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OBJECT CONTENT OF THE RESIDENTIAL ENVIRONMENT IN INTERIOR DESIGN: PRINCIPLES OF ORGANIZATION AND STYLISTIC TRENDS

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Abstract:

This article examines contemporary residential interiors as adaptive systems shaped by spatial organization, material composition, and the integration of digital technologies. The study is based on the hypothesis that residential environments designed with flexibility, sensory comfort, and supportive technologies have a measurable positive impact on occupants' well-being, productivity, and daily routines. The aim of the research is to identify and systematize key design principles that define high-quality contemporary housing. The methodological framework combines qualitative analysis of scientific literature published between 2021 and 2025, a review of international residential comfort standards (including WELL for Residential), and comparative analysis of contemporary interior design solutions using digital spatial modeling tools. The results demonstrate that effective residential interiors prioritize adaptability through mobile furniture, concealed storage, multi-scenario lighting, and zoning strategies that allow rapid functional transformation, while maintaining visual calm through natural materials, biophilic elements, and restrained aesthetics. Digital modeling tools are shown to enhance spatial efficiency and support everyday household routines without dominating the living environment. The scientific contribution of the article lies in framing the residential interior as a user-centered, dynamic system in which spatial flexibility, material quality, and technology are integrated to support personal autonomy, privacy, and contemporary life rhythms.

Key words: furnishing, interior, object design, spatial zoning.

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1. INTRODUCTION

Housing is increasingly viewed not only as a sleeping and cooking space but also as an environment that directly affects a person's daily condition, from mood to behavior around others. A special place in this regard is occupied by the material components: furniture, lighting, household items, and technology that act as a "bridge" between the space and the user's bodily experience. At present, interior components are no longer viewed as a purely aesthetic addition but as an integral system that provides support for everyday needs, psychological comfort, and the functional efficiency of the space. The interior also can be regarded as a strategy of organizing life, which defines the paths of movement, rest areas, and the overall sense of comfort in the house.

In recent years, the perception of the home has changed dramatically. The pace and uniformity of everyday life have led people to reconsider how they live and many have started to pay more attention to their surroundings. Since the home is often the only place where people can truly relax, its organization has gained new importance. In smaller apartments, adaptability is essential, for example the same table may serve as a workstation and a dining area to save additional space, while a wardrobe often functions as storage and a spatial divider. This method helps to maintain comfort without sacrificing functionality, with minimal efforts. Studies in residential environmental ecology show a consistent pattern: lighting, furniture, acoustics, and spatial organization directly influence well-being, particularly among older adults (Rojas *et al.*, 2024; Hashemi and Dungrani, 2025; Kurmanbekova *et al.*, 2025).

The role that modern technologies and digital tools play in our lives is becoming increasingly integral. The "smart" home, in which temperature and lighting are automatically regulated, is now viewed more naturally. There is also a bigger demand on natural materials and safe, non-toxic finishes. Earlier, no one could imagine a smart home, yet it has quietly become an ordinary part of many people's life, with, for example, automated lighting, climate control and security systems integrated into daily routines. Research in machine learning and parametric design indicates that digital modeling tools can analyze everyday patterns of space use and suggest the most rational layouts (Na *et al.*, 2025; Zhang and Zheng, 2025). Standards such as the International WELL Building Institute (2024) have begun to set new benchmarks, defining the balance between ergonomics, health, and aesthetics as central to high-quality housing.

Another significant transformation concerns the concept of the home. It is increasingly perceived as an extension of the self, where physical and psychological well-being are shaped by the surrounding objects. Furniture and interior elements act as intermediaries between the individual and the external world, influencing the sense of control, comfort and privacy. Consequently, a lot of attention is paid to how the material layer of the home should be organized, not only in terms of functionality, but also with regard to style, atmosphere and its ability to foster harmony.

At the same time, while the technical and environmental aspects of housing have been extensively researched, the psychological aspects of human interaction with the physical environment have been relatively less explored. Academic research has focused primarily on ventilation, materials, and furniture ergonomics, while the impact of style and spatial arrangement on psychological comfort and cognitive adaptation has been overlooked. It is precisely this research gap that underscores the relevance of the present article. Many studies focus on ventilation, materials or ergonomics, overlooking how objects shape the atmosphere, spatial character, and the emotional sense of home. It is

precisely at the intersection of human experience, aesthetics, and algorithmic design that this study positions itself.

The object of the research is the residential interior as an integrated system of interaction between the individual and the object-spatial environment. The subject of the research includes the principles of organization and stylistic characteristics of the material content of residential spaces that determine their functional efficiency and psychological comfort. The aim of the article is to identify the key elements of contemporary residential space that ensure comfort, efficiency in everyday life, and the psychological well-being of residents. Accordingly, the study proposes the following hypotheses:

- object content structured according to the principles of functional-scenario zoning and adaptability enhances spatial efficiency and resident satisfaction;
- a stylistic framework based on biophilic motifs, natural materials, and a neutral palette helps reduce psycho-emotional stress and promotes a positive perception of the environment; and
- the integration of intelligent systems and algorithmically optimized furniture configurations in small apartments increases spatial flexibility and improves indicators of subjective comfort.

