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Improving the Quality of Intermediate Spaces in Order to Enhance the Satisfaction Level and Quality of Life of the Residents in Residential Complexes (Case Study of the Sanglaj Neighborhood in Tehran City)

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Abstract

Urban development in contemporary Iranian history has caused the most damage and physical changes to the country's historical neighborhoods. The introduction of modernity into contemporary architecture, which marked the beginning of many fundamental changes in the fields of architecture and urban planning, has led to the increasing expansion of cities. As a result, this expansion has caused the isolation, deterioration, and inefficiency of important historical neighborhoods across the country. The existence of interstitial spaces in historical neighborhoods once created a functional balance of spaces in urban areas, addressing both the obvious and hidden needs of citizens in terms of spirituality, psychology, social interactions, and economics. However, over time, these interstitial spaces have gradually been removed from historical neighborhoods or significantly overlooked and neglected, resulting in many negative consequences for society. From this perspective, this research focuses on the Sanglaj neighborhood, one of the most significant historical neighborhoods in Tehran, which is grappling with this important issue. It studies, compares, and examines the performance of interstitial spaces in both the past and present of this neighborhood to pave the way for architectural design in contemporary residential spaces from a functional analytical perspective. Therefore, the approach of this research is applied and qualitative. By adopting a descriptive-analytical method, it studies libraries and documents and examines Sanglaj neighborhood through an analysis of its foundations and field observations. The results of this research highlight the need to reevaluate the patterns of interstitial spaces in neighborhood centers and residential areas, offering practical solutions for improving and revitalizing these functional spaces.

Key words: *Residential complex, interstitial spaces, satisfaction level, quality of life, Sanglaj neighborhood.*

Introduction

In the structure of traditional residential architecture in Iran, interstitial spaces, serving as the transitional zone between public and private areas, were highly valued and held a significant role. However, today, due to issues and constraints in housing design—such as

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reduction in residential space sizes due to rising construction costs and the continuous growth of the nation's population—the importance of interstitial spaces has greatly decreased and faced substantial shortages (Nasr Esfahani, 2015). In this context, interstitial spaces are now mainly viewed as links between indoor and outdoor spaces in terms of function, while other aspects of human biological and psychological needs receive little attention. A strong emphasis on functionality in architectural design, from the viewpoint of modern architecture, has resulted in interstitial spaces lacking an adequate level of quality, which has led to numerous psychological and social problems in the design of contemporary residential architecture (Rahimi Atani, 2016).

As a result, interstitial spaces have lost their pivotal role as environmental control zones, in alignment with the cultural elements of modern society. Their crucial function in managing individuals' privacy in social life has been notably reduced (Nasr Esfahani, 2015). Since interstitial spaces are responsible for organizing the components and elements of a building and also provide suitable environments for various functions, if these spaces are designed from a post-functional perspective, considering the five core human needs—biological, belonging, power, freedom, and leisure—it is possible to significantly improve the quality of these spaces. This approach could steer the design process of these spaces in a direction that enhances accessibility for individuals and allows these spaces to accommodate events, thus improving the quality of human relationships. By addressing the individualistic values dominant in today's Iranian society, this could foster the expansion of social interactions (Danaei-Nia, 2019).

In 2015, Nasr Esfahani, in an article titled *An Exploration of the Role of Interstitial Spaces in Residential Architecture*, discusses the value and significance of interstitial spaces in the spatial organization of buildings by examining and analyzing these spaces in both historical and contemporary housing in Iran. In 2013, Hosseinzadeh Fallahi Nejad, in their joint article titled *A Comparative Study of Interstitial Spaces in Iranian and Global Architecture*, presented proposed solutions for improving the quality of these spaces. In 2016, Majidi, in their joint article titled *The Cultural Role of Interstitial Spaces in the Preservation of Historic Fabric*, studied the historical fabric of Aran and Bidgol, highlighting in their findings that interstitial spaces, due to their high flexibility and dynamism, play a crucial role in the development and evolution of a building's spatial organization.

