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Egyptian Residence Architecture Identity Between Contemporary and Originality

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Abstract Some of the Egyptian contemporary residences are designed without considering the traditional architectural elements, resulting in a loss of the country's cultural identity. This not only undermines the preservation of Egyptian culture but also poses a challenge of retaining the cultural identity for future generations. To explore this conflict, this research aims to review the architectural design of selected cases of stand-alone residential units in Egypt, which reflects the contemporary architectural thoughts in Egypt. A research gap can be inferred from the lack of research on the architectural design of contemporary residences in Egypt that takes into account the country's cultural identity. Contemporary architects in Egypt often do not consider the importance of preserving traditional architectural elements in their designs. This research aims to fill this gap by reviewing selected case studies of residential standalone units, which offer customization and an association with affluent lifestyles, facilitating greater expression of the identity of their inhabitants. The case studies will be evaluated based on the criteria provided by Nikos Salingaros' Unified Architectural Theory. This theory's criteria evaluate the case studies based on their Elements of Regional Adaptation Measurement and Elements of Measuring the form Language of Architectural Design and its regional adaptation, and this data is collected through a questionnaire given to a group of architects as a purpose sample. The research concludes that the most successful designs blend traditional architectural values with contemporary styles, resulting in a harmonious balance between the past and present, by preserving traditional elements while incorporating modern functionality creating the visually appealing and practical space.

Keywords Unified Theory, Egyptian Identity, Traditional, Contemporary, Architecture, Residential, Stand-Alone Unit

1. Introduction

The lack of research on the cultural identity of Egyptian contemporary residences suggests a need for research. This study aims to fill the gap by evaluating case studies of standalone residential units based on Nikos Salingaros' Unified Architectural Theory. Salingaros raised a question about the reasons for the gap between the architectural product and local identity. He argued that there is a need for a theory based on the existence of an architectural identity for each country that expresses its cultural heritage. This theory posits that architectural systems should be integrated, respect nature, and use vernacular materials instead of manufactured materials. It also presents a critical vision to analyze and evaluate different architectural projects. Therefore, this research will apply the Unified Architectural Theory to analyze a set of selected case studies [1].

Architectural identity refers to the unique design and style of buildings and structures that represent a particular

culture or region. It encompasses distinctive elements and features that reflect the history, traditions, and values of a community. Architectural identity is how a building or a structure visually communicates the cultural identity of a particular place or a group of people. It can include elements such as building materials and patterns that are unique to a particular region or culture [2]. Nowadays, after the pandemic, the residential units have become places where people carry out all their daily activities, in addition to serving as a place for rest and housing. As such, their architectural design needs to be compatible with the local climate and environmental characteristics. The excessive use of steel, concrete, and cement in contemporary residential designs contributes significantly to greenhouse gas emissions, exacerbating the problem of global warming. Therefore, it is essential to analyze the architectural design of contemporary residential units to develop more effective designs that are beneficial for both users and the environment [3].

2. Materials and Methods

The research is based on an analytical methodology that adopts a quantitative analysis approach to reach the results, while the research material is a questionnaire. This questionnaire is divided into three specialized parts designed to assess the Elements of Regional Adaptation Measurement of selected cases of studies: the first part focuses on measuring architectural regionalism and the language of architectural design, while the second part examines the principles of similarity. The third part is specialized in the principle of semiotics. This questionnaire uses the 'triple Likert scale', typically including three answer options for participants to choose from, such as "accept," "neutral," or "disagree". The questionnaire was specifically designed to be administered to a purposive sample of specialized architects, to investigate their perspective on the relationship between architectural design and Egyptian identity. The methodology of this research is outlined as follows:

2.1. Descriptive Method

This method is to clarify the fundamental definitions associated with Egyptian architectural identity, as well as the Unified Architectural Theory, which presents the philosophical theories that inform the investigation of the relationship between architectural design and identity, which have been presented in literature review. Therefore, define the criteria by which the case studies will be selected to evaluate it.

2.2. Case Study Method

The analytical study applied to a selected set of contemporary stand-alone residential units in Egypt, to evaluate their compatibility with regional architectural design and Egyptian identity. The research objective is to review residential design cases that reflect Egyptian architectural identity by combining traditional architectural values with contemporary style. Those cases are examined with a questionnaire.

3. Literature Review

This section will present a set of definitions that will be used to determine criteria for selecting and evaluating case studies. These definitions relate to the identity of Egyptian architecture and its relationship to residential design. The literature review has revealed many related topics concerning the concept of contemporary residential unit design that combines contemporary techniques and traditional vocabulary of Egyptian architectural identity.

3.1. The Architectural Identity in Egypt

Architectural identity is defined as the distinctive essence of a building that sets it apart from others. This identity is a complex construct that includes multiple dimensions, such as cultural, historical, social, and technological elements. Cultural identity refers to the unique characteristics of a particular culture that are reflected in its architecture, preserving architectural identity is crucial as it provides a sense of continuity and connection to the past that is essential for maintaining social and cultural cohesion. It also inspires innovation and creativity for architects and designers to develop new and innovative designs. Conversely, the challenges to maintaining architectural identity are significant, especially with rapid urbanization and globalization [4].

The architectural identity of Egypt has evolved over several millennia. While the ancient Egyptian architecture is renowned for its monumental temple construction and royal tombs, it was not typically associated with residential buildings or daily life. Instead, it primarily served as a means reinforcing their connections to the afterlife. In contrast, the Islamic civilization's architectural style emerged in Egypt following the Arab conquest in the seventh century. Islamic architecture in Egypt is marked by a fusion of local traditions and Islamic influences, resulting in a unique style that reflects the country's cultural and ideological affiliation. This style features geometric patterns, domes, arches, vaulting, inner courtyard, and domes. The Islamic architectural identity has had a profound impact on contemporary architecture in Egypt, with many modern buildings incorporating elements of traditional Islamic design. This fusion of old and new has helped to create a distinctive and vibrant architectural identity that continues to evolve to this day. Overall, while the ancient Egyptian architecture was focused on serving the needs of the ancient Egyptians and their connection to the afterlife, the Islamic architectural identity in Egypt reflects a broader cultural and religious context that continues to shape the country's built environment [5].

The traditional Egyptian Residence in rural Egypt has a style of architecture that is designed for private homes in Egypt. One of the most important elements of Egyptian residential architecture is the use of courtyards. The traditional Egyptian residence is often centered on a central courtyard, which provides light and air to the interior rooms. A wall that provides privacy and security for the residents usually surrounds the courtyard. It also relies on using mud brick construction. Mud bricks were commonly used in the traditional architecture in Egypt because of their availability and low cost, and it also provides natural insulation to the interior [6]. Architect Hassan Fathi identifies the traditional Egyptian residence as an example of vernacular architecture. He also described the traditional residence as a simple, low-rise structure with thick walls made of mud brick or stone, designed to keep the interior cool in the hot desert climate. The building typically has a central courtyard, which serves as a private outdoor space for the family. The roof is flat and made of mud or palm fronds, providing additional living space and protection from the sun. Overall, he emphasized the sustainable and energy-efficient design principles of the traditional Egyptian residence, which he believes should be preserved and adapted for modern use [7].

3.2. Modernizing Traditional Architecture

Modernizing traditional architecture refers to the process of modernizing or adapting traditional architectural styles, elements, or techniques to align with contemporary design principles, materials, and technologies. It involves combining the historical and cultural aspects of traditional architecture with modern innovations and functional requirements. The goal is to achieve a balance between preserving cultural heritage and meeting the evolving needs of the present, allowing for the continuation of architectural traditions while emphasizing innovation, functionality, and sustainability. The impact of modern buildings on conventional architectural practices in Egypt is a complex issue with both positive and negative aspects. It is important to weigh these factors carefully when considering the future of Egyptian architecture. Modern buildings have introduced new materials, construction techniques, and architectural styles to Egypt, which have had a profound impact on the way buildings are designed and built. For example, modern buildings are often made of concrete, steel, and glass, which are materials that were not widely used in traditional Egyptian architecture. These new materials have allowed for the construction of taller, more complex buildings, and have made it possible to create new architectural forms and styles [8].

Modern buildings have also introduced new architectural styles to Egypt. Modern architecture is characterized by its use of simple forms, clean lines, and unadorned surfaces. This style of architecture has had a major impact on the way buildings are designed in Egypt, and has led to a more modern and contemporary look to the Egyptian landscape. The impact of modern buildings on conventional architectural practices in Egypt has been both positive and negative. On the one hand, modern buildings have brought new materials, construction techniques, and architectural styles to Egypt, which have allowed for the construction of more efficient, cost-effective, and aesthetically pleasing buildings. On the other hand, modern buildings have also led to the loss of some of the traditional architectural features of Egypt, such as the use of local materials and construction techniques [9].

Ultimately, the impact of modern buildings on conventional architectural practices in Egypt is a complex issue. There are both positive and negative aspects to this impact, and it is important to weigh these factors carefully when considering the future of Egyptian architecture. Here are some specific examples of the positive and negative impacts of modern buildings on conventional architectural practices in Egypt: [10]

- The Positive impacts such as the Contemporary buildings can help to revitalize traditional architecture by introducing new materials, construction techniques, and architectural styles. This can help to make traditional buildings more sustainable, efficient, and aesthetically pleasing. In addition, the use of new architectural styles can help to make traditional buildings more visually appealing. This can help to attract new visitors to traditional architectural sites [10].
- Negative impacts Represented in the Losing of traditional features, for example, the use of new materials and construction techniques can lead to the abandonment of traditional building methods. This can lead to a decline in the cultural significance of traditional architecture. Moreover, the use of new architectural styles can sometimes clash with the traditional architectural styles of a particular region. This can lead to a sense of visual disharmony and can make it difficult to appreciate the traditional architectural heritage of a place [10].

3.3. The Unified Architectural Theory

Architectural theory is an intellectual pursuit with a scientific approach aimed at serving the architecture community. It provides a summary of experiences and reviews without imposing on others without first considering their intellectual reviews. However, the scientific content of this theory must be linked to the economic, social, cultural, and environmental realities of the place where it will be applied to, taking into account the identity of that place [11].

