Sustainability and the Furniture Industry: A Comprehensive Synthesis

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This paper presents a systematic review of the academic literature published until 2024 about sustainability and the furniture industry. Relevant publications were selected through keyword searches in Scopus and the Web of Science databases. One hundred and one publications were identified after having removed duplicates and other, non-peer-reviewed papers. A content analysis on the 101 identified publications allowed the classification of these papers into the following categories: "Sustainable Design" (21%), "Supply Chain Management" (14%), "Sustainability Strategies" (10%), and "Environmental Management" (9%) with the remaining publications (46%) being distributed among eleven other categories. To find out if the topic attracts more interest today than 10 or 20 years ago, the study also analyzed the distribution of publications by year. Investigations were also done by type of publications, countries, and focal points. Findings suggest that academic studies on sustainability in the furniture industry are still scattered and no coherent or continuous research stream has yet evolved. However, interest in the topic has been increasing lately.

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INTRODUCTION

Sustainability has become a buzzword. Countless products and services are being sold with claims of being "sustainable," often with no clear definition of what the term essentially entails (Wuelser *et al.* 2011; Zhang 2020). Customers frequently give preference to a product or a service with a claim of being created sustainably and which is said to be used more sustainably. To improve sales volume, the industry reacts to customers' expectations by using the term "sustainable" for its products and operations. An example from the construction industry illustrates our point. The construction industry uses terms like "green concrete" and "energy-efficient materials" as sustainable solutions to promote its products (Choong *et al*. 2022; Senthilkumar *et al.* 2023). While such claims may improve the industry's or the product's image, the industry needs to address the sector's significant environmental impacts, as it is responsible for 35% of global CO_2 emissions and 45% to 65% of the waste discarded in landfills (Lima *et al.* 2021).

A similar situation ails the furniture industry. Every year, the volume of furniture waste increases and creates significant pressure on landfills. To that end, as millions of tons are trashed annually in the European Union (Barbaritano *et al.* 2019), a number that is expected to grow due to furniture's eco-friendly characteristics (Nam *et al.* 2024). In fact,

approximately 10 million metric tons of furniture end up in landfills, waiting for actions to deal with this huge amount of waste (Suandi *et al*. 2022). Reusing furniture, recycling unused items, and using environmentally friendly production methods are vital to mitigating this issue (Xiong *et al.* 2022; Ofori-Agyei *et al.* 2023). Such challenges highlight that environmental concerns are a significant component of the sustainability concept in the furniture industry. The academic literature contains numerous definitions of sustainability (Glavič and Lukman 2007; Moore *et al.* 2017; Hallin *et al.* 2021). Gruen *et al.* (2008) define sustainability as the *"capability of being maintained at a certain rate or level*," while Donnelly *et al.* (2006) indicated that sustainability is *"minimizing the consumption of the world's resources by pursuing better environmental performance within product lifecycles*." The terms "sustainability" and "sustainable development" are often intertwined, and authors, including Marcuse (1998), Phillis and Andriantiatsaholiniaina (2001), and Sverdrup and Svensson (2002), use the definition of "sustainable development" when defining sustainability. However, the most frequently used definition of sustainability is provided by Brundtland (1987), which defines sustainable development as "*the development that meets the needs of the present without compromising the ability of future generations to meet their needs*."

According to Elkington (1998), the concept of sustainability has three dimensions, *e.g.*, environmental, social, and economic. This is often referred to as the Triple Bottom Line (TBL). The TBL framework states that sustainability goes beyond environmental concerns, providing a holistic approach that integrates environmental, economic, and social aspects (Elkington 1998; Evans and Sawyer 2010; Nikolaou *et al.* 2013). Ricetti (2016) described these dimensions as the environmental dimension involving the sustainable consumption of natural resources (materials, energy, air, land, and water, among others), thereby allowing the planet to renew what is consumed; the social dimension, which calls for a socially sustainable system that ensures adequate social services for all involved (health, education, equality, and accountability, among others); and the economic dimension which signifies that managing resources that enable an organization to continue its activities over the long term emphasizing the efficient use of its resources to achieve sustained operational gains.

The furniture industry, like any other industry, is working to become more sustainable (Pei *et al.* 2024). To make furniture, the industry utilizes various resources, and consequently, waste and emissions are produced (Lima and Silva 2005). Such waste includes wood, plastics, metals, textiles, natural and synthetic leathers, glass, and liquid residues, among others (Nikolić and Gordić 2010). Additionally, the manufacturing of furniture, the distribution of the furniture, the sales processes, the use of the furniture and their final disposure have significant environmental impacts, including resource consumption, emissions, and waste generation (Sakib *et al.* 2024). For example, the primary material used to make furniture is wood (Namicev and Petrovski 2019), which is obtained from natural forests and/or plantations. The extraction of this raw material may have environmental consequences such as deforestation, loss of biodiversity, and soil degradation, among others, if not properly addressed.

The furniture industry serves humans in every walk of life, addressing the various needs of a vastly diverse set of customers. According to Britannica (n.d.) the furniture industry encompasses "*All the companies and activities involved in the design, manufacture, distribution, and sale of functional and decorative objects of household equipment*." According to the North American Industry Classification System (NAICS), the industry is categorized under the 337 NAICS code - Furniture and Related Product

Manufacturing (NAICS Association n.d.). It includes several sub-sectors: NAICS 3371 Household and Institutional Furniture and Kitchen Cabinet Manufacturing, NAICS 3372 Office Furniture (including Fixtures) Manufacturing, and NAICS 3379 Other Furniture Related Product Manufacturing. Each sub-sector in NAICS code 337 has different roles to fulfill in residential, commercial, and industrial furnishing needs. Globally, furniture market revenue for 2024 was projected to reach $765 billion, with approximately $263 billion coming from the United States, $88 billion from China, $172 billion from the European Union, $7.5 billion from Turkey, and $1.4 billion from Vietnam (Statista 2024). The furniture industry also plays a significant role in employment globally, with 338,100 employees in the United States (NAICS code 337, U.S. Bureau of Labor Statistics 2024), 1,096,200 employees in the European Union (NACE Code C31, Manufacture of furniture, Eurostat 2024), 908,000 employees in China (CEIC 2024), 355,900 employees in Turkey (NACE Code C31, Manufacture of furniture, Eurostat 2024) and over 500,000 workers in Vietnam (Cosmo Sourcing 2024; The Shiv 2024).

This manuscript presents a systematic bibliometric literature review to analyze and synthesize the existing literature on environmental sustainability and the furniture industry. First, the Introduction section provides general information about sustainability and the furniture industry. The subsequent Experimental section provides details about the methods for this systematic bibliometric literature review. The Results and Discussion section presents the analysis of the documents obtained and then evaluates and discusses some of the more noteworthy findings.

EXPERIMENTAL

This study conducted a systematic literature review by bibliometric analysis to examine the existing literature and to help understand the relationship between the furniture industry and environmental sustainability. James Lind, in 1753 conducted the first systematic review, which marked a milestone in the systematic organization and analysis of scientific research (Poklepovic *et al.* 2019). Lind's (1753) study was presented in the form of a paper that aimed to deliver a concise and unbiased summary of evidence regarding scurvy. Since then, uncountable systematic reviews have been published, with some achieving great acclaim such as the widely cited publication "*Systematic literature reviews in software engineering - A systematic literature review,*" by Kitchenham *et al.* (2009, 5693 citations on Google Scholar on December 3, 2024), Cocchia's (2014, 1432 citations) "*Smart and digital city: A systematic literature review*," Tremmel *et al.*'s (2017, 1149 citations) "*Economic burden of obesity: a systematic literature review*," or Adams' (2016, 1790 citations) "*Sustainability-oriented innovation: A systematic review*." Dodgson (2021) argued that a systematic literature review is a research approach employing a meticulous process to gather valid and reliable data necessary for building knowledge. Such systematic literature reviews provide numerous benefits, including (1) broadening the scope (expanding the research field by including a wider and more diverse range of studies), (2) by improving transparency (by documenting the search strategies, inclusion criteria, and screening processes), (3) by underlining the significance of empirical evidence over preconceived knowledge (Mallett *et al.* 2012; Xiao and Watson 2019), and (4) tracking and documenting changes in the literature over time. Also, a systematic literature review uncovers gaps in the relevant literature and shows methodological inconsistencies and weaknesses, thereby contributing to establish priorities for future studies (Paul and Criado 2020). Benefiting from Dodgson's (2021) work,

Rosário and Dias (2022) framed a systematic literature review procedure that involves screening and selecting information sources for analysis and presentation. They presented a framework for structuring this procedure, which consists of three phases and six stages as shown in Table 1. This framework provides that the literature review is conducted systematically, with a strong focus on transparency and repeatability.