In the field of understanding, examining, and enhancing the key elements that shape residential spaces, including interstitial spaces, it is important to note that in contemporary residential buildings, the diversity of spatial functions is significantly decreasing. As a result, the sense of territoriality and the distinction between public and private

spaces have almost disappeared, and the connection between semi-private open spaces and public urban spaces is abrupt and unplanned. Therefore, designing interstitial spaces as the link between public and private areas, using a postmodern and post-functional approach, could offer a solution. The reduction of open and semi-open spaces, which serve as interstitial spaces, in modern housing has diminished natural ventilation and the flow of light and air compared to the architectural spaces of Iran's past. In the design of contemporary residential complexes, the reduced use of interstitial spaces has led to the entrance area of the home being limited to just a door, with no space for waiting or protection from wind and rain at the entrances. Inside the house, there is no boundary between the living space and the entrance, and when the door opens, the entire interior is exposed to view. The need for appropriate design of interstitial spaces can significantly enhance the quality of privacy in residential buildings.

The Sanglaj neighborhood, located in district 12 of Tehran, covers an area of approximately 113 hectares. It is one of the 13 neighborhoods in this district, situated in zone 3 of the district's subdivisions. The current boundaries of this neighborhood extend to the north by 15 Khordad Street, to the east by Khayyam Street, to the south by Molavi Street, and to the west by Vahdat Islami Street. Given this, the goal of this research is to improve the quality of interstitial spaces to enhance the satisfaction and quality of life of residents in residential complexes in the Sanglaj neighborhood of Tehran.

The Concept of Interstitial Space

The architectural dictionary defines "in-between space" as follows: An in-between space is a dynamic area that is constantly in motion. It is a space characterized by ambiguity and confusion, and on the other hand, it is hybrid and undefined. With its complex design and geometry, an in-between space has the potential to become a stable place. Therefore, it cannot merely be an empty space and always serves the role of connection. In-between architecture is the architecture of relationships and interactions (Karimi, 2020).

An in-between space is one that is enclosed by physical elements that define its boundaries and limits (spatial-formal). Within this space, the focus of meaning is established (semantic), and, on the other hand, it becomes a place for social interactions (communicative-functional) (Bailan, 2008). As the name suggests, this space serves as the link between public and private areas. The separation or connection of two spaces always requires a third space to provide structure and identity to that space. The significance of this connection becomes clear when, on one hand, the interior space must be enclosed and have boundaries relative to the exterior, while also maintaining a connection to the external environment. Both of these spaces serve as pathways, and the need for both is essential for human life and daily activities. This understanding

is facilitated by interstitial spaces, which, by defining spatial organization, create effective connections between the components and elements of a building (Nasr Esfahani, 2015).

In examining the spaces and boundaries of interstitial spaces at the micro level, it can be observed that the boundary between a private area adjacent to each residential unit, at the level of residential blocks, is defined up to the private area inside each residential unit. This area is determined by a series of interstitial spaces within the internal boundaries of residential spaces (Fathi Pekani et al., 2010). At the intermediate scale, it can be stated that this area is defined by a series of interstitial spaces in the form of physical elements within the internal boundaries of a residential space. By combining several residential units into residential blocks, a unified and integrated whole is achieved (Abedini, 2020). In defining interstitial spaces in large-scale residential environments, the neighborhood, as a public space, plays a crucial role (Bailian Asl, 2011).