The Unified Architectural Theory, developed by Nikos Salingaros with contributions from Christopher Alexander, Zaheer Allam, Leon Krier, and others, this theory emphasizes the importance of human-centered design and creating spaces that promote well-being and health. This theory provides a comprehensive framework for creating

sustainable, beautiful, and functional buildings that consider the users' needs, the natural and cultural context of the site, and the visual and spatial characteristics of the building itself. By incorporating pattern and form architectural languages based on these principles, architects can create buildings that not only look aesthetically pleasing but also contribute to the overall well-being of their inhabitants [1].

The "Form Language Checklist" in the Unified Architecture Theory, is a tool for measuring the complexity of architectural designs. The checklist consists of a series of questions that can be used to evaluate different aspects of a building's form, including its spatial organization, visual texture, and structural composition. This Checklist is based on the idea that architectural complexity can be measured in terms of the number of distinct elements, or "modules," which make up a building's form. The more modules there are, and the more interconnections and interrelationships between them, the more complex the overall design is likely to be, and to use the checklist, an evaluator would go through the list of questions and assign scores based on the presence or absence of various modules or design features. The Unified Architectural Theory also relies on experimental observations in architecture using the human sense as a measurement tool. It enables comparisons between different types of architectural designs, using several criteria to measure the complexity of the design language and the degree of its regional adaptation. This comparison is made using a graph between the degree of regional adaptation, and the number of words describing the architectural design, which can be measured using the "Kolomogrove-chatting" complexity scale. As shown in (Table 1), the number of words used to describe the architectural design reflects the level of complexity of the architectural design language, with more words indicating higher complexity [1].

Table 1. Example for The kolomogorove-chaitin complexity measure.

Shapes		
Description	Green square	Green square whose right side is a circle with a diameter equal to the length of the side.
The Number of words Used in the Description	2 words	18 words
Conclusion	Shape 2 is more complex than shape1	

The Unified Architectural Theory also includes a scale (1:10) to measure the degree of regional adaptation and respect for traditional culture, local materials, and the natural environment. Zero on the scale indicates the least adaptation to the culture of the place and its nature, as shown in (Table 2). This scale enables the identification of elements responsible for the strength or weakness of the design and the level of achievement of architectural regionalism. Moreover, models can be compared to each other to determine the best architectural solutions, with the aim of establishing the foundations of a unified architectural theory, as depicted in Figure 1 [12].

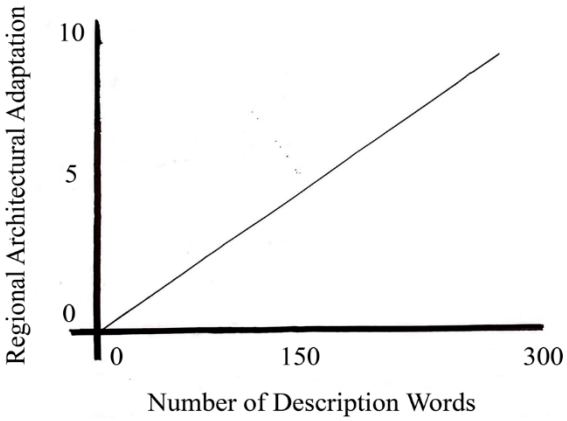

Figure 1. A relationship between Regional Architectural Adaptation and Kolmogorov-Chaitin Complexity Measurement

Table 2. Measuring the degree of compatible with the Regional Architectural Adaptation to the design language

Architectural Regional Measurement Elements	**compatible**	**not compatible**
Compatibility With The Local Culture	1	0
Compatibility With The Needs Of The User	1	0
Use Of Local Materials	1	0
Employing Traditional Design Patterns	1	0
Using Low-Cost Methods Of Energy Use	1	0
Historical continuity of design	1	0
Use of traditional ornament	1	0

3.4. Pattern and Form Languages

The pattern and form architectural languages of buildings refer to the visual and spatial characteristics that shape its design and overall appearance. The unified architectural theory provides a comprehensive framework for understanding how these languages can be used to create sustainable and functional buildings. This theory emphasizes that a building's pattern language should create a sense of coherence and harmony throughout the space. This can be achieved by using patterns that are derived from the natural and cultural context of the site. For example, a building located in a forested area might incorporate patterns found in the surrounding foliage, such as the branching patterns of trees. Additionally, the pattern

language should incorporate human-scale elements, such as courtyards, and arcades, which promote social interaction and a sense of community [13].

The pattern and form languages of a building are refer to the visual characteristics of its design, including its overall shape, massing, and proportions. According to Salingaros' theory, the form of language should create a sense of hierarchy and order throughout the space. This can be achieved by using fractals and scaling, which create self-similar patterns at different levels of magnification. For example, the curvature of a wall might be repeated in the shape of a doorway or a window, creating a sense of unity and continuity. Additionally, the form language should be responsive to the needs and desires of its users, promoting a sense of well-being and comfort [1].

While the architectural form languages of the twentieth century enjoyed commercial success and widespread adoption among architects and designers, neglecting the needs of the environment. However, in light of the growing phenomenon of global warming, there is an urgent need for designers to shift towards form languages that prioritize sustainability and support for the environment, rather than those based on purely symbolic or technical considerations. Nowadays the designers have access to a wide range of tools and approaches that can help them create buildings and spaces that are both aesthetically pleasing and ecologically responsible [14].

3.5. The Critical Regionalism

Critical regionalism is an approach to architecture that seeks to counter the placelessness and lack of identity of International Style modernism. The stylings of critical regionalism seek to provide an architecture rooted in the modern tradition, but tied to geographical and cultural contexts. Hence, it is not simply regionalism in the sense of vernacular architecture. Critical regionalism rejects the homogenizing tendencies of globalized architecture, which often overlooks local traditions and conditions in favor of a universal design language. Instead, it advocates for an architecture that engages with the cultural, social, and environmental aspects of a particular place, resulting in buildings rooting in their context and enhancing the regional identity [15].

The term 'critical regionalism' was initially introduced in 1981 by architectural theorists Alexander Tzonis and Liane Lefaivre in their essay titled 'The Grid and the Pathway,' published in Architecture in Greece. It was also later used by the historian and theorist Kenneth Frampton, albeit with a slightly different interpretation. In his essay "Towards a Critical Regionalism: Six Points for an Architecture of Resistance", Frampton defines critical regionalism as "an architecture that accepts the challenge of modern technology and accepts the imperative of international standards, but does so in a way that sustains regional character and cultural identity." Frampton outlines six principles that define Critical Regionalism: the use of local materials and construction techniques, the response to climate and topography, the incorporation of traditional forms and patterns, the use of tectonic expression that reveals the structure and construction of the building, the attention to detail, and the cultivation of a critical attitude. This means that architecture should be aware of its own limitations and open to change [16].

Through these six points, Frampton's Critical Regionalism advocates for an architecture that is deeply rooted in its context, engages with local culture and traditions, and resists the homogenizing forces of globalized architecture. One aspect of Critical Regionalism is the integration of modernist architectural principles with regional vernacular traditions. By following that approach, Critical Regionalism creates an architecture that reflects both the universal values of modernism and the distinct character of the region [16].

3.6. The Similarity Principle

The principle of similarity is known as the law of similarity, and it is a fundamental concept in Gestalt psychology that has significant implications in building design and architecture. According to this principle, objects or elements that are similar to each other tend to be perceived as a group or a single unit, and they are perceived as more related than those that are dissimilar. In architecture, the principle of similarity could be applied to create a cohesive and visually appealing design. For example, it can be used to create patterns or repetition of design elements such as materials, colors, shapes, or textures. This repetition can be used to create a sense of rhythm, balance, and harmony within a space. In architecture, this principle can be used to create a sense of identity and coherence within a building or environment by using consistent visual elements that share similar characteristics. For example, a building with a repeated pattern of windows or a consistent use of brickwork can create a strong sense of visual coherence and identity that ties the different parts of the building together [17].

The principle of similarity can also be applied to the grouping of design elements. For example, grouping similar elements such as windows or columns can create a sense of unity and coherence within a building. Similarly, using similar shapes or forms in different parts of a building can create a sense of continuity and connection, see Figure 2. Furthermore, the principle of similarity can be used to create a hierarchy of visual elements within a building. Elements that are more similar to each other can be grouped to create a dominant visual feature, while less similar elements can be used to create a secondary effect. The principle of similarity is an important concept in building design and architecture as it helps to create a sense of unity, coherence, and harmony within a space. By applying this principle, designers can create visually appealing and functional spaces [18].

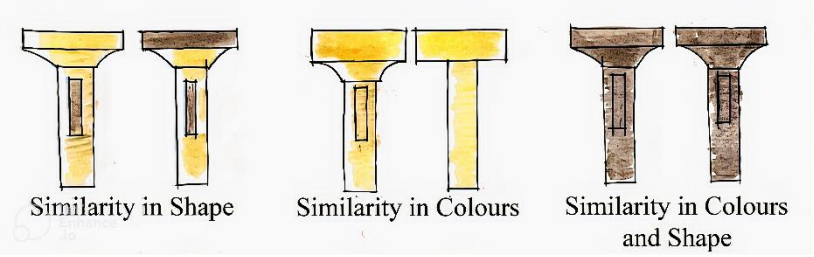

Figure 2. The main types of the law of Similarity Principal "Gestalt theory"

3.7. The Semiotics in Architecture

Semiotics is the study of signs and symbols, and in architecture, it involves the use of visual cues to convey information and create meaning. The semiotics principle in architecture is based on the concept that buildings and spaces communicate meaning and information to people through their physical forms, materials, and design features. According to the semiotics principle, architectural design can be used to communicate a range of meanings, from functional information about how to use a space to symbolic meanings related to cultural values or historical context. For example, the use of columns or arches in classical architecture can convey a sense of grandeur and historical significance, while the use of bright colors or playful shapes in contemporary architecture can convey a sense of innovation and creativity [19].

