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REVIEW PAPER

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WOOD AS AN ARCHITECTURAL MEDIUM: AESTHETICS, FUNCTION AND SOCIAL PERCEPTION FROM A HISTORICAL AND CONTEMPORARY PERSPECTIVE

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ABSTRACT

The objective of this article is to present the role of wood in contemporary architecture from the perspective of aesthetics, technology and social perception. The study is based on a review of literature from 2020 to 2025 (Scopus, Web of Science) and an analysis of the authors' own projects. Wood's natural texture and colour are conducive to creating friendly spaces rooted in tradition, while modern technologies enable its use in large, energy-efficient buildings. In social terms, this strengthens the identity of a place and openness to interaction, combining heritage with innovation. The conclusions emphasise the importance of wood as a key material for sustainable design, integrating aesthetic, technical and social values.

Keywords: wood in architecture, aesthetics of materials, wood construction technology, social perception, sustainable architecture, original designs

INTRODUCTION

Architecture may be defined as a constant effort to organise physical and symbolic space in a manner that meets human needs, their ideas about the world, and their relationship with their surroundings. In this process, material is not merely a means to an end, but becomes the designer's partner, a participant in the narrative of space. Wood, a material with a deep historical presence in the field of construction, possesses the capacity to be shaped and to shape meanings and experiences. The contemporary return to wood in architecture is not a coincidence. This approach is indicative of a broader ambition to align design with the principles of sensuality, sustainability and human-centredness.

The utilisation of wood in the construction of edifices for residential, occupational, commercial and communal purposes has a long-standing historical precedent that spans multiple centuries. Its historical presence is both widespread and diverse, ranging from rural dwellings to monumental public buildings. In ancient cultures, wooden architecture was instrumental in shaping the rhythm of everyday and festive life, providing a framework for social and cultural practices. The practice of craftsmanship, the concept of local identity and the organisation of space are inscribed in wood, thus transcending the purely functional understanding of a building. In the contemporary context, there is a resurgence of interest in these qualities,

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which is inextricably linked to the imperative to redefine the relationship between architecture and its context, as well as the symbiotic relationship between technology and cultural memory.

It is nevertheless important to acknowledge that wood is not the same material it was in the past. The advent of contemporary technologies has resulted in its transformation into an engineering material with the capacity to compete with concrete and steel in terms of both strength and scalability. The utilisation of innovative wood-based products facilitates the construction of large-scale, energy-efficient buildings that adhere to the principles of sustainable construction (Rilatupa, 2021; Kuzman & Sandberg, 2023). The contemporary utilisation of wood transcends nostalgia, becoming an articulation of modern architectural thought that responds to climate and social challenges.

Technological change has been accompanied by a transformation in the aesthetic impact of wood. In contemporary spaces characterised by glass, concrete and aluminium, wood is experiencing a renaissance as a material with a distinct visual and haptic character. The warmth of its colour, the diversity of its textures and its natural irregularity are conducive to evoking deeply sensual reactions. Research on the perception of materials indicates that wood evokes a sense of comfort, closeness and calm, especially in work and everyday environments (Dai, Li & Zhang, 2023; Zhu, Wang & Zhao, 2023). Nevertheless, the aesthetic qualities of wood are subject to cultural interpretations and historical changes and are influenced by the social context and the individual experiences of its users.

The material also exhibits a social dimension, which assumes particular significance during periods of search for connections and identity in urban spaces. As a natural material, it is subject to the effects of ageing and wear and tear, which results in the accumulation of traces of use. This process of deterioration and the subsequent patina that forms make the material a carrier of time and history. In the fields of adaptive and conservation architecture, as well as in projects grounded in local narratives, it functions as a conduit between the present and the past, thereby fostering a sense of continuity and belonging (Khimesara & Shah, 2024). Spaces constructed from wood are frequently perceived as more ‘familiar’, less anonymous, and conducive to a sense of closeness and shared experience of a particular locale.

