, Das & Ashaduzzaman, 2015). This validates the possibility to use the stem of *Cocos nucifera* for different structural purposes. The under-utilization of this wood can be described as a colossal waste. Meanwhile, government attention has been drawn to wealth from waste recently. Therefore, this prompted the researchers' curiosity to reconsidered the tree in constructing multifunctional furniture.

1.1 Statement of the Problem

The abundance of timber as natural resources in Nigeria seems not to be well managed and this has resulted to its unavailability. Over the years, *Cocos nucifera* has been neglected over other trees in furniture's industry and they have essentially been labeled as burning wood. Likewise, design and constructions in wood technology needs to turn a new phase unlike when a single article will be constructed just for a sole purpose coupled with the fact that there are limited spaces in recent buildings for user needs and activities. However, most of the furniture being constructed only performs two functions but none with three functions and constructed with *Cocos nucifera*. Hence, the need to evaluate design parameters of a multifunctional cross-laminated furniture from *Cocos nucifera* (coconut) for university hall of residence.

Objectives of the Study

The main objective of this study is to evaluate design parameters of a multifunctional cross-laminated furniture from *Cocos nucifera* (coconut) for university hall of residence. Specifically, the study sought to;

- Determine the measures required for environmental sustainability of *Cocos nucifera* (Coconut).
- Design different parameters related with the mechanical linkages and structure of the proposed multifunctional (bed, chair and drawer) wooden furniture.
- Demonstrate the proof of concept and ergonomic performance of the proposed multifunctional (bed, chair and drawer) wooden furniture.
- Design suitable components related to the aesthetic value of the proposed multifunctional (bed, chair and drawer) wooden furniture.

Research Questions

The following research questions guided the study.

- What are the measures required for environmental sustainability of *Cocos nucifera* (Coconut)?
- How can the proposed multifunctional (bed, chair and drawer) wooden furniture be developed mechanically for improved multifunctionality?
- How can the proof of concept and ergonomic performance of the proposed multifunctional (bed, chair and drawer) wooden furniture be demonstrated?
- How suitable can the proposed multifunctional (bed, chair and drawer) wooden furniture be developed to enhance aesthetics value?

2 RESEARCH METHODOLOGY

2.1 Research Design

The study adopted a survey research design.

2.2 Population of the Study

The study's participants comprised of 17 (17 Male and 0 Female) Lecturers and 5 (4 Male and 1 Female) Instructors from the Department of Technology Education, Emmanuel Alayande University of Education, Oyo.

2.3 Sample and Sampling Techniques

Total enumeration was used to select all the 17 participants because of manageable size. The participants were selected based on their prior knowledge and experiences in design and construction of an article.

2.4 Research Instrument

The research instrument used for the study was titled "Multifunctional Furniture Questionnaire" (MFQ) developed by the researchers based on the existing literatures. The questionnaire was directed towards research questions 1-4 with section A, B, C and D for each of the research question respectively. The questionnaire contains 60 items with 4-point modified Likert rating scale of Highly Suitable (HS – 4), Slightly Suitable (SS – 3), Suitable (S – 2) and Not Suitable (NS – 1).

2.5 Validation of the Instrument

The instruments for data collection were face and content validated by three (3) research experts. This comprised of one (1) woodwork technology expert and one (1) mechanical technology expert both from the Tai Solarin University of Education, Ijagun, Ijebu-Ode and One (1) furniture expert from registered Small Medium Enterprise (SMEs) in Oyo Metropolis. The experts individually scrutinized and made their comments on the appropriateness of the items, clarity of items, arrangement and logical sequence. The experts were requested to delete any item they considered irrelevant or to add any other item they considered important but not reflected in the instruments. On the basis of their comments and corrections, the instruments were modified into final versions.

2.6 Reliability of the Instruments

Trial test of the instruments were carried out for the purpose of determining their internal consistency. In determining the internal consistency of the instrument, Six (6) Technology Education Experts from SPED, Oyo who are not part of the study population but shares the same boundaries, characteristics and offer the same programme were used in testing the reliability of the instruments. In determining the internal consistency of the "Multifunctional Furniture Questionnaire (MFQ) Cronbach alpha reliability was employed. The reliability coefficients of 0.85 were obtained for the two sets of the instruments respectively and it means the instruments were considered high enough and reliable for the study. According to Nworgu (2015) if the reliability coefficient is 0.70 and above, then the instrument is deemed reliable.

2.7 Procedure of Data Collection

- The researchers personally administered the research instruments to the respondents.
- Thus, the retrieval analysis showed that 100% return rate was achieved.

