

# Sustainable Integration of Interior, Structural, and Architectural Design in Residential Buildings

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**Abstract** This study investigates the relationship between interior and architectural design, emphasizing the importance of collaboration in achieving functional, aesthetic, and sustainable spaces. Falling under the descriptive research category, both descriptive and analytical survey methods were used to examine current design practices and the degree of correlation between integration, functionality, and user satisfaction. A review of seven previous studies provided a theoretical foundation, highlighting the interdependence of interior and architectural design across various contexts. These studies addressed disconnections between exterior and interior design, holistic approaches to design implementation, the role of technology in enhancing collaboration, and the cultural dimensions of integration. Case studies of residential, institutional, and cultural projects revealed that integrated design enhances spatial balance, sustainability, and user experience. Survey results from design professionals showed a strong awareness of the value of collaboration between interior designers and architects. Participants emphasized that lack of coordination negatively affects functionality and harmony, underscoring the need for structured, early-stage teamwork. The findings indicate that achieving coherent and sustainable design requires collaborative workflows, client participation, and the use of real-time digital tools. This study contributes to the field by proposing a framework for interdisciplinary

collaboration, bridging the persistent gap between architecture and interior design. Practical implications include developing formal guidelines and training programs that foster integration between design disciplines, while social implications relate to enhancing user satisfaction and environmental quality through holistic design practices.

**Keywords** Integrate Interior, Sustainable, Residential Structures, Architectural, Technical Practices

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## 1. Introduction

The integration of architectural and interior design is of crucial importance in achieving functional, aesthetic, and structurally sound residential buildings. Yet, these disciplines are often treated as separate processes, which can lead to inefficiencies and disjointed spaces that fail to meet residents' needs. In residential contexts, where functionality and aesthetics impact people's daily lives and quality of life, establishing a strong relationship between architects and interior designers is crucial to achieving cohesive and sustainable results. In addition to the idea of collaboration having value, previous studies have provided little investigation into how demographic factors influence

perceptions of such integration in residential buildings. This study addresses that gap through the investigation of the impact of demographic factors on perceived cooperation between architectural design and interior design in relation to functionality, beauty/aesthetics, and structural safety.

## 2. Research Hypothesis

The study evaluates the effect of demographics (gender, age, occupation) on the study sample's perception of certain aspects of residential design. The study proposes the following hypotheses: Hypothesis 1 indicates that demographics will affect perceptions associated with improving the functions of a residence through cooperation between the architectural designer and the interior designer. Hypothesis 2 indicates that public perceptions that the aggregate of architectural appearance is disintegrating because of the role separation between the architectural designer and the interior designer are also affected by demographics.

Hypothesis 3 examines whether demographic factors impact the perception of the compatibility of form and function in residential buildings, which results from collaboration between the two design specialties. Hypothesis 4 focuses on how demographic factors influence the perception of achieving a scientific approach in residential construction through the integration of architectural and interior design. Hypothesis 5 posits that an increased perception of improved residential functions due to cooperation between architectural and interior designers leads to greater behavioral intentions toward future cooperation. Hypothesis 6 suggests that greater awareness of structural disintegration in the architectural appearance, caused by the separation of roles between the designers, increases the likelihood of future cooperation. Hypothesis 7 argues that increased awareness of the harmony of form and function in residential buildings, resulting from collaboration between the two design specialties, leads to a higher rate of behavioral intentions to cooperate in the future. Finally, Hypothesis 8 asserts that greater awareness of the achievement of scientific methods through cooperation between architectural and interior design leads to an increase in behavioral intentions to continue this cooperation in the future.

## 3. Literature Review

The study adopts a mixed-methods approach, using quantitative data collected through samples and statistical analysis of research tools like questionnaires, and qualitative data to examine the integrative relationship between architectural and interior design. It focuses on three main areas: first, the concept of "systems" as a procedural link between the two design fields and its

impact on the design process; second, the principles needed to achieve unity between architectural and interior design in residential buildings; and third, an analytical study of design elements within integrated systems to enhance functionality and spatial coherence.

### 3.1. Study of Systems and Analysis of Their Procedural Concepts

The primary focus of this study is on the notion of "systems" as a gap between interior design and architectural design, with knowledge about integration and impact on design for the study sample.

#### 3.1.1. System Design and Classifications

System design is described as a well-structured system to organize and coordinate the actions of interior designers and architects in order to attain unified results. It entails the establishment of functional and aesthetic objects in a space and the harmonization of the two disciplines in an integrated process. In system design, the individual components or subsystems that interact dynamically to attain certain objectives are known as systems. Such systems could be categorized according to their complexity (simple or complex), purpose (functional, aesthetic, and both), and range (local or global integration) [1]-[3]. Just as stressed in [4], systems are made up of interrelated parts, which serve the general purpose as well as the overall operations of the entire system. Such components in the system interact dynamically and exchange their inputs and outputs to achieve certain objectives [5]. The definition highlights the fact that a system is not just a collection of distinct components- it is a coordinated interrelationship of components that interact and communicate with each other so as to produce the intended results [6]-[8]. The principles of integrated system design between architectural and interior practice, as noted in [9], [10], include the establishment of smooth transitions between exterior and interior spaces, functional cohesion through effective layout and arrangement, and spatial hierarchy to improve the user experience. The concepts further support the use of technology to enhance functionality and efficiency, promote a shared design effort between architects, interior designers, and stakeholders, adhere to regulatory standards, and seek innovative ways to address issues within legal guidelines [11], [12].

#### 3.1.2. Types of Systems and Their Applications in Interior Design

Interior design utilizes many systems that can help create a functioning space, a comfortable environment, and an aesthetic visual vocabulary, such as spatial systems (layout and flow), lighting systems (function and mood), and HVAC systems (temperature control and air quality). Once the designer applies and integrates these three systems in a manner that delivers an integrated design and does so as a unified space, the designer has a stronger

understanding of how all of the systems work individually and as an integrated whole system to satisfy the needs of the space. In this application, these systems in interior design communicate a higher level of understanding of the organization, development, and full integration of design features into the built environment [13]-[15]. In anchoring these systems and corresponding products in an integrated interior design product, designers must consider the synthesis of system features, system features and subsystems, core systems, as well as the continuum of systems such as open systems, closed systems, and isolated systems. When designers take into consideration user needs and preferences, technical and other constraints are effectively solved for the effective creation of productive and effective interior realities [16].

### 3.1.3. Study and Analysis of Integrated Systems between Interior and Architectural Design

Integrating the design systems of interior and architectural design is essential to designing functional and aesthetically pleasing spaces. This study aimed to investigate separating interior design and architectural design, and the effect of that separation, which can result in numerous inefficiencies, such as structural compromise or competing aesthetics [15]. From our research, we concluded that collaborating as a team with a designer from each discipline could provide more capable space planning, enhanced material selection, as well as shared design intent. An integrated systems approach allowed the designer and architect to incorporate functional aspects of the space, as well as structural and aesthetic elements in both form and function, creating strong functional performance and aesthetic [17]-[19]. Designers can move forward in the design process, reduce conflicts, and create a level of efficiency through collaborating and planning, and integrating their systems [19], [20].