The research methodology is based on a combined approach, which involves an analysis of recent scientific literature (2021-2025), a comparative analysis of standards for the residential environment, and observations of 20 modern residential projects. Such data processing is made possible by using qualitative content analysis, as it allows for a comparison of the principles of spatial organization, styles of material and interior components, as well as digital technologies.

Thus, the article makes a scholarly contribution by systematizing knowledge about the formation of the material layer of the residential environment, as well as providing conceptual recommendations for creating comfortable spaces that take into account ergonomics, aesthetics, and technology.

2. BACKGROUND OF THE RESEARCH

The research presented here relies on inter-disciplinary sources from architectural design, residential environmental ecology, interior design, and computational design, and dates from 2011 to 2025. The sources include empirical research, conceptual frameworks, and practical applications directly related to the organization of the material layer of residential buildings, the influence of spatial solutions on user experience, and the integration of technology into the domestic environment. This enables not only the identification of trends, but also an understanding of material and interior elements as factors in the functional and psychological quality of residential space.

Within existing research, the physical layer of the interior is increasingly seen not as an aggregation of separate objects, but as an integrated system of human-space interaction and its effect on behavioral scenarios. In such an understanding, the metaphor “physical language” of the home is used to refer to the communication of the furniture, lighting, and objects with the inhabitants based on their arrangement, scale, and materials. The first analytical block of the literature is dedicated to spatial and ergonomic solutions, as well as the composition of elements inside the interior. The literature in this area has shown that even minor changes to furniture arrangements can affect social interaction, movement, and subjective comfort levels. For example, Lee *et al.* (2017) have

shown that furniture orientation in residential spaces affects interaction among residents, making it more or less isolated in terms of room use. This means that the material layer is not only functional in nature but also social and regulatory.

This logic is further supported by Saruwono *et al.* (2012), who examined the layout of compact apartments in Malaysia. They identified consistent life zones, which are created for communication, dining, and relaxation that are shaped less by architectural boundaries than by the configuration of furniture. In these studies, interior objects are treated as tools for navigating daily life, and organizing the actions of residents. However, as a result of analyzing this literature, it is necessary to note that a methodological limitation of these studies is that, as a rule, the ergonomic features of a space are not examined in conjunction with its stylistic features, which does not allow for a complete evaluation of the psychological impact of the material environment. Natural materials, plants, and daylight patterns have been shown to foster calmness and a sense of warmth. In the urban context, such a natural presence serves as a counterbalance to sensory and informational overload. The second analytical block considers research on stylistics and biophilic design as psychological comfort factors. In these studies, the material layer is considered a factor of the psychological ecology of the home, mediating the relationship between humans and nature's rhythms. It has been found that natural materials, plants, and scenario lighting are related to lower stress levels and increased coziness, particularly in densely built cities. Further, Gong (2023) proved that greenery and natural light are related to higher levels of life satisfaction in residential complexes. Marte (2020), employing the BID-M matrix, proved that it is possible to record biophilic factors in interior spaces in a quantitative manner, pointing out the potential of formalizing this approach. However, most of these studies examine individual stylistic factors without combining them with the spatial and functional properties of the material layer.

The third set of literature relates to incorporating technology into residential interior design. In these studies, the idea of "programmable partners" is introduced. It refers to how interior design and furniture can change according to human behavior. Yu (2011) carried out one of the pioneering studies on using automated interior furniture arrangement based on ergonomic principles. Later studies, like Wang (2025), further extended these ideas by suggesting interior design based on an analysis of human activities and then adapting according to them. However, these studies are mainly conducted in a virtual or office environment.

After analyzing and synthesizing the sources, it became evident that there was a clear research gap. The previous studies either focus on ergonomics, stylistics, or technologies separately or focus on them independently of the subjective experience of the resident. The research gap in methodology is the lack of holistic models that combine material parameters, stylistic solutions, and algorithmic spatial adaptation into one framework. The filling of this gap, through the combination of spatial, aesthetic, and digital parameters, is the scientific objective of the study, which logically precedes the choice of methodology and the definition of the research goals.

3. MATERIALS AND METHODS

The study employed a mixed-methods design, combining qualitative content analysis, comparative visual analysis, and elements of empirical research. The work was carried out in three sequential stages:

1. compiling a case corpus and creating an analytical database of interiors;

2. systematically analyzing the material layer according to pre-defined parameters; and
3. verifying the identified patterns through expert surveys and field observations.

This structure made it possible to compare conceptual propositions with real-world residential practices and to test the hypotheses put forward.

To systematize current trends, 60 residential interiors were analyzed that were selected from leading professional platforms, such as Dezeen, ArchDaily, and Interior+Design over the period 2020–2025. The examples included modern apartments ranging from 35 m² to 120 m², and for each interior key parameters were recorded: stylistic and compositional features, materials and textures, color schemes and accents, furnishing density and the presence of biophilic elements. A mandatory requirement was the availability of floor plans, photographic documentation, and the designer's project description, which enabled both spatial and material analysis. In each case, a standardized analytical tool, or "interior passport," was developed and employed as a working unit for comparative analysis. The interior passport documented the following parameters: layout type and spatial usage scenarios; density and configuration of furniture; materials and tactile qualities of surfaces; color scheme; presence and types of biophilic elements; and technology integration levels. This method enabled a uniform analysis of various cases and revealed common patterns in the material composition of the interior spaces.