In recent years, there has been a marked increase in interest in wooden structures in Poland and worldwide. The utilisation of cross- and glued-laminated timber (CLT, GLT) technologies facilitates the construction of multi-storey and multi-purpose buildings, thereby reducing the carbon footprint and ensuring high performance (Kuzman & Sandberg, 2023). The substantial increase in the number of new wooden buildings in Poland by over 50% between 2018 and 2022 serves to underscore the significance of this material in sustainable construction strategies (Rilatupa, 2021). The evolution of prefabrication and digital processing technologies has led to a significant expansion in the formal and aesthetic possibilities of wood as a medium in contemporary architecture, positioning it as one of the most dynamic materials in current design.

The findings outlined above necessitate an analysis of wood from three distinct perspectives, which will be expanded upon in this paper: aesthetic impact, function and technology, and social perception. The objective of this article is to demonstrate the evolution of the perception of wood as an architectural material, from its traditional application in construction to contemporary projects that integrate technological innovation with the imperative to create sustainable and meaningful spaces.

METHODOLOGY AND MATERIALS

The present study constitutes a problem-oriented review, the objective of which is to present the role of wood in contemporary architecture from an aesthetic, technological and social perspective. The analysis was conducted from the perspective of an architectural theorist and practitioner, which allows for the combination of reflections derived from scientific literature with design experience.

The material basis consists of two groups of sources. The initial group consists of scientific publications from 2020 to 2025, indexed in the Scopus and Web of Science databases, focusing on wooden architecture, novel technologies in wooden construction, the aesthetics of the material, and its social reception. The second category comprises observations and conclusions derived from design practice, encompassing both the authors' personal projects and the analysis of objects created within a broader national and international context. The authors' own projects were selected based on their functional diversity, application of engineered wood technologies, and representativeness for the Polish architectural context. This combination makes it possible to capture both the empirical and technological dimensions, as well as the design reflection resulting from the authors' professional experience. The central research problem concerns how contemporary architectural uses of wood integrate the aesthetic, technological, and social dimensions in sustainable design. This, in turn, enables a more comprehensive view of the analysed problem.

The review is thematic in nature. The individual issues have been grouped around three axes that are considered key to contemporary reflection on wood in architecture. The first of these aspects pertains to the aesthetic qualities and methodologies employed in shaping the visual and haptic perception of wood, along with its relationship to tradition. The second part of the paper is dedicated to examining the function and technology, with a particular focus on the evolution of the structural utilisation of materials in the context of advancements in engineering, prefabrication, and sustainable construction principles. The third aspect pertains to the social perception of wood, encompassing its role in fostering a sense of place, comfort, and connection with the environment.

The selection of materials was deliberate. It was considered good practice to give priority to publications that combined technical, aesthetic and cultural perspectives, as well as studies that took the Polish context into account in a broader international context. The analysis was based on a comparison of research findings with practical observations of the design process, which allows us to capture the complexity of the relationship between theory and practice.

CONTEMPORARY DIMENSIONS OF WOOD IN ARCHITECTURE

The contemporary use of wood in architecture can be considered a multidimensional phenomenon, in which aesthetics, technology, function and social perception intertwine. In recent years, this material has undergone a significant evolution, transitioning from a material deeply rooted in the tradition of craftsmanship to a highly processed engineering material used in projects of various scales and degrees of complexity. This transformation has been accompanied by a change in its role in the cultural landscape and in the awareness of users.

The analysis presented in this chapter is approached via three distinct perspectives. The initial issue pertains to the aesthetic impact of wood; that is to say, the manner in which its presence within a given space influences the visual and haptic perception, and the extent to which these properties can be manipulated during the design process. The second part of the paper addresses issues of function and technology, with a focus on the possibilities offered by new wood-based products, prefabrication, and materials engineering. The third perspective pertains to the social perception of wood, encompassing the manner in which users and communities interpret its significance, ascribe symbolic values to it, and associate it with a sense of place identity.

