

A Review of Research on the Spatial System and Dwelling Mechanisms of Beijing Siheyuan Courtyard Houses

Boyue Cao^{1,2,*}, Mustafa Halabi Azahari¹

¹ Faculty of Creative Industries, City University, Kuala Lumpur, 46100, Malaysia

² Inner Mongolia Technical University of Construction, Hohhot, Inner Mongolia, 010070, China

*Corresponding Author

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Abstract: Courtyard housing represents a residential system formed through the long term interaction of natural conditions, social organization, and cultural traditions. The Beijing siheyuan courtyard house, as a representative example, constitutes an integrated residential spatial system that combines spatial logic with cultural meaning. Its core value lies in the holistic relationship among the courtyard, architectural layout, and patterns of family life. Based on existing research, this paper presents a systematic review of studies on Beijing siheyuan from the dual perspectives of spatial systems and dwelling mechanisms. It clarifies the characteristics of siheyuan as a localized residential system, examines the spatial organization centered on the courtyard, explains the mechanisms through which the built environment regulates climate and organizes social life, and interprets the cultural symbolism embedded in spatial order. The review indicates that scholarly research has gradually shifted from heritage preservation and morphological reconstruction toward a deeper understanding of the spatial principles and dwelling mechanisms embodied in siheyuan. Increasingly, the siheyuan is regarded as a residential prototype that can be translated into contemporary architectural practice. Its key residential characteristics provide locally rooted insights for high density urban housing design, low energy residential development, and the reconstruction of community social relations. This study offers a comprehensive reference for further research and for the application of traditional courtyard principles in contemporary contexts.

1. Introduction

Courtyard housing represents a residential form that has evolved through long term interactions among the natural environment, social structures, and cultural values. Its spatial organization gradually stabilizes through continuous practice and responds to the living needs embedded within specific social and cultural contexts. The formation of traditional residential forms is not determined solely by technical or formal factors. Rather, it is closely related to family structure, behavioral patterns, and systems of cultural values[1]. Within the traditional Chinese architectural system, the Beijing siheyuan is an important representative type of courtyard dwelling. Its spatial structure forms a stable living unit through the enclosure of buildings around a central courtyard, creating a

distinctive residential form in the course of urban development[2,3].

Previous studies on the siheyuan have mainly focused on architectural form, historical evolution, and heritage conservation. These studies provide an important foundation for understanding the development of traditional courtyard housing, yet they have also tended to treat the siheyuan as a relatively static historical architectural object. With the development of architectural anthropology and spatial studies, increasing attention has been given to the relationship between residential spatial structure and everyday life. Scholars have emphasized the role of domestic space in organizing social relations and daily practices[4]. In the field of Chinese architectural studies, researchers have also examined the spatial significance of the siheyuan from the perspectives of spatial organization and dwelling culture. These studies suggest that the courtyard structure not only organizes daily domestic activities but also embodies traditional family ethics and broader social order [5,6].

In recent years, research on the Beijing siheyuan has gradually shifted from descriptive historical accounts toward a more integrated analysis of spatial systems and dwelling mechanisms. On the one hand, scholars have examined its courtyard centered spatial structure and hierarchical spatial sequence. On the other hand, studies have explored its dwelling logic from the perspectives of environmental adaptation, social interaction, and cultural symbolism, increasingly interpreting the siheyuan as a localized residential system with continuing relevance [7]. On this basis, the present paper reviews existing studies on the spatial system and dwelling mechanisms of the Beijing siheyuan. It discusses relevant scholarship in terms of spatial organization, environmental adaptation, social life, and cultural symbolism, with the aim of providing a theoretical reference for the contemporary reinterpretation of traditional residential architecture [8,9].

2. Research Scope and Theoretical Foundations of Siheyuan Studies

Within the academic tradition of research on traditional architecture, a clear definition of the research object and a well structured theoretical framework are essential foundations for in depth analysis. The Beijing siheyuan, as a central paradigm of traditional Chinese courtyard housing, has gradually revealed its research value through evolving understandings of its fundamental characteristics. Interdisciplinary perspectives from architectural anthropology, space syntax, and housing sociology provide important methodological support for this process. These perspectives have encouraged a shift in siheyuan studies from simple morphological description toward systematic analysis of underlying spatial and social mechanisms, and from static heritage preservation toward a more dynamic exploration of cultural and spatial value.