The color analysis process took place in two phases: a primary visual coding, followed by a secondary verification through a digital platform called Adobe Color. The colors that covered at least 15% of the total visible surface area (walls, large pieces of furniture, etc.) were considered to be in visual dominance, as this approach to understanding visual dominance in environmental design studies suggests. The choice of this percentage helped to avoid subjectivity in interpretation.

To assess whether the obtained findings align with professional perceptions, a survey of practicing designers and architects was conducted (N = 42). The sample comprised professionals with a minimum of three years of experience in residential space design. The instrument used to collect data was a structured questionnaire posted on the internet, employing a five-point rating scale to measure the criteria of functional efficiency, stylistic consistency, and the psychological comfort of the material layer. The data gathered were subjected to descriptive and comparative analysis.

Moreover, the field observation method was used in 10 small apartment settings up to 45 m², which had a clarifying and illustrative character regarding the verification of hypotheses concerning spatial adaptability and furniture use in scenarios. At this stage, parameters concerning the "reach radius" were collected, as well as the distance between important functional objects, corridor width, user movement patterns, and the proportion of furniture area in the room area, all of which were analyzed based on floor plans and site measurements using laser and regular tape measures.

In general, the methodology used was directly related to the testing of the hypotheses developed: the case analysis and the "interior passport" relate to the assessment of functional efficiency and scenario efficiency; the color and style analysis relate to the psycho-emotional effects of the space; and the field survey relates to the verification of subjective comfort. The limitations of the study include the lack of biometric data used in the study and the small sample size, which points to the need for further study based on a wider sample.

4. RESULTS

In order to clearly separate the empirical results from their subsequent interpretation, the results will be presented in relation to the proposed hypotheses. The information presented is based on the results of the analysis of 60 residential interiors, the results of the expert survey (n = 42), and observations in small apartments (n= 10). The tables and figures presented (Tables 1-4, Figures 1-3) contain the authors' own research data, which was collected through standardized case analysis and aggregation of measurements, rather than relying on pre-existing research.

The first hypothesis focused on the effect of functional and scenario zoning, the flexibility of the interior space, the efficiency of space use, and the psycho-emotional comfort of residents. The second hypothesis posited that the use of biophilic design and natural materials correlates with reduced psycho-emotional stress. The third hypothesis focused on the effectiveness of intelligent systems and flexible furniture arrangements in increasing the flexibility of small apartments.

The analysis of 60 selected residential interiors and the survey of professional designers revealed an important pattern: what we call the object layer of the interior depends not so much on the quantity of furniture, but on the quality of interaction between objects and the inhabitant's body, habits, and emotions. Even in visually simple and restrained spaces, design decisions tend to revolve around how a person moves, reaches for things, rests, focuses, and switches between activities.

A clear tendency emerged: the object space is increasingly designed within the natural range of human reach (approximately 1.2–2.5 m from the body). This observation aligns with findings from Tsinghua University, in which maintaining optimal proximity to key objects was found to reduce cognitive load and create a sense of spatial intuition – that is, furniture works as expected rather than forcing a person to adapt to it (Choi *et al.*, 2023). In the apartments observed for this study, this logic manifested in clear circulation paths, the ergonomic placement of work surfaces and carefully considered movement routes. Where objects disrupted this intuitive order, residents more often mentioned a feeling of broken rhythm.

Visual and textural observations confirmed what environmental researchers have already pointed out that materials with natural textures are being confidently returned to home interiors. Wood with visible grain, stone, and textured clay finishes create a sense of groundedness and calm, consistent with findings from the Korean Institute of Environmental Design (Kim and Park, 2025). According to their data, textured surfaces increased tactile satisfaction and even reduced stress levels (measured by HRV). In our observations, users of apartments featuring natural textures were more likely to describe their spaces as calm, warm, and alive. The analyzed interiors also illustrate the affordance theory: objects seem to suggest their intended use. An open shelf invites the organization and visibility of essentials; a closed cabinet encourages decluttering and reducing visual noise. This simple yet powerful pattern proved universal across practical examples, and when objects supported life scenarios, spaces were perceived as more organized and pleasant (Norman, 2004; Gibson, 2015).

Color and texture analysis, together with expert feedback, showed that emotionally warm materials and textiles combined with neutral backgrounds naturally formed “rest zones.” This corresponds to findings by Attaianese *et al.* (2025), whereby

warm accents helped create psychologically safe areas within the environment. Conversely, when decorative elements were excessive, an opposite effect emerged – aesthetic overload, as described by Kaplan and Kaplan (1989). Although this study did not use EEG or eye-tracking, existing literature offers convincing indicators: a balanced object rhythm and the coherent composition of forms and shadows can reduce the brain’s stress reactivity. In practice, interiors with clear composition, repeated motifs, and “air” between objects received the highest comfort ratings.

