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Review

Perceptions of Multi-Story Wood Buildings: A Scoping Review

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Abstract

The construction sector contributes significantly to global greenhouse gases, accounting for 39% of worldwide emissions. Multi-story wood buildings (MSWBs) present a sustainable alternative to traditional emissions-intensive construction materials like concrete and steel. However, only a few studies have investigated how potential customers perceive MSWBs, which influences their acceptance and demand. This study uses a concept-driven scoping review to explore perceptions and concerns about living in MSWBs and to understand barriers to their adoption. Through a narrative synthesis of 20 peer-reviewed articles, this study uncovered five key themes: environmental sustainability, fire safety, human well-being, structural durability, and costs. These findings highlight opportunities and challenges for MSWBs' market growth and inform future communication strategies to enhance public acceptance and promote sustainable construction and the built environment.

Keywords: mass timber buildings; mass timber construction; sustainable construction; sustainable built environment; public perceptions; customer perceptions; communication strategies

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1. Introduction

The construction sector is a significant contributor to global greenhouse gas (GHG) emissions, making it a vital focus for sustainable solutions. In 2009, construction activities were stated to be responsible for 23% of global economic CO_2 emissions [1], and a decade later, this figure rose to 39% with rapid urbanization and population growth [2]. Studies indicate that without intervention, construction will consume 30% more energy and emit 10% more carbon dioxide by 2060 [3]. A major portion of these GHG emissions comes from the production of carbon-intensive materials like steel, concrete, and glass, resulting in increased criticism of traditional construction practices and a push for sustainable alternatives [2,4,5]. As researchers and policymakers seek alternatives, innovative materials are emerging to address these environmental challenges while meeting the demands of urban development.

Among these innovations, mass timber stands out as a promising low-carbon and sustainable alternative to traditional construction materials like concrete and steel [6]. Mass timber is produced by combining small pieces of lumber with adhesives under high pressure that provide robust strength for building construction [7–9]. Unlike conventional wood-framed buildings that are typically limited to single-family homes, mass timber enables the construction of taller, multifamily structures [8]. It is calculated that replacing

conventional building materials with mass timber can reduce global CO_2 emissions by 14% to 31% [10].

Globally, structures made of mass timber can be referred to differently from one region to another. For example, in Australia, the buildings are called "mass timber construction" [11], while in North America, especially the Pacific Northwest, this structure is referred to as "tall wood buildings" [12]. Due to common linguistic word choice, the term "multi-story wood buildings" (MSWBs), as proposed by Kozak [13], is used in this study.

MSWBs are a form of mass timber structures made primarily from engineered wood and are at least two stories tall. These are taller multifamily buildings, unlike traditional wood structures, which are mostly single-family houses and are predominantly built of a single stick of wood [14]. MSWBs are gradually gaining attention as a sustainable solution for the growing urban population among engineers and architects [15–20], taking a step closer to a renewable resource-based bioeconomy [21]. While the knowledge and attitudes are evolving with the increasing recognition of wood as a construction material in the media and news [22], there are some persistent biases in public attitude and perceptions that need to be addressed [23–27]. Public perceptions remain mixed, with enthusiasm for the sustainability and well-being benefits of wood buildings often overshadowed by concerns about their fire safety, durability, and forest degradation [24,26–30].

Understanding public perceptions is essential to overcoming these barriers and increasing customer demand. This scoping review aims to identify and synthesize existing literature on public perceptions and attitudes toward MSWBs, with the goal of uncovering key themes that influence their acceptance and adoption. The following sections of the article present the theoretical background, a description of the methodologies utilized in the study, the results, and the discussion. Finally, perspectives on possible directions for future research in this topic area are offered.

2. Theoretical Background

A scoping review method was chosen for this study because it allows for a broad and systematic exploration of existing research [31]. While a systematic review is probably the most appropriate method for examining topics related to the feasibility, appropriateness, significance, or efficacy of a particular intervention, a scoping review is most suitable when research objectives or questions entail exploring, identifying, mapping, reporting, or debating traits or concepts across a wide array of evidence sources [32,33].

Given that public attitudes toward MSWBs cover multiple aspects such as environmental and health benefits, safety concerns, durability, and costs [27–29,34–36], a scoping review provides the flexibility needed to synthesize this wide-ranging literature without restricting the types of evidence included. This approach is particularly useful when research is still emerging, as is the case with MSWB public perceptions.

Scoping reviews are well-established in fields such as public health to assess public perceptions and synthesize diverse literature. For instance, a review on Parkinson's disease explores public knowledge and attitudes to enhance awareness about the disease and identify broader societal contexts influencing those attitudes [37]. Similarly, a scoping review on tuberculosis in India examines gender differences in care access, highlighting societal influences and research gaps to support equitable health interventions [38]. In education, a scoping review has been used to understand students' perceptions of assessment feedback and its effectiveness [39]. In construction, a scoping review on green finance mapped the under-researched area of investment gaps in green buildings, identifying key research directions to promote sustainable construction practices [40].

3. Methods

This study followed the Joanna Briggs Institute (JBI) methodological framework [33] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [41], which provides structured guidance for reporting scoping reviews. In the context of this study, the process involved establishing a research question, identifying relevant studies by developing eligibility criteria, selecting appropriate literature, extracting and analyzing key themes, and reporting the results (Figure 1). This approach allowed us to capture a wide range of perspectives, which is essential for understanding diverse public perceptions.

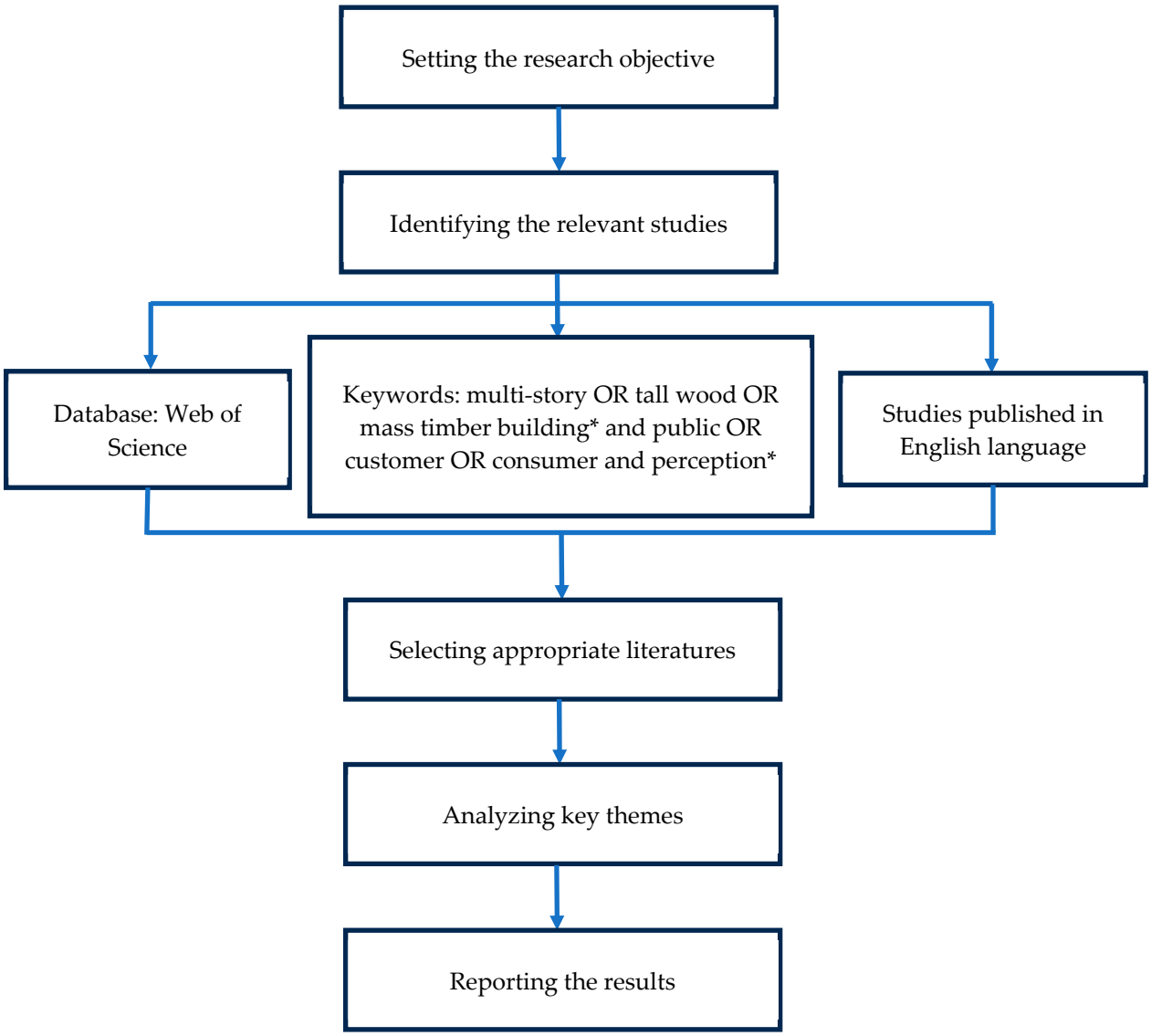


Figure 1. A methodological framework of the study.

3.1. Search Strategy

The literature search was conducted using the Web of Science database in April 2025, with a Boolean search query: multi-story OR tall wood OR mass timber building* and public OR customer OR consumer and perception*. To ensure no relevant studies were missed, the reference lists of the selected articles were also reviewed, as recommended by Horsley et al. [42].

