

A Study of Traditional Ecological Culture in Ming Dynasty Furniture, and Research of The "Furniture Design" About Green Design Curriculum-Based Education

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Abstract

This article investigates the ecological culture and design features of Ming Dynasty furniture to establish a framework for sustainable furniture design, focusing on incorporating traditional philosophies into modern education. It evaluates Ming Furniture's eco-design principles against contemporary environmental standards through literature reviews and case studies. The study concludes that Ming furniture exemplified ecological awareness and sustainability, significantly influencing modern furniture design education by fostering environmental responsibility. It encourages students to harmonize heritage with innovation and deepen their understanding of eco aesthetics. The conclusion underscores the urgent need for curriculum reforms to enhance ecological civilization in China's universities, advocating for applying Ming eco-aesthetic principles in contemporary design. It proposes an innovative educational strategy combining traditional wisdom with modern design needs to cultivate designers equipped to meet environmental challenges.

Keywords: Ming Furniture, Furniture Culture, Furniture Design, University Education, Eco-Education Concepts

Introduction

In China, since the 18th National Congress of the Communist Party, with Comrade Xi Jinping at its core, the Party Central Committee has attached great importance to the construction of socialist ecological civilization. It has proposed the scientific proposition of "steadfastly adhering to green development and integrating the construction of ecological civilization into various aspects of economic development, political development, cultural development, and social development." (Chinese People's Political Consultative Conference newspaper, 2015)

On the evening of April 22, 2021, in response to an invitation from U.S. President Biden, President Xi Jinping of China attended the Leaders' Climate Summit via video from Beijing and delivered an important speech titled "Building a Common Community of Life for Man and Nature." General Secretary Xi Jinping's remarks on ecological civilization, in line with the trends of the times, have presented a macro-level development concept at the national level by emphasizing that "man and nature form a community of life." (Xi Jinping, 2021)

Furniture industries worldwide, including China's, encounter issues such as resource shortages, significant waste and pollution, and "green consumer barriers" to world trade. (TianNa,2015) Against steady economic development, consumption upgrades, and technological advances, green eco-furniture with artistic qualities has a more substantial market competitiveness. This brings new impetus to the development of the furniture design industry. However, the current state of Chinese higher education in furniture design often finds art students overly focused on formal aesthetics and innovation while ignoring the functional needs of the audience and technical elements. Students must continually learn and master new design concepts and, more importantly, cultivate a green ecological consciousness that benefits humanity, society, and the environment. (Zhang Haiyan, 2020)

Objective of the Study

This study aims to analyze the cultural connotation of furniture design by guiding students in learning about the ecological ideas present in the traditional Chinese furniture culture from the Ming Dynasty. This allows them to understand better the environmental and cultural concepts embedded in the distinctive features of Ming Dynasty furniture, representing a quintessential aspect of Chinese classical furniture. In furniture design education and teaching, focusing on the rich imagery rooted in Ming traditional culture and guiding students to explore the ecological and cultural ideas of traditional furniture is the inheritance of the exquisite culture of traditional Chinese furniture - a heritage of conventional furniture's beautiful culture.

This study integrates the concept of ecological civilization into furniture design education within colleges and universities. It involves consolidating the theoretical foundations of environmental civilization among college students, primarily focusing on classroom teaching in furniture design and promoting the innovation of furniture design courses in higher education institutions.

Significance of the Study

Establish a cultivation mode centered on constructing ecological furniture culture in furniture design teaching. The model aims to assist students in discovering the synergy between traditional furniture design concepts and modern design principles while guiding them to draw from the ecological wisdom of traditional Chinese and embrace green design principles. Combined with the Furniture Design course curriculum, it forms a comprehensive green eco-knowledge system that equips students with the necessary tools for modern furniture design. Ultimately, our research aims to guide future furniture design students' training, promote the deep integration of sustainable furniture manufacturing and cultural heritage with green design, and address the furniture industry's needs for environmental protection and cultural heritage in modern society. This endeavor holds practical significance and provides theoretical guidance to elevate future furniture talents' technical expertise.

In summary, the study of furniture culture can assist us in better cultural preservation, nurturing aesthetics, enhancing cultural confidence, inspiring innovation, and promoting

sustainable development. Education on furniture culture can stimulate creativity and foster innovation among students in furniture design.