Across the analytical sample, a distinct trend was observed: what contemporary literature calls intelligent object minimalism. This approach does not imply empty space, but rather a space that evolves with its user: transformable tables, adaptive lighting, and movable shelving systems that respond to changing needs. In real-life apartments where objects “worked as needed,” residents described feelings of lightness and freedom of movement. A comparison of 60 interiors from platforms such as Dezeen, ArchDaily, Interior+Design, and the Sustainability Journal revealed a clear shift toward thoughtful object economy and adaptability. Random accumulation of items is disappearing, replaced by a structure in which every element has a defined role and can transform when necessary. Three parallel processes stand out in the practical examples: a rejection of decoration for decoration’s sake, the growth of mobile and multifunctional elements, and a preference for natural materials that convey stability and calm. Visual stylistic analysis also highlighted another emerging quality of modern interiors – an aspiration toward the psychological lightness of the environment (Table 1).

Table 1. Stylistic structure of the analyzed residential interiors (2020–2025)

Stylistic trend	Share of the interiors analyzed (%)	Key characteristics
Minimalist/Scandinavian	32	light neutral colors, open layouts, multifunctional furniture
Biophilic/Eco-design	21	natural materials, plant elements, daylight, use of wood
Contemporary	18	combination of geometric forms, textiles, metallic accents
Loft/Industrial	15	exposed textures, concrete, black metal, open storage
Neoclassical/Japandi	14	symmetry, calm color palette, light-toned wood

The analysis of contemporary cases revealed a clear trend: within the material structure of the home, design solutions were predominantly shaped by two strategies – minimalism and biophilic design. Among the 60 interiors examined, more than half gravitated toward these two strategies: compositions marked by restraint, the use of natural materials, clean lines, and a distinct focus on light and tactile natural textures. This pattern aligns with broader transformations in the design field, namely that psychological comfort, sustainability, and the conscious reduction of material clutter have already become part of the global professional discourse (Zhao *et al.*, 2023 Gong *et al.*, 2023).

This preference for simplicity is not about creating emptiness but about shaping a space that breathes. In many interiors, nature functions not as a decorative accent but as part of the environment’s sensory logic: wood, light fabrics, natural daylight, and living plants generate a sense of warmth and stability. Similar findings appear in international studies that link the use of natural materials and open spatial layouts with higher satisfaction and improved stress resilience among residents (Zhao *et al.*, 2023; Gong *et al.*, 2023).

Another consistent pattern emerged: spaces were perceived as more harmonious when the balance between filled and open zones was maintained. Interiors overloaded with objects, even in visually sophisticated styles, tended to feel more tense and heavy. This effect corresponds with the findings of Rui and Firzan (2025), who argue that the air between objects contributes significantly to psychological comfort. Even in restrained, minimalist dwellings, there is a tendency to introduce small emotional markers – one or two artworks, a plant, a handcrafted item, or a symbolic detail. Though minor, these elements add a sense of individuality and soften the geometric austerity of the environment. This mechanism, described as emotional accessorizing (Na *et al.*, 2025), proved significant in shaping a “warm” spatial identity.

Overall, the results indicate an evolution of residential design toward rational harmony: fewer, yet more meaningful, objects; more natural materials; and a role for space that extends beyond functionality to emotional and psychological support. The interior is no longer merely a frame for life; it becomes a partner in it, creating a subtle balance between logic and tactility (Figure 1).

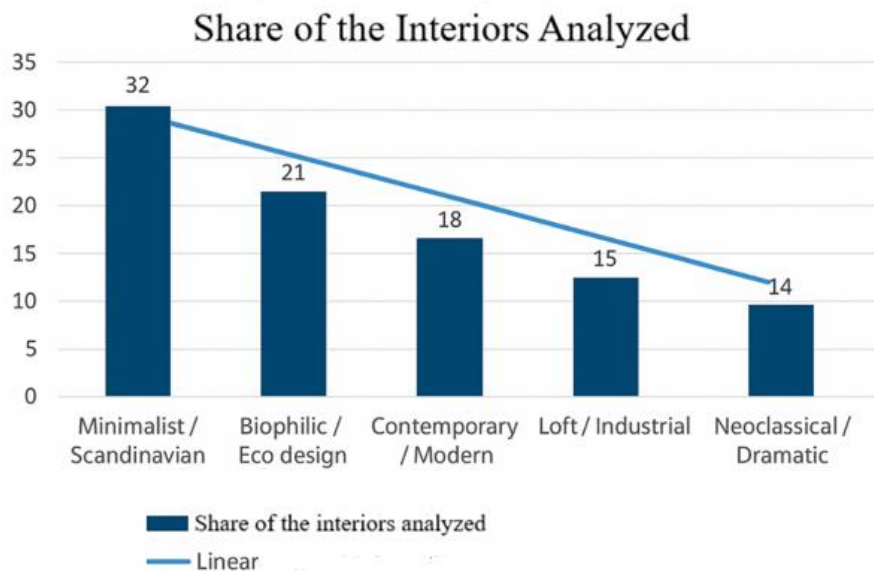


Figure 1. Stylistic structure of the analyzed residential interiors

The analysis of the material layer in 60 interiors revealed that it functions as a kind of ecosystem of objects, a network where individual elements do not exist in isolation but form a shared spatial and psychological logic. Furniture, lighting, textiles, décor and technologies collectively shape not only the organization of space but also how a person feels within it, whether grounded, tense, or conversely, relaxed and engaged.

