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A Study on the Development of Paper-Based Mobile Furniture

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In response to increasing spatial constraints, diverse living patterns, and growing awareness of sustainability, mobile furniture has emerged as a relevant design typology suitable for temporary and flexible environments such as rentals, markets, and exhibitions. While paper offers advantages of lightness, recyclability, and low cost, it still faces challenges regarding structural stability, durability, and user trust. Therefore, this study examines the feasibility and design potential of applying paper materials to mobile furniture from both practical and sustainable perspectives. A qualitative approach was adopted using semi-structured interviews with ten participants who had experience in furniture design, promotion, or usage. Through thematic analysis, users were found to value rapid assembly, modular structure, and contextual flexibility as core design needs. Moreover, structural reinforcement, surface treatment, and cultural narrative were identified as key strategies to enhance the acceptance of paper-based furniture. Although concerns about durability and safety remain, participants indicated that appropriate design strategies and material validation could improve trust and willingness to adopt such furniture. This study proposes preliminary design considerations and contextual applications for paper-based mobile furniture, offering a foundation for future prototype testing, material validation, and sustainable design approaches. The findings fill a gap in user-centered research on paper materials and provide practical implications for the development and market potential of sustainable furniture solutions.

Keywords: Mobile Furniture, Paper Material Application, Sustainable Design

1. INTRODUCTION

In recent years, as urban spaces become increasingly compressed and residential lifestyles grow more mobile, mobile furniture has emerged as a significant direction in the design field (Yu et al., 2019). Unlike traditional furniture that emphasizes stability and long-term fixed arrangements, mobile furniture prioritizes portability, rapid deployment, lightweight structure, and situational adaptability. It effectively meets the growing demand for spatial flexibility and immediacy in contemporary living—whether in rental housing, camping, pop-up exhibitions, market stalls, or shared spaces. With features such as modularity, foldability, and ease of disassembly, mobile furniture is not merely a typological innovation but a concrete response to shifting living patterns and spatial-economic thinking.

Simultaneously, sustainable design has become a foundational pillar in global design discourse. Under the dual pressures of limited resources and climate change, designers increasingly prioritize environmental impacts in material selection and sustainability across the full product life cycle. In this context, paper materials, which are renewable, recyclable, lightweight, and low in manufacturing energy consumption, have begun to attract attention in the design domain. While paper-based furniture has existed since the 20th century, its structural limitations and relatively low durability have kept it outside mainstream product systems (Łątka et al., 2022). However, advances in technologies such as honeycomb panels, multi-layer corrugation, eco-friendly coatings, and composite processing have significantly enhanced the feasibility of paper materials for furniture. Combined with modular and folding strategies, paper furniture now shows strong potential for short-term installations, educational outreach, exhibitions, outdoor events, and temporary spaces.

Despite this, most mobile furniture on the market continues to be made from metals, plastics, and composite wood panels. These materials, through both their production and disposal processes, contribute to carbon emissions and resource depletion—contradicting sustainability goals. Although paper offers environmental advantages and visual adaptability, users still express concerns about its durability, safety, and trustworthiness. As such, a key design challenge lies in reconstructing public perception and usage scenarios for paper-based furniture through design language, structural innovation, and cultural narratives.

A review of existing studies indicates that while paper materials have gained increasing attention in the fields of sustainable materials and experimental design, most research remains focused on material performance testing, structural engineering simulations, or case-based demonstrations. However, systematic investigations from the user's perspective are still limited, particularly those addressing context-specific needs of mobile furniture, mechanisms for building material trust, and integrated design strategies. Moreover, current discussions often treat paper either as a technical challenge or a visual medium, rather than exploring how structural reinforcement, surface treatment, and cultural narrative may reshape users' perception and acceptance of paper-based furniture. The novelty of this study lies in its integration of mobile furniture characteristics with the potential of paper materials, adopting a

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user-centered and scenario-based approach to propose actionable design insights and a strategic framework, thereby addressing the research gap in user perception, design methodology, and feasibility assessment.

Yet, past studies have seldom examined paper-based furniture through a holistic framework that connects "usage scenarios, material trust, structural strategies, and cultural narrative" as interrelated factors influencing user acceptance. Most existing research isolates material performance or aesthetic experimentation, without addressing how design actions may rebuild material credibility and reposition paper furniture within everyday life. Therefore, there remains a clear gap in integrating user-centered needs with technical feasibility and cultural expression. The novelty of this study lies in proposing a scenario-based and user-centered framework to analyze how paper-based mobile furniture can achieve practicality, structural reliability, and narrative value, thereby bridging the fragmented perspectives found in existing literature. This clarifies that while prior research has discussed individual aspects such as material reinforcement or modularity, few studies have systematically addressed how user perception, structural strategies, and cultural narrative can jointly reshape material trust and market feasibility.

