

Study on Typical Courtyards from the Perspective of Culture: A Case Study of Shandong, China

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Abstract: *Background:* The appearance of residential courtyards in Shandong is mediocre and cannot attract the attention of designers and researchers. *Objective:* This study attempts to answer the characteristics of typical courtyards in Shandong by exploring the internal relationship between typical residential courtyards in Shandong and regional culture. *Methods:* With literature, field, and image analysis, more than 100 village sites were investigated to determine the relationship between the form, distribution, and type of typical courtyard in Shandong and regional culture. *Results:* Based on the imaging method, the structural classification of the courtyard was consistent with the regional division in the Northern Song Dynasty. At the same time, the regional culture formed by river, coast, and mountain terrain is also an important factor affecting the distribution. *Conclusion:* The appearance of typical courtyard buildings in the Shandong region is weakened, emphasizing sociality and sustainability as the main characteristics.

Keywords: typical courtyard; Shandong folk houses; regional culture; culture perspective

1. Introduction

The traditional courtyard is closely related to the region's natural conditions and the profound regional culture. Shandong Province is a warm temperate monsoon climate zone. The plain accounts for 55% of the province's total area, with four distinct seasons, adequate sunshine, and is suitable for farming. Shandong is half inland and half coastal, with typical commercial courtyards under the influence of canal culture in the west Plain of Shandong. Taishan influences the construction culture in the hilly area of central Shandong. The Marine culture of fishing, transportation, and trade in Jiaodong Peninsula influences the construction tradition. Qilu¹ is one of the birthplaces of Chinese civilization with a long history and profound culture. The Lu¹ culture is based on the principles of Confucius and Mencius. Jiang Taigong² created the Qi¹ culture based on the Dongyi³ culture. It laid the foundation of Shandong regional culture. The difference between Jiaodong Peninsula and inland culture can be seen from the relatively independent dialect area. The Huitong River was dug and used in the Yuan, Ming, and Qing Dynasties. The Shandong section of the Grand Canal made the North-South trade smooth and promoted the rise of Shandong canal cities and towns. This led to the gathering of Craftsmen, helping industry and commerce to flourish. After 500 years, the civic culture was born along the canal. Shandong is diverse in topography and culture. Why do traditional courtyards not have an impressive sense of form? What are the characteristics of courtyard dwellings in Shandong? We try to find the correlation and law between Shandong culture and courtyards. We also try to answer the "Qilu characteristics" of typical courtyards built by craftsmen in Shandong before 1949 with traditional techniques and materials. It also includes buildings built after 1949 using traditional construction techniques and repaired by craftsmen.

2. Literature Review

In the 1980s and 1990s, Professor Zhang Runwu of Shandong Jianzhu University and his research team greatly contributed to the survey of Shandong folk houses. They published some works, such as *Picture of Jinan Old Buildings. Folk Houses*, and published several journal papers on Shandong folk houses and traditional courtyards. Under the umbrella of the rural revitalization policy, the investigation and research on Shandong residential buildings have been continuously promoted. Domestic scholars have continuously explored the diversity and uniqueness of Shandong folk houses. They have successively published some notable research work such as *Shandong Folk Houses* (Sun, 1999), *Research on Regional Characteristics of Shandong Folk Houses* (Li, 2014), and *Complete Collection of Types of Shandong Traditional Folk Houses* (Jiang, 2019). Relevant research institutions have also promoted a large number of practical projects. With the continuous improvement of the research level, broadening of the research field, and continuous involvement of related disciplines, Pan Lusheng's "*Beauty in the Countryside*" (Pan, 2019), Liu Su's "*Shandong Ancient Architecture*" (Liu, 2015), Li Zhen's "*Atlas of Traditional Village and Town Houses with Different Regional Characteristics -- Shandong Volume*" (Li, 2015) and relevant important research achievements have been published successively. This study draws on the methods and experience of Professor Li Zhen^{4,5} of Tongji University and Professor Zhu Guangya^{6,7} of Southeast University. Based on the architectural typology, culturology, anthropology, folk art, folklore, archaeology, geography, and history the study of rural architecture in Shandong Province changes from an individual case to a universal study. It changes from a single discipline and perspective to a multi-discipline and multi-angle. Present a holistic and systematic study. Western scholar Amos Rapoport⁸ (1969) proposed that culture's influence on the courtyard's shape is greater than that of natural climate. In 1971, the University of Tokyo in Japan established the World Settlement Data Database. Hiroji Hara published the *World Settlement Teaching 100*, focusing on settlement research and tried to find the context of architectural design through traditional settlement. Foreign scholars' cultural studies on courtyards and dwellings have started the trend of space design of cultural determinism, which has a certain inspiration for this research. Shandong's typical courtyard is the carrier of local culture. Culture determines the environment in which people live, and the environment, in turn, affects the people who live in it.