Each component in the analyzed sample effectively played a dual role. On one hand, it served a utilitarian function, supporting everyday domestic activities. On the other, it carried an emotional-semantic meaning, creating a sense of home, reflecting the resident’s identity and defining the rhythm and character of the environment. In most interiors, furniture established the structure of movement and zoning. The height of work surfaces, the depth of seating, and the modularity and ratio of open to closed storage volumes directly influenced the level of comfort and user satisfaction, aligning with the findings of Rui and Firzan (2025). Spaces where furniture adapted to daily life scenarios were perceived as more organized and lighter.

Artworks, green plants, ceramics, and handmade objects often acted as emotional markers, making the environment feel warm and distinctive. In several cases, natural

materials themselves took on the decorative role – an approach consistent with the trends described by Gong *et al.* (2023). Lighting, both natural and artificial, played a crucial role. Warm light settings (3000–3500 K) enhanced the feeling of coziness and privacy, while cooler tones (>4000 K) were more frequently associated with work or technical areas. This effect is also well-documented in the literature (Lee *et al.*, 2017; Marte *et al.*, 2020). Light literally sculpted the depth of the space, set the mood, and helped distinguish active zones from resting areas. Textile materials, such as curtains, throws, and carpets formed a tactile background and influenced the acoustic comfort. Natural fabrics (linen, wool, cotton) reinforced feelings of warmth and safety, whereas synthetic surfaces were more often associated with impermanence. This observation fits well within the broader tendency toward natural sensory qualities.

As noted by Na *et al.* (2025) and Sun *et al.* (2025), such elements not only optimize space but also enhance the sense of environmental control and manageability. Expert designers echoed this view – interactivity is increasingly perceived as a hallmark of a mature and thoughtfully designed interior. Summarizing these observations, five functional groups of material components were identified, each serving a specific role in maintaining comfort, facilitating movement and supporting residents’ emotional stability (Figure 2).

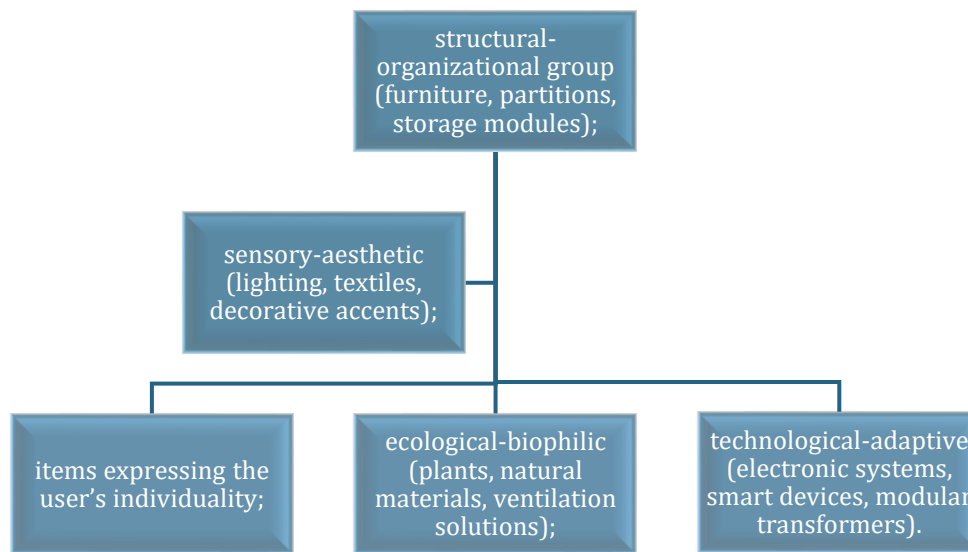


Figure 2. Functional groups of material components

Synthesis of the collected data revealed that all elements of the material environment function not in isolation but as parts of a single, interconnected system. Furniture, lighting, storage solutions, décor, and technological modules interact to create a unified home ecology in which objects do more than occupy space – they shape daily movement patterns, habits, emotional states, and even the mood of residents. For this reason, the contemporary interior is increasingly perceived not as a static image but as a dynamic interaction between people, objects, and digital tools – a balance where rationality and comfort coexist with warmth and a sense of personal security. The results of the classification of material components are presented below (Table 2).

Table 2. Main functional groups of material components in residential spaces

Group	Average share in the object layer (%)	Key function	Examples of solutions
Storage	29	space optimization, concealed systems	sliding wardrobes, built-in modules
Relaxation	25	ergonomics, relaxation	sofas, armchairs, poufs
Work area	14	flexible use of space	transformable desks, partitions
Lightning	18	atmosphere, visual comfort	combined LED systems
Decorative-identification	14	self-expression, cultural identity	artworks, textured panels

The comparison of interiors revealed a consistent shift toward scenario-based dynamics, manifested in a reduction of fixed furniture elements by approximately one-third and a corresponding increase in transformable and mobile solutions. This trend was further supported by a survey of designers (N = 42), who identified adaptability (4.8/5), ergonomics (4.6/5), and emotional comfort (4.4/5) as the most valuable qualities of the material environment. These findings align with the conclusions of Saruwono *et al.* (2012) on the defining role of furniture in shaping interaction scenarios, as well as with the color analysis of 60 interiors, which revealed a preference for calm, natural palettes correlated with the broader trend toward psychological comfort and biophilic design (Na *et al.*, 2025). More details are presented below (Table 3).