Sense of Place

Numerous studies have been conducted in the field of understanding the concept of sense of place and its relationship with various human characteristics. Based on the research of scholars, this topic can be examined from two perspectives: that of phenomenologists and environmental psychologists. From the viewpoint of human geography phenomenologists, the sense of place is a strong and solid connection between people and a place, along with the components and elements that comprise it. The sense of place plays a significant role in strengthening the bond and interaction between people and a specific place, deepening an individual's connection with their surrounding environment. Moreover, the passage of time significantly contributes to the deepening of this relationship (Norberg-Schulz, 2002; Grotter, 2004). According to this approach, experiencing is the key element in understanding the concepts and meanings of an environment. As a result, the meaning of a place is directly and intimately linked to how an individual perceives it. Environmental psychologists use the term "behavioral setting" to describe the sense of place, referring to a place-behavior description within a small social unit. In this way, the combination of a place and an activity, in a structured process, can fulfill the essential functions of that environment. Perception, cognition, and feeling are considered among the most important factors in creating a sense of place within people's lives (Ghobadian, 2009). Ultimately, it can be said that meaning is the factor that provides identity and existence to a space, evoking the sense of place within an individual (Norberg-Schulz, 2005).

Flexibility in Architectural Space

Flexibility in architecture and environmental design involves activities related to the adaptability of functions and the creation of new uses. Spatial flexibility, in fact, refers to the organization of spaces during the design process to accommodate new needs, conditions, and applications (Madani Poor, 2008). What is certain

is that architectural spaces are confined to their physical structure, such as ceilings, floors, and walls. However, these spatial structures should be designed in such a way that they are adaptable, allowing for the redefinition of new and emerging events within the space. This is because change is an inherent characteristic of all phenomena, and this change is also reflected in the unending human desire for innovation and novelty. Therefore, when designing spaces to meet the psychological and emotional needs of humans—or in other words, designing from a behavioral perspective—spatial flexibility becomes a crucial factor (Pirnia, 2011).

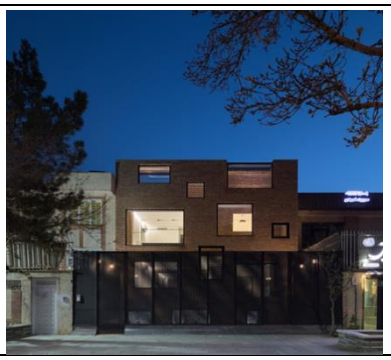
Presence

A public space can be considered dynamic, lively, and sociable when a significant number of people from various age groups and social classes, with a range of genders, gather and engage in social activities of their choice during specific times throughout the day. When individuals from different backgrounds meet their friends, greet neighbors, or interact with strangers in public urban spaces, they tend to feel better about themselves and their community. This is because these social interactions help them connect with their living environment. Therefore, the more attractive and appealing the design of public spaces, the easier it becomes to create dynamic urban spaces that meet the social, cultural, environmental, and economic needs of the community. It is important to remember that it is the presence of others in a space that draws more people to it (Chomí, 1991).

To enhance social interactions and increase the presence of individuals in urban spaces, it is essential to establish a balance between three experiential realms: residential, work, and social. This balance can foster a sense of satisfaction and comfort, encouraging greater presence and increasing social interactions in the daily activities of individuals within urban environments. By focusing on the identity of public space realms, aligned with the desires, needs, customs, traditions, and culture of a community, significant progress can be made in promoting social interactions (Aram, 2018).

Table 1: Examination of the Organization of Intermediate Spaces in Historical Case Studies of Iran and the World

Number	**Building Name**	figure	**Explanation**
1	Vakil al-Mulk Mansion in Sanandaj		The southern entrance of this building begins with a corridor located slightly lower than the level of the main street. This corridor, acting as an intermediate space between the interior and exterior, is positioned with a height difference to

			prevent direct sightlines into the interior of the building.
2	Borujerdi House in Kashan		Upon entering the building, we reach a vestibule adorned with a dome and lighting, which serves as the light source for this space. Then, we pass into a corridor with curved, spiral decorations, and after traversing these two intermediate spaces, we arrive at a central courtyard, which serves as another intermediary space.
3	Glass House by Philip Johnson		In this building, there are no walls, and the roof surface is the primary spatial defining element that organizes the forms and underlying subspaces. The house is divided into six main sections, and the furniture within them defines the boundaries and functional spaces.
4	Intermediate House in Hamadan		The dialectic of empty spaces (intermediate spaces) with the warmth of the brick-colored texture, alongside the outward-facing view and sky, creates a unique charm when combined with the central white seating area.
5	Vidha House located in Bangalore		The main element shaping the layout of spaces in this building is the presence of a central corridor, which serves as the main axis of the building. This corridor performs its role as an intermediate space in the differentiation of areas, connectivity, and also in establishing spatial hierarchy.