This approach enables us to consider wood not only as a building material but also as an architectural medium that contributes to the creation of meanings and experiences of space. The ensuing subsections are devoted to an examination of these three aspects, which collectively constitute the contemporary image of wood in 21st-century architecture.

Aesthetic effect of wood

The aesthetic impact of wood encompasses both visual and tactile sensations; its presence in architectural spaces has been shown to evoke feelings of warmth, tranquillity and a connection with nature. In the context of contemporary architecture, wood is notable for its ability to engender a more sensual and intimate atmosphere, thereby counterbalancing the use of cold, impersonal materials.

Empirical studies have confirmed that wood significantly influences the perception of comfort. In an experiment conducted within a climate chamber, participants assessed their thermal sensation after entering a room with wooden walls, compared to a room with uniform plaster walls. The findings indicated that wood facilitated more rapidly attaining thermal neutrality in comparison to conventional materials, though the statistical significance was not invariably evident. Nonetheless, the visual effect exerted a discernible influence on the subjective perception of space (Gravelle, Stenson, Fretz & Van Den Wymelenberg, 2025).

A number of studies have been conducted that have explored the impact of combining wood with other materials. The study found that wood was perceived as the 'warmest' material, and its increased presence enhanced the feeling of warmth. On top of this, employing light colours and integrating diverse materials served to enhance the visual appeal of the furnishings. In contrast, combining wood with fabric resulted in diminishing its initial appeal (Kwak & Choi, 2025).

The subsequent analysis concentrated on the perception of untreated wooden façades, a characteristic of Scandinavian and German architecture. The findings indicated that preferences concerning the extent of wood ageing (e.g. the manifestation of grey colouration) exhibited variations in accordance with the nation and the personality traits of the respondents. Individuals who were introverted, conscientious, younger in age and possessed higher levels of education demonstrated a greater propensity to accept the raw, natural appearance of wood (Gustavsen et al., 2025).

This research has a direct impact on the design of both interiors and façades. The aesthetic impact of wood is contingent on its colour, texture, surface treatment and combination with other materials. This approach facilitates establishing a convivial and recognisable ambience, or a more pronounced sense of local heritage and convention.

Function and technology of wood

The contemporary use of wood in architecture is undergoing rapid development, driven by technological advances and increasing demand for sustainable construction methods. The utilisation of engineered wood solutions, such as CLT and dowelled cross-laminated timber (DCLT), facilitates the construction of multi-storey buildings that exhibit high performance and a low carbon footprint. It is becoming increasingly evident that they are becoming regarded as a viable alternative to concrete and steel in both residential and public utility projects.

There has been a clear rise in this segment in Poland. According to some studies, the number of new wooden buildings went up by about 52% between 2018 and 2022, and the value of the domestic wooden construction market in 2022 was around PLN 3.5 billion. This increase refers to new constructions compared with 2017 levels (Mazur & Winkler, 2025). Although still modest relative to Western European markets such as Sweden or Germany, it reflects growing national interest and institutional support for timber construction. However, the authors of this study emphasise that the pace of further development depends on the availability of raw materials and changes in legal regulations favourable to this type of investment (Mazur & Winkler, 2025).

From an international perspective, the growing role of CLT is particularly noteworthy. A review of the relevant literature suggests that this material has the potential to become one of the dominant construction materials in large-scale construction, especially in the context of carbon dioxide emission reduction (De Araujo & Christoforo, 2023). At the same time, technological development requires parallel improvements in fire

protection, including the use of protective coatings and encapsulation methods for components, which slow down the spread of fire (Hopkin et al., 2024).

Research into alternative construction solutions has shown that DCLT is characterised by high air tightness and favourable thermal properties, thus confirming its suitability for energy-efficient residential construction (Świrska-Perkowska, Wicher, Pochwała, Anweiler & Böhm, 2022).

In the context of climate policy, the importance of wood as a resource is also recognised. Projections indicate that augmenting CLT output to billions of cubic metres by the year 2100 could potentially lead to the permanent sequestration of billions of tonnes of carbon dioxide, both within forest ecosystems and within the structures themselves (Pitchford, 2025).