3.2. Eligibility Criteria

The Population, Concept, and Context (PCC) framework [43] was used to develop the inclusion criteria. Our population includes all types of scientific studies (quantitative research, qualitative research, and mixed methods research). The concept of interest was "public perceptions of MSWBs" in which MSWBs can be synonymous with other terms, such as mass timber constructions. The context was limited to studies written in English, although no geographical restrictions were applied. There were also no year restrictions applied.

3.3. Data Analysis

A narrative synthesis approach was used to analyze and present the findings from the included studies. This approach involved examining the studies to identify similarities, differences, and relationships in their findings related to public perceptions of MSWBs. To enhance clarity and organization, the findings were grouped into specific themes [44]. As recommended by Levac et al. [45], these themes were discussed in the context of the study's goal.

4. Results

The database search using the Boolean query yielded 43 papers. The first author read all the articles to identify those with a scientific contribution (i.e., using research methods to meet their objectives). Articles that did not directly address the topic of public perceptions of MSWBs were excluded, reducing the total number to 15. When there was doubt regarding inclusion and exclusion, the second author served as a tiebreaker. This step was also one of the methods to validate the search results. In the next step, references to each article were examined. In total, 18 additional potential articles were identified. Using the same criteria, the first author repeated the inclusion step. These combined steps resulted in a final selection of 20 articles (Appendix A Table A1).

4.1. Characteristics of Included Studies

This scoping review found 20 peer-reviewed articles that explore perceptions, attitudes, behaviors, and preferences toward wooden building materials, particularly in the context of multi-story wooden buildings (MSWBs) and mass timber construction (MTC). Twelve studies in this review adopted a quantitative approach of data collection. Five studies used a qualitative approach [25,45–51], with the remaining three papers using a mixed-methods approach [11,12,52].

Most studies used a cross-sectional design, collecting data at a single point in time. However, Viholainen et al. [48] used a longitudinal design, tracking changes in perceptions over one year, which followed homeowners before and after they moved into wooden homes to understand how their perceptions changed over time.

Geographically, the studies were concentrated in Europe (Finland, Sweden, Norway, Germany, Austria, Denmark, and the United Kingdom), the United States, and Australia. Three studies [25,29,53] compared perceptions across multiple countries, including Austria, Denmark, Finland, Germany, Norway, Sweden, and the UK, while others focused on specific regions, such as the Helsinki metropolitan area in Finland [54] or the Portland and Seattle metropolitan areas in the U.S. [12] or the Oslo region of Norway [24].

Kremer & Symmons [11] conducted a two-part study to explore mass timber construction in Australia. In Study 1, they surveyed 281 consumers to understand attitudes toward timber construction. While in Study 2, they interviewed nine industry stakeholders to identify barriers to adoption, such as concerns about durability and fire safety. This

mixed-methods approach provided both broad consumer insights and detailed professional perspectives, making it unique in its comprehensive analysis of people's perceptions.

Sample sizes across the studies ranged significantly from seven participants in qualitative studies [48] to 7056 respondents in large-scale surveys [29]. The combined total number of participants across all studies was more than 16,000. The population varied from the public in urban and rural areas [22,29,53] to specific professional groups such as architects [19], construction professionals [25,47], and municipal civil servants [55].

4.2. Data Collection

Questionnaires were the most common tool used by 19 studies, either using face-to-face, online, or telephone methods. The remaining one study by Mahapatra et al. [25] used information collected mainly from secondary sources such as reports, newspapers, journal publications, conference proceedings, and general internet searches. Almost all the quantitative studies used online surveys for data collection, except for Harju & Lähtinen [56], who used a postal survey with both paper and electronic options.

4.3. Five Key Themes

Utilizing a narrative synthesis of 20 peer-reviewed articles, five key themes were found in the factors influencing public attitudes toward MSWBs. In this section, the findings are represented in an organized and coherent manner [33].

Theme 1: Environmental Sustainability

Environmental sustainability is considered a central theme in public perceptions of Multi-Story Wood Buildings (MSWBs). Across the reviewed studies, there is a strong awareness of the environmental benefits of wood as a building material, particularly its ability to reduce carbon emissions and promote sustainability. Larasatie et al. [12] found that MSWBs were perceived as more environmentally friendly, with respondents appreciating their use of renewable materials. Similarly, Kim et al. [53] and Kremer and Symmons [11] highlighted that attitudes toward environmental sustainability strongly influence the intention to live in MSWBs across European countries. Harju & Lähtinen [56] also emphasized that consumers with strong environmental consciousness value the sustainability benefits of wooden building products, such as carbon storage and reduced greenhouse gas emissions.

Stakeholders like construction professionals and municipal servants have also acknowledged the sustainability benefits of wooden buildings [25,47,55]. However, despite these positive perceptions, concerns about deforestation and forest degradation persist. Conroy et al. [15] noted that some architects raised concerns about the overuse of wood and its potential impact on forests, with 25% of respondents agreeing that building with wood could lead to forest degradation. This suggests that while the environmental benefits of wood are widely recognized, there is a need for education about sustainable forestry practices to address these concerns.

Younger respondents with strong environmental values are more likely to prefer wood in urban housing due to its sustainability benefits [12,24]. However, they also appear to be more concerned with perceived climate change and the environmental problems associated with forest harvesting and using wood as a construction material [36].

As environmental attitudes evolve in society and a greater proportion of consumers search for environmentally friendly product alternatives, the opportunities for wood to gain market share will increase [24]. This shift in consumer attitudes presents a significant opportunity for the growth of MSWBs, if concerns about deforestation and forest degradation are addressed through effective communication and education. Targeted messaging and education about sustainable forestry practices, as well as the emission reduction benefits of wooden buildings, are crucial for the widespread adoption of MSWBs [11,12,48,54].

Theme 2: Fire Safety

Fire safety emerges as one of the most prominent and frequently discussed themes in the context of MSWBs across the studies reviewed. Concerns about fire safety are consistently highlighted as a significant barrier to the widespread acceptance of wooden construction, with studies from various regions, including the US, Australia, and Europe, consistently identifying it as a major barrier to the acceptance of wooden construction. For instance, Larasatie et al. [22] found that 19% of respondents familiar with Tall Wood Buildings (TWBs) expressed concerns about greater fire risk, which influenced their overall perception of wooden structures. Similarly, Kremer & Symmons [11] reported that over half of the Australian consumers surveyed were concerned about the fire safety, which they perceived as a critical drawback of Mass Timber Construction (MTC). This concern was echoed by Mahapatra et al. [25], who noted that construction professionals in Germany, Sweden, and the UK held negative perceptions regarding the engineering properties of wood, with fire safety being a recurring issue.

Further, Mallo & Espinoza [19] revealed that U.S. architects, while generally positive about Cross-Laminated Timber (CLT), raised concerns about its fire performance, which contributed to their hesitation in adopting CLT in future projects. Nyrud et al. [29] also identified fire safety as the top concern among citizens in seven European countries, with respondents consistently ranking it as the most important factor influencing their preference for or against living in MSWBs. This finding is supported by Gold & Rubik [35], who found that German consumers held persistent negative views about timber's fire resistance, which hindered the adoption of timber frame houses despite their positive associations with well-being and eco-friendliness. Similarly, Franzini et al. [57] noted that Finnish municipal civil servants perceived concrete multi-story buildings as less susceptible to fire compared to wooden ones, which influenced their preferences in urban development projects. These findings are further corroborated by Roos et al. [36], who found that urban residents in Finland and Sweden valued quality and design more than rural residents, with fire safety being a key quality concern that negatively impacted their preference for wooden construction materials.

Viholainen et al. [48] observed that Finnish homeowners initially expressed concerns about fire safety when moving into timber-framed homes; however, these concerns gradually diminished as they developed trust in modern safety measures over time. This indicates that fears about fire safety in wooden buildings are often based on misconceptions rather than factual risks. So, it is crucial to address these misconceptions through targeted educational campaigns and clear communication strategies that highlight the advanced safety features and reliability of modern wooden construction.

Theme 3: Human Health and Well-Being

Human health and well-being emerge as significant themes in the discourse on MSWBs, with studies highlighting the positive perceptions of wood as a building material for creating healthier built environments. For instance, Gold & Rubik [35] found that German consumers strongly associated timber with well-being, aesthetics, and eco-friendliness, valuing timber frame houses for their living comfort and health benefits. Similarly, Conroy et al. [15] revealed that 91% of architects on the U.S. West Coast perceived wood as a renewable material that positively contributes to indoor thermal comfort, aesthetics, and connection with nature.

Further, Harju & Lähtinen [56] emphasized that Finnish consumers highly valued the health benefits and coziness of wooden building products, particularly those with a strong consciousness for sustainable consumption. This aligns with Viholainen et al. [48], who observed that homeowners appreciated the pleasant soundscape and natural ambiance of

timber-framed homes, which contributed to their overall well-being after living in them for a year. Additionally, Nyrud et al. [29] identified a healthy indoor environment as one of the key factors influencing citizens' preferences for MSWBs across seven European countries, underscoring the growing recognition of wood's role in promoting health and comfort.

These findings collectively suggest that wood is widely perceived as a material that enhances human health and well-being, offering benefits such as improved indoor air quality, thermal comfort, and psychological well-being. By emphasizing the health and well-being advantages of MSWBs, wooden construction can be better aligned with the growing demand for sustainable and health-conscious living environments.