Research Method

The research method in this study is **applied** in terms of its objective and falls under the category of **descriptive-analytical research** in terms of its execution. To examine the research variables, a **mixed-methods approach (quantitative-qualitative)** with an **interpretive strategy** is employed. Data collection is carried out through **both library and field methods**, utilizing the following tools:

- **Library and document-based studies** to review theoretical foundations
- **Field studies and photography** of the Sanglaj neighborhood fabric

- **Spatial mapping and analysis** of existing urban structures
- **Semi-structured interviews** with residents, and experts in architecture and urban planning

Research Variables

- **Independent variable**: Spatial patterns in the design of residential complexes and intermediate spaces
- **Dependent variables**: Quality of presence, spatial flexibility, sense of place, and social interactions

Data Analysis Methods

- **Spatial analysis using GIS** to examine spatial hierarchy
- **Qualitative content analysis** of interviews to identify residents' needs
- **Comparative typological analysis** to recognize housing patterns
- **Descriptive statistics** for classifying behavioral variables
- **Integrated interpretive analysis** to overlap qualitative and quantitative findings

Data validation was carried out by **comparing field findings with visual analysis**

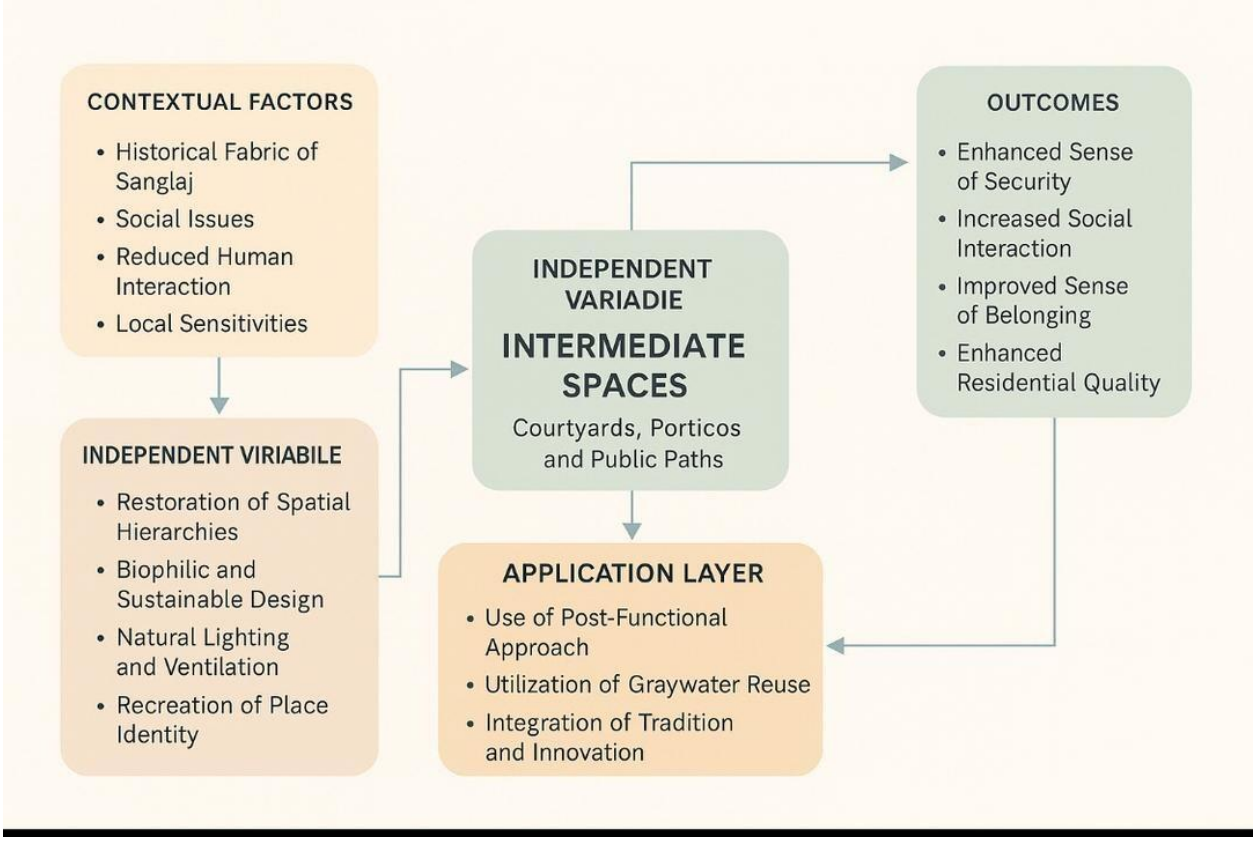


Figure 1. Flowchart of the Research Process

Study Area

