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Factors Of The Formation Of Traditional Residential Architecture In The Jizzakh Oasis And Its Integration Into Contemporary Design

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Abstract: The article analyzes the formation of traditional residential architecture in the Jizzakh oasis in relation to climatic, historical-geographical, socio-cultural and constructive factors. The research discusses how the sharply continental climate of the oasis, water resources, foothill and plain landscapes, mahalla-courtyard structure, and local earthen building traditions influenced the spatial and planning organization of dwellings. The traditional courtyard house is interpreted not only as a historical heritage phenomenon, but also as a methodological basis for contemporary climate-responsive and energy-efficient housing design. The study substantiates that the courtyard, iwan, seasonal rooms, thick walls, natural ventilation routes and solar-control elements form an integrated adaptive architectural system in the residential architecture of the Jizzakh oasis.

Keywords: Jizzakh oasis, traditional dwelling, courtyard system, mahalla, climate-responsive architecture, adobe, earthen architecture, energy efficiency, contemporary integration.

INTRODUCTION

The Jizzakh Oasis is located in the central part of Uzbekistan, within the historical and geographical area situated between the Zarafshan and Syr Darya river basins. Since ancient times, it has developed as a region where foothill, plain, desert, and irrigated oasis landscapes converge[1]. Jizzakh Region was established as a separate administrative unit on December 28, 1973. Its territory covers approximately 21.2 thousand square kilometers and includes the districts of Arnasay, Bakhmal, Dustlik, Sharof Rashidov, Zarbdor, Zafarabad, Zaamin, Mirzachul, Pakhtakor, Yangiyabad, Forish, and Gallaaral.[2]

The residential architecture of this region has evolved in direct relation to natural and climatic conditions, water resources, land availability, local lifestyles, and the traditional neighborhood (mahalla) system. The sharply continental climate—characterized by hot and dry summers, cold winters, seasonal changes in wind direction, and limited humidity—has had a significant influence on the spatial and planning solutions of residential buildings. Consequently, traditional houses of the Jizzakh Oasis developed as an integrated ecological and architectural system comprising internal courtyards, ayvans (verandas), summer and winter rooms, thick walls, roof overhangs providing shade, narrow streets, and interconnected neighborhood spaces[3].

Today, new residential districts and contemporary urban development projects are being implemented in the Jizzakh region. In particular, the construction of the “New Jizzakh” residential complex in the adjoining territory of Sharof Rashidov District and Jizzakh City demonstrates the emergence of a new urban model in the region. The project incorporates multi-story residential buildings, schools, polyclinics, preschool

educational institutions, administrative facilities, and transportation infrastructure within a single integrated development. Under these circumstances, the scientific analysis of traditional residential architecture and its adaptation to contemporary design practices has become an increasingly important issue[4].

The aim of this study is to identify the principal factors that have shaped the traditional residential architecture of the Jizzakh Oasis, to analyze the climatic adaptability of courtyard-house typologies, and to develop scientific and practical recommendations for integrating this architectural heritage into contemporary residential design principles.

RESEARCH METHODOLOGY

The research focuses on the traditional residential buildings that developed within the Jizzakh Oasis, while the subject of the study encompasses their natural-climatic, planning, structural, and socio-cultural characteristics. The research methodology includes historical-typological analysis, comparative analysis, morphological analysis, assessment of climatic adaptation factors, literature review, and the generalization of contemporary architectural design trends.

Historical and Geographical Development of the Jizzakh Oasis and Its Influence on the Residential Environment

The historical development of the Jizzakh Oasis has been closely associated with the Silk Road, mountain passes, irrigated agricultural lands, and networks of livestock breeding and craft production. Urban and rural settlements were generally established near water sources, fertile agricultural lands, and major transportation routes. These factors significantly influenced the location of residential buildings, the structure of neighborhoods (mahallas), the dimensions of courtyards, and the organization of household and economic zones.

