

Architectural Characterization of Hongjialou Catholic Church in Jinan

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Abstract. This paper focuses on the Hongjialou Catholic Church in Jinan, China. Hongjialou Catholic Church was designed by Italian Brother Poncieri. It is one of the larger Catholic churches in Jinan. It occupies an important position in modern Chinese religious architecture. This paper will use the field research method, literature analysis method, comparative analysis method, and chart enumeration method to analyze the Hongjialou Catholic Church in terms of its construction background, plan layout, facade style, decorative decoration and building materials, structure, etc. in terms of culture, art, and other aspects. To further demonstrate the rules of decorative construction of typical Western Gothic church buildings, compare Hongjialou Catholic Church with Western churches, and study the influence of localization on the facade and interior space decoration and ornamentation of Western churches. And through the comparison with other Chinese modern Catholic churches, it is concluded that the localization influence of Hongjialou Catholic Church is not significant, which will help the subsequent in-depth study of Hongjialou Catholic Church in terms of artistic achievement and historical and cultural value.

Keywords: Hongjialou Catholic Church; architectural features; mixing of cultures.

1. Introduction

The outbreak of the Opium War in 1840 marked the beginning of China's modern history, and China has since entered a semi-colonial and semi-feudal society, as well as the beginning of China's modern architectural history. Before the Opium War, China closed its doors to Western culture, and Western architectural culture was only partially imported into China. Subsequently, the signing of various humiliating contracts and the invasion of Western imperialism led to the large-scale introduction of Western architectural culture into China, which rubbed a different spark with traditional Chinese culture and concepts.

Compared with the Protestant and Orthodox churches, the Catholic Church had earlier missionary activities and had a greater influence on the façade style and decoration of Chinese church buildings. The spread of Catholicism in Shandong began at the end of the sixteenth century, initially through the Beijing-Hangzhou Grand Canal to Linqing County, after which the northwestern part of Shandong became an important area for Catholic missions in Shandong during the Ming and Qing dynasties. Taking the first Opium War in 1840 as the time point, against the background of colonial aggression by Western countries, Catholicism entered Shandong as a strong culture, the church's power grew rapidly, and the mode, purpose, and scale of Catholic missionary work changed dramatically. The construction of churches in modern Shandong is closely related to the spread of Catholicism in Shandong. From the 17th century to the middle of the 19th century, the Catholic Church began its missionary work in Shandong, and the church buildings were simple churches in the style of local traditional houses, small in scale and mainly in Chinese style. After the Opium War in 1840, the Qing government was forced to allow missionaries to preach freely, and the church buildings were dominated by larger Western-style Catholic churches. During the period between the Opium Wars and the signing of the Treaty of Xinjiao in 1901, the spread of Catholicism in Shandong expanded rapidly, and the style of churches built was dominated by the traditional Western church style, but variations were made to suit different situations. In the mid-20th century, foreign missionaries left

Shandong and Chinese clergy managed the parishes, after which basically no churches of Western architectural style were built.

It can be seen that the church missionary is the early Western architectural culture and influence and changed the Chinese architectural culture by a major important means, the church building in China's modern architectural history occupies an extremely important position. Therefore, it is more representative to study the influence of Western architectural culture on modern Chinese church architecture. Hongjialou Catholic Church in Jinan was designed by Italian monk Pang Huixiang and was built and put into use in 1908 as a whole, which is one of the larger Catholic churches in Jinan at present and occupies an important position in modern religious architecture in China. This paper mainly utilizes the methods of field research method, literature analysis method, comparative analysis method, chart enumeration method, etc. to study the characteristics of the architectural features of the Hongjialou Catholic Church.

2. Architectural Characterization

2.1. Layout of the Compound

Hongjialou church complex is located in Jinan City, Shandong Province, Lichicheng District, Hongjialou 1, and is a typical Gothic architectural complex, with a courtyard inward layout. The church is surrounded by Hongjialou Square to the south, the old campus of Shandong University to the north and east, with a strong cultural atmosphere, and Honglou Road to the west, with convenient transportation. The church complex consists of the main body of the church, the nearby monastery, commodities, and living rooms. On the east side are the student living quarters in the form of a courtyard, including dormitories, dining halls, classrooms, libraries, offices, etc. on the west side are the auxiliary rooms of the seminary; on the north side are the Church's living and office space, including the reception area, souvenir shop, nuns' room, and prayer room, etc.; and on the south side is the priest's office building.