2.1 Defining the Siheyuan: From Architectural Form to a Localized Residential System

In studies of vernacular architecture and traditional housing, the concept of a residential system has become an important framework for understanding the formation of dwelling environments. This concept emphasizes the long term interaction between architectural space, social structure, everyday life, and the natural environment, and moves beyond the traditional approach that treats housing as an isolated architectural object. Residential forms typically emerge gradually within specific cultural contexts and social lifestyles rather than being determined solely by technical or formal logic [10]. As a representative form of traditional Chinese courtyard housing, the spatial significance of the Beijing siheyuan lies not only in its architectural configuration but also in the integrated relationship between courtyard space, everyday living practices, and social relations.

Early studies of siheyuan primarily focused on architectural history and historical morphological analysis. Through archival research and field surveys, scholars systematically documented courtyard layouts, architectural types, and construction techniques. These studies provided valuable

material for understanding the historical development of courtyard housing and contributed significantly to heritage conservation efforts in Beijing. However, within this research framework, the siheyuan was often approached as a static historical architectural object, and its social functions and everyday living mechanisms received relatively limited attention [9].

As architectural research increasingly adopts interdisciplinary approaches, scholars have begun to interpret traditional residential space from more comprehensive perspectives. Studies have shown that courtyard housing typically organizes environmental adaptation, daily activities, and social interaction through a central courtyard, forming a relatively stable spatial structure [10]. From this perspective, the siheyuan can be understood not only as a building type but also as a systematic spatial structure that supports specific patterns of dwelling.

From the perspective of environmental adaptation and social organization, traditional Chinese courtyard housing gradually developed spatial configurations suited to climatic conditions and family structures. Courtyard space improves ventilation and daylight while providing a shared area for household activities, thereby establishing a close relationship between spatial organization and social life. This courtyard based spatial model is widely found in traditional Chinese dwellings and forms an important foundation for understanding traditional residential culture [8].

The stability of the siheyuan as a residential system is also reflected in the continuity of its spatial principles over time. Although variations in scale, decoration, and function appeared in different historical periods, the courtyard centered spatial organization remained consistent. Studies have shown that this courtyard based structure not only organizes family life but also forms a residential network linked with the hutong street system in Beijing's urban fabric [11]. Consequently, contemporary research increasingly regards the siheyuan as a spatial prototype with enduring relevance, whose spatial logic and dwelling experience may provide insights for contemporary housing design.

2.2 Multidisciplinary Theoretical Foundations of Siheyuan Studies

As a complex localized residential system, the study of siheyuan relies on multiple theoretical perspectives. Architectural anthropology, phenomenology, space syntax, and housing sociology provide diverse analytical tools that enable scholars to examine the formation of traditional housing within the broader relationship between people, space, culture, and environment. Architectural anthropology suggests that residential space is not merely a physical structure but also a material expression of cultural values and social practices [12].

Architectural anthropology therefore provides an important theoretical foundation for defining the siheyuan as a cultural and social spatial system. Studies in this field indicate that traditional residential forms are closely associated with family structures, ethical norms, and everyday life patterns, and that spatial organization reflects broader social relationships. In Chinese architectural history research, scholars widely recognize the close relationship between the spatial layout of the siheyuan and traditional family structures. The courtyard configuration not only fulfills residential functions but also embodies family hierarchy and social ethics [13].

Phenomenological theory offers another perspective by emphasizing the experiential and symbolic dimensions of dwelling space. From this viewpoint, the meaning of residential space is shaped by human perception, emotional experience, and everyday practice. Architectural phenomenology argues that people continuously construct spatial meaning through daily life, thereby forming a sense of identity and belonging in the living environment [14].

Within Chinese architectural scholarship, researchers have also examined the spatial significance of traditional courtyard housing from the perspectives of cultural meaning and spatial experience. These studies suggest that courtyard space creates distinctive dwelling experiences through

variations in scale, spatial sequences, and hierarchical spatial organization. Such experiential spatial structures not only serve functional needs but also subtly shape residential culture and spatial awareness [15].

Space syntax theory provides a further analytical approach for studying the spatial organization of traditional courtyard houses. By examining spatial integration, connectivity, and accessibility, this theory reveals relationships between spatial configuration and human behavior. Research has shown that in many traditional dwellings, central spaces play a key role in integrating spatial activities and circulation patterns, a characteristic that is particularly evident in courtyard housing [16].