Theme 4: Structural Durability

Structural durability is a recurring theme in the discussion of MSWBs, with studies revealing mixed perceptions about the long-term performance and resilience of wood as a construction material. For example, Kremer & Symmons [11] found that over half of the Australian consumers surveyed expressed concerns about the durability of timber, particularly in relation to moisture vulnerability. Similarly, Mahapatra et al. [25] noted that construction professionals in Germany, Sweden, and the UK held negative perceptions regarding the engineering properties of wood, often questioning its structural soundness and longevity compared to traditional materials like concrete. Gold & Rubik [35] further highlighted that German consumers held persistent negative views about timber's durability and stability, perceiving timber frame houses as requiring high maintenance and being less robust over time.

However, Viholainen et al. [48] offered a contrasting perspective, showing that Finnish homeowners who lived in timber-framed homes for a year reported minimal issues with structural durability. Additionally, Nyrud et al. [29] identified solidity and durability as key factors influencing citizens' preferences for MSWBs across seven European countries, indicating that while concerns exist, there is also recognition of wood's potential when properly engineered and maintained.

Theme 5: Market and Costs

Market acceptance and cost considerations are also critical themes in the adoption of MSWBs, with studies highlighting both the economic challenges and opportunities associated with wooden construction. For instance, Kremer & Symmons [11] found that Australian industry stakeholders perceived Mass Timber Construction (MTC) as attracting higher premiums, which they viewed as a potential barrier to its widespread adoption. Similarly, Mahapatra et al. [25] noted that construction professionals in Germany, Sweden, and the UK often cited higher costs as a significant obstacle to the market growth of wood-frame multi-story buildings, despite the favorable conditions for innovation in Sweden.

Franzini et al. [57] further emphasized that Finnish municipal civil servants viewed concrete multi-story buildings as less expensive to build and maintain compared to wooden ones, which influenced their preferences in urban development projects. This perception of higher costs was also observed in the study by Mallo & Espinoza [19], who found that U.S. architects raised concerns about the post-construction maintenance costs of CLT, contributing to their hesitation in adopting it for commercial projects.

On the other hand, Toppinen et al. [47] highlighted the potential for cost savings in wooden construction through faster on-site assembly and higher levels of prefabrication, which can reduce construction time and labor costs. This aligns with Roos et al. [36], who found that urban residents in Finland and Sweden valued quality and design over material costs, suggesting that market acceptance of MSWBs could be improved by emphasizing their aesthetic and environmental benefits. Additionally, Kylkilahti et al. [54] revealed that students with frugal and responsible consumption styles were willing to pay a premium

for sustainable housing solutions like MSWBs, indicating a growing market segment that values sustainability over cost.

5. Discussion

5.1. Concrete, Steel, and Wood as Building Materials

Concrete and steel have long dominated the global construction industry, serving as the common preferred materials in both residential and commercial buildings. Their basic ingredients are inexpensive and easy to obtain, and can be molded into almost any shape to give structures the size, strength, and characteristics they need [49,58]. Concrete and steel are perceived to have compressive strength, fire resistance, durability, and versatility, and are believed to withstand heavy loads for centuries, while wood is often associated with less structural durability, being vulnerable to fire, moisture, and decay [50]. Modern preservative treatments and engineered detailing can effectively mitigate these risks, yet public and industry awareness of these advances remains limited, and many still perceive wood as inherently vulnerable to environmental factors [51].

To better characterize wood's durability, it is essential to consider how regional climatic conditions and biological pressures interact with wood's inherent properties. Due to its hygroscopic nature, wood becomes prone to structural variations and mold growth as the moisture content increases [59]. In humid tropical regions, for example, wood may be more susceptible to decay due to increased moisture and the presence of xylophagous agents [60]. In contrast, colder or drier climates may slow biological degradation but introduce risks like shrinkage or cracking due to moisture loss [59,60]. Thus, the suitability of wood for structural applications depends not only on its structure, but also on how it responds to local environmental stressors [61,62]. Understanding these interactions is crucial for selecting appropriate wood types and treatments for each region, and for justifying the use of wood alongside or in place of conventional materials like concrete and steel to the consumers.

5.2. Contradictory Perceptions and Research Gaps

The five themes—environmental sustainability, human health and well-being, fire safety, structural durability, and market and costs—were frequently emphasized in reviewed studies and represented the most significant concerns and priorities of consumers, professionals, and policymakers. Yet these themes often reveal internal contradictions that complicate public acceptance of multi-story wood buildings (MSWBs). Conflicting perceptions can be seen in the emotional and aesthetic appeal versus concerns about performance in critical areas such as fire safety, moisture resistance, and structural durability [22,25,29,52–54].

While many consumers associate wood with warmth, natural ambiance, and improved well-being [15,35,36,54,63], doubts persist regarding fire safety, moisture vulnerability, and long-term structural reliability [22,29,52,53]. Even when informed about fire code compliance and predictable charring behavior, respondents often remain skeptical of wood fire performance [64]. These fears tend to be amplified in regions where mass timber construction is less common [65–67]. Cost perceptions further complicate adoption. Some professionals view mass timber as costly due to custom fabrication and supply chain bottlenecks [19,55], whereas others emphasize its potential for savings through prefabrication, reduced on-site labor, and operational efficiencies [19,27]. Moreover, some consumers appear willing to prioritize sustainability over price, particularly if environmental benefits and product quality are effectively communicated [36,54].

Although many studies underscored strong public appreciation for wood's environmental benefits, such as carbon sequestration, renewability, and a low ecological footprint [12,15,25,29,35], concerns about deforestation and the sustainability of large-scale

timber use persist [12,15,35,54]. These concerns reflect a broader uncertainty about whether increased timber use can be scaled responsibly without compromising forest health or biodiversity. This highlights a need for education on sustainable forestry practices, including those supported by certification systems such as the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI), among many others [68]. These certification systems are designed to ensure that timber is sourced in ways that maintain forest biodiversity, protect ecosystems, and uphold the rights of indigenous and local communities [69].

Studies have shown that forest certification can enhance transparency, traceability, and stakeholder trust, thus contributing to increased consumer acceptance and market value [70,71]. However, challenges remain, including inconsistent implementation across regions, limited accessibility for small landowners, and varying levels of public awareness and understanding of what these certifications truly represent [72,73]. Additionally, the relatively high costs and administrative complexity of obtaining and maintaining certification can act as significant barriers, particularly for small-scale forest owners and businesses operating in resource-constrained settings [74].

Growing consumer preference for certified timber and the willingness to pay a premium for sustainably sourced wood suggest strong potential for targeted outreach and market transformation [68]. Education on sustainable forestry practices can take various forms, targeting different stakeholders involved in the construction and design of multi-story wood buildings, to potential consumers residing in such buildings. Workshops and seminars can be organized to raise awareness about the benefits of certified timber, emphasizing its role in promoting environmental sustainability and mitigating deforestation concerns. Incorporating studies that show how sustainable forestry practices and certified wood used in the construction of multi-story wood buildings can minimize the impacts on the environment will illustrate the practical applications and advantages of these materials [75]. Additionally, integrating sustainable forestry education into curriculum can equip future professionals with the knowledge to advocate for the responsible sourcing of timber [51,72].

For end-user consumers, public awareness campaigns can focus on the importance of choosing certified wood products in sustainable construction, highlighting the environmental and social benefits associated with certification schemes. By fostering a deeper understanding of the certification processes and the implications of timber sourcing, stakeholders can make informed decisions that align with their values, ultimately enhancing the market demand for certified timber in multi-story wood construction [27,53,69].

The carbon advantages of MSWBs have the potential to be valued as a carbon offset [76]. The carbon benefit of mass timber construction projects, including avoided emissions and carbon storage, is estimated to be worth millions of dollars. In the U.S., Georgia has been a pioneer in this effort by establishing a carbon registry program that incentivizes sustainable building practices through carbon credits, aiming to enhance both the state's environment and economy concurrently [77]. However, it should also be effectively communicated that mass timber is a custom-made product designed for specific construction tasks [78]. The supply chain for mass timber involves multiple stakeholders, including tree farmers, loggers, mill owners, architects, engineers, project managers, manufacturers (e.g., connectors, insulation, siding), and construction workers [79].

Studies have shown that misconceptions regarding MSWBs are shaped by deeply rooted psychological, cultural, and contextual biases [11,35,53]. The persistence of these misconceptions, even when credible information is available, reveals a critical research gap in proper communication and awareness. Additionally, most of the reviewed studies emphasize the need for effective communication to address these contradictory beliefs and reinforce positive perceptions of MSWBs. For instance, Larasatie et al. [12] highlighted the

need for effective messaging to educate those unfamiliar with tall wood buildings, while Kremer & Symmons [11] stressed clear communication to counter prejudices about timber durability. Similarly, Gold & Rubik [35] and Nyrud et al. [29] advocated for educational campaigns to address concerns about fire safety and promote environmental benefits. These insights align with this study's results, highlighting the role of strategic communication in improving public acceptance and advancing sustainable construction.

5.3. Perceptions from Underrepresented Regions

The scientific literature on MSWBs adoption across the world shows a strong geographical skew. Most literature is focused on Europe (70–80%), followed by North America (15–20%), Oceania (5–10%), and Asia (1%) [80,81]. Similarly, existing literature on engineered wood or mass timber construction—the technology that makes MSWBs possible—remains heavily concentrated in Western regions, particularly Europe, North America, and Australia [12,29,53,54]. This regional bias likely stems from earlier adoption, a longer history of engineered wood development, and more robust policy support in the markets [65,66,82].