The Sanglaj neighborhood, located in District 12 of Tehran, spans approximately 113 hectares. It is one of the 13 neighborhoods in this district and lies in Zone 3 of the district's subdivision. The current boundaries of the neighborhood are as follows: to the north, 15 Khordad Street; to the east, Khayyam Street; to the south, Molavi Street; and to the west, Vahdat Islami Street. However, old maps of Tehran show that the neighborhood's area used to be larger, as the area now known as Park-e Shahr (City Park) was once part of Sanglaj. In newer maps,

the area from 15 Khordad Street to the north of Park-e Shahr has been excluded. During the Qajar era, Sanglaj was one of the five main neighborhoods of Tehran, alongside Oudlajan, Chaleh Meydan, Bazaar, and Arg, all of which were historically significant. At that time, Tehran was broadly divided into five major neighborhoods, with Sanglaj holding considerable authenticity and identity (Madani Poor, 2000) (Figure 1).

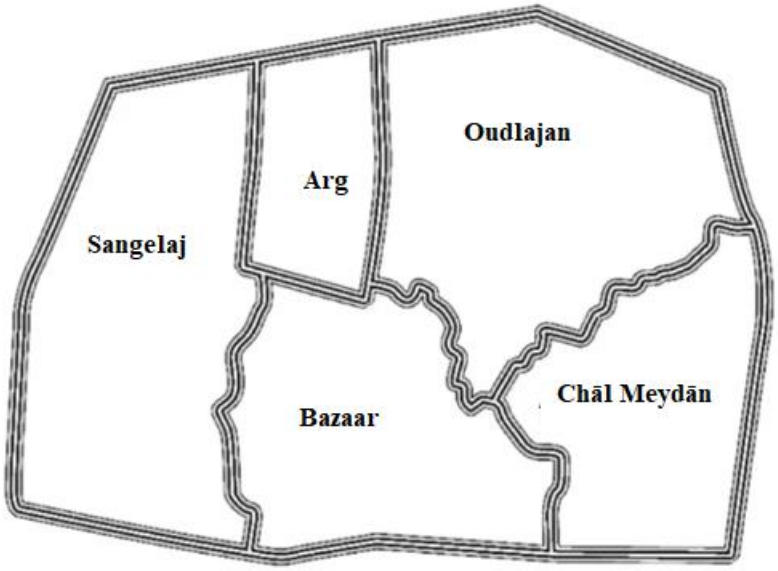


Figure 1: The Five Main Neighborhoods of Tehran According to Old Maps

The site's land currently has a dilapidated and uninhabited texture, covering an area of approximately seven thousand square meters. It is enclosed by a high wall to prevent unauthorized entry. Adjacent to the site is the historic and valuable Vakil al-Tijar traditional restaurant. Nearby, there is an old public parking lot, which, due to the site's limited space, has expanded the area of the desired land by adding approximately two thousand eight hundred square meters (Figure 2).