This study centers on paper-based mobile furniture as its core focus, aiming to integrate the practical needs of mobile furniture, the application potential of paper materials, and the value propositions of sustainable design. Using qualitative interviews, the research collects perspectives from both end-users and design professionals, seeking to understand their expectations and insights regarding paper furniture in terms of function, safety, environmental values, aesthetics, and contextual applications. In doing so, the study evaluates the feasibility and limitations of paper as a furniture material, while proposing key design attributes and strategies for future development and market positioning.

The primary objectives of this study are as follows:

1. To explore usage scenarios and design characteristics of mobile furniture, and to summarize users' expectations regarding functional demands and spatial flexibility.
2. To analyze the structural potential, fabrication characteristics, and acceptance threshold of paper materials in furniture applications, thereby clarifying their feasibility as a mobile furniture material.
3. To investigate the value of paper-based furniture within the context of sustainable design, and to propose product development strategies that align with contemporary societal and environmental needs.

2. LITERATURE REVIEW

2.1 Mobile Furniture

Against the backdrop of increasingly flexible spatial use and highly mobile personal lifestyles, mobile furniture has become an important trend in contemporary design (Yu et al., 2019). In contrast to conventional furniture that emphasizes stability and permanence, mobile furniture highlights mobility, rapid deployment, and spatial adaptability, effectively addressing the diverse and transient spatial needs of today's society—such as short-term rentals, camping, pop-up events, exhibition setups, and co-working environments. Key features include light weight, foldability, modularity, ease of transport, and simple assembly. Design approaches often emphasize minimal tool requirements, single-user operability, and quick setup.

The development of mobile furniture not only responds to the physical constraints of spatial usage, but also reflects users' psychological desire for control and flexibility over their living environments (Yang, 2022). Particularly amid growing urbanization and shrinking living spaces, users increasingly prefer furniture that is multifunctional and adaptable, allowing for frequent relocation, short-term use, and spatial transformation. Modular and reconfigurable designs further enable mobile furniture to serve multiple roles across various settings—such as functioning as desks, display stands, or storage boxes—without compromising usability (Liu, 2014).

Practical cases demonstrate the wide adoption of mobile furniture in exhibition design and cultural-creative markets, where quick setup and flexible spatial structuring reduce installation time and enhance the aesthetic versatility of the venue (Gong & Yan, 2020). Additionally, the COVID-19 pandemic accelerated demand for home-based workspaces and flexible living arrangements, prompting designers to prioritize mobility, layout flexibility, and storage efficiency in furniture development (Cheng et al., 2021).

Nevertheless, although mobile furniture has matured in terms of function and form, mainstream products are still predominantly made from metals, plastics, and plywood—materials that entail considerable environmental burdens (SILVA & Medeiros, 2019). Furthermore, assembly mechanisms that rely heavily on tools and standardization reduce user-friendliness and efficiency in certain contexts—such as children's spaces, educational displays, or outdoor activities. Thus, for mobile furniture to further expand its application scope, it must propose forward-thinking design strategies in material innovation, assembly logic, and spatial semantics.

This study positions mobile furniture as a foundational design proposition, reexamining its core attributes of lightweight structure, rapid assembly, and contextual flexibility. The research further investigates whether the use of paper-based materials in such furniture can balance functionality and environmental value—thereby expanding the potential of mobile furniture as a sustainable design practice.

2.2 Paper-Based Furniture

Although not a mainstream material in furniture design, paper has increasingly gained attention as a medium for experimental design and alternative material innovation—especially in light of growing sustainability awareness and advancements in material technology. The inherent advantages of paper include its light weight, foldability, ease of processing, renewability, and high recyclability. For designers, it also offers form flexibility and low technical barriers, making it particularly suitable for short-term events, temporary installations, and educational exhibitions (Petutschnigg & Ebner, 2005). Culturally, paper lends itself well to design narratives involving environmentalism, craftsmanship, and cultural creativity.