This study's literature search was executed using the Web of Science (WoS) and the Scopus databases. WoS was chosen due to its reputation as the first international bibliographic database with broad coverage, making it an effective and efficient resource for journal selection, research evaluation, and bibliometric analyses (Li *et al.* 2018). Scopus, being recognized as a comprehensive bibliographic database (Pranckutė 2021) was also used, as it includes some of the world's most prominent peer-reviewed academic journals (Rosário and Dias 2022). This review is a systematic mapping study and does not include a methodological quality appraisal or a risk-of-bias assessment the publications discussed. No specific search preference (such as title or abstract search) was applied in the document search process. Instead, the default search preferences of the databases were used (In Scopus, the default setting is "Article title, Abstract, Keywords," whereas in Web of Science it is "All Fields"). Initially, the keyword "sustainability" was searched to identify potential documents. In the search executed on October 23, 2024, there were 501,214 results in the WoS database and 462,014 results in the Scopus database. These documents were then searched for the term "furniture industry" and "furniture sector" (*e.g.*, "sustainability" AND ("furniture industry" OR "furniture sector"). Keywords such as "wood industry" and "forest products" were not included as they encompass the broader forest products industry from forestry to papermaking (IndustrySelect 2024). The same screening procedure was repeated on February 2, 2025, to update the number of relevant publications for 2024 with the results incorporated into Table 2.

Table 1. Stages of the Systematic Bibliometric Literature Review

Phase	Stage	Description
Exploration	1	Formulating the research problem
	2	Searching for appropriate literature
	3	Critical appraisal of the selected studies
	4	Data synthesis from individual sources
Interpretation	5	Reporting findings and recommendations
Communication	6	Presentation of the systematic literature review report
Source: Adapted from Rosário and Dias (2022)		

Screening the documents refers to reviewing documents revealed from a database search to determine how relevant the resulting publications are to this research. The following criteria were established for the document screening process: types of peer-reviewed documents (articles, conference/proceeding papers, books, and book chapters), language (English), and publication years (2024 and earlier). The resulting 101 publications (Table 2) were then analyzed by year, journal, keywords, geography, and number of citations, and followed by an examination of the focal points. Publications were considered "out of scope/irrelevant" when they did not contain elements related to both the furniture industry and sustainability (*e.g.*, studies that discussed sustainability without linking it to the furniture industry, or studies about the furniture industry that did not include any sustainability component). In addition, documents in which the term "sustainability" appeared only in peripheral elements, such as conference or proceedings titles, but were

not reflected in the study's actual content, were also excluded. Also, access to 13 publications could not be obtained despite attempts through institutional databases and open-access platforms. These documents spread across various research areas, and most of them were judged not be included in this review (*e.g*., Chiurciu *et al.* 2016, introduced at the 28th International Business Information Management Association Conference) or technical reports (*e.g*., Pupo *et al*. 2012, focusing on composite materials for civil construction) fall outside the scope of this review.

Examining the year of publication for each of these 101 publications made it possible to track the relative interest in this field of study over the years. Analyzing the journals/outlets where these 101 publications were published made it possible to find out where the academic community is researching sustainability and the furniture industry publishes their work most frequently.

Table 2. Screening Methodology

Step		Web of Science	Scopus
Inclusion Criteria	Keyword: "sustainability" AND ("furniture industry" OR "furniture sector")	133	157
Screening	Year, language, type of document	119	136
Duplicates between databases		65 (*190 left)	
No-Access		13 (*177 left)	
Out of scope, Irrelevant		76	
Decision	Considered for review	101	
*A total of 119 publications were identified from Web of Science and 136 from Scopus. After removing 65 duplicate entries between the two databases, 190 unique publications remained. Among these, 13 were excluded due to lack of access, resulting in 177 publications eligible for detailed screening.			

VOSviewer 1.6.20 (2023) was used for the keyword analysis, making it possible to introduce the co-occurrence network of the keywords. In VOSviewer, the co-occurrence network of keywords is used to visually analyze the main research topics and how they relate and cluster related terms based on how frequently they appear together in the literature (Gao *et al.* 2017). The VOSviewer network visualizes the keyword frequency and co-occurrence patterns (Martynov *et al.* 2020). It helps to identify trends, popular topics, and the evolving structure of a research field (Ellegaard and Wallin 2015; Zhou *et al.* 2022). Additionally, such networks allow researchers to explore collaborations, gaps in the literature, and potential new research directions (Lozano *et al.* 2019). RIS (Research Information Systems) format files were downloaded for the 101 documents from the WoS and Scopus databases to analyze the author-specified keywords in VOSviewer 1.6.20 (2023). These files contain the keywords used by the authors for their publications. VOSviewer evaluates these keywords verbatim (word-for-word). For instance, if one author uses the keyword "ecodesign," another might use "eco-design". In such cases, VOSviewer treats both terms as separate keywords. The keywords were not modified to maintain simplicity and ensure that other researchers could replicate this study with the same results. For example, terms like "ecodesign" and "eco-design" were accepted as they are.

To determine the countries where research into sustainability and the furniture industry is most prevalent, the first author's employer's country affiliation was used. This metric was used to show the geographical location of the researcher pursuing this topic,

which may or may not be identical with the work being described in the paper.

Analyzing article citations is among the most common approaches to assessing the influence of authors, journals, and articles, as it identifies key studies within a research field (Mulet-Forteza *et al.* 2018). The most-cited works in the relevant research area were analyzed and examined in terms of basic citation metrics such as total citations and average annual citations. Citation data were obtained from Google Scholar on January 29, 2025 to avoid divergent numbers from the WoS and Scopus databases.

For the focal point analysis, the focal point categories were determined through an inductive coding process. During the full-text review of the 101 publications, recurring themes were identified, compared, and clustered, allowing the categories to emerge from the data rather than being imposed *a priori*. Each publication was reviewed based on its title, abstract, keywords, and, when necessary, the complete text, to determine its most relevant focal point. For example, Pei *et al.*'s (2024) study was categorized under the Circular Economy focal point because the phrase "Circular Economy" appears directly in the title "Enhancing circular economy practices in the furniture industry through circular design strategies" and is supported by the text. Similarly, Sukmawati and Setiawan (2022) were categorized under the Supply Chain Management category, as the term "green supplier selection" is explicitly stated in the title of their work, "A conceptual model of green supplier selection in the manufacturing industry using the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) methods" and in the text. These examples reflect how title-based keywords inform the focal point assignment. Another example is the study by Liu *et al.* (2022a), which was categorized under the focal point Digitization and Technology Use because its title, "A Conceptual Blockchain Enhanced Information Model of Product Service Systems Framework for Sustainable Furniture." Liu *et al.* (2022a) clearly emphasize the application of digital technologies (particularly blockchains) in the context of sustainable furniture. The phrase 'Blockchain Enhanced Information Model' in the title justifies its categorization under the digitization-focused category. Additionally, the study's full text includes frequent appearances of digitization and technology terms.

This way, 15 focal points, as shown in Table 6, were created. All the 101 publications reviewed were categorized under these points. Some publications fall under multiple focal points. An example would be Susanty *et al.* (2019), where the main focus of the study is on policy-making and strategic decision-making for implementing Green Supply Chain Management (GSCM) in the wooden furniture industry. Therefore, the Susanty *et al.* (2019) article was categorized under Sustainability Strategies as it primarily addresses sustainability from a strategic policy perspective, emphasizing supply chain management practices and their integration into the industry. However, the study also involves supply chain concepts and hence could be categorized under Supply Chain Management. However, its primary contribution lies in the policy and strategic aspects of GSCM implementation. Hence, the study by Susanty *et al.* (2019) was categorized under Sustainability Strategies. Each of the 101 publications was assigned to a single focal point to maintain consistency in the analysis.

RESULTS AND DISCUSSION

One hundred and one publications (65 journal articles, 29 conference proceedings, and seven book sections) have been published since 1995 on the furniture industry and environmental sustainability (Table 2). The publications found were analyzed by year,

journal, keywords, geography, and number of citations to obtain an overview of the research done. Additionally, a review and discussion of the focal points of the 101 publications is being given and a discussion about the research thrust and the gaps uncovered is discussed.

Publications by Year

The search for published manuscripts in Scopus and Web of Science (WoS) using the keywords "sustainability" AND "furniture industry" OR "furniture sector" yielded 101 manuscripts (Table 2). The earliest published manuscript dates back to 1995 and is entitled "*An analysis of tropical hardwood product importation and consumption in the United States*" (Smith *et al.* 1995). The publication analyzed the role of tropical hardwoods in the furniture industry, and their impact on global deforestation.

