

INNOVATIONS IN SOLID WOOD FURNITURE DESIGN BETWEEN 1950 AND 2020: AN ANALYSIS BASED ON SUSTAINABLE PRINCIPLES

Michele D. C. Zamoner
Débora Barauna
Dalton Luiz Razera

DOI 10.52050/9788579176685.9

Abstract: The production of wooden furniture is a significant economic activity within the country's sector. Over time, various factors have influenced the evolution of Brazilian furniture design. Despite industrialization and species extinction, wood remains in use. This article examines shifts in wood utilization within Brazilian furniture design from 1950 to 2020. It discusses how sociocultural, environmental, legal, technological, and economic aspects contribute to changes, resulting in a sometimes dichotomous, sometimes promising relationship between innovation and sustainability. The study employs a qualitative approach, relying on interpretative analysis of information, drawing from Zamoner's (2021) research on wooden furniture design and principles of innovation and sustainability in materiality from Barauna and Razera (2018), along with other complementary references. Conclusions highlight the sector's transformation driven by technological modernization, environmental concerns, and the adoption of new materials. Notably, it was only in the 2000s that a paradigm shift toward sustainability fully took hold. During this period, companies began embracing responsible practices, such as using certified solid wood and hybrid manufacturing processes that blend craftsmanship, mechanics, and advanced technology.

Keywords: Brazilian design; Wooden furniture; Innovation.

INOVAÇÕES NO DESIGN DE MÓVEIS DE MADEIRA MACIÇA ENTRE 1950 E 2020: UMA ANÁLISE BASEADA EM PRINCÍPIOS SUSTENTÁVEIS

Resumo: A fabricação de mobiliário de madeira é uma atividade econômica que representa uma significativa parcela da produção do setor no país. Muitos foram os fatores, ao longo do tempo, que influenciaram nas transformações da composição do design de mobiliário brasileiro. Apesar do avanço da

industrialização e da extinção de espécies, o uso da madeira permaneceu. O presente artigo apresenta momentos de modificação no uso da madeira no design de mobiliário brasileiro, mais especificamente, entre o período de 1950 e 2020, a fim de discutir como aspectos socioculturais, ambientais, legais, tecnológicos e/ou econômicos marcam os processos de mudança, levando a uma relação, ora dicotômica, ora promissora, entre os conceitos de inovação e sustentabilidade. Uma abordagem qualitativa, apoiada na análise interpretativa das informações, é empregada no estudo, tendo como referência a pesquisa em design de mobiliário de madeira de Zamoner (2021) e preceitos de inovação e sustentabilidade na materialidade no design de Barauna e Razera (2018), além de outras referências complementares. Conclui-se que o setor passou por diversas transformações impulsionadas por fatores como modernização tecnológica, preocupações ambientais e inserção de novos materiais. A adoção de técnicas mais eficientes, bem como máquinas e equipamentos possibilitou a melhoria nos processos de fabricação e na qualidade dos produtos. No entanto, foi somente a partir dos anos 2000 que uma mudança de paradigma em direção à sustentabilidade se consolidou. Nesse período empresas começaram a adotar práticas mais responsáveis, como o uso de madeira maciça certificada e processos híbridos de fabricação artesanal, mecânico e altamente tecnológico.

Palavras-chave: Design brasileiro; Mobiliário de madeira; Inovação.

INNOVACIONES EN EL DISEÑO DE MUEBLES DE MADERA MACIZA ENTRE 1950 Y 2020: UN ANÁLISIS BASADO EN PRINCIPIOS SOSTENIBLES

Resumen: La fabricación de muebles de madera es una actividad económica que representa una parte importante de la producción del sector en el país. Fueron muchos los factores, a lo largo del tiempo, que influyeron en las transformaciones de la composición del diseño de muebles brasileños. A pesar del avance de la industrialización y la extinción de especies, el uso de la madera se mantuvo. Este artículo presenta momentos de modificación en el uso de la madera en el diseño de muebles brasileños, más específicamente, entre el período de 1950 y 2020, con el fin de discutir cómo los aspectos socioculturales, ambientales, legales, tecnológicos y/o económicos marcan los procesos de cambio, llevando a una relación, a veces dicotómica, a veces prometedora, entre los conceptos de innovación y sostenibilidad. En el estudio se emplea un enfoque cualitativo, apoyado en el análisis interpretativo de la información, teniendo como referencia la investigación en diseño de muebles de madera de Zamoner (2021) y los preceptos de innovación y sostenibilidad en la materialidad en el diseño de Barauna y Razera (2018), además de otras referencias complementarias. Se