Literature Review

Culture and furniture culture

The most important viewpoint of Chinese scholars on the definition of "culture" is that "culture is a complex of different forms of traits created by human beings." (Sima Yunjie, 1996)

"In Chinese culture, furniture holds significant importance. As a typical form of craftsmanship, Chinese-style furniture exhibits distinctive characteristics in terms of materials, craftsmanship, techniques, and aesthetics." (Xu Jifeng, 2009)

"Traditional Chinese furniture embodies the profound traditional thoughts and cultural significance of Chinese civilization, carrying the heritage of Chinese culture over thousands of years. From the ancient origins of traditional furniture to the flourishing Ming and Qing dynasty furniture, from the low-profile seating arrangements to the later more visually striking high-rise furniture, it gradually reveals its enduring development. Chinese traditional furniture encompasses a wide variety of types, including diverse chairs and stools, rustic and elegant beds and couches, as well as storage cabinets and decorative screens, all reflecting the cultural spirit and tastes of the Chinese people.

The term 'culture' has existed in the early vocabulary of various parts of the world. In cultural anthropology, British anthropologist Edward Burnett Tylor first defined the term 'culture' in 1871. He stated, 'Culture or civilization, taken in its broad, ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society.' In other words, 'culture' is humanity's response and reaction to time, documenting human societies' behavior, ways of thinking, and lifestyles at different times. It is a product of time, the memory of human history, and values. It represents the identity and recognition of a group. The core of 'culture' is traditional concepts, especially values. From the evolution of the word 'culture' and related definitions and understandings, culture is relative to nature, with a social and holistic nature. The depth and origins of culture lie in human thoughts, while its surface lies in human behavior and the material environment created by humans, including architecture, furniture, and more."

Ming Dynasty furniture symbolizes tradition, distinctive characteristics, and ethnicity; it has evolved into a cultural form, a cultural vessel, and a cultural phenomenon; it has become a synthesis of material, spiritual, and artistic culture, as well as it has become a way of life and a mode of behavior of a particular group formed by certain customs, concepts, and norms. (Tao Tao, 2003)

Within the framework of Chinese tradition, furniture is highly valued for its cultural significance. Chinese-style furniture, emblematic of skilled craftsmanship, showcases unique features in material composition and artisanal techniques while also reflecting broader aesthetic principles. During the Ming Dynasty, furniture stood out as a cultural icon, merging tradition and ethnic identity and a synthesis of material, spiritual, and artistic cultures. It encapsulates the cultural norms, customs, and ideologies of its time, offering insights into the lifestyles and behaviors of its creators and serving as a window into that historical period.

Cultural Ecology Theory

Cultural ecology is an emerging interdisciplinary discipline that applies ecological approaches to studying culture. It is a science that studies the resources, environments, states, and laws that govern the existence and development of culture. (Baidu online encyclopedia, 2022)

In 1955, American scholar J.H. Steward first put forward the concept of cultural ecology, pointing out that it is "a doctrine that studies the laws of cultural emergence, development, and mutation from the interaction of various factors in the natural and social environments in which human beings live." (Sima Yunjie, 1990)

Cultural ecology advocates studying the laws of cultural emergence and development through the interaction of human, natural, social, and cultural variables. It seeks to identify the particular shapes and patterns of cultural development of different peoples.

Origin and Sources The concept of "cultural ecology" is mainly derived from the term "ecology," which was proposed by the German biologist E.H. Haeckel in the 1870s to study the relationship between culture and the whole set of living organisms in the environment. In 1955, the American cultural anthropologist J.H. Steward first put forward the concept of "cultural ecology," advocating the establishment of a specialized discipline to explore the origins of particular cultural characteristics and cultural patterns with regional differences. Since then, cultural ecology has been paid attention to by more and more anthropologists and ecologists, and a new discipline has gradually formed.

The "Ecological View" in Traditional Chinese Furniture

Ancient Chinese furniture is a fundamental part of traditional Chinese culture, celebrated for its rich history and distinctive eco-aesthetic characteristics. Artisans utilized premium woods like huanghuali, zitan, and redwood, highlighting the material selection known for their durability and beauty (Ma Kewang, 2017). These artisans were proficient in intricate wood carving and used traditional joinery techniques such as mortise and tenon, ensuring the furniture's durability and aesthetic appeal. This approach emphasized the furniture's functionality and beauty and reflected deep-seated respect for sustainability and resource conservation inherent in ancient Chinese culture.