3. Analysis of a typical courtyard

Traditional houses in Shandong villages can be divided into two building types: single-family buildings and courtyard buildings. Single-family buildings are generally the form of poor family conditions or temporary housing. This kind of housing accounts for a small proportion, a simple structure, and no decoration. Building a courtyard is the choice of most families, so it is representative and typical. The courtyard is the carrier of the family unit and the most important part of the ancient village. Typical courtyards are the most concentrated embodiment of ancient people's survival experience, engineering rules, aesthetic preferences, social ethics, and other aspects. Their inheritance and development are an important embodiment of the continuation of Chinese culture. It includes the ideological wisdom of construction, craftsman-style ceremony, structure, structural characteristics, and regional style.

3.1 Material selection and combination

Shandong is located in the lower reaches of the Yellow River. Its terrain includes vast plains, mountains, hills, and lakes. The rich landscape provides abundant building materials. The materials used for residential dwellings in Shandong include wood, earth (adobe, clay tile), stone, and grass (thatch, seaweed) used for roofing. The combination of materials follows no set form. This reflects the craftsmen's local skills, experience, and wisdom in using and saving local materials. Clay brick and tile are rather pricey. The

common courtyards did not completely use brick and tile to build. These are only used for key positions. In areas rich in stone resources, the wall body uses more stone, making them rain-resistant. Therefore, there are often no head or flying rafters. Slope roof mostly uses yingshan roof. It makes the building appearance quite closed and heavy. The sloping roof of many stone or adobe houses is made of grass. The roof frame load is light and has the advantage of being warm in winter and cool in summer. In Jiadong Peninsula, the seaweed or thatch bundles were tied on the wooden frame layer-wise. The roof is relatively thick, which gives the sea grass house a unique appearance in <cold> winter. The thatched roofs of the residential buildings in Changzhuang Village at the foot of Mount Tai are mainly local yellow and white grass. The life of yellow grass is shorter, and the quality of white grass is better. According to villagers, the material looks weak. However, if it is handled properly, it will not rot for up to 100 years. Weihai's seaweed roof can last for 200 years. This can also be used to estimate the age of the building.

3.2 Structure classification and distribution

Typical courtyard buildings in Shandong are divided into three types: the Dachashou roof structure, the shallow-vaulted roof structure, and the beam-lifting wood structure influenced by official architecture. After analyzing the distribution of houses with large fork structures (detailed explanation in another article), the distribution was less affected by climate and terrain. It was consistent with the scope of Jingdong and Jingxi Roads in the Northern Song Dynasty. It can be inferred that after the Northern Song Dynasty, the immigrants adopted the local house form by inheriting and developing its construction technology. After the fall of the Song Dynasty, large-scale population migration to Shandong continued until the early Ming Dynasty. After the political situation became stable, some Shandong people moved back to other provinces. According to the genealogy, most immigrants came from Dahuaishu in Shanxi, followed by Zaoqiang in Hebei. According to Zhao Shiyu (2018), Dahuaishu is just a synonym for immigration. Conformity and convergence are the basic attitudes of foreign retail investors to integrate into the local collective quickly. Therefore, it is not surprising that Shandong can preserve the structural form distribution of folk dwellings in the Northern Song Dynasty.