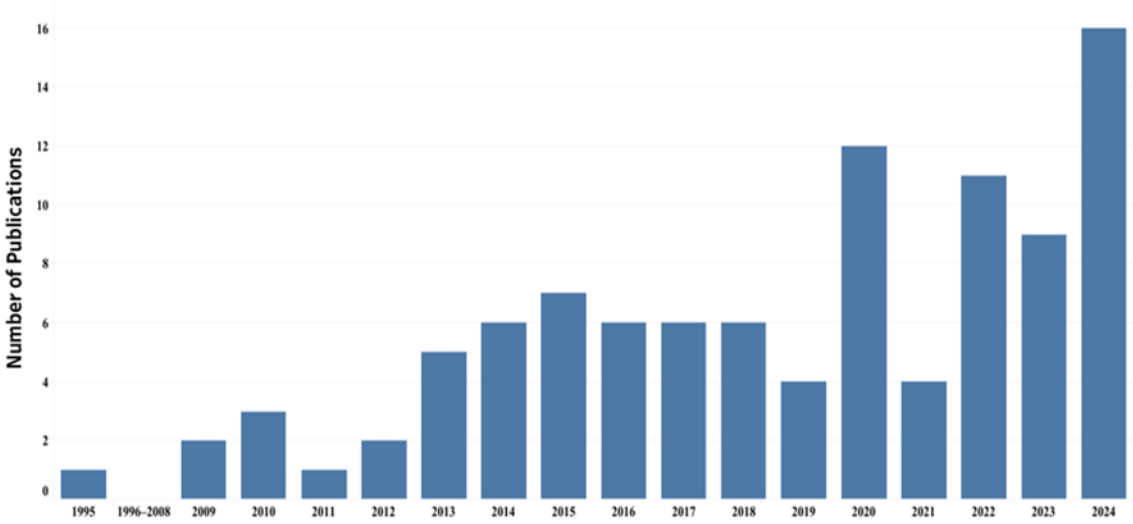

Fig. 1. Distribution of publications by year from 1995 to 2024

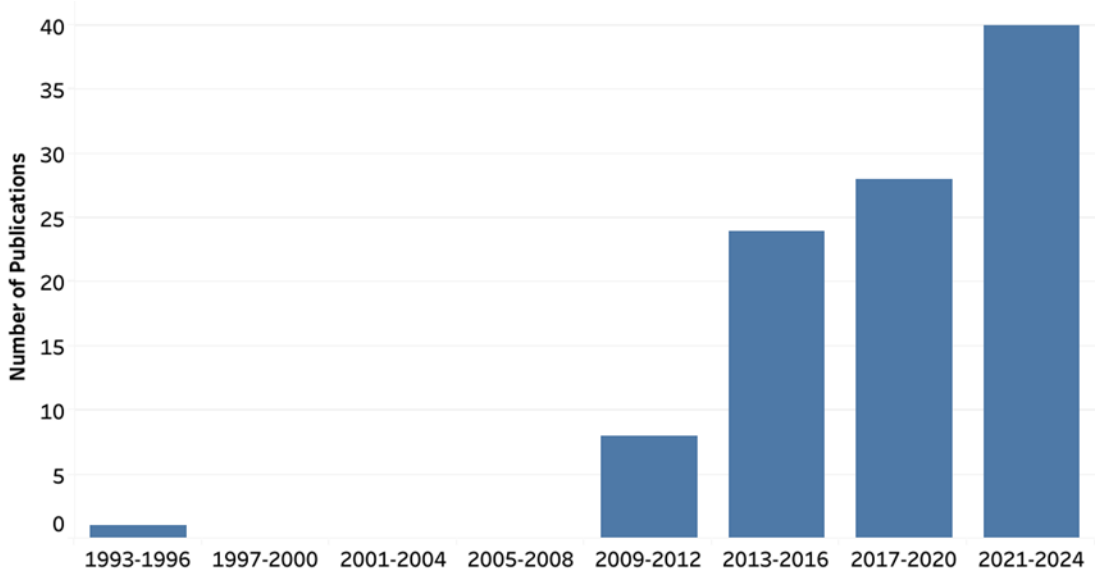

Fig. 2. Distribution of publications by 4-year periods

Based on our keyword search, Smith *et al.*'s 1995 publication relating to the hardwood product importation and consumption in the United States was not followed by any other publication until 2009. In 2009, two manuscripts were published, followed by 98 more manuscripts published between 2010 and 2024. The highest numbers of manuscripts were published in 2024 (16 publications).

Based on this yearly analysis (Fig. 1), no clear trend for the importance of the subject could be found. However, to eliminate annual fluctuations of manuscript production due to factors such as the COVID-19 pandemic in 2020, a grouped analysis conducted at four-year intervals (the choice of four years is arbitrary) shows an increasing trend in the number of publications since 2009 (Fig. 2).

Publications by Journal

The 65 analyzed peer-reviewed journal articles found from the literature search (another 36 articles were found either in proceeding papers or in book sections) are distributed across 41 different journals. Table 3 shows the distribution of journals in which publications were published.

Thirty-six journals (87.8%) of the total 41 journals in which peer-reviewed publications with a focus on sustainability and the furniture industry published only one article between 1995 and 2024. Three (7.3%) of the journals published two articles each, while another two (5.4%) published five or more articles. Two journals (*Sustainability* and *Journal of Cleaner Production*) published 23 articles combined, accounting for 35.4% of the total number of 65 peer-referred manuscripts published. *Sustainability* was found to be the leading journal, publishing 18 articles (27.7%), followed by the *Journal of Cleaner Production* (five articles, 7.7%), followed by *Ambiente and Sociedade*, *Asian Journal of Scientific Research*, and *Sustainable Production and Consumption* (each two articles, 3.1%).

Table 3. Journals in which the 65 Manuscripts were Published

Source	**#**
Sustainability	18
Journal of Cleaner Production	5
Ambiente & Sociedade	2
Asian Journal of Scientific Research	2
Sustainable Production and Consumption	2
Other*	36
Total (Articles)	**65**
Proceeding Papers	29
Book Sections	7
Grand Total	**101**
***Other:** *Acta Technica Napocensis Series-Applied Mathematics Mechanics And Engineering, Bioresources, Buildings, Clean Technologies and Environmental Policy, Competition & change, Drvna industrija, Electronic Commerce Research and Applications, Entrepreneurship and Sustainability Issues,, Environment, Development and Sustainability, Environmental Technology & Innovation, EuroMed Journal of Business, European Business Review, Forest Products Journal Gestão & Produção, International Journal of Adhesion and Adhesives, International Journal of Designed Objects, International Journal of Industrial Engineering, International Journal of Lean Six Sigma, Journal of Bamboo and Rattan, Journal of Manufacturing Technology Management Journal of Product & Brand Management, Journal of Product Innovation Management, Journal of Retail & Distribution Management, Journal of Transport Geography, Maderas: Ciencia y Tecnologia, Management of Environmental Quality: An International Journal, Management Systems in Production Engineering, Proceedings of the Institution of Civil Engineers - Waste and Resource Management, Production & Manufacturing Research, Progress in Industrial Ecology, An International Journal, Science of The Total Environment, Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration, Studia Europejskie – Studies in European Affairs, The Design Journal, The International Journal of Life Cycle Assessment, World Academy of Science, Engineering and Technology*	

Keyword Analysis

The 101 publications (Table 3) were analyzed to identify the most frequently used keywords entered by the authors. To that end, VOSviewer 1.6.20 software (2023) identified 353 keywords across all the selected publications. Of these, 301 appeared only once, making up 85% of the keywords identified. Thirty-two keywords appeared twice (9%), while twenty (6%) were mentioned three or more times. The most frequently occurring keyword was "sustainability," appearing 34 times, followed by "furniture industry" (21), "furniture" (10), "circular economy" (7), and "sustainable development" and "sustainable design" (6 each). Figure 3 shows a visual overview of the co-occurrence network of some keywords as prepared by the VOSviewer 1.6.20 software (2023). The minimum number of occurrences for a keyword used in Fig. 3 is two.

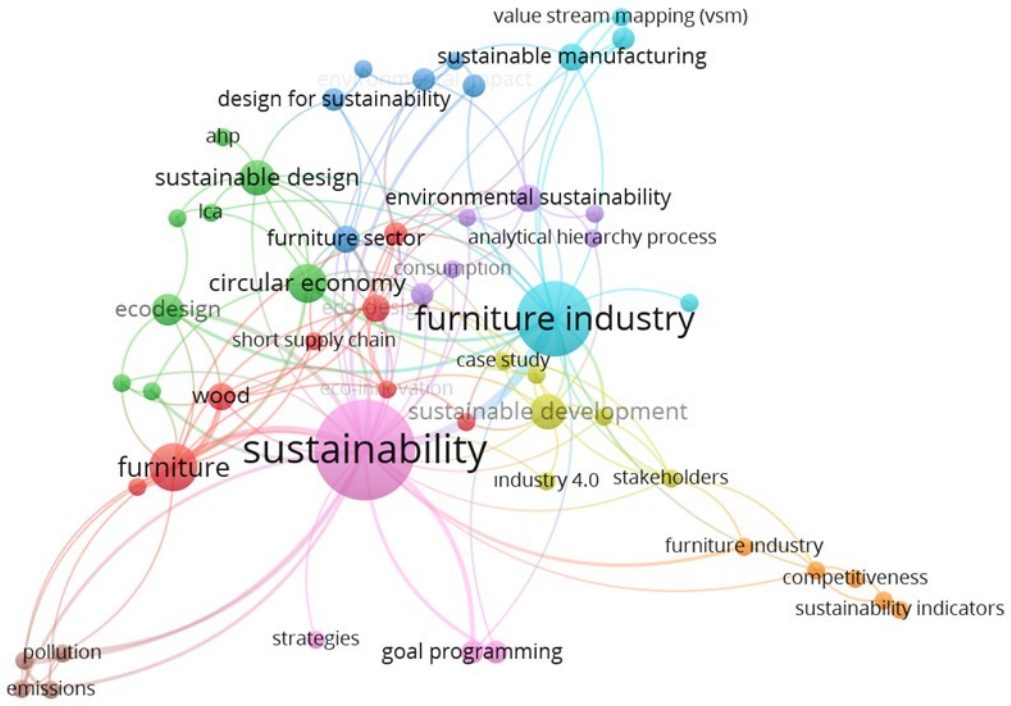

Fig. 3. Keywords co-occurrence network by VOSviewer

Geographical Analysis of Publications

The analysis of the first author's employer's country affiliation revealed that 31 countries were involved in creating the 101 publications analyzed. Italy (18 publications), Brazil (15), and Indonesia (11) had the highest number of publications, suggesting a greater academic focus on the subject in these regions. Table 4 shows the global distribution of the 101 publications identified in our literature research.