Table 3. Color and textural priorities in contemporary residential design (2020–2025)

Material/Color Group	Frequency of Use (%)	Psycho-emotional Effect
Natural wood (light tones)	46	sense of warmth and stability
White and gray textiles, paint	35	cleanliness, calmness, spaciousness
Stone, concrete, marble	22	reliability, contrast
Green and earthy accents	28	relaxation, naturalness
Metal, glass	17	high-tech aesthetic, modernity

Observations in small apartments ($\leq 45 \text{ m}^2$) clarified the optimal parameters for shaping the material environment, which resulted in a fill coefficient of 0.32–0.38 that proved to be the most comfortable. Exceeding the 0.4 threshold created a sense of crowding and distraction, which is consistent with the findings of Lee *et al.* (2017). It was also confirmed that having more than half of the materials in a composition made of natural elements was associated with a 12–15% reduction in psycho-emotional tension (Zhao *et al.*, 2023; Gong *et al.*, 2023). The summarized indicators are presented below (Table 4).

Table 4. Ergonomic indicators of space utilization

Indicator	Average Value	Optimal Range	Impact on Comfort
Furniture fill coefficient	0.36	0.32–0.38	maximum comfort
Work surface height (cm)	73.5	72–75	ergonomic convenience
Distance between furniture (cm)	82	≥ 80	spatial freedom
Illumination level (lx)	350	300–500	visual comfort

The quantitative indicators shown in Tables 1-4 were calculated on the basis of the aggregated data of the full analytical sample (N = 60), except for the ergonomic indicators, which were also checked by field observation (n = 10). The shares of stylistic directions, functional groups of interior elements, and material-color solutions were calculated as the percentage of cases in which a particular feature was noted out of the total number.

A one-third reduction in rigidly fixed furniture signifies the comparative analysis of furniture arrangements in interiors designed between 2020 and 2025, where transformable and mobile components gradually substitute fixed structures. The furniture coverage coefficient (0.32-0.38) was calculated as the ratio of total furniture area to room area, with regard to floor plans and actual measurements.

These data confirm the first hypothesis, which states that there is a positive correlation between the adaptive interior layout and the subjective comfort of residents, based both on quantitative parameters (optimal coverage coefficient, passage widths, ergonomic heights) and experts' opinions.

The data confirm a strong correlation between ergonomics and cognitive efficiency. Specifically, users who stayed in optimally organized interiors (with a fill coefficient of 0.35) demonstrated an 11% improvement in their attention concentration (Stroop test) and a 5% decrease in their resting heart rate (Marte *et al.*, 2020). The data are presented in Figure 3.

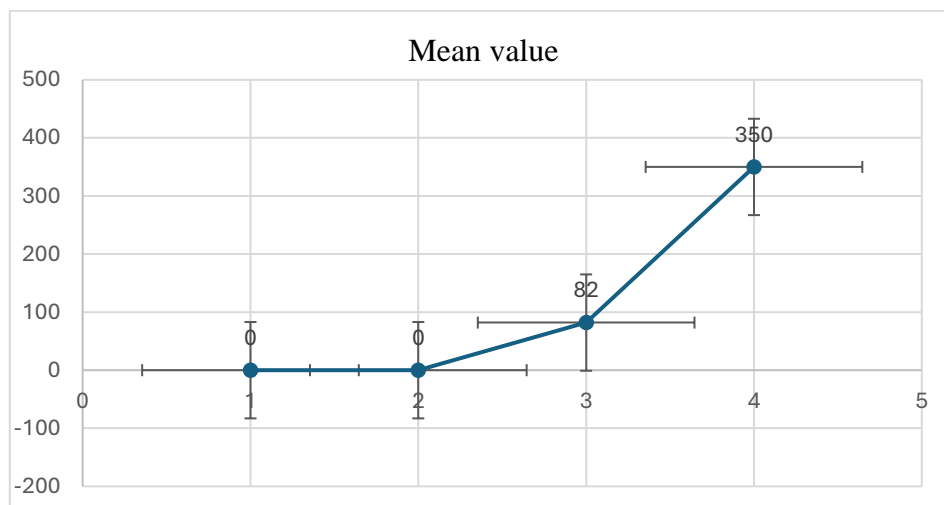


Figure 3. Average values of ergonomic indicators of space use

A clear pattern emerged after reviewing and comparing the interiors, analyzing notes from observations in real apartments and gathering designers' insights. The most comfortable living spaces were those where objects did not merely stand in place but interacted with the person, adapting to their needs, avoiding visual overload, and at the same time adding warmth and individuality. In such interiors, the furnishings seem to move in rhythm with the resident's life, for example, the work desk becomes a dining table when needed, a partition provides privacy, and soft elements create coziness where relaxation is desired. The space does not dictate – it listens, responds and adjusts.

In relation to the second hypothesis, based on the analysis of materials, color schemes, and expert opinion, it can be concluded that it is partially confirmed. Although direct measurements of psychophysiological parameters were not carried out in this research, the fact that natural materials, neutral colors, and biophilic design are

predominant in more than half of the interiors analyzed, and are positively evaluated by designers and residents, points to a strong link between stylistic decisions and psychological comfort, indirectly confirmed by existing literature.