From the overall layout, the church complex adopts a symmetrical courtyard layout, with the main body of the church occupying the center position, which is formed on the basis of inheriting the spatial layout of the traditional Chinese buildings, absorbing the features of the Western church architectural art and combining with the traditional Chinese culture [1].

2.2. Layout

The church covers an area of 1,625 square meters, a construction area of 1,246 square meters, east-west length of about 65 meters, north-south width of about 25 meters, the use of the Latin cross-shaped system plan, in function and proportion with the Western Catholic Church compared to a slight change. The building sits east to west, the west side of the building where the main entrance is located, so that the layout of the building and the traditional Catholic Church entrance towards the religious holy land of Jerusalem is the same form layout.

The plan layout of the church for the north-south symmetrical layout and can be seen in figure 1. The main entrance and the two sides of the door were porches and the side porch corresponds to the main entrance porch on the left and right sides of the porch with a 0.8-meter-wide lapis lazuli masonry cylinder rotary staircase, leading to the church mezzanine. The mezzanine floor is a choir stall for the organ class, and it is connected to the discrete bell tower above the side porch, which is about 40 meters high and has an octagonal roof leading to the top of the tower. The interior of Hongjialou Catholic Church is compact in rhythm, and the interior space of the building is divided into three parts by two rows of square stone columns and coupons, namely the narthex and the two side porches. The center hall is high and wide, while the side corridors are low and narrower than the center hall. The center hall is longitudinal and intersects vertically with the horizontal hall, which is about 22 meters wide at its end [2]. At the end of the central axis of the hall with granite do elevated treatment and set the altar, so that the central axis and the symmetrical layout of the left and right forms a more prominent altar of the sacred status. The altar is flanked by choir stalls and an octagonal roofed tower,

which also has a rotating staircase leading to the choir on the second mezzanine level, echoing the bell tower.

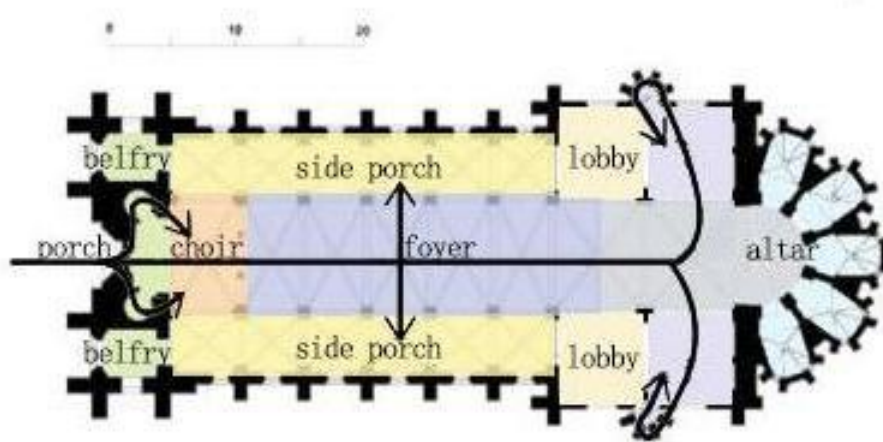


Fig. 1 Hongjialou Catholic Church floor plan analysis.

2.3. Building Elevations

The architectural style of Hongjialou Catholic Church is the Western Gothic style, which is the closest to the Western churches in Jinan Diocese. The architecture emphasizes the horizontal and vertical segmental composition, and the overall feeling is light and upward [3]. The towers, flying buttresses, small minarets, and rose windows on the façade of the church are the main features of Gothic churches. The west façade of the church is the main façade, with the spires of about 46 meters in height arranged symmetrically on both sides, and the narthex in the middle, which is connected with the spires on both sides and the localized features on the façade are not obvious.