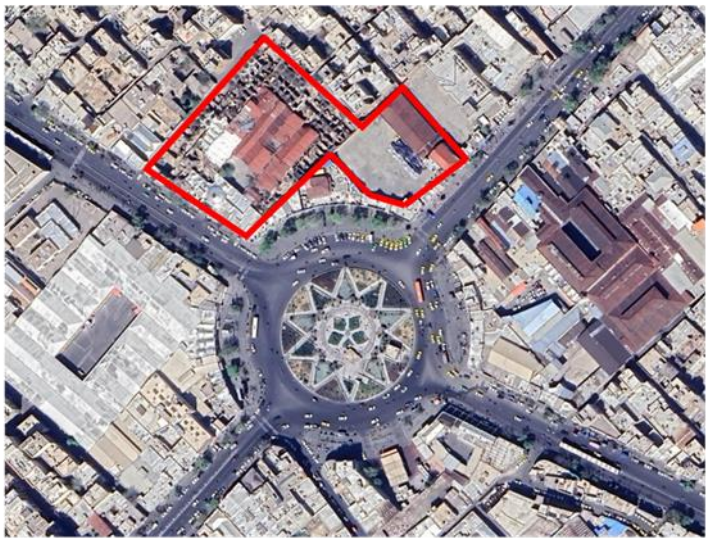


Figure 2: The Site Location of the Project. Source: Author

Findings:

Through the study and examination of the historic Sanglaj neighborhood, based on a descriptive-analytical research method and both field and library research, the results are presented in the form of an analysis of intermediate spaces at both micro and macro scales, in both the contemporary era and prior to it. The findings from the study of settlement patterns in this neighborhood and their connection to the communication arteries at the center of the neighborhood show a significant decline compared to the pre-contemporary period. In the architectural framework of the historic Sanglaj neighborhood, the connections and interactions between people were established through a multi-layered hierarchy of intermediate spaces, starting from a main public passage and leading to the most private areas of a house. However, in the contemporary urban structure of this neighborhood, the diminishing or elimination of intermediate spaces at a macro scale, such as gates, passages, and markets, and at a micro scale, such as small squares, corridors, and vestibules, has led to a crisis in privacy, a sense of security, and a reduction in social interactions among the residents. Additionally, with the decline in the quality of design in public urban spaces in this neighborhood, there has been a decrease in event acceptability, presence, and a sense of place among the residents, leading to a significant reduction in their enthusiasm for being in such spaces. With the increase in construction and rising building costs, and the narrow alleys in this neighborhood, the elimination of intermediate spaces in residential areas has significantly reduced the ability to control personal boundaries. The historic houses in this neighborhood were typically designed to preserve privacy, religious-cultural values, and hospitality, which played a crucial role in fostering social interactions. The first intermediate space in traditional residential houses was the "darbend," which kept several

houses in a narrow alley together and served as the connection point between the house and the neighborhood. Following that, there were entrances and separate door knockers for men and women. Intermediate spaces at the micro scale, without allowing complete access to the inner quarters, facilitated communication with the household members, enabling social interactions at different levels without direct intrusion into the home's private space. These intermediate spaces, with a level difference from the urban realm, provided limited visibility and access to the interior of the house upon entry. However, in modern residential buildings in the Sanglaj neighborhood, this spatial hierarchy has been largely eliminated, and once the door of a residential unit is opened, the entire interior space is visible. According to the spatial hierarchy of traditional houses, after passing through the main entrance, one would enter a vestibule. This space, along with the winding corridors leading to the inner and outer courtyards, prevented strangers from having direct visual access to the inside of the house. In fact, spaces for waiting, spatial division, and creating pauses were always present. However, with the elimination and reduction of such spaces in the modern housing structure, there is no longer a space to wait, pause, or shield oneself from rain and wind. In the broader urban transformation process, the structure of the Sanglaj neighborhood has undergone many changes, with numerous main passages and squares being demolished. As a result, the social interactions that were once shaped in these spaces in relation to economic, cultural, political, and religious factors have disappeared.