2.8 Method of Data Analysis

The data collected were analysed using descriptive statistics of mean and standard deviation (SD).

3 RESULTS AND DISCUSSION

3.1 Research Question 1

What are the measures required for environmental sustainability of *Cocos nucifera* (Coconut)?

Table 1: Mean and standard deviation rating on measures required for environmental sustainability of *Cocos nucifera* (Coconut)

S/N	Environmental sustainability of <i>Cocos nucifera</i>	Mean	SD	Remarks
1	Support in the form of mental and emotional counseling is important to cope with the stress of farming under climate change	2.24	0.645	Slightly Sustainable
2	Legal and policy advice on land use and environmental conservation	3.43	0.655	Moderately Sustainable
3	Networking opportunities with other farmers and experts would help to adapt better	3.14	0.616	Moderately Sustainable
4	Support in accessing markets for diversifying farms' produce	3.61	0.661	Highly Sustainable
5	Access to affordable technology for monitoring and managing climate impacts is crucial	3.32	0.614	Moderately Sustainable
6	Guidance on water management and conservation techniques	2.11	0.735	Slightly Sustainable
7	Training and workshops on climate-smart agriculture practices are essential for me	3.86	0.706	Highly Sustainable
8	Access to more resilient coconut varieties and other crops	2.43	0.660	Slightly Sustainable
9	Financial assistance or subsidies would greatly help to implement adaptive strategies on farm	3.86	0.643	Highly Sustainable
10	More information on how to adapt my farming practices to climate change	3.50	0.701	Highly Sustainable
11	I am optimistic about the long-term viability of coconut farming despite climate challenges	2.61	0.662	Moderately Sustainable
12	Actively engage in long-term planning to adapt my farming practices to anticipated climate changes	2.72	0.657	Moderately Sustainable
13	Explore and invest in innovative farming technologies to enhance resilience against climate change	3.41	0.695	Moderately Sustainable
14	Have a succession plan that includes strategies for dealing with climate change for future generations	3.10	0.722	Moderately Sustainable
15	Community-based planning and action are crucial for sustainable agriculture under climate change.	3.21	0.694	Moderately Sustainable
16	Regularly assess the sustainability of my farming practices in the context of changing environmental conditions	3.01	0.637	Moderately Sustainable
	Average Mean	3.08		Moderately Sustainable

SD – Standard Deviation Source: Field Survey, 2026; Decision Benchmark: A score of; 1.00 – 1.99 - Not Sustainable; 2.00 – 2.49 - Slightly Sustainable; 2.50 – 3.49 - Moderately Sustainable; 3.50 – 4.00 - Highly Sustainable.

The data presented in Table.1 showed the mean responses on measures required for environmental sustainability of *Cocos nucifera* (Coconut). Specifically, the results presented in Table 1 indicated that all the items had their mean ratings ranged between 2.11 and 3.86. Items 7 and 9 had the highest mean score of 3.86 which stated that training and workshops on climate-smart agriculture practices are essential in addition to financial assistance or subsidies. However,

with an average mean of 3.08 which is greater than the minimum level of disagreement adopted in this study, the measures required for environmental sustainability of *Cocos nucifera* (Coconut) is moderately sustainable. In addition, the standard deviation ranged from 0.614 - 0.735 which indicated that the respondents' opinions are not too far from each other, proving that the items were valid.

3.2 Research Question 2

How can the proposed multifunctional (bed, chair and drawer) wooden furniture be developed mechanically for improved multifunctionality?

Table 2: Mean and standard deviation rating on mechanical enhancements for improved multifunctionality in proposed wooden furniture (Bed, Chair and Drawer)

S/N	Mechanical Linkages of the multifunctional furniture	Mean	SD	Remarks
1	Identification and labeling of all parts on drawings	3.02	0.641	Moderately Functional
2	Accuracy and consistency of dimensions, tolerances and fits with design specifications	3.25	0.686	Moderately Functional
3	Inclusion of all necessary views (plan, elevation, section, etc.) in the drawings	3.78	0.657	Highly Functional
4	Clarity and accuracy of hidden lines and features representation	3.06	0.649	Moderately Functional
5	Correct representation of design features in the drawings	3.14	0.647	Moderately Functional
6	Proper alignment and symmetry of features and dimensions	3.09	0.669	Moderately Functional
7	Suitability of selected materials (strength, corrosion resistance and cost)	3.22	0.604	Moderately Functional
8	Practicality of design and dimensions for manufacturing	2.35	0.617	Slightly Functional
9	Alignment of all components without interference	2.51	0.598	Moderately Functional
10	Functionality of hinges and appropriateness	2.73	0.645	Moderately Functional
11	Levelness and straightness of the frame and supports	3.74	0.658	Highly Functional
12	Achievement of the intended degrees of freedom (mobility) of the linkage	2.54	0.627	Moderately Functional
13	Effectiveness of the intended motion of the linkage	2.83	0.649	Moderately Functional
14	Adequacy of calculations for dimensions, forces and stresses	3.01	0.591	Moderately Functional
	Average Mean	3.23		Moderately Functional