concluye que el sector ha sufrido varias transformaciones impulsadas por factores como la modernización tecnológica, las preocupaciones ambientales y la inserción de nuevos materiales. La adopción de técnicas más eficientes, así como de maquinaria y equipos, ha permitido mejorar los procesos de fabricación y la calidad del producto. Sin embargo, no fue hasta la década de 2000 cuando se consolidó un cambio de paradigma hacia la sostenibilidad. Durante este período, las empresas comenzaron a adoptar prácticas más responsables, como el uso de madera maciza certificada y procesos híbridos de fabricación artesanal, mecánica y de alta tecnología.

Palabras clave: Diseño brasileño; Muebles de madera; Innovación.

1. Introduction

Furniture production is an economically significant activity in Brazil. In 2022, the furniture industry generated approximately R\$ 77 billion, equivalent to 2.6% of the total net revenue of the manufacturing sector (IEMI, 2023). The wooden furniture production chain represents a substantial portion of this output. Out of the 19.3 thousand active production units in the country, approximately 16,616 (86.0%) operate in the wooden furniture industry (IEMI, 2023). The wooden furniture manufacturing sector accounts for nearly 80% of employment within this segment. Notably, there is a predominant focus on bedroom furniture production, representing 33.8% in 2022 (IEMI, 2023). The Southern and Southeastern regions of Brazil house the majority of production units, distributed across seven regional hubs with distinct production structures and product lines.

Solid wood has been the formal language of Brazilian furniture since its earliest pieces were crafted. Native noble woods, abundantly available in the regions where furniture was produced, were employed. Various types of wood with different qualities were used (ZAMONER, 2021). According to Canti (1988), key woods included cedar, cinnamon, jacarandá-da-baía, vinhático, and suaçucanga. This situation laid the groundwork for furniture development in the country, based on skilled craftsmanship and artisanal production (MAYNARDES, 2015).

Over time, Brazilian furniture has been shaped by a blend of cultural influences. Portuguese colonization, indigenous heritage, African presence, and later, the influence of European immigrants such as Italians, Spaniards, and Germans after Independence (COSTA, 1975; SANTI, 2013; SANTOS, 2017). During the modern movement in Brazil—both during wartime and post-war periods—there was an emphasis on regional Brazilian materials like native woods and natural fibers due to the high costs associated with importing other materials, such as metals (SANTOS, 2017; MON, 2010).

During the 1930s in Brazil, the development of the first wood laminating industries stood out. This marked the beginning of wood panel production and utilization, including plywood and laminated wood, within the furniture segment. Later, this trend intensified alongside industrialization processes (NENNEWITZ *et al.*, 2008). However, starting from the 1950s, there was a noticeable decline in the use of solid wood in Brazil. This decline continued through subsequent decades and stabilized between 1980 and 2000 due to strengthened environmental restrictions and notifications from competent authorities regarding the extinction of native species. Yet, from the 2000s onward, there has been a reevaluation of solid wood usage. Considerations such as the durability of furniture pieces gained prominence. Additionally, there has been better control over the management of fast-growing species like pine and eucalyptus, developed by the industry. Environmental certification systems and the adoption of digital production technologies, combined with manual techniques, now guide the creation, development, and production processes of furniture in Brazil.