Although Hongjialou Catholic Church is a typical Western Gothic building, the façade components and decorations are mainly Western Gothic, but it is still influenced by traditional Chinese culture, and there are many localized eclectic styles. The church window styles are rich and varied, the form retains the Gothic architectural features, the window openings are decorated with patterns put together by stone strips, wiped outwards into eights, and there are typical Gothic rose windows, but the windows are not inlaid with delicate stained glass as in western churches but are replaced by flat glass as shown in figure 2. The flying buttresses have been simplified and differentiated from the light and translucent flying buttresses of the Cologne Cathedral, which are beautifully carved, while the flying buttresses of the Hongjialou Catholic Church have a localized character, similar to the brick eaves of a garden wall, but still decorated with carvings of animal intent. The façade pilasters are simplified Corinthian columns. The church appears in the façade decoration of the head of the beast and the dragon pattern, both of which are traditional Chinese patterns, together with the practice of stacking shibori under the eaves of the eaves, all of which is a clear manifestation of the localization of the decorative patterns of the Hongjialou Church, and the specific localization of the decoration is shown in figure 3.



Fig. 2 Elevation windows.



Fig. 3 Elevation Localization Decoration.

2.4. Structure and Materials

Hongjialou Catholic Church is a masonry and wood structure, with stone as the foundation of the building and wooden roof frames. When the church was built, it was in the period of German occupation and was deeply influenced by Western architectural culture. At that time, the German building structure was generally a mixed masonry, steel, and wood structure with I-beam floor slabs, but Hongjialou Catholic Church was built in the early period of German occupation, and steel structure was not yet applied in that period [1]. As a typical Gothic church building, Hongjialou Catholic Church adopts a vault and its support system, the outward thrust of the cross-vault is supported by the fly-rail wall, the skeleton coupon serves as the load-bearing member of the vault, and the cross-vaults also make it possible to lighten the maintenance and infill parts.

The church is made of locally sourced materials, using traditional local gray bricks, gray stone, and gray clay tile masonry to add a strong charm of regional color to the church. The history of brick and tile production in Jinan is more than 2,000 years old, and before the 1920s, bricks and tiles were made in Shandong by firing in earthenware kilns, which consumed high amounts of coal and produced low yields and was not economical, resulting in bricks and tiles that appeared to be a greenish-gray color. At the beginning of the 20th century, mechanism bricks and tiles appeared, but the varieties of bricks and tiles didn't change much, just using the mechanism instead of manpower, and the size of bricks and tiles became bigger [1]. Hongjialou Catholic Church exterior wall surfaces as well as the tower with green brick paving, and the church roof with gray tiles. The stone used to build the church was mainly purchased at a low price from the Zibo, and the masonry materials are shown in figure 4, from left to right, as bar masonry, gray tiles, and local gray bricks. Due to technical constraints, there was no hoisting device at that time, and the difficulty of constructing the Hongjialou Catholic Church can be imagined. Against the background of technical constraints, workers used the hoarding method and the elevated ramp method to transport the stone to the same height as the church. The earthen ramp of the church, as shown in figure 5, extends about five kilometers southward from the top of the church building, and the ramp can be used for horse-drawn carriages to transport the stone as well as building materials, such as green bricks and lime [1].



Fig. 4 Masonry styles and materials.

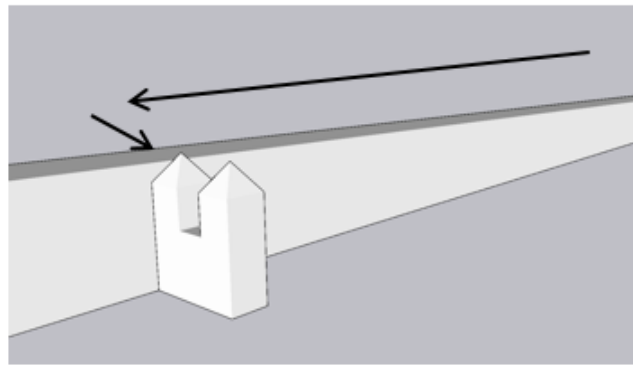


Fig. 5 Schematic diagram of the church's earthen ramp.