The use of paper in furniture design can be traced back to the mid-20th century, with notable contemporary examples including the Wiggle Chair by architect Frank Gehry and the Flexible Love honeycomb sofa. These designs demonstrate the structural potential and formal transformability of paper, inspiring subsequent designers to treat it as a structural medium rather than merely a packaging or surface material (Bai et al., 2014).

Despite its ecological and expressive advantages, paper as a structural base for furniture still faces several practical challenges. These include insufficient moisture resistance, limited load capacity, short lifespan, and deeply rooted user perceptions that paper is "fragile" or "unsafe" (Shi, 2021). Overcoming these barriers

requires design approaches that address structural reinforcement, material innovation, and semantic reinterpretation, in order to rebuild user trust and functionality perceptions.

Advancements in material engineering have helped to mitigate some of these issues. Techniques such as honeycomb structures, multi-layer board lamination, PP film lamination, and magnetic or locking joints have been employed to enhance the durability and stability of paper furniture, reducing its vulnerability to environmental variables (Petutschnigg & Ebner, 2005). In addition, paper has been incorporated into smart design, interactive mechanisms, and digital fabrication technologies (e.g., laser cutting, parametric design), offering new opportunities for innovation.

From a design culture perspective, paper is not only an ecological material but also a medium rich in cultural plasticity and contextual storytelling. Its minimalist, raw, and impression-neutral qualities enable designers to reinterpret it as a communication tool, educational resource, or cultural-creative artifact, creating stronger symbolic and spatial connections (Yang et al., 2012). As such, paper-based furniture represents not only material innovation but a holistic practice that merges sustainability thinking, design narratives, and spatial interpretation.

This study does not merely focus on the technical feasibility of "making furniture out of paper," but rather on how design can overcome material skepticism and structural limitations, allowing paper furniture to be practically applied in living environments. It also explores how the integration of mobility, lightness, and contextual responsiveness can shape a design pathway rooted in cultural communication and environmental responsibility.

2.3 Sustainable Design

Amid escalating global climate change and resource depletion, sustainable design has become a core value across product design, architecture, and materials development. It emphasizes minimizing environmental impact throughout the entire life cycle of a product—from production and usage to disposal—through responsible practices in material selection, processing, packaging, recycling mechanisms, and lifecycle management (Tenuta et al., 2024).

As originally proposed by Papanek (1971) in his ethical framework for design, the discipline should not merely serve market demand but should instead prioritize long-term impacts on people and the planet. This concept has evolved into the three central pillars of sustainable design: environmental responsibility, social equity, and economic viability. At the product level, this translates into practices such as the use of renewable materials, energy-efficient production, modular repairability, and extended product lifespan.

In the context of furniture design, sustainable thinking manifests through various strategies: incorporating low-carbon or natural materials, adopting modular designs, minimizing the need for tools during assembly, implementing disassemblable and recyclable structures, and shortening supply chains through localized production (Manzini & Vezzoli, 2003). These approaches not only reduce environmental burdens but also enhance user engagement and awareness of sustainability—through formats such as DIY assembly, participatory material selection, or cultural regeneration, fostering a stronger sense of responsibility between users and their belongings.

With the United Nations' Sustainable Development Goals (SDGs) becoming an influential framework across policy and industry, sustainable design increasingly aligns with Goal 12: Responsible Consumption and Production (Yang & Vezzoli, 2024). For designers, this entails not only technical challenges like reducing carbon footprints and material consumption but also communicative challenges—such as how to use design language, narrative strategies, and product experiences to reshape user perceptions and foster more ethical and environmentally conscious behavior.

Paper serves as a representative material in sustainable design due to its renewability, recyclability, and low-energy manufacturing. It is often positioned as a substitute for plastics and composite materials in the effort to reduce pollution. However, its short-term durability and limited environmental adaptability remain challenges (Wang & Yu-ming, 2021). Therefore, the sustainability of paper-based products does not stem solely from their material properties; it must also be supported by design strategies that enable continued usability—such as modular replacements, structural enhancements, and cultural value augmentation—ensuring that they do not become single-use consumables.

More broadly, sustainable design should not be limited to ecological performance or material selection; it must involve a cultural and behavioral translation. Studies have shown that when products incorporate both a "sustainable language" and "contextual storytelling," users are more likely to perceive their social intentions and environmental value, which in turn increases acceptance and brand loyalty (Chapman, 2005; Tonkinwise, 2011).

This study adopts sustainable design as a critical framework for the development of paper-based mobile furniture, seeking to integrate material selection, structural planning, and contextual application. It aims to explore how to balance product feasibility with social recognition, and ultimately proposes a design model that is both environmentally responsible and culturally meaningful.