In traditional residential environments, courtyard space functions as the core organizing element. Through the courtyard, rooms with different functions are integrated into a coherent living unit while forming a clear hierarchical spatial structure. The courtyard serves both as a primary site for family activities and as a central node connecting different functional spaces, giving it a crucial role within the spatial system of traditional housing [17].

Housing sociology further explains the interaction between residential space and social relationships. From this perspective, space is not only a container of social relations but also a condition through which social relations are produced and reproduced. Through everyday practices, residents continuously reshape social order and cultural meaning within spatial settings, making residential space an important component of social structure [18].

In studies of Chinese urban living environments, traditional courtyard housing organizes neighborhood interaction and family relations through shared spaces and hierarchical spatial structures. Courtyards and hutong streets together form a multi-layered social environment that allows residential space to maintain both family privacy and community interaction, giving courtyard housing an important social role in traditional urban life [19].

3. The Spatial System of the Siheyuan

The spatial system of the Beijing siheyuan constitutes the material framework and core carrier of its localized residential system. It can be understood as an integrated spatial structure organized around three key principles: a courtyard-centered spatial core, a hierarchical spatial order, and a network of transitional threshold spaces. Rather than being a simple aggregation of architectural forms, this system developed through centuries of practice and adaptation to local lifestyles and social culture. Its significance lies in the careful construction of spatial relationships that support residential functions, social organization, and cultural meaning within a coherent spatial framework.

Research on the spatial system of the siheyuan has gradually moved from early morphological description to deeper analysis of spatial logic and functional mechanisms. Scholars have identified three interrelated characteristics that define this spatial structure: the courtyard as the spatial core, hierarchical spatial organization, and transitional threshold spaces. These three elements interact to form the distinctive spatial identity that differentiates the siheyuan from other housing types.

3.1 Courtyard Centered Spatial Organization

The courtyard forms the structural core and generative origin of the siheyuan spatial system. It is not simply an empty open space but functions as an active spatial center that integrates surrounding architectural units into a coherent residential environment. Unlike many Western housing models that emphasize individual building units, the siheyuan places the courtyard at the geometric and functional center of the dwelling. The main hall, side rooms, and entrance buildings are arranged around the courtyard in an enclosed configuration. Functional spaces are not connected through long internal corridors but are instead linked through the courtyard, which serves as a shared node

for circulation and daily activities. In this arrangement, everyday living activities are consistently oriented toward the shared courtyard space [20].

Studies based on space syntax analysis further confirm the central role of the courtyard. Quantitative spatial analysis indicates that the courtyard typically has the highest spatial integration within the siheyuan layout, functioning simultaneously as the primary circulation hub and the central activity space. Family members moving between rooms or carrying out daily activities often pass through the courtyard or adjacent corridors facing it[21]. This spatial arrangement reinforces the courtyard's role as the primary space for family interaction.

The courtyard also plays an important role in defining spatial hierarchy and architectural value within the residential compound. By organizing the overall spatial structure around a central courtyard, relationships among building orientation, functional allocation, and spatial status become clearly defined. Studies of traditional courtyard housing indicate that the central courtyard not only organizes spatial relationships but also influences the perceived hierarchy of architectural spaces (Wu, 2015).

The spatial hierarchy within the siheyuan also reflects traditional family structures and ethical order. The main hall is usually located on the north side of the courtyard with the most favorable orientation and is traditionally occupied by senior family members. Side rooms located on the east and west sides accommodate younger family members or auxiliary functions. Entrance buildings at the southern side are often used for reception or storage. This spatial arrangement surrounding the courtyard therefore reflects both functional needs and traditional social hierarchy.

Despite changes in scale, decoration, and functional arrangements across historical periods, the courtyard centered spatial logic of the siheyuan has remained remarkably stable. Studies suggest that the enclosing courtyard structure creates a stable residential environment while reinforcing the continuity and coherence of domestic space [22].

In traditional Chinese architecture, multi courtyard residential layouts represent an important spatial development. Through the sequential organization of multiple courtyards, residential space forms a progressive hierarchy moving from exterior to interior, with each courtyard serving different domestic functions. Courtyard space also functions as an intermediary between architecture and the natural environment. Research indicates that courtyards introduce sunlight, air circulation, and vegetation into residential compounds, enabling residents to experience natural environmental changes within the dwelling. In this way, the courtyard forms an important interface between built space and the natural environment [23].