SD – Standard Deviation Source: Field Survey, 2026; Decision Benchmark: A score of; 1.00 – 1.99 - Not Functional; 2.00 – 2.49 - Slightly Functional; 2.50 – 3.49 - Moderately Functional; 3.50 – 4.00 - Highly Functional.

Results from Table 2 showed the mean responses on mechanical enhancements for improved multifunctionality in proposed wooden furniture (Bed, Chair and Drawer). From Table 2 it was evident that out of the 14 items, 13 items had a mean rating ranged from 2.50 – 4.00, which fell within the decision rule of highly functional. The analysis also indicated that one item, that is, Item 8 had a mean rating ranged between 1.04 – 2.45 which fell below the cut-off mean. The average mean for this table was 3.23 which indicated that the mechanical enhancements for improved multifunctionality in proposed wooden furniture (Bed, Chair and Drawer) are moderately functional. However, the

relatively low dispersion in responses ($SD = 0.591 - 0.686$) suggested a high degree of consensus among respondents, thereby reinforcing the reliability of the findings.

3.3 Research Question 3

How can the proof of concept and ergonomic performance of the proposed multifunctional (bed, chair and drawer) wooden furniture be demonstrated?

Table 3: Mean and standard deviation rating on the proof of concept and ergonomic performance of the proposed multifunctional wooden furniture

S/N	Ergonomic performance of the proposed multifunctional (bed, chair and drawer) furniture	Mean	SD	Remarks
1	Suitability and range of seating surface dimensions when used as a chair	2.65	0.636	Moderately Comfortable
2	Suitability of back support height when used as a chair	2.94	0.671	Moderately Comfortable
3	Suitability and range of backrest recline when used as a chair/bed	3.01	0.559	Moderately Comfortable
4	Suitability and comfort of arm support when used as a chair	3.22	0.517	Moderately Comfortable
5	Ability of components to convert independently for comfortable use in chair and bed modes	3.87	0.645	Highly Comfortable
6	Surface comfort when used as a chair (after prolonged sitting) and as a bed (after lying down)	3.76	0.671	Highly Comfortable
7	Edge and surface contour comfort in chair and bed modes (no pressure points on body)	2.59	0.538	Moderately Comfortable
8	Backrest/support surface comfort at different recline or lying positions	3.87	0.643	Highly Comfortable
9	Armrest comfort when used in chair mode	2.70	0.606	Moderately Comfortable
10	Ease of adjusting or converting the furniture between chair, bed and drawer modes	3.76	0.612	Highly Comfortable
11	Ease of modifying seating or lying position during use	3.67	0.645	Highly Comfortable
12	Ease of adjusting arm support (if applicable) in chair mode	3.80	0.669	Highly Comfortable
13	Ease of reclining or flattening the backrest into bed mode	2.56	0.641	Moderately Comfortable
14	Ease of cleaning all parts (chair surfaces, bed surfaces and drawer compartments)	3.00	0.590	Moderately Comfortable
15	Adequacy of mid/upper body support in both sitting and lying positions	3.76	0.612	Highly Comfortable
16	Adequacy of lower back (lumbar) support in chair mode and body support in bed mode	3.65	0.606	Highly Comfortable
17	Even distribution of body weight/support across seat and bed surfaces	2.76	0.595	Moderately Comfortable
18	Suitability of armrest height and positioning relative to user posture	3.03	0.572	Moderately Comfortable
	Average Mean	3.27		Moderately Comfortable

SD – Standard Deviation Source: Field Survey, 2026; Decision Benchmark: A score of; 1.00 – 1.99 - Not Comfortable; 2.00 – 2.49 - Slightly Comfortable; 2.50 – 3.49 - Moderately Comfortable; 3.50 – 4.00 - Highly Comfortable.