Despite these changes, wood remained a constant presence, even amidst industrial advancements and species extinction. Experiences spanning half a century (1950-2000), characterized by innovation driven by technology, production demands, and environmental and sociocultural pressures—particularly evident from the 1970s—enabled the furniture sector and designers to explore new ways of thinking, designing, and producing furniture in Brazil. In this new context,

well into the 21st century, solid wood has regained prominence and is prioritized through explicit and reliable sustainable practices, which were previously overlooked or overshadowed by rapid economic and technological development.

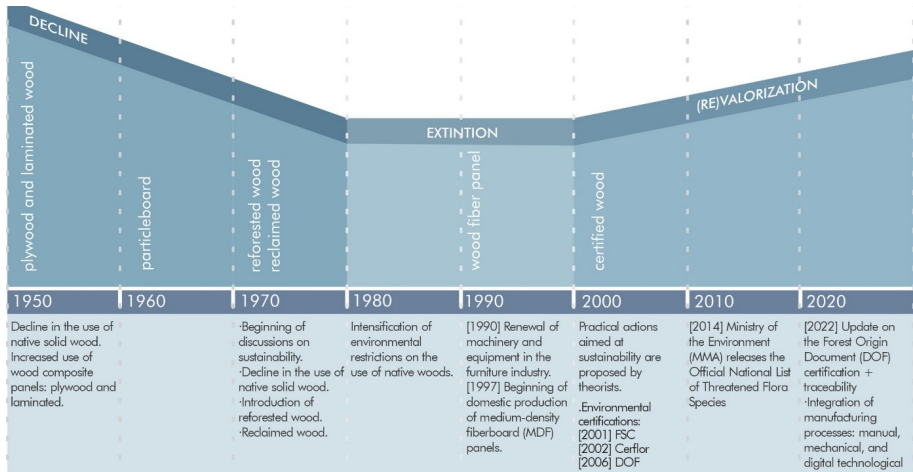
Against this historical backdrop, this article examines moments of change in wood usage within Brazilian furniture design, specifically between 1950 and 2020. We discuss how sociocultural, environmental, legal, technological, and economic aspects shape these transformations, leading to a sometimes dichotomous, sometimes promising relationship between the concepts of innovation and sustainability. It's important to note that our perspective on these concepts is relational: 'They are complex relationships that require considering social, environmental, and economic impacts both from the perspective of material, technology, and product choices (consumers) and from the supply side (providers and producers)' (BARAUNA and RAZERA, 2018, p. 63). However, an emphasis on environmental aspects is evident, given the material focus (solid wood) of this study.

In this study, a qualitative approach supported by interpretative analysis of information is employed. The reference points include Zamoner's (2021) doctoral thesis titled 'Design of Brazilian Wooden Furniture: Evolution and Perspectives' from the Graduate Program in Design (PPGDesign) at UFPR, as well as the chapter titled 'Foundations, Methodological Aspects, and New Scenarios for Sustainability' by Barauna and Razera (2018), published in the volume 'Design, Artifacts, and Sustainable Systems.' Additional complementary references were drawn from a narrative literature review method, exploring and verifying the current state of the study's theme. Databases such as SciELO, the Brazilian Digital Library of Theses and Dissertations (BDTD), and Google Scholar were consulted. The exclusion criterion was a five-year publication window within the field of design. Furthermore, references were updated based on publications from institutions related to thematic axes. The article takes the stance that sustainability acts as a driving force for innovation. However, it acknowledges that not all innovations are sustainable.

2. Using solid wood in Brazilian furniture design: advances and sustainability

In design, material resources serve as conduits for ideas, stemming from the fusion of tangible and intangible material values—properties, technical features, functionality, symbolism, and emotional aspects. The goal is to use materials in products aligned with user demands and needs. However, in a world facing increasing complexity and environmental unsustainability, with dwindling material supply sources, it becomes crucial to reassess demands and rethink material resource utilization through new systems and processes that yield sustainable solutions for society (BARAUNA and RAZERA, 2018, p. 62).