Table 4. First Authors' Affiliation Countries

Country	Publication (#)	Country	#	Country	#	Country	#
Australia	3	India	3	Portugal	2	Taiwan	1
Brazil	**15**	**Indonesia**	**11**	Romania	2	Turkey	3
Canada	3	Iran	1	Singapore	1	UAE	1
China	2	**Italy**	**18**	Slovakia	1	UK	3
Estonia	1	Lithuania	1	Slovenia	3	Ukraine	1
Finland	1	Malaysia	2	Spain	4	USA	2
Germany	1	Norway	5	Sweden	1	Vietnam	2
Greece	1	Poland	4	Switzerland	2	**Total**	**101**

Analysis of Citations

The analysis of citations from Google Scholar (January 29, 2025) identified the most-cited work in the field as Dangelico *et al.* (2013), which had 355 citations. Table 5 shows the nine most cited publications investigated in this literature review. Only publications with 100 or more citations were selected for Table 5.

Focal Points Identified

The 101 publications found by the literature research were categorized into 15 focal points (Table 6). Sustainable Design was the largest focal point, comprising 21 publications (21% of the total). The second category was Supply Chain Management, with 14 articles (14%), and the third category was Sustainability Strategies, with 10 publications (10%).

Table 7 presents a table of publications organized by focal point and year, providing an overview of the distribution of publications over the years. Publications under Sustainable Design appear more frequently and across multiple years. Categories such as Supply Chain Management and Sustainability Strategies are also represented in several years. In contrast, categories like Raw Material Management and Social Responsibility have only one or two entries. Table 7 illustrates that some focal points are more frequently addressed than others.

Below, each of these 15 focal points is analyzed and put into the context of the sustainability of the furniture industry.

Sustainable Design

The focal point with the most publications is Sustainable Design, accounting for 21% of the reviewed publications (Table 6). Bianco *et al.* (2021) aimed to develop an LCA-based tool that examined how modification of variables such as material type, quantity, product lifetime, and recycling influence the environmental performance of furniture, aiming to enhance sustainability starting from the design phase. Yang and Vezzoli (2024) presented design guidelines and toolkits to enhance environmental sustainability, encouraging the integration of environmental considerations in the early stages of the design process. Borchardt *et al.* (2012) promoted the development of eco-design-related indicators, helping manufacturers evaluate and update their strategies in terms of environmental concerns, all of which demonstrate efforts to optimize environmental performance at the design stage. Similarly, Vo and Le (2024) aimed to examine why sustainable materials have not been widely used in the furniture sector in Vietnam.

Table 5. Citations by Articles

Title	Authors	Journal	Year published	Total Citations	Annual Average
Developing sustainable new products in the textile and upholstered furniture industries: Role of external integrative capabilities	R.M. Dangelico, P. Pontrandolfo, D. Pujari	*Journal of Product Innovation Management*	2013	355	29.6
Performance evaluation of green suppliers using entropy-TOPSIS-F	B.M. dos Santos, L.P. Godoy, L.M.S. Campos	*Journal of Cleaner Production*	2019	335	55.8
Green innovation and competitive advantages in a furniture industrial cluster: A survey and structural model	M.A. Sellitto, C.G. Camfield, S. Buzuku	*Sustainable Production and Consumption*	2020	182	36.4
Sustainable strategies analysis through Life Cycle Assessment: A case study in a furniture industry	D.R. Iritani, D.A.L. Silva, Y.M.B. Saavedra, P.F.F. Grael, A.R. Ometto	*Journal of Cleaner Production*	2015	161	16.1
A corporate effort towards a sustainable business model: A case study from the Norwegian furniture industry	N.M. Høgevold	*European Business Review*	2011	131	8.7
The greening of global value chains: Insights from the furniture industry	V. De Marchi, E. Di Maria, S. Ponte	*Competition and Change*	2013	120	13.3
Making resources work more efficiently - the importance of supply chain partnerships	K. Schliephake, G. Stevens, S. Clay	*Journal of Cleaner Production*	2009	120	7.5
Selection and identification of the indicators for quickly measuring sustainability in micro and small furniture industries	A.A. Feil, D.M. de Quevedo, D. Schreiber	*Sustainable Production and Consumption*	2015	107	10.7
Additive manufacturing in the wood-furniture sector: Sustainability of the technology, benefits and limitations of adoption	F. Murmura, L. Bravi	*Journal of Manufacturing Technology Management*	2018	100	14.3

Table 6. Number of Published Studies by Focal Point with Percentage and Citations

Focal Point	#	%	Citations
Sustainable Design	21	21%	Aschehoug *et al.* 2012; Aschehoug *et al.* 2013; Bianco *et al.* 2021; Borchardt *et al.* 2012; Cardoso Braga *et al.* 2017; Chen *et al.* 2020; D'Itria *et al.* 2024; Dangelico *et al.* 2013; Gramegna *et al.* 2024; Gutierrez Aguilar *et al.* 2017; Lähtinen *et al.* 2014; Pereira *et al.* 2018; Seyajah *et al.* 2014; Seyajah *et al.* 2016; Ševčíková and Knošková 2021; Vicente *et al*. 2018; Vo and Le, 2024; Yang, 2023; Yang and Vezzoli, 2024; Zhang *et al.* 2024; Zurlo and Nunes, 2016
Supply Chain Management	14	14%	Ciccullo *et al.* 2020; Dalalah *et al.* 2022; De Marchi *et al.* 2013; Djunaidi *et al.* 2018; Dos Santos *et al.* 2019; Hisjam et *al.* 2013; Hisjam *et al.* 2015a; Hisjam *et al.* 2015b; Ince *et al.* 2023; Putri *et al.* 2013; Schliephake *et al.* 2009; Sukmawati and Setiawan 2022; Upadhyay *et al.* 2020; Wiśniewska-Sałek, 2021
Sustainability Strategies	10	10%	Armir *et al.* 2020; Borowiecki *et al.* 2022; Cordero *et al.* 2010; dos Santos and Brandao 2016; Iritani *et al*. 2015; Johann *et al.* 2022; Mirabella *et al.* 2014; Papadopoulos *et al.* 2014; Shukla and Joshi, 2020; Vignote *et al.* 2016
Environmental Management	9	9%	Badiu *et al.* 2015; de Souza Pinho *et al.* 2023; Kurniawan *et al.* 2023; Luisser and Rosen, 2009; Luisser and Rosen 2010; Menghi *et al.* 2018; Michelsen *et al.* 2023; Rossi *et al.* 2023; Zutshi *et al.* 2016
Circular Economy	6	6%	Accorsi *et al.* 2015; Barbaritano *et al.* 2019; Bruno *et al.* 2022; Koszewska and Bielecki, 2020; Mahalakshmi *et al.* 2024; Pei *et al.* 2024
Digitalization and Technology Use	6	6%	Liu *et al.* 2022a; Makovec Radovan *et al.* 2024; Marques *et al.* 2017; Murmura and Bravi, 2018; Rigillo *et al.* 2024; Thecka 2014
Sustainability Evaluation	6	6%	Azizi *et al.* 2016; Feil *et al.* 2015; Feil *et al.* 2017; Feil *et al.* 2022; Kucuk and Akdag, 2024; Sriyanto *et al.* 2019
Sustainable Production	6	6%	Hartini *et al.* 2020; Lins *et al.* 2021; Nishad *et al.* 2024; Pedrazzoli *et al.* 2014; Sakib *et al.* 2024; Utama *et al.* 2022
Business Models	5	5%	Ellingsen and Vildåsen 2022; Høgevold, 2011; Kans *et al.* 2024; Külschbach *et al.* 2020; Küttim *et al.* 2024
Sustainability Policies	4	4%	Braulio-Gonzalo and Bovea 2020; San *et al.* 2015; Susanty *et al.* 2019; Vrublevska, 2024
Green Innovation	3	3%	Sellitto *et al*. 2020; Šūmakaris *et al.* 2023; Vuong, 2022
Green Marketing	3	3%	Primožič and Kutnar 2022; Savelli, 2017; Yeğin and Ikram, 2022
Raw Material Management	2	2%	Hromatka and Savage 2010; Smith *et al.*1995
Social Responsibility	2	2%	Mello and Mello, 2017; Migliaccio and Rossetti, 2020
Other	4	4%	Carbonell-Blasco *et al.* 2024; Imteaz *et al.* 2017; Kostecka and Kopczewska 2023; Oblak *et al.* 2020
Total	**101**	**100%**	