Contemporary research further emphasizes the everyday cultural significance of courtyard space. The courtyard supports daily household activities while also providing space for family communication, leisure, and seasonal celebrations. This spatial model, in which daily life and environmental experience are organized around a shared courtyard, remains a key factor supporting the enduring relevance of the siheyuan spatial system[24].

3.2 Hierarchical Spatial Structure from Exterior to Interior

The spatial organization of the siheyuan is not homogeneous but structured through a progressive hierarchy that moves from exterior to interior and from public to private space. This hierarchical organization is not simply a functional division of space but a social spatial order constructed through spatial distance, accessibility, visual permeability, and degrees of enclosure. Its purpose is to create a gradual transition between public and private domains while accommodating different patterns of domestic life and social interaction.

Similar hierarchical spatial arrangements are widely observed in traditional courtyard housing. By varying spatial depth and accessibility, traditional residences create progressively increasing

levels of privacy, which is considered a key characteristic of spatial order in vernacular housing [24].

In terms of spatial boundaries, the siheyuan exhibits a concentric spatial structure organized around the central courtyard. From the innermost to the outermost layer, the spatial sequence typically consists of interior rooms, courtyard space, entrance space, and hutong street space. Each layer corresponds to different degrees of privacy and social use. Interior rooms represent the most private spaces used exclusively by household members. Courtyard space functions as a semi private domain where family members interact in daily activities and occasionally receive close neighbors. Entrance areas, including the gateway and transitional spaces behind the screen wall, serve as semi public areas used for reception and circulation. Hutong streets constitute the fully public domain and connect the residential compound with the broader urban environment.

This concentric spatial structure reflects the spatial logic of gradual privacy in traditional residential environments. Through multiple spatial boundaries, public and private domains are connected through gradual transitions rather than abrupt separation. Studies of East Asian courtyard housing identify this layered spatial strategy as a characteristic organizational principle of traditional residential environments [25].

Spatial sequence is the key mechanism that enables this hierarchical organization. The siheyuan employs a strategy of delayed entry, in which multiple spatial transitions guide residents gradually toward the core living spaces. The typical sequence experienced when entering a siheyuan moves from the hutong to the main gate, then to the screen wall, followed by the front courtyard, inner courtyard, and finally the interior rooms. This spatial sequence has been described in architectural studies as a progressive spatial depth structure that creates layered spatial experience while reinforcing orientation and spatial order [24].

The hierarchical spatial structure of the siheyuan also reflects traditional social hierarchy and family ethics. Within the compound, the position of each building unit within the spatial hierarchy corresponds to the social roles, generational status, and authority of family members [26](Steinhardt, 2023).

From the perspective of spatial perception and everyday use, hierarchical spatial sequences help residents develop stable spatial understanding and expectations. Through repeated daily experience, residents gradually associate particular spatial levels with corresponding behavioral norms and social interactions. Sequential spatial organization strengthens spatial identity and a sense of belonging while reducing external disturbance and enhancing psychological security within the residential environment [27].

3.3 Transitional Threshold Spaces and Spatial Regulation

Threshold spaces form an important component of the siheyuan spatial system and serve as key elements that connect spaces of different levels and characteristics. In architectural theory, a threshold refers to a transitional zone between two spatial domains. Within the siheyuan, elements such as door thresholds, screen walls, corridors, raised platforms, and courtyard boundaries collectively create a continuous system of transitional spaces. These elements do not merely separate spaces but function as intermediary zones that regulate relationships between openness and enclosure, public and private space, and interior and exterior environments.

The screen wall represents one of the most distinctive threshold elements within the siheyuan. Typically located near the entrance gate, it creates a transitional space between the gateway and the courtyard. By blocking direct lines of sight, the screen wall protects courtyard privacy while forming a spatial sequence of gate, screen wall, and courtyard. In addition to its spatial function, decorative motifs on the screen wall often convey symbolic cultural meanings. The door threshold

also marks a clear boundary between interior and exterior space. Its raised form requires a physical step when entering or leaving the house, reinforcing spatial boundaries through bodily movement and sensory experience [28].