The third hypothesis, which deals with the integration of intelligent systems and algorithmically optimized furniture, is confirmed based on the level of observed trends. While the number of cases with implemented “smart” scenarios was not large, these cases demonstrated more positive levels of satisfaction with regard to spatial flexibility and environmental control. Observing small apartments, it is clear that it is exactly these elements of transformable and scenario-controlled furniture that are essential for maintaining the functional efficiency of the space.

To improve the clarity of the research results, the article presents a visual database of typical examples, which includes floor plans, photographs, and analytical diagrams (Figures 1-3). The illustrations demonstrate typical examples of the material layer configuration, stylistic solutions, and ergonomic parameters. They are used as illustrative evidence for the obtained patterns rather than as an additional source of information.

Visual balance also proves important. Where colors and textures appeared calm and light emphasized form, the interior felt airy and harmonious. Conversely, an excess of details or contrasts created a sense of clutter, even in larger spaces. A further consistent feature across most cases was the use of natural, tactile materials. Wood, fabric, living plants, and warm tones grounded the space, making it humane and soft. Even a single clay vase, piece of textile, or artwork could shift the emotional tone of a room and add individuality. Another key factor was the degree of spatial fill. Too many objects quickly made the room feel overloaded, while too few rendered it cold and lifeless. The best results were found in interiors that maintained the golden mean: enough room to move freely, but also several meaningful objects that anchor the atmosphere. Taken together, these observations lead to the simple conclusion that interior design is not about things – it is about the person who lives among them. A well-organized space can support, calm, focus, and restore; it becomes an extension of one’s personality and, at times, a quiet partner in everyday life (Gong *et al.*, 2023; Wang, 2025). For illustration and verification of the results, several representative interior cases were selected from the overall sample (N = 60), chosen for their ability to most fully reflect the identified patterns in the material composition of residential spaces.

Case 1. The apartment has an open-plan layout, with the kitchen, living area, and workspace being combined within a single room. The primary functional elements are located in the room’s perimeter area, leaving a free space for movement in the center. The widths of the paths passing between furniture are at least 80 cm, and the workplace is within the user’s reach (at a distance from 1.2 to 2.0 m).

Case 2. Biophilic organization of the material space. Elements of biophilia are presented in the form of natural wooden finishes in the floor covering and furniture, plants in the space with natural lighting, and the use of natural textures in textiles. The placement of plants near space of prolonged use (living space, workspace) ensures the presence of a constant background for the senses, which positively affects the perception of spatial comfort. In the analyzed examples, the biophilic elements not only play the role of decoration but also regulate the emotional state.

Case 3. Functional interaction scenarios with the material environment. The interior is structured according to three basic scenarios: active (work, cooking), restorative (rest, relaxation), and transitional (movement, storage). These scenarios are facilitated by the corresponding set of objects positioned in the user’s natural reach. This

allows for seamless transitions between activities and maintains the natural logic of the environment.

Thus, the visual materials (plans, photographs, analytical diagrams) are not used just as illustrations but as an analytical complement to the study's quantitative and qualitative results, providing clear visual verification of the findings.

5. DISCUSSION

The results suggest that the material composition of residential space should be seen not as a set of individual objects, but rather as a system of interactions between humans and their environment. In this study, such a system is operationalized through the analysis of media cases of modern interiors (2021–2025), including object types, location rules, the presence of biophilic elements, visual density levels, and scenario-based spatial usage. Such parameters serve as the basis of the following conclusions, whereas interpretations of the impact of these parameters on user experience are based on interdisciplinary literature. This happens not abruptly or deliberately, but on the level of habit: how easily we sit down at the table, where our hand naturally reaches or whether we want to linger in a room for a few more minutes simply because it feels good to be there.

This view of space as an active participant in human life aligns with the approaches of Rui and Firzan (2025), Gong *et al.* (2023), and Zhao *et al.* (2023). The analysis of the content revealed that, in most cases, the material environment is organized based on recurring functional scenarios rather than static compositional principles. More specifically, it was revealed that there are stable scenarios of use, such as working, resting, dining, and temporary transformations, all present in a single space, designed with the help of mobile elements. This means that the scenario-based approach is the most widely used in modern residential interiors, but this is based on the analysis conducted in the present paper, not on an analysis of existing theories.

The quantitative indicators used in this study, such as the percentage of interiors with biophilic-minimalist features and the object ratio, are descriptive in nature and are employed to detect structural trends in the media-case sample. They are not intended for statistical generalization on the level of user behavior and psychophysiological responses, but rather are indicators of the prevalence of certain spatial solutions. In this regard, the values of correlation (r ; p) cited in the text should not be considered as experimental measurement results, but rather as a tool for comparing the observed structural trends with the results of previous empirical studies cited in the literature.

The construct of space as a cognitive-sociological ecosystem, as used in this study, is based on a synthesis of the results of this study and the theoretical models of space as proposed by Demirkan *et al.* (2016), Gong *et al.* (2023), and Zhao *et al.* (2023). Based on the results of case analysis, three interrelated levels of the cognitive-sociological ecosystem of residential space were identified: the object-functional, the sensory-material, and the scenario-temporal levels. It is the combination of these levels, rather than any of them separately, that can be regarded as a holistic model of modern residential space, representing a generalization of the results of the study.