In the design of ancient Chinese furniture, harmony with nature was paramount, aligning with traditional Chinese ecological perspectives. The furniture was often multifunctional, embodying the frugality and pragmatism of ancient Chinese society (Chen Baoguang, 2018). Additionally, the carvings and motifs on these pieces frequently had symbolic meanings related to wealth, fortune, and family happiness, strengthening their connection to natural and cultural values. Thus, ancient Chinese furniture represents not just exceptional craftsmanship and profound cultural significance but also embodies eco-aesthetics principles integral to traditional Chinese culture, making these items more than utilitarian household objects but bearers of deep historical and cultural value.

The ecological concept and green design embodiment in the traditional furniture culture of the Ming Dynasty

Natural minimalist design. The style is "simple, natural, not carved."

The way of material - the way of nature. Simple texture, quiet, and light colors reflect the philosophical idea of "the way of nature."

The way of modeling is the way of the middle, the way of heaven and earth. The philosophical concept of "the circle of heaven and earth" perfectly blends the ancient worldview and

furniture - the ecological manufacturing of the unity of heaven and man. Functionality and Practicality: Ming furniture is designed to be simple and practical. This practicality helps to reduce waste and reflects the core concept of green design. The interconnections between components rely on mortise and tenon and frame construction. (Ren Hao, 2017)

The Ming Dynasty's traditional furniture culture is a paragon of the ecological concept in design. Ren Hao (2017) describes the Ming style as characterized by its simplicity, practicality, and unadorned elegance, embodying the philosophical notion of "the way of nature." This minimalist design philosophy is reflected in the choice of materials, the serene and unobtrusive hues, and the construction methods that emphasize the ancient philosophical concept of a harmonious "circle of heaven and earth." The functional and practical aspects of Ming furniture design align with contemporary principles of green design, as they advocate for the efficient use of resources and emphasize the longevity and sustainability of the created pieces.



Figure 1. Late ming dynasty huanghuali plain wreath chair



Figure 2. Ming furniture tenon structure (Hua li sheng yue, 2022)

The exploration of Ming-style furniture should extend beyond mere artistic appreciation to a deeper analysis of its philosophy and influence on contemporary design. Ming-style furniture is emblematic of ecological culture, from its design conception to production (Tang et al.,

2019). The minimalist design is not simplistic; it is a testament to the classical thinking of ancient Chinese philosophers on nature. Ming furniture demonstrates the conservation of valuable materials, with the entire manufacturing process ingeniously respecting the natural characteristics of wood. Its predominantly natural decorations enhance the inherent beauty of the themes they represent. Thus, Ming-style furniture stands not only as a pinnacle of ancient Chinese craftsmanship but also as a beacon of ecological culture. In today's context of dwindling wood resources, the eco-cultural ethos of Ming-style furniture holds significant relevance for contemporary solid wood furniture design.

Definition and Reflection in Furniture Design Education of Eco-Education

Eco-education is the rational and effective integration of ecological ideology, principles, and methods into modern education to promote sustainable development and create an ecologically civilized society, which aligns with the strategic concept of sustainable development and can drive social development (Fu Yang, 2017).

In furniture design education in colleges and universities, the critical focus is cultivating students' ecological sense of responsibility and making them become designers with a profound awareness of their social responsibilities. Cultivating people through culture has been a traditional practice in China for thousands of years and is also necessary in the contemporary era. It is crucial for cultivating cultural confidence (Wu Haibo, 2023).

The concept of "carbon neutrality" has been integrated into the course design and teaching practice of "Wood Furniture Manufacturing Technology" and "The Artisanry of Wood Furniture Fabrication." These core courses for furniture design and engineering students must be integrated with the contemporary spirit and the industry's development path and incorporate the principle of "carbon neutrality" into the academic structure (Xiong et al., 2023). A review of the shortcomings of the courses under the "dual carbon" framework highlights the urgent need for strategic redevelopment. There should be a strong emphasis on integrating innovative teaching methods in furniture and reforming professional courses to meet the "carbon neutrality" educational goals and contemporary environmental standards.