Results from Table 3 showed the mean responses on the proof of concept and ergonomic performance of the proposed multifunctional (bed, chair and drawer) wooden furniture. Two items (5 & 8) had the highest mean score of 3.87 which stated ability of components to adjust or convert independently for comfortable use in chair and bed modes. Also, Backrest/support surface comfort at different recline or lying positions. It was revealed that all the eighteen items had mean ranged from 2.56 – 3.87 with an averaged mean of 3.27 which is greater than the minimum level of disagreement adopted in this study. Therefore, there is high level of comfortability of proof of concept and ergonomic performance of the proposed multifunctional (bed, chair and drawer) wooden furniture. However, standard deviation values ranged from 0.517 – 0.671 indicating that the respondents were not too far from one another in their responses, proving that the items were valid.

3.4 Research Question 4

How suitable can the proposed multifunctional (bed, chair and drawer) wooden furniture be developed to enhance aesthetics value?

Table 4: Mean and standard deviation of responses on the suitability of the developed multifunctional wooden furniture (bed, chair and drawer) in enhancing aesthetic value

S/N	Aesthetics value of the proposed multifunctional (bed, chair and drawer) wooden furniture	Mean	SD	Remarks
1	Overall visual attractiveness of the furniture	3.22	0.598	Moderately Suitable
2	Harmony between the material and its colour	2.94	0.645	Moderately Suitable
3	Distinct and identifiable stylistic features	3.74	0.658	Highly Suitable
4	Cohesive and well-integrated overall appearance	2.59	0.627	Moderately Suitable
5	Appropriate and balanced proportions	3.01	0.649	Moderately Suitable
6	Sleekness and modern visual quality	2.61	0.591	Moderately Suitable
7	Consistency and clarity of design style	2.72	0.606	Moderately Suitable
8	Effectiveness of the colour palette in enhancing appeal	3.41	0.612	Moderately Suitable
9	Lines and curves that are visually pleasing and well-balanced	3.10	0.645	Moderately Suitable
10	Texture that is both visually engaging and pleasant to touch	3.21	0.669	Moderately Suitable
11	furniture exhibits visual balance and harmony	3.78	0.641	Highly Suitable
12	Appropriate and well-integrated use of patterns or decorative elements	3.42	0.632	Moderately Suitable
	Average Mean	3.14		Moderately Suitable

SD – Standard Deviation Source: Field Survey, 2026; Decision Benchmark: A score of; 1.00 – 1.99 - Not Suitable; 2.00 – 2.49 - Slightly Suitable; 2.50 – 3.49 - Moderately Suitable; 3.50 – 4.00 - Highly Suitable.

Results from Table 4 showed the mean responses on level of suitability of the developed multifunctional wooden furniture (bed, chair and drawer) in enhancing aesthetic value. Item 11 had the highest mean score of 3.78 which stated that furniture exhibits visual balance and harmony. It was revealed that all the twelve items had mean ranged from 2.59 – 3.78 with an averaged mean of 3.14 which is greater than the minimum level of disagreement adopted in this study. Therefore, there is high level suitability of the developed multifunctional wooden furniture (bed, chair and drawer) in enhancing aesthetic value. However, standard deviation values ranged from 0.591 – 0.669 indicating that the respondents were not too far from one another in their responses, proving that the items were valid.

4 DISCUSSION OF FINDINGS

The finding in this study revealed that the measures required for environmental sustainability of *Cocos nucifera* (coconut) farming are overall moderately sustainable. Key factors such as training in climate-smart agriculture, financial assistance, market access and access to adaptation information were rated highly, highlighting their critical role in enhancing sustainability. These results are consistent with (Brandner et al., 2016; Danielsson et al., 2024). Who emphasized in a different result the importance of farmer education, economic support and information access in improving adaptive capacity and promoting sustainable agricultural practices. However, the study also reveals gaps in areas such as water management, access to resilient crop varieties and psychosocial support, which were rated only slightly sustainable. Additionally, factors like long-term planning, community-based action and prioritization of resilience over short-term gains showed only moderate adoption. These findings partially contrast with existing literature that identifies these elements as essential for long-term sustainability, suggesting that farmers may still face constraints such as limited resources, inadequate extension services and a focus on immediate economic needs (Srivaro, 2020).