### 3.1.4. The Role of Industrial Design in Achieving Integration between Architecture and Interior Design

Industrial design describes the process of designing, manufacturing, and assembling materials and components utilized in the development and design of buildings and other structures. This encompasses a variety of products, including doors, windows, facades, roofing systems, prefabricated wall panels, flooring, and custom architectural elements [16]. The focus on industrial design in this study was based on the ability of industrial design to mediate technical performance and aesthetic quality. Although this study focused on architecture and interior design, industrial design is relevant to both in the final assembly of materials, furnishings, and fixtures - ideally within prefabricated assemblies or units. Several examples assist in establishing that industrial design spans scales of the built environment while examining the integration of systems, materials, and environmental systems, such as the use of modular wall panels, façade systems, as well as

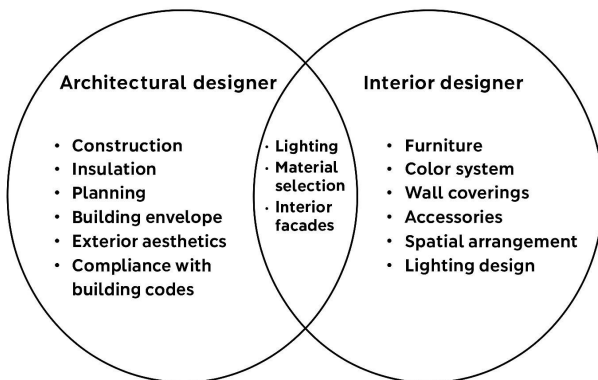
bespoke interior product pieces, indicating that efficiencies in integrated systems lead toward a future built environment design innovation. By recapitulating industrial design, it broadly applies to a mode of collaboration that is beyond the perceived limits of architecture and interiors and demonstrates that multiple inputs transcend the isolated nature of disciplines to achieve tangible results in sustainable residential projects. This study does not position industrial design as a unique field of study but as a supportive discipline with ideas and strategies, as agreed upon by the researcher, to guide and enhance sustainable integration in housing. The goal is to create functional, aesthetic, and durable materials that contribute to the overall architectural vision and meet specified performance standards. It's a mix of craftsmanship with industrial-scale production, which includes sophisticated means involving possible CNC machining, 3D printing, and automation. The benefits of Industrial Design in combining architecture and interiors are that it is able to ensure an equal mixture of aesthetics, functionality, and experience to its users [17], [19]. Industrial Design also bridges the gap between both fields by designing products and components, furniture, lighting, and fixtures, fulfilling the architect's vision in space and function [20], [21]. In identifying materials and being creative in the design, the Industrial Designer can help ensure that the user experience with the interior elements represents the architectural style and exhibits an image of unity in the space [20], [21]. Industrial Design has been useful to align both Architecture and Interiors by developing products that relate both fields together in an easier way, for instance, architecture and manufacturing working together in the design-assist process to generate unified solutions in space. On the one hand, [22] has been cooperating with architects to fix the problem with the facade detailing to make the structural parts correspond with both the beauty and usefulness requirements [23]. Furthermore, sustainable building design considers several facets from magnetic orientation of convection in the building to insulation in floors, walls, and roofs, and ventilation [18]. The Canyon View High School by DLR Group is a great example where integrated design was used successfully. The combined approach resulted in home and interior design working and feeling useful and engaging [18]. While this is not a residential project, it could be used to illustrate how the concepts of integrated design can be applied to residential buildings, and how the relationships can support harmony, function, and balance between spaces and purpose.

## 3.2. Principles of Achieving Unity between Architectural and Interior Design in Residential Buildings

This investigation considers first principles for reconciling architectural and interior design in residences, particularly motivated by integrated design.

### 3.2.1. Residential Building Design

The design of residential buildings relates to the integration of architecture and interior design, which can also be considered a prerequisite. Design recognizes the creation of space and spatial experience that meet the needs of independent humans and promotes awareness of the structural safety of the building, a consideration of the architecture, and whether it meets the general requirements to be aesthetically pleasing. Based on findings reported in [24]-[27], there are complicated interactions among the key players (i.e., the core players are stakeholders in the design process: designers, owners, and regulatory frameworks). The interactions and roles of the players create a potential risk of conflict and reduce successful outcomes, so understanding the roles and limitations of each player is vital. The authors also discussed the implications of interior design on the success of the interior and exterior architectural environments of detached residential buildings from the Nablus study [25]. The study discussed in Figure 1 considered the roles of various stakeholders, including designers, owners, and regulatory frameworks that must exist to ensure that the competing expectations in the design processes do not result in efforts that lead nowhere.



**Figure 1.** The importance of understanding the roles of different stakeholders—designers, owners, and legal frameworks [25]

### 3.2.2. Interior Harmony in Design

Interior harmony is the collaboration of any two elements, consisting of the spatial organization of the building and its aesthetic quality. To achieve interior harmony, the appropriate pacing of the formal qualities of architecture (i.e., walls, windows, and door openings) should align with the interior design, such as color systems, textures, and furnishings. When architectural form and interior design elements are seamlessly integrated (systematic coincidence), this space could be perceived as compatible and complete, allowing for full functioning and impression. Conversely, the role of interior design in shaping and defining the content and efficacy of architectural spaces is now focused on the direct and indirect effects of interior design. Each interaction between

the architectural design and interior design is influential in shaping the residential built experience. In this paper, we will address how the two facets of the design process between architecture and interior design demonstrate comfort of the user's residential environment, ease of use, and previous satisfaction. Much of this will be discussions of all considerations, such as spatial flow, natural light, ventilation, and acoustic properties, that shape operationally, will develop and sustain a better living environment.

Interior design plays a significant role in the success of the architectural spaces [27]. The exploration of interior design, including colour systems, textures, and furniture, in relation to architectural details, such as walls and windows, contributes to how the user experience is affected. They highlight the importance of flow through spaces, natural light, airflow, and acoustics to enhance comfort and satisfaction for residents in residential spaces [25], [27], [28]. The mixture produces a pleasant space that is functional and beautiful.

### 3.3. An Analytical Study of Design Elements within the Framework of Formulating Integrated Systems

An analysis of both design elements shows how they set and enhance integrated systems, particularly as the analysis looks at how the individual parts come together and produce design options and solutions that are unified.

#### 3.3.1. Analytical Examination of the Components of Integrated Systems in Local Architecture

Integrated systems in local architecture involve architectural elements, such as design and materials, and three-dimensional characteristics with cultural and environmental factors. While the analysis shows integrated systems, it highlights how local systems adjust to a local context while consciously engaging with a cultural context when addressing modern design challenges.