Ecological Concepts and Modern Transformation in The Traditional Furniture Culture of The Ming Dynasty

The ecological cultural perspective of traditional furniture significantly impacts contemporary furniture design. Taking Ming-style furniture as an example, as one of the representatives of traditional Chinese furniture, Ming-style furniture emphasizes the exquisite processing of wood and unique craftsmanship. The impacts of the ecological cultural perspective include using renewable resource woods such as rosewood, walnut, and ash. Designers choose wood from responsibly managed forests to avoid excessive damage to the forest ecosystem, strongly emphasizing handicraft production to reduce energy consumption and waste generation. Highly skilled artisans minimize material waste and ensure the high quality and uniqueness of each piece of furniture through generations of training and deep immersion in traditional techniques; the design has evolved over generations, emphasizing simplicity, elegance, and humanism, meeting the contemporary demand for high-quality, durable, and aesthetically pleasing furniture; adhering to traditional Chinese values such as modesty, harmony, and balance, which is in line with the ecological cultural perspective and encourages people to pursue a simple, sustainable, and harmonious way of life. In conclusion, Ming-style furniture design influenced by the ecological cultural perspective emphasizes the

sustainability of wood, the value of craftsmanship, and traditional values, which conforms to contemporary values of environmental responsibility, high quality, and cultural significance.

Methodology

Comparative Analysis

Data on modern furniture design is collected through design schematics, manufacturing process descriptions, and evaluations of environmental policy impacts. This information is sourced from surveys at modern furniture factories, interviews with designers, and professional literature reviews. These methods assess whether modern furniture design reflects ecological culture, actively responds to sustainability demands, and integrates ecological values into manufacturing and design processes.

Curriculum Analysis

Data for courses integrating green design principles is derived from course syllabi, textbooks, student assignments, and teaching evaluations. Interviews with teachers and students provide further insights into the effectiveness of teaching methods and the integration of ecological concepts into education.

Expert Interviews

Interviews with furniture designers, historians, ecologists, and educational experts are conducted face-to-face, over the phone, or online. These discussions yield professional opinions and insights, crucial for a comprehensive evaluation of modern furniture design about ecological culture.

This study meticulously explores the intersection of traditional ecological principles and modern furniture design, specifically focusing on the enduring impact of Ming Dynasty furniture.

By employing various methodologies, including case studies, comparative analyses, and curriculum evaluations, the research provides a deep dive into how Ming-style furniture, celebrated for its sustainable materials and handcrafted artistry, aligns with and enhances contemporary design practices under green design principles. Incorporating expert interviews and user experience studies enriches the understanding of how traditional Chinese values of modesty, harmony, and balance influence modern ecological and design trends. This comprehensive approach assesses the ecological relevance of Ming Dynasty furniture. It demonstrates its contemporary significance and application, promoting a sustainable and culturally rich design ethos in the modern furniture industry.

Tab 1

Research methods and Content of research

Research Method	Content of research
Material Analysis	Assessment of eco-friendly material usage

Recycling and Reuse Assessment	Evaluation of furniture's recyclability
Ecological Aesthetics	Examination of natural inspiration in design
User Experience and Satisfaction	Understanding user contentment and alignment with ecological principles
Case Studies and Trend Analysis	In-depth analysis of contemporary ecological elements and industry trends

Case Study

A comprehensive investigation of Ming dynasty furniture can be conducted by visiting museums or exhibitions or collecting relevant data. This includes examining the structure, materials, manufacturing techniques, and physical properties of the furniture while also conducting a comparative literature analysis.

Comparative Analysis:

Data on modern furniture design may include collecting design schematics, descriptions of manufacturing processes, and the impacts of environmental policies. Data can be obtained through surveys of modern furniture factories, interviews with designers, or analysis of professional literature.

Curriculum Analysis:

Course data integrating green design principles can be obtained from course syllabi, textbooks, student assignments, and teaching evaluations. Interviews with teachers or students can provide an in-depth understanding of teaching methods and learning outcomes.

Expert Interviews:

Conversations with furniture designers, historians, ecologists, and educational experts can be conducted face-to-face, over the phone, or online surveys. As an essential research data source, these interviews provide professional opinions, insights, and perspectives.

These methods help analyze whether modern furniture design reflects furniture ecological culture, actively responds to environmental sustainability requirements, and integrates the values of ecological culture into all aspects of furniture manufacturing and design. By comprehensively considering these factors, we can assess the performance of modern furniture design in terms of environmental culture.