3. RESEARCH METHOD

This study investigates the feasibility, user acceptance, and design positioning of applying paper materials in mobile furniture development. A qualitative research methodology was adopted to gather insights from potential users and industry professionals, aiming to construct a foundation for design strategies that are both practically viable and innovatively promising. This chapter outlines the adopted methodology, participant profiles, and research procedures.

3.1 Research Method

A qualitative research approach was employed, with semi-structured in-depth interviews as the primary data collection method. The study explores interviewees' views on the usage needs, material feasibility, market acceptance, and envisioned applications of paper-based mobile furniture. Through open-ended questioning, participants were encouraged to share insights based on real-life experience and to articulate their ideas and expectations regarding the use of paper as a furniture material.

The interviews were designed around three thematic dimensions, aligned with the study's objectives:

1. Usage Scenarios and Needs Analysis: Focused on real-life contexts involving mobile furniture, perceived pain points, and imagined functional enhancements.
2. Material Feasibility and Design Recommendations: Explored participants' perceptions of paper's physical properties, structural techniques, environmental adaptability, and proposed design strategies.

3.Market Acceptance and Design Positioning: Assessed perspectives on brand values, pricing expectations, marketing strategies, and potential application environments for paper-based furniture.

Following transcription and classification, the interview data were analyzed to identify key indicators within each thematic dimension. Recurrent patterns were cross-compared to establish both consistency and representativeness, forming a solid basis for the development of subsequent design strategies and product concepts.

3.2 Participant Profile

A total of ten participants with experience in mobile furniture usage were interviewed, including renters, camping enthusiasts, furniture designers, and marketing professionals. Participants ranged in age from 23 to 58, representing a diverse mix of genders and occupational backgrounds, ensuring a broad spectrum of life scenarios and usage perspectives within the limited sample, qualitative saturation with 10–12 participants is common in design-related research (Guest, Namey & Chen, 2020)

Among the participants, some had been directly involved in the design or development of DIY or paper-based furniture; others had professional experience in furniture design or had utilized such products in exhibitions, educational settings, or shared platforms. This diversity provided a multi-angled understanding of the potential and limitations of paper furniture and helped to fill gaps often found in conventional user studies regarding sustainable material applications.

To determine the adequacy of the sample size, this study adopted the principle of data saturation. Recurring themes emerged during the interviews with the eighth to tenth participants, and no substantially new information was obtained; therefore, the sample of ten participants was considered sufficient to achieve saturation for qualitative analysis.

3.3 Research Procedure

The research was conducted in three phases: study planning, data collection, and data analysis. The key steps are outlined below:

1.Planning Phase: Clearly defined research problems and goals. A semi-structured interview guide was developed, informed by literature and relevant design issues. The guide encompassed three main dimensions and ten questions, covering topics from usage scenarios to market applications.

2.Interview and Data Collection Phase: Ten interviews were conducted in accordance with the participant plan. Each session lasted approximately 60 minutes. Verbatim transcripts were created, and the raw data were organized for initial coding and filtering.

3.Data Organization and Analysis Phase: All audio recordings were transcribed into full-text format. The responses were categorized according to the three main research dimensions. Using thematic analysis, relevant statements and reflections were extracted from the data and organized into representative key indicators. Each indicator was supported by at least two participants, with their full statements and underlying implications recorded to ensure analytical richness and comparability. The results were ultimately compiled into a standardized analytical table, which served as a key reference for the writing of Chapter 4 and the formulation of design recommendations.

4. RESEARCH FINDINGS AND DISCUSSION

4.1 Usage Scenarios and Needs Analysis

This section explores users' practical expectations for paper-based mobile furniture, focusing on their perspectives regarding spatial behaviors, functional assumptions, and the evolving role of furniture. Based on interview data, three core themes were identified: usage scenarios and functional needs for mobile furniture, limitations and pain points of conventional furniture, and envisioned features and ideal attributes of furniture design.

1.Application Scenarios and Diverse Needs of Mobile Furniture

This subsection examines users' real-life contexts and functional requirements for mobile furniture. Across the interviews, participants emphasized the importance of rapid adaptability and situational compatibility in response to the increasing fluidity of urban living. In scenarios such as camping, renting, exhibitions, markets, and temporary workspaces, furniture is no longer seen as a fixed part of space but as a mobile asset supporting spatial flexibility.