The evolution of prefabrication and modular technologies has led to a significant expansion in the formal and functional capabilities of wood. These solutions enable architects to construct structures with intricate geometries while maintaining a high degree of precision and reducing construction time. In this manner, engineered wood becomes a medium that combines rational structural requirements with aesthetic and environmental values.

Social perception of wood

The perception of wood in architecture is shaped by a complex network of cultural references, environmental factors and personal experiences of users. This material is firmly embedded within the collective memory of the nation. In Poland and numerous other countries, it is associated with both traditional architecture and new explorations of forms that are more conducive to human and environmental well-being. Consequently, the perception of wooden spaces is imbued with symbolic meanings that have the capacity to strengthen a sense of identity and belonging.

A plethora of studies on material perception have indicated that wood evokes positive emotional responses in users, which are associated with feelings of warmth, closeness and naturalness. In professional settings, the incorporation of wood has been demonstrated to enhance the perception of comfort and reduce stress levels among employees (Zhu et al., 2023). This effect is multisensory in nature; therefore, factors such as visual qualities are of significance, but also the texture, smell and acoustics of the material.

However, the social perception of wood varies and is subject to cultural context. Comparative studies on the perception of natural, untreated wood façades have demonstrated that the degree of acceptance of natural ageing processes varies between countries and demographic groups. As demonstrated in Figure 1, younger people who have received a higher level of education, who are more introverted and conscientious, were more likely to approve of the raw appearance of aged wood (Gustavsen et al., 2025). These findings, while indicative, are based on a limited sample and should therefore be interpreted cautiously. The findings of this study imply that individual differences in personality traits may serve as a contributing factor in the manifestation of preferences for natural materials.

Wood can also serve a socially integrating function. In public space designs, such as pavilions, squares and cultural facilities, this material helps to build a sense of community and ‘familiarity’ with a place. Perceived as less formal than concrete or glass, wooden elements of urban infrastructure facilitate spontaneous interactions between users and encourage them to spend more time in the space (Starzyk, Cortiços, Duarte & Łacek, 2024).

The social significance of wood is also pertinent to the relationship between architecture and local identity. In the context of architectural adaptations that preserve historical functions or perpetuate regional building traditions, wood assumes the role of a medium for conveying the narrative of a locale’s continuity. It can then act as a conduit between the past and the present, facilitating the establishment of social bonds and the protection of cultural heritage (Khimesara & Shah, 2024).

It is evident that the social perception of wood is not confined to mere aesthetic preferences. This phenomenon is the result of a combination of individual experiences, symbolic meanings and the real properties of the material. It is important to consider these factors during the design process in order to create spaces that are both functional and durable, and which are also deeply rooted in human experience.

DISCUSSION OF RESULTS

The collected analyses demonstrate that the role of wood in contemporary architecture extends beyond its structural value. The material under discussion occupies a space between emotion, technology and social narrative, thus facilitating a multifaceted understanding of its design potential.

A plethora of studies have demonstrated that the presence of wood has a significant impact on the creation of a sense of warmth and comfort within a given environment. This phenomenon has been found to enhance both visual and tactile sensations, thereby contributing to an overall positive and pleasant experience. Questionnaire and physiological analyses have been used to confirm this trend, with an increase in the proportion of wood in the material composition correlating with a higher rating of the friendliness and attractiveness of a space (Kwak & Choi, 2025). Empirical tests of aesthetic preferences, including those for wood joint details, indicate that forms with gentle shapes (e.g. curved segments) are most appreciated, which may have practical implications for the design of architectural details (Kuys & Mridha, 2024). The outcomes of this study call into question the limits of 'aesthetic functionality' and the extent of compromises that can be made between visual expression, economy and durability. This issue provides a foundation for future research, which will facilitate more precise differentiation of design decisions.