The initial design of the project is shown in **Figure 3**.

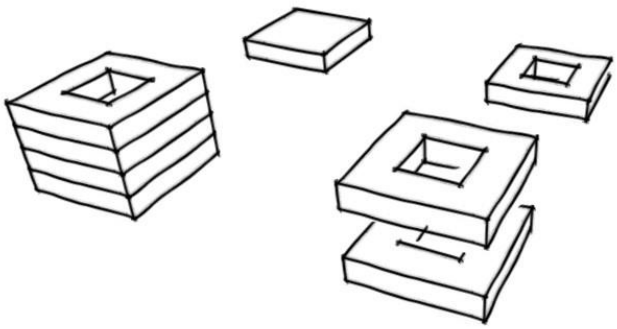


Figure 3: The Design Process of the Residential Complex Based on the Main Concept and the Central Courtyard Space. Source: Author.

During the design process, the initial consideration was an empty plot intended for residential use, with a central courtyard or void placed at its core. This design choice aimed to establish a pivotal intermediate space, a crucial element in many of Iran's renowned architectural

works, and to provide meaning and identity to the surrounding spaces. The empty plot was then replicated, and to create a mid-rise residential complex with an average of four floors per building, it was organized according to the existing layout in District 12. Essentially, the central courtyard functions as a key void within each block and between them. In other words, the central void of each block, the inner area, and the space enclosed by four blocks all act as the outer space, each serving its designated role in the design. (Figure 4).

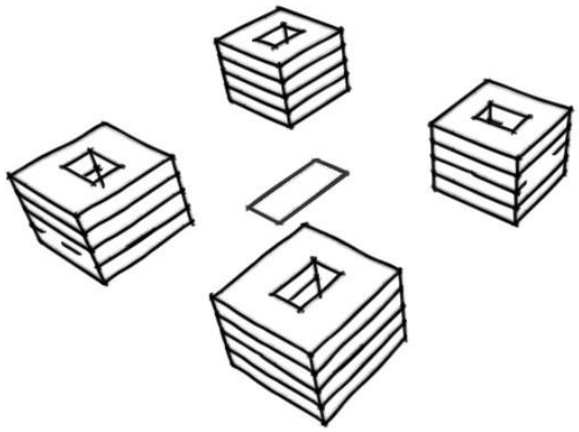


Figure 4: The Design Process of the Residential Complex Based on the Main Concept and the Central Courtyard Space. Source: Author.

Biophilic architecture pays significant attention to the element of water and discusses the connection between the human spirit and nature. However, the use of natural elements such as water, plants, and trees has its own critics. (Figure 5).

Figure 5: Site Plan Design of the Residential Complex Based on the Main Concept. Source: Author.

The criticisms from these individuals, considering the global water crisis and the costs associated with constructing and maintaining green spaces, are understandable and reasonable. However, based on the principles observed in Iran's historical architecture, and considering the need to address resource limitations and the rapid advancement of technology, this challenge appears manageable. To address this, a solution has been implemented to fulfill the water requirements of the residential complex's network and supply water for the green spaces. The water used by each block will undergo treatment through a cost-effective and efficient filtration system, which will then be used to irrigate the trees and supply water to the existing waterways within the complex. This approach ensures that valuable drinking water is not wasted to meet the project's needs. In fact, given the constraints of the area and available resources, the design of the garden within the complex has been tailored accordingly.