One of the distinctive characteristics of the oasis is the coexistence of several landscape types within a single region. In the foothill and mountainous areas such as Zaamin, Bakhmal, Gallaaral, and Forish, residential architecture was more strongly influenced by topography, wind conditions, winter cold, and the availability of natural building materials. In contrast, in the plains of Mirzachul, Dustlik, Pakhtakor, and Arnasay, water supply systems and agricultural land resources constituted the primary determining factors. As a result, the Jizzakh Oasis did not develop a single “universal” housing model; instead, a variety of residential forms emerged, each adapted to the specific environmental and socio-economic conditions of particular micro-regions.

Traditional housing was regarded not merely as a residential building but as a multifunctional space integrating family economic activities, handicraft production, seasonal labor, hospitality, child upbringing, and social interaction. In this regard, the houses of the Jizzakh Oasis were organized through an interconnected arrangement of courtyards, ayvans (verandas), entrance halls, guest rooms, kitchens, utility spaces, and garden-orchard areas.

Natural and Climatic Factors and Adaptive Mechanisms of Traditional Houses

A large part of Uzbekistan lies within an arid continental climatic zone. Hot and dry summers, the occurrence of cold air masses during winter, and the uneven distribution of precipitation across different regions have historically necessitated the development of passive architectural adaptation strategies. Recent studies of the Jizzakh Desert and the surrounding oasis areas likewise identify high summer temperatures, severe winter cold, and limited precipitation as the principal climatic characteristics of the region.

These environmental conditions significantly influenced the architectural and planning solutions of traditional dwellings. As a result, local builders developed a range of adaptive mechanisms aimed at improving thermal comfort, reducing solar heat gain, enhancing natural ventilation, and ensuring efficient use of available resources throughout different seasons of the year.

RESULTS AND DISCUSSION

Under these climatic conditions, the courtyard-house typology emerged as one of the most effective architectural responses. The internal courtyard created a microclimate partially protected from dust, wind, and direct solar radiation. When combined with

trees, vineyards, water basins, or irrigation channels, it functioned as a natural cooling environment during the hot summer season. Since the rooms were arranged around the courtyard, their ventilation, daylight access, and seasonal use could be effectively regulated[5].

Thick walls and locally sourced earthen construction materials possessed considerable thermal inertia, allowing them to absorb heat slowly during the day and gradually release the accumulated warmth at night. The thermal properties of walls constructed from rammed earth and mud brick contributed significantly to maintaining a stable indoor environment within traditional houses. Such solutions correspond closely to contemporary principles of energy-efficient design and represent a low-technology yet environmentally sustainable approach to passive architecture[6].

The **ayvan** (veranda) functioned as an intermediate climatic zone between the enclosed rooms and the courtyard. During summer, it served as a shaded and naturally ventilated living space, while in spring and autumn it operated as a semi-open social environment. The openness of the ayvan toward the courtyard, its column-supported structure, roof covering, and compositional relationship with adjacent rooms connect the traditional houses of the Jizzakh Oasis to the broader architectural traditions of Central Asian residential culture [7].

Table 1. Natural Factors and Architectural Responses in the Residential Architecture of the Jizzakh Oasis

Natural-Climatic Factor	Traditional Architectural Solution	Functional Outcome
High summer temperatures	Internal courtyard, ayvan (veranda), thick walls, shaded façades	Natural cooling and mitigation of the microclimate
Cold winter season	Winter rooms, compact building volumes, high thermal-mass walls	Heat retention and reduced fuel consumption
Wind and dust	Outwardly closed walls and inward-oriented courtyards	Privacy, protection, and improved sanitary conditions
Uneven distribution of water resources	Efficient water use within the courtyard and garden-orchard areas	Integration of residential and economic functions
Foothill and plain topography	Adaptation of house placement to relief and transportation routes	Adjustment of neighborhood structure and transport connectivity

Traditional Courtyard-House Typology: Planning, Function, and Social Space

The courtyard constituted the principal planning core of traditional houses in the Jizzakh Oasis. On the one hand, it functioned as the protected and private center of family life; on the other, it served as an open space integrating daylight, ventilation, greenery, and household activities. UNESCO materials concerning Samarkand and other historic cities identify the organization of traditional Uzbek houses around a central courtyard, together with mud-brick construction and garden-courtyard systems, as a significant architectural characteristic [8].