Analyzing the framework of Brazilian furniture design history proposed by Zamoner (2021), the trajectory of solid wood usage stands out (Figure 1). It serves both as a symbolic materiality representing Brazilian identity in furniture design and as a resource that has needed reevaluation over time. Both perspectives have driven advancements and innovations in the industry, particularly through the introduction of new systems, processes, and technologies. However, they have also raised questions and highlighted the need for sustainable practices. According to Barauna and Razera (2018), sustainability is a potent contemporary force that transforms how processes are conceived, challenging the production and consumption of raw materials and products. For these authors, sustainability acts as a driving force for societal progress, urging productive sectors to reconsider their technologies and account for estimates of resource scarcity.

Figure 1 – The Trajectory of Wood Usage in Brazilian Furniture Design.

Source: Adapted by the authors (2024), based on Zamoner (2021).

In the historical trajectory of Brazilian furniture design between 1950 and 2020, a sequence of significant phases regarding solid wood usage emerges: **decline, extinction, and (re)valorization**. With the development of industry starting in the 1950s, mass production of modern furniture began (SANTI, 2013; SANTOS, 2017), leading to a decline in the use of native solid wood in furniture design. According to Zamoner (2021), this decline can be understood through three main points:

- i) Intensification of the application of composite wood panels (plywood and laminated wood) due to industrialization demands (IWAKIRI, 2005; SANTI, 2013; SANTOS, 2017).
- ii) Exhaustion of certain wood species that were intensively used for furniture and other objects due to their desirable properties (SANTOS, 2017; IBAMA, 2024).
- iii) Introduction of technologies allowing the production of alternative materials for furniture, such as plastic (SANTOS, 2017).

This phase differs from previous periods, primarily due to the principles of industrial organization: reducing production time through material and process optimization, standardizing and

modularizing components, and normalizing designs and processes (MON, 2010; SANTI, 2013; MAYNARDES, 2015; SANTOS, 2017). The goal was to cater to different population segments by developing products with simple forms, flexibility, functionality, ease of disassembly, and timeless design. Lightweight materials prevailed, reducing costs for large-scale production (SANTI, 2013; FRANCO, 2014; SANTOS, 2017). This circumstance drove national production of wood-derived materials, including plywood and laminated wood, which had been produced in Brazil since the 1930s (IWAKIRI, 2005).

During this period, little to no concern existed regarding sustainability. On the contrary, capitalism thrived with the development of models such as Toyota's production system and the polymerization of the plastics industry. These innovations accelerated economic growth but also triggered consequences that we now recognize as unsustainable for our planet. These consequences include premature product disposal, reliance on non-renewable resources (such as petroleum), and the proliferation of plastic waste in landfills and oceans. Only in the late 1960s and early 1970s did sustainability concepts emerge in design discussions, prompted by debates about the environmental impact of increased production and consumption (MANZINI e VEZZOLI, 2008 e 2010; CESCHIN & GAZIULUSOY, 2020). Victor Papanek's book "Design for the Real World" (1971) stands as a reference from that era.

Amid restrictions on native solid wood usage and encouragement of industrial standards, particleboard panels with pre-finished paper surfaces became almost exclusively used as raw materials for the popular furniture market (FRANCO, 2014). While this sociocultural innovation democratized access to Brazilian furniture, it also created an environmental issue due to the shorter lifespan of this material and the impurities present—such as formaldehyde-based resins used for particleboard bonding. The primary environmental concern lies in gas emissions, as free formaldehyde emissions have carcinogenic potential (FREIRE *et al.*, 2015).

In the 1970s, alternative approaches emerged to maintain wood in Brazilian furniture composition. One such approach was the introduction of reforested pine wood, native to the United States, in an attempt to replace established species. However, limited knowledge about this species' properties and the technological constraints of that period led manufacturers to produce low-quality products (GORINI, 1998). For small-scale production, designers and artists turned to reclaimed wood. A precursor to this practice can be seen in José Zanine Caldas's "móveis denúncia" (furniture made from burned and discarded wood), where he transformed charred and discarded wood into furniture. This approach served as a critique of the deforestation affecting Brazilian wood (MON, 2010; SANTOS, 2017).