For example, traditional Middle Eastern architecture with modern design elements, such as courtyards and wind towers, shows, in local building contexts, a means of evolving building projects that are focused on sustainability and comfort [25]-[29]. This kind of integrated system illustrates how local architectural systems are aware of and adaptive to the climate of the environment, while evolving expressions of cultural identity and aesthetic values [29].

#### 3.3.2. The Impact of Art and Kinetic Architecture on Achieving the Concept of Integrated Systems

Art and kinetic architecture are both aspects of integrated design systems and have an impact on their development. Art enhances overall aesthetic values, while kinetic architecture introduces movement and change into the static nature of architecture. Art and kinetic architecture aim to develop an integrated design where visual form,

function, and temporal technological adaptations are combined to enhance user experience and environmental responsiveness. Kinetic architecture in contemporary architecture describes how and where art provides kinetic qualities to architecture, specifically visually and experientially in a space [30], [31]. The authors discuss developments that demonstrate a kinetic type of design in public buildings, where the design and architecture include artistic expressions such as a moving sculpture or a facade that changes to provide an alternative form of use for the building, creating a dynamic, interactive space. These dynamic aspects of design provide experiences of spaces that transform and allow the space to respond to changing needs [30], [31]. The photos in Figure 2 demonstrate the Sharifi house in Iran with Kinetic Facades at multiple angles.

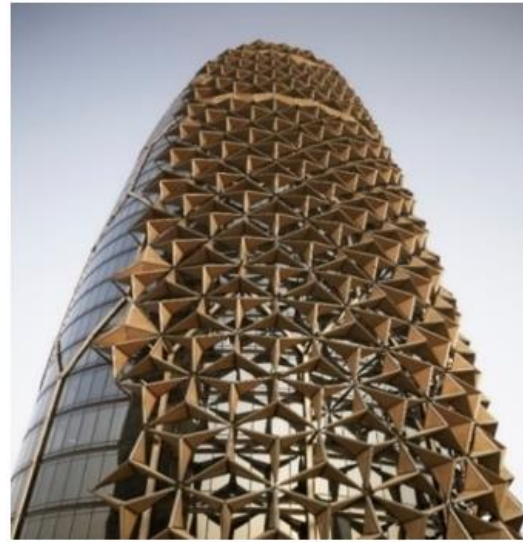


**Figure 2.** Sharifi House in Iran with Kinetic Facades

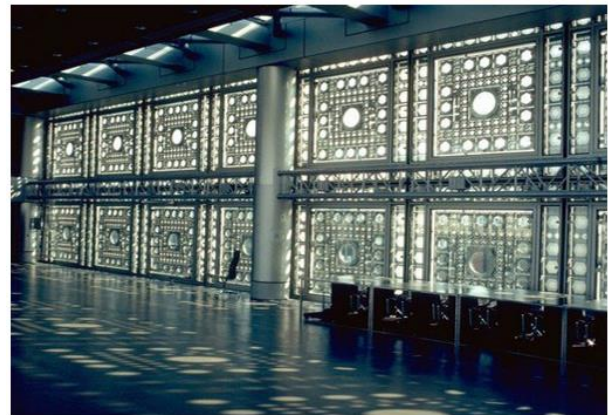
### 3.3.3. Study of the Procedural Aspects of Applying the Concept of Integrated Systems in Design

This section focuses on the practical application of integrated systems in architectural design. It examines the procedural steps required to integrate different design elements, from conceptualization to execution. The study highlights the challenges and strategies involved in creating cohesive systems that improve both functionality and aesthetics, ensuring that architectural and design components work together efficiently. Some elements illustrate how the integration of functional considerations and the exterior structure can enhance the overall design and user experience of interior spaces. One example is the mashrabiya. The concept of mashrabiya as architectural models aligns with the characteristics of Arab countries, especially due to the intense heat and light in some Arab and Islamic regions [24], [32]. It is considered a successful architectural solution for regulating temperature and light in Islamic architecture. The mashrabiya connects the interior to the exterior in a unique way [5], [33], [34], fulfilling the required function of reducing the intensity of incoming light, allowing air to penetrate to ventilate the interior space, while maintaining privacy for the users. This is achieved by controlling the spacing of the openings. Figures 3 and 4 show some contemporary buildings

influenced by the philosophy of the mashrabiya, incorporating modern technology.



**Figure 3.** The Sea tower



**Figure 4.** The Interior of the Arab World Institute

## 4. Research Methodology

The study employs a mixed-methods approach, combining both quantitative and qualitative research methods. The quantitative method involves distributing questionnaires to gather data from a broad sample, enabling statistical analysis of perceptions related to the integration of architectural and interior design in residential buildings. The qualitative method, on the other hand, includes in-depth interviews with experts to gain qualitative insights into the practical realities, benefits, challenges, and future potential of integrating architectural and interior design. This combined approach aims to comprehensively address the research objectives and test hypotheses about the collaboration between architectural and interior design in residential projects. The quantitative

study was conducted through an electronic questionnaire distributed to a sample of 393 individuals, which included 81 interior design professors, 67 interior design students, 56 architects, 54 architecture students, 44 interior designers, 35 architecture professors, 24 contractors, 21 real estate marketing workers, and 11 individuals from various other fields such as pharmacy, electronics engineering, and students from diverse disciplines. The qualitative study involved 14 respondents, all Jordanian university professors specializing in architecture and interior design. The electronic questionnaire covered six key topics: improving residential functions through cooperation between architectural and interior designers, structural disintegration due to the separation of their roles, harmonizing form and function in residential construction, the scientific foundations of architectural and interior design, behavioral intentions related to future cooperation, and the demographic characteristics of the study sample. The interviews included 23 questions focused on six main axes: integrating architectural creativity with the functional aspects of interior design, the pillars of integration such as educational programs and innovations, obstacles to cooperation, the effects of integration on aesthetic culture, strategies to enhance communication, and the demographic characteristics of the respondents. The study data were analyzed using the SPSS program and various statistical methods, including Cronbach's Alpha, arithmetic means, standard deviations, statistical frequencies, t-tests, and one-way ANOVA tests.

## 5. Analysis and Discussion

One of the residential buildings that applied the procedural aspects of integrated systems is the Abu Samra House, located in Amman, Jordan. This project, developed by Symbiosis Designs for Mr. Ma'rouf Abu Samra, spans a total area of 1,300 square meters and was completed in 2008. The design emphasizes simplicity, with the main concept stemming from the site's terrain, orienting the structure toward key landscapes and organizing it into two main zones: one for private use and another for hosting guests. The design consists of two cubic masses carefully positioned to preserve the site's natural terrain. These two volumes are connected by a freestanding wall that serves as a visual axis and focal point. The northern mass is rotated westward to maximize views of the surrounding landscape, while the recessed entrance is highlighted by the forward placement of the freestanding wall. The following Figures 5 and 6 illustrate the concept of the Abu Samra House.