Table 7. Highlight Table Showing the Number of Publications by Focal Point and Publication Year

Focal Point	1995	1996 - 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Sustainable Design						2	2	2		2	2	2		1	2		1	5
Supply Chain Management			1				3		2			1	1	2	1	2	1	
Sustainability Strategies				1				2	1	2				2		2		
Environmental Management			1	1					1	1		1					4	
Circular Economy									1				1	1		1		2
Digitalization & Technolgy Use								1			1	1					1	2
Sustainability Evaluation									1	1	1		1			1		1
Sustainable Production								1						1	1	1		2
Business Models					1									1		1		2
Sustainability Policies									1				1	1				1
Green Innovation														1		1	1	
Green Marketing											1					2		
Raw Material Management	1			1														
Social Responsibility												1		1				
Other											1			1			1	1

# of Publicaitons: 1 – 5

It also highlighted that sustainable interior design contributes to the conservation of natural resources without causing environmental degradation and investigated possible solutions to increase the demand for sustainable materials. Aguilar *et al.* (2017) proposed a new product design proposed with consideration of eco-design parameters to directly influence the production process by reducing both waste generation and energy consumption. Eco-design is a concept that systematically integrates environmental considerations into the design process throughout the product life cycle from raw material procurement to final disposal (Bhamra 2004). Hence, environmental impacts are addressed already at the design stage.

Supply Chain Management

Supply Chain Management was the second most frequently studied focal category, representing 14% of the reviewed publications (Table 6). Schliephake *et al.* (2009) analyzed resource efficiency and value loss across the supply chains of the timber furniture and food industries. It showed that proactive and integrated collaboration with supply chain partners can improve material efficiency and productivity without increasing environmental impact.

De Marchi *et al.* (2013) examined environmental sustainability practices in the furniture industry using Global Value Chain (GVC) analysis and identified key approaches to the greening of the furniture value chain. Hisjam *et al.* (2013 and 2015) developed procurement and partnership models that integrate sustainability into export-oriented furniture manufacturing. Putri *et al.* (2013) or Sukmawati and Setiawan (2022) demonstrated the use of decision-making techniques such as AHP and TOPSIS in supplier selection processes. Dos Santos *et al.* (2019) assessed the performance of green suppliers using the entropy-based methods, while Upadhyay *et al.* (2020) examined the role of ethical practices in sustainable supplier selection. Additionally, Dalalah *et al.* (2022) proposed an integrated assessment framework to evaluate environmental sustainability in wood-based supply chains. These studies raise the point that considering implementing and improving sustainability practices within the supply chain involves issues such as sustainable supplier selection, performance, and sustainability assessments, which play a significant role.

Sustainability Strategies

Sustainability Strategies represented the third most frequently addressed focal category, accounting for 10% of the reviewed publications (Table 6). Representative studies in this category include Cordero *et al.* (2010), who emphasized the lack of decision-support tools specifically designed for the furniture sector. Some studies employed the LCA methodology to evaluate the environmental impacts of sustainable design and production strategies (Mirabella *et al.* 2014; Iritani *et al.* 2015). Papadopoulos *et al.* (2014) analyzed why and how furniture companies adopt green product strategies, highlighting the role of sustainability in managerial decision-making. Vignote *et al.* (2016) examined the planning and implementation of community-based sustainability strategies through a model forest case study in Honduras. Johann *et al.* (2022) evaluated the impact of sustainability practices on performance and competitiveness in export-oriented furniture companies in Brazil. In general, these studies presented strategic information and tools such as eco-design strategies, green product development approaches, and lifecycle-based assessments about dealing with sustainability issues in the furniture industry. These tools help form strategies for decision-makers and can improve competitiveness, resource efficiency, and innovation. Additionally, some of these studies support integrating a sustainability approach into new product development processes and recommend that businesses make decisions aligned with their sustainability goals.

Environmental Management

The next most frequently addressed focal point was Environmental Management, representing 9% of the reviewed publications (Table 6). Badiu *et al.* (2015) examined the use of reclaimed wood in furniture manufacturing as an alternative to new wood and discussed how material reuse can reduce environmental impacts. De Souza Pinho *et al.* (2023) conducted a comparative LCA to evaluate the environmental consequences of wood waste management strategies in the furniture industry, while Kurniawan *et al.* (2023) in "Utilizing rattan waste of furniture industry in Desa Trangsan, Sukoharjo" explored how valorizing rattan waste could help minimize environmental damage. Kurniawan *et al.* indicated that through the reuse of primary materials and improved material efficiency, alternative furniture products can be developed while reducing waste in the production process with innovative and environmentally friendly solutions. Luisser and Rosen (2009, 2010) focused on identifying and assessing feasible pollution prevention measures to reduce VOC emissions and improve sustainability in office partition production. Menghi *et al.* (2018) proposed a practical approach for estimating VOC emissions from furniture based on semi-finished components. Michelsen *et al.* (2023) highlighted how the Norwegian furniture industry implemented cleaner production practices, LCA, environmental performance indicators, and certified environmental management systems (EMS) to minimize waste and improve environmental outcomes. Rossi *et al.* (2023) presented a web-based LCA tool designed to help manufacturers perform environmental assessments more easily, with practical validation shown in the furniture industry. Zutshi *et al.* (2016) investigated how environmental management initiatives were implemented in an Australian furniture retailer and provided comparative insights from other retailers in the sector. In general, these studies presented the importance of environmental evaluation and management practices, including emission control and waste reduction, in improving the environmental performance, considering the furniture industry.

Circular Economy

Circular Economy was the focal point in 6% of the reviewed publications (Table 6). Accorsi *et al.* (2015) investigated how closed-loop network design can facilitate circular economy practices such as recycling and reuse in the furniture sector. Barbaritano *et al*. (2019) assessed the level of understanding, implementation efforts, and influencing factors related to circular economy adoption in the luxury furniture market. Bruno *et al.* (2022) described how an Italian furniture company transitioned toward circularity by redesigning materials, processes, and quality standards. Koszewska and Bielecki (2020) highlighted the roles of component standardization and consumer engagement in enabling a shift toward circular economy practices. Mahalakshmi *et al.* (2024) focused on circular design strategies emphasizing longevity, disassembly, and recyclability to enhance sustainability while supporting the circular transition. Similarly, Pei *et al.* (2024) examined the application of circular design strategies in the furniture industry, emphasizing innovations in materials and products as well as the need for systemic, stakeholder-inclusive approaches. These studies suggest that, beyond emphasizing the importance of "recycling," the transition to a circular economy also requires consideration of additional elements such as design decisions, material standardization, supply chain structure, organizational capacity, and stakeholder engagement.

Digitization and Technology Use

Digitization and Technology Use appeared as the focal point in 6% of the reviewed publications (Table 6). Liu *et al.* (2022a) in "A conceptual blockchain enhanced information model of product service systems framework for sustainable furniture" developed a blockchain-enhanced product–service system model designed to support the sustainable development of furniture and facilitate the transition to a circular economy through digitally integrated lifecycle management. Makovec Radovan *et al.* (2024) emphasized the importance of equipping wood science and technology graduates with strong digital and sustainability competencies to support the sector's shift toward technology-driven sustainability. Marques *et al.* (2017) introduced a digital architecture to enable reconfigurable product–service systems in the furniture industry to improve sustainability and extend product lifespans. Murmura and Bravi (2018) explored how the adoption of 3D printing technologies can contribute to more sustainable and innovative production practices within the wood furniture sector. Rigillo *et al.* (2024) described a research initiative to promote circular design and digital innovation by helping small and medium-sized enterprises (SMEs) implement sustainable manufacturing and material reuse strategies. Finally, Thecka (2014) proposed the adoption of Social, Mobile, Analytics, and Cloud (SMAC) technologies to enhance transparency, stakeholder engagement, and competitiveness in fragmented industries like furniture. These studies presented that digitalization in the furniture industry supports sustainability through tools such as blockchain, 3D printing, and SMAC technologies. Moreover, initiatives such as graduate competency development and SME support programs highlight that digital transformation is not only technological but also an organizational and systemic shift.

