UDC 721:620.9 DOI: https://doi.org/10.64076/iedc250821.04

# Sustainable materials in the architecture of the interior space – between tradition and innovation

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***Abstract.*** *The article presents a theoretical study that highlights the importance and necessity of using sustainable materials, characterized by energy efficiency, in the process of renovating and decorating architectural constructions, both interior and exterior. It also analyzes conceptual models that explore the use of traditional ornamental patterns applied to tiles and decorative panels made from eco-friendly materials, offering effective aesthetic and functional solutions for promoting sustainable design. Furthermore, the authors emphasize the relevance of research in this field for the design of sustainable interior architecture through the harmonious integration of traditional style with current innovative trends, adapted to the requirements of sustainable and ecological interior design.*
***Keywords:*** *sustainability, decorative panels, traditional style.*

## Introduction

The global ecological crisis represents one of the most pressing issues facing contemporary humanity and is increasingly addressed in depth in international discourse. Major climate changes, the rise in global temperatures, and the negative impact on ecosystems have led to a rethinking of human activity at political, economic, and cultural levels, with the field of interior architecture remaining a key priority. In this context, there is a growing shift toward sustainable and environmentally ergonomic practices aimed at reducing the negative impact of construction materials–not only on the natural environment but also on human well-being. Thus, sustainable design becomes a key pillar in contemporary interior planning, with one of its central directions being the use of recycled and recyclable materials [1].

In this context, through the scientific approach of the research, the authors propose the investigation of the functionality and applicability of decorative panels made from a composite material obtained from recycled waste, which offers a distinctive aesthetic appearance suitable for both interior and exterior spaces. Therefore, the proposed material represents a modern and sustainable solution that combines ecological efficiency with aesthetic versatility in both interior and exterior design [2].

**Sustainability of materials – intelligent and innovative approach in interior architecture through tiles, decorative panels for interior and exterior**

Ecodesign in architecture and sustainable interior design is defined by ISO 14006:2020 (International Organization for Standardization) as a systematic process that integrates environmental considerations into the conscious design process of products, with the aim of reducing environmental impact throughout their life cycle - "environmentally sustainable design" and "green design" [3].

The historical origins of tiles and decorative panels are secular, for example the Terrazzo tiles, which began in the 15th century in Venice. These Terrazzo composite tiles are based on an economical method for reusing marble scraps. Venetian craftsmen mixed them with a lime and sand-based binder, obtaining beautiful and accessible floors. Over time they have been used in public buildings, churches, palaces and later in commercial spaces, being appreciated for their resistance and aesthetics [4].

Today, in the twenty-first century, the resurgence of interest in recycled and sustainable materials has brought Terrazzo tile manufacturing technology back to the forefront. Modern applications include countertops, furniture, decorative walls, art pieces, and modular elements. And current technological innovations allow the creation of sustainable decorative tiles or panels in customized shapes, with various colors for any area of the interior space or building facades [3].

Such a design process is guided by the following objectives:

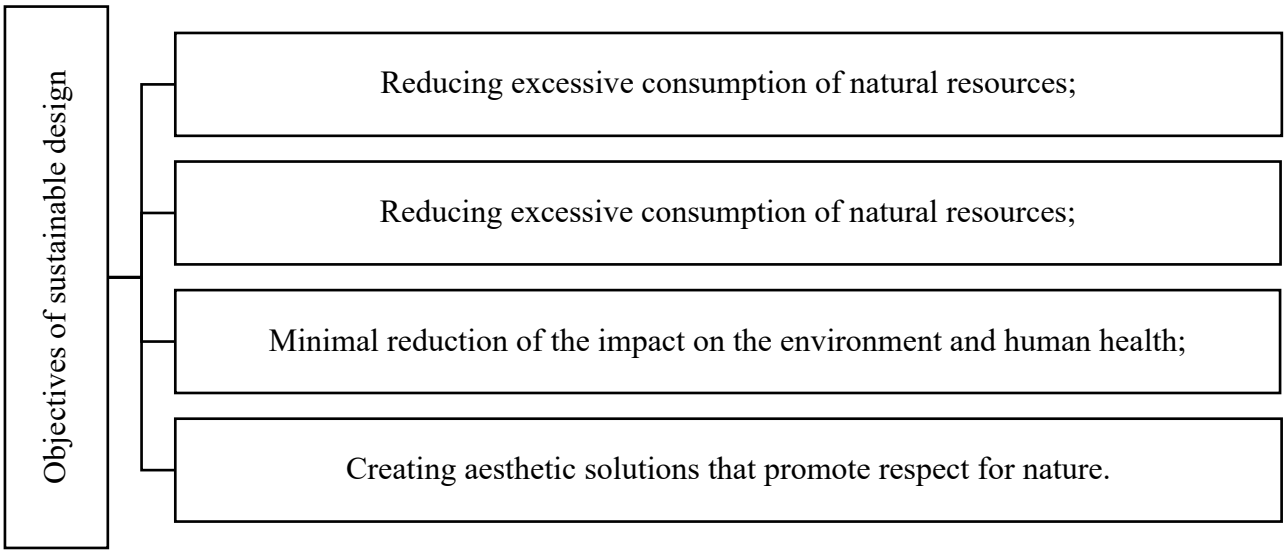


**Fig. 1.** Objectives of sustainable design from recycled materials

Sustainable and creative recycling in interior architecture

The eco-friendly creation process for tiles and decorative panels begins with the selection of fillers (called aggregates), which can come from natural or recycled sources, such as:

- Scraps of marble, granite, quartz from quarries or processing workshops.
- Shards of recycled glass, pieces of broken tiles or tiles.

• Other elements: shells, metals, coloured gravel or innovative materials (wood, vegetable fibres) fig. 2 [5].

**Fig. 2.** Interior and exterior decorative tiles made of sustainable materials

This stage is important in determining the final aesthetic appearance of the decorative tiles through the size, shape and color and the applied ornaments, which directly influence the visual texture. The bonding stage of the composite material is the binder, such as:

- *Portland cement* – traditional, more porous, but easier to recycle;

- *Epoxy resins* – modern, offer a wide range of colors and increased water resistance, but less environmentally friendly (depending on the composition);

- *Ecological binders* – based on lime, activated clay or biosynthetic resins (under development in eco-design) [6].

The final product of the sustainable material used for the decorative panels, the composition is molded: directly on the floor or stretched on the exterior interior wall, in the form of a continuous layer, which allows creative freedom and customization or in prefabricated molds, for modular pieces - tiles, countertops, furniture elements, etc. fig. 3, 4 [5, 6]. After casting, the material is left and swept away from dust – during which time the binder is hardened and sanded to a glossy, matte or embossed surface.

The aesthetic advantages of tiles and panels that complement interiors and exteriors made of sustainable materials are, through the infinite variety of colors and ornamental patterns; easily integrates into contemporary, traditional or personalized styles; It provides a visual texture that can replace the much more expensive and rare natural stone.

**Fig. 3.** Material sustenabil compozit pentru diverse produse

**Fig. 4.** Sustainable composite material for various products

**In conclusion,** decorative tiles and panels made from sustainable materials represent a responsible, ecological, and durable choice in contemporary architecture and interior design. In the current context, marked by the global ecological crisis and the need to reduce the harmful effects on natural ecosystems, the use of such materials is not only an aesthetic option but also a practical, optimal, and sustainable solution for the harmonious integration of tradition with innovation. Thus, it contributes to the creation of built environments that meet the functional, aesthetic, cultural, and ecological demands of today's society. Article part of the draft with the number 02.04.06.

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