As one furniture designer noted: "Mobile furniture satisfies the need to relocate and reconfigure living setups—it's especially suitable for camping, outdoor events, markets, and rental spaces." (P7, Male, Age 52) Another participant shared how mobile furniture serves dual purposes in both home and studio settings: "It improves daily efficiency and makes it easier to host guests or adapt to changes in work." (P10, Male, Age 30) These narratives suggest that the value of mobile furniture lies in its ability to respond to changing spatial needs, offering users customizable and self-directed configurations.

These findings are consistent with recent studies on adaptive and modular furniture, which argue that customizable spatial arrangements enhance both functional performance and user satisfaction Kim & Lee, 2020). By applying these principles specifically to paper-based materials a context rarely examined in previous studies, this research contributes a novel application of modular design thinking to sustainable and lightweight furniture development.

2.Limitations and Inconveniences of Traditional Furniture

Users' dissatisfaction with conventional furniture primarily stemmed from three key issues: bulk and weight that hinder portability, complex and time-consuming assembly, and lack of adaptability to non-standard spatial layouts.

Regarding transport, one female participant commented: "Heavy or oversized furniture makes moving extremely difficult. Being able to disassemble and pack quickly would ease that burden." (P2, Female, Age 37) Another interviewee shared frustration over complicated assembly: "I once gave up on new furniture because I couldn't understand the instruction manual." (P3, Male, Age 58) Others emphasized the need for tool-free and solo-friendly assembly: "Furniture should be installable without tools—ideally by just one person." (P7, Male, Age 52)

Spatial limitations were also commonly raised: "Our living room is narrow and long. Most standard furniture doesn't fit. I wish the dimensions were more adjustable." (P9, Male, Age 46) Overall, if mobile furniture aims to replace conventional models, it must address these pain points by reducing user burdens and enhancing environmental adaptability.

Similar concerns have been highlighted in existing research on furniture usability, demonstrating that excessive weight and complex assembly procedures can negatively impact both perceived value and consumer adoption rates (Santos & Ribeiro, 2021). Therefore, this study reinforces user-centered perspectives

on the need for lightweight and easily deployable furniture solutions, further extending these discussions into the domain of paper-based materials.

3.Functional Integration and Contextual Imagination for Ideal Furniture

When asked about their vision of "ideal furniture," participants frequently mentioned three key expectations: multifunctional integration, quick and lightweight assembly, and human-centered, emotionally resonant design.

One interviewee stated: "I want furniture that integrates lighting, storage, and transformability—perfect for small households." (P6, Female, Age 34) Another added: "Ideally, a table during the day could become a bed at night. That would really maximize space use." (P1, Male, Age 52) Some emphasized the importance of time efficiency: "Furniture should be as quick to set up as a tent. That way, it can meet outdoor and emergency needs." (P7, Male, Age 52)

Beyond practicality, some participants viewed furniture as a medium for emotional or social interaction: "I hope paper furniture can become a communication tool—something that connects people in public spaces." (P9, Male, Age 46) "Design shouldn't just be about function—it should also shape atmosphere and interaction." (P1, Male, Age 52) These insights highlight a conceptual shift: furniture is no longer seen as static objects but as interactive, narrative-driven tools that enrich spatial aesthetics, lifestyle rhythms, and social engagement.

This section demonstrates that user expectations for mobile furniture go far beyond traditional norms. In real-world contexts, they seek furniture that reflects flexibility, efficiency, and personal control. Paper, as a potential material, may fulfill these expectations if combined with lightweight modularity and visual appeal. Future furniture development should balance technical feasibility with contextual and cultural value, thereby elevating the significance of furniture as a spatial medium.

This perspective aligns with recent studies emphasizing the role of narrative and cultural framing in product identity and user engagement (Smith & Garcia, 2020). By integrating practical functionality with cultural and emotional value, paper-based furniture may provide new opportunities for education, public interaction, and cultural design areas underexplored in previous material-oriented studies.

This section demonstrates that user expectations for mobile furniture go far beyond traditional norms. In real-world contexts, they seek furniture that reflects flexibility, efficiency, and personal control. Paper, as a potential material, may fulfill these expectations if combined with lightweight modularity and visual appeal. More importantly, the integration of modular adaptability and contextual design as noted in recent modular furniture literature suggests that paper-based furniture may serve as a viable response to urban spatial constraints when supported by appropriate structural and aesthetic strategies (Liu & Huang, 2021). Future furniture development should balance technical feasibility with contextual and cultural value, thereby elevating the significance of furniture as a spatial medium.