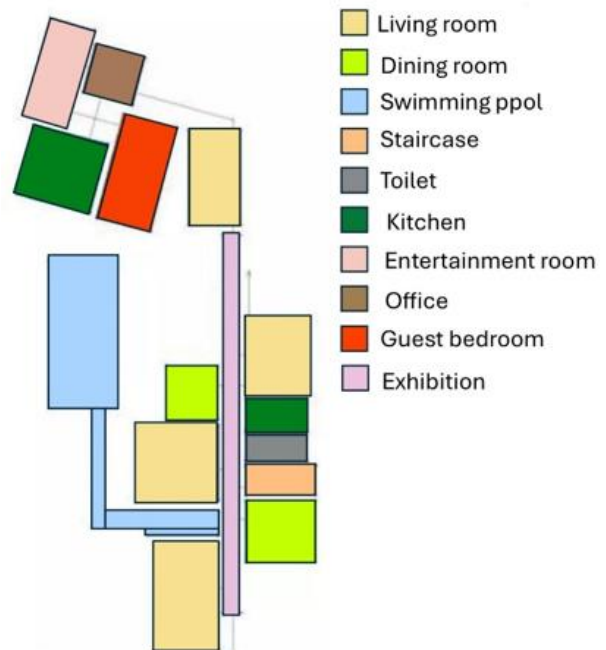


Figure 5. Zoning of Abu Samra House

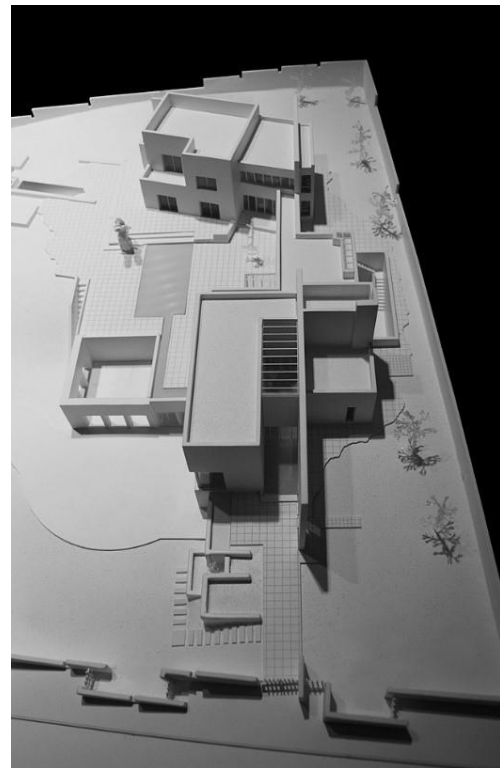
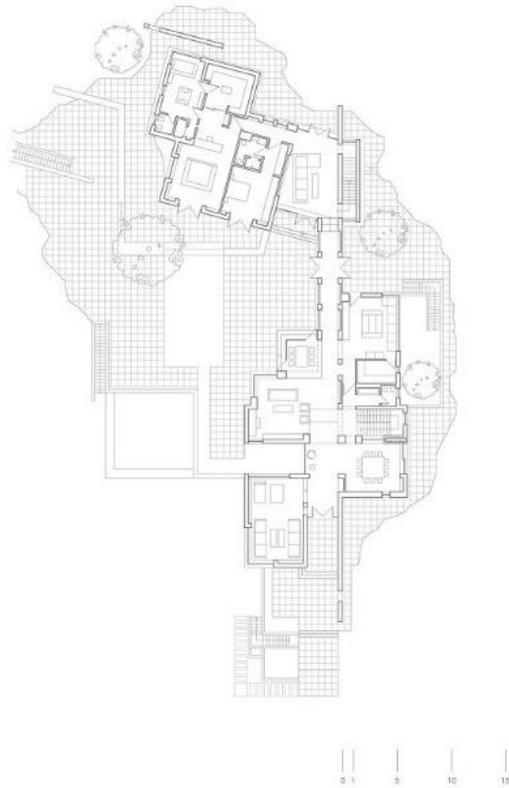


Figure 6. 3D Plan concept of Abu Samra House

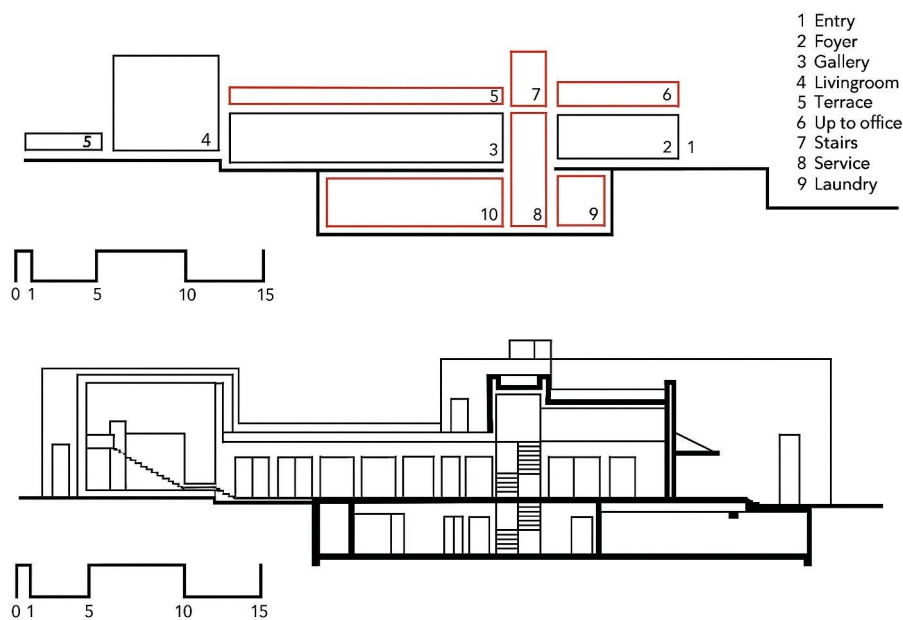
The building conveys a sense of simplicity, a dry climate, and a touch of mystery. The visual axis (corridor) was designed as part of the architectural concept, serving as a transitional element to connect the two main groups and establish a sense of hierarchy. Figure 7 illustrates the horizontal plan of the Abu Samra House.



**Figure 7.** The horizontal plan of the Abu Samra House

This architectural plan of the Abu Samra House in Jordan demonstrates a thoughtful layout that maximizes functionality and aesthetic appeal. The layout consists of zones with clear separation of living spaces. The use of open plan spaces combined with the location of rooms promotes natural light and airflow throughout the house. Integration of outdoor spaces into the cumulative domestic spaces creates a connected flow that allows occupants to engage with their outside environments. Courtyards and terraces function as private outdoor spaces, which encourage living with nature while improving overall livability and comfort. The body's movement and circulation, as detailed in the plan, are conducive to an efficient and comfortable experience of living linked through pathways from the various areas of the living space. The design described works in conjunction with the landscape, and the materials and methods implemented were very particular to the environment, creating a sense of beauty within the house as well as a consciousness of one's home as its environment. Figure 8 illustrates one section of the horizontal plan of the Abu Samra House, highlighting the divisions of the zone.