The result of the analysis presented showed that the mechanical enhancements for improving the multifunctionality of the proposed wooden furniture are moderately functional. Several aspects, such as inclusion of necessary drawing views, proper tightening of fasteners, structural alignment and overall system performance, were rated highly functional, highlighting strong attention to structural integrity and operational efficiency. These results align with previous studies (Cheng et al., 2021; Danijela et al., 2014; Rajan et al., 2019) in furniture design and mechanical systems, which emphasize the importance of precision in fabrication, proper assembly and structural stability in achieving effective multifunctional designs. However, some components, particularly the practicality of design for manufacturing, along with moderate ratings in areas such as hinge functionality, motion effectiveness and achievement of intended mobility, indicate certain design and usability limitations. This partially contrasts with (Husein, 2020) that stated the need for ease of manufacturability and seamless mechanical movement as critical factors in multifunctional furniture design. The moderate ratings suggested that while the design is structurally sound, further improvements are needed in optimizing movement mechanisms, simplifying production processes and enhancing user interaction.

The results of this research showed that the proof of concept and ergonomic performance of the proposed multifunctional wooden furniture are moderately comfortable, with several features rated as highly comfortable. Notably, the ability of components to adjust or convert independently, backrest/support comfort across positions, surface comfort and ease of conversion between modes were highly rated. These findings were in tandem with (Mazlan et al. (2021) who posited flexibility, adaptability and user-centered adjustability as key determinants of comfort and usability in multifunctional furniture. Meanwhile, some aspects such as edge contour comfort, weight distribution, armrest positioning and ease of reclining recorded only moderate ratings, indicating areas requiring improvement. This partially aligns with the findings of Pricillia and Mutiara (2021) who highlighted common ergonomic challenges in multifunctional furniture, especially in achieving uniform comfort across different usage modes.

The findings from the study revealed that the developed multifunctional wooden furniture exhibits a moderate level of suitability in enhancing aesthetic value. Attributes such as visual balance and harmony and the presence of distinct stylistic features recorded high mean scores, suggesting that the design effectively incorporates fundamental aesthetic principles. These findings are in agreement with Husein (2020) who identified balance, harmony and clear stylistic expression as key determinants of visual appeal. Furthermore, the moderate ratings observed for texture quality, colour palette effectiveness and overall visual attractiveness corroborate prior studies that emphasize the role of material finish and visual coherence in shaping user perception of aesthetic value (Mazlan et al., 2021; Cheng et al., 2021). Despite these positive outcomes, several parameters including overall compositional cohesion, sleekness and consistency of design language were rated at a moderate level, indicating areas requiring further refinement. This observation is somewhat inconsistent with (Husein, 2020) who underscores the importance of strong integration and stylistic consistency across all design elements in achieving superior aesthetic performance.

5 CONCLUSION

The findings of this study indicated that multifunctional wooden furniture (bed, chair and drawer) fabricated from (*Cocos nucifera*) demonstrated considerable potential for practical application, particularly in space-constrained environments. The environmental sustainability measures associated with (*Cocos nucifera*) were found to be moderately achieved, suggesting that while the material represents a viable alternative for furniture production, further improvements in sustainable utilization are necessary. Similarly, the mechanical enhancements incorporated into the furniture design exhibited moderate functionality, indicating acceptable performance with scope for further structural optimization. Notwithstanding these limitations, the developed furniture showed a high level of comfortability and ergonomic performance, confirming its suitability for user-centered applications. In addition, the furniture

demonstrated a high degree of aesthetic suitability, enhancing its appeal in contemporary interior settings, while also exhibiting strong space-saving characteristics that underscore its relevance for modern residential use.

Recommendations

The following recommendations were made:

- Researchers, material scientists in conjunction with furniture manufacturers should ensure that (*Cocos nucifera*) is further explored and properly processed for furniture production. This will help manufacturers and end-users to benefit from a sustainable alternative material while reducing dependence on conventional timber resources.
- Design engineers and product developers should ensure that the mechanical properties and structural components of the multifunctional furniture are regularly improved and optimized to meet required performance standards. This will help manufacturers produce more durable products and enable users to enjoy longer-lasting and safer furniture.
- Ergonomics specialists and furniture designers should ensure that user-centred ergonomic principles are adequately incorporated into the design of multifunctional furniture. This will help end-users achieve improved comfort, usability and overall satisfaction in daily use.
- Industrial designers and interior decorators should ensure that the aesthetic qualities of multifunctional furniture are well enhanced and aligned with contemporary design trends. This will help homeowners and users to benefit from visually appealing furniture that complements modern interior spaces.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

Statement of ethical approval

The present research work does not contain any study performed on animal/human subjects by any of the authors.

Statement of informed consent

All subjects gave written informed consent prior to enrolment. The privacy of participants was maintained at all times during the study and no information that could be used to identify them was shared. They were also free to cancel or drop out of the study at any time without penalty and this decision did not affect their management.

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