Moving into the 1980s, design challenges became multidisciplinary due to economic, social, and industrial transformations that directly impacted Brazilian furniture characteristics. Factors such as computerization and new workspaces demanded appropriate designs to meet specific needs. Global environmental concerns aimed at achieving forest balance and species preservation gained prominence. Consequently, political and economic regulations were established to reduce pollution at its source. In this context, sustainability-oriented design practices emerged, exemplified by early works like those of Carlos Motta, who used wood found on beaches brought by the sea, and Michael Arnoult, who encouraged the use of reforested eucalyptus wood for a line of dismountable seating in 1988 (ARNOULT, 2011; SANTOS, 2017).

The 1990s witnessed the modernization of machinery and equipment in the furniture industry. Programmable and automated systems required materials with characteristics suitable for new production and consumption capabilities (GORINI, 1998; FRANCO, 2014; SANTOS, 2017). The introduction of these technologies enabled the national production of wood fiber composite panels, which gradually gained market share starting in 1997. These panels were incorporated into both large-scale production processes and small

to medium-sized enterprises (SMEs) specializing in custom-made furniture.

In subsequent years, the use of solid wood gained regulatory incentives. In 2001, Brazil adopted the international Forest Stewardship Council (FSC) certification, followed by the Brazilian Forest Certification Program (Cerflor) in 2002, which is recognized only within Brazil (FSC, 2024; INMETRO, 2024). These initiatives aimed to promote conscious and traceable wood usage, considering both source and species. In 2014, the Ministry of the Environment (MMA) issued Portaria MMA n.º 443, establishing the “Official National List of Threatened Flora Species” (IBAMA, 2024). Among these species are woods suitable for furniture production, with either prohibited exploitation or exploitation allowed only through sustainable management plans. In 2022, the Forest Origin Document (DOF), now called DOF+Traceability, enhanced the existing DOF system since 2006, improving control over the forest production chain at the national level (IBAMA, 2024). The significance of these regulations and documents lies in ensuring that the entire production chain, including end users of wood products like furniture, recognizes the contribution of sustainably sourced raw materials to forest balance and species preservation, while also respecting local communities (KAZAZIAN, 2005; PEREIRA, 2013).

In response to these concerns, discussions and practices focused on environmental preservation gained momentum from the 2000s (MANZINI and VEZZOLI, 2008 and 2010). During the same period, materials became a realm of invention and innovation at the intersection of design and engineering. Designers began to consider both material and immaterial aspects when conceiving and developing strategic products for specific purposes, particularly through advanced material design approaches (BARAUNA and RAZERA, 2018). According to these authors, intelligent materials, green materials, nanotechnology, biotechnology, and biomimicry play pivotal roles in these processes. As a result, designers increasingly emphasize low environmental impact requirements when selecting

materials and processes. Characteristics such as non-toxicity, renewability, biodegradability, recyclability, abundance, durability, energy and water efficiency, diversity of choice, and extended lifespan are now carefully weighed in design decision-making (BARAUNA and RAZERA, 2018; ZAMONER, 2021).

Within this context, specifically in contemporary furniture design, certified solid wood stands out as a sustainable raw material. Alongside the growing environmental awareness among designers, contemporary furniture design has evolved significantly in terms of environmental responsibility compared to earlier periods. The hybridization of technological and digital processes with manual creative and manufacturing skills is another characteristic of this period (2000-2020). This hybrid approach enables the development of more predictive pieces, optimizing raw material usage, making them lighter, ergonomic, and comfortable. These structural and visual changes are evident in products within the industry, as shown in Figure 2 (SANTI, 2013; MAYNARDES, 2015; SANTOS, 2017).

Figure 2 – (a) Dining or kitchen chair; (b) Armchair; (c) Armchair from the Aratu line; and (d) Grain chair.



Source: Adapted by the authors (2024), based on Zamoner (2021).