The Abu Samra House site indicates that the exterior components of the house were designed with local climate in mind, to augment the architectural design and the interior design of the house itself. Shading devices, deep overhangs, and recessed windows helped shield the interior from the sun, minimizing radiant heat gain and reducing the need for climate control (a real necessity in a hot, humid place like Jordan). Similarly, locally sourced and locally appropriate climate materials not only contribute to the strength and sustainability of the house but also provide a visual link with the surrounding natural habitat.



**Figure 8.** A section of the horizontal plan of the Abu Samra House, highlighting the division of zones

The architectural design emphasizes geometric forms and clean lines of contemporary architecture. The landscaping and courtyards help draw the boundaries between the outdoors and indoors of the home, while the interior design emphasizes this sensibility with large windows and open spaces to draw natural light in and provide expansive views of the surroundings, to create a cohesive and unified living space. The house balances privacy with openness: the public-facing facades' higher walls stay blank for privacy, while the other facades roll back to engage the landscape and scenery. The exterior surfaces are coated with waterproof earth-colored plaster, which is unusual, as the site is often rich with stone. Notably, this house was one of the first to adopt sustainable design strategies, setting a benchmark for future architectural projects in the region. Figure 9 showcases the exterior of Abu Samra House. While Figure 10 showcases the interior of Abu Samra House.



**Figure 9.** Different Exterior Shots of Abu Samra House



**Figure 10.** Different Interior Shots of Abu Samra House

Openings are positioned according to their function. The first type of openings, located along the corridor and at its end, showcases the surrounding landscape. The second type, found at the corners, reveals the thickness of the house's external walls.

The building exemplifies effective integration between interior and architectural design, particularly through material selection and spatial configuration. The architectural form and interior spaces are harmonized, establishing a coherent and continuous relationship between the two domains. The massing strategy and the articulation of openings reflect contemporary design principles adapted to the Jordanian context, while maintaining sensitivity to the site's topography. The elongated horizontal forms align with the natural contours of the terrain, promoting architectural cohesion with the landscape. This integrative approach extends to interior spatial arrangements, which are informed by the external architectural forms. Open and fluid interior layouts correspond to the exterior geometry, reinforcing the functional and visual continuity between indoor and outdoor environments.

## 6. Results and Proposal Framework

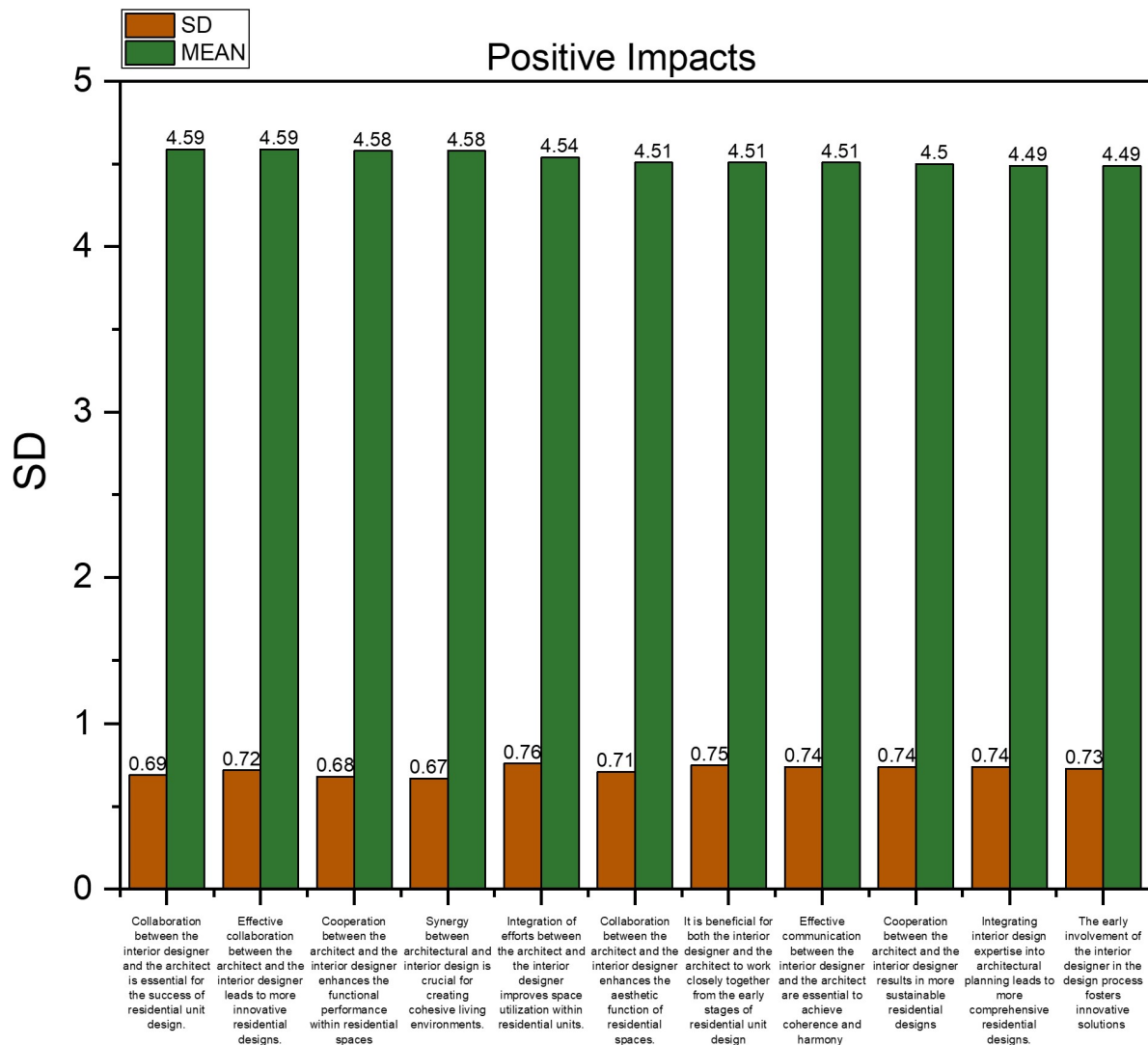
As listed in Table 1, the results of the statistical analysis revealed that the overall rate of the study sample's awareness of the improvement in residential functions through cooperation between the architectural designer and the interior designer was significantly high ( $M = 4.58$ ). Figure 11 shows the Positive Impacts (Manifestations of Improved Residential Functions) according to SD and Mean.