3.3 Courtyard building plane and elevation characteristics

The typical courtyard in Shandong belongs to the northern courtyard type. There is no connection between the main room (hall, north room) and the wing room. The separation distance is related to the regional culture. The main room generally comprises less than five rooms (three rooms plus two small ear rooms, Fig.1 to Fig.4, Fig. 5-Fig. 7, drawn by the research group). Typically, it comprises three rooms. There are one, two, and three wing rooms. The design/construction of these rooms is governed by

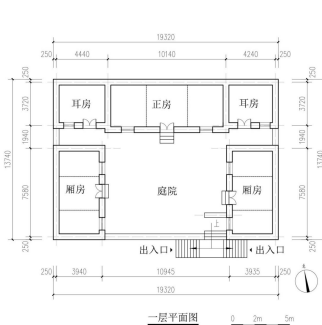


Fig.1 A house in Wuyunpu Village in Laiwu City

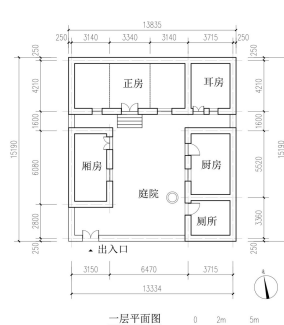


Fig. 2 A house in Taokesi Village in Linyi

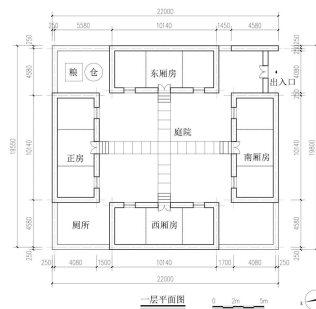


Fig.3 A house in Chaoyang Village in Tai'an City

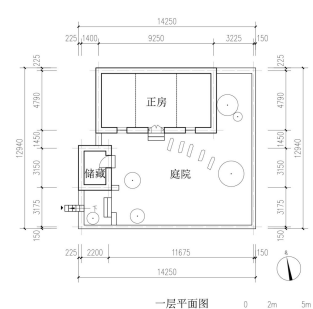


Fig.4 A house in Zoucheng Village in Yufeng Village

local building customs and the base length from north to south. In addition to a few areas due to the terrain's layout, the general direction of the conditional house faces south. Government yamen and temples usually adopt the north and south orientation. The residential courtyards are generally tilted/oriented slightly to the southwest or southeast to show the difference. The location of the courtyard gate is generally southeast or southwest. If there is only an east wing in the courtyard, and the gate opens to the south, the gate can be directly opposite the south gable or in the right half of the south gable opposite the east wing. Folk saying: enter to see the mountain tall (facing the gable), life will be better more. If the direction of the gate cannot face south, it must face east or west under the influence of the homestead and road. Then the entrance corridor is generally made along the gable on the south side of the east or west wing room. The courtyard's spatial order reflects the need for etiquette. In most areas, the privacy of the courtyard is greater than the defense requirement. In the countryside, the doors are open if people are in the house. The villagers usually look out for each other if nobody is in the house. The screen wall acts to block the view. Auspicious characters and patterns on the screen wall let people enter the door to see happiness. It is the host's way of showing courtesy to guests. After entering, we pass through the wing room and finally reach the main room where the old man lives. The location of the principal room is the least disturbed and shows the respect that its owner deserves. People usually worship in the main room. There are tower buildings in the courtyard for the guard to prevent bandits or foreign enemies in Individual areas. Some distributed defensive courtyard groups are Shandong like the Wei Manor in Binzhou, the Stone Village in Qianwangzhuang Village in Heze, Damihunzhen Village, and Xiaomihunzhen Village in Liaocheng, etc.

The depth of the main and wing rooms are the same. From the building height: main room > street gate > East wing > West wing > barn. The bedrooms and earrooms on both sides of the main room also have the concept of "East is first, west is second". In a single building in the courtyard, the main room is about 0.5 meters higher than the main ridge of the wing room. In the early years, the house owner would first consult the master to determine the specific height of the house in each direction before building. The floor height of the side rooms is generally the same as that of the main room.