The arrangement of the blocks in the complex, their orientation and direction, have been designed with consideration for both the hot and dry climate as well as optimal light and sunlight exposure. The angle of rotation of the blocks is such that it helps control the dominant and disruptive winds coming from the west, with the building's rotation acting as a windbreaker.

This project is designed as a mid-rise residential complex. According to the detailed plan for the area, the complex consists of five residential floors, a pilot parking floor on the ground floor, and a basement parking floor located beneath the ground level (negative one). The central void, serving as an intermediate space within each block, extends down to the ground floor and

features green space, waterways, and abundant light. The roof of this space is made of glass to ensure adequate lighting for each floor. Moreover, the roof has an opening that facilitates fresh air, promotes airflow, and helps ventilate the living spaces, while also being closable during colder seasons. This intermediate space contributes to natural light, ventilation for adjacent areas, and a connection with nature, all supported by these voids (inner spaces). In this way, the parking area is transformed from a dark and oppressive environment into a brighter and more inviting space. (Figure 6).

Figure 6: Access route to the public terraces of the complex via an intermediate space. Source: The author

At the internal entrance of each unit, the spatial arrangement is designed in such a way that, as much as possible, the interior of the house is not visible, and through the existing spatial hierarchy, one can gradually move from the semi-public space to the semi-private and finally to the private space. However, in units with smaller areas, this hierarchy is not fully achieved, and due to space limitations, it seems somewhat unavoidable.

For the comfort of the residents and to increase neighborhood interactions with other residents of the Sanglaj neighborhood, and on the other hand, to reduce unnecessary traffic and congestion in the neighborhood, a service-welfare complex has been designed for the residents. This building is located in the extension of the site, namely the old parking area. Neighborhood residents can also use this service space after passing through the necessary security hierarchy (Figure 7).

Figure 7: The role of intermediate spaces as a central courtyard in the plan of the service-welfare section of the complex. Source: The author

In the core structure of this intermediate-level residential complex, a concrete frame is employed. The primary advantage of a concrete frame lies in its high compressive strength, whereas its drawback is its relatively low tensile strength. To address this limitation, reinforcement bars have been incorporated into the structure. Given the public and private terraces that cantilever at a width of 1.5 meters on each side of the building, Kubiak ceilings have been chosen to support the load on the building's frame. The central heating and cooling system for the complex is managed through a central boiler room, with the necessary equipment for the pool's boiler room also provided. In the design of the building's amenities, considerable efforts have been made to ensure that temperature, humidity, and proper ventilation are maintained at optimal levels to meet the needs of the 50 families living in the complex.

Conclusion

The design and construction of residential complexes and public urban spaces in the Sanglaj neighborhood primarily focus on quantitative factors such as space dimensions and standards, economic considerations, and the challenges posed by population growth and limited urban development space. As a result, less attention is given to improving the quality of residential and intermediate spaces. Therefore, achieving higher-quality living environments in these intermediate spaces—which is the primary objective of this research—can lead to solutions that enhance their quality in the Sanglaj neighborhood. This, in turn, could significantly foster eventfulness, social interactions, a sense of belonging, and identity-building among residents. Based on data analysis, the dominant functionalist approach in modern architecture, with its emphasis on the design of residential spaces, coupled with neglect of the human psyche and spirit as the main user of these spaces, and the failure to integrate behavioral

architecture, has resulted in diminished social interactions. This is due to people's reluctance to engage with these overly functional spaces. In light of this, the research recommends that the design process of intermediate spaces adopt a post-functional and postmodern approach—one that emphasizes the human spirit, meaning, and identity-building in addition to fulfilling physical and functional needs. The success of such spaces in this historic neighborhood is evident in the way architects approach human beings, considering all aspects required by individuals, including culture, customs, habits, traditions, and spiritual needs, rather than merely adhering to a functionalist or structuralist perspective. This human-centered approach, emphasizing all dimensions of the human experience, is the primary outcome of modern architecture. To achieve higher-quality intermediate spaces, innovation in design and a new perspective on contemporary human life are essential.

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