The substantial expansion of the timber construction market in Poland is indicative of a combination of factors, including an increase in market confidence in the material, as well as changes in regulatory frameworks and the emergence of advanced technologies (e.g. CLT, DCLT). The observed dynamic growth in the number of new timber structures indicates a real change in the construction paradigm (Ilgın, Karjalainen & Pelsmakers, 2023). Concurrently, associated technologies (e.g. fire protection, prefabrication, modularity, hybridisation) generate novel prospects in one respect whilst simultaneously highlighting domains in which standards and protective measures require further enhancement (Menzemer, Vad Karsten, Gwynne, Dragsted & Ronchi, 2025; Starzyk, Cortiços, Duarte & Łacek, 2025). It is imperative to undertake rigorous research to enhance our comprehension of the regulatory, technical and educational impediments that persist in curtailing the comprehensive utilisation of wood in large-scale buildings.

The public perception of wood is subject to fluctuation between a sentiment for tradition and aspirations for modern, sustainable construction. Research on aesthetic preferences indicates that acceptance of natural forms of wood depends, among other things, on the demographic and personality characteristics of the respondents (Kuys & Mridha, 2024; Menzemer et al., 2025). In an urban context, the use of wood has been demonstrated to contribute to the development of a narrative of place, fostering an environment that is perceived as comfortable and 'familiar', as well as facilitating stronger relationships with local heritage (Bo & Abdul Rani, 2025; Mair-Bauernfeind, Boiger, Asada & Stern, 2025). This finding lends further credence to the notion that designs incorporating wood can effectively cultivate a sense of belonging, a concept that aligns with broader discourses on place identity and placemaking.

FROM THEORY TO PRACTICE – SELECTED ORIGINAL CONCEPTS

In order to provide a practical illustration of the theoretical analysis presented, a selection of original projects and conceptual designs are presented below. These projects and designs incorporate wood in a significant aesthetic, technological and social role. Each example provided illuminates the issues that were discussed

earlier, demonstrating the feasibility of implementing the assumptions of the article in design practice. These projects represent a progression of the findings presented and the conclusions of the preceding discussion, demonstrating their practical application in design.

The construction of a residential and commercial building incorporating a daycare centre is hereby proposed. The concept (Fig. 1) integrates residential and care functions, with wood employed as a façade material in a vertical board arrangement with a light colour. The aesthetic of the building is inspired by its natural surroundings, creating a visual contrast with the modern form of the structure. The social function of the building necessitated the creation of amicable and accessible spaces, which was accomplished through the utilisation of materials that are perceived as warm and the incorporation of ecological solutions, such as a green roof and photovoltaic panels.

The concept of an energy-efficient kindergarten in Michałowice (Fig. 1b) serves as a paradigm of educational architecture, wherein the utilisation of wood plays a pivotal role in fostering an atmosphere of safety and openness. The functional layout and spatial solutions encourage children to interact with nature, thanks to large glazed areas and green roofs. The wooden slatted façade is distinguished by its light rhythm, which serves to accentuate the structure's perceived lightness and simultaneously integrates the building harmoniously into the surrounding landscape. The design also incorporates high energy efficiency standards, integrating both aesthetic and technological elements.

The construction of a service building with a boathouse in the Czerniakowski Port is illustrated in Figure 1c. The purpose of the building is twofold: it is intended for both port and recreational functions. The dark, vertical wooden cladding bestows upon the structure a distinctive, modern character, whilst simultaneously alluding to the traditional aesthetics of waterfront buildings. The integration of terraces and greenery on the roofs of these buildings serves two primary purposes. Firstly, it enables the structures to blend in with their surroundings, thus reducing the visual impact. Secondly, it provides additional functionalities, such as enhanced thermal comfort and aesthetic appeal. The ground floor's transparency fosters visual openness to the port space, thereby strengthening social relations between users and the locale.