Attributes related to industrialization can be observed in the works of José Zanine Caldas (a), with *Móveis Artísticos Z*, and Geraldo de Barros (b), with *Móveis Objeto*. Both applied cut and screwed plywood panels to their chairs, respectively, in the 1950s and 1970s. Additionally, Michael Arnoult, through the Aracatu line, developed furniture projects in 1995 that supported responsible exploration by

using eucalyptus wood slats in the fully dismountable chair (c). In a contemporary context, blending high technology with the sensitivity of artisanal techniques, we find the work of designer Rejane Carvalho Leite, who created the Grão chair (d) in 2023 using Uva do Japão wood. This species is considered invasive and has mainly proliferated in the southern part of the country. Its use in furniture production contributes to environmental restoration, allowing native species to thrive once again.

Material selection in furniture design is a technical decision intertwined with all factors operating within the system (MANZINI and VEZZOLI, 2008 and 2010). Decisions regarding materials and processes directly influence the direction of innovative proposals, making them either sustainable or unsustainable. Therefore, designers' systemic knowledge is crucial for effecting change that reduces negative impacts on nature and society.

3. Conclusion

This article addressed changes in wood usage throughout the history of furniture design between 1950 and 2020. The information covers each decade within this period, highlighting sociocultural, environmental, legal, technological, and/or economic aspects that influenced the solutions found. The research method employed, Narrative Bibliographic Review, combined with a qualitative and interpretative approach, effectively facilitated the proposed discussions.

In conclusion, the sector underwent various transformations during this period, driven by factors such as technological modernization, environmental concerns, and the introduction of new materials. The adoption of more efficient techniques enabled large-scale production, making furniture accessible to a broader audience. Furthermore, new machinery and equipment allowed greater precision in manufacturing, waste reduction, and product quality

improvement. However, it was primarily from the 2000s onward that a paradigm shift toward sustainability occurred, with companies adopting more responsible practices, including the use of certified wood and hybrid manufacturing processes.

Furthermore, it was understood that sustainability principles, supported by more responsible and conscious material and process choices, contributed to the (re)valorization of solid wood in contemporary furniture design. Specifically, in terms of origin certification, the diversity of standards, and wood durability, which ensure a long lifespan for furniture. Additionally, the plasticity of this raw material allows designers to create unique forms and details through a hybrid approach that combines artisanal, mechanical, and highly technological manufacturing processes, leveraging digital tools and automation.

This study prompts reflections for research in the field of Brazilian furniture design, exploring the relationship between wood usage transformations and sustainability and innovation practices. Furthermore, it contributes to documenting Brazilian identity in national furniture design and serves as informative and formative material for education and research in the field.

Above all, it reinforces that this work emerged from collective contributions by researchers and professors affiliated with the Graduate Program in Design (PPGdesign) at the Federal University of Paraná (UFPR).

References

ARNOULT, M. **Michel Arnoult, design e industrialização de móveis**. IPTVUSP. Entrevistadora Yvone Mautner. Galeria. Publicado em 27 de Junho de 2011. São Paulo. Disponível em: <http://iptv.usp.br/portal/video.action;jsessionid=90627DF9E412791FEFA61306E5FCC3AE?idItem=9176&idVideoVersion=42412>. Acesso em: Mai. 2024.

CANTI, T. **O móvel do século XIX no Brasil**. Rio de Janeiro: GPM, 1988.

COSTA, L. **Notas sobre a evolução do mobiliário luso-brasileiro.** IPAHN. nº3. P. 112-125.1939/1975. Disponível em: <https://docvirt.com/docreader.net/DocReader.aspx?bib=reviph&pagfis=6512>. Acesso em: Mai. 2024.

CESCHIN, F., & GAZIULUSOY, I. **Design for Sustainability: A Multi-level Framework from Products to Socio-technical Systems.** 1. ed. Londres: Routledge, 2020.

BARAUNA, D.; RAZERA, D. L. Sustentabilidade, desenvolvimento e inovação no século 21: demandas para o design de materiais avançados. *In: Design, Artefatos e Sistema Sustentável.* Blucher Open Access, v. 1, n.1, 2018, p.59-86.