3.4 Low-tech strategy

Shandong has a large population and relatively limited resources. People are simple and thrifty. It is reflected in the affordable materials used for building good-looking houses. Primitive technology has matured through experience. It applies the laws of nature to solve large and small, simple and complex problems without reducing their effectiveness. Low-tech also has some enlightenment for the theory and practice of modern architecture. First, it is convenient for people to operate and easy to master the technology; Second, rural areas are far away from urban pipe networks and have low population density. Using low-tech buildings can save materials and reduce maintenance costs with high efficiency; Third, the existence of low-tech is the guarantee of high technology. In times of energy supply shortage, it can continue to use without impact; Fourth, it is environmentally friendly with lower requirements. It reduces the mining demand for building materials and raw materials; Fifth, it can be used for post-disaster reconstruction to restore normal life and production faster.

There are many cases of obtaining high benefits at a low cost. This paper only takes the "patchwork technology" encountered in the investigation process as a typical example. Patchwork technology uses small materials to form aniseed, which is worth advocating for the folk. It saves cost and is convenient for transportation. Regarding technology, it tests the level of artisans and often achieves better decorative effects. Typical courtyards in Shandong have lots of doors and Windows in some areas. Lintel of doors and windows is the key point of decoration in typical courtyard buildings. (Fig. 5-Fig. 7, shot by the research group)

3.5 Auspicious decorations

Typical courtyards in Shandong Province are rough and primitive. The main purpose of decoration is to reflect auspicious culture. The entrance, eaves, doors, windows, and surrounding areas are the most important decorative objects of typical courtyards in Shandong province.



Fig. 5 Jining - Wudai Mountain Village: The window linings are made of three pieces of stone with a width of about 120mm. Seen from the front facade, it looks very atmospheric. The lintel has an arc pattern.



Fig. 6 Taian-Yin Shanzhuang: The lintel of the door is made of three different widths of stone. Chisel marks with straight or diagonal lines carved above the stone.



Fig.7 Taian-Chaoyang Zhuang: The door lintel has an independent riding stone outside and an independent door lintel inside.

The three sculptures (stone, wood, and brick) mainly reflect the educational legend. The auspicious meaning of animals and flower patterns, texts. Most of the doors and windows are surrounded by the contrast of building materials to reflect the decoration. In areas with better conditions, exquisite carving art decoration can be seen. The door carvings include carp, lotus, and fairy crane ganoderma lucidum. They are prominently placed inside and outside the waist of the door frame. The stone spout on the eaves is also carved into straight lines and L shapes according to the orientation needs. The lintel and the head of the sweet clover are often decorated with stone or brick relief in areas unsuitable for round carving, like the foot of the door. The ears on the gables are mainly used to aerate the space above the ceiling. It is shaped like a copper coin or heaps of shingles to create buds' form. Generally, only brick walls have wall ears, and stone walls do not. The eaves rainwater outlet in Wuzhaishan and Qianwangzhuang Villages is strange and simple in shape. Parts are curved or have finely carved double heads. They make the most delicate part of the whole building. The main function of the door clip is to secure the door frame. Jining Heze adjacent parts of the door card work is very elegant. The shape of a quarter of a lucky knot, fish, lotus seed pod shape, elliptical ball. (Fig. 8-Fig. 11, Photo was taken by the research group)



Fig.8 Wuzhaishan Village: lucky knot



Fig.9 Wuzhaishan Village: fish

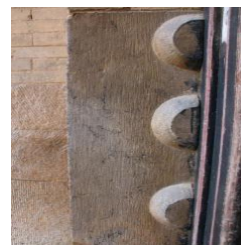


Fig.10 Shuangfeng Village: cylinder



Fig.11 Fumiao Village: the lotus seed pod

Tse Tou, or "Tuizi" in dialect. A pillar head is used where the roof and eaves of a building meet the wall. It is a component with an obvious local hand style. The lower platform of the head is used to place incense burners. The head is the most elegant place in the whole building. The highest grade has carvings on it. Generally, the arc

performance of a certain rhythm relationship is only through the stone concave. The white chisel on the stone and the vertical and 45-degree oblique chisel line reflect the fine degree of stone processing. Diamond shape, square, and peaceful pattern, the method is similar to the local Han Dynasty stone. Rough but fine.