Additionally, as listed in Table 2, the awareness of the negative effects resulting from the separation between the two designers ranged between ( $M = 4.51$ ) and ( $M = 4.35$ ), all of which were notably high. Figure 12 shows the negative Impacts (Structural Disintegration) according to SD and Mean.

As listed in Table 3, the study also found that the sample's awareness of the positive effects of cooperation between the architectural and interior designers was equally high, with values ranging from ( $M = 4.44$ ) to ( $M = 4.61$ ). Figure 13 shows the Alignment Between Form and Function according to SD and Mean.

**Table 1.** Positive impacts of the study samples

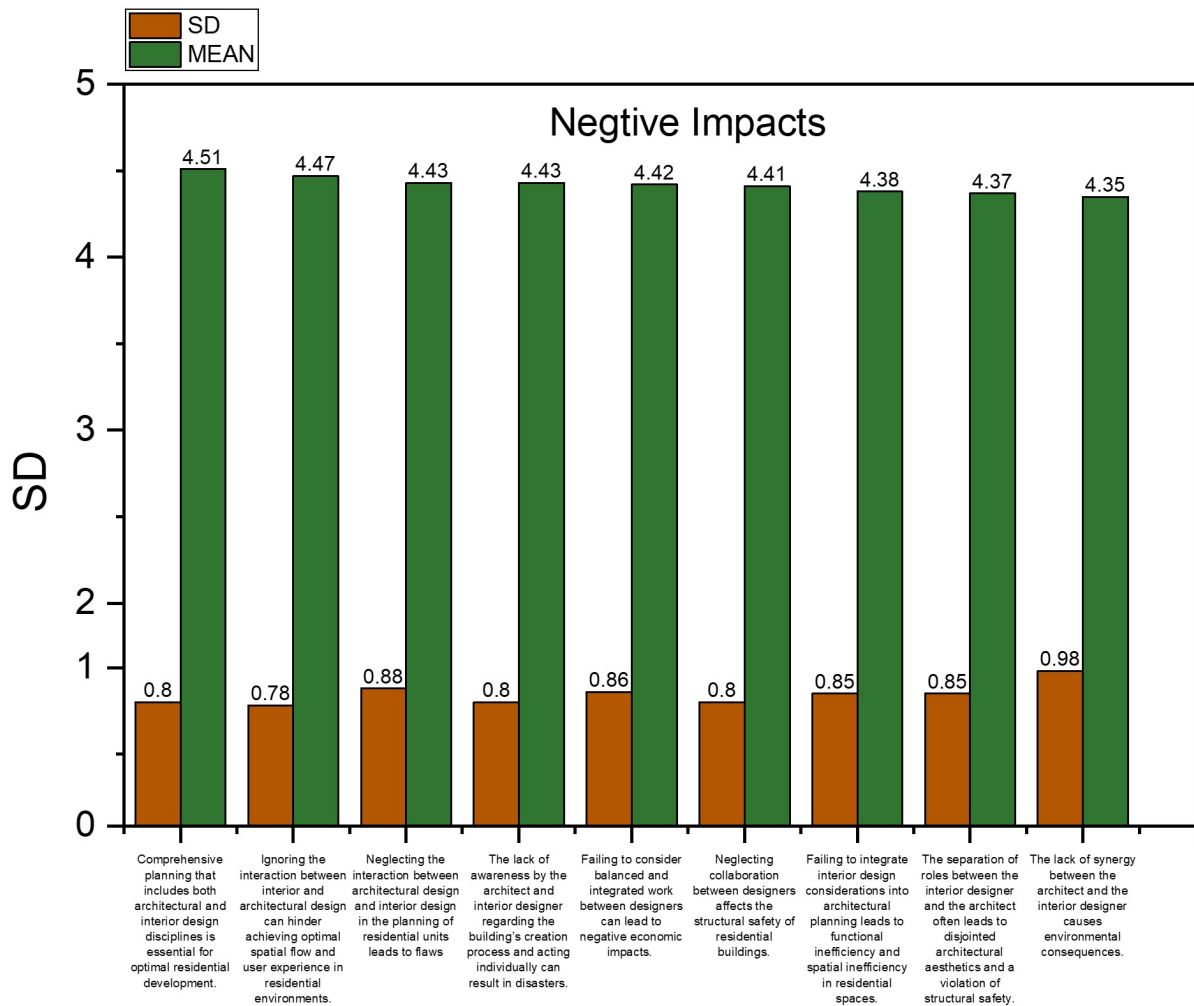
N	Positive Impacts (Manifestations of Improved Residential Functions)	SD	MEAN
1	Collaboration between the interior designer and the architect is essential for the success of residential unit design.	0.69	4.59
2	Effective collaboration between the architect and the interior designer leads to more innovative residential designs.	0.72	4.59
3	Cooperation between the architect and the interior designer enhances the functional performance within residential spaces.	0.68	4.58
4	Synergy between architectural and interior design is crucial for creating cohesive living environments.	0.67	4.58
5	Integration of efforts between the architect and the interior designer improves space utilization within residential units.	0.76	4.54
6	Collaboration between the architect and the interior designer enhances the aesthetic function of residential spaces.	0.71	4.51
7	It is beneficial for both the interior designer and the architect to work closely together from the early stages of residential unit design.	0.75	4.51
8	Effective communication and teamwork between the interior designer and the architect are essential to achieving coherence and harmony in design for residential projects.	0.74	4.51
9	Cooperation between the architect and the interior designer results in more sustainable residential designs.	0.74	4.50
10	Integrating interior design expertise into architectural planning leads to more comprehensive residential designs.	0.74	4.49
11	The early involvement of the interior designer in the design process fosters innovative solutions and creative use of space in residential units.	0.73	4.49
<b>General Rate</b>		0.589	4.58