In recent years, however, several Asian countries, including Japan, South Korea, China, and Singapore, have shown growing interest in promoting mass timber as a sustainable building solution [83,84]. Despite these initiatives, consumer awareness and academic exploration of public perceptions in these regions remain relatively limited compared to the extensive body of research produced by European and North American scholars [65]. Much of the existing research in Asia has focused on the technical feasibility of MSWBs [85–88], leaving perceptual and behavioral dimensions underexamined. This limited focus may reflect the novelty of MSWB technologies in Asia, where public familiarity with timber construction, particularly for mid- to high-rise buildings, is still emerging [66]. Achieving a truly global understanding of MSWB acceptance requires integrating these regional and underrepresented perspectives [66].

Despite the limited number of studies, a few offer valuable insights that contribute to a broader understanding of perceptions. For instance, Wong et al. [82] surveyed industry practitioners in South-East Asia and found significantly lower familiarity with Mass Engineered Timber (MET) compared to Western counterparts. Respondents expressed concerns over fire resistance, water durability, and the perceived unsuitability of timber for high-rise applications. Similarly, Zhang et al. [65] compared consumer attitudes between China and Japan towards timber as a construction material and found that consumers from both countries have shared skepticism about fire resistance, acoustic insulation, and durability. Respondents also expressed uncertainty about the environmental benefits of timber construction, despite valuing its connection to nature and perceived health benefits. These results echo Hu et al. [89], who documented persistent prejudices in China regarding timber-frame houses' resistance to fire, durability, and stability. In Singapore, Low et al. [90] reported that construction professionals viewed cost as a major barrier to MET adoption.

In another region, such as South America, Encinas et al. [91] found that end-users in a Chilean forest city held persistent concerns about wood's durability, fire resistance, and maintenance costs. Similarly, Zaldumbide et al. [92] reported that Ecuadorian professionals expressed concerns about timber production, humidity, and pest issues as key barriers, while noting that fire risk was perceived as lower than in other construction methods.

Taken together, the findings suggest that the public and professional concerns about MSWBs are somewhat consistent across geographic regions, including those where adoption is still low. The misconceptions and barriers identified in Asian contexts, particularly regarding fire safety, durability, and cost, largely parallel those seen in Western studies. This suggests that, regardless of geography, perceptions of MSWBs are shaped by a shared set of practical and psychological considerations.

5.4. Research Impacts

Over the past decade, the field of MSWBs, constructed using mass timber and engineered wood products, has witnessed significant progress in materials, components, and building systems. Emerging policy frameworks and technological innovations are also playing a pivotal role in further strengthening and advancing this sector. In the United States, initiatives like the federal Mass Timber Competition, the inclusion of mass timber buildings in the International Building Code (IBC), and state-level carbon credit programs (e.g., Georgia's carbon registry) signal growing institutional support for sustainable wood construction. The IBC permits mass timber buildings up to 18 stories, provided they meet stringent fire resistance criteria [93]. Similar momentum can be seen in countries like Canada, Australia, China, and Japan, with supportive policies and subsidies. These policies not only create economic incentives but also can help to standardize safety and quality regulations.

In parallel, innovations in engineered wood materials and systems are directly addressing long-standing concerns around safety, performance, and efficiency. For example, CLT (a mass timber product) panels are now designed with predictable charring behavior, tested to meet three-hour fire resistance ratings [94]. Intumescent coatings with microencapsulated flame retardants (e.g., ammonium polyphosphate) have demonstrated enhanced fire and moisture resistance while maintaining wood's aesthetic qualities [95]. These benefits are complemented by the visual and biophilic qualities of timber interiors, which highlight the natural warmth and aesthetic appeal of mass timber spaces. In addition to improved health and well-being outcomes [3,96,97], mass timber buildings have also been reported to reduce construction time by 25% to 40% compared to traditional concrete structures, with only marginal differences in preliminary costs [98]. The Natural Hazards Engineering Research Infrastructure (NHERI) Tall Wood Project has further validated the seismic and structural performance of CLT, demonstrating only insignificant structural damage to a 10-story mass timber building following simulated magnitude 7.7 earthquakes [99].

The practical and aesthetic potential of MSWB design is exemplified by Figure 2, which shows Adohi Hall—a 202,027 square foot multi-story student residential building at the University of Arkansas at Fayetteville, that utilizes mass timber extensively in its structure. Adohi is an (Indigenous) Cherokee word for "woods." Moreover, the interior design of such buildings often capitalizes on timber's biophilic appeal and warmth, contributing to user well-being and visual comfort. Figure 3 highlights these qualities, demonstrating how exposed wood surfaces enhance both the indoor environment and the occupant's connection to nature.

Despite these technical advances, a critical gap remains: the growing body of evidence is not reaching the broader public- or in many cases, even key industry stakeholders [19,25,55]. Misconceptions regarding fire safety, structural durability, and cost persist in regions where engineered timber is relatively novel (e.g., parts of Asia and South America) as well as in regions with longer histories of mass timber use (e.g., Europe, US, and Canada) [29,67,89,100]. This persistent disconnect highlights the urgent need for strategic communication frameworks that translate technical knowledge into relatable, culturally appropriate messages. Effective messaging strategies can address these misconceptions and shape positive opinions if the audiences are open to new information [23,101]. Social media campaigns and digital platforms have proven effective at shifting public perceptions when content is frequent, interactive, and includes visual elements [102]. However, this may exclude older adults with lower internet engagement [103] and people with less internet access. Therefore, communication strategies for MSWBs should be tailored according to the target group's demographics and regions. For future research, experimental studies can offer a strong potential strategy for targeted communication. A study on wood products preference has shown that targeted messaging can change people's perception [26]. The perceptions of young millennials towards CLT changed after they were subjected to targeted information.



Figure 2. Adohi Hall at the University of Arkansas at Fayetteville (Courtesy: University of Arkansas at Fayetteville, Division of Student Affairs, University Housing).



Figure 3. Interior of Adohi Hall at the University of Arkansas at Fayetteville, showcasing the exposed mass timber elements (Courtesy: University of Arkansas at Fayetteville, Division of Student Affairs, University Housing).

To further enhance adoption of MSWBs as an innovative construction technology, insights from established theories such as innovation diffusion and technology acceptance are particularly relevant [104,105]. The diffusion of innovations theory [104] states that an innovation must be widely adopted to become successful. It provides a framework to understand how, why, and at what rate new ideas, technologies, or practices spread through a social system. Similarly, MSWB's adoption depends on key influencers, such as architects, engineers, building developers, and policy makers, promoting its virtues to achieve mainstream acceptance. Further, the Unified Theory of Acceptance and Use of Technology (UTAUT) [105] suggests that users adopt technology when they believe it will help them, find it easy to use, feel encouraged by others, and have the resources to make it work. For MSWBs, barriers such as doubts about durability, fire resistance, or insufficient facilitating conditions (e.g., lack of proper communication) can hinder adoption. Moore's Crossing the Chasm [106] explains that high-tech products face a critical gap when moving from visionary early adopters—who embrace innovation—to the pragmatic early majority, who need proven solutions before buying. Moore recommends targeting a focused niche, delivering a whole-product solution, and using reference customers to build credibility and drive mainstream adoption. For MSWBs, this means identifying and convincing key influencers (e.g., architects and policymakers as opinion leaders) within targeted niches (e.g., sustainable urban housing), using their social network status to influence broader adoption and bridge the divide between visionary early users and pragmatic majorities.

Drawing on the Rogers' Diffusion of Innovations, the UTAUT, and Moore's Crossing the Chasm, key barriers to MSWB adoption include perceived complexity (e.g., concerns about fire safety, durability, and forest degradation) and low awareness of benefits. To overcome these barriers, strategies should focus on engaging key influencers such as architects, engineers, building developers, and policymakers, whose social network influence can drive broader acceptance by demonstrating MSWB reliability and sustainability. Additionally, adopting Moore's "whole product" approach, integrating comprehensive solutions like regulatory support, certified timber sourcing, and visible case studies (e.g., Adohi Hall), can bridge the chasm between early adopters and the early majority, ensuring the mainstream. Together, these frameworks offer a comprehensive lens for understanding how new technologies, such as MSWBs, are perceived and adopted by public.

6. Conclusions

This scoping review synthesized 20 peer-reviewed articles to explore public perceptions of multi-story wood buildings (MSWBs), drawing from diverse geographical contexts including Europe (e.g., Finland, Sweden, Norway, Germany, Austria, Denmark, and the UK), the United States (particularly the Pacific Northwest and West Coast), and Australia, with emerging insights from underrepresented regions such as Asia (e.g., China, Japan, South Korea, Singapore) and South America (e.g., Chile, Ecuador). The analysis revealed five key themes shaping perceptions: environmental sustainability, fire safety, human health and well-being, structural durability, and market costs. These themes underscore a complex interplay of enthusiasm and skepticism, offering targeted opportunities to enhance MSWB's adoption as a sustainable alternative to emissions-intensive materials like concrete and steel.

Across the themes, positive perceptions were prominent in environmental sustainability, where respondents consistently valued wood's renewability, carbon sequestration, and beautiful aesthetics. In human health and well-being, wood was associated with improved indoor air quality, thermal comfort, and psychological benefits like a connection to nature. However, negative views dominated in fire safety and structural durability, with over half of Australian, European, as well as Asian respondents expressing concerns

about fire risk and moisture vulnerability. Market costs also emerged as a barrier, with respondents citing higher upfront premiums and maintenance perceptions, though prefabrication advantages reduce construction time and labor costs. In underrepresented regions like Asia and South America, similar concerns about fire resistance, durability, and costs persisted, often compounded by lower familiarity. Yet, shared appreciation for wood's natural and health benefits suggested potential. These findings convey a clear message for better understanding wood's role in structural construction [27,87,107].