In the courtyard-house typology, **inward orientation** represents the fundamental spatial principle. Street façades were generally modest, enclosed, and provided with few openings, while the main activities of daily life were directed toward the internal courtyard. Such an arrangement ensured social privacy, protection from external dust and heat, and the regulation of family life within the broader neighborhood

environment. This characteristic also reflects the relationship between residential architecture and the social functions of the mahalla system, including social supervision, neighborhood interaction, and collective cultural traditions [9].

From a planning perspective, traditional houses were typically divided into guest-reception areas, family living zones, and service or utility spaces. Guest rooms were usually located closer to the entrance, whereas family rooms were oriented toward the inner courtyard. Kitchens, storage rooms, tandoor facilities, livestock shelters, and other utility spaces were positioned along the peripheral sections of the courtyard. This functional differentiation demonstrates how family life was spatially organized and regulated through architectural design[10].

Seasonality also played an important role in the planning of traditional dwellings. Summer rooms, ayvans, and open courtyard spaces were actively used during the warm season, while winter rooms were designed as compact, less exposed spaces capable of retaining heat efficiently. Such a dual-season residential system reduced household energy consumption and enhanced living comfort under the climatic conditions of the Jizzakh Oasis[11].

Building Materials and Construction Culture

The use of locally available natural materials was a defining characteristic of traditional residential architecture in the Jizzakh Oasis. Earth, straw, timber, stone, and mud brick were selected based on the resources available within the region. Rammed-earth walls and mud-brick constructions were distinguished by their environmental sustainability, the possibility of local production, ease of maintenance, and high thermal inertia.

In the context of Central Asia, earthen architecture should not be viewed merely as a product of economic necessity but rather as the result of climatic and cultural adaptation. Contemporary studies likewise explain the construction of adobe houses in Central Asia through their association with the mahalla system, collective community labor (*hashar*), the use of local materials, and climate-responsive building traditions [9]. This perspective helps to understand traditional house construction as a form of collective experience and a repository of regionally accumulated knowledge[12].

From a structural perspective, the stability of traditional houses was ensured through thick walls, low-rise building forms, a structurally enclosed perimeter organized around the internal courtyard, and timber-beam roofing systems. However, under contemporary conditions, the direct replication of such materials and construction methods is insufficient. Instead, they must be integrated with requirements for seismic safety, moisture protection, sanitation standards, engineering infrastructure, and modern living comforts[13].

From this standpoint, it is important to integrate the underlying principles of traditional materials and construction techniques with contemporary technologies. For example, walls with high thermal mass, natural ventilation channels, shaded ayvans, landscaped courtyards, solar-protection screens, and the use of locally sourced materials can all be reinterpreted and adapted within modern residential architecture.

Integration of Traditional Architectural Experience in the Context of Contemporary Urbanization

As urbanization processes continue to intensify in the Jizzakh region, new demands are emerging in residential architecture, including the development of multi-story housing, service infrastructure, transportation systems, public spaces, and energy-efficient design solutions. Projects such as “New Jizzakh” demonstrate the necessity of considering housing not merely as an individual building but as part of an integrated urban model that incorporates schools, polyclinics, preschool institutions, public transportation, and administrative services within a unified spatial framework [14].

However, if local climatic and cultural characteristics are not adequately considered in contemporary multi-story residential projects, buildings may appear modern in their external form while remaining uncomfortable as living environments. Therefore, it is advisable to adopt several principles from the traditional houses of the Jizzakh Oasis, including internal or semi-enclosed communal courtyard spaces, shaded galleries,

naturally ventilated corridors, seasonally adaptable balcony-verandas, landscaped interior areas, and façade elements designed to regulate solar exposure.

The contemporary interpretation of the traditional courtyard-house typology should not be limited solely to single-family dwellings. Within multi-story residential complexes, traditional social spaces may be reinterpreted through concepts such as the “vertical mahalla,” “semi-private courtyard,” “communal veranda,” and “green interior environment.” Attempts made within Tashkent’s modernist architecture to transfer the traditional mahalla courtyard system into multi-story residential compositions demonstrate the conceptual potential of this approach [15].

For the conditions of the Jizzakh Oasis, the following integration model is proposed for contemporary residential design. First, buildings should be positioned in relation to solar orientation, prevailing winds, and green spaces. Second, courtyard or semi-courtyard spaces should be designed as core elements for regulating the microclimate. Third, passive shading devices should be incorporated into façade design. Fourth, local materials, colors, and textures should be harmonized with contemporary construction technologies. Fifth, small-scale public spaces that support social interaction within the mahalla community should be created and integrated into residential developments.

Table 2. Directions for Applying Traditional Courtyard-House Experience to Contemporary Residential Design

Traditional Element	Historical Function	Contemporary Interpretation	Expected Benefits
Internal courtyard	Family life, ventilation, privacy	Semi-private communal courtyard within multi-family residential complexes	Improved social interaction and microclimate
Ayvan (veranda)	Shaded semi-open living space	Balcony-veranda, gallery, shaded terrace	Enhanced summer comfort and reduced energy consumption
Thick walls	Heat retention and protection from overheating	High thermal-mass construction and thermal insulation systems	Improved energy efficiency
Summer and winter rooms	Adaptation to seasonal living conditions	Flexible room functions and transformable layouts	Greater functional adaptability and user comfort
Mahalla space	Neighborhood interaction and collective supervision	Small public spaces, children's play areas, and recreation zones	Social stability and enhanced security

The analysis demonstrates that the residential architecture of the Jizzakh Oasis did not evolve randomly; rather, it developed in close relation to the region’s climate, water resources, topography, economic activities, family lifestyle, and mahalla culture. The courtyard-house typology emerged as the principal architectural model integrating these diverse factors.

The first scientific finding of this study is that the internal courtyard, ayvan, thick walls, and seasonal rooms in traditional houses of the Jizzakh Oasis should not be viewed as separate architectural elements but as components of a unified climate-responsive adaptive system. This system simultaneously provides natural ventilation, solar shading, thermal regulation, and privacy.

The second finding is that the planning structure of traditional dwellings is closely connected with socio-cultural factors. The arrangement of guest rooms, family living spaces, courtyards, service areas, and ayvans reflects family hierarchy, hospitality traditions, neighborhood relationships, and the social organization of the mahalla. Therefore, residential architecture should be studied not only as a technical and functional object but also as a social space.

The third finding is that the use of traditional architectural experience in contemporary residential projects should not involve the direct replication of historical forms. Instead,

it should be achieved through the reinterpretation of their ecological, climatic, and social principles within modern construction systems and technologies. In this way, cultural identity becomes not merely an external decorative feature but a design methodology that enhances the quality of the living environment.

Conclusion

1. The traditional residential architecture of the Jizzakh Oasis represents a regional architectural system formed through the interaction of natural-climatic, historical-geographical, socio-cultural, and structural factors.
2. Internal courtyards, ayvans (verandas), thick walls, seasonal rooms, and the use of local materials constitute the principal adaptive mechanisms of traditional houses in the Jizzakh Oasis, contributing to the regulation of the indoor microclimate and the reduction of energy consumption.
3. The traditional courtyard-house typology should be regarded as a comprehensive socio-spatial model integrating family life, hospitality, neighborhood relations, and household economic activities.
4. Local materials such as rammed earth and mud brick represent an important component of the historical construction culture of the region. Their environmental and thermal properties possess significant scientific and practical value for contemporary energy-efficient architecture.
5. Under the conditions of contemporary urbanization in Jizzakh, it is advisable to reinterpret traditional residential experience through the incorporation of multi-story housing complexes, communal courtyards, shaded galleries, landscaped interior spaces, and climate-responsive façade elements.
6. The findings of this study may serve as a scientific and methodological foundation for the development of modern, sustainable, and energy-efficient residential environments in the Jizzakh Oasis while preserving the region's distinctive architectural identity.

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