**Figure 11.** The Positive Impacts (Manifestations of Improved Residential Functions) according to SD and Mean

**Table 2.** Negative impacts of the study samples

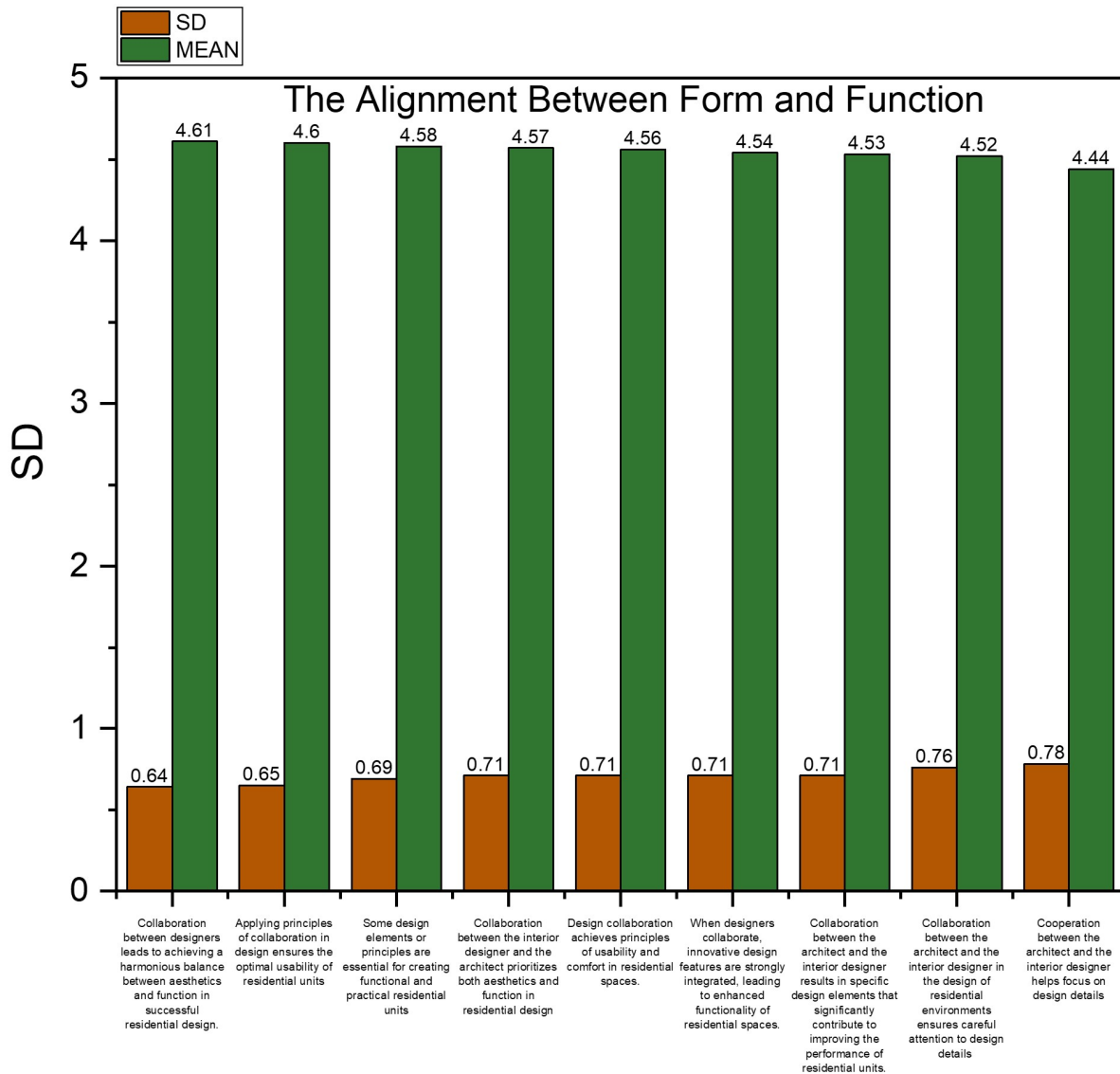
N	Negative Impacts (Structural Disintegration)	SD	MEAN
1	Comprehensive planning that includes both architectural and interior design disciplines is essential for optimal residential development.	0.8	4.51
2	Ignoring the interaction between interior and architectural design can hinder the achievement of optimal spatial flow and user experience in residential environments.	0.78	4.47
3	Neglecting the interaction between architectural design and interior design in the planning of residential units leads to flaws.	0.88	4.43
4	The lack of awareness by the architect and interior designer regarding the building's creation process and acting individually can result in disasters.	0.8	4.43
5	Failing to consider balanced and integrated work between designers can lead to negative economic impacts.	0.86	4.42
6	Neglecting collaboration between designers affects the structural safety of residential buildings.	0.8	4.41
7	Failing to integrate interior design considerations into architectural planning leads to functional inefficiency and spatial inefficiency in residential spaces.	0.85	4.38
8	The separation of roles between the interior designer and the architect often leads to disjointed architectural aesthetics and a violation of structural safety.	0.85	4.37
9	The lack of synergy between the architect and the interior designer causes environmental consequences.	0.98	4.35
<b>General Rate</b>		0.688	4.46



**Figure 12.** The Negative Impacts (Structural Disintegration) according to SD and Mean

**Table 3.** The Alignment Between Form and Function

N	The Alignment Between Form and Function	SD	MEAN
1	Collaboration between designers leads to achieving a harmonious balance between aesthetics and function in successful residential design.	0.64	4.61
2	Applying principles of collaboration in design ensures the optimal usability of residential units	0.65	4.60
3	Some design elements or principles are essential for creating functional and practical residential units.	0.69	4.58
4	Collaboration between the interior designer and the architect prioritizes both aesthetics and function in residential design.	0.71	4.57
5	Design collaboration achieves principles of usability and comfort in residential spaces.	0.71	4.56
6	When designers collaborate, innovative design features are strongly integrated, leading to enhanced functionality of residential spaces.	0.71	4.54
7	Collaboration between the architect and the interior designer results in specific design elements that significantly contribute to improving the performance of residential units.	0.71	4.53
8	Collaboration between the architect and the interior designer in the design of residential environments ensures careful attention to design details that enhance both functional performance and visual appeal.	0.76	4.52
9	Cooperation between the architect and the interior designer helps focus on design details, resulting in more functional and aesthetically pleasing residential environments.	0.78	4.44
<b>General Rate</b>		0.688	0.593



**Figure 13.** The Alignment between Form and Function according to SD and Mean

Moreover, as shown in Figure 14, the awareness of the achievement of scientific foundations in architectural and interior design within residential construction due to this cooperation was also high (M = 4.63).

Finally, as shown in Figure 15, the behavioral intentions of the study sample related to cooperation between architectural and interior design were high (M = 4.57).

Based on these results, several recommendations were made. These include enhancing the importance of collaboration between architectural designers and interior designers through educational programs, workshops, and awareness campaigns to promote a better understanding and encourage the adoption of collaborative design practices. It is also recommended to establish clear communication protocols and collaborative guidelines to

ensure seamless cooperation between the two roles, reducing the risk of disconnected designs and structural issues. Utilizing joint design practices from the start of residential projects is very helpful to align functional considerations with aesthetic needs. Participating in joint design processes is an important step, and implementing targeted training programs to engage science in architectural and interior design practice means that core principles will be appropriately adopted. Finally, engaging in associative opportunities and involvement in professional organizations (such as working groups and workshops) will help sustain engagement from architects and interior designers while maximizing opportunities for supportive strategies and positive outcomes that can be anticipated for the future.