Fig. 1. Case studies: a – residential and service building with a daycare centre for children with intellectual disabilities (2021), b – energy-efficient kindergarten in Michałowice (2020), c – multifunctional service building with bosun's office in Czerniakowski Port, Warsaw (2022)

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The concepts presented herein are illustrative and demonstrate the manner in which theoretical assumptions concerning aesthetics, technology, and the social perception of wood can be directly translated into design decisions. It is demonstrated that the conscious use of this material enables the creation of objects in which form, function and social meaning remain in consistent dialogue. This approach demonstrates that wood, when considered in the three dimensions discussed in the article, functions not only as a building material but also as a tool for shaping spaces rooted in culture, the environment and human experience.

CONCLUSION

The utilisation of wood in contemporary architecture is a material that exhibits a distinctive capacity to amalgamate aesthetic, technological and social values. This material has the capacity to influence the atmosphere of a given space, to respond to the needs of its users, and to serve as a tool for the construction of narratives that are rooted in the local context. Its incorporation into a design can imbue an environment with a more human, sensual dimension, thereby facilitating interaction with its surroundings.

From an aesthetic perspective, wood possesses a distinctive character that is derived from its inherent texture and colour variations, and its vulnerability to the effects of time. In the domain of technology, it demonstrates its capacity for the construction of contemporary buildings that require elevated structural and environmental standards. Within the social sphere, it has been demonstrated that this phenomenon fosters bonds with a place, strengthens identity and creates spaces that encourage interaction.

A thorough examination of the three dimensions of contemporary wood use reveals that it is not merely a structural element, but a fully fledged architectural medium. It has the capacity to combine tradition with innovation and to respond to both functional and cultural challenges. Its role in contemporary design appears to be of particular importance in the context of efforts to create sustainable architecture that is rooted in real human experience. This study is limited to architectural and perceptual dimensions of wood and does not encompass quantitative life-cycle assessment or comparative analysis with other sustainable materials such as bamboo or mycelium-based composites. These aspects will be addressed in future research.

It is evident that wood remains a material that necessitates a deliberate design approach; one that fully exploits its technical, aesthetic and social properties. In the future, it is likely to become one of the key elements in shaping spaces that are durable, meaningful and open to dialogue with people and the environment.

For practitioners, the findings highlight the importance of integrating aesthetic and social considerations into technical design decisions. Awareness of users' perceptual and emotional responses to wood can enhance both comfort and sustainability outcomes.

Authors' contributions

Conceptualisation: A.S., J.M. and V.M.; methodology: A.S.; validation: A.S., J.M. and V.M.; formal analysis: A.S., J.M. and V.M.; writing – original draft preparation: A.S., J.M. and V.M.; writing – review and editing: A.S., J.M. and V.M.; supervision: A.S.; project administration: A.S.

All authors have read and agreed to the published version of the manuscript.

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DREWNO JAKO MEDIUM ARCHITEKTURY: ESTETYKA, FUNKCJA I PERCEPCJA SPOŁECZNA W UJĘCIACH HISTORYCZNYM I WSPÓŁCZESNYM

STRESZCZENIE

Celem artykułu jest ukazanie roli drewna we współczesnej architekturze z perspektywy estetyki, technologii i odbioru społecznego. Opracowanie opiera się na przeglądzie literatury z lat 2020–2025 (Scopus, Web of Science) oraz analizie realizacji autorskich. Drewno, dzięki naturalnej fakturze i barwie, sprzyja tworzeniu przestrzeni przyjaznych i zakorzenionych w tradycji, a nowoczesne technologie umożliwiają jego zastosowanie w dużych, energooszczędnych obiektach. W wymiarze społecznym zastosowanie drewna jako budulca wzmacnia tożsamość miejsca i otwartość na interakcję, do tego łączy dziedzictwo z innowacją. Wnioski z przeprowadzonej analizy podkreślają znaczenie drewna jako materiału kluczowego dla projektowania zrównoważonego, integrującego wartości estetyczne, techniczne i społeczne.

Słowa kluczowe: drewno w architekturze, estetyka materiałów, technologia budownictwa drewnianego, percepcja społeczna, architektura zrównoważona, projekty autorskie