Sustainability Evaluation

Six percent of all the 101 investigated publications focused on Sustainability Evaluation (Table 6). Azizi *et al.* (2016) utilized the Analytical Hierarchy Process (AHP) to identify and rank the key factors affecting the sustainable development of Iran's wooden furniture industry, while Feil *et al.* (2015) introduced a focused set of sustainability indicators aligned with the Triple Bottom Line (TBL, Elkington 1998) to enable rapid assessments in small furniture enterprises. Building on Feil *et al.* (2015), Feil *et al.* (2017) constructed a sustainability index composed of indicators and subindices to support systematic performance measurement and management. Later, Feil *et al.* (2022) applied a TBL-based sustainability index to evaluate small companies and found environmental dimensions to be the most critical. Kucuk and Akdag (2024) applied the Neutrosophic Evaluation Based on Distance from Average Solution (EDAS) method to prioritize environmental sustainability indicators tailored to the furniture industry, while Sriyanto *et al.* (2019) developed a prototype decision-support system designed to help managers assess sustainability performance based on the TBL perspective. These studies indicate that sustainability performance assessments in the furniture industry are primarily focused on SMEs. Commonly, a holistic approach, *e.g.*, the Triple Bottom Line (TBL, Elkington 1998) was considered, incorporating both economic and social in addition to the environmental dimension. In addition, Multi Criteria Decision Making (MCDM) methods such as AHP and EDAS (Azizi *et al*. 2016; Kucuk and Akdag, 2024) were used to evaluate sustainability elements in the furniture industry.

Sustainable Production

Sustainable Production was the focal point in 6% of the analyzed publications (Table 6). Hartini *et al*. (2020) developed a lean-based sustainability index to assess the wooden furniture production processes. Lins *et al*. (2021) demonstrated how a factory layout redesign, integrated with Cleaner Production practices, maximizes the use of materials, boosting the reduction of production losses and the waste of natural resources. Nishad *et al*. (2024) highlighted the role of lean strategies in improving decision-making for more sustainable and efficient manufacturing systems, including applications in the furniture industry. Pedrazzoli *et al*. (2014) introduced a mini-factory concept promoting local and flexible production to support sustainable and customer-centered wood furniture manufacturing. Sakib *et al*. (2024) in "A life cycle analysis approach to evaluate sustainable strategies in the furniture manufacturing industry" conducted a comprehensive LCA of the manufacturing and distribution stages of a pinewood table to evaluate its environmental sustainability. Utama *et al*. (2022) proposed a framework to assess and enhance sustainable manufacturing performance within the furniture sector. These studies in the Sustainable Production focal category focus on achieving sustainability through the improvement, restructuring, or evaluation of production processes.

Business Models

Business Models were the focus of 5% of the reviewed publications (Table 6). Ellingsen and Vildåsen (2022) promoted the adoption of circular products and innovative business models in the Norwegian furniture industry and encouraged sustainable behaviors across manufacturers, supply chains, and end-users to reduce the environmental impact greatly. Høgevold (2011) examined the steps taken by a Norwegian furniture company to build a sustainable business model aligned with long-term corporate goals. Kans *et al*. (2024) presented a conceptual business model approach to help implement circular

strategies in the Swedish furniture sector, highlighting both challenges and sustainability benefits. Külschbach *et al*. (2020) aimed to develop an international co-creation platform within the European furniture sector to facilitate effective stakeholder collaboration and enable the production of personalized, sustainable furniture by integrating consumer creativity into professional design processes. Finally, Küttim *et al*. (2024) explored the motivations behind corporate sustainability practices and introduced a typology to support self-assessment and inform policy development. These studies suggest that business models may support progress toward sustainability goals, a conclusion that is also supported by Bocken *et al*. (2013), who emphasize the role of business models in improving organizational sustainability performance.

Sustainability Policies

Sustainability Policies represented one of the focal points with a moderate share of publications (4% of the total, Table 6). Braulio-Gonzalo and Bovea (2020) analyzed the Green Public Procurement (GPP) criteria used in Spanish furniture tenders, identifying the types and relative importance of environmental, technical, social, and economic considerations in the awarding process. San *et al*. (2015) evaluated governmental initiatives in Malaysia aimed at promoting sustainable practices and green technologies in the furniture manufacturing sector. Susanty *et al*. (2019) supported policy-making for GSCM in the wooden furniture industry by applying a combined Decision-Making Trial and Evaluation Laboratory (DEMATEL) and system dynamics approach to assess how different factors influence wood waste reduction and raw material demand. Finally, Vrublevska (2024) investigated the preparedness of Ukrainian furniture companies for the EU's upcoming Eco-design for Sustainable Products Regulation (ESPR), focusing on the awareness, adaptability, and perceptions of sustainability-related regulatory challenges. These studies inferred that sustainability policies guide more environmentally conscious practices and promote the broader adoption and visibility, regarding the furniture sector.

Green Innovation

Green Innovation was another focal point accounting for 3% of the total (Table 6). Sellitto *et al*. (2020) investigated how green innovation contributes to competitive advantage within a furniture industry cluster in Southern Brazil, focusing on its influence through operations, product design, and eco-efficiency. Šūmakaris *et al*. (2023) introduced an integrated evaluation method for eco-innovation strategies that supports strategic green transformation and assists decision-makers in selecting competitive approaches. Vuong (2022) aimed to explore the relationship between environmental sustainability perceptions, lifestyle, and green purchasing behavior to inform eco-innovation strategies in Vietnam's furniture manufacturing sector. These studies suggest that green innovation supports environmental sustainability and can provide a competitive edge in the furniture industry, as shown by Sellitto *et al*. (2020).

Green Marketing

Green Marketing was another focal point with a modest share of the total publications, representing 3% of the total 101 publications reviewed (Table 6). Primožič and Kutnar (2022) in "Sustainability communication in global consumer brands" examined how global brands across major industries communicate sustainability messages through online platforms. Savelli (2017), using a case study approach, analyzed how environmental standards are integrated into the marketing strategies of eco-sustainable furniture products.

Yeğin and Ikram (2022) assessed the performance of green furniture brands by applying an integrated multi-criteria decision-making (MCDM) approach within the framework of Marketing 4.0 (the term Marketing 4.0 first appeared in the study of Kotler *et al*. 2017). Based on these studies, it can be stated that a competitive advantage can be gained through improving the clarity and effectiveness of green messaging, which also helps to strengthen customer loyalty and brand image.

Raw Material Management

Raw Material Management accounted for approximately 2% of the reviewed publications (Table 6) with Smith *et al*. (1995) highlighting the environmental consequences of tropical hardwood importation and consumption in the United States, particularly its contribution to global deforestation and resource depletion. Likewise, Hromatka and Savage (2010) examined timber shortages in the Malaysian furniture sector and indicated that the industry's sustainability is closely tied to responsible sourcing and the long-term availability of raw materials. It can be inferred that sustainable raw material supply in the furniture industry is closely linked to forest resource management and that promoting private forestry can help ensure long-term timber availability.

Social Responsibility

Social Responsibility accounted for approximately 2% of the reviewed publications (Table 6). Mello and Mello (2017) examined how Brazilian manufacturers integrated social responsibility into their strategic planning. Migliaccio and Rossetti (2020) explored how SMEs in the Italian furniture industry addressed sustainability and business ethics, particularly emphasizing sustainability's ethical dimensions. Based on these findings, it can be stated that incorporating social responsibility and ethical practices into sustainability strategies positively impacts organizations' economic and social performance.

Other Focal Points

Four publications were classified under the Other category because their topics did not align with any of the focal points used (Table 6). Carbonell-Blasco *et al*. (2024) introduced CO_2-based hot-melt adhesives and evaluated their potential as a sustainable alternative for use in footwear, wood, and furniture applications. Imteaz *et al*. (2017) investigated the reuse of wood chips from furniture production in embankments and landscaping, emphasizing their environmental benefits. Kostecka and Kopczewska (2023) developed a Spatial Customer Relationship Management (CRM) approach for optimizing pick-up point locations in the furniture industry, using IKEA Poland as a case study. This approach improves customer access, supports sustainability, and improves cost-effectiveness. Oblak *et al.* (2020) examined the European furniture sector in terms of market outlook, industry challenges, design innovations, and recent trends, focusing on innovation, sustainability, and global competitiveness

DISCUSSION

Since 2009, a growing number of published studies on sustainability in the furniture industry signify increasing interest in the topic (Figs. 1 and 2). The highest number of publications was published in 2024, with 16 documents (Fig. 1), followed by 2020 (12), 2022 (11), and 2023 (9), all quite recently. This may reflect a shift in global policy and industrial focus toward environmental sustainability for the furniture industry. Factors such as the adoption of the United Nations Sustainable Development Goals (SDGs) by numerous countries in 2015 (United Nations n.d.) and the Paris Agreement in 2015 (United Nations Framework Convention on Climate Change [UNFCCC] 2015) may have supported this trend. Notably, over 70% of the publications in the present corpus were published after 2015, coinciding with the adoption of the United Nations SDGs and the Paris Agreement. However, while sustainability has become more deeply embedded in the research agendas of fields such as renewable energy and green building (Norouzi and Fani 2021; Zuo and Zhao 2014), it appears less so for the furniture industry, as it lacks an established and sustained academic research path so far.