Semiotics can also be employed in architecture to establish a building's identity. For instance, using specific materials or design elements can create a distinctive visual language associated with a country's identity. Additionally, incorporating water features or natural materials like wood or stone can evoke a sense of calmness and relaxation. In contrast, bold patterns or lighting effects can generate a feeling of energy and excitement. Semiotics is a potent tool that architects and designers can use to establish and reinforce a building's identity or architectural style. By meticulously selecting and combining elements of form, material, and meaning, architects can create buildings that convey their purpose, identity, and cultural context in a meaningful and powerful way. However, a building's identity is not only about its visual aspects but also about the symbolic and functional meanings it communicates. For instance, a building with a grand entrance or a magnificent staircase may convey a sense of importance or authority, whereas a building with open and adaptable interior spaces may convey a sense of community and collaboration, see Figure 3 [20].

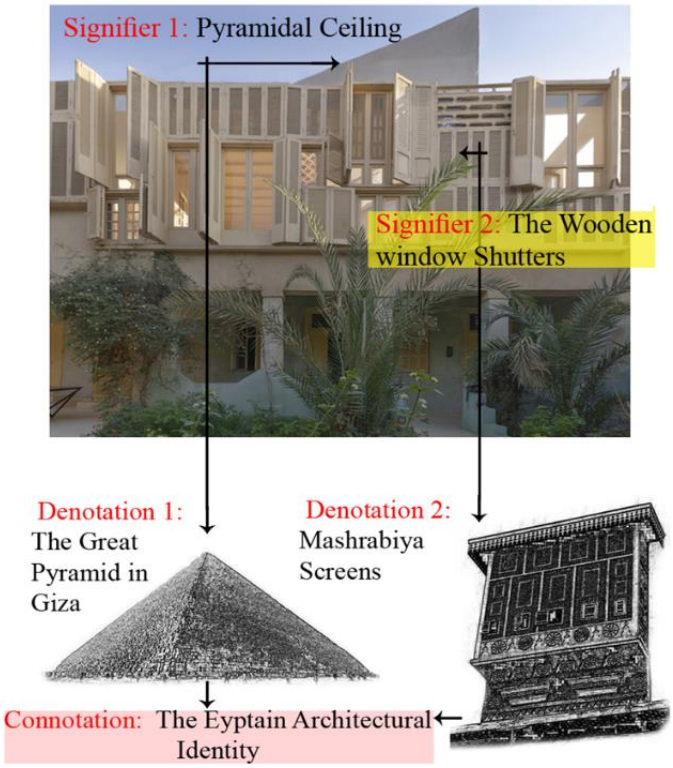

Figure 3. The architectural elements of the Cheops observatory residence façade in Giza, as an example for the semiotics in Architecture

4. Case Studies

After reviewing the theoretical framework, this section reviews the selected case studies for contemporary Egyptian residential designs. There are two types of limitations for selecting case studies, as follows:

- The qualitative delimitation: is the residential buildings such as villas, chalets, and guesthouses, where their users belong to a certain social class that does not base their choices solely on economic cost. Therefore, their architectural design reflects the social and cultural identity of the users.
- The spatial delimitation: All selected case studies are located within Egypt. A specific number of cases were chosen to cover Egypt geographically, as the geographic nature varies with the different Egyptian regions. Therefore, these variations will be reflected in the selected cases.

4.1. Case 1: Khalifa Guest House

In 2017, Architect Yassin Elhamaki designed a residential guesthouse located in Mansourieh village, Giza Governorate, Egypt. The design language chosen for the house was traditional and reflective of the heritage of the original inhabitants, who bred Arabian horses, by using Nubian architectural style. The house design utilized local architecture and resources of the area, as well as environmental considerations. Moreover, the architect incorporated a set of traditional architectural vocabularies such as arches, domes, vaults, inner water fountain, and traditional decorations. During construction, the architect employed local materials and utilized the load-bearing wall system as a structural system, see Figure 4, and Figure 5. This residential unit has been carefully planned to fulfill its functional aspect. The following elements have been incorporated; A well-organized hierarchy and circulation among the interior spaces, ensuring that users' functional needs are met, using the Local construction materials and traditional building techniques, resulting in benefits such as thermal comfort, insulation, ample natural lighting, and effective ventilation, and the emphasis on aesthetic and visual appeal, providing an enjoyable living environment. The design of this residential unit is both functional and aesthetically [21].

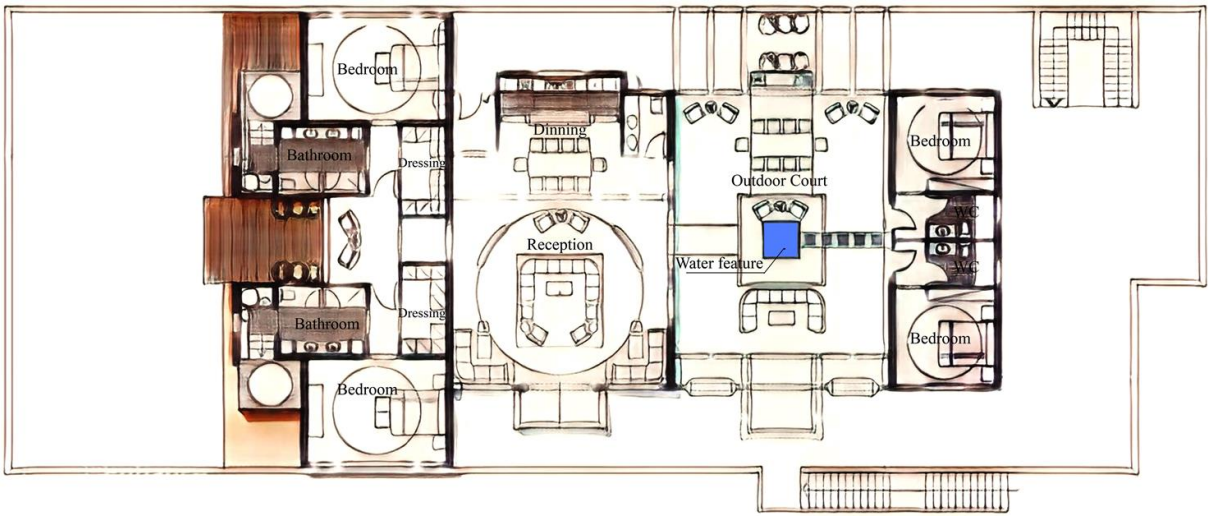

Figure 4. The first floor plan Khalifa guesthouse

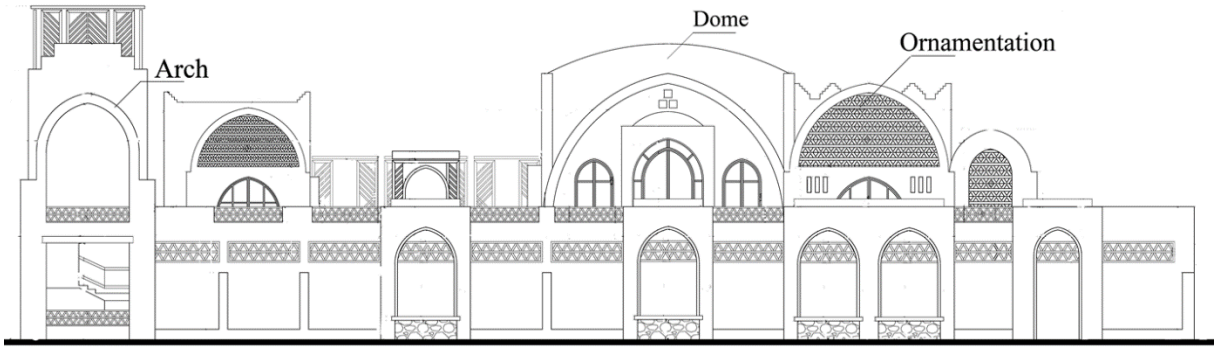

Figure 5. Main facade design of Khalifa guesthouse

4.2. Case 2: Pearl Villa

In 2022, EMAAR MISR Real Estate Company designed this villa located in the Uptown Cairo neighborhood of Cairo Governorate, Egypt. The exterior facades of the building were influenced by classical European architecture, which is characterized by the facades of buildings in the streets of "Khedivial Cairo". Such facades bear a distinctly Mediterranean- style houses architectural as its homes typically feature a red-tiled roof, as well as brick or stucco that is often painted white. Stone details, carved doors, and raw iron and metalwork on windows, over balconies, and front doors are other common features, and therefore, the current design may potentially express an Egyptian architectural identity in a past era, see Figure 6, and Figure 7. As for the functional aspect of this design, it greatly meets the contemporary needs and preferences of users. The hierarchy and circulation of interior spaces have been planned in a modern and minimalist style. Furthermore, state-of-the-art construction materials and techniques have been employed. As a result, the design seamlessly blends elements from both the traditional and the contemporary, creating a harmonious fusion [22].