"Taishan Shigandang" "Taishan Zhenzhai" and "Taishan Zhenzhai Shigandang" are the most commonly used zhenzhai characters in Shandong typical courtyards. They are believed to have the ability to defend the house. These characters are generally hanged at the gates or the building corner facing the road to protect the building from harm. The former are stone tablets, while the latter are mostly written directly on the cement mortar surface of the wall. Font color has stone color, red, or black. A few people also use "lucky star" or other words to bless their house.

4. Results and Discussion

Typical courtyards in Shandong are mostly left after Ming and Qing dynasties. The layout is square and regular, and the function gives way to the social etiquette in the architectural plan. The layout follows the order concept handed down by the ancestors. The shape and system conform to the hierarchy and cannot be usurped. There is no innovation in the use of convenience and comfort. There are few defensive courtyards in Shandong province, border areas, and mountainous areas. It reflects that the culture of Confucius and Mencius deeply influences most areas. The common people are simple and faithful, with strong internal constraints. It is the representation of the stability of the social structure. The structure and construction of residential buildings are economical everywhere. The hard-working spirit of Shandong people explains why the solid and strict solutions to technical problems are settled perfectly. Facade decoration is rarely seen in ordinary residential houses. The medium-sized and large courtyards have carved decoration only in key parts. This means auspiciousness and expresses the owner's active pursuit of a peaceful and healthy life. The courtyard is regular, but the architectural details reflect the personality and can be said to be harmonious but different.

5. Conclusion

The style of residence pertains to the alignment with regional culture. The typical Shandong courtyard is not an architectural style but a social construct. The Shandong vernacular dwellings exhibit an unassuming facade yet maintain strict internal organization. The space order regulates the relationship between family members and social relations so that the residents are in their positions and perform their duties. Shandong's developed agriculture ensures its self-sufficiency, making the external image less significant than the internal order - a characteristic also reflected in Shandong folk houses. In the new era of residential buildings, the housing type has become the primary determining factor for families in selecting a new home. Different from the traditional framework of the courtyard, most people do not agree or disagree with the new housing type. During passive selection, we must relinquish certain expectations and subconsciously allow the new home to shape our lifestyle. Thoroughly comprehending the cultural implications embodied in the traditional courtyard, our regional cultural characteristics, and our cultural convictions, we can transform this decision into an active one rather than a passive follower. The study is confined to Shandong Province, and investigating courtyards in other regions remains inadequate. Therefore, further exploration of the proposed typical characteristics is warranted.

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Notes

- ¹ Qilu is a place name referring to the concept of regional culture, including two different states of Qi and Lu. The territory of Qilu equivalent to today's Shandong province.
- ² Jiang Taigong, his real name is Jiang Ziya (? -- About 1015 B.C.), who was the founding king of Qi.
- ³ Dongyi refers to the eastern region with Shandong as the center. Dongyi culture is from the worship of bird totem, to the development of various handicrafts and architectural crafts, to the emergence of ritual system, the differentiation of settlements and cities, and even the formation of early countries.
- ⁴ Li Zhen, professor of Tongji University, China. Related achievements of 2008 National Natural Foundation Program: "Application System Research on Heritage Protection and Inheritance of Traditional Architectural Craft", chaired by Prof. Li Zhen.
- ⁵ 2005 National Natural Foundation Superficial Project of "Strategy, System and Application of Low Technology in Local Architecture Conservation", chaired by Prof. Li Zhen.
- ⁶ Zhu Guangya, professor of Dongnan University, China. Related achievements of the Doctoral Foundation Project of the Ministry of Education, "Research on the Rescue of Traditional Architectural Techniques in Developed Areas of South China", presided over by Prof. Zhu Guangya.
- ⁷ Related achievements of the 2007 National Natural Science Foundation project "Research on Some Endangered and Lost Traditional Building Techniques in Southeast China".
- ⁸ Amos Rapoport is a U.S. scholar who studies the relationship between architectural settlements and area culture by combining architecture and anthropology. His experience teaching at universities around the world helped him to complete this comparative study.

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