This study provides actionable insights for policymakers and real estate developers by highlighting the key themes in public perceptions surrounding MSWBs: fire safety, costs, structural durability, human health, and environmental sustainability. By understanding these themes, stakeholders can develop targeted communication strategies, craft evidence-based messages, and implement policies that address these specific barriers. For instance, emphasizing the fire-resistant properties of engineered wood, the long-term cost benefits, or the carbon sequestration and stress-reducing potential of wood can help shift public opinion and accelerate market adoption.

While communication strategies are essential, the 70:20:10 learning model highlights that substantial shifts in perceptions and behaviors are more likely through practical, on-the-job experiences (70%) and peer interactions (20%), rather than formal information alone (10%) [108]. This suggests the need for hands—on demonstrations like building tours or pilot projects to build familiarity. Similarly, Klein's Recognition Primed Decision-Making model [109], as popularized in Gladwell's "Blink," [110] indicates that stakeholders often rely on past experiences for quick decisions in high-stakes contexts, so providing real-world experiences like building tours or visits can provide people with much confidence in choosing to live in a MSWB. Future research could explore these approaches, such as experimental studies testing peer-led workshops or virtual reality experiences of MSWBs, to more effectively overcome entrenched concerns and promote adoption across regions and demographics.

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Appendix A

Table A1. 20 articles population.

Authors and Study Locations	Sample Size	Aim	Methods	Analysis	Key Findings
Conroy et al. [15]—United States West Coast (California, Oregon, and Washington)	533 Architects	To assess architects' views on wood product sustainability, health impacts, and familiarity with sustainable certifications.	Quantitative study using an online questionnaire administered through Qualtrics	Descriptive Statistics, one-way ANOVA	91% viewed wood as renewable. Concerns about forest degradation. Wood enhances aesthetics, thermal comfort, and air quality.
Franzini et al. [57]—Finland	11 civil servants	To explore municipal civil servants' perceptions of wooden multi-story construction (WMC) and to understand how they perceive their role in promoting WMC in urban development.	Qualitative approach using semi-structured interviews	Qualitative Content Analysis (QCA)	Saw WMC as a sustainable solution but felt limited by the lack of political directives and support from higher authorities. Expressed a need for more information and better communication with end-users to understand housing desires.
Franzini et al. [55]—Finland	273 Civil Servants	To compare perceptions of wooden vs. concrete multi-story buildings; examine the influence of background factors.	Quantitative study using an online survey	Mean comparisons, t-tests, ANOVA	Wooden buildings were seen as eco-friendly and recyclable. Concrete was viewed as cheaper and fire-resistant. Planners were more positive than managers.
Gold and Rubik [35]—Germany	1004 respondents	To explore consumer views on timber and timber frame houses and assess prejudices and decision-making criteria.	Quantitatively evaluated a telephone survey	Univariate descriptive analysis, socio-demographic correlations	Timber was valued for its comfort and eco-friendliness. Persistent concerns about fire resistance and durability. Soft criteria like living comfort and health influence choices.

Table A1. *Cont.*

Authors and Study Locations	Sample Size	Aim	Methods	Analysis	Key Findings
Harju & Lähtinen [56]—Finland	256 respondents	To examine perceptions of wooden building product quality and its link to sustainable consumption consciousness.	Quantitative survey with paper and electronic options.	Exploratory Factor Analysis, Mann–Whitney U test	Wood quality was valued for its longevity, health, and coziness. Sustainable consumers appreciate wooden buildings more.
Høibø et al. [24]—Norway	503 respondents	To investigate material preferences in urban housing, focusing on wood, durability, and environmental concerns.	Quantitative study using a web-based survey	Logistic regression models	Concrete was preferred as a structural material. Wood was the least preferred because of durability concerns. Evolving environmental attitudes can boost wood cladding preference.
Kim et al. [53]—Austria, Denmark, Germany, Finland, Norway, Sweden, and the United Kingdom	7056 respondents	To quantify factors influencing intent to live in wooden multi-story buildings and compare them across countries.	Quantitative survey through a consumer panel approach	Country-specific Structural Equation Modeling (SEM) and Theory of Planned Behavior (TPB)	Attitudes drive intent across countries. Subjective norms were less relevant in Austria, Germany Perceived control varies by country.
Kremer & Symmons [11]—Australia	281 Survey, 9 Interviews	To identify psychological barriers to mass timber construction uptake and explore consumer and stakeholder views.	Mixed methods: quantitative survey, qualitative interviews	SPSS 22 for survey; coding for interviews	Sustainability was valued in purchasing. Durability and fire safety concerns. Stakeholders considered that the technology attracts higher premiums. Insurance companies showed conservative attitudes.

Table A1. *Cont.*

Authors and Study Locations	Sample Size	Aim	Methods	Analysis	Key Findings
Kylkilahti et al. [54]—Norway	531 Students	To explore students' views on wooden multi-story buildings and link them to consumption styles.	Quantitative survey via Google Form	Descriptive statistics, cluster analysis, ANOVA	Aesthetic appeal was high among frugal students. Familiarity reduces skepticism. Thoughtful spenders and casual frugal willing to pay a premium for sustainable housing.
Mallo & Espinoza [19]—U.S.	351 Architecture Firms	To assess awareness, perceptions, and willingness to adopt Cross-Laminated Timber among architects.	Quantitative survey using an online consumer panel	Descriptive statistics, chi-square tests	Low CLT awareness (4.3% very familiar) Positive environmental and structural views Concerns about post-construction maintenance and fire performance. Familiarity boosts adoption.
Lähtinen et al. [111]—Denmark, Finland, Norway, and Sweden	2191 respondents	To explore housing values and prejudices against wooden homes in Nordic countries.	Quantitative survey via consumer panel	Exploratory Factor Analysis, Binary Logistic Regression	Urban lifestyle linked to wood prejudice Aesthetics and natural milieus reduce prejudice Urban consumers were most skeptical.
Larasatie et al. [12]—U.S. Pacific Northwest (Portland, Oregon, and Seattle, Washington, metropolitan areas)	27 Pilot Interviews and 502 survey respondents	To compare familiarity with Tall Wood Buildings and inform communication strategies.	Mixed methods: interviews and online survey	Qualitative thematic analysis, bivariate statistical tests	19% of respondents were familiar with TWBs. Seen as aesthetic and renewable Concerns about fire, maintenance, and deforestation. Familiar respondents were more positive.

Table A1. *Cont.*

Authors and Study Locations	Sample Size	Aim	Methods	Analysis	Key Findings
Mahapatra et al. [25]—Germany, Sweden and the UK	Not explicitly stated (data collected from secondary sources)	To analyze regulations, perceptions, and promotions for wood-frame multi-story buildings.	Qualitative secondary data analysis	Descriptive analysis, cross-country comparison	Sweden was most favorable for wood construction Professionals were skeptical of wood engineering. Public perceptions vary by country.
Nyrud et al. [29]—Austria, Denmark, Finland, Germany, Norway, Sweden, United Kingdom	7007 respondents	To investigate awareness and preferences for multi-story wood buildings; identify influencing factors.	Quantitative study using an online questionnaire	Descriptive statistics	Fire safety, durability, and indoor environment were key concerns Fire safety was a top issue across countries.
Roos et al. [36]—Finland and Sweden	2017 respondents	To examine beliefs about environmental and climate impacts of wood construction.	Quantitative study using a web-based consumer panel survey	Exploratory Factor Analysis, Linear Regression	Positive climate beliefs were tied to Finnish, male, and older respondents. Biodiversity concerns were linked to urban, female, and younger groups.
Roos et al. [63]—Finland and Sweden	479 respondents	To analyze link between housing requirements and preferences for wooden vs. non-wooden materials.	Quantitative online survey via consumer panel	Exploratory Factor Analysis, Linear Regression	Wood preference was tied to sustainability. Quality concerns reduce preference. Urban dwellers value quality and design.
Schauerte [52]—Germany and Sweden	Germany: 31 Interviews, 229 Surveys; Sweden: 34 Interviews, 503 Surveys	To understand consumer perceptions of wooden multi-story houses.	Mixed methods: Interviews and Surveys	SPSS statistical analysis	Germans value environmental benefits. Swedish consumers were concerned about costs. National habitation affects perceptions.

Table A1. *Cont.*

Authors and Study Locations	Sample Size	Aim	Methods	Analysis	Key Findings
Toppinen et al. [47]—Finland and Sweden	23 Experts	To identify factors shaping wooden multi-story construction competitiveness.	Qualitative three-stage dissensus-based Delphi study (interviews and surveys).	Thematic Analysis	Education was key to improving adoption of wooden multi-story buildings. Positive consumer views face concrete cultural resistance.
Toppinen et al. [46]—Finland (three urban residential wooden multi-story construction projects)	15 Interviews	To analyze business and sustainability benefits in wooden multi-story construction ecosystems.	Qualitative semi-structured interviews	Thematic analysis	Carbon storage, faster construction Challenges include cost, awareness, and coordination issues among project actors.
Viholainen et al. [48]—Finland	7 Homeowners	To understand perceptions of wood before and after living in timber-framed homes.	Qualitative semi-structured interviews	Qualitative thematic analysis	Wood was initially seen as cozy, natural, and traditional but had concerns about fire safety and durability. Post-living appreciation for practical benefits. Fire concerns were minimal, with trust in modern safety features.