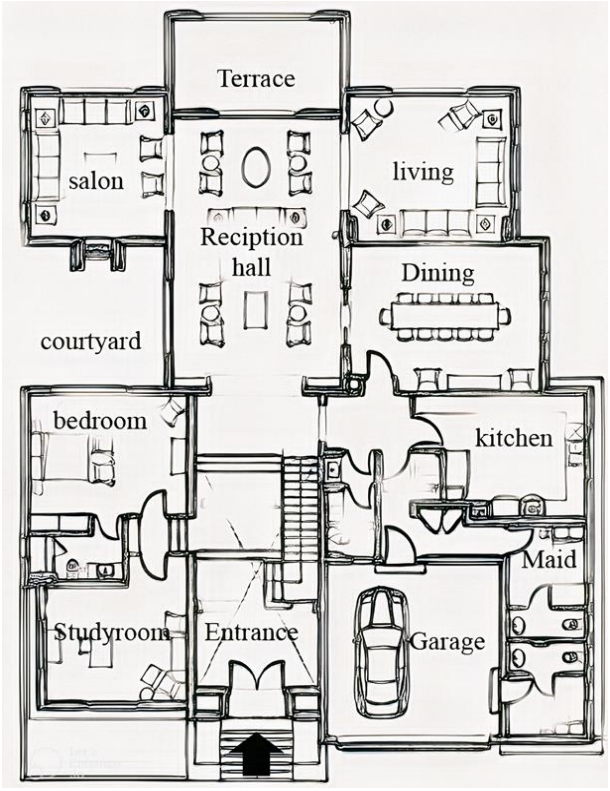

Figure 6. Pearl villa ground floor plan

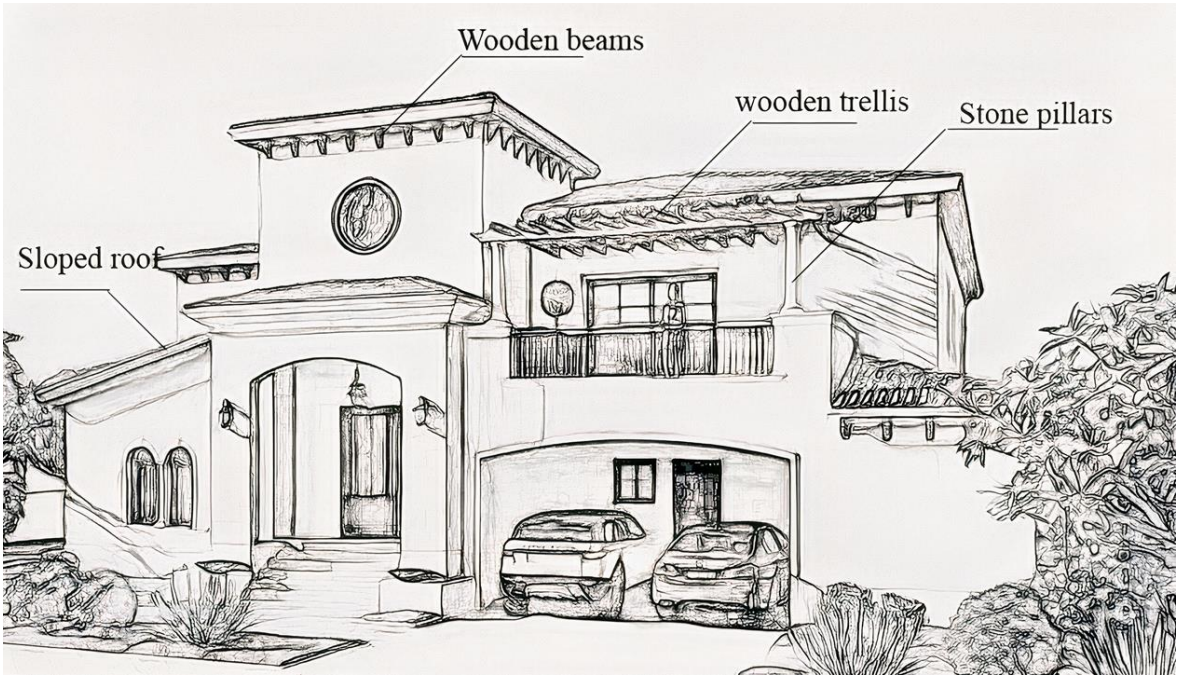

Figure 7. Pearl villa exterior design

4.3. Case 3: The Model House East Nassriya

The house was designed by Professor Adel Fahmy in 1988 and is situated in East Nassriya, Aswan Governorate, Egypt. The model house was specifically created for the Nassriya community in Aswan in 1988, as these Nubian people migrated and settled in the region during and after the construction of the High Dam. The design was based on the traditional language of the Nubian architectural style, which utilized local construction materials, local workers, and a set of traditional architectural vocabularies, such as roofing by domes and vaults. The house was designed in collaboration with the inhabitants and local government decision-makers, and the opinions, needs, and requirements of the inhabitants were considered in the design process, see Figure 8, and Figure 9. The functional aspect of this residential unit has taken into consideration the opinions of the users, who are the native inhabitants of the region. Therefore, following this approach has led to accommodating the interior spaces design and zoning circulation to meet the users' needs and aligning them with their local culture. Furthermore, the utilization of local materials and traditional architectural vocabulary in construction has enhanced the sense of Architectural identity. As a result, this approach demonstrates respect for heritage and the local environment [23].

Figure 8. The Ground Floor Plan of Nassriya Model House

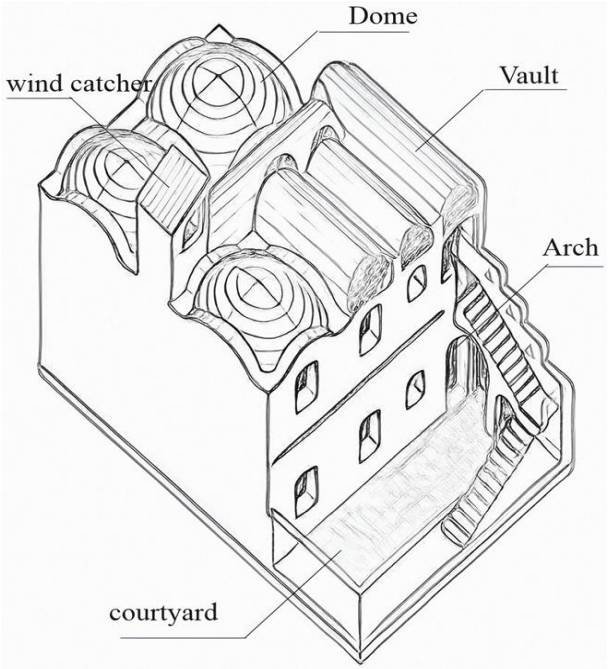

Figure 9. The Exterior Design of Nassriya Model House

4.4. Case 4: Shedwan Vernacular Villa

This villa designed by Architect Ahmed Hani and Orascom Development Holding Company in 2021, It is located in Elgouna city, Egypt. The typical architectural language was used in the design, using a contemporary architectural style inspired by the Nubian architectural style, also using some of the local materials available in the area where the unit is located, and using local plants such as cactus and palm trees. Thus, the design is regionally adapted to the geographical features and cultural aspects of its regional environment. The exterior design depended on using the arches, protruding and recessed parts in the facades to create areas of shade to reduce the heat load inside. The inner courtyard had been used in the interior design of the unit to provide lighting and natural ventilation for the internal spaces, in addition to separating between the entrances to provide privacy for the users, see Figure 10, and Figure 11. The functional approach of this case focuses on providing thermal comfort and energy efficiency for residential units, in addition to ensuring privacy for users. The design includes an internal courtyard that directs all living spaces inwards, taking inspiration from the traditional architecture in Egypt. This feature emphasizes respect for cultural heritage and the local regional environment. Furthermore, the use of contemporary building materials creates a harmonious blend of the past and present [24].

Figure 10. Shedwan Villa main façade exterior design

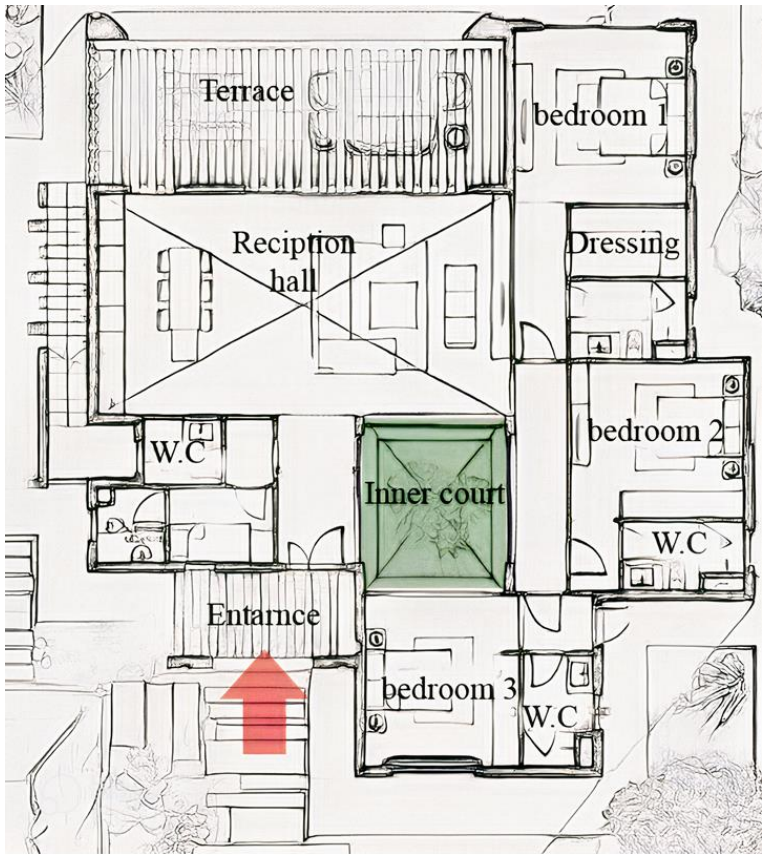

Figure 11. Shedwan Villa Ground floor plan

4.5. Case 5: Al Maqsad Villa

This residential unit was designed by City Edge Developments Company in 2020, and is situated in the new administrative capital of Egypt. The facades were designed with a formal architectural language that draws inspiration from traditional styles while utilizing modernized Islamic geometric patterns. The facades' decorative cladding was constructed with Glass-Fiber Reinforced Concrete (GRC). The color scheme of the facades comprises a harmonious combination of smooth and deep beige tones, which incorporates a stone cladding in certain parts; see Figure 12, and Figure 13. From a functional perspective, the interior space design offers users comfortable living spaces with suitable areas, despite the use of modern building materials and techniques. The utilization of external decorations on the facades did not have any functional implications, as they did not affect the lighting conditions, ventilation of the living spaces, user privacy, or thermal comfort, despite this residential unit is located in a desert environment, where one would expect it to have a more pronounced effect on the design of the model [25].