Corridors provide another important form of threshold space linking buildings with courtyards and connecting different architectural units. In siheyuan compounds these may appear as covered eaves corridors or enclosed walkways. Their semi open character allows them to function simultaneously as circulation routes, resting spaces, and viewing platforms. Depending on weather conditions and daily activities, corridors can shift between passage, shelter, and social interaction space, thereby softening the boundary between interior and exterior environments. From the perspective of social behavior, these transitional spaces often support informal interaction among family members [29].

Other spatial elements such as raised platforms, courtyard edges, and secondary gates also function as threshold spaces. Raised platforms emphasize the status of the main hall while serving as a transitional zone between interior rooms and the courtyard. Courtyard boundaries defined by walls, vegetation, or low partitions establish spatial enclosure without completely blocking airflow or visual connection. Secondary entrances help distribute daily circulation and neighborly interaction while maintaining the ceremonial role of the primary gate [28].

Threshold spaces do not function independently but operate together with spatial hierarchy and spatial sequence to form a continuous spatial experience. When entering a traditional courtyard compound, residents typically pass through a sequence of transitions such as gate, screen wall, courtyard, corridor, inner courtyard, doorway, and interior space. These threshold spaces both reinforce hierarchical order and soften spatial transitions, allowing daily activities to unfold gradually in time and space [30].

The ambiguity and multifunctionality of threshold spaces also provide flexibility within the siheyuan spatial system. Corridors function as circulation paths in daily use but may temporarily serve as resting or dining spaces during gatherings. Transitional spaces in front of screen walls may serve as buffers during ordinary days but become ceremonial spaces during festivals. Such adaptability enhances the capacity of the siheyuan spatial system to accommodate diverse living situations [28].

Threshold spaces also subtly shape patterns of social behavior. The presence of multiple spatial thresholds allows residents to regulate social distance through spatial choice. Courtyards support active family interaction, corridors allow casual conversation, while spaces outside the entrance maintain distance from unfamiliar visitors. This spatially mediated regulation of social distance helps balance social interaction and privacy within the residential environment [31].

4. Dwelling Mechanisms of the Siheyuan

4.1 Environmental Adaptation: Passive Climatic Regulation Embedded in Spatial Organization

Environmental and climatic adaptation constitutes an important material foundation of the siheyuan dwelling mechanism and is a key reason for its long term persistence in the climate of northern China. Unlike active environmental control systems that depend on modern mechanical equipment, the siheyuan embeds climatic regulation within its spatial organization. Through its spatial structure, it forms a passive environmental system capable of responding to Beijing's climatic conditions, characterized by cold winters, hot summers, and distinct seasonal variation. This mode of regulation emphasizes the coordinated operation of spatial elements. Through the integrated relationship among the courtyard, building layout, and enclosure structure, it creates a dynamic balance between the natural environment and residential space, reflecting the ecological

wisdom of traditional housing in adapting to nature [32].

As the core of the siheyuan spatial system, the courtyard is also a key node of environmental regulation. Its proportions, degree of enclosure, and relationship with surrounding buildings directly affect solar access, air movement, and heat exchange. Research has shown that an appropriate balance between courtyard scale and building height can create a stable courtyard microclimate, allowing sufficient solar gain in winter while reducing heat accumulation in summer through shading and ventilation, thereby producing a seasonally adaptive living environment [33].

The design of building orientation and enclosure structures further strengthens environmental adaptation. The principal living spaces of the siheyuan are usually oriented to the south in order to maximize winter sunlight and reduce exposure to cold northern winds. Northern walls are often built as thicker, more solid surfaces with fewer openings to block winter winds. At the same time, gateways, corridors, and window openings form adjustable spatial boundaries that allow different ventilation paths to emerge in different seasons. Studies indicate that traditional courtyard housing can achieve relatively stable thermal conditions without mechanical systems through the combined effects of building orientation, spatial enclosure, and the thermal inertia of construction materials [34].

At the same time, the environmental adaptation of the siheyuan does not seek a fixed and uniform level of indoor comfort. Instead, it relies on spatial diversity, allowing residents to choose suitable places for daily activities according to changes in season and time, thereby forming a dynamic comfort model based on behavioral adjustment [33].