The journal analysis reveals that a highly dispersed publication structure characterizes the dissemination of research on the furniture industry and sustainability. Of the total 41 different journals in which these 65 peer-reviewed publications were published, 36 journals published only a single publication over all these years (1995 - 2024). Only the journal *Sustainability* and the *Journal of Cleaner Production* featured more than five articles on "sustainability" and the "furniture industry" (Table 3). The fragmented structure of publications across various journals indicates that sustainability in the furniture industry is a niche research area with many differing specialties contributing to it. The absence of a focused journal in this field may create difficulties for researchers in tracking developments and following the progress of studies on this topic. A simple solution to this problem could be the creation of special issues by journals on this subject. The journal *Sustainability* accounts for the highest number of publications on this topic, thanks to its multidisciplinary nature and thus publishing a broad range of sustainability-related research since its establishment in 2009. As of 2025, *Sustainability* has published over 92,543 papers (Sustainability, n.d.). Similarly, the *Journal of Cleaner Production*, a relatively older and more selective journal founded in 1993, has published 42,630 papers to date (SciSpace n.d.).

A keyword co-occurrence analysis (Fig. 3) shows that the clusters around sustainability and furniture industry centers around concepts such as "circular economy," "sustainable design," and "ecodesign." This can be inferred to signify a strong emphasis on design-oriented solutions, reflecting the growing role of design thinking in addressing environmental concerns while integrating sustainability into product development (Verganti *et al.* 2021; Rösch *et al.* 2023). However, the wide array of keywords, ranging from "pollution" to "competitiveness" (Fig. 3), shows the scope of work being done and reiterates the challenge the industry is facing to achieve sustainability.

Countries with large contributions to the field of sustainability in the furniture industry (Table 4), *e.g.*, Italy (18), Brazil (15), and Indonesia (11)) accounted for almost half of all the selected publications (44 out of 101, Table 3). Italy's leading position in fashion may have contributed to the number of publications in furniture design, as well

as aligning with Italy's status at the leader in furniture production capacity within the European Union (Łukiewska and Brelik 2021). Brazil, in addition to its abundant forest resources, is home to initiatives such as the Sustainability of the Brazilian Furniture Industry (SIMB - Sustentabilidade da Indústria do Mobiliário do Brasil), who may have triggered enhanced research activities (Johann *et al.* 2022), while in Indonesia, the country's most prominent furniture-producing region is Jepara, located on the northern coast of Central Java Province (Larasatie 2018). However, local forests in Jepara cover only 5% of the furniture industry's timber demand (Melati and Shantiko 2013), hence its furniture production depends on continuous external timber supplies (Nurrochmat *et al.* 2015). Such challenges may have contributed to increased sustainability-focused research and initiatives in Indonesia's furniture sector. Conversely, large markets for furniture, such as the USA, China, and Germany, appear to have contributed little to the scientific literature on sustainability and the furniture sector. For China, this lower contribution may be related to an insufficient adoption of sustainable development concepts within the furniture industry and a lack of comprehensive green manufacturing technology systems, as highlighted by Xiong *et al.* (2021). Germany and the USA, both, have hemorrhaged large parts of their furniture industry over the last two decades and may not find it worthwhile to invest resources to the topic.

The publication with the highest total number of citations is by Dangelico *et al.* (2013), with 355 citations in the *Journal of Product Innovation Management*. The highest annual average citation belongs to Dos Santos *et al.* (2019), with 55.8 citations per year in the *Journal of Cleaner Production*. However, this statistic does not necessarily reveal the interest in the furniture industry topic itself. Instead, it reflects their relevance across different contexts. To support this claim, an examination of the citing publications of the study by Dangelico *et al.* (2013) in WoS reveals that, under the *Citation Topics Meso* classification, 78% of citations are associated with the field of Management and 4% with *Sustainability Science* according to Clarivate (2022). WoS generated a three-level hierarchy for topics as 10 broad macro-topics, 326 meso-topics and 2,444 micro-topics). Additionally, only two papers included the "furniture industry" keyword among these studies. To that end, it can be hypothesized that the citations belong to the broader research areas (*e.g.*, Corporate Social Responsibility) rather than the furniture industry. Similarly, an argument can be made that the citation popularity of the study by Dos Santos *et al.* (2019) is also not related to the furniture industry. It was postulated that its popularity comes from the methodology used (*e.g.*, Multi Criteria Decision Making Methods - MCDM methods). To support this claim, an analysis of citing papers in WoS shows that approximately 52% fall under the "Artificial Intelligence & Machine Learning" topic and around 50% are categorized under "Fuzzy Decision-making." These figures indicate that citations come from researchers interested in decision science studies instead of a focus on the furniture industry.

Almost half (45%, Table 6) of the 101 studies investigated are focused on either Sustainable Design (21%), Supply Chain Management (14%), or Sustainability Strategies (10%). The focus on sustainable design shows that integrating sustainability principles at the design stage is a critical strategy for enhancing the environmental performance of furniture products.

Sustainable design (eco-design) is expressed as a practice of blending environmental considerations into all phases of product development, aiming to minimize environmental impacts, considering the entire life cycle of a product (Septiani *et al*. 2022).

Over time, the environmental burden of furniture waste has become more apparent, making blending sustainable design principles into furniture manufacturing increasingly crucial (Li *et al*. 2023). With growing awareness of the environmental impact associated with the furniture industry, design is now widely regarded as a key leverage point for innovation toward more sustainable furniture solutions (Yang and Vezzoli 2024). The demand for furniture made with sustainable and environmentally friendly materials is steadily increasing (Suandi *et al*. 2022; Mittal *et al*. 2023), making the Sustainable Design focal point ever more important to researchers.

Supply chain management, *e.g.*, the managing of a network of interconnected organizations to efficiently deliver products and services while optimizing processes and resources across the supply chain (Harland 1996; Chen *et al.* 2023), was the second-ranking focal category based on the number of published studies (14%) for a reason. Supply chain decisions directly shape a company's environmental impact (Vachon and Klassen 2007; Green *et al*. 2012), as they play a fundamental role in ensuring sustainability in the furniture industry by influencing various processes, from the sourcing of raw materials to supplier relationships and from transportation efficiency to material traceability. Sustainable supply chain management refers to overseeing material and information flows across the supply chain while simultaneously considering three dimensions of sustainability (TBL), *e.g.*, economic, social, and environmental (Elkington 1998; Chen *et al.* 2023). Farhan and Iqbal (2021) indicate that the number of publications relating to a sustainable supply chain management focus has steadily been increasing in recent years from zero in 2000 to over 350 per year in 2020. For example, a Google Scholar search using the relevant keyword (sustainable supply chain management) yields approximately 11,700 results for 2024, 9,070 for 2023, 7,240 for 2022, 5,770 for 2021, and 4.750 for 2020. The furniture sector is characterized by a complex supply chain structure, which makes supply chain management particularly challenging (Andry *et al*. 2023) but also rewarding.

Sustainability Strategies, the third ranking focal point (10%, Table 6), allows the furniture industry to promote more environmentally friendly approaches that help reduce waste generation, resource consumption, and greenhouse gas emissions while promoting sustainable consumption and production patterns (Righi *et al*. 2023) and, hopefully, make the business more profitable. Although the furniture industry's environmental impact and connection to sustainability are widely acknowledged in the literature, the sector, unfortunately, still lacks a well-developed, science-based framework tailored to its specific challenges and needs for advancing sustainability (Yang 2023).

By contrast, the focal point of raw material management (2%, Table 6) is represented last, together with social responsibility (2%). This situation is noteworthy, given that wood is the primary material for furniture manufacturing, and thus, the environmental implications of raw material extraction are critical. This lack of attention from the research community may have to do with the ubiquitous availability of lumber and engineered wood products worldwide, which allows the industry to neglect such an important topic. However, as Hromatka and Savage (2010) show, in places where the ubiquitous availability of wood is fragile, such a topic automatically gains attention and researchers are starting to investigate it. In the future, will the industry place more emphasis on the sourcing of its major raw material?

Social responsibility (2%, Table 6) ranked last with raw material management. Only two publications were captured by the present search on the WoS and the Scopus databases relating to the social responsibility category. These studies examined the correlation between sustainability, commercial ethics, social responsibility, and management practices

(Mello and Mello 2017; Migliaccio and Rossetti 2020). Researchers from a wide range of specialties, such as law, economics, management, production, and systems engineering, have contributed to these studies, emphasizing that the topic of sustainability in the furniture industry is approached from an interdisciplinary perspective. Most likely, research focusing solely on social issues is not being done focusing on a particular industry like furniture but on larger strata of the industry and society. Also, such studies may rarely use sustainability in the title or in its keywords.