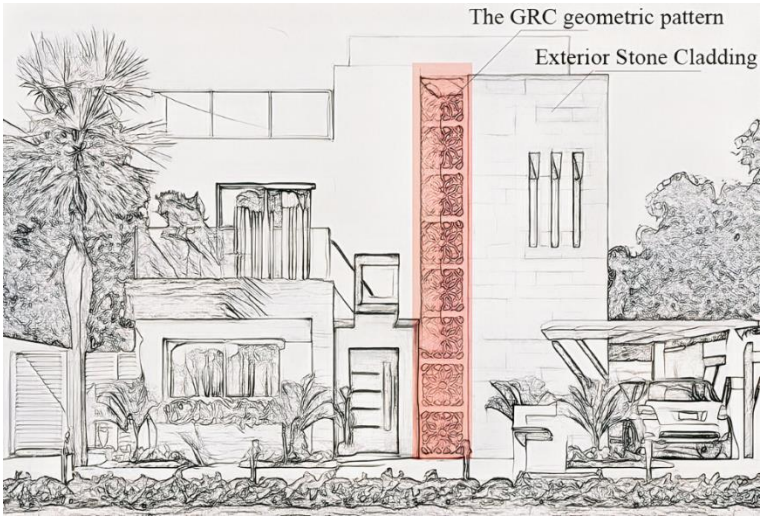

Figure 12. AL Maqsad villa exterior design

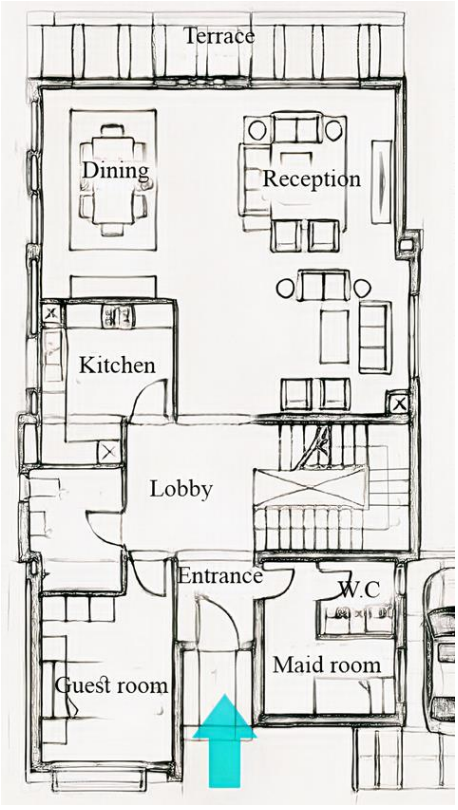

Figure 13. AlMaqsad Villa ground floor plan

4.6. Case 6: Mountain View Villa

The present residential unit is situated in the Mountain View North Coast Resort, a beachfront development located on the Mediterranean Sea in the Alexandria governorate of Egypt. The Mountain View Developments Company, a real estate developer in Egypt, designed the villa, constructed in 2022. The design of the villa facades follows the desert architectural style, which is recognized for its use of curved, angular, and geometric forms, heavily influenced by traditional Islamic architecture. Furthermore, this style is distinguished by its employment of the color white and long wooden boards for roofing the outdoor terrace see Figure 14, and Figure 15.

In terms of functional analysis, choosing a traditional design style creates a sense of identity. However, criticism can be directed towards the failure to use local materials in the construction. It is also evident that the interior spaces do not have a well-defined hierarchy, as they rely on a central distribution hall that opens up to all the interior spaces. Furthermore, the design does not incorporate any architectural elements that provide natural lighting, ventilation, or user privacy. Consequently, the design does not consider any sustainability or environmental considerations. The designer solely drew inspiration from the external visual aspect of heritage [26].

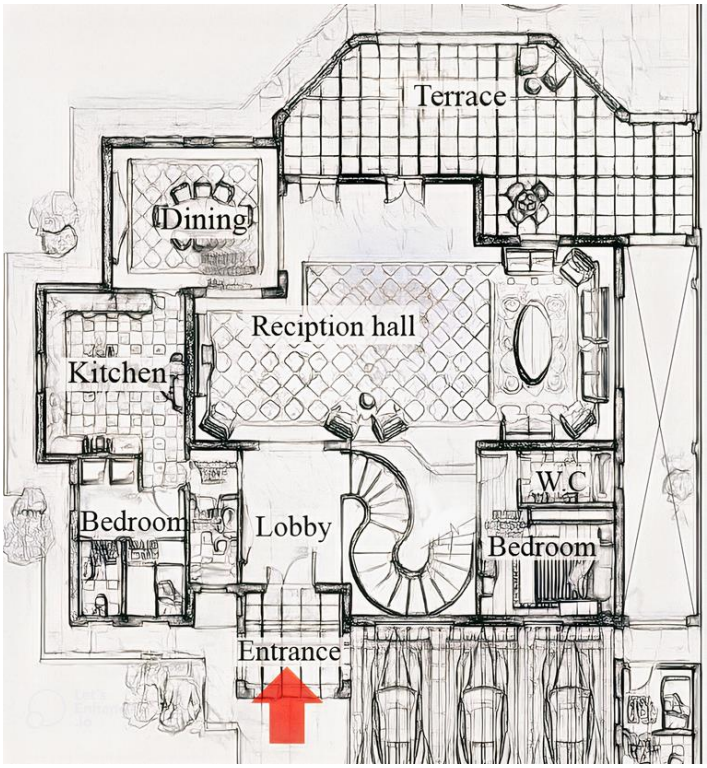

Figure 14. Mountain View villa ground floor plan

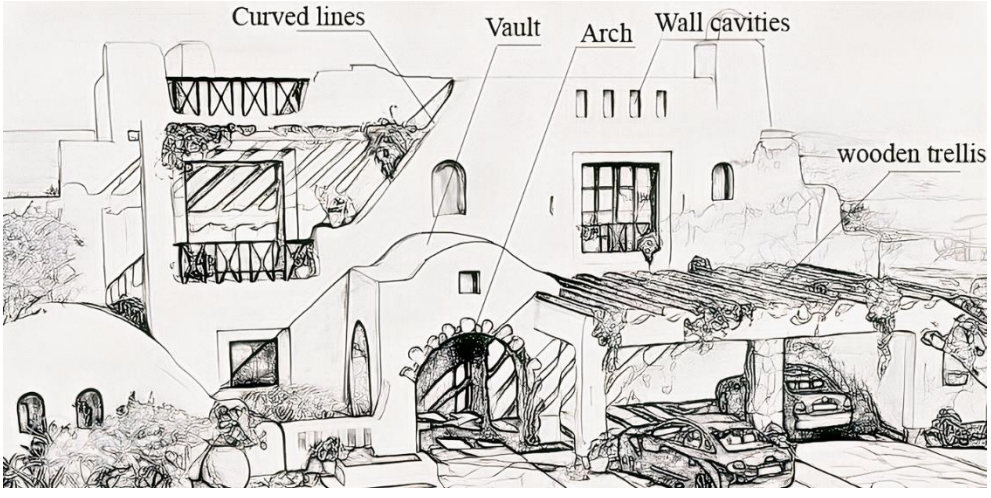

Figure 15. Mountain View villa exterior design

5. Case Studies Analysis

In this section, a correlational study will be conducted to analyze the various case studies of contemporary residential units discussed in the previous section. This study will use a questionnaire survey based on the "Unified Architectural Theory" by Nikos Salingaros. The survey will measure the complexity of design language and its connection to regional adaptation using the "Degree of Regional Adaptation Scale." This method will enable a comparison of the different architectural designs presented in the case studies. The questionnaire will include several parts that measure regional adaptation, the complexity of the form language, and the application of The Principle of Similarity and semiotics in architecture. These parts will serve as a tool for measuring the design language of each case study, see Table 3. The data collected from the survey were analyzed by considering the responses of the 34 participants who completed the 45-question survey for each of the six selected case studies. Overall, this study will provide valuable insights into the design languages of contemporary residential units in Egypt and their regional adaptations. The use of a standardized questionnaire will allow for a more objective comparison of the case studies, and the analysis of the data collected will provide a deeper understanding of the design principles underlying these architectural styles.

Table 3. The questionnaire design form comprises the elements of the Unified Architectural Theory criteria, including Pattern and Form Language, the Principle of Similarity, and the Semiotics in Architecture, designed by the researcher.

Question Element					**Accept**	**Neutral**	**Disagree**
Part 1	**Regional Adaptation Measurement**		1	The building design reflects the unique cultural identity of the local area.			
			2	The building design takes into account the local environment and natural surroundings.			
			3	The building design is efficient in its use of energy and takes into account the local climate.			
			4	The building design promotes the economic and social well-being of the local community.			
			5	The building design employs the Traditional architectural Design Patterns.			
Part2	**Measuring the Language of Architectural Design**	**Scale and Proportion**	1	The size of the building is visually appealing.			
			2	The proportions of the building are harmonious.			
			3	The building design employs proper scale and proportion to create harmonious interior spaces.			
		Surface	1	The texture of the walls and surfaces in the building is visually interesting.			
			2	The surfaces of the building are in harmony with each other.			
			3	The surface of the building is appropriate for the building's purpose.			
		Detailing	1	The decorative details of the building enhance its overall design.			
			2	The aesthetic elements details of the building complement the other design elements.			
			3	The aesthetic elements detailing is appropriate for the building's purpose.			
		Color	1	The color scheme of the building is visually appealing.			
			2	The colors used in the building are in harmony with each other.			
			3	The color scheme of the building is visually comfortable.			
		Lighting	1	The lighting of the building is sufficient to meet its needs.			

Table 3 continued:

			2	The lighting complements the other design elements.			
			3	The building design uses light and shadow to create a dynamic and engaging environment.			
		Syntax	1	The design of the building is components that are related (symmetry) between its parts.			
			2	The design of the building is not related (contrast).			
			3	The parts of the building's design are in harmony with each other.			
		Material	1	The materials used in the construction of the building are visually appealing environment.			
			2	The materials used in the construction of the building are appropriate for its purpose.			
			3	The use of certain materials is visually comfortable.			
Part3	**Pattern And Form Language**		1	The architectural design of the building is a pattern architectural language.			
			2	The architectural design of the building is a form architectural language.			
			3	The building design reflects the architectural features of its cultural or historical context.			
			4	The building design reflects contemporary architectural styles and techniques.			
part4	**The Similarity Principle**		1	The building design employs the principle of proximity to group similar elements together.			
			2	The building design employs the principle of continuity to create a sense of flow and connection between similar elements.			
			3	The building design employs the principle of closure to create a sense of completeness or wholeness by grouping similar elements.			
			4	The building design employs the principle of symmetry to create a sense of balance and harmony between similar elements.			
			5	The building design employs the principle of simplicity to create a sense of order and clarity by grouping similar elements.			
Part5	**The semiotics in Architecture**		1	The architectural design of the building gives a sense of identity to its users.			
			2	The architectural design of the building reflects the culture or history of its surroundings.			
			3	The architectural design of the building communicates its purpose or function.			
			4	The architectural design of the building is unique or stands out from its surroundings.			
			5	The architectural design of a building affects the emotional state of its users.			