References

1. Huang, L.; Krigsvoll, G.; Johansen, F.; Liu, Y.; Zhang, X. Carbon Emission of Global Construction Sector. *Renew. Sustain. Energy Rev.* **2018**, *81*, 1906–1916. [CrossRef]
2. UNEP. *Global Status Report for Buildings and Construction: Towards a Zero-Emission, Efficient and Resilient Buildings and Construction Sector*; UNEP: Nairobi, Kenya, 2019.
3. Abergel, T.; Dean, B.; Dulac, J. *Towards a Zero-Emission, Efficient, and Resilient Buildings and Construction Sector*; United Nations Environment Programme: Nairobi, Kenya, 2017.
4. Estrella, E.; Belaro, C.; Promentilla, M.A. Retrofitting of Cement Plant with Carbon Capture Technology and Emissions Trading Scheme (ETS): An Integrated P-Graph and AHP Approach. *Chem. Eng. Trans.* **2023**, *103*, 397–402. [CrossRef]
5. Lehmann, S. Sustainable Construction for Urban Infill Development Using Engineered Massive Wood Panel Systems. *Sustainability* **2012**, *4*, 2707–2742. [CrossRef]
6. Churkina, G.; Organschi, A.; Reyer, C.P.O.; Ruff, A.; Vinke, K.; Liu, Z.; Reck, B.K.; Graedel, T.E.; Schellnhuber, H.J. Buildings as a Global Carbon Sink. *Nat. Sustain.* **2020**, *3*, 269–276. [CrossRef]
7. Ahmed, S.; Dharmapalan, V.; Jin, Z. A Subject Review on the Use of Mass Timber in the US Construction Industry. In Proceedings of the Construction Research Congress 2024, Des Moines, Iowa, 20–23 March 2024; American Society of Civil Engineers: Des Moines, IA, USA, 2024; pp. 287–295.
8. Brandner, R.; Flatscher, G.; Ringhofer, A.; Schickhofer, G.; Thiel, A. Cross Laminated Timber (CLT): Overview and Development. *Eur. J. Wood Prod.* **2016**, *74*, 331–351. [CrossRef]
9. Laguarda Mallo, M.F.; Espinoza, O.; Rodriguez Trujillo, V.; Buehlmann, U. Cross-Laminated Timber: Status and Research Needs in Europe. *BioResources* **2015**, *11*, 281–295. [CrossRef]
10. Oliver, C.; Nassar, N.; Lippke, B.; Mccarter, J. Carbon, Fossil Fuel, and Biodiversity Mitigation with Wood and Forests. *J. Sustain. For.* **2013**, *33*, 248–275. [CrossRef]
11. Kremer, P.; Symmons, M. *Overcoming Psychological Barriers to Widespread Acceptance of Mass Timber Construction in Australia*; Monash University: Melbourne, Australia, 2016.
12. Larasatie, P.; Guerrero, J.E.; Conroy, K.; Hall, T.E.; Hansen, E.; Needham, M.D. What Does the Public Believe about Tall Wood Buildings? An Exploratory Study in the US Pacific Northwest. *J. For.* **2018**, *116*, 429–436. [CrossRef]
13. Kozak, C. Sustainability of Multi-Story Wood Buildings. 2023. Available online: https://mau.diva-portal.org/smash/get/diva2:1794271/FULLTEXT02.pdf (accessed on 21 March 2025).
14. Bowyer, J.; Bratkovich, S.; Howe, J.; Fernholz, K.; Frank, M.; Hanessian, S.; Groot, H.; Pepke, E. *Modern Tall Wood Buildings: Opportunities for Innovation*; Dovetail Partners Outlook: Minneapolis, MN, USA, 2016.
15. Conroy, K.J.; Riggio, M.; Knowles, C. *Perceptions of the Environmental and Health Impacts of Wood Product Use in Buildings: A Survey among Architects on the United STATES West Coast*; BioProducts Business: Louisville, KY, USA, 2019.
16. Hemström, K.; Mahapatra, K.; Gustavsson, L. Architects' Perception of the Innovativeness of the Swedish Construction Industry. *Constr. Innov.* **2017**, *17*, 244–260. [CrossRef]
17. Knowles, C.; Theodoropoulos, C.; Griffin, C.; Allen, J. Oregon Design Professionals Views on Structural Building Products in Green Buildings: Implications for Wood. *Can. J. For. Res.* **2011**, *41*, 390–400. [CrossRef]
18. Kozak, R.; Cohen, D. Architects and Structural Engineers: An Examination of Wood Design and Use in Nonresidential Construction. *For. Prod. J.* **1999**, *49*, 37–46.
19. Mallo, M.F.L.; Espinoza, O. Awareness, Perceptions and Willingness to Adopt Cross-Laminated Timber by the Architecture Community in the United States. *J. Clean. Prod.* **2015**, *94*, 198–210. [CrossRef]
20. O'Connor, J.; Kozak, R.; Gaston, C.; Fell, D. Wood Use in Nonresidential Buildings: Opportunities and Barriers. *For. Prod. J.* **2004**, *54*, 19.
21. Bosman, R.; Rotmans, J. Transition Governance towards a Bioeconomy: A Comparison of Finland and The Netherlands. *Sustainability* **2016**, *8*, 1017. [CrossRef]
22. Larasatie, P.; Young, K.; Hansen, E. Concrete Cracks, Wood Burns: Competing Narratives in the Construction Sector. *Int. Wood Prod. J.* **2024**, *15*, 110–118. [CrossRef]
23. Cheung, K. Case Studies of Multi-Storey Wood-Frame Construction in USA. *Struct. Eng. Int.* **2008**, *18*, 118–121. [CrossRef]
24. Høibø, O.; Hansen, E.; Nybakk, E. Building Material Preferences with a Focus on Wood in Urban Housing: Durability and Environmental Impacts. *Can. J. For. Res.* **2015**, *45*, 1617–1627. [CrossRef]
25. Mahapatra, K.; Gustavsson, L.; Hemström, K. Multi-Storey Wood-Frame Buildings in GERMANY, Sweden and the UK. *Constr. Innov.* **2012**, *12*, 62–85. [CrossRef]
26. Montague, I.; Stout, K.; Shmulsky, R. Love It or Leave It: What do Millennials Really Think of Wood Products? *For. Prod. J.* **2021**, *71*, 150–160. [CrossRef]
27. Kremer, P.D.; Symmons, M.A. Mass Timber Construction as an Alternative to Concrete and Steel in the Australia Building Industry: A PESTEL Evaluation of the Potential. *Int. Wood Prod. J.* **2015**, *6*, 138–147. [CrossRef]