3. Comparative analysis of architectural features of Hongjialou Church

3.1. The Underlying Logic of Church Style

Since the signing of the Treaty of Nanking, the Catholic Church has had free missionary rights in China, but at the same time, there has been a growing resistance to Catholicism among the Chinese people. Throughout the period between the Opium War and the signing of the Treaty of Simchun, the construction of Catholic churches in China was more or less subject to the constraints of both governmental and civil forces, and the church buildings constructed during this period were either a mixture of Chinese and Western architectural styles or compromises in architectural forms, such as the relocation and remodeling of the Beitang Church in Beijing [4]. However, in areas where the church was powerful or where there was not strong resistance from the local government and the public, the church still chose to build Western-style churches in a distinctive style in order to promote their religious spirit, as exemplified by the Sacred Heart of the Shihlu Catholic Church in Guangzhou, which was built in 1861. It can be seen that when the Church in modern China approached the issue of church building, the subjective level was still intent on choosing a more purely Western architectural style for its construction.

In 1917, Pope Benedict XV promulgated the Code of Canon Law, which stipulates in Article 1162 that all designs for Catholic churches must be submitted to and approved by the Pontiff. Vicar General's approval. To build a cathedral, an architect must be hired. The design plan should not just be a plan drawn by lines, but should also include elevation, frame structure, and detail parts. In order to avoid unnecessary trouble, even the thickness of the walls and the method of laying wall bricks should be explained in the design plan. It is also mentioned in the book "Imported and Indigenous" that when the Catholic Church built churches in China, there existed a generalized instruction manual that specified in detail how the churches should be built.

With regard to traditional Chinese culture, the missionaries believed that the art of Chinese painting could be used as a form of decoration to blend in with the Western style of church architecture in order to create an atmosphere familiar to the local population of believers and that this kind of decoration should not be contrary to the teachings of the religion. In 1919, Pope Benedict XV proposed the concept of "vernacularization" in an attempt to expand the influence of the Catholic Church in China through the use of practices that were in harmony with the local Chinese culture. Although the construction of Hongjialou Catholic Church predates the concept of "vernacularization", the architecture and decorative arts it displays can, to a certain extent, be regarded as a cutting-edge exploration of "vernacularization" [5].

3.2. Comparative analysis of church buildings

3.2.1. Courtyard layout and plan formation

Western churches tend to have an open layout, with the church building facing the public space of the city, such as the Cologne Cathedral, which is a copy of the Hongjialou Catholic Church.

Comparison with modern churches in China reveals that Hongjialou Catholic Church, like most modern churches in China, adopts an inward-looking courtyard layout, using a courtyard wall to separate the church from the public space of the city, which is summarized in table 1. Perhaps due to security considerations and the policy of "segregation between China and the West," this is indeed different from the traditional Western form, reflecting the localized characteristics of the church's layout.

At this level of church plan, Honglou Church and Cologne Cathedral share the same Latin cross form, but the proportions and plan functions are slightly different, with Hongjialou Catholic Church's transepts protruding less, but otherwise maintaining the traditional Latin plan form. Compared with the East Church in Beijing, the transept of the East Church is located at the proximal end of the plan, and the side of the plan also adopts a polygonal closure instead of the traditional semi-circular shape. When compared with the North Church, the vertical space of the North Church is shortened, and two Chinese monumental pavilions are built outside the church. A comparison of the Latin Cross Plans of Hung Lau Church is summarized in table 2.

In comparison, it can be seen that Hongjialou Catholic Church presents localized features in the layout of the courtyard, while in terms of plan form, it follows the traditional Western design, which is less localized compared to other churches in recent times.

Table 1. Comparison of the layout of the Hung Lau churchyard.