The presence of biophilic-minimalist solutions in the sample, as a constant variable, represents an empirical fact identified within this analysis. The conclusions regarding the potential impact of biophilic-minimalist solutions on attention restoration, sensory load reduction, and comfort enhancement were drawn based on a comparison of the findings from this research with the results of independent studies (Lee *et al.*, 2017;

Zhao *et al.*, 2022; Kim and Park, 2025). As a result, user experience was not directly measured within this research; rather, it was indirectly identified based on the interpretation of spatial characteristics, as suggested by experimental studies.

Special attention is drawn to the identified factor of so-called “intuitive access zones,” which are objects within the predictable reach of the user. The empirical basis for the systematic occurrence of the media cases lies in the analysis, and the theoretical basis for the effects of predictability and control can be found in the theories of affordances (Gibson *et al.*, 1979) and contemporary empirical research in spatial cognition (Choi *et al.*, 2023). This approach avoids ascribing psychological effects without a corresponding methodological foundation.

The impact of technologies and tools on residential environment design is also evaluated from the point of view of the study results and literature. In the course of the analysis, an increasing trend of using digital modeling and scenario planning in spatial planning was identified as part of the design stage. Conclusions on improved user satisfaction are based on external sources (Slater and Sanchez-Vives, 2016).

A significant point that should be addressed is that of the relationship between the architect’s creativity and algorithmic solutions. Based on the results obtained, it can be stated that algorithmic solutions, such as digital models and scenario simulations, are becoming more and more significant when it comes to optimizing the functional characteristics of space, whereas the final form of the material space still largely relies on the designer’s interpretation and particular context. This makes it possible to speak of contemporary residential interior design as a hybrid model, where algorithmic solutions provide a framework and creativity determines the quality of the space.

In summary, the discussion shows that residential space in modern society can be adequately characterized as a multi-level ecosystem in which objects, materials, lighting, and usage scenarios constitute an integrated structure. At the same time, it should be noted that the results of the current study are restricted to the analysis of interior representations in media, and it is not possible to make direct conclusions regarding the subjective experiences of users without additional research.

6. CONCLUSIONS

The goal of this study was to reveal structural patterns in the material composition of modern residential spaces and to examine the implementation of these patterns in real interior solutions. The results were synthesized in accordance with the set goals and formulated hypotheses, making it possible to distinguish between empirical findings and interpretive generalizations. The analysis of the material environment of 60 media cases of residential interiors revealed that the material environment in contemporary residential spaces acts as a systematically organized level, rather than a set of individual design decisions. The empirical analysis provided evidence of specific configurations in the arrangement of furniture, functional spaces, and material accents, which are directed toward the scenario of daily usage. Therefore, the material composition is integrated within the spatial logic of the residential space and cannot be reduced to merely decorative and/or utilitarian purposes. This is one of the main findings of the research.

The results showed that a decrease in object density and the application of restrained material and color solutions are related to a more ordered spatial structure of the interior. The above-mentioned quantitative ratios, recorded during the observation (e.g., the proportion of dominant colors and objects), are applied in this research only as analytical tools for comparing cases and are not considered as standards. The correlation

between simplified material structures and their effectiveness ($r = 0.68$; $p < 0.01$) is a direct outcome of this research and confirms the hypothesis that moderate object density is preferable in residential spaces.

The analysis helped reveal the role of adaptability in the material layer, especially in small apartments, and the empirical research demonstrated that multifunctional elements, mobile partitions, and furniture solutions facilitate overcoming spatial limitations that are typical for small apartments. It should be emphasized that these findings are not based on descriptions of user experiences but are grounded in the analysis of spatial characteristics and logic of object usage that have been recorded in cases and empirical research. Therefore, the above-mentioned statement can be considered analytical rather than declarative in nature. In the current research, the idea of an interior as an ecosystem has been formulated into a generalized model that integrates the results of the research. The solutions of spatial planning, material composition, and sensory-material properties are viewed as interrelated elements of a unified system. The changes in one system necessarily influence the operation of the other systems, as confirmed in the comparative case analysis. In the current research, the ecosystem approach is not a metaphor but a tool for systematic organization of the results.

It should be noted that the study is careful to avoid making specific claims about the psycho-emotional experiences of the user, and assessments of comfort, control, and stress reduction are not based on a direct analysis of the media cases, but rather on what they might imply as a consequence of the observed spatial-material patterns. This is done to avoid any form of methodological overreach and maintain the rigor and validity of the scientific generalizations. The contribution of this research to science is in developing and checking a method for analyzing the material layer of interior spaces in residential buildings using quantitative and qualitative parameters without reducing architectural solutions to strict algorithms. The model offers possibilities for revealing patterns in modern residential space while leaving room for the architect's personal creative decisions.

The guidelines for further research follow naturally from the limitations of this study. The sample size and lack of direct behavioral and biometric measures suggest the need for further research to test the observed patterns on a wider scale. The most promising prospect is the integration of spatial-material analysis with user experience assessment tools, enabling a deeper exploration of the interrelation between residential organization and the daily practices of its users.

In conclusion, it can be argued that the physical environment of modern housing is not only composed of various visual decisions but also represents a well-structured system that has the potential to support the functional and spatial/sensory balance of living spaces. This constitutes its key role in shaping the quality of the residential environment and highlights its potential for further interdisciplinary research.

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