6. Results and Discussion

The reliance on the unified architectural theory in this research is due to its comprehensive nature, encompassing all aspects of design, from the smallest details to the overall composition. This makes it a valuable tool for understanding and addressing the issue of architectural identity, which is a complex and multifaceted problem. Moreover, it is based on the idea that architecture should be rooted in nature and the human experience. This means that design should fulfill functional and aesthetic aspects while also creating a sense of place and belonging. All of these are important aspects of architectural identity. Christopher Alexander, the architect and design theorist, has emphasized the importance of unified architectural theory in addressing the issue of architectural identity absence in contemporary designs. Alexander's ideas offer insightful perspectives on why unified architectural theory, such as Nikos Salingaros' theory, is relevant in this context:

1. Design as a Living Process: Alexander regards design as a living process that should reflect the cultural and social context of a place and create a sense of identity and belonging. By incorporating traditional architectural elements into contemporary designs, architects can establish a link between the past and the present, enhancing a sense of continuity and cultural identity [27].
2. Patterns and Context: Alexander stresses the importance of understanding the patterns and context of a place before design. Traditional architectural elements often embody patterns that have evolved over time to respond to the local climate, culture, and lifestyle. By integrating these patterns into contemporary designs, architects can create harmonious spaces that resonate with their surroundings and align with local architectural heritage, fostering a sense of identity [14].
3. Human Scale and Connection: Alexander advocates for designing spaces at a human scale, promoting a sense of familiarity, comfort, and connection with the built environment. Architects can create spaces that feel familiar, comfortable, and contribute to human well-being, thereby contributing to architectural identity [28].
4. Wholeness and Perfection: Alexander emphasizes the concept of wholeness in design, where different components of a building or space are integrated into a coherent and harmonious whole. Traditional architectural elements often possess inherent perfection achieved through careful composition of forms, materials, and details. By incorporating these elements into contemporary designs, architects can create visually appealing and architecturally expressive spaces that convey a sense of architectural identity [27].

By applying Nikos Salingaros' unified architectural theory, inspired by Christopher Alexander's ideas, architects can bridge the gap between traditional architectural elements and contemporary design principles. This approach allows for the preservation of architectural identity, enabling the creation of visually compelling and culturally relevant spaces that bridge the past and the present. It also aligns with Kenneth Frampton's critical regionalism, arguing that architecture should be rooted in the specific cultural and historical context of its site, while Salingaros and Alexander believe that architecture should be based on principles of natural order and harmony. Despite their differing approaches, they all emphasize the importance of context, cultural significance, and sustainability in architecture. Though their methodologies may differ, they share a common belief that architecture should be more than just functional, but rather the creation of built environments centered on humans, adaptable, and contextually sensitive.

This study examined various aspects related to the vocabulary of architectural form language. Five categories were employed to analyze the case studies, which focused on the criteria of the unified architectural theory, Principle of Similarity, and Semiotics in Architecture. These categories formed the basis of the questionnaire questions presented in Table 3, which was presented to a purpose sample of 34 architects specialized in the field of architecture. In this section, the collected data were analyzed, and the most significant results of the study were presented using graphs.

6.1. Part 1: Regional Adaptation Measurement

Through examining whether the building design takes into account the local environmental conditions and natural surroundings, it became evident that "Case 3: The Model House East Nassriya" achieved the highest rating confirming that it is the most compliant with regional architecture in its design, and consequently, it affirms the identity of Egyptian architecture the most, see Figure 16. This architectural design of the building was in line with the local architectural methods of the surrounding region, and local residents were involved in both the design and construction phases. As a result, the building is sustainable and in harmony with the surrounding ecosystem, leading to improved energy efficiency, reduced environmental impact, and enhanced well-being of occupants. Furthermore, this design approach can contribute to the preservation of natural resources and biodiversity in the area, while also inspiring other architects to consider the unique characteristics of the local environment and incorporate them into their designs. Such an approach can lead to a more harmonious and sustainable built environment, with potential benefits for the environment and building occupants alike.

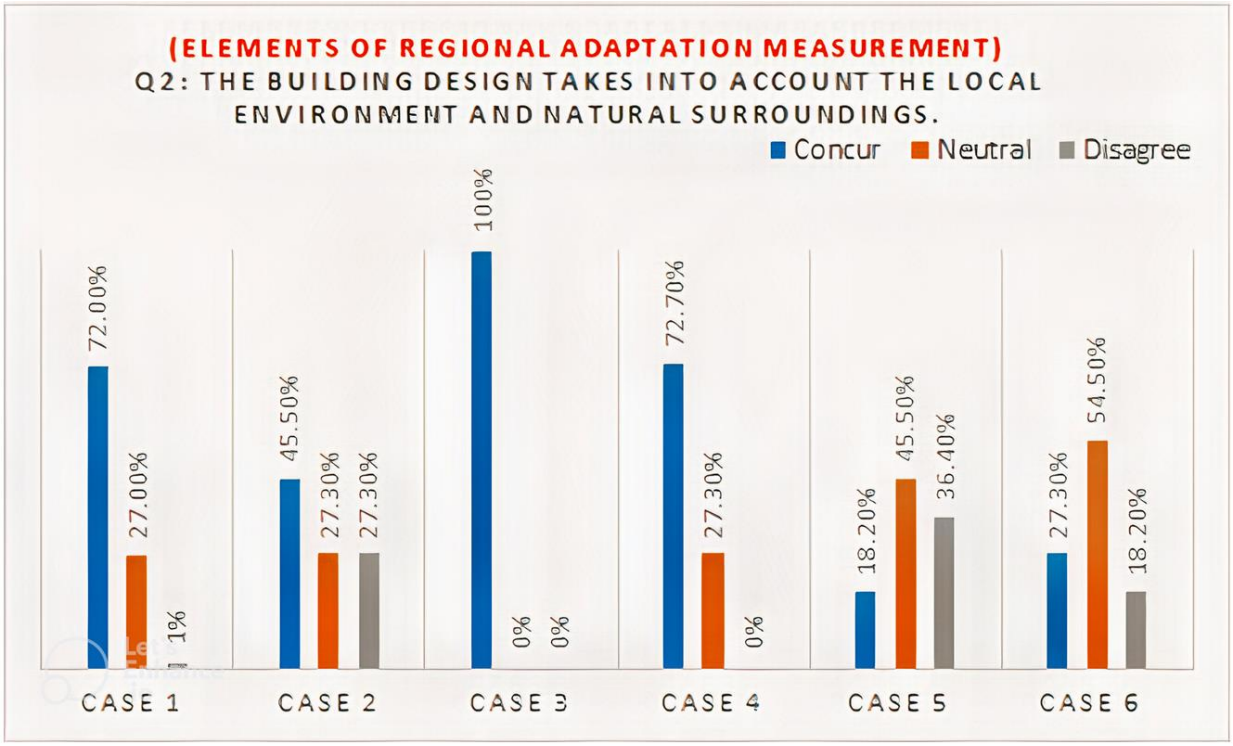

Figure 16. Analyzed data from Regional Adaptation Measurements Q2

6.2. Part 2: Measuring the Language of Architectural Design

The case studies have achieved similar results regarding the proportion and scale aspects related to the measurement elements of the Language of Architectural, with the exception of "Case 5: Al Maqsad villa," which achieved the highest rating in terms of achieving harmony in the architectural composition of the building design, see Figure 17. This indicates that designers can utilize these measurements as a fundamental basis for their own designs to ensure they align with established architectural standards. Consequently, this can lead to a more unified and cohesive built environment, characterized by buildings that complement each other with respect to their scale and proportion. By adhering to these established standards, designers can improve the functionality, safety, and aesthetic appeal of their buildings, thereby enhancing the overall experience for users.

The results indicate that the surface designs of case 4 "Shedwan Vernacular Villa", and case 1 "Khalifa Guest House" are highly cohesive with each other, unlike case 2 "Pearl villa", see Figure 18. This suggests that the use of local building materials gives greater harmony to the architectural design components. This approach has the potential to result in reduced environmental impact, improved energy efficiency, and increased occupant well-being in future buildings. By incorporating local building materials, designers can achieve greater harmony and alignment with the natural surroundings and local culture, leading to a more sustainable and contextually appropriate design.

Most of the case studies in the research did not follow the principle of symmetry and similarity in their building designs. Instead, they relied on the contrast between the components of Design Syntax. The research findings suggest that the use of contrast can be an effective approach in achieving a unique and distinct architectural composition, see Figure 19. Designers can consider this approach as an alternative to the traditional principle of symmetry and similarity, leading to more diverse and innovative architectural solutions. However, it is crucial to note that this approach should still prioritize the overall harmony and coherence of the building design. By adopting this approach, designers can potentially create buildings that stand out and contribute to the visual identity of their surroundings.