Tools like Life Cycle Assessment (LCA) and Multi-Criteria Decision-Making (MCDM), case studies and surveys/interviews, and lean systems are often used to address sustainability-related problems in the furniture industry, as they are also widely adopted across industry sectors to tackle sustainability challenges. For instance, Lima *et al*. (2021) in "Sustainability in the construction industry: A systematic review of the literature" noted that LCA was frequently used by researchers in the context of sustainability in the construction industry. Additionally, in their literature analysis, Nuralievna and Park (2023) indicated that MCDM methods are frequently applied, and mathematical modeling approaches are commonly employed in the automobile industry. Another systematic review entitled "A systematic review of green construction research using scientometrics methods" by Luo *et al*. (2022) indicated that Environmental Impact Assessment (EIA) is commonly employed to evaluate the environmental sustainability of green construction projects, suggesting that EIA use is frequent in construction-focused studies. One can speculate that such tools will be used even more in the future to address the challenges of sustainability in the furniture industry, including environmental, social, and economic (TBL, Elkington 1998) issues, as in the end, the furniture business can only be sustainably conducted, if all the TBL aspects are resolved.

The growing importance of sustainability in the furniture industry can also be observed through public statements made by leading companies. IKEA, which is known for its pursuit of sustainability (Ojo *et al.* 2015; Cosmo and Yang 2017; Yang and Shao 2019; Enquist and Sebhatu 2021), began documenting and disclosing its sustainability practices starting in 2005 (Ojo *et al.* 2015). In alignment with this, IKEA (n.d.) has named its sustainability strategy "People and Planet Positive." The company defines its 2030 sustainability ambitions as follows: "We have big ambitions for 2030. We are committed to doing our part to tackle climate change, unsustainable consumption, and inequality. Our three major focus areas are Healthy and Sustainable Living, Circular and Climate Positive, and Fair and Equal (IKEA n.d.)." Despite those good intentions, IKEA was accused by Earthsight (n.d.) in 2020 of manufacturing chairs using beech wood that was illegally obtained, despite being certified by the Forest Stewardship Council (FSC). Such dubious situations clearly highlight the necessity of transparent timber traceability systems (Environmental Investigation Agency [EIA] 2025) and enduring vigilance of the furniture industries participants towards bad actors.

Considering sustainability and the furniture industry, researchers studied numerous subjects such as material selection, supply chain management, chemical analyses, regulations, and others. This variety supports the requirement for an interdisciplinary approach in this research area. Sustainability in the furniture industry starts with design and raw material sourcing before manufacturing a product. As an example, even though wooden materials are renewable, this does not automatically mean they are sustainable. Forests must be managed sustainably to ensure long-term resource continuity. In addition to ensuring the sustainability of resources, a sustainable design approach also helps to reduce environmental impact before production begins. Additionally, some chemicals used

in production may cause pollution, which is another issue to deal with to achieve sustainability.

Digitalization in the furniture industry is also gaining interest. In a recent study, Çardak *et al.* (2025) demonstrated how machine-learning models and large-scale e-commerce data can be used to predict consumer preferences. The sustainability concept can also be integrated into this kind of study. In another context, some studies in the literature offer methodologically comparable mappings of wood-based value chains. For example, Akyüz *et al.* (2025) conducted a bibliometric analysis of wood pellets. When viewed together with such work, the present review on sustainability and the furniture industry contributes to a broader effort to understand patterns and developments across interconnected forest product sectors.

Although this study primarily considered environmental sustainability, the literature reviewed addresses a variety of issues. For example, the studies investigated are concerned about supply chain decisions, environmental regulations, and material longevity. Producing furniture using eco-friendly methods, emitting less CO_2, and using less water do not constitute holistic sustainability, meaning that sustainability encompasses not only the responsible cultivation or sourcing of raw materials but also the entire sequence of processes a product goes through; from production and distribution to consumer use and end-of-life management, including disposal or recycling. A *Furniture Today* article (2023) claimed that "Too many furniture companies claim sustainability without giving evidence." The article talks about greenwashing in the furniture industry and explains that many companies say they are sustainable without showing clear and reliable proof. Even if a product is made from recycled materials, this does not necessarily mean it is recyclable (MARK Product 2022) or environmentally beneficial. For example, Liu *et al*. (2022b) indicated that plastics recycled from electronic waste cause more ozone depletion than making new (virgin) plastics. Therefore, achieving sustainability requires a holistic approach that starts from design to raw materials sourcing to end-use recovery, including recycling and customer engagement. It involves the active participation of various stakeholders, including designers, regulators, manufacturers, supply chain participants, wholesalers, retailers, consumers, recyclers, and waste specialists, among others. From this perspective, the sustainability issue in the furniture industry is not simply a technical issue but requires holistic actions and involves multiple actors along the furniture value chain.

Limitations

This review has some limitations related to the scope of the literature search conducted. Broader sectoral terms such as "wood industry," "forest products," and "timber sector" were intentionally excluded to maintain a focused dataset centered explicitly on the furniture industry. This decision may have led to the omission of studies in which furniture appears as a sub-domain of a more exhaustive research into forest products. Another limitation of the search strategy is the strict requirement that the term "sustainability" appears in the search query. Although this approach ensured that all selected publications explicitly framed their contributions within the sustainability discourse, it may also exclude studies that address sustainability-related topics under other labels, such as eco-efficiency, life-cycle performance, circular production, resource efficiency, or green manufacturing. As a result, the chosen dataset represents a clearly bounded but somewhat conservative subset of the broader research landscape in which sustainability themes are present but are not always explicitly named. Another limitation of this review is that each publication was assigned to a single focal point. This approach allows for clear synthesis but may

underrepresent research that can be categorized into multiple themes, such as design and supply chain interactions or strategy and business model overlaps. Therefore, focal points of the studies can be interpreted as reflecting each publication's dominant emphasis rather than its complete thematic breadth.

Future Work

Future research could focus on examining technology adaptation in the furniture industry revealing whether companies are actively engaging in environmental sustainability initiatives through emerging technologies. If so, what types of technologies are being used and how for what purpose? Another topic could be to research whether the firms perceive sustainability as a strategic priority or whether they merely treat it as a regulatory requirement. Research of that type would help to understand the motivations behind actions that improve sustainability and inform policies and practices that encourage meaningful transformation. Most likely, the pressure, regulatory and consumer-induced, on the furniture industry to offer sustainable products will only increase.

Additionally, future literature could grow by examining sustainability in the furniture industry holistically. In this case, the TBL perspective can be integrated with related sectors, such as the forest products and wood industries. In studies that follow firms over a long period, sustainability indicators can be monitored to assess real improvements in performance and the possible influence of digitalization and studies that compare different countries can help clarify whether companies adopt sustainability as a strategic choice or mainly in response to regulatory requirements. Also, mixed methods approaches incorporating LCA with organizational analysis could offer valuable insights into the alignment between environmental performance and design or supply chain decisions. Finally, as global value chains become more complex, there is an increasing need for supply chain studies that involve multiple actors and focus on traceability across regions and industry segments. Last but not least, future research could further explore the substantial yet underutilized potential of construction and demolition waste as a secondary material resource for sustainable furniture design and circular manufacturing strategies.

CONCLUSIONS

One hundred and one peer-reviewed publications related to sustainability in the furniture industry were investigated as well as providing a detailed thematic analysis of sustainability studies in the furniture industry. The documents were evaluated by year of publication, publishing journals, author keywords, country affiliations of the first author, and number of citations. Additionally, the study identified both well-researched areas, such as Sustainable Design, Supply Chain Management, and Sustainability Strategies, as well as underexplored areas, such as raw material management and social responsibility.

1. Keyword analysis revealed that concepts including sustainable design and circular economy were central in the studies reviewed.
2. Based on the affiliation of the first author, Italy, Brazil, and Indonesia were the leading countries for such publications, whereas major furniture markets like the United States, China, and Germany contributed considerably less.
3. The citation analysis showed that the most cited studies were primarily associated with

broader fields, such as management and decision science, rather than focusing specifically on the furniture industry.

4. The most prominent focal points observed were Sustainable Design, Supply Chain Management, and Sustainability Strategies. Raw Material Management and Social Responsibility were addressed in a limited number of studies.
5. The terms highlighted by the keyword analysis in the first part, such as "eco-design" and "circular economy" align closely with the prominent focal points identified in this section.
6. The studies reviewed have addressed different aspects of sustainability, showing that the furniture sector continues to approach sustainability in a fragmented manner.
7. Additionally, customer-oriented (end-user) factors such as aesthetics, ergonomics, and functionality are significant elements in the furniture sector, making the design stage particularly distinctive because trade-offs between customer-oriented factors and sustainability must be made. Trends, fashion, and cultural preferences also influence product and production decisions.

This literature review emphasizes the interdisciplinary nature of the field and highlights the importance of collaboration between all actors of the furniture industry for future research directions.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Use of Generative AI

No generative AI tools were used in this work.

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