4.2 Material Feasibility and Design Suggestions

This section focuses on evaluating the feasibility of paper as furniture material and explores directions for future design development. Based on participants' practical experiences and professional observations, three major dimensions were identified: material perception and intuitive usability, structural and durability challenges, and design recommendations and innovation potential. These findings reflect not only users' acceptance of paper materials but also offer technical and conceptual pathways for further development.

1.Perceptions of Paper Properties and Intuitive Usability

Most participants initially recognized paper's strengths in sustainability and lightweight characteristics, yet expressed concern over its durability, structural stability, and environmental adaptability. This dual view of potential and skepticism was a recurring theme.

"Paper has obvious sustainability advantages, but its stability and durability need to be supported by good design and appropriate technologies." (P1, Male, Age 52) A furniture designer added: "Surface treatments and innovative processing methods could help overcome paper's physical limitations and enable creative applications." (P3, Male, Age 58) These comments suggest that the core value of paper furniture lies in whether design strategies and manufacturing techniques can effectively compensate for its material weaknesses.

Another participant emphasized that strength can be enhanced through proper material selection and structural planning: "By using specific types of paperboard and well-considered structures, paper can absolutely be used as a furniture base." (P6, Female, Age 34) This indicates that users do not reject the idea of paper furniture outright; rather, they expect it to be reinterpreted through design to meet everyday functional and structural needs.

Similar findings have been reported in recent material perception studies, showing that user acceptance of alternative materials improves significantly when structural reinforcement and clear functional logic are incorporated into design (Chamanfar et al., 2021). This suggests that design strategies may play a more critical role than the material itself in determining usability and acceptance.

2.Structural Challenges and Durability Concerns

The primary challenges for paper-based furniture are moisture resistance and long-term durability. Participants frequently emphasized that for paper to enter practical use, it must overcome issues such as humidity absorption, deformation, and insufficient load-bearing capacity, ideally through technological reinforcement.

"Paper absorbs moisture and can't hold heavy loads. Improving moisture resistance is essential for regular use." (P10, Male, Age 30) A designer with production experience added: "Waterproof coatings like PP films or eco-friendly glues can significantly extend the lifespan of paper furniture." (P4, Male, Age 40) Beyond coatings, structural strategies were also mentioned: "Modular structures with proper weight distribution and balance are key to achieving stability." (P1, Male, Age 52) "Score lines, fold angles, and locking mechanisms can improve support strength and reduce tipping." (P3, Male, Age 58) These perspectives highlight that when material selection and structural engineering are well integrated, paper furniture can meet the basic functional and safety standards expected of everyday products.

This is consistent with recent research emphasizing that reinforcement systems and moisture control are essential for transforming lightweight materials into viable furniture options (Park & Lee, 2021). Furthermore, layered structural design and hybrid fabrication methods have been proposed as emerging techniques that could extend the functional lifespan of paper-based products (Rossi, L., & Bianchi, F., 2023).

3.Design Recommendations and Innovation Potential

Despite acknowledging the limitations of paper, many participants offered constructive suggestions from a design innovation standpoint. Popular strategies included: modular configurations,

hybrid material integration, smart features, and embedded cultural elements.

"Design should account for humidity levels and usage duration—anti-moisture paper types and protective coatings are key." (P5, Male, Age 29) "Composite structures and selective reinforcement can give paper furniture different mechanical properties." (P3, Male, Age 58) "If combined with bamboo fibers or recycled cotton, paper furniture could offer better support and stronger sustainability messaging." (P8, Female, Age 23)

Some participants emphasized the symbolic and cultural significance of paper furniture: "Paper furniture can stand out in the market by combining environmental values with aesthetic appeal and a clear brand narrative." (P7, Male, Age 52) "It carries a sense of social responsibility—it reflects a design attitude and communicates a value system." (P6, Female, Age 34) These insights indicate that although paper materials impose technical limitations, they also present opportunities for innovative expression and brand differentiation—especially when sustainability and design storytelling are integrated.

In summary, while paper is not traditionally used in furniture production, its potential is rising due to increasing sustainability demands and advancements in fabrication technologies. Users show openness mixed with rational caution, and their ultimate acceptance will hinge on whether design solutions can address the three core challenges: durability, structural stability, and moisture resilience. If paper-based furniture can satisfy both technical requirements and cultural communication goals, it has the potential to establish a distinct position in the future furniture market.