FRANCO, Antonio. **Histórias do design no Brasil II. Móvel popular e alta tecnologia: o paradoxo brasileiro exemplificado pela Bergamo Companhia Industrial.** São Paulo: FAUUSP. 2014, p.11-34.

FREIRE, A.L.F.; FIGUEIREDO, M.C.B.; Rosa, M.F.; ARAÚJO, J. Impacto ambientais de painéis de madeira e derivados. - Uma revisão da literatura. **Espacios**, v.36, n.10, p- 3, 2015. Disponível em: <http://www.revistaespacios.com/a15v36n10/15361004.html>. Acesso em: Mai. 2024.

FSC BRASIL. **FOREST STEWARDSHIP COUNCIL.** Disponível em: <https://br.fsc.org/br-pt>. Acesso em: Mai. 2024.

GORINI, A. P. F. Panorama Do Setor Moveleiro No Brasil, Com Ênfase Na Competitividade Externa a partir do Desenvolvimento da Cadeia Industrial de Produtos Sólidos de Madeira. **BNDS Setorial.** n.8, pp. 3-57. Rio de Janeiro,1998.

IBAMA. **Instituto brasileiro do meio ambiente e dos recursos naturais renováveis.** Disponível em: <https://www.ibama.gov.br/index.php?Itemid=>. Acesso em: Mai. 2024.

IEMI. Inteligência de mercado. **Relatório Setorial da Indústria de Móveis no Brasil.** V.18. p. 1 82. São Paulo, 2023.

INMETRO. INSTITUTO NACIONAL DE METROLOGIA, QUALIDADE E TECNOLOGIA. **Cerflor: Certificação Florestal.** Disponível em: <http://inmetro.gov.br/qualidade/cerflor.asp>. Acesso em: Mai. 2024.

IWAKIRI, S. **Painéis de madeira reconstituída.** Curitiba: FUPEF, 2005.

KAZAZIAN, T. **Haverá a idade das coisas leves.** 2. ed. São Paulo: SENAC, 2005.

LEITE, R.C. **Perfil e produtos.** Disponível em: <http://carvalholeite.com.br>. Acesso em: Mai. 2024.

MANZINI, E., & VEZZOLI, C. **O desenvolvimento de produtos sustentáveis: os requisitos ambientais dos produtos industriais.** São Paulo: Edusp, 2008.

MAYNARDES, A.C. **A dimensão emocional no design de móvel brasileiro**. 243p. Tese de Doutorado. Programa de Pós-Graduação em Design da Universidade de Brasília, 2015.

MON. MUSEU OSCAR NIEMEYER. **Os modernos Brasileiros +1**. Curitiba: Planeta Brasil, 2010.

NENNEWITZ et. al., I. **Manual de Tecnologia da Madeira**. São Paulo: Bluscher, 2008.

PEREIRA, A. F. **Design para a sustentabilidade: melhoria de produtos e processos e valorização da identidade local**. Estudos em Design, 2012.

SANTI, M.A. **Mobiliário no Brasil. Origens da Produção e da Industrialização**. São Paulo: Senac, 2013.

SANTOS, M. L. **Móvel Moderno no Brasil**. São Paulo: Olhares, 2017.

VEZZOLI, C. **Design de Sistemas para a Sustentabilidade**. Salvador: EDUFBA, 2010.

ZAMONER, M.T.D.C.; RAZERA, D.L.; CATAPAN, M.F. **Design de mobiliário brasileiro e o uso da madeira como estratégia para a sustentabilidade**. VIII Simpósio de Design Sustentável (SDS). DOI: 10.5380/8sds2021.art49. p.305-316. Universidade Federal do Paraná (UFPR), 2021.

ZAMONER, M.T.D.C. **Design do mobiliário brasileiro de madeira: evolução e perspectivas**. 256 p. Tese de doutorado. Programa de Pós-Graduação em design da Universidade Federal do Paraná (UFPR). Curitiba, 2021.