4.2 Social Construction: Shared Living and the Reproduction of Social Relations through Space

Built upon its material basis of environmental adaptation, the siheyuan dwelling mechanism also performs the function of constructing and reproducing social relations, which is central to its adaptation to traditional patterns of social life. By embedding social functions within spatial organization, the siheyuan forms a multi layered structure of shared living centered on the courtyard. This structure supports traditional multigenerational households while also mediating between family and neighborhood, and between private and public life, making residential space an important medium for the formation and maintenance of social relations.

As a semi public and semi private shared space, the courtyard is the core carrier of this social mechanism [35]. Compared with fully private interior rooms and fully public street space, the courtyard provides a high frequency setting for everyday interaction among family members. Daily activities such as cleaning, food preparation, and evening relaxation create opportunities for natural communication and emotional connection. In addition, festive gatherings and ritual activities held in the courtyard further strengthen family cohesion and a sense of belonging. The semi open character of the courtyard also creates spatial conditions for moderate social interaction among neighbors, allowing social contact to occur without disrupting private life and thereby maintaining a balance between internal family relations and external neighborhood ties.

The progressive spatial hierarchy of the siheyuan, moving from public to private and from exterior to interior, provides the structural basis for this pattern of shared living [36]. Entrance spaces and front courtyards function as semi public areas suitable for receiving visitors and interacting with neighbors. The central courtyard serves as a semi private space mainly used for the everyday activities of family members. Interior rooms, by contrast, form a fully private domain for rest and solitude. This layered spatial organization encourages spontaneous social interaction while also protecting individual privacy, thus producing a flexible pattern of shared living.

This spatial structure corresponds closely to the clan based organization of traditional Chinese

society. Through the spatial arrangement of the compound, family members of different generations obtain relatively independent living areas. Elder family members occupy the main hall on the northern side, which has the best orientation and the largest space. Younger generations live in the side rooms, maintaining independence while remaining close enough to care for elders. Servants or auxiliary spaces are located in the southern entrance building. All of these spaces are connected through the courtyard and corridors, enabling family members to maintain both independence and close interaction, thereby producing a pattern of family life that is spatially differentiated yet socially integrated.

The social construction of the siheyuan is not limited to the interior of the courtyard compound. Its organic relationship with hutong space forms an interactive neighborhood network linking courtyard and lane. Hutongs function as urban public space for circulation and communal activity, while the siheyuan courtyard extends private domestic life and complements the hutong. Residents connect with the hutong through the courtyard gate, and daily mobility, neighborhood interaction, and community activities all unfold within this spatial network. The small scale and high density of this environment enable residents to maintain moderate levels of familiarity and contact, thereby strengthening community identity and mutual support.

The siheyuan, therefore, is not a neutral container of residence but an active spatial setting deeply involved in the construction of social relations. Through everyday spatial practices, residents continuously reproduce family ethics and neighborhood ties while living within the spatial order of the compound. In this sense, the siheyuan functions not only as a physical environment for dwelling but also as an important material carrier of traditional social structure and interpersonal relations.

4.3 Cultural Symbolism: Meaning Production through Spatial Order and Everyday Practice

The mechanism of cultural symbolism forms the spiritual core of the siheyuan dwelling system. Built upon environmental adaptation and social construction, it embeds traditional cultural concepts and ethical norms into everyday life through spatial order, so that the siheyuan becomes not only a material living environment but also a material carrier of traditional culture and values [36]. Unlike cultural expression that relies primarily on decorative symbols, the siheyuan integrates symbolism deeply into spatial organization, hierarchical relationships, and patterns of use. In this way, residents continuously perceive and reproduce traditional ethical values through everyday spatial experience and daily practice.

This cultural order is first reflected in the spatial expression of the traditional social principles of hierarchy and generational distinction. The location, orientation, and scale of the main hall, side rooms, and entrance building are not simply matters of functional arrangement, but correspond to the social roles and generational status of family members. The main hall is located at the center of the northern side of the courtyard, facing south with the best solar orientation and the largest spatial capacity, and symbolizes the central status of senior family members. The east and west side rooms are smaller and are typically occupied by children or younger generations. The southern entrance building is more modest in scale and often accommodates servants or auxiliary functions such as receiving guests and storage. Through this layout, family members naturally follow an established ethical order in the course of everyday spatial use, and architectural space becomes a material expression of social hierarchy.