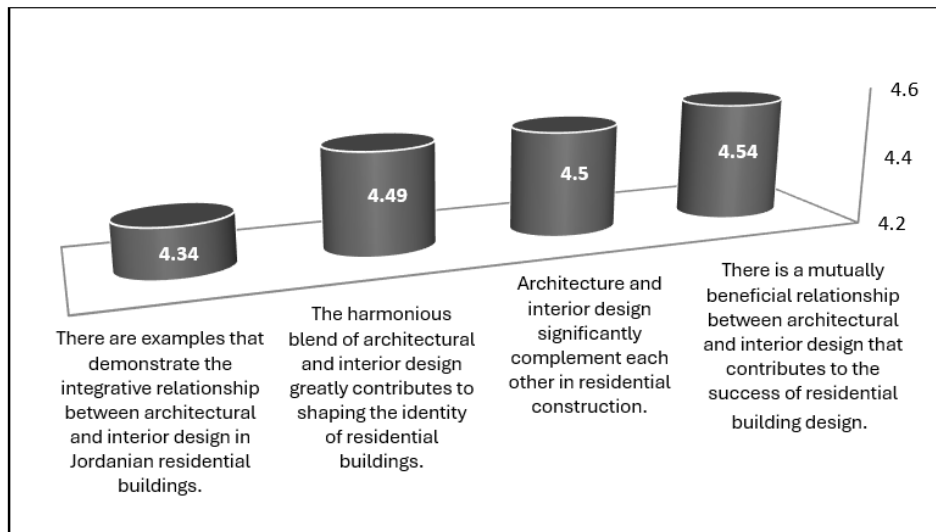


Figure 14. The awareness of the achievement of scientific foundations in architectural and interior design within residential construction

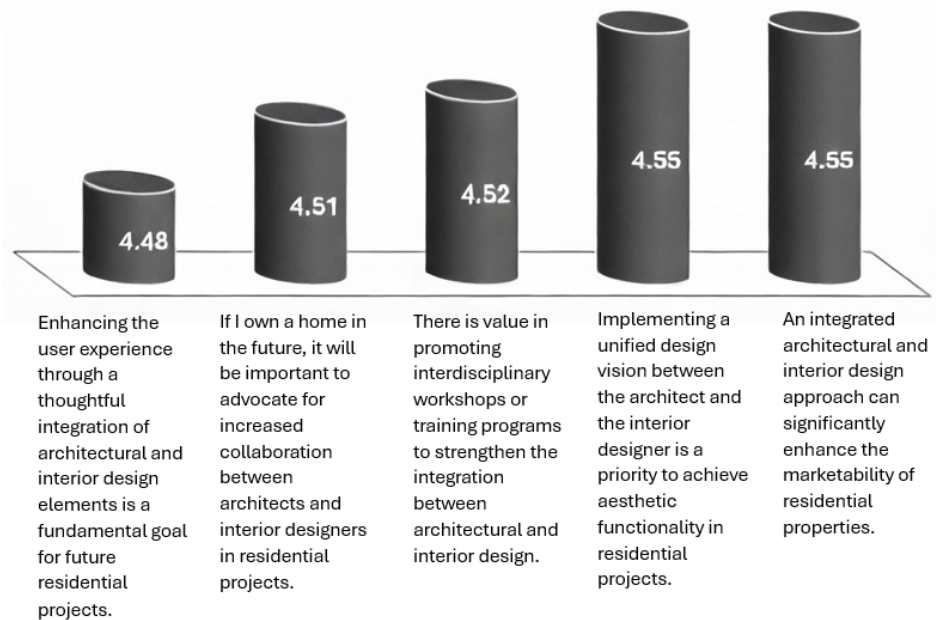


Figure 15. The behavioral intentions of the study sample related to cooperation between architectural and interior design

## 7. Conclusions

This study has demonstrated the importance of integration between architectural design and interior design in order to achieve functionally and aesthetically pleasing, and user-friendly residential buildings. Integrated design can assist in supporting spatial flow functionality, so that spaces feel coherent, perform functionally, reflect holistic design, and maintain aesthetic value, while offering a coherent aesthetic visual experience. There is the ability to convey the proportionality and triangulation of architectural ideas and, as interior ideas are material, an engagement with interior tone or body is instrumental in making them coherent, to retain a high degree of quality in a residential space and to enhance useable quality of space and proper incorporation of user needs, which comes with the issue of sustainability as a goal. The confirmatory factor analysis and variable data have suggested that demographic factors like gender, class/age, and profession are positive and shape perceptions of the overall benefit of integration. There is a need for more specific awareness of the involvement of various stakeholders. Ultimately, a single design perspective provides a dimension of balance between artistic form and functionality, prevents structural disintegration, and enriches the overall residential experience.

## 8. Recommendations

The implications of the study pointed to the need for articulated and context-responsive recommendations for the sustainable integration of interior, structural, and architectural design initiatives for residential buildings. Working toward those recommendations included, first, establishing formal collaboration protocols to address the communication gaps reflected in the survey and case studies for more cohesive team efforts, starting as early as possible in the design process. Second, expanding disciplinary training as demographic differences indicated that students were more prone to collaboration than professionals, with all student groups expressing exposure to collaborative methods, while professionals suffered from experience with only siloed experience. Third, participatory techniques and visualization methods must be normalized in practice, as the study also revealed that active client participation can provide functional and aesthetic coherence. Digital collaborative efforts highlighted in case studies like BIM are consistently positioned as collaborative support; potentially, the largest collaboration potential for residential design requires expansion beyond only larger, more complex projects to include residential-scale projects for efficiency and sustainability. Fourth, the study illustrated material selection to include both context-sensitive and sustainable materials, and case studies documented the parallels between ecological performance and cultural expression.

Finally, demographics also demonstrated that future training and professional development must include various groups so future architects, engineers, energy advisors, builders, code representatives, consultants, as well as junior and senior practitioners, can collectively reinforce collaborative design and build integrated projects.

## 9. Future Work

This study provides a foundational framework for integrating interior, structural, and architectural design to promote sustainable technical practices in residential structures. Future research could explore the following areas to build upon these findings:

1. **Advanced Material Innovation:** Investigating the use of emerging eco-friendly materials and smart technologies for enhanced sustainability and structural efficiency.
2. **Digital Design Integration:** Leveraging advanced Building Information Modeling (BIM) techniques to improve collaboration among architects, structural engineers, and interior designers for more seamless and sustainable design processes.
3. **Performance Evaluation:** Conducting long-term case studies on residential buildings designed using the proposed framework to assess their durability, energy efficiency, and user satisfaction.
4. **Regulatory and Policy Frameworks:** Developing guidelines and policy recommendations to encourage the adoption of integrated design approaches for residential structures.
5. **Cultural and Regional Adaptations:** Exploring how cultural preferences and regional climatic conditions influence sustainable design decisions and their implementation.
6. **User-Centric Innovations:** Incorporating occupant feedback to refine the integration strategies and improve the overall living experience.

By pursuing these future research directions, the integration of interior, structural, and architectural design can be further optimized to create sustainable, efficient, and user-focused residential environments.

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