28. Menzemer, L.W.; Vad Karsten, M.M.; Gwynne, S.; Dragsted, A.; Ronchi, E. Public Perception of Fire safety and Risk of Timber Buildings. *Wood Mater. Sci. Eng.* **2025**, *20*, 755–768. [CrossRef]
29. Nyrud, A.Q.; Heltorp, K.M.A.; Roos, A.; Aguilar, F.X.; Lähtinen, K.; Viholainen, N.; Berghäll, S.; Toppinen, A.; Thorsen, B.J.; Kniivilä, M.; et al. Citizens' Knowledge of and Perceptions of Multi-Storey Wood Buildings in Seven European Countries. *Scand. J. For. Res.* **2024**, *39*, 8–19. [CrossRef]
30. Petruch, M.; Walcher, D. Timber for Future? Attitudes Towards Timber Construction by Young Millennials in Austria—Marketing Implications from a Representative Study. *J. Clean. Prod.* **2021**, *294*, 126324. [CrossRef]
31. Peters, M.D.J.; Marnie, C.; Colquhoun, H.; Garritty, C.M.; Hempel, S.; Horsley, T.; Langlois, E.V.; Lillie, E.; O'Brien, K.K.; Özge, T.; et al. Scoping Reviews: Reinforcing and Advancing the Methodology and Application. *Syst. Rev.* **2021**, *10*, 263. [CrossRef]
32. Munn, Z.; Peters, M.D.J.; Stern, C.; Tufanaru, C.; McArthur, A.; Aromataris, E. Systematic Review or Scoping Review? Guidance for Authors when Choosing Between a Systematic or Scoping Review Approach. *BMC Med. Res. Methodol* **2018**, *18*, 143. [CrossRef]
33. Peters, M.D.J.; Marnie, C.; Tricco, A.C.; Pollock, D.; Munn, Z.; Alexander, L.; McInerney, P.; Godfrey, C.M.; Khalil, H. Updated Methodological Guidance for the Conduct of Scoping Reviews. *JBI Evid. Synth.* **2020**, *18*, 2119–2126. [CrossRef]
34. Giorgio, B.; Blanchet, P.; Barlet, A. Social Representations of Mass Timber and Prefabricated Light-Frame Wood Construction for Multi-Story Housing: The Vision of Users in Quebec. *Buildings* **2022**, *12*, 2073. [CrossRef]
35. Gold, S.; Rubik, F. Consumer Attitudes Towards Timber as a Construction Material and Towards Timber Frame Houses—Selected Findings of a Representative Survey among the German Population. *J. Clean. Prod.* **2009**, *17*, 303–309. [CrossRef]
36. Roos, A.; Hurmekoski, E.; Häyrinen, L.; Jussila, J.; Lähtinen, K.; Mark-Herbert, C.; Nagy, E.; Toivonen, R.; Toppinen, A. Beliefs on Environmental Impact of Wood Construction. *Scand. J. For. Res.* **2023**, *38*, 49–57. [CrossRef]
37. Crooks, S.; Carter, G.; Wilson, C.B.; Wynne, L.; Stark, P.; Doumas, M.; Rodger, M.; O'Shea, E.; Mitchell, G. Exploring Public Perceptions and Awareness of Parkinson's Disease: A Scoping Review. *PLoS ONE* **2023**, *18*, e0291357. [CrossRef]
38. Samal, J. Women and Tuberculosis Care in India: A Scoping Review. *Egypt. J. Bronchol.* **2025**, *19*, 24. [CrossRef]
39. Kleij, F.M.V.D.; Lipnevich, A.A. Student Perceptions of Assessment Feedback: A Critical Scoping Review and Call for Research. *Educ. Asse. Eval. Acc.* **2021**, *33*, 345–373. [CrossRef]
40. Debrah, C.; Chan, A.P.C.; Darko, A. Green Finance Gap in Green Buildings: A Scoping Review and Future Research Needs. *Build. Environ.* **2022**, *207*, 108443. [CrossRef]
41. Tricco, A.C.; Lillie, E.; Zarin, W.; O'Brien, K.K.; Colquhoun, H.; Levac, D.; Moher, D.; Peters, M.D.J.; Horsley, T.; Weeks, L.; et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann. Intern. Med.* **2018**, *169*, 467–473. [CrossRef] [PubMed]
42. Horsley, T.; Dingwall, O.; Sampson, M. Examining Reference Lists to Find Relevant Studies for Systematic Reviews. Available online: https://www.cochrane.org/MR000026/METHOD_examining-reference-lists-to-find-relevant-studies-for-systematic-reviews (accessed on 21 March 2025).
43. Pollock, D.; Peters, M.D.J.; Khalil, H.; McInerney, P.; Alexander, L.; Tricco, A.C.; Evans, C.; Moraes, É.B.D.; Godfrey, C.M.; Pieper, D.; et al. Recommendations for the Extraction, Analysis, and Presentation of Results in Scoping Reviews. *JBI Evid. Synth.* **2023**, *21*, 520–532. [CrossRef] [PubMed]
44. Boyatzis, R.E. Transforming Qualitative Information: Thematic Analysis and Code Development. Available online: https://us.sagepub.com/en-us/nam/transforming-qualitative-information/book7714 (accessed on 21 March 2025).
45. Levac, D.; Colquhoun, H.; O'Brien, K.K. Scoping Studies: Advancing the Methodology. *Implement. Sci.* **2010**, *5*, 69. [CrossRef]
46. Toppinen, A.; Röhr, A.; Pätäri, S.; Lähtinen, K.; Toivonen, R. The Future of Wooden Multistory Construction in the Forest Bioeconomy—A Delphi Study from Finland and Sweden. *J. For. Econ.* **2017**, *31*, 3–10. [CrossRef]
47. Toppinen, A.; Aaltio, A.; Lähtinen, K.; Jussila, J.; Toivonen, R. "It all Depends on the Project"—A Business Ecosystem in Residential Wooden Multistory Construction in Finland. *Front. Built Environ.* **2022**, *8*, 1046954. [CrossRef]
48. Viholainen, N.; Kylkilahti, E.; Autio, M.; Toppinen, A. A Home Made of Wood: Consumer Experiences of Wooden Building Materials. *Int. J. Consum. Stud.* **2020**, *44*, 542–551. [CrossRef]
49. Deng, E.-F.; Zong, L.; Ding, Y.; Zhang, Z.; Zhang, J.-F.; Shi, F.-W.; Cai, L.-M.; Gao, S.-C. Seismic Performance of Mid-to-High Rise Modular Steel Construction—A Critical Review. *Thin-Walled Struct.* **2020**, *155*, 106924. [CrossRef]
50. Abed, J.; Rayburg, S.; Rodwell, J.; Neave, M. A Review of the Performance and Benefits of Mass Timber as an Alternative to Concrete and Steel for Improving the Sustainability of Structures. *Sustainability* **2022**, *14*, 5570. [CrossRef]
51. Nepal, P.; Prestemon, J.P.; Ganguly, I.; Kumar, V.; Bergman, R.D.; Poudyal, N.C. The Potential Use of Mass Timber in Mid-to High-Rise Construction and the Associated Carbon Benefits in the United States. *PLoS ONE* **2024**, *19*, e0298379. [CrossRef]
52. Schauerte, T. Consumer Perceptions on Wooden Multistory Houses: Segmenting international markets. In Proceedings of the International Convention of Society of Wood Science and Technology and United Nations Economic Commission for Europe—Timber Committee, Geneva, Switzerland, 11–14 October 2010.
53. Kim, D.; Franzini, F.; Jellesmark Thorsen, B.; Berghäll, S.; Aguilar, F.X. Greener Homes: Factors Underpinning Europeans' Intention to Live in Multi-Storey Wooden Buildings. *Sustain. Prod. Consum.* **2023**, *39*, 373–381. [CrossRef]

54. Kylkilahti, E.; Berghäll, S.; Autio, M.; Nurminen, J.; Toivonen, R.; Lähtinen, K.; Vihemäki, H.; Franzini, F.; Toppinen, A. A Consumer-Driven Bioeconomy in Housing? Combining Consumption Style with Students' Perceptions of the Use of Wood in Multi-Storey Buildings. *AMBIO A J. Hum. Environ.* **2020**, *49*, 1943–1957. [CrossRef]
55. Franzini, F.; Toivonen, R.; Toppinen, A. Why not wood? Benefits and Barriers of Wood as a Multistory Construction Material: Perceptions of Municipal Civil Servants from Finland. *Buildings* **2018**, *8*, 159. [CrossRef]
56. Harju, C.; Lähtinen, K. Perceptions of Wooden Interior Product Quality—Insights on Sustainability Views among Finnish Consumers. *Silva Fenn.* **2021**, *55*, 10605. [CrossRef]
57. Franzini, F.; Berghäll, S.; Toppinen, A.; Toivonen, R. Comparing wood versus concrete: An Explorative Study of Municipal Civil Servants' Beliefs about Multistory building Materials in Finland. *For. Prod. J.* **2021**, *71*, 65–76. [CrossRef]
58. Surahyo, A. *Concrete Construction: Practical Problems and Solutions*; Springer International Publishing: Cham, Switzerland, 2019; ISBN 978-3-030-10509-9.
59. Shirmohammadi, M.; Leggate, W.; Redman, A. Effects of Moisture Ingress and Egress on the Performance and Service Life of Mass Timber Products in Buildings: A Review. *Constr. Build. Mater.* **2021**, *290*, 123176. [CrossRef]
60. Campbell, A. Mass Timber in the Circular Economy: Paradigm in Practice? *Proc. Inst. Civ. Eng. Eng. Sustain.* **2018**, *172*, 141–152. [CrossRef]
61. Brambilla, A.; Gasparri, E. Mould Growth Models and Risk Sssessment for Emerging Timber Envelopes in Australia: A Comparative Study. *Buildings* **2021**, *11*, 261. [CrossRef]
62. Dietsch, P.; Gamper, A.; Merk, M.; Winter, S. *Building Climate—Long-Term Measurements to Determine the Effect on the Moisture Gradient in Large-Span Timber Structures*; Bundesamt für Bauwesen und Raumordnung: Bonn, Germany, 2014.
63. Roos, A.; Hoen, H.-F.; Aguilar, F.X.; Haapala, A.; Hurmekoski, E.; Jussila, J.; Lähtinen, K.; Mark-Herbert, C.; Nord, T.; Toivonen, R.; et al. Impact of Prospective Residents' Dwelling Requirements on Preferences for House Construction Materials. *Wood Mater. Sci. Eng.* **2023**, *18*, 1275–1284. [CrossRef]
64. Wallius, V.; Kunttu, J.; Hurmekoski, E.; Hujala, T.; Nyrud, A.Q.; Hoen, H.F. Attractiveness of Wood-Frame Multi-Storey Buildings in Seven European Countries: Consumer Segmentation and the Effect of fire Safety Information. *Silva Fenn.* **2024**, *58*, 23035. [CrossRef]
65. Zhang, T.; Hu, Q.; Dewancker, B.J.; Gao, W. Comparative Assessment of Consumer Attitudes to Timber as a Construction Material in China and Japan. *For. Prod. J.* **2024**, *74*, 165–177. [CrossRef]
66. Qian, Y.; Gunawardena, T.; Mendis, P.; Aye, L. Carbon Footprint Variability in Engineered Wood Products for Timber Buildings: A Systematic Review of Carbon Accounting Methodologies. *Sustainability* **2025**, *17*, 4804. [CrossRef]
67. Luo, W.; Mineo, K.; Matsushita, K.; Kanzaki, M. Consumer Willingness to Pay for Modern Wooden Structures: A Comparison Between China and Japan. *For. Policy Econ.* **2018**, *91*, 84–93. [CrossRef]
68. Larasatie, P.; Handrito, R.; Fitriastuti, T.; Sari, D. Who Prefers Legal Wood: Consumers with Utilitarian or Hedonic Shopping Values? *Forests* **2023**, *14*, 2163. [CrossRef]
69. Rametsteiner, E.; Oberwimmer, R.; Gschwandtl, I. Europeans and Wood: What Do Europeans Think about Wood and its Use? A Review of Consumer and Business Surveys in Europe. In Proceedings of the Ministerial Conference on the Protection of Forests in Europe (MCPFE), Warsaw, Poland, 5–7 November 2007.
70. Cashore, B.; Auld, G.; Newsom, D. *Governing Through Markets*; Yale University Press: New Haven, CT, USA, 2004; ISBN 978-0-300-10109-6.
71. Auld, G.; Gulbrandsen, L.H.; McDermott, C.L. Certification Schemes and the Impacts on Forests and Forestry. *Annu. Rev. Environ. Resour.* **2008**, *33*, 187–211. [CrossRef]
72. Gulbrandsen, L.H. Explaining Different Approaches to Voluntary Standards: A Study of Forest Certification Choices in Norway and Sweden. *J. Environ. Policy Plan.* **2005**, *7*, 43–59. [CrossRef]
73. Pattberg, P. What Role for Private Rule-Making in Global Environmental Governance? Analysing the Forest Stewardship Council (FSC). *Int. Env. Agreem.* **2005**, *5*, 175–189. [CrossRef]
74. Ma, Z.; Butler, B.J.; Kittredge, D.B.; Catanzaro, P. Factors Associated with Landowner Involvement in Forest Conservation Programs in the U.S.: Implications for Policy Design and Outreach. *Land Use Policy* **2012**, *29*, 53–61. [CrossRef]
75. Gullison, R. Does Forest Certification Conserve Biodiversity? *Oryx* **2003**, *37*, 153–165. [CrossRef]
76. Taylor, A.; Gu, H.; Nepal, P.; Bergman, R. *Carbon Credits for Mass Timber Construction*; BioProducts Business: Louisville, KY, USA, 2023.
77. Walker, M. Georgia Offers Carbon Credits for Mass Timber Projects. How It Works. Available online: https://www.macon.com/news/environment/article306480376.html (accessed on 25 May 2025).
78. Muszynski, L.; Larasatie, P.; Hansen, E. The Sensitive Question of Commoditization in the Mass Timber Panel Industry. In Proceedings of the Society of Wood Science and Technology International Convention, Kingscliff, Australia, 10–15 July 2022.
79. Muszynski, L.; Hansen, E.; Fernando, S.; Schwarzmann, G.; Rainer, J. *Insights into the Global Cross-Laminated Timber Industry*; BioProducts Business: Louisville, KY, USA, 2017; Volume 2.