In terms of the relationship between inside and outside, the siheyuan establishes clear cultural boundaries through its progressive spatial hierarchy, reflecting traditional norms that distinguish interior from exterior and host from guest. The main gate serves not only as a defensive element but also as a symbol of household identity. After entering through the gate, the screen wall blocks direct sightlines and creates a spatial effect of concealment and restraint. Only after passing the screen

wall does one enter the courtyard, which forms the core domestic space of the household [37]. This layered sequence protects the privacy of family life while also reinforcing the cultural meaning of the home as a space of spiritual belonging. Residents therefore experience social norms of interiority and exteriority through spatial transition.

The cultural symbolism of the siheyuan is not static but is continuously generated and reinforced through everyday life and ritual practice. The courtyard serves not only as a setting for ordinary domestic activities but also as the central space for festivals and ritual events[38-40]. In this way, it becomes a symbolic center of family memory and cultural identity. Through such activities, abstract cultural concepts are transformed into concrete spatial experiences, thereby strengthening family cohesion and cultural identification.

From the perspective of cultural geography, stable spatial order and repeated scenes of daily life gradually shape residents' emotional understanding of home and place. In the siheyuan, every plant, brick, and tile can carry family memory, while ways of living, social etiquette, and behavioral norms are continuously transmitted across generations. The siheyuan thus becomes an important link connecting the individual, the family, and traditional culture. At the same time, its mechanism of cultural symbolism also shows a degree of dynamic adaptability. As family structures and lifestyles have changed in modern society, some siheyuan compounds have been transformed into museums, guesthouses, teahouses, or offices. Although the traditional symbolic order of family hierarchy may be weakened in these new uses, cultural meanings such as sharing, belonging, and locality are often retained and reinterpreted in contemporary terms [24].

5. Conclusion

As a representative type of traditional Chinese courtyard housing, the Beijing siheyuan has increasingly been defined in the context of vernacular architecture studies as an integrated courtyard oriented residential spatial system. Its core value lies not in the formal characteristics of individual buildings but in the holistic structural relationship among courtyard space, architectural layout, and family life, together with the family structure, social order, and cultural values embedded in this relationship. Scholarly research on the siheyuan has moved beyond a singular focus on historical reconstruction and heritage conservation toward an exploration of its spatial principles and dwelling mechanisms. It is now increasingly regarded as a locally rooted residential prototype that has been tested through long term practice and can be analyzed and abstracted, thereby providing an important documentary and theoretical basis for the contemporary reinterpretation of traditional dwelling wisdom.

As a typical localized residential system, the siheyuan is characterized by the systematic integration of multiple dimensions. First, it organizes the overall dwelling structure around the courtyard, which is not an empty residual space but the central integrative node that coordinates surrounding architectural units and determines the order of the overall layout and the unfolding of spatial hierarchy. Second, through a progressive spatial structure moving from exterior to interior and from public to private, together with a threshold system composed of doorsteps, screen walls, and corridors, it creates a spatial sequence that combines order with experiential richness. This sequence not only shapes everyday spatial perception but also serves as a material expression of traditional ethical order. Third, in functional terms, the siheyuan embeds environmental and climatic regulation within spatial organization. Through the coordinated relationship among courtyard scale, building orientation, and degree of enclosure, it forms a passive environmental system that responds effectively to the climate of Beijing. At the same time, with the courtyard serving as a semi public and semi private shared space, it establishes a multi layered structure of shared living that accommodates the traditional multigenerational family and supports the balance

and reproduction of social relations within both the family and the neighborhood.

The deeper value of the siheyuan lies in the cultural symbolic order generated through the interaction between spatial organization and everyday practice. Traditional cultural concepts and ethical norms, including distinctions between inside and outside, senior and junior, and hierarchy and status, are structurally embedded in architectural layout, spatial hierarchy, and patterns of use. In this way, residents continue to perceive and reproduce cultural values through everyday spatial experience, and the siheyuan becomes a medium for the generation of meaning that carries local culture and family memory. These characteristics do not exist in isolation. Rather, they are highly integrated and mutually supportive, together forming a complete residential system that combines material practicality, social adaptability, and cultural significance.

The core principles of spatial organization and dwelling operation embodied in the siheyuan not only provide a representative case for understanding traditional Chinese residential culture but also reveal considerable potential for contemporary reinterpretation in the context of high density urban living. They offer valuable locally grounded insights for low energy housing design, the reconstruction of community social relations, and the creation of livable environments with distinctive cultural identity.

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