Recent studies support this perspective, suggesting that cultural framing and narrative-based design can enhance user engagement, particularly when material limitations are present (Smith & Garcia, 2020). Accordingly, paper furniture may serve not only as a material innovation but as a medium for contextual expression and sustainable branding within emerging design markets.

In summary, while paper is not traditionally used in furniture production, its potential is rising due to increasing sustainability demands and advancements in fabrication technologies. Users show openness mixed with rational caution, and their ultimate acceptance will hinge on whether design solutions can address the three core challenges: durability, structural stability, and moisture resilience. This study therefore suggests that paper-based furniture may hold future market potential if combined with strategies such as structural reinforcement, hybrid material integration, and narrative-driven design, approaches that have been recognized in recent sustainable product research as key drivers of user acceptance (Keane & Smyth, 2022; Akhtar et al., 2023).

4.3 Market Acceptance and Design Positioning

This section investigates users' perspectives on the market acceptance, brand perception, and application positioning of paper-based mobile furniture. Based on participants' views on brand value, purchasing behavior, and promotional channels, three major themes were derived: consumer expectations and purchasing considerations, design appeal and brand value creation, and potential application scenarios and marketing strategies. These findings help clarify the cognitive thresholds and communication strategies that paper furniture must address in order to gain broader market traction.

This reflects recent discussions indicating that consumers are increasingly willing to support sustainable products, but their purchasing intentions depend heavily on perceived functional value and design credibility rather than environmental claims alone (Mora & De Marchi, 2022).

1.Consumer Expectations and Purchasing Considerations

Most users expressed a tentative interest in paper furniture—showing curiosity but also maintaining caution. While they were attracted to its eco-friendly attributes and aesthetic possibilities, actual purchase decisions were strongly influenced by factors such as durability, functionality, and long-term usability.

"If the product is eco-friendly, well-designed, and customizable, I would consider buying it. But quality and long-term value matter most." (P1, Male, Age 52) "I like the renewable and stylistic aspects of paper furniture, but price and quality are still key deciding factors." (P6, Female, Age 34) These responses suggest that even when consumers support environmental values, practical concerns like durability and perceived reliability play a critical role in purchasing behavior.

Regarding pricing, most participants believed that paper furniture should be positioned within a mid-to-low price range, with flexibility depending on functionality and innovation level: "For mid-sized innovative furniture, I'd expect a price range of NT$3,000–6,000; with smart features, up to NT$8,000." (P7, Male, Age 52) "For the middle market, NT$2,000–4,000 seems reasonable—balancing function and budget is the top concern." (P1, Male, Age 52) In short, clear value communication is essential for overcoming the baseline skepticism that "paper equals fragility." A balance must be struck among price, function, and design credibility.

These findings are consistent with consumer research showing that perceived usability and material reliability are primary drivers of purchase intention for sustainable products, even when ecological attributes are acknowledged (Luchs et al., 2023). Thus, paper furniture must clearly demonstrate functional legitimacy before environmental benefits can translate into consumer trust.

2.Design Appeal and Brand Value Creation

At the branding level, participants emphasized that environmental values and social responsibility can foster strong emotional resonance with consumers. In terms of aesthetics, paper furniture must offer distinctive visual identity to stand out in cultural, exhibition, or educational contexts.

"If the brand highlights sustainability and conveys a strong design attitude, it will attract value-conscious consumers." (P6, Female, Age 34) "With compelling storytelling and value expression, a paper furniture brand could be seen as intentional and meaningful." (P3, Male, Age 58) These insights reveal that users aren't just purchasing a physical object—they're buying into a lifestyle philosophy and cultural statement.

Participants also highlighted the importance of visual identity and aesthetic coherence: "I'd like to see paper furniture with cultural or artistic language. That gives it value and makes it conversation-worthy." (P4, Male, Age 40) "It needs a strong look—pop-up shops and temporary exhibitions need eye-catching design." (P7, Male, Age 52) "Simplicity with a systematic visual approach appeals to me. The design doesn't have to be complex, but it should have a clear concept." (P8, Female, Age 23) These comments suggest that market competitiveness lies not only in material differentiation, but in a cohesive interplay of visual design and brand narrative.

Similar observations have been made in design research, where narrative-based branding and cultural positioning have been shown to enhance user engagement and strengthen perception of product identity (Chen & Huang, 2022). For paper furniture, this suggests a strategic opportunity to link sustainability with emotional value rather than relying solely on material innovation.