80. CTBUH. *Special Issue: Tall Timber*; CTBUH: Chicago, IL, USA, 2022.
81. Svatoš-Ražnjević, H.; Orozco, L.; Menges, A. Advanced Timber Construction Industry: A Review of 350 Multi-Storey Timber Projects from 2000–2021. *Buildings* **2022**, *12*, 404. [CrossRef]
82. Wong, F.P.; Oldfield, P.; Osmond, P. Industry Perceptions of Mass Engineered Timber (MET) Construction: A Comparison of South-East Asia with Other Regions. *Archit. Eng. Des. Manag.* **2024**, *20*, 1543–1565. [CrossRef]
83. Central, W. *NTU Singapore: Asia's Largest Mass Timber Building*; Wood Central: Brisbane, Australia, 2023.
84. Jeong, T. *Boom in Large-Scale Wooden Building Construction Across South Korea*; Canada Wood Group: Vancouver, UK, 2024.
85. Pang, Y. Japan Continues to Invest in Mass Timber Structures | Panels & Furniture Asia. 2023. Available online: https://panelsfurnitureasia.com/japan-continues-to-invest-in-mass-timber-structures/ (accessed on 14 July 2025).
86. Tao, L. *China Unveils Groundbreaking Mass Timber Construction in Landmark Hospital Project*; Canada Wood Group: Vancouver, UK, 2024.
87. Chen, C.X.; Pierobon, F.; Jones, S.; Maples, I.; Gong, Y.; Ganguly, I. Comparative Life Cycle Assessment of Mass Timber and Concrete Residential Buildings: A Case Study in China. *Sustainability* **2021**, *14*, 144. [CrossRef]
88. Liu, Y.; Guo, H.; Sun, C.; Chang, W.-S. Assessing cross Laminated Timber (CLT) as an Alternative Material for Mid-Rise Residential Buildings in Cold Regions in China—A Life-Cycle Assessment Approach. *Sustainability* **2016**, *8*, 1047. [CrossRef]
89. Hu, Q.; Dewancker, B.; Zhang, T.; Wongbumru, T. Consumer Attitudes Towards Timber Frame Houses in China. *Procedia Soc. Behav. Sci.* **2016**, *216*, 841–849. [CrossRef]
90. Low, S.P.; Gao, S.; Ng, S.K. The Adoption of Mass-Engineered Timber (MET) in the Singapore Construction Industry: Barriers and Drivers. *J. Clean. Prod.* **2021**, *327*, 129430. [CrossRef]
91. Encinas, F.; Truffello, R.; Ubilla, M.; Aguirre-Nuñez, C.; Schueftan, A. Perceptions, Tensions, and Contradictions in Timber Construction: Insights from End-Users in a Chilean Forest City. *Buildings* **2024**, *14*, 2813. [CrossRef]
92. Zaldumbide, P.J.; Fuentes, E.I.; Guerra, M.A. Barriers to Introduce Mass Timber in Construction in Ecuador—Exploratory Study. *J. Build Tech.* **2024**, *6*, 44–55. [CrossRef]
93. IBC Chapter 6 Types of Construction—2021 International Building Code (IBC). Available online: https://codes.iccsafe.org/content/IBC2021P1/chapter-6-types-of-construction (accessed on 29 April 2025).
94. Woodworks. *Fire Design of Mass Timber Members: Code Applications, Construction Types and Fire Ratings*; Woodworks: Washington, DC, USA, 2019.
95. Hussain, A.; Landry, V.; Blanchet, P.; Hoang, D.-T.; Dagenais, C. Fire Performance of Intumescent Waterborne Coatings with Encapsulated APP for Wood Constructions. *Coatings* **2021**, *11*, 1272. [CrossRef]
96. FPInnovations. Wood and Human Health. Available online: https://library.fpinnovations.ca/viewer?file=%2Fmedia%2FWP%2F2862.pdf#page=1 (accessed on 11 November 2024).
97. Passarelli, R.N.; Koshihara, M. Mass timber system in Japan: Environmental and Economic Impact of a Mid-Story Residential Building. In Proceedings of the World Conference on Timber Engineering, Seoul, Republic of Korea, 20–23 August 2018.
98. Kremer, P.D.; Ritchie, L. *Understanding Costs and Identifying Value in Mass Timber Construction: Calculating the 'Total Cost of Project' (TCP)*; Monash University: Melbourne, Australia, 2018; Volume 1.
99. Pei, S.; Ryan, K.L.; Berman, J.W.; Van De Lindt, J.W.; Pryor, S.; Huang, D.; Wichman, S.; Busch, A.; Roser, W.; Wynn, S.L.; et al. Shake-Table Testing of a Full-Scale 10-Story Resilient Mass Timber Building. *J. Struct. Eng.* **2024**, *150*, 04024001. [CrossRef]
100. Schauerte, T. Identifying Product Attributes for Quality Function Deployment: Consumer Perceptions in the Case of Wooden Multi-Storey Houses. *Pro Ligno* **2013**, *9*, 773–779.
101. Lewandowsky, S.; Ecker, U.K.H.; Seifert, C.M.; Schwarz, N.; Cook, J. Misinformation and its Correction: Continued Influence and Successful Debiasing. *Psychol. Sci. Public Interest* **2012**, *13*, 106–131. [CrossRef] [PubMed]
102. Roberts-Lewis, S.; Baxter, H.; Mein, G.; Quirke-McFarlane, S.; Leggat, F.J.; Garner, H.; Powell, M.; White, S.; Bearne, L. Examining the Effectiveness of Social Media for the Dissemination of Research Evidence for Health and Social Care Practitioners: Systematic Review and Meta-Analysis. *J. Med. Internet Res.* **2024**, *26*, e51418. [CrossRef]
103. Xu, X.; Mei, Y.; Sun, Y.; Zhu, X. Analysis of the Effectiveness of Promotion Strategies of Social Platforms for the Elderly with Different Levels of Digital Literacy. *Appl. Sci.* **2021**, *11*, 4312. [CrossRef]
104. Rogers, E.M. *Diffusion of Innovations*, 3rd ed.; Free Press [u.a.]: New York, NY, USA, 1983; ISBN 978-0-02-926650-2.
105. Marikyan, D.; Papagiannidis, S. *Unified Theory of Acceptance and Use of Technology*; Newcastle University: Newcastle, UK, 2025.
106. Moore, G.A. *Crossing the Chasm, 3rd Edition: Marketing and Selling Disruptive Products to Mainstream Customers*; Harper Collins Publisher: New York, NY, USA, 2014.
107. Ahmed, S.; Arocho, I. Analysis of Cost Comparison and Effects of Change Orders During Construction: Study of a Mass Timber and a Concrete Building Project. *J. Build. Eng.* **2021**, *33*, 101856. [CrossRef]
108. Johnson, S.; Blackman, D.; Buick, F. The 70:20:10 Framework and the Transfer of Learning. *Hum. Resour. Dev. Q.* **2018**, *29*, 383–402. [CrossRef]

109. Klein, G. A Recognition Primed Decision (RPD) Model of Rapid Decision Making. In *Decision Making in Action: Models and Methods*; Ablex Publishing Corporation: New York, NY, USA, 1993; ISBN 978-0-89391-943-6.
110. Gladwell, M. *Blink: The Power of Thinking Without Thinking*; 1. Back Bay Trade pbk. ed.; Back Bay Books: New York, NY, USA, 2007; ISBN 978-0-316-01066-5.
111. Lähtinen, K.; Häyrinen, L.; Roos, A.; Toppinen, A.; Aguilar Cabezas, F.; Thorsen, B.; Hujala, T.; Nyrud, A.; Hoen, H. Consumer Housing Values and Prejudices Against Living in Wooden Homes in the Nordic Region. *Silva Fenn.* **2021**, *55*, 10503. [CrossRef]

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