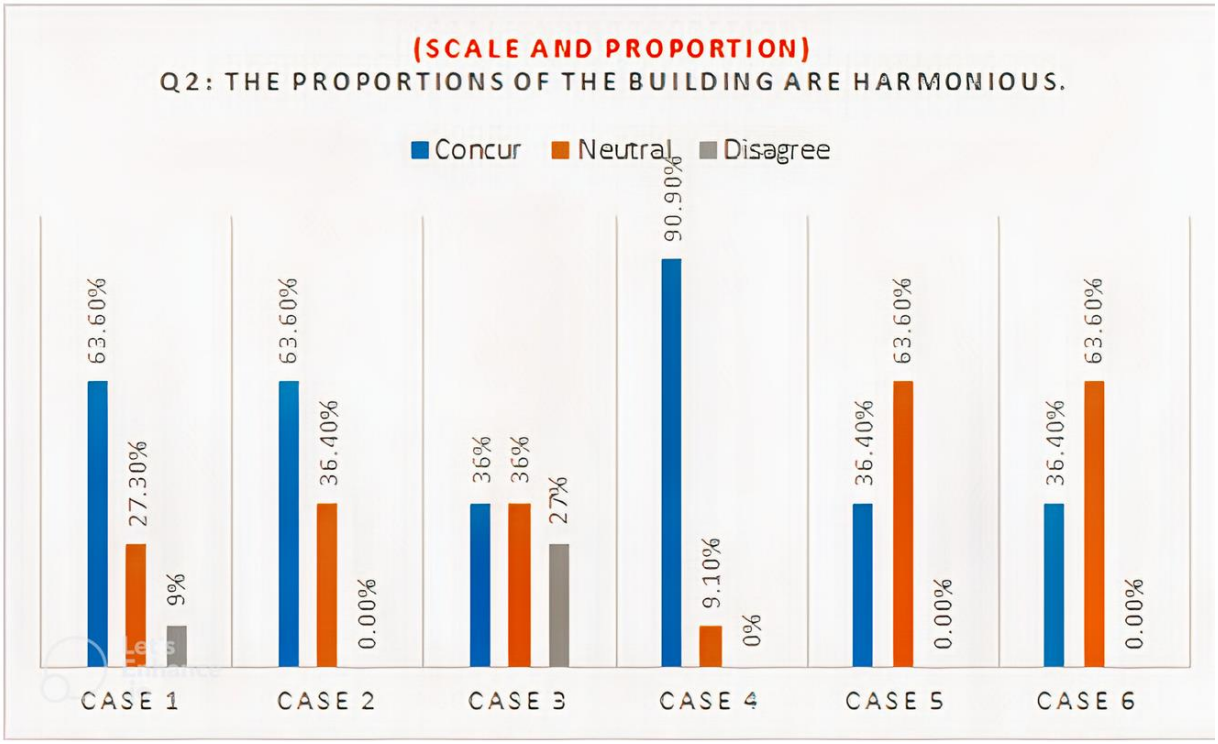

Figure 17. Analyzed data from Language of Architectural Design Measurements Q2 (Scale and Proportion)

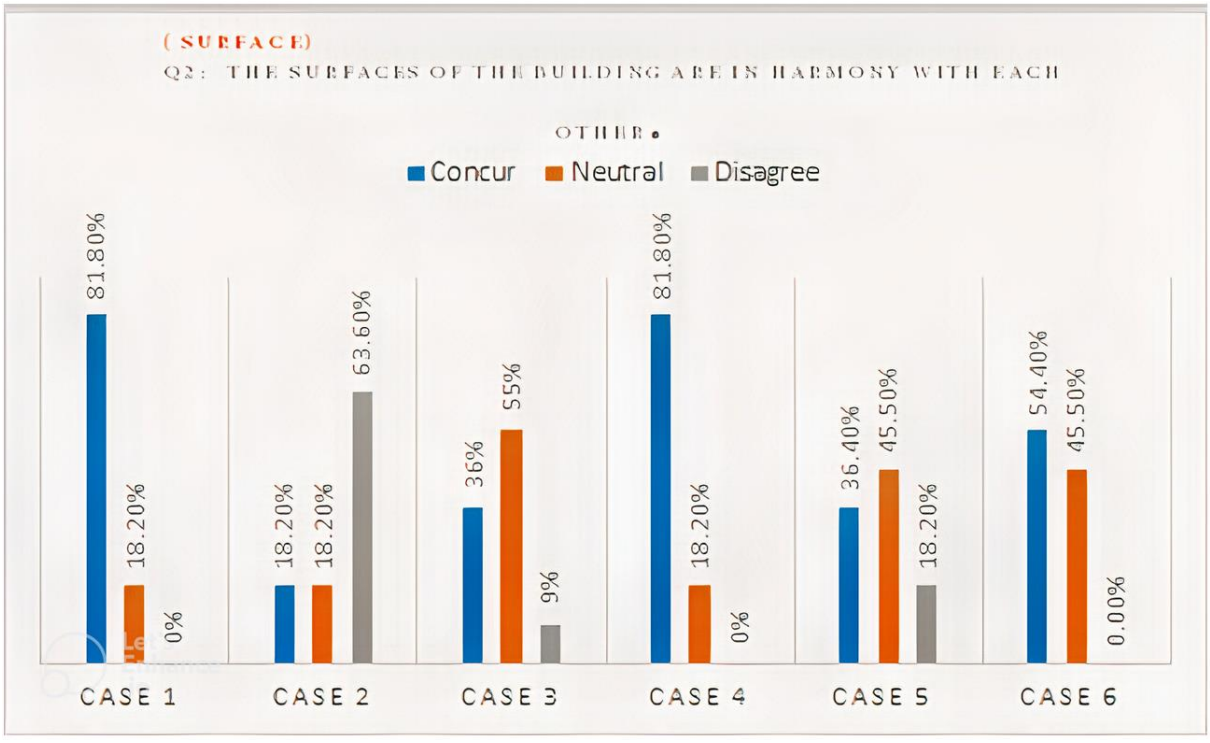

Figure 18. Analyzed data from Language of Architectural Design Measurements Q2 (Surfaces harmony)

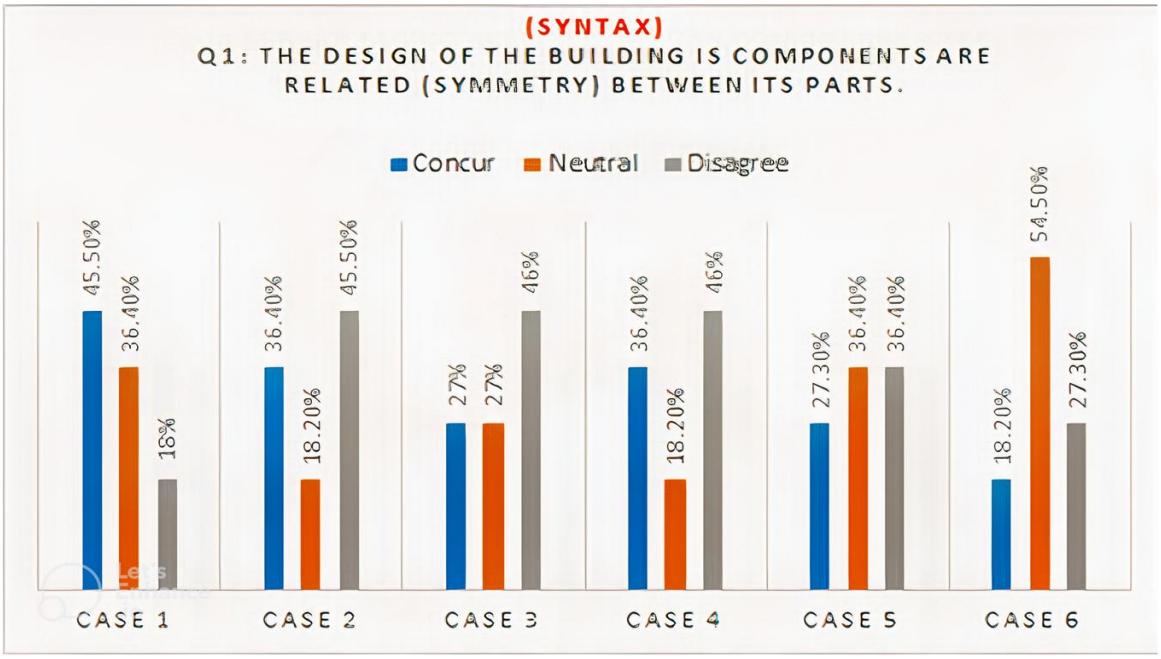

Figure 19. Analyzed data from Language of Architectural Design Measurements Q1 (Syntax)

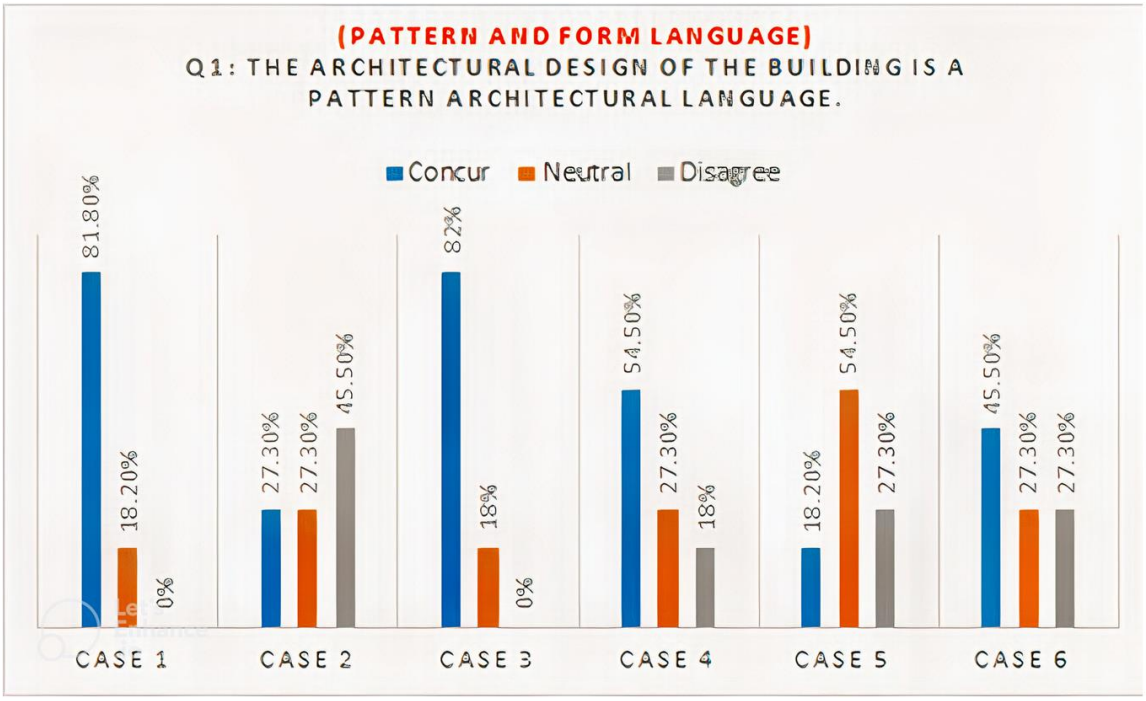

Figure 20. Analyzed data from Pattern and Form Language Q1

6.3. Part 3: Pattern and Form Language

The results of the question about whether the architectural language style is pattern or form, indicate that case 1 "Khalifa Guest House", and case 3 "The Model House East Nassriya" are considered closer to being a pattern architectural language, see Figure 20. This approach can also ensure that the building design is functional, safe, and aesthetically appealing. By adopting a unified architectural theory, designers can create a set of guidelines and principles that can be applied to their designs, leading to more consistent and contextually appropriate solutions. Additionally, this approach can contribute to the preservation of cultural heritage and the promotion of local identity using regional architectural methods and materials. Ultimately, a pattern architectural language based on the unified architectural theory can lead to buildings that are sustainable, respectful of the natural surroundings, and contribute positively to the quality of life of their users.