By carefully considering these methods, a more comprehensive assessment of the performance of modern furniture design in an ecological culture can be achieved, thereby promoting the development of a sustainable furniture culture. In conclusion, traditional Ming-style furniture design is influenced by the environmental concept of culture, which emphasizes the sustainability of wood, craftsmanship, and traditional values. These aspects make Ming-style furniture a choice that conforms to contemporary values of environmental responsibility, high quality, and cultural significance.

The Construction of Ecological Furniture Culture Science

Developing the theory of human-society-nature eco-design systems aims to promote more sustainable furniture manufacturing and usage. The objective in this domain is to reduce the consumption of natural resources while focusing on social and spiritual needs. Several factors must be considered holistically to achieve this objective, including material selection, design processes, manufacturing techniques, and usage habits. This integrated approach promotes the realization of more environmentally friendly and sustainable furniture production and usage patterns. Tab.1 (Wu Xinlin, 2020)

The construction of ecological culture aims to create a culture concerned with the environment and sustainability to meet the needs of modern society. Furniture design education highlights the close connection between humans, society, and nature. These three connections guide students to consider the impact of furniture material acquisition, production, use, and recycling on the environment. At the same time, it emphasizes the concept of the circular economy, focusing on reusing resources after the end of furniture's lifespan to reduce waste and resource waste. Incorporating green design and ecological design into education:

They emphasize sustainability principles such as circular economy, energy efficiency, material selection, and their application in furniture design and manufacturing.

Integrating these principles into design and engineering education, incorporating green design and ecological design concepts, helps students think more comprehensively about developing environmentally friendly and sustainable furniture production and usage patterns.

Furthermore, combining traditional elements of Ming Dynasty furniture with modern green and ecological design principles can create designs with historical heritage and modern sustainability. This can contribute to the advancement of furniture manufacturing.

In summary, the study of ecological furniture culture aims to make furniture manufacturing and usage more sustainable, reducing the consumption of natural resources while considering societal and spiritual needs. This requires comprehensively considering material selection, design, manufacturing, and usage habits to achieve more environmentally friendly and sustainable furniture production and usage patterns.

We are introducing the theoretical framework of ecological design systems in design and engineering education to cultivate students' understanding of sustainable design principles.

Tab.2

Product design attributes based on the "human-society-nature" system

Design Elements	Product Attributes	Value Attributes
Human	Based on humanised user experience and a longer product lifecycle that aligns with the human lifecycle, the goal is to satisfy both functional and spiritual needs	Satisfying functional and spiritual needs while reflecting humanistic care
Socially	Products address societal pain points and respond to social problems	Balancing social and natural ethics

Nature	Product production, distribution and recycling are environmentally friendly and pose no harm to human health	Environmentally friendly and resourceefficient
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The construction of an ecological culture aims to cultivate an environmentally and sustainability-conscious culture that aligns with the needs of modern society. The close connection between humans, culture, and nature is highlighted in furniture design education. Students are guided to explore this intricate relationship, considering the impact on nature across the lifecycle of acquiring, producing, using, and recycling materials for furniture. At the same time, it strongly emphasizes the concept of a circular economy, promoting the reuse of resources at the end of a furniture's useful life to reduce waste and resource depletion. Integrating these principles into design and engineering education and aligning them with the concepts of green design and ecological design helps students comprehensively address the environmental and sustainable development challenges in furniture production and usage.

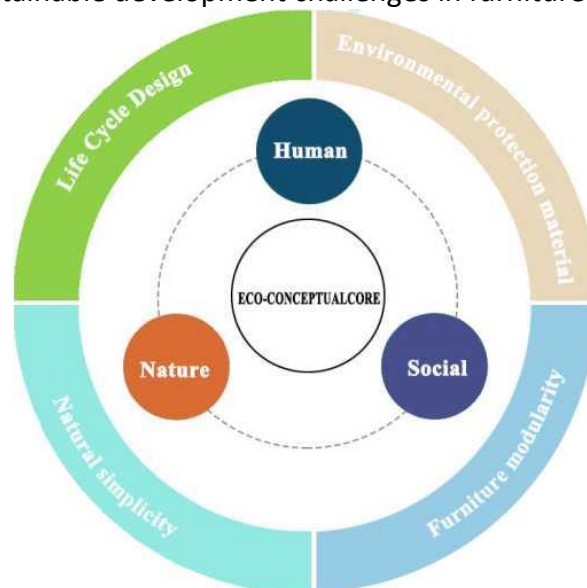


Figure 3. Closing the loop of furniture eco-design "Human - Nature - Society"(Hua li sheng yue, 2022)