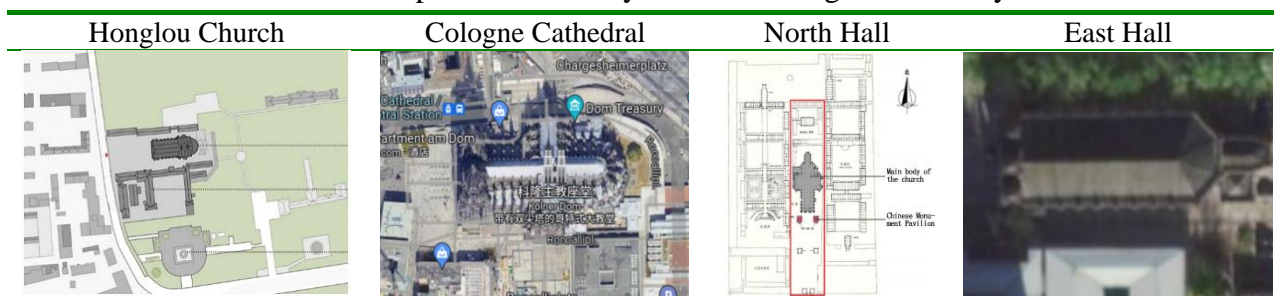
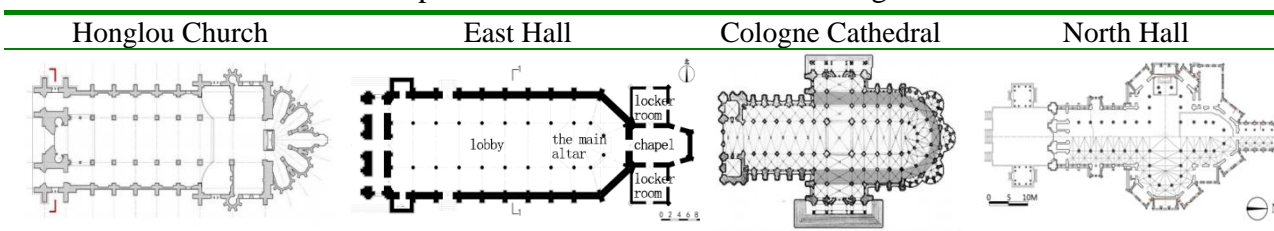


Table 2. Comparison of Latin cross Plans of Hung Lau Church.



3.2.2. Elevation styles

Hongjialou Church embodies a distinctive Gothic style. When Hongjialou Church was designed and built, it followed the church's design requirements for churches and interpreted the artistic style of Gothic churches in the façade, structure, and details in a vernacular way. Compared with the North Church before the reconstruction and the earlier local churches in Jinan (e.g. the General Temple Street Catholic Church), the facade of the Hongjialou Church is less localized and is only partially reflected in some parts of the building.

Compared to other church buildings in China during this period, such as the remodeled North Church and East Church, or the Daimyo Catholic Church in Hebei, they all reflect a distinctly Western style of church architecture, with a low degree of localization, which is only reflected in parts of the building or outside of the main building. It can be seen that during this period of history, especially after the signing of the Xinchou Treaty, the church no longer cared about the local power, and insisted on Western architectural styles when building churches. The elevation Comparison is summarized in table 3 and the comparison of the Rose Window in the Gothic Elevation of Hung Lau Church is summarized in table 4.

It can be seen that at this stage of the construction of Hongjialou Church, the Catholic Church building activities in China still followed their traditional design and maintained the architectural style of Western churches, and some of the localized features can be speculated through the examination because of the compromise between the craftsmen's skills and the choice of materials [6].

Table 3. Honglou Church Gothic Elevation Comparison.









Honglou Church	Cologne Cathedral	North Hall	East Hall
			

Table 4. Comparison of Rose Window in Gothic Elevation of Hung Lau Church.

Honglou Church	Notre Dame de Paris	North Hall	East Hall
			

3.2.3. Interior space

Hongjialou Church, like the Cologne Cathedral and the North Church, has a Gothic vault, while the East Church embodies the Romanesque style, and there is no localization in the style of these churches. It can be seen that during this period, the construction of church buildings insisted on the Western style, and the interior style was less localized. It is summarized in table 5.

The local characteristics of the interior style in this stage are mostly found in the floor plan, columns, and decorations. The mezzanine spaces of Hongjialou Catholic Church and the North and East Churches are all located at the entrance, under which the entrance vestibule is formed, which is slightly different from the Western-style churches [7]. It is summarized in table 6. In terms of columns, Hongjialou Catholic Church has plant motifs carved on the column heads, which is a kind of localization, and this feature is also found in other local churches. It is summarized in table 7.

The more localized features appear in the decoration, which also confirms the missionary's view on the integration of traditional Chinese culture with Western architecture in the previous article. Hongjialou Catholic Church, the columns of the arch, similar to the Chinese rafter's square three-part painting, in the color theme is also mostly used in traditional Chinese cultural intentions [8]. At the same time, Hongjialou Catholic Church all over the dome of the painting, is its own relatively unique form of decoration, this large area of the dome of the painting, in the Chinese and foreign gothic churches is extremely rare.