3.Potential Application Scenarios and Promotional Strategies

Participants generally agreed that paper furniture is best suited for short-term, low-commitment, high-variability environments, such as cultural markets, design exhibitions, educational spaces, and pop-up events. They also recommended integrating digital platforms and contextual storytelling to broaden reach and user engagement.

"Design fairs, markets, and event venues are perfect for paper furniture. It grabs attention and encourages on-site interaction." (P1, Male, Age 52) "Cultural markets are a good way to test consumer reactions and build word-of-mouth." (P4, Male, Age 40) "Schools can use paper furniture in classrooms or activity centers. It reduces renovation costs and supports sustainability goals." (P6, Female, Age 34) As for promotional strategies, most participants suggested combining social media engagement with content-driven storytelling:

"The brand story needs to be compelling. If the production process or material sourcing is transparent, it'll be more persuasive." (P2, Female, Age 37) "Use social media and videos to show how paper furniture works in real-life situations—short clips can really help spread the message." (P5, Male, Age 29) These perspectives show that for paper-based furniture to gain market visibility and trust, product differentiation must be paired with strong storytelling and marketing communication. Brands that present themselves in a way that is accessible, understandable, and shareable will be more likely to cultivate recognition and consumer loyalty.

In conclusion, paper-based mobile furniture holds market potential but must overcome certain trust barriers. Consumers expect not only functionality and reasonable pricing but also a compelling brand narrative. If designers can combine sustainability, aesthetic distinctiveness, and engaging storytelling, and promote these through immersive marketing and cross-domain applications, paper furniture can gradually build cultural and commercial value—and ultimately carve out a meaningful place in the market.

This aligns with digital marketing trends suggesting that social media transparency and contextual demonstration can increase product credibility and emotional connection (Lim & Lee, 2021). As a result, paper-based furniture may find market success not only through affordability or sustainability but through narrative-driven and immersive branding approaches.

In conclusion, paper-based mobile furniture holds market potential but must overcome certain trust barriers. Consumers expect not only functionality and reasonable pricing but also a compelling brand narrative. If sustainability is paired with functional clarity and narrative-based design, paper furniture may gradually establish cultural and commercial value and achieve long-term market positioning (Mora & De Marchi, 2022).

5. CONCLUSION AND RECOMMENDATIONS

This study aimed to examine the feasibility of paper as a material for furniture design, with a particular focus on the usage scenarios, design potential, and market acceptance of paper-based mobile furniture. Through in-depth interviews with ten participants who had either practical experience or potential needs in this domain, the research constructed a comprehensive framework based on user demands, material technology, safety perceptions, market insights, and brand strategies—mapping out the possibilities for product innovation in this field.

First, in terms of user needs, participants showed strong expectations for features such as lightweight portability, rapid assembly, and multifunctional integration. For mobile groups such as renters, exhibition professionals, and small households, spatial flexibility was seen as a key factor in improving daily efficiency and comfort. Paper, due to its inherent lightness and malleability, was identified as a promising material in fulfilling these expectations.

Second, regarding the material feasibility of paper, users largely recognized its sustainable value and innovative potential, but also clearly pointed out existing concerns related to structural stability, moisture resistance, and environmental adaptability. Nevertheless, the study found that by incorporating honeycomb structures, protective coatings, and modular design strategies, it is possible to progressively overcome these technical barriers and transition paper furniture from a conceptual product to a functional reality.

Several limitations should be acknowledged. First, this research adopted a qualitative approach, and although data saturation was achieved, the sample size may not reflect diverse cultural backgrounds or usage patterns across different demographics. Second, this study focused on usage scenarios and design strategies, without conducting prototype testing or material strength verification, which means the findings remain exploratory in nature. Third, the assessment of market acceptance primarily relied on simulated scenarios rather than quantitative data or actual purchasing behavior, thereby limiting the generalizability of the results. Overall, this study makes a theoretical contribution by proposing an integrative analytical framework for paper-based mobile furniture, while the practical contribution lies in offering design strategies and contextual positioning guidelines that may inform future product development and design education.

Future studies may extend this work in three directions. The first is to develop physical prototypes and conduct structural and durability testing to evaluate the viability of reinforced or hybrid material strategies. The second is to incorporate quantitative surveys or behavioral experiments to construct a user acceptance or material trust model. The third is to explore deeper integration between paper-based furniture and cultural narratives, exhibition contexts, or educational environments to establish clearer product positioning and context-driven application value.

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