Ways to Cultivate Design Concept

Students are often concerned with modeling and decorative materials in furniture innovation and lack awareness of eco-design concepts; by guiding students to incorporate eco-design principles into their furniture design, treating designs as a part of nature, with full respect for nature mechanism and following the 3R principles of green design: "Reduce, Reuse, and Recycle."(Yu et al., 2020), in promoting the sustainable development of our natural society. Guiding students to assess the resource consumption and environmental impact of modern furniture design, encouraging the responsible use of natural materials such as bamboo, wood, and rattan, which offer significant advantages in sustainability and eco-friendliness. Cultivating students' ecosystem thinking enables them to comprehend how design decisions can have cascading effects throughout the ecosystem, including considering the impact of furniture on other organisms and natural processes within the ecosystem. Guiding students to consider cultural and regional characteristics, incorporating local ecological and traditional knowledge into their designs, and creating furniture designs with unique identities and

sustainability.

Exploring ecological art, viewing furniture design as a form of environmental expression, and encouraging students to convey respect for nature and the values of ecological culture through their furniture designs. Cultivating students' consideration of maintainability and repairability in design, emphasizing features that make furniture easy to repair and maintain, thereby extending the furniture's lifespan. Encouraging students to engage in ecological innovation, brainstorming ways to apply new technologies and materials to reduce resource waste and environmental impact.

When delving into the notions of reform in furniture design pedagogy, grounded in the principles of ecological education, one might embark from the vantage point of instructional approaches and curricular substance. By weaving together the strands of ecological ethos and verdant design philosophies, the objective becomes to nurture within learners a profound appreciation and understanding of environmental design principles and ethics, thereby fostering a commitment to the enduring progression of a harmonious natural society.

Conclusions and Future Work

Exploring the ecological culture of Ming dynasty furniture has opened up a brand-new perspective for the sustainable development of contemporary furniture design. As an outstanding representative of traditional Chinese furniture, Ming dynasty furniture embodies the wisdom and aesthetic pursuit of the ancients. This research deeply analyzes the ecological wisdom demonstrated by Ming dynasty furniture in aspects such as material selection, structural design, and resource utilization, fully highlighting the balance between aesthetics and environmental sustainability and bringing essential inspiration for sustainable development practices.

The article emphasizes integrating ecological education principles into teaching strategies and course contents. Through education, students' environmental design concepts and values can be cultivated, enhancing their national identity and strengthening their respect for cultural roots. This educational model aims to revitalize Chinese furniture design and achieve harmonious coexistence between human needs and the ecological environment. In teaching, methods such as case analysis, field trips, and practical operations can enable students to deeply understand the Ming dynasty furniture's ecological culture and learn the ancients' ecological wisdom and design concepts. At the same time, students can be guided to apply ecological education principles to modern furniture design and explore innovative design methods and material choices to achieve sustainable development of furniture design.

In addition, the reform of this academic model ensures that design goes beyond product creation and incorporates sustainability principles, laying a foundation for cultivating designers with environmental awareness. The reform of the academic model needs to start from aspects such as educational concepts, teaching methods, and curriculum settings to develop students' innovative thinking and practical abilities. Regarding educational concepts, social responsibility, and environmental design awareness should be emphasized to guide students to pay attention to the harmonious development of humans and nature. Regarding teaching methods, project-driven teaching, cooperative learning, and interdisciplinary teaching can be adapted to let students learn and grow in practice. Regarding curriculum settings, courses such as ecological design, sustainable materials, and green manufacturing can be added to broaden students' knowledge and vision.

These efforts will help build a future of furniture design oriented towards environmental sustainability. In the future, furniture design will pay more attention to ecological and

environmental protection, humanized design, and the application of intelligent technologies. Designers will continuously explore innovative design methods and material choices to meet people's needs for high-quality life. At the same time, the government, enterprises, and all sectors of society should strengthen cooperation to jointly promote the sustainable development of furniture design and create a better living environment for humanity.

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