The comparison shows that although the interior space of Hongjialou Church has certain localized characteristics, the overall situation still reflects the distinctive Gothic church architectural style, with a low degree of localization.

Table 5. Comparison of the interior halls of Honglou Church

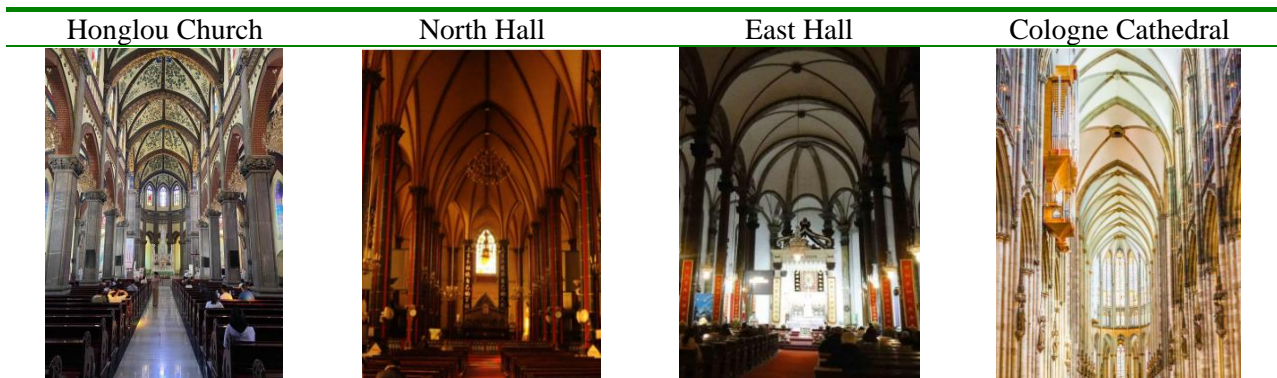
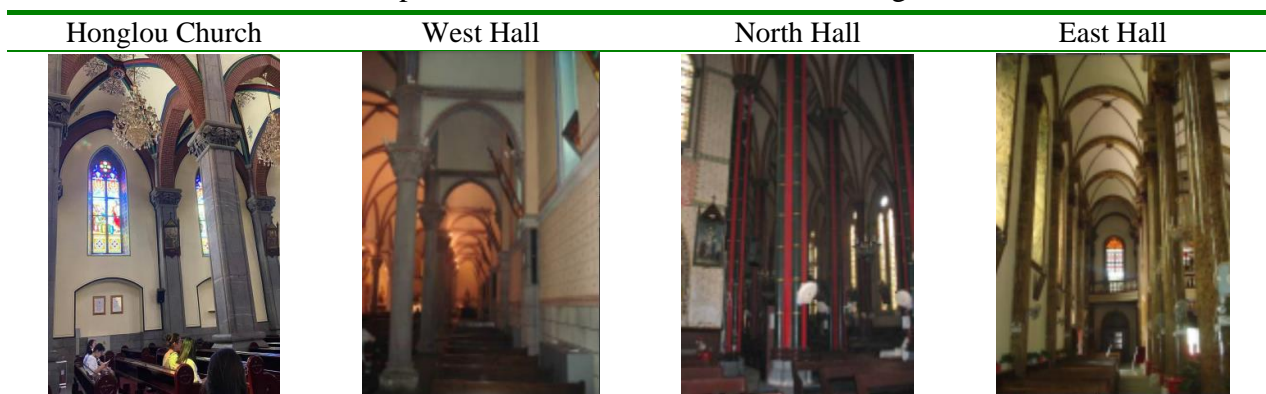


Table 6. Comparison of the interior mezzanine floors of Hung Lau Church



Table 7. Comparison of the interior columns of Honglou Church.



3.2.4. Entrance gates

The design of Hongjialou Catholic Church was based on the Cologne Cathedral, and by comparing it with the Cologne Cathedral, the plant motifs and decorative pilasters at the door frames, though slightly simplified, still reflect the same artistic style. Compared with the entrance gates of modern churches in China, the decoration of Honglou Church is more complicated, with plant motifs as the main theme and the cross at the top, all of which reflect the Gothic art style.

Comparison with domestic churches reveals that the lintel frames of the entrance doors of