6.4. Part 4: The Similarity Principle

The results of the case studies agreed on the law of similarity and the perception of Gestalt theory that most of the elements and vocabulary of architectural design relied on contrast between them, which was achieved by case 2 "Pearl villa" with a high ratio, see Figure 21. Objects that are similar in shape, color, or size are easily perceived as a cohesive whole. This approach can result in a visually cohesive and harmonious design. Thus, other designers can consider using this technique in their own designs to achieve a similar effect. Nonetheless, it is crucial to also take into account other design principles and adapt them accordingly to the specific context and requirements of each project. By integrating the law of similarity into their designs, designers have the potential to create buildings that possess a distinctive visual identity and contribute to the overall aesthetic of the built environment.

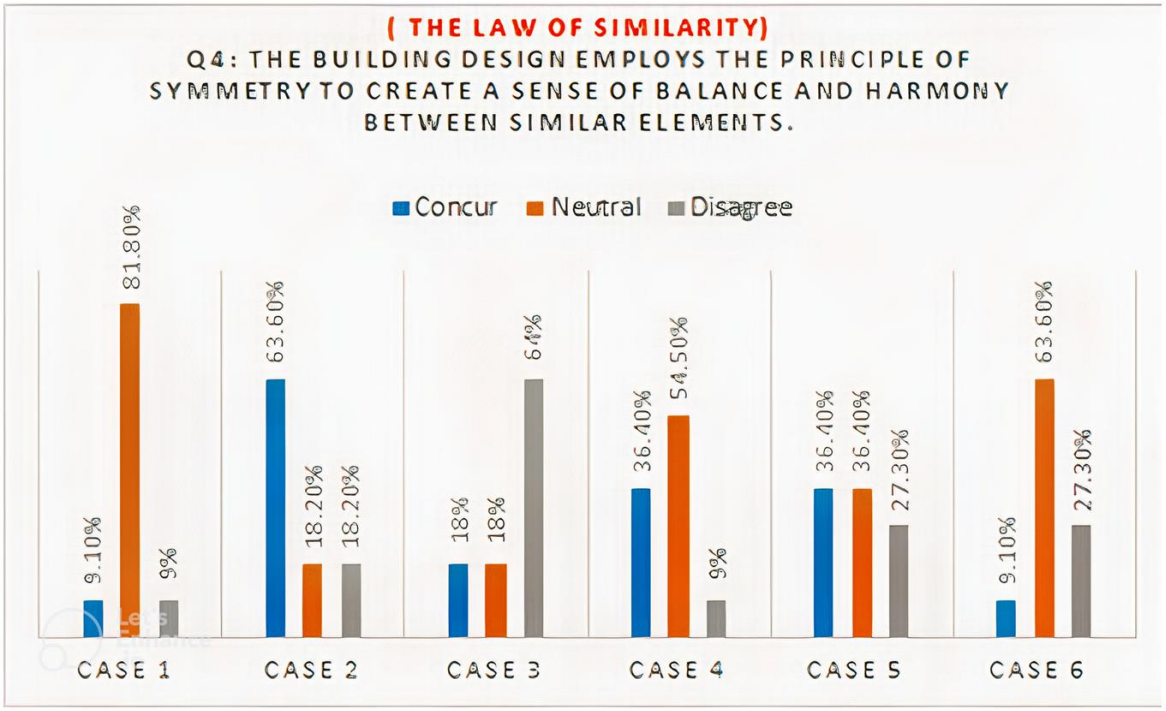

Figure 21. Analyzed data from the law of similarity Q4.

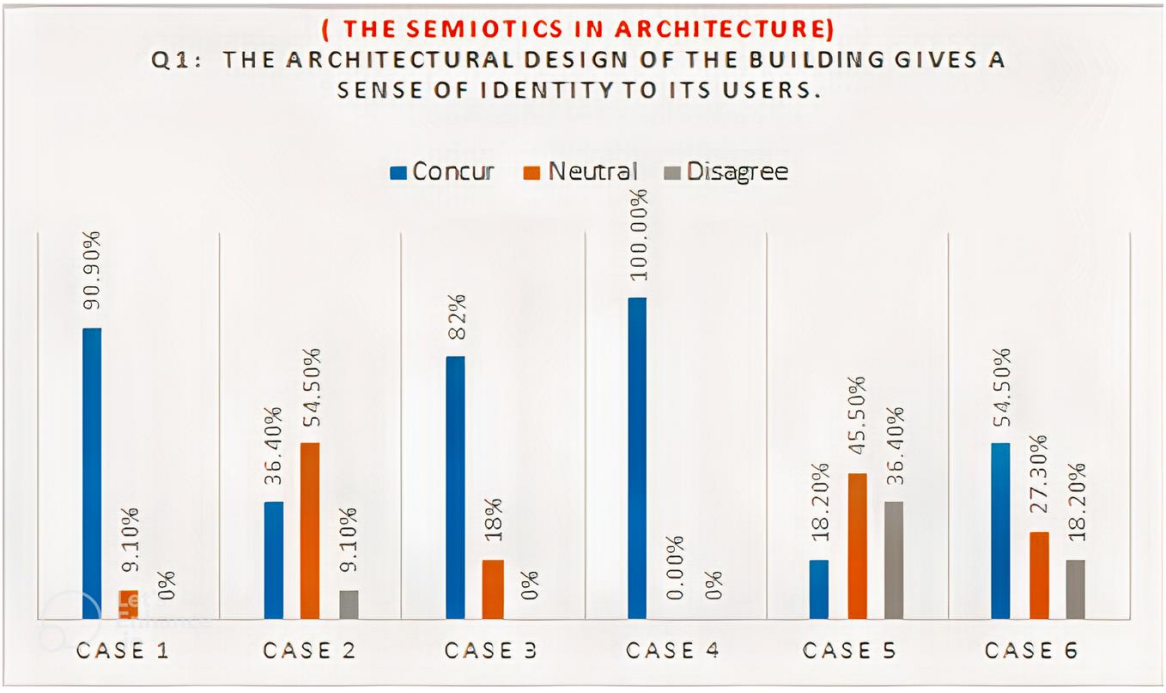

Figure 22. Analyzed data from semiotics in Architecture Q1

6.5. Part 5: The Semiotics in Architecture.

According to the survey results, the principle of semiotics has been successfully achieved in architecture through the "case4: Shedwan Vernacular Villa" and "case2: Pearl Villa" designs, which received the highest percentage in confirming the architectural identity of Egypt through their elements of architectural composition, see Figure 22. This indicates that these designs effectively use signs and symbols to convey meaning and communicate with the user, resulting in a more expressive and meaningful design that resonates with users at a deeper level. Other designers can learn from this approach and apply it in their own designs to create a more engaging and effective user experience. However, the use of semiotics in architecture should be approached as it involves cultural and social contexts that can vary greatly across different regions and communities. Therefore, it is crucial for designers to conduct thorough research and analysis of the cultural and historical significance of the signs and symbols used in their designs and adapt them appropriately to the context of the project. By incorporating the principles of semiotics in architecture, designers can potentially create buildings that have a strong emotional impact and contribute to the cultural and social identity of the built environment.

7. Conclusions

To conclude, this research sheds light on the architectural identity of Egyptian residential units and explores the degree of originality in contemporary designs, the research also offers a new perspective on architectural regionalism and its role in shaping contemporary designs. By presenting case studies of independent residential unit models and conducting a survey of 34 architects, this study provides valuable insights into the fusion of traditional and modern design elements in Egyptian stand-alone unit architecture. However, future research could expand the sample size to provide a more comprehensive understanding of the subject. This research offers a new perspective on architectural identity and its role in shaping contemporary designs. Effective strategies for preserving and revitalizing traditional architectural culture within contemporary architectural design involve a thoughtful combination of employing new materials and construction techniques that respect the heritage of a place, integrating traditional architectural features into modern buildings, raising public awareness about the importance of traditional architecture, and providing support to preservation organizations. Through the implementation of these measures, contemporary residential units in Egypt can assume a crucial role in safeguarding and rejuvenating traditional architectural heritage, serving as a positive catalyst for its ongoing preservation.

The findings of this study highlight the importance of identity and regionalism in contemporary Egyptian architecture. The use of traditional design elements such as courtyards, domes, and local materials is a crucial aspect of creating a unique architectural identity that reflects Egypt's cultural heritage while meeting the needs of contemporary society. While the research has several strengths, including a comprehensive analysis, valid data collection methods, and highlighting the importance of cultural identity in architecture, there are also some weaknesses, such as a small sample size of architects, limited questionnaire coverage, and lack of comparative analysis.

While this research contributes valuable insights into the significance of cultural identity in shaping contemporary architecture in Egypt, further advancements can be made to enhance its rigor and scope. This includes incorporating larger sample sizes and engaging a more diverse group of stakeholders. Furthermore, conducting comparative analyses with other countries or regions would yield invaluable perspectives on the similarities and differences in architectural identity, thereby facilitating the promotion of sustainable and culturally relevant architectural designs that authentically reflect the diverse cultural identities of various communities.

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