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Research on the Spatial Characteristics and Generative Logic of Hui Settlements in Gansu, Qinghai, and Ningxia from the Perspective of Cultural Integration

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Abstract

The Gansu–Qinghai–Ningxia region is a major area of concentrated Hui settlement in northwestern China, characterized by significant cultural interaction and integration. In response to the limited regional-scale research on how multiple cultural and geographical factors jointly shape settlement spatial forms, this study adopts a cultural integration perspective and develops an analytical framework of "field investigation–settlement morphology–historical tracing–cultural interpretation." Eleven representative traditional Hui settlements and historical residential areas in Gansu, Qinghai, and Ningxia are selected as case studies. Based on field surveys, spatial mapping, and an examination of local gazetteers and historical documents, the study identifies the spatial characteristics of these settlements and traces their historical and cultural origins. Four major spatial types are identified: settlements organized around mosques, differentiated hierarchical settlements, fortress-based settlements, and settlements shaped by commercial activities. The study argues that the long-term interaction among the distinctive frontier environment, multicultural integration, shared religious beliefs, and transregional trade networks has jointly produced the multilayered spatial patterns of Hui settlements in the region. This research establishes an analytical approach that integrates geographical, religious, commercial, and ethnic-cultural factors, providing a useful reference for the study and conservation of traditional settlements and cultural heritage in the multiethnic regions of northwestern China.

Keywords: Hui settlements; cultural integration; spatial construction; Gan–Qing–Ning region; Islamic culture; traditional settlements

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1. Introduction

Traditional settlements are not only the result of the continuous interaction between humans and the land, but also spatial witnesses to the exchange, integration, and local adaptation of different civilizations [1,2]. Located in the transition zone of the Loess Plateau, the Qinghai–Tibet Plateau, and the Mongolian Plateau, Gansu, Qinghai, and Ningxia (hereinafter referred to as Gan–Qing–Ning) have long been at the intersection of agrarian and nomadic civilizations and served as a hub for the Silk Road transportation corridors. Since the Yuan and Ming dynasties, accompanied by large-scale population

migration and settlement, this region has gradually formed a large-scale and complete system of traditional Hui settlements, with a wealth of material remains such as Hui settlements, mosques, Gongbei, and forts still existing today. Specifically, influenced by Sufism, Gongbei—monumental tombs dedicated to the leaders of Menhuan (Sufi orders)—emerged in northwestern China. In later periods, these structures gradually assumed the functions of traditional mosques, evolving into the core religious spaces for local communities, a vital role they continue to play to this day. Interpreting the generation logic of the Hui settlement system in this region cannot rely solely on religious culture; it is also necessary to value its process of cultural interaction and regional adaptation within the specific geopolitical society of the Northwest. Therefore, this paper takes "cultural integration" as its perspective. Cultural integration refers to the dynamic process in which the Islamic belief system and traditional Chinese ethical norms have undergone two-way adjustment and symbiotic fusion in long-term social practice based on the natural and human environment of the Northwest, and have gradually materialized into settlement spatial order, built environments, and social connection networks.Furthermore, it should be clarified that the term "Hui" in this study derives from the historical Chinese appellation "Huihui," which refers to highly localized Muslim groups. Within the context of the Gansu, Qinghai, and Ningxia regions discussed in this paper, the "Hui" ethnic cluster encompasses several Islamic ethnic groups, primarily including the Hui, Bonan (Bao'an), Salar, and Dongxiang peoples.

This study primarily uses CNKI for literature retrieval, supplemented by Web of Science and Scopus for international research. Existing achievements are summarized into four categories. The first category of research focuses on spatial morphology and generative mechanisms. Early studies simply viewed block texture as a direct projection of religious and social order, interpreting the physical form of Islamic cities as a spatial product of religious and social principles [3]; based on this, domestic research on Hui settlements refined indigenous spatial characteristics such as "living around the mosque" and "integration of mosque and community (Si-Fang)," while explaining the distribution pattern of "large dispersion, small concentration" of the Hui people [4,5]. With the introduction of quantitative analysis tools such as space syntax and GIS, research has shifted from static morphological description to structural analysis [6,7]. However, on the whole, such achievements still lean towards the measurement and typological induction of physical space, and the explanation of the deep-seated social relations and the process of multi-force interaction behind the material form is relatively weak; the second category of research focuses on cultural localization and regional adaptation. "Hybrid urbanism" theory points out that the cultural identity of settlements is always constructed through continuous interaction and negotiation between tradition, modernity, and local culture [8]. Existing studies have confirmed that whether it is the adaptive construction of traditional residential space regarding privacy order and regional climate conditions, or mosque architecture absorbing traditional Chinese courtyard layouts and construction techniques [7,9], cultural localization is not a simple superposition of style transplantation, but a product of long-term interaction and negotiation between religious norms and local natural and social environments [10,11]. However, most existing achievements are limited to qualitative analysis of a single building or a single settlement, lacking cross-regional sample comparison, and have not yet established a comprehensive explanatory framework for the interaction of multiple factors; the third category of research adopts the perspective of social production of space and place identity. Lefebvre's theory of the production of space provides an important analytical tool for understanding settlements: space is not a passive container, but the result of constant production and continuous reconstruction of religious practices,

daily life, and institutional forces [12]. Many domestic studies on Hui communities have used this as a basis to launch discussions around place attachment and place identity, arguing that mosques, as key nodes for maintaining community networks and carrying collective memory, provide an important fulcrum for interpreting the transformation of settlements and the reconstruction of memory under the impact of urbanization [13–16]. However, this theoretical path still has limitations in practice; how to translate abstract social relations and collective memory into observable changes in material space, and how to explain cross-settlement regional network connections, still lack mature and effective spatial translation means; the fourth category of research introduces the perspective of religious landscape and living cultural heritage. Religious geography-related research has revealed that Islamic belief concepts are deeply embedded in the daily built environment of settlements through prayer direction, geometric composition, and water feature symbolism [17,18]. Modern heritage conservation concepts further propose that Hui settlements should be understood as living cultural landscapes where material space, folklore customs, and ethnic interactions are intertwined [19–21]. However, in specific research practice, when defining the boundaries of cultural clusters and identifying the mechanisms of multiple cultural superposition, there is more reliance on administrative boundaries or empirical judgment, and the interpretation of the synergistic and embedded relationship between the natural substrate and the artificial built environment still needs to be deepened.

In general, existing studies have laid the foundation for the spatial identification and cultural analysis of settlements, but significant gaps remain: First, the research scale is limited, often focusing on a single settlement or administrative region, lacking a systematic investigation of the macro-cultural geographical unit of Gansu, Qinghai, and Ningxia, which spans the transition zone of three major plateaus and carries the intersection of agriculture and animal husbandry as well as trade interactions. Second, the analytical dimension is narrow, often focusing in isolation on religious or architectural elements, with insufficient attention paid to the interaction and integration of spatial centrality (religious centers), hierarchy (ethical order), boundaries (security and defense), and networks (commercial interconnection). Third, there is a lack of cross-verification of elements, where qualitative research of historical documents and objective analysis of spatial morphology lack deep mutual verification, making it difficult to clarify the intertwined and mutually constitutive relationship between socio-culture and physical space. At the same time, it has failed to systematically answer how diverse heterogeneous factors—such as varied natural landforms, Islamic faith, Confucian ethics, frontier defense, and long-distance trade—have worked together through long-term interplay to shape the unique spatial landscape of the region.

Based on this, this study constructs an analytical framework of "field investigation–settlement morphology–historical tracing–cultural interpretation," attempting to establish a regional explanatory path that considers multiple elements and multiple scales. This study argues that the spatial characteristics of Hui settlements in Gansu, Qinghai, and Ningxia are the result of social space production formed by the long-term interplay and continuous negotiation of multiple forces within a specific historical context. This research hopes to supplement international academic understanding of the localization practices of Islamic settlements in China, as well as provide a scientific basis and theoretical support for the analysis of traditional settlements in multi-ethnic regions of Northwest China.

2. Materials and Methods

2.1. Study Area and Case Selection

Gansu, Qinghai, and Ningxia (Gan–Qing–Ning) represent a significant site for the long-term integration of Islamic culture and traditional Chinese culture. The region features diverse natural geographic environments, including river valleys, plains, mountainous areas, and agropastoral transition zones. It is also home to important historical transportation corridors, such as the Silk Road, the Tang-Bo Ancient Road, and the Tea Horse Road, providing a regional sample for examining the formation process of Hui settlements under the combined influence of cultural factors, regional environment, and socio-economic activities.

This study selects cases to observe the spatial relationships formed by settlements under the constraints of different historical backgrounds, regional environments, and social functions. Case selection follows three main principles: First, the principle of regional coverage—cases are distributed across the concentrated Hui residential areas in Gansu, Qinghai, and Ningxia to reflect different natural environments and regional historical backgrounds. Second, the principle of typological differentiation—samples include traditional villages, historical urban blocks, and settlements serving important religious or commercial functions, in order to compare settlement spatial organization under different social functional orientations. Third, the principle of research feasibility—selected cases should possess a relatively complete historical documentary basis and allow for field research and spatial investigation, thereby supporting morphological analysis and cross-case comparative analysis. Based on these principles, this paper ultimately selects 11 sites as analysis samples: the settlement around the Tongxin Grand Mosque, the Mengda Mosque Hui settlement, the Dongshahe Mosque settlement, the Hanzeling Gongbei settlement, the Jiucaiping Gongbei settlement, the Tashapo Hui settlement, the Dawantou settlement, the Xuanhuagang Gongbei and Ninglingbao, Liangjiabao Village, the Chengguan Hui residential area in Lanzhou, and the Hui commercial block in Yinchuan, to explore the influence of cultural factors, social organization, and regional conditions on the construction of settlement space (Table 1). It should be noted that the cases in this study do not constitute a continuous evolutionary sequence of settlements according to historical chronology, but are instead treated as spatial samples formed under the mutual influence of multiple cultural factors and regional conditions; through horizontal comparison between cases, the specific expression of various influencing factors in settlement space and their interaction relationships are analyzed.

Table 1. Summary table of basic information on traditional Hui settlement research cases in Gansu, Qinghai, and Ningxia.

Settlement Name	Region	Historical Period	Spatial Characteristics	Data Sources	Field Survey	Morphologi Characteristi
Tongxin Great Mosque Hui Settlement	Ningxia	Ming Dynasty	Shaping of the centripetal spatial identity of "Mosque–Residence–Field"	Historical documents, Field survey	July 2021 mapping and interviews	Centripetal
Mengda Mosque Hui Settlement	Qinghai	Ming Dynasty	"Mosque–Residence–Field" concentric pattern,	Historical documents, Field survey	July 2021 mapping and interviews	Centripetal

Settlement Name	Region	Historical Period	Spatial Characteristics	Data Sources	Field Survey	Morphologic Characteristi
			Minaret as the visual commanding height			
Dongshahe Mosque Hui Settlement	Qinghai	Mid to Late Qing Dynasty	"Mosque–Residence–Graveyard" adjacent coexistence, "Mosque–Gongbei" co-presence	Field survey, Historical data	August 2022 spatial mapping	Centripetal, Hierarchical
Hanzeling Gongbei Settlement	Gansu	Yuan Dynasty–Republic of China	Progressive Gongbei evolution, mountain-top Gongbei + village mosque at the foot of the mountain	Field survey, Historical data	May 2023 aerial photography and mapping	Centripetal, Hierarchical
Jiucaiping Gongbei Settlement	Ningxia	2nd Year of Tongzhi (Qing)–Republic of China	"Mountain-top Gongbei–Village residences at the foot"	Field survey, Historical data	August 2022 mapping and interviews	Centripetal, Hierarchical
Tashapo Hui Settlement	Qinghai	Ming–Early Qing Dynasty	"Mosque–Residence–Field" concentric differentiated pattern	Field survey, Historical data	July 2021 spatial mapping	Hierarchical, Centripetal
Dawantou Hui Settlement	Gansu	Ming Dynasty–Republic of China	"Mosque–Gongbei" dual centers	Field survey, Historical data	May 2023 aerial photography and mapping	Centripetal, Hierarchical
Xuanhuagang Gongbei and Ninglingbao	Gansu	Qing Dynasty–Republic of China	Mountainous natural barrier defense pattern	Historical data, Spatial reconstruction, Field survey	May 2023; Topographic survey	Boundary
Liangjiabao Village	Gansu	Ming Dynasty–Republic of China	Enclosed fort with artificial rammed earth walls	Field survey, Historical data	May 2023; Mapping and interviews	Boundary
Lanzhou Chengguan Hui Enclave	Gansu	Qing	Overlap of	Historical	Reconstruction	Networked,

Settlement Name	Region	Historical Period	Spatial Characteristics	Data Sources	Field Survey	Morphologic Characteristi
		Dynasty–Republic of China	religious nodes and commercial spaces	maps, Historical documents, Existing research	based on historical data and maps	Centripetal
Yinchuan Hui Commercial District	Ningxia	Qing Dynasty–Republic of China	Networked settlement model with multiple mosques at traffic gateways	Historical maps, Historical documents, Existing research	Reconstruction based on historical data and maps	Networked, Centripetal

Note: The "Historical Period" indicated in this table is determined by the construction date of the respective mosque or Gongbei. This criterion is used because the evolution of daily customs and social organization within traditional Hui settlements inherently revolved around these core religious centers. Additionally, the spatial analyses for the settlements in Lanzhou and Yinchuan are specifically based on historical maps from the Republic of China period as the temporal reference point.

2.2. Data Sources and Research Methods

This study adopts a research method of cross-verification using four types of basic data: field investigation and mapping data, historical materials, historical maps, and existing research results, to analyze the interaction between cultural factors, regional environments, and the spatial form of Hui settlements. The specific data sources are as follows (Table 2): first, field investigation and mapping data, mainly derived from basic information such as settlement floor plans and aerial images obtained by the research team through multiple rounds of field research between 2021 and 2023, extracting the distribution boundaries and locational relationships of spatial elements such as mosques, Gongbei, fortress walls, and residential areas to complete the drawing of settlement space maps; second, historical materials, including ancient texts such as “A Brief History of the Hui Nationality,” “Islamic Architecture in China,” and “Records of the Nine Frontiers of the Ming Dynasty,” as well as local chronicles of various counties and cities, and records of fur trade quantities and trends, used to sort out the historical background of regional population migration, religious dissemination, frontier governance, and trade circulation, and to establish the connection between settlement spatial forms and historical processes; third, historical map materials, selecting regional ancient maps from key historical periods of the Republic of China, such as the “Sketch Map of Lanzhou Prefecture City” and “Map of Ningxia City Streets,” to interpret the spatial correlation between settlement patterns and transportation corridors, trade nodes, and geopolitical environments at different stages, supplementing the historical dimension; and fourth, existing research results, used to supplement regional social, religious culture, and historical background information, providing theoretical support for the cultural logic interpretation of settlement spatial characteristics.

Table 2. Summary table of basic research data and sources.

Data Type	Core Elements of Settlement	Data Sources
Field Survey and Mapping	Landscape composition, settlement layout, residential buildings, mosques, Gongbei,	2021–2023 field investigations; on-site mapping; observation

Data Type	Core Elements of Settlement	Data Sources
	tombs, fort walls, roads	records; image data
Historical Documents and Materials	Population migration, religious spread, Menhuan system, social organization, frontier governance, defense activities, commercial trade, ethnic interaction	A Brief History of the Hui People; History of Islam in China; Islamic Architecture in China; A Study of the Nine Frontiers of the Ming Dynasty; Tianfang Dianli; Qingzhen Zhinan; Xiahe; Overview of Labrang's Economy; Culture; Networks; and Wool Trade: Hui Merchants in Modern Gansu, Ningxia, and Qinghai 1894–1937
Historical Maps and Spatial Documents	Settlement scope, roads, water systems, religious venues, traffic nodes, commercial nodes, regional spatial relationships	Map of Lanzhou Prefecture City during the Republic of China; Ancient map of Ningxia streets and markets; Republic of China maps; East Asia Tongwen Memorial Society (Japan)
Existing Research Findings	Settlement morphology, religious culture, social organization, historical evolution, regional connections	Related academic papers; monographs; and existing research results

In terms of the specific analytical process, this study follows a layer-by-layer approach of "element extraction–morphological identification–historical cross-verification–cross-case induction." First, spatial elements are extracted from field survey drawings to strip away the planar forms and distribution locations of key spatial elements such as mosques, residential areas, farmland, water systems, cemeteries, and commercial nodes. Second, settlement morphology is identified through spatial topological relationships, focusing on the analysis of the geometric layout and topological associations of each functional element. This includes the clustering patterns of residential groups around religious buildings, the enclosure structure of internal settlement space by fortress wall boundaries, the spatial relationship between main roads and core settlement nodes, and the locational matching characteristics between the natural base and settlement layout. Third, the results of spatial morphology identification are cross-verified with historical documents and archival records to trace the socio-cultural and geopolitical drivers behind the spatial patterns. Addressing different morphological characteristics—such as closed defensive spaces, religious-centered patterns, and trade-dependent layouts—and combining these with historical backgrounds such as frontier defense, social unrest, and trade development during corresponding periods, the underlying logic of spatial morphology generation is clarified. Finally, a multi-case horizontal comparative analysis is conducted to compare samples of Hui settlements of different regions and functional types under a unified morphological analysis framework, distilling the common spatial laws and overall pattern characteristics of regional Hui settlements as influenced by cultural integration, geopolitical environment, religious tradition, and commercial

activities.

2.3. Analytical Framework and Morphological Investigation

The analytical logic of this paper follows the research path of "field investigation-settlement morphology-historical tracing-cultural interpretation." Based on the research team's field investigations and settlement morphology analysis from 2021 to 2023, four types of spatial representations—centrality, hierarchy, boundary, and network—were distilled from the actual spatial appearance of the settlements. On this basis, combined with the collation and textual research of historical materials, the generative logic behind each morphological characteristic was analyzed, thereby constructing an analytical system for the spatial morphology of Hui settlements (Table 3). Specifically, centrality is mainly identified through the geometric layout of peripheral elements such as residential areas, water systems, and farmland surrounding the religious center, including distribution characteristics such as concentric circles and eccentric adjacency. Hierarchy can be manifested as layout differences formed by terrain elevation within the settlement, and it is also reflected in the layered order formed by various functional blocks on the plane relative to the central religious building. Boundary is judged based on the continuity of the defensive interface at the settlement periphery, examining the enclosure effect formed by rammed-earth walls or natural mountain barriers, as well as the defensive pattern of internal and external passages. Network focuses on the spatial connections between commercial markets, religious nodes, and regional transportation corridors such as rivers and post roads, as well as the overlapping state of different functional spaces.

Table 3. Analysis framework of spatial morphology of Hui settlements in Gansu, Qinghai and Ningxia.

Morphological Representation	Case Examples	Influencing Factors	Settlement Spatial Construction Mechanism
Centripetal	Tongxin Great Mosque Settlement, Mengda Mosque Settlement, Dongshahe Settlement, Hanzeling, Jiucaiping Gongbei Settlement	Islamic Religious Belief	Belief Identity and Community Cohesion
Hierarchical	Tashapo Settlement, Dawantou Settlement, Jiucaiping Gongbei Settlement	Integration of Traditional Chinese Ethics	Ethical Differentiated Order and Spatial Order Reconstruction
Boundary	Xuanhuagang–Ninglingbao, Liangjiabao Village	Frontier Ecology and Security Environment	Spatial Adaptation and Security Defense
Networked	Lanzhou Chengguan, Yinchuan Urban Area, Zhangjiachuan, Sanjiaji, Shanjiaji	Regional Commerce and Transportation Networks	Regional Interconnection and Functional Differentiation

On this basis, this paper applies the above analytical dimensions to case spatial analysis, and through spatial diagramming, historical data analysis, and cross-case com-

parison, examines the manifestations of different dimensions in specific settlements. It should be noted that different settlement cases often present multiple spatial representations simultaneously; there is no simple one-to-one correspondence between cultural, religious, geopolitical, and trade factors and each spatial representation. Various influencing factors interact within specific historical environments and local social practices, jointly shaping the settlement's spatial pattern.

3. Spatial Characteristics and Formation Logic of Hui Settlements in Gansu, Qinghai, and Ningxia

The spatial morphology of Hui settlements in Gansu, Qinghai, and Ningxia stems from migration, production shifts, cultural integration, and environmental adaptation. Since the Tang Dynasty, the ancestors of the Hui people had been active in northwestern China, traveling back and forth between the Western Regions and Chang'an along the Silk Road.Historical records like "A Brief History of the Hui People" indicate that following Genghis Khan's early 13th-century western expedition, Central Asians, Persians, and Arabs migrated eastward, alongside voluntary merchants. Yuan Dynasty documents collectively termed them "Huihui." Primarily soldiers, farmers, and craftsmen, they intermarried with Han, Uyghur, and Mongol groups to form the Hui ethnic group [22,23]. Transitioning from nomadic herding to the northwestern hinterland, they adopted Chinese culture and farming civilization. This reshaped their land concepts, balancing nomadic and farming production methods [24,25] and establishing a "wide dispersion and small concentration" distribution pattern.

In the process of long-term settlement, regionalization, and cultural integration, Hui settlements in Gansu, Qinghai, and Ningxia have formed spatial characteristics that possess both environmental adaptability and social constructiveness. Combined with the aforementioned field investigation and on-site research, it can be seen that Hui settlements in Gansu, Qinghai, and Ningxia are mostly located at transportation nodes, trade routes, and areas near water sources, taking into account the multiple realistic needs of water supply, land cultivation, and trade passage. This is a material development requirement for agricultural production and commodity trade, and it can also ensure the effective exertion of the mosque's religious dissemination, community organization, and public service functions. It is also the result of spatial choices jointly dominated by the ethnic group's religious life, material production activities, and social interaction needs [26,27]. Influenced by differentiated factors such as regional environment, religious culture, commercial development, and wartime security, traditional Hui settlements in Gansu, Qinghai, and Ningxia have gradually evolved into four typical spatial forms: living around the mosque, living in differential order, living in fortified strongholds, and living by commerce. These correspond to the centrality, hierarchy, boundary, and network characteristics of settlement space, respectively, and together constitute the complex spatial structure system of regional Hui settlements. Based on this, this chapter combines on-site spatial diagrams with the mutual verification of historical documents to systematically interpret the morphological representations of the four types of settlement spaces and deeply trace the historical causes and cultural generative logic behind them.

3.1. Living Around the Mosque: Centripetal Spatial Representation and Cohesion of the Faith Community

Based on field research and spatial morphology measurements of Hui settlements in Gansu, Qinghai, and Ningxia, it is evident that regional Hui settlements generally exhibit typical centripetal spatial characteristics. The mosque consistently occupies the core

or a visually dominant position within the settlement, with the overall settlement fabric growing and unfolding in layers around this religious center. To systematically explain the generation patterns of such spatial forms, this section selects the Tongxin Grand Mosque settlement in Ningxia and the Mengda Mosque settlement in Qinghai as typical cases to analyze the spatial form and construction logic of "living around the mosque" in traditional Hui settlements.

In terms of the morphological pattern of the settlements (Figures 1 and 2), both settlements exhibit a relatively complete and typical "mosque–residence–field" concentric spatial structure, forming an outward gradient pattern with the mosque at the absolute center. The mosque occupies the geometric center of the settlement and serves as the governing node of the settlement's spatial order. Residential living spaces are compactly arranged around the mosque near water sources to satisfy the needs of daily religious activities and community interaction. The peripheral agricultural production spaces are distributed around the village dwellings, reflecting an overall settlement growth texture that centers on the mosque and extends layer by layer from living spaces to agricultural production spaces.

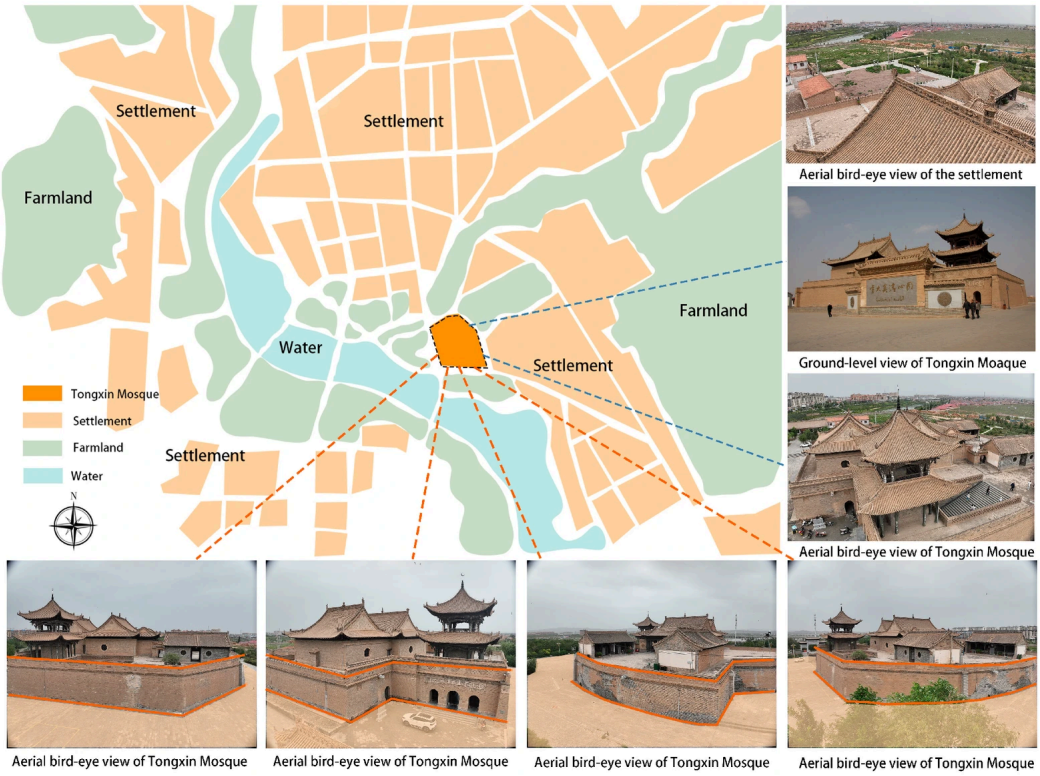


Figure 1. Schematic diagram of the Hui settlement space around Tongxin Grand Mosque in Ningxia (source of drawings and photographs: 2021 field survey).



Figure 2. Schematic diagram of the Hui settlement space of Mengda Mosque in Qinghai (source of drawings and photographs: 2022 field survey).

Building upon the planar concentric structure, both settlements shape visual landmarks through elevated construction, further strengthening spatial centripetalism; however, the two approaches show distinct differences. The Tongxin Grand Mosque was sited and built on a natural loess mound in the Qingshui River valley, which was later reinforced with blue brick cladding to form a 6–7 m high pedestal, making it both the topographic and visual pinnacle of the old town—a creation of sacred space dominance through "topographic elevation." Lacking natural high ground, the Mengda Mosque breaks the settlement skyline through the vertical massing of a towering minaret, shaping the settlement's visual center via artificial building height. Both construction methods reveal the logic of Hui settlements in reinforcing the authority of the religious center through spatial vantage points, while also implying an initial fusion of Northwest Islamic construction wisdom with the traditional Chinese indigenous concept of "selecting high ground to establish reverence."

From the perspective of generative logic, the centripetal spatial form of settlements is a material projection of the long-term adaptation of Hui religious beliefs, community structure, production relations, and the Northwest regional environment [28,29]. In the traditional Hui social system, the mosque is a public core that integrates religious worship, scripture education, wedding and funeral ceremonies, festive gatherings, and community mediation, with most important ritual activities in the life course of individual believers also revolving around the mosque. Therefore, the mosque is located at the center of the settlement, which not only achieves spatially balanced coverage of residential areas to ensure the accessibility and equity of daily religious life and public activities, but also strengthens visual dominance through favorable terrain such as highlands, terraces, and slopes, or through the vertical height of the building, completing the spatial construction from visual control of the settlement to the religious psychology of the believers. It can be seen that the mosque is not only the spiritual commanding height in the mental world of believers, but also an important medium for maintaining the connection between individuals and the community. At the same time, the two settlements also ex-

hibit a spatial pattern of "living near water"; the water system, together with the mosque, participates in shaping the unique spatial order of Hui settlements [29]. This layout is not merely a result of passive adaptation to the regional natural environment, but a spatial choice formed by the combined effects of religious culture, agricultural production needs, and regional natural conditions. Islam originated in the arid zones of the Middle East, where the scarcity of water resources endowed it with special spiritual symbolic meaning; the ritual ablutions (ghusl and wudu) performed before prayer have a rigid demand for water sources. Coupled with the overall arid climate of Gansu, Qinghai, and Ningxia, and the high dependence of agricultural production on stable water supply, the water system and the mosque ultimately constitute the important supporting elements of the centripetal order of traditional Hui settlements.

Compared to the productive concentric spatial pattern of "mosque-dwelling-farmland" in the Tongxin and Mengda Mosque settlements, some Hui settlements have further undergone upgrades in spatial form and expansion in the spiritual dimension. The Dongshahe Hui settlement in Qinghai is a case in point, where its spatial centrality has broken through the material realm and extended to the spiritual level of faith and the continuum of life and death, forming a symbiotic pattern of "mosque–dwelling–cemetery" (Figure 3). The reason for this lies in the influence of the Islamic perspective of the two worlds [30] on this unique spatial form; Muslims view worldly life and the afterlife as a unified whole, and the dwellings of the living are not completely severed from or opposed to the cemeteries of the dead. Therefore, the settlement arranges public cemeteries adjacent to mosques and residential areas, which facilitates religious rites such as funerals and chanting, and perfects the settlement's complete faith space system. At the same time, through the spatial presence of ancestral graves, it continuously reinforces the community's shared faith affiliation and historical memory, making the centrality of the mosque not only govern the daily production and life of residents, but also deeply cover the ethnic group's spiritual identity and cultural inheritance, further deepening the spatial order of Hui settlements with religion as the center.

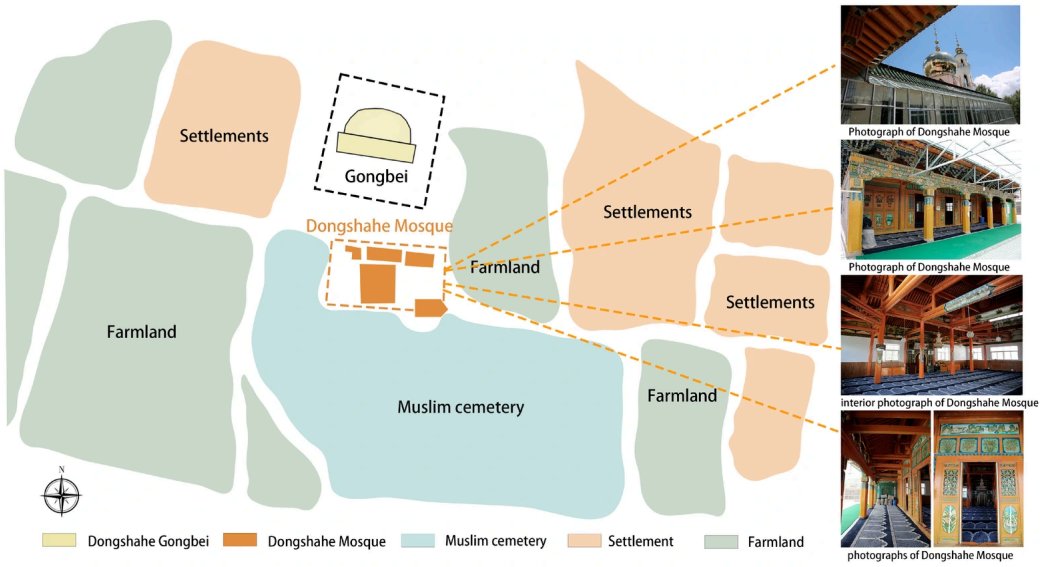


Figure 3. Schematic diagram of the Hui settlement space in Dongshahe, Qinghai (source of drawings and site photos: 2022 field survey).

Since the late Ming and early Qing dynasties, with the widespread dissemination of Sufism and the development and stabilization of the Menhuan (Sufi order) system in Northwest China, the centripetal structure of some settlements has undergone historical

evolution and differentiation, experiencing a process of extending from the mosque to the "Gongbei" (shrine) as an independent spiritual center. This spatial evolution represents a historically established sequence derived from extensive regional field investigations. While it is unfeasible to exhaustively detail all investigated sites within the scope of this article, this sequence is presented here as a foundational finding. The specific field cases selected for this study are thereby utilized as representative spatial evidence to corroborate and illustrate the distinct characteristics of each historical phase. Accordingly, this paper outlines the spatial evolution process of Gongbei settlements in Gansu, Ningxia, and Qinghai through four progressive stages (Figure 4), clearly presenting the iterative patterns of settlement space: (1) Subsidiary stage (Ming dynasty and earlier): Taking the Tongxin Hui settlement in Ningxia and the Mengda Hui settlement in Qinghai as examples, the Menhuan system had not yet emerged, there were no Menhuan-attributed Gongbei, and the settlement had the mosque as its only absolute religious core, with a simple and singular spatial form. (2) Coexistence stage (mid-to-late Qing dynasty): With the formation of the Menhuan system and the strengthening of the veneration of sages, the Gongbei appeared and formed a "mosque–Gongbei" coexistence pattern with the mosque, and the Dongshahe Hui settlement in Qinghai fully presents the spatial characteristics of this stage. (3) Spatial detachment stage (mid-to-late Qing to late Qing dynasty): The Menhuan belief circle continued to expand, and the Gongbei gradually detached from the core of secular village residences, independently choosing sites based on high terrain with landscape features, becoming a regional belief node, while the mosque continued to undertake the daily worship functions of the village, achieving the initial separation of secular space and sacred space [31,32]. (4) Faith and spatial reconstruction period (late Qing to Republic of China): The public burial area of the settlement shifted accordingly, and the graves of believers turned from surrounding the internal mosque to following the external Gongbei buildings, with the Gongbei formally becoming an independent spiritual center with regional influence.

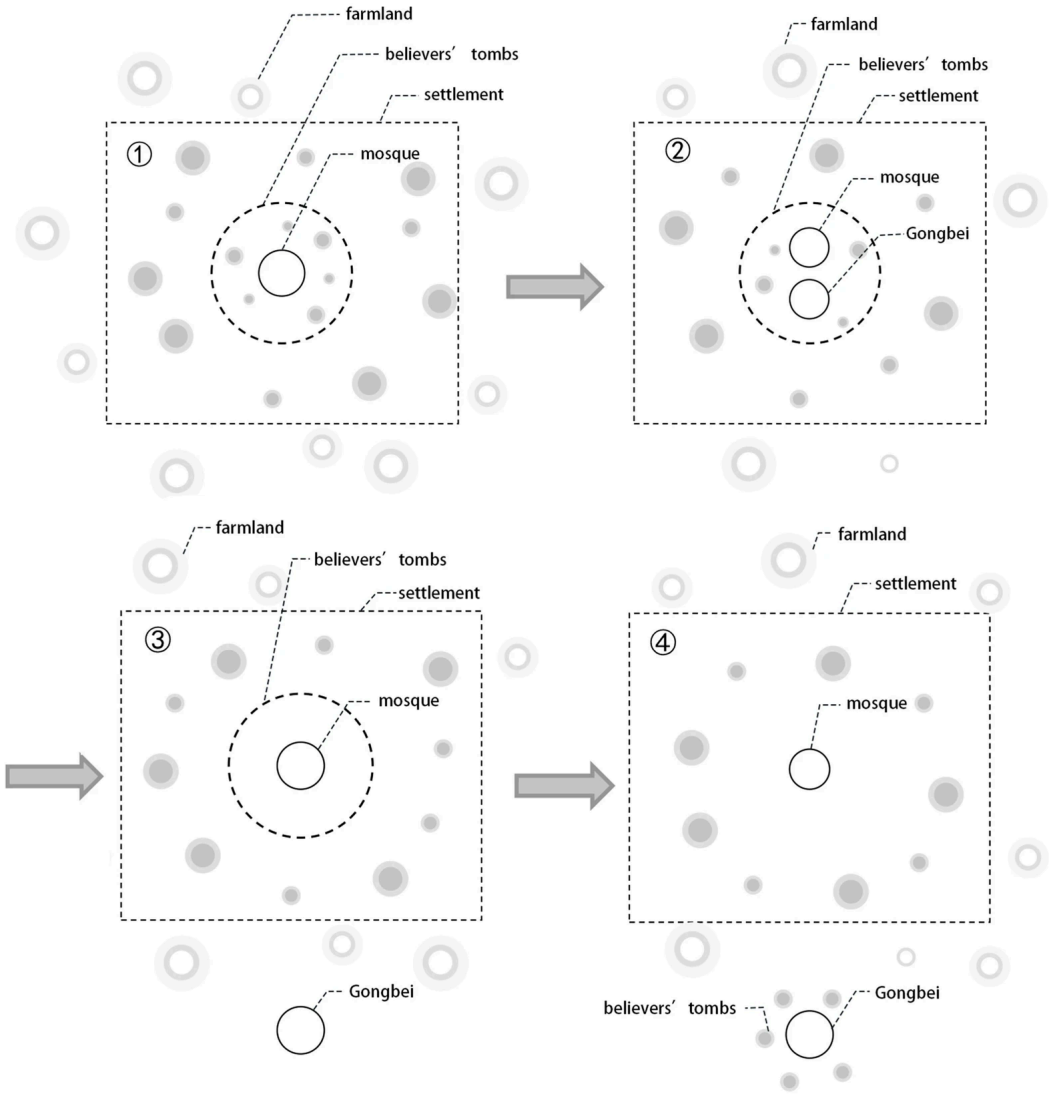


Figure 4. Schematic diagram of the evolution of Gongbei and settlement space (self-drawn based on settlement characteristics in different periods).

Different settlements present differentiated stage evolution paths based on their own construction history. The Hanzeling Gongbei in Gansu (Figure 5) is a sample of gradual evolution. Its predecessor was the tomb of the pioneer Hamuze, who came from the east to preach in the Yuan Dynasty. The tomb pavilion was first built in the Ming Dynasty; at that time, it was still a pioneer tomb in the subsidiary stage, and the Menhuan system had not yet taken shape, so it did not fulfill the function of a Menhuan Daotang (hall). By the mid-Qing Dynasty, as the influence of Sufi Menhuan expanded outward, this ancient pioneer tomb was incorporated into the Menhuan belief system. The village of Hanzeling gradually developed, and a "Mosque–Gongbei" coexistence pattern was formed between the village mosque and the pioneer tomb on the hillside. By the end of the Qing Dynasty and the Republic of China period, an increasing number of pilgrims from other villages came to worship, and a large number of believers' tombs gathered around the Gongbei. The ancient pioneer tomb was thus upgraded into a regional spiritual sanctuary, completing the evolution from the coexistence stage to the faith and space reconstruction period. Relying on the early pioneer tomb and accompanied by the development of Menhuan beliefs, the reconstruction of the settlement space was gradually completed.

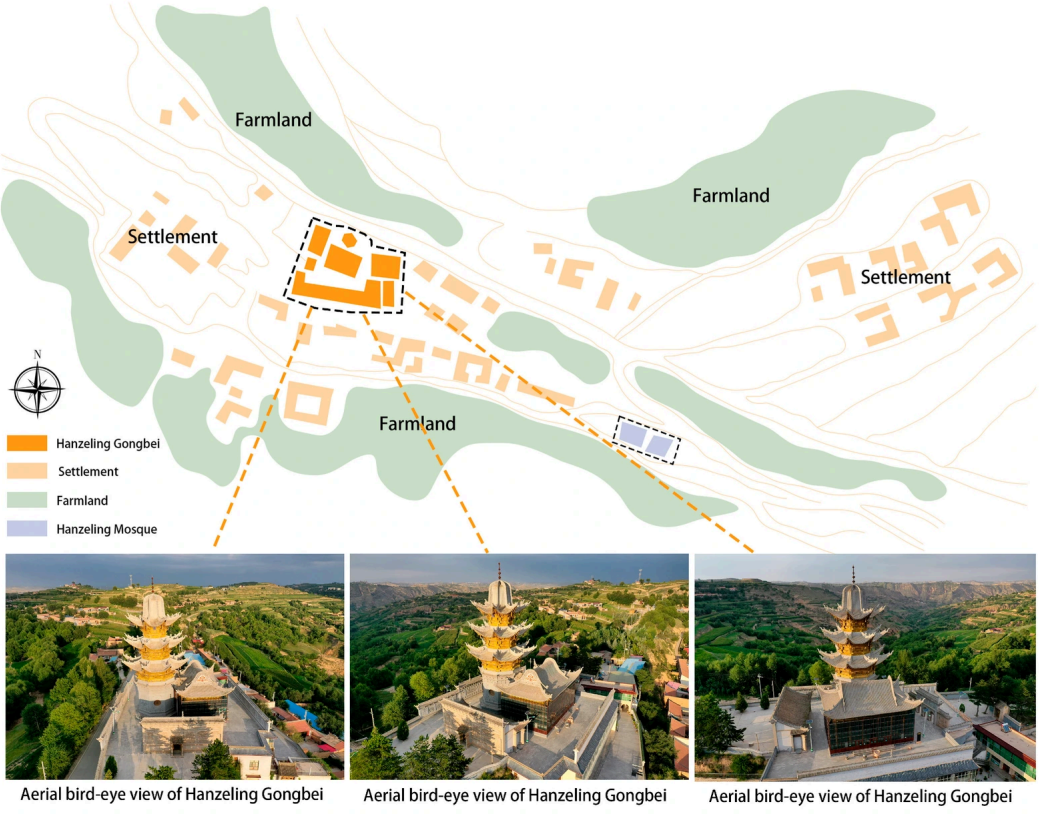


Figure 5. Schematic diagram of the spatial layout of the Hui settlement at Hanzeling Gongbei, Gansu (source of drawings and real-scene images: 2023 field investigation).

The Jiucaiping Gongbei settlement (Figure 6) further confirms the developmental path of the later stages of Gongbei spatial evolution, while highlighting the spatial characteristics of multicultural integration. The Jiucaiping Gongbei was first built in the second year of the Tongzhi reign of the Qing Dynasty. From the beginning of its construction, the site was chosen on the mountaintop terrace of Geda Mountain, separated from the residential settlement area at the foot of the mountain. It did not go through the process of first coexisting with the mosque within the village and then moving outward, but directly manifested the characteristics of independent site selection in the "spatial detachment stage" of Gongbei. The mountain pilgrimage path leading from the foot of the mountain to the scripture hall at the top is an important ritual pilgrimage route. After pilgrims climb to the top of the mountain along the path, they participate in preaching and Sufi practice activities within the scripture hall; the choice of a mountain retreat location also reflects the cultural integration between Jahriyya Sufi thought and the traditional Chinese Taoist concept of seclusion in the mountains and forests. Entering the late Qing Dynasty to the Republic of China period, with the continuous expansion of the regional influence of the Jahriyya Menhuan, believers from surrounding cross-village areas regarded this place as a spiritual sanctuary, and a large number of graves gradually concentrated around the Gongbei; burial space was no longer limited to the public cemeteries attached to mosques within individual villages. This shift in burial space is the most prominent settlement manifestation of the "faith and spatial reconstruction period." It can be seen that after its completion, the Jiucaiping Gongbei simultaneously carried the two spatial results of independent sacred site selection for Gongbei and the concentration of regional cemeteries, reflecting the settlement evolution logic of the Sufi menhuan Gongbei in Gansu, Ningxia, and Qinghai jumping from ordinary religious buildings to cross-regional spiritual centers. Compared with the horizontal circu-

lar pattern of "mosque–residence-grave" coexistence in the same village in the Dongshahe settlement, the Jiucaiping Gongbei settlement is a vertical hierarchical settlement form of "mountaintop Gongbei sacred site-mountain foot village residence," which also reflects the differentiation of the religious settlement spatial pattern in the Hui residential areas of Northwest China after the development of Menhuan faith [29,31,32], enabling Hui settlements to further develop from living spaces centered on daily worship into a spiritual space system that integrates faith worship, historical memory, and the regional environment.

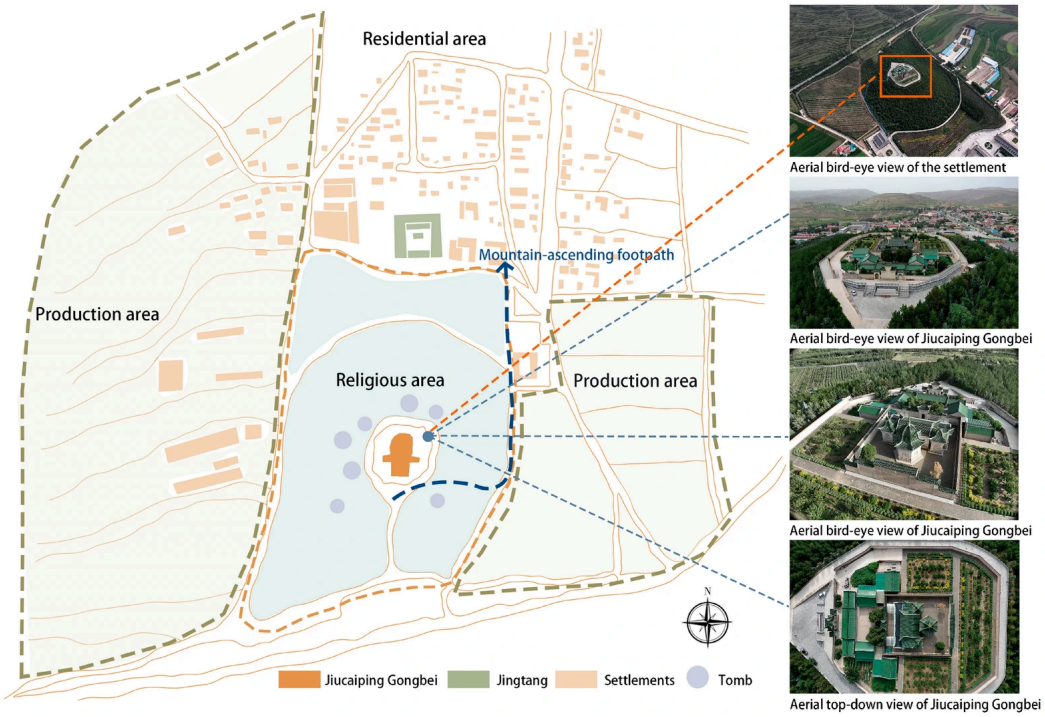


Figure 6. Schematic diagram of the Hui settlement space of Jiucaiping Gongbei in Xiji, Ningxia (source of drawings and real-scene photos: 2022 field survey).

3.2. Differential Dwelling: Hierarchical Spatial Representation and the Reconstruction of Ethical Order

Through the analysis of field morphology in the Hui settlements of Gansu, Qinghai, and Ningxia, it can be observed that in addition to common centripetal characteristics, the Hui settlements in the region also exhibit significant hierarchical and orderly spatial features, forming a unique indigenous pattern of "differential dwelling." This differentiated spatial hierarchy is the material result of the long-term localization of Hui settlements, achieved through the bidirectional integration of the Islamic belief system and the Chinese traditional ethical order, and manifested within the spatial fabric of the settlements. Based on functional zoning and spatial gradient observations from field research, a concentric, progressive structure is formed within the settlements, centered on religious nodes, with sacredness, social status, and productive functions decreasing layer by layer. The quality of spatial location corresponds highly with religious authority and social ethical rank, serving as a concrete projection of social order and cultural ethics within the settlement space.

From the perspective of the spatial construction logic of traditional Hui settlements, the mosque, as a sacred place for communication between man and Allah, occupies the highest level in the settlement spatial system, forming a complete ethical spatial hierarchy centered around it. Combined with the actual scenes of settlements observed in field

research, their spatial arrangement laws can be summarized as follows: the mosque is always in the highest-level position. As a sacred place for communication between man and Allah, the spatial layout formed around the mosque actually establishes a morphological hierarchical structure that gradually spreads from the sacred center to the daily living space, creating a correspondence between spatial gradients and religious authority. This morphological hierarchy embodies multiple ethical meanings: the mosque, as the center of faith, functions to maintain the community, and the cemetery located near or within the mosque constitutes the most sacred level in the settlement space; the Imam undertakes responsibilities such as presiding over prayers and interpreting religion, and his residence is usually located near the mosque; family elders or the elderly also mostly live in positions close to the mosque, which is the spatial expression of the ethical concepts of order between the young and old, and respecting the virtuous and the elderly in Hui society; families form stable man-land relationships through land management, and blood ties maintain production cooperation, making the peripheral space a carrier of kinship and production relations.

The Tashapo settlement in Qinghai (Figure 7) is a typical field sample of the traditional Hui settlement's single-center homogeneous differential order, preserving the spatial and ethical order of early Islamic settlements in Gansu, Ningxia, and Qinghai quite intact. The settlement is compactly laid out, relying on the valley and river beach terrain, with the village mosque as the sole sacred core; secondary religious nodes such as Gongbei or Jingtang have not yet appeared, and the settlement space has not undergone functional differentiation or hierarchical fission. In terms of spatial gradient arrangement, the concentric layout of the settlement clearly reflects the differential logic of gradually decreasing sanctity: the mosque is located at the center of the settlement; the residences of the Imam, clan elders, and public cemeteries are distributed in its immediate vicinity, collectively forming the innermost circle with the strongest sanctity; moving outward, it transitions into a zone of ordinary residential dwellings; the outermost periphery extends into agricultural fields along the gentle river valley, overall forming a "Mosque–Residence–Field" concentric texture that expands layer by layer. The spatial order of this settlement is built entirely upon daily religious practices, blood-based ethics, and agricultural production, with the mosque integrating the three-fold order of faith, human relations, and production. The spatial hierarchy is simple and clear with a strong sense of unique centrality, serving as a representative case of the single-layer ethical spatial pattern of ethnic minority settlements in Northwest China from the Ming Dynasty to the early Qing Dynasty. Islamic settlements in Gansu, Ningxia, and Qinghai construct different levels of cosmology, views on life and death, ethics, and values within the belief framework of the Heavenly Way and human relations. It is a spatial mode rooted in Chinese culture with Hui culture as the main body, forming a hierarchical structure that unfolds layer by layer from the order of faith, to social order, to the order of production. This hierarchical spatial organization logic is socially isomorphic with the "differential mode of association" (Chaxugeju) proposed by Fei Xiaotong: social relations diffuse outward from major nodes, and an individual's position within the community determines their spatial hierarchy, which is an order construction based on religious ethics and social responsibility [33].

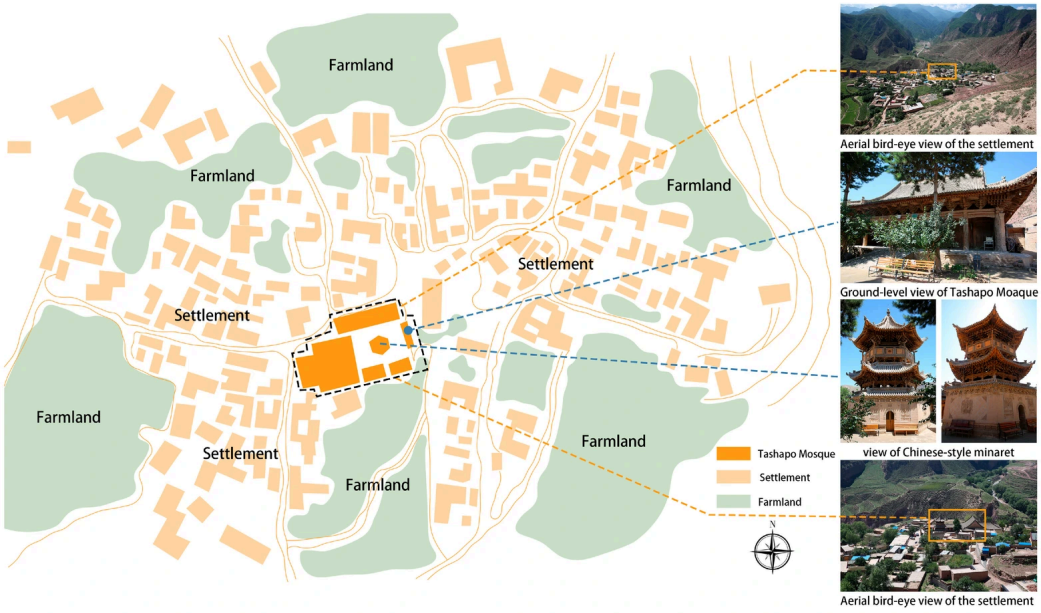


Figure 7. Schematic diagram of the space of Tashapo Hui settlement in Qinghai (source of drawings and actual scene photos: 2021 field survey).

This unique localized spatial order of settlement ethics is rooted in the mature system of Hui–Confucian syncretic thought that emerged during the Ming and Qing dynasties. Following the rise of the Hui–Confucian movement during the Ming and Qing periods, Hui scholars such as Wang Daiyu and Liu Zhi interpreted Islam through Confucianism, deeply integrating and reconstructing Confucian concepts—such as Sangang Wuchang (三纲五常, the Three Bonds and Five Constant Virtues) and Wulun (五伦, the Five Relationships)—with the Islamic faith system, thereby completing the localized theoretical construction of a social ethical system for the Hui people. In fact, the Islamic canon itself contained doctrinal foundations compatible with Confucian ethics; both the Quran and the Hadith contain ethical requirements concerning filial piety, respect for elders, kindness to kin, and the practice of generous care in life and simple burials (厚养薄葬). It was precisely on this basis that Hui–Confucian scholars bridged and reconstructed Confucian moral codes with the Islamic faith system. As Liu Zhi stated in the "General Principles" of Volume 10 of Tianfang Dianli (《天方典礼》, The Rites of Islam): "The husband-wife relationship is the head of all human ways. Only after the husband and wife exist can there be a hierarchy; within the family, this becomes father and son, and within the state, it becomes ruler and subject. Only after hierarchy exists can there be peers; those who come from the same origin are brothers, and those of different clans are friends. When the essentials of human relationships are fulfilled, the Five Pillars are complete [人伦之要，五功备矣]"[34], thus incorporating social relations such as husband and wife, father and son, ruler and subject, brothers, and friends into the Islamic social order of the Hui people. Similarly, Hui scholars stated in the " Chapter on Loyalty and Filial Piety" in Qingzhen (《清真指南》), Guide to the Pure and True):"The son of Heaven is the father of the people. From this the Three Bonds emerge, the Five Relationships are established, the nine degrees of kinship are divided, and all people arise [天之子，民之父也。三纲由兹而出，五伦由兹而立，九族由兹而分，万民由兹而出]." Through the theoretical construction of these Hui-Confucian scholars, Confucian concepts such as Sangang Wuchang and recognition within Hui Islamic society, eventually transforming from doctrinal interpretations at the ideological level into spatial practices at the settlement level.

With the spread of Sufism and the localization of the Menhuan (Sufi order) system,

the spatial ethical order of Hui settlements in Northwest China has further evolved. The traditional single-center hierarchical pattern of mosques has gradually differentiated into a complex tiered system, with the spatial evolution of the Dawantou settlement in Gansu (Figure 8) clearly demonstrating this reconstruction process. Field investigations show that in its early stages, the Dawantou settlement, like the Tashapo settlement, followed a single-center construction model where all religious activities, community interactions, and production and daily life revolved around the village mosque, relying on it to build a unified secular ethical hierarchy. After the formation of the Qadiriyya Menhuan in the Qing Dynasty, the settlement formed an independent Gongbei daotang (shrine) based on the tomb of a Ming Dynasty sage on a ridge beside the village, transforming the settlement from a single secular worship center into a higher-level hierarchical system with a superimposed "mosque–Gongbei" dual-center structure. Among these, the mosque at the foot of the hill continues its traditional functions, serving the villagers' daily worship and the order of interpersonal community, maintaining the hierarchical pattern of secular life; meanwhile, the Gongbei on the ridge carries the functions of sage veneration, Sufi practice, and cross-regional spiritual belief, representing a sacred heavenly order that transcends daily human relations. Each forms an independent spatial radiation sphere, achieving a spatial stratification of worldly worship and afterlife cultivation. This dual-center structure further enriches the connotation of the settlement's hierarchy: the spatial hierarchy dominated by the traditional mosque corresponds to the secular social order of human relations, kinship, and production, while the sacred hierarchy dominated by the Gongbei corresponds to the ethnic spiritual belief, historical memory, and religious inheritance order. This upgrades the originally single settlement spatial gradient into a settlement system with dual layers of secular human relations and heavenly faith. From the perspective of cultural integration, the Dawantou Gongbei's site selection on the ridge beside the village—a mountain-based construction mode that is somewhat distant yet connected—not only conforms to the Sufi Menhuan's orientation toward mountain retreat and cultivation but also absorbs the traditional Chinese indigenous spatial concept of "attaining enlightenment in forests and connecting with the divine from high places." It is a material product of the mutual adjustment between Islamic faith and traditional Chinese culture. Compared with the single-layer ethical pattern of Tashapo, the spatial evolution of the Dawantou settlement reflects the development path of Hui settlements in Northwest China after the rise of the Menhuan. It can be seen that the spatial hierarchy of a settlement can simultaneously accommodate cross-regional spiritual worship, forming a settlement pattern in which secular human relations and heavenly faith are superimposed.



Figure 8. Schematic diagram of the spatial layout of Dawantou Hui settlement in Gansu (source of drawings and photographs: 2023 field survey). Orange box: Hanzeling Gongbei; Purple box: Hanzeling Mosque.

3.3. Construction of Defensive Boundaries Based on Fortified Living

Based on field investigations, unlike the open layout of traditional agricultural settlements in the interior, in some mountainous and tableland areas of Gansu, Qinghai, and Ningxia—especially in southeastern Gansu—Hui settlements exhibit fortress-like spatial characteristics featuring enclosed boundaries, internal-external separation, and defensive positioning, forming a defensive settlement boundary system with unique frontier regional qualities. It should be noted that the regional distribution of such fortress settlements is uneven; the typical samples collected for this study are concentrated in the Gansu region, while similar fortress remains were not found in the surveys of Hui settlements in Qinghai and Ningxia.

This characteristic is fully embodied in the settlement forms of the Xuanhuagang Gongbei settlement and the Liangjiabao Village in Zhangjiachuan, Gansu. This defensive consciousness is also reflected in settlement site selection. With the widespread distribution of mountains, river valleys, and loess tablelands in the Gansu–Qinghai–Ningxia region, Hui settlements often choose locations with high terrain, wide fields of vision, and ease of surveillance and control. Natural terrains such as mountains, gullies, rivers, loess tablelands, and ridged canyons form natural barriers. Among them, mountain settlements often form natural defensive advantages through the height difference between slopes and tablelands; in river valley areas, rivers define settlement boundaries, thereby reducing the risk of external intrusion. This site selection not only improves the settlement's security capacity to cope with external risks but also defines the scope of community habitation. Regarding internal spatial organization, to adapt to the needs of risk avoidance and defense, many Hui settlements in this region differ from the open patterns of ordinary traditional agricultural settlements and have gradually formed an inward-looking, closed, fortress-like spatial system. Relying on rammed earth walls, fortress gates, ramparts, and winding alleys to build multi-layered defensive structures, a continuous and enclosed protective boundary is formed on the periphery of the settlement, while the internal street network connects residences, mosques, and various pub-

lic spaces, balancing the maintenance of daily community order with defensive organization in sudden conflict situations. From the perspective of spatial formation, such defensive settlements can be broadly divided into natural defensive modes formed by relying on the natural environment and artificial defensive modes constructed through artificial facilities.

Among these, the Xuanhuagang Gongbei and Ninglingbao in Zhangjiachuan, Gansu, exemplify a defensive model formed by relying on the natural environment (Figure 9). The settlement is situated as a whole on a gentle mountain slope; rather than relying on large-scale artificial walls, it primarily utilizes the natural terrain—the height difference of the mountain and the mountain terraces—to form a natural outer barrier, leveraging these topographical differences to achieve observation, early warning, and risk avoidance functions. At the same time, the settlement uses stockade walls, mountain paths, and hidden passages to connect the defensive points of the high-altitude Ninglingbao with the religious living spaces of the lower-lying Zhaipubao. This forms a three-dimensional defensive system that coordinates the upper and lower levels, ensuring the religious life and spiritual worship needs of the believers while completing the spatial construction of the settlement's security and defense by relying on the natural terrain, thus achieving a profound overlap between sacred space and defensive space.

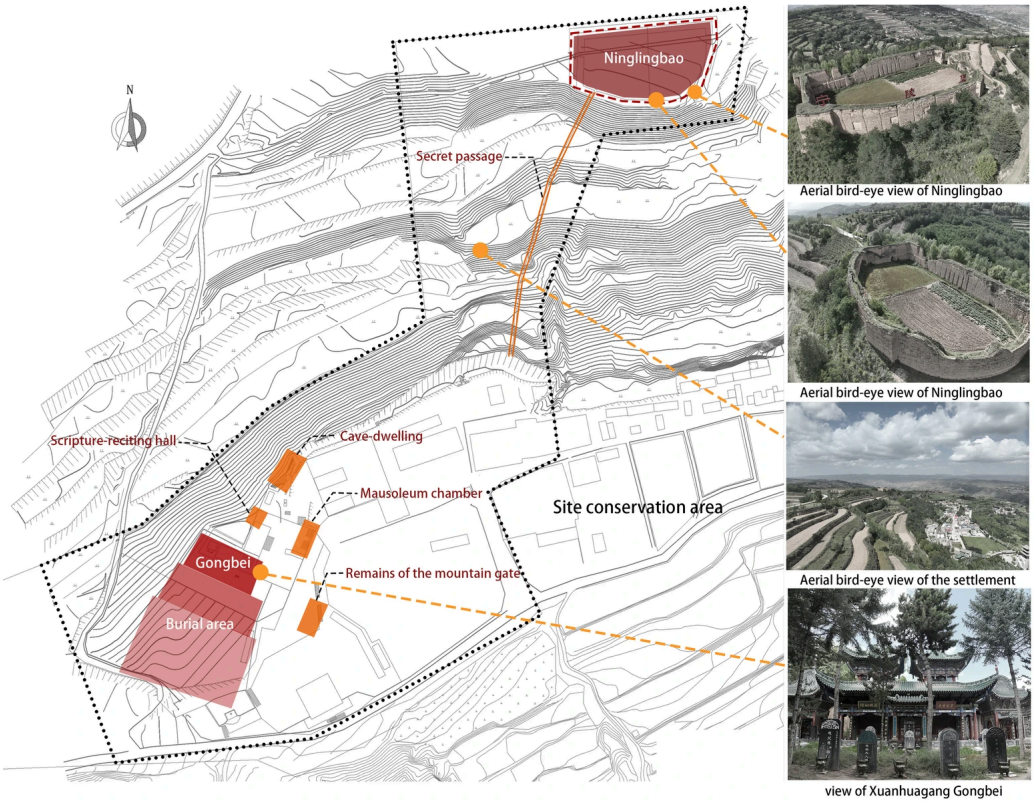


Figure 9. Schematic profile of the Zhaipu defense system at Xuanhuagang Gongbei and Ninglingbao in Zhangjiachuan, Gansu (image source: redrawn from Ninglingbao and XuanHuagang Gongbei cultural relic declaration plan (Tianshui City Design Institute, Gansu Province); real-scene images from 2023 field survey). The black dotted lines simply delineate the spatial boundaries of the two locations.

In contrast, the Liangjiabao Village settlement in Zhangjiachuan, Tianshui, Gansu, is a closed defensive fort primarily constructed by artificial means (Figure 10). The periphery of the settlement is enclosed by continuous fort walls, forming a relatively complete

living space inside, with the walls and main roads jointly constituting a clear inner–outer boundary. From the perspective of spatial organization, the interior of the fort walls is not merely a simple concentration of residences; rather, it uses a road network to connect residential spaces, public spaces, and religious spaces, forming a living system with internal order. The peripheral main roads expand along the outer side of the fort walls, further strengthening the distinction between the inside and outside of the settlement. This layout pattern of external closure and internal aggregation allows the settlement to possess a certain level of security and protection capability while meeting the needs of daily production and life. As mixed villages predominantly inhabited by non-Muslim ethnic groups, they demonstrate a consistency in defensive morphology with Ningling Fort in Zhangjiachuan. This serves as a spatial projection of the social turmoil of the era, as well as a manifestation of the collective ethnic psyche.

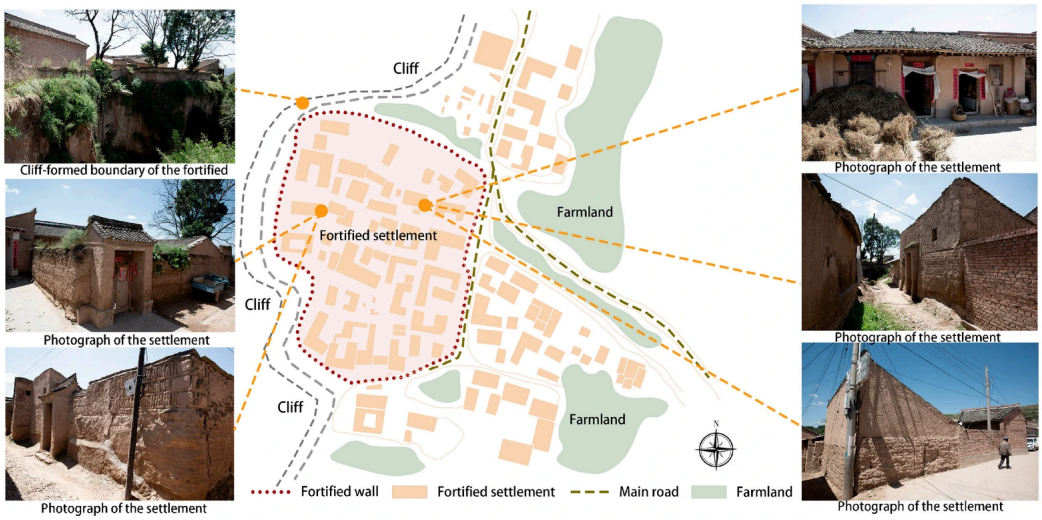


Figure 10. Schematic of Liangjiabao Village's settlement space, Zhangjiachuan, Tianshui, Gansu (source: 2023 field survey).

From the perspective of historical origins, this settlement morphology of "fortified dwelling and closed defense" is a spatial outcome jointly shaped by the garrison defense pattern of the northwestern frontier and long-term social turmoil since the Ming Dynasty. Located at the intersection of agrarian and nomadic civilizations, the Gan–Qing–Ning region has been a crucial strategic area for the central plains dynasties to manage the Northwest since ancient times, historically known as the frontier fortress (*Biansai*). It has long faced frequent ethnic interactions, border conflicts, and social unrest. The volume "Zhenshu Tongkao" (《镇戍通考》), Comprehensive Examination of Garrison Defense) in*Huangming Jiubian Kao* (*《皇明九边考》*), A Comprehensive Study of the Nine Frontiers of the Ming Dynasty) by Wei Huan of the Ming Dynasty detailed the spatial response strategies in this region: "As for the dwellings scattered far in the suburbs, they are inevitably the places that bandits will plunder. If trenches are dug and walls are raised here to serve as key defenses and protection, then families and relatives can join forces to protect themselves, and how could the bandits succeed in plundering? By strengthening the walls and clearing the fields to exhaust their vigor, and laying ambushes in strategic passes to exploit their weaknesses when they retreat, integrating defense and offense, it is impossible not to prevail over the barbarians [而民居散乱在郊外者，则贼所必掠之地也.....攻守互用，不得志于夷狄未之有也]" [35]; Furthermore, the lyrics of the widely circulated local Hui folk song *Minxian Hua'er*(《岷县花儿》, Min County Folk Songs)—"Chabu Valley and Longwang Platform, you come up to the

Eleventh Camp; I will not come to the Eleventh Camp, with no hat on my head and no shoes on my feet[茶埠峪嘛龙王台，你到十一营上来，十一营上我不来，头没帽子脚没鞋]"—vividly reflect the high demand of the Hui ancestors for a garrison-based residential model and defensive functions [36]. The aforementioned Ming Dynasty frontier defense documents and local folk songs reflect the universal demand for garrisoning and defense throughout the Northwest frontier. For Hui settlements, against the backdrop of a volatile frontier society, this era's demands were translated into choices for settlement construction; however, the construction of fortified villages was also constrained by local economic capabilities, topographical conditions, and community scale, and not all Hui settlements were built with large-scale fortifications.

From the Qing Dynasty to the Republican period, persistent regional social unrest, large-scale ethnic conflicts, and population migration further perpetuated and consolidated this type of defensive settlement pattern, with the reconstruction process continuously strengthening boundary control and defensive elements such as walls, fortress gates, and watchtowers [37]. Even when large-scale warfare decreased during the Republican period, the hinterlands of Gansu, Qinghai, and Ningxia remained subject to local armed disputes and banditry, allowing the enclosed fortress-style spatial pattern to be maintained over the long term. In this process, the defensive space of the settlement and the religious community space became deeply intertwined, giving the fortress boundaries a dual spatial connotation: on one hand, it served as a physical barrier against external security threats, and on the other, it acted as a critical interface for maintaining internal community order. Walls and fortress gates clearly divided the interior and exterior spaces, ensuring the stable continuation of shared religious beliefs, lifestyles, and community interests within the settlement, and while improving security conditions, they continuously promoted the cohesion of the internal ethnic community identity. The "living in fortified settlements" spatial pattern formed as a result essentially reflects the profound influence of security requirements on settlement structure and is one of the important features that distinguish Hui settlements in Gansu, Qinghai, and Ningxia from general agricultural settlements.

3.4. Dwelling by Trade: Networked Spatial Representation and Regional Interconnectivity

The three previously mentioned spatial characteristics—dwelling around mosques, dwelling by social hierarchy, and dwelling in forts—primarily reflect the micro-spatial order within settlements, which can be intuitively verified through contemporary field measurements and analysis of current urban fabric. However, the networked spatial pattern formed by Hui settlements relying on trade corridors belongs to a macro-historical spatial structure that spans across settlements and regions. Influenced by modern urbanization expansion, the renewal of transportation networks, and the iteration of trade systems, the current fabric of contemporary settlements makes it difficult to fully restore the historical linkages between traditional agricultural and pastoral trade corridors, ancient trade route nodes, and religious settlements. Therefore, this section primarily relies on historical maps from the Republican period and modern times, local economic archives, field historical data, and existing research on modern commerce. By using historical spatial diagrams and cross-referencing the literature, it reconstructs the spatial interaction patterns of Hui settlements in Gansu, Qinghai, and Ningxia under the traditional trade system, explores the symbiotic relationship between commercial nodes, religious cores, and historical transportation corridors, and clarifies the shaping mechanism of regional trade activities on the networked spatial form of Hui settlements.

Commercial activity is not only an important means for Hui settlements to sustain their livelihoods, but also a significant medium for connecting different settlements, dis-

seminating religious culture, and promoting ethnic interaction [38,39]. Since the Tang and Song dynasties, the ancestors of the Hui people had a strong tradition of "being good at trade," with historical records noting that "there is no one who is not a merchant, and no one who is not a farmer." After entering the Gansu–Qinghai–Ningxia region, although a large number of Hui residents engaged in agricultural production, commerce remained an important economic foundation for sustaining their social development. Especially in the farming-pastoral transitional zone, the Hui group leveraged their advantage of connecting different cultural regions—such as those of the Han, Tibetan, and Mongol peoples—to long serve as intermediaries in regional trade, establishing stable commodity circulation systems between agricultural and pastoral areas [40,41]. As recorded in Xia Suo's article "Xiahe": "The transport and sale of livestock such as cattle, sheep, and horse hides are almost entirely managed by Hui people from Linxia, Longdong, Shaanxi, and other places." Furthermore, as detailed in "General Economic Situation of Labrang": "Regarding the general commercial situation in this county, for businesses with capital over 100,000 yuan, fur and wool products account for 40%; there are also many businesses with capital under 100,000 yuan, approximately over 130 firms. Due to the war, transportation to Peiping and Tianjin is blocked, and business is gradually declining, with only the fur trade still being maintained. These fur merchants are mostly Hui officials and gentry from Qinghai and Linxia." Additionally, statistics on wool trading in the Gansu–Qinghai–Ningxia region from "Culture, Networks, and Wool Trade: Modern Gansu–Ningxia–Qinghai Hui Merchants 1894–1937" (Figures 11 and 12) show that the fur and wool trade in this region experienced clear periodic fluctuations, and the boom periods of trade coincided with the time of cross-regional mobility and expansion of Hui merchant groups, which also provided a foundation of population movement for the spread of religious networks accompanying trade routes. All these historical pieces of evidence demonstrate the significant proportion of participation by the Hui ethnic group in the fur and wool trade [38].

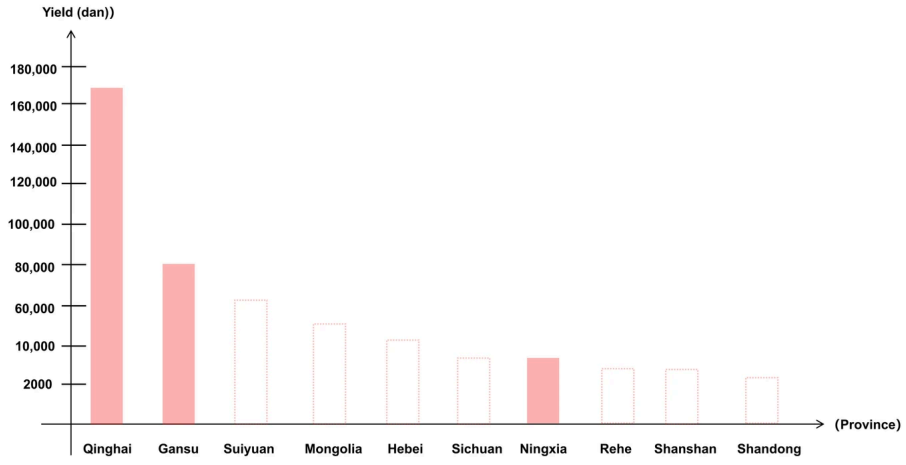


Figure 11. Schematic diagram of wool trading volume in Gansu–Qinghai–Ningxia (data source: "Culture, Networks, and Wool Trade: Modern Gansu–Ningxia–Qinghai Hui Merchants 1894–1937").

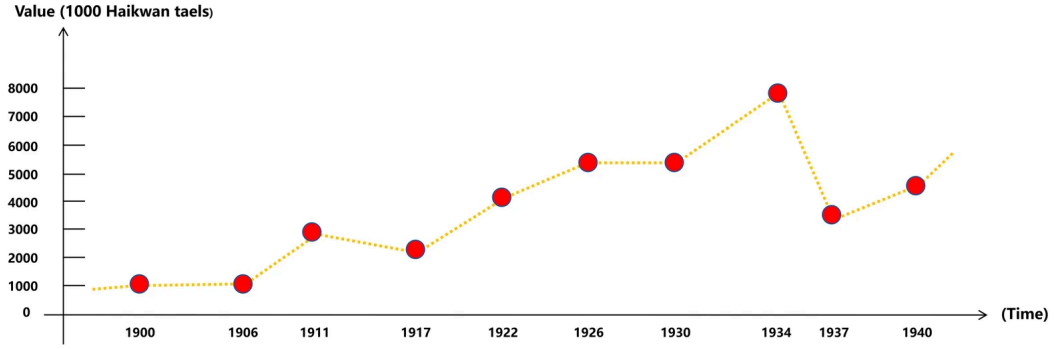


Figure 12. Schematic diagram of wool trading output trends in Gansu, Qinghai, and Ningxia (source of chart content: "Culture, Networks, and Wool Trade: Hui Merchants in Modern Gansu, Ningxia, and Qinghai 1894–1937").

This specific economic function gives Hui settlements distinct traffic-oriented characteristics; settlements are often prioritized at traffic nodes, commercial route intersections, and near regional markets. Important Hui residential areas such as Hezhou, Lanzhou, Xining, Yinchuan, and Zhangjiachuan are all located along historical traffic corridors. The Gansu–Qinghai–Ningxia region has formed a multi-level commercial network structure consisting of production areas, distribution centers, and trade hubs. Pastoral areas serve as raw material production bases providing hides and wool; Lintan, Minxian, and Tongxin undertake acquisition and transshipment; while Lanzhou, Xining, and Yinchuan have become regional trade centers. The Yellow River shipping system, traditional courier route system, and modern highway network together constitute a framework for regional connectivity, incorporating originally dispersed settlements into a unified market system. This study extracted commercial circulation records from historical local chronicles and compared them by overlaying them with the propagation paths of Hui Menhuan (Sufi orders) and Jiao-fang (religious communities) (Figures 13 and 14). The correlation reveals a notable spatial overlap between the commercial network and the process of religious propagation; many commercial routes are also important paths for the movement of followers and the spread of religion, showing a mutually nested and synergistically expanding relationship between religious networks and commercial networks.

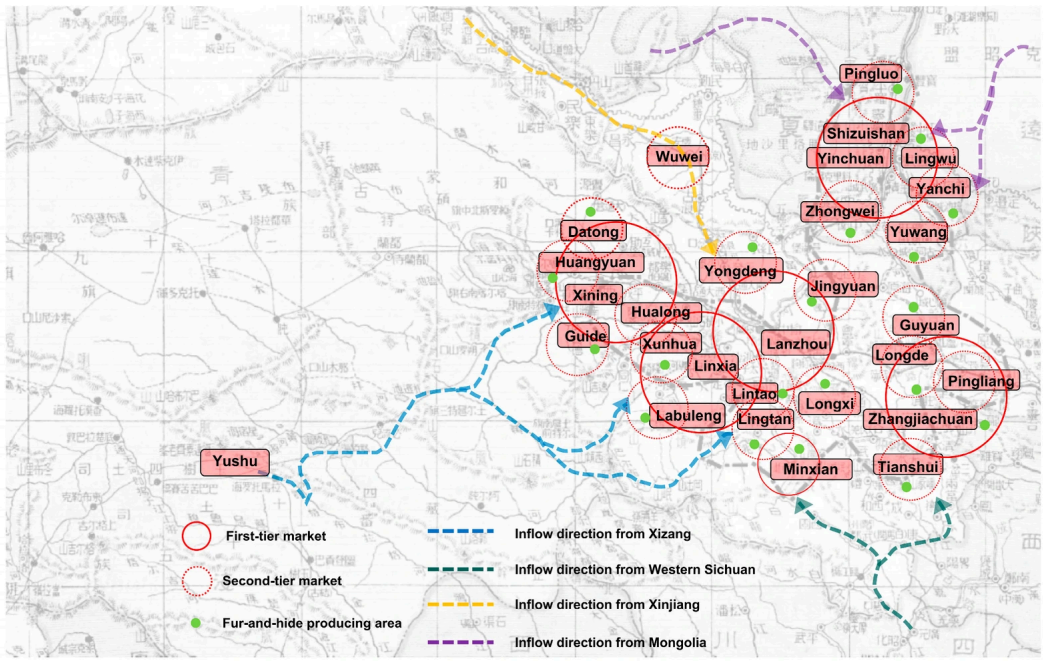


Figure 13. Schematic diagram of the commercial network of Hui towns in Gansu, Qinghai, and Ningxia (redrawn; base map source: Republic of China map).

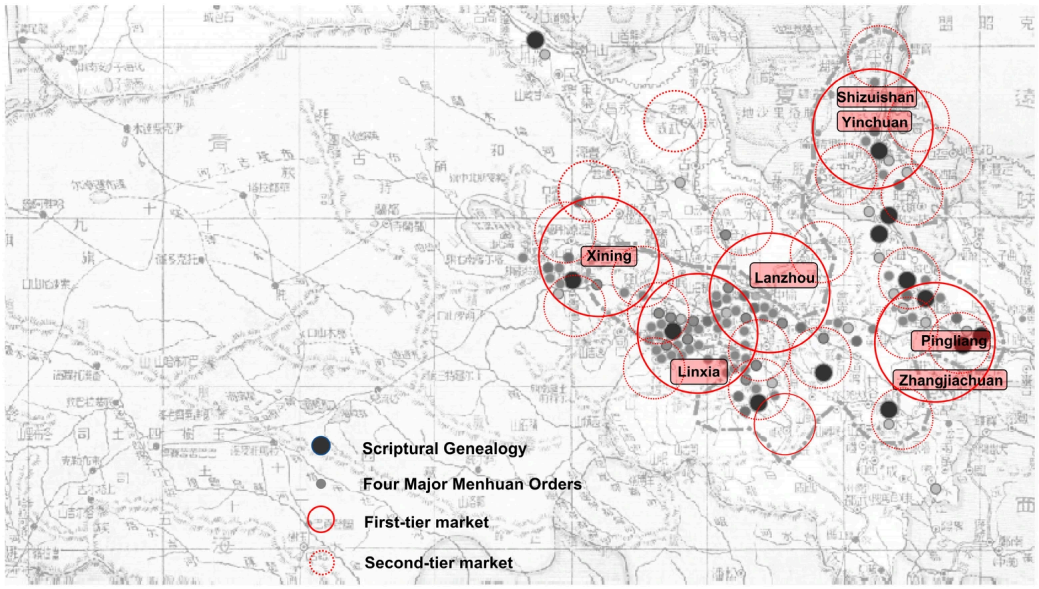


Figure 14. Schematic diagram of Hui commerce and religion distribution in Gansu, Qinghai, and Ningxia (redrawn; base map: Republic of China map).

Through a comparison of the Hui commercial districts in Lanzhou Chengguan and Yinchuan during the Republic of China period, one can clearly see the profound shaping of settlement network forms by commercial culture. Taking the Hui residential area in Lanzhou as an example (Figure 15), this area is located in Chengguan, on the periphery of the main city, with mosques distributed within it. Relying on the distribution and transit industry of raw hides and various local specialties from the Northwest, goods were gathered here and then transported to Ningxia, Baotou, and other places via the Yellow River waterway. The residential area is adjacent to the Yellow River ferry. By guarding the key passage for external travel and being close to the river ferry, a large number of commercial activities could take place in the Hui residential area before

goods officially entered the city market for trade, forming a forward-positioned commercial space development model with significant locational advantages [5,42]. At the mesoscale, the development of commercial networks profoundly influenced the evolution of urban spatial structure and residential patterns. After entering the Gansu, Qinghai, and Ningxia region, the continuous expansion of the Hui population gradually led to a development model where multiple mosques jointly constitute the urban spatial framework.

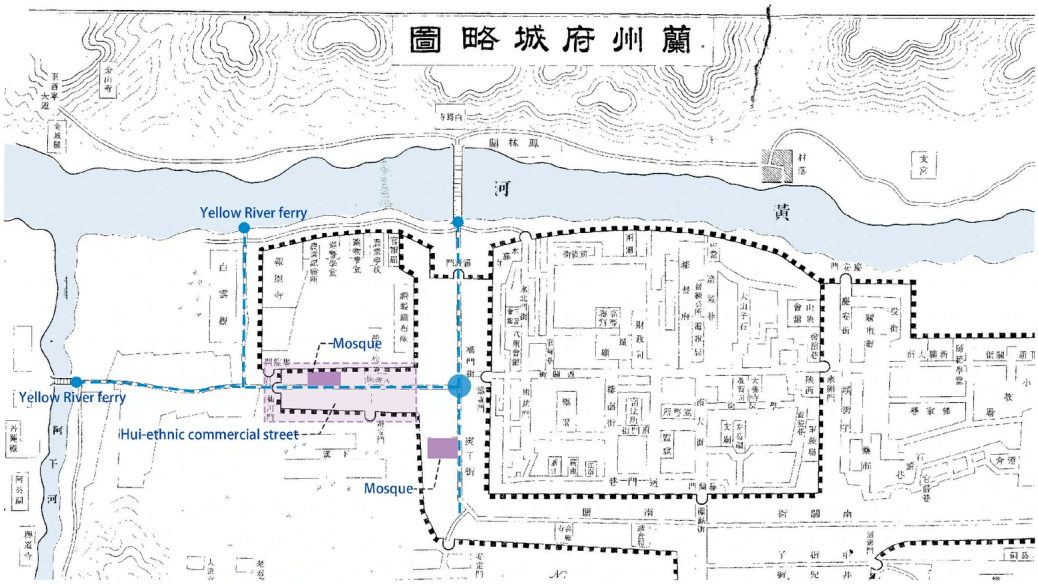


Figure 15. Location map of Hui residential areas in Lanzhou during the Republic of China (redrawn; base map source: East Asian Common Culture Society (Japan). Complete Records of Chinese Provinces: Gansu Province and Xinjiang Province [M]. Beijing: National Library of China Publishing House, 2015.).[5[43]

Taking Yinchuan, Ningxia as another example (Figure 16), it is a networked residential model with the Nanguan Mosque and the Hui residential area at Yangrou Street intersection as the main pattern. Major mosques each occupy traffic gateways in Yinchuan and are connected by internal primary transport routes, with clear division of labor: Nanguan Mosque is the main site for religious affairs and the distribution of fresh meat and furs; the Beiguan Mosque residential area is the main gateway to Inner Mongolia, primarily selling tea and grain; the Dongguan Mosque residential area spatially exhibits a "centripetal-centralized-through" topological structure centered on the mosque, focusing on wholesale and retail of daily necessities; the Xiguan Mosque focuses on local specialties and traditional Chinese medicine. This mature networked residential area model has continued to the present [5], reflecting a close spatial association and functional integration between religious space and commercial space.

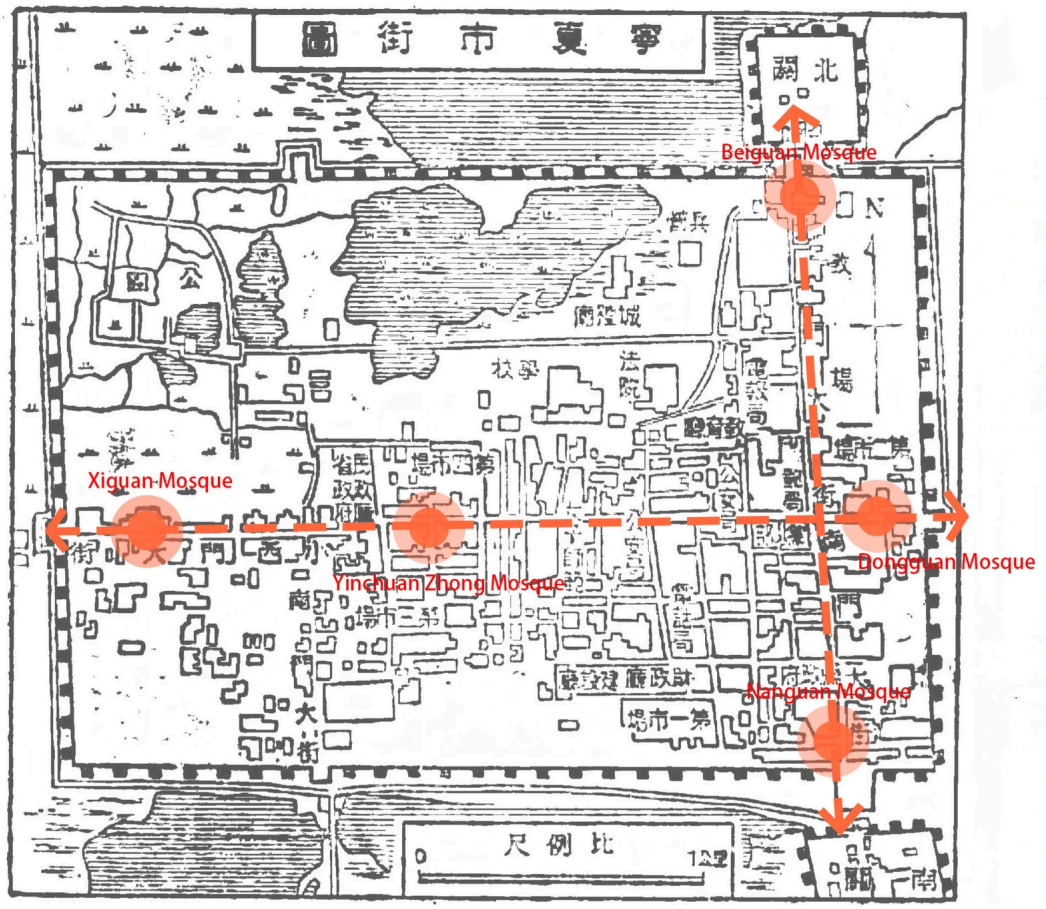


Figure 16. Schematic of the Hui commercial network in Yinchuan during the Republic of China (redrawn; base map: East Asian Common Culture Society (Japan). Complete Records of Chinese Provinces: Gansu and Xinjiang [M]. Beijing: National Library of China Publishing House, 2015.).[5] [43]

At the same time, settlements such as Zhangjiachuan, Sanjiaji, and Shanjiaji gradually developed into linear commercial market towns distributed along major transportation routes. Commercial activities continuously guided settlement space to concentrate in areas with transportation advantages, causing the mode of living around mosques to gradually integrate with regional trade systems and driving the evolution of settlements into higher-level regional centers. From a micro-scale perspective, the overlapping of commercial networks and cultural networks promoted exchanges and interactions among different ethnic groups. For a long time, Hui merchants have been active in the border areas between Han and Tibetan regions, playing an important role in the exchange of agricultural and pastoral products, information transmission, and cultural communication. Centered on Hezhou, a crescent-shaped Han-Tibetan trading zone gradually formed, extending westward through Xunhua to Xining, and southward through Lintan, Songpan, and Aba directly to Garzê. Hui merchants continuously moved along trade corridors, not only promoting regional economic ties but also fostering the exchange and integration of different ethnic cultures [44]. Long-term trade contacts and population mobility further influenced the development of settlement architecture and spatial forms. In terms of architectural expression, Hui settlements gradually absorbed elements of Han and Tibetan architectural cultures, forming an architectural system with multicultural characteristics that demonstrates the profound connection between commercial mobility, cultural exchange, and spatial construction. It is precisely in this

process that the Hui settlements in Gansu, Qinghai, and Ningxia gradually formed a spatial system with mosques as nodes, trade routes as links, and transportation as the framework [45], ultimately constructing a regional cultural network that combines religious, economic, and social functions.

4. Discussion

This study takes traditional Hui settlements in the multi-ethnic convergence area of Gansu, Qinghai, and Ningxia as the research object. Selecting 11 typical settlements and neighborhoods as empirical samples, it extracts four types of spatial characteristics—centripetalism, hierarchy, boundary-orientation, and networking—based on field surveys of the settlements, historical literature reviews, and spatial morphology analysis. By systematically deconstructing the morphological texture and layout patterns of key physical spaces such as mosques, Gongbei, fortress alleys, and trade nodes, it analyzes the synergistic relationships between settlement space and religious belief, Hui–Confucian ethics, frontier defense, and regional trade. Ultimately, it summarizes a multi-dimensional spatial construction mechanism: "belief identity as the core, ethical order as the framework, security defense as the barrier, and regional interconnection as the bond." Based on the empirical analysis of settlement morphology, it is evident that the spatial form of Hui settlements in Gansu, Qinghai, and Ningxia is neither a mechanical projection of single religious doctrines nor a random result of natural settlement; rather, it is a spatial product jointly shaped by the unique geopolitical environment of the Northwest frontier, the deep integration of Hui and Confucian cultures, the survival needs of frontier defense, and cross-regional trade flows. It realizes the synergistic evolution of the regional natural environment, socio-cultural systems, and settlement physical space, serving as a concentrated material representation of the unique man-land relationships and social order in the Northwest agro-pastoral transition zone.

Existing research on Islam and traditional Hui settlements has already achieved fruitful results in fields such as the protection of individual buildings, spatial distribution patterns, and the value of cultural landscapes. One type of research focuses on the spatial distribution and aggregation patterns of settlements, often adopting quantitative methods such as space syntax and visibility graph analysis to reveal the connectivity characteristics of their physical scales. Although such methods can intuitively demonstrate the spatial topology of settlements, they often struggle to explain the deep-seated cultural connections behind the physical form, or the mutual shaping mechanisms between social organization and spatial form. Another type of research focuses on the cultural types, architectural forms, or lineage landscapes of settlements, emphasizing the influence of regional culture, residential patterns, and religious rituals on the formation of village landscapes. However, these studies often rely on qualitative descriptions and single-case analyses, rarely translating deep cultural elements into spatial morphological indicators with cross-regional comparability. Other studies have based their conservation area divisions on administrative divisions or macro-geographical units, providing a reference for the concentrated and contiguous protection of settlements. However, their classification boundaries sometimes place excessive focus on administrative jurisdictions, making it difficult to fully reveal the multiple interconnected relationships formed between villages based on trade networks, religious dissemination, and geopolitical forms.

Compared to the single paradigm and research shortcomings of existing studies, this research combines field empirical evidence with theoretical induction, achieving effective breakthroughs and supplements in research logic, analytical methods, and practical value. At the research logic level, this study breaks away from the traditional single

approach of doctrinal deduction or purely material form analysis. Based on field morphological observations, it integrates four types of spatial characteristics—centripetal circles, hierarchical order, defensive boundaries, and trade networks—into a unified analytical framework. This confirms that Hui settlements are an organic whole formed by the multidimensional integration of natural environment, historical culture, and built space, effectively remedying the disconnect between form and culture in existing research. At the research methodology level, this study constructs a complete analytical process of "field survey-settlement morphology-historical tracing-cultural interpretation," comprehensively applying methods such as spatial element mapping and topological relationship identification. By cross-verifying base maps, ancient maps, and historical documents, it enhances the scientific rigor and interpretability of settlement spatial analysis. At the theoretical and empirical levels, this study clarifies the unique hierarchical ethical space and religious-commercial networks of Hui settlements. By systematically analyzing these morphological characteristics, it provides a comprehensive spatial and theoretical framework for understanding the cultural integration, historical generative logic, and regional interconnectedness of traditional Hui settlements in Gansu, Qinghai, and Ningxia.

Although this study systematically reveals the spatial morphological characteristics and multidimensional construction mechanisms of Hui settlements in Gansu, Qinghai, and Ningxia, it remains subject to certain limitations due to research data and scope, which may provide directions for improvement in subsequent studies. First, this study focuses on morphological analysis based on the existing static spatial fabric of settlements, emphasizing the historical formation mechanisms and spatial patterns of traditional settlements; it lacks sufficient research on the dynamic evolution processes and evolutionary driving mechanisms of settlement space during the urbanization process, failing to fully cover the long-term iterative patterns of settlement space. Future research could integrate multi-year remote sensing imagery, local chronicles and genealogies, and field oral histories to construct a long-term spatiotemporal analysis framework, deeply exploring the dynamic adaptation and evolutionary logic of Hui settlement space. Second, while this study's sample covers mainstream Hui settlement types in Gansu, Qinghai, and Ningxia, it fails to exhaust settlement variants in special regions such as extremely arid oases and areas with deep integration of Tibetan and Hui cultures, and the universality of the research framework remains to be further verified. Future research could expand the scope by applying the analytical framework to Hui settlements in the Southwest and Southeast coastal areas, refining comparative research on Hui settlements in different regions, and clarifying the applicable boundaries of the theoretical framework. Finally, limited by the lack of precise ancient surveying and mapping data and limited historical document records, this study entails a certain degree of subjectivity in the restoration of the historical spatial boundaries and microscopic street fabric of some settlements, and research on spatial differences at the micro-scale remains insufficient. Future work could combine social network analysis and refined ethnographic surveys to further detail the study of microscopic settlement space and architectural details, thereby promoting a more comprehensive and dynamic understanding of the deep interactions among culture, physical space, and social networks within traditional settlements.

5. Conclusions

This study moves beyond single-factor explanations of Hui settlements by explicitly identifying the generative logic and specific mechanisms that construct their spatial forms in the Gansu–Qinghai–Ningxia region. The new knowledge generated by this re-

search lies in demonstrating four specific, empirically verified spatial mechanisms across 11 case studies: (1) belief cohesion driving a centripetal "mosque–residence–cemetery" spatial restructuring; (2) the integration of Hui–Confucian ethics reconstructing the internal community into a hierarchical spatial order, prominently manifested in the "mosque–Gongbei" dual-center model; (3) frontier security demands physically shaping bounded, defensively enclosed fortress settlements; and (4) transregional fur and wool trade networks actively directing the networked distribution of settlements along historic transport corridors.

These demonstrated mechanisms reveal that the spatial characteristics of these settlements are not mere physical projections of Islamic doctrines, but rather the active socio-spatial products of continuous negotiation with the specific frontier geopolitical environment and cross-regional economic activities over centuries. Ultimately, this multidimensional perspective provides a more grounded theoretical framework for understanding the spatial evolution and cultural integration of traditional settlements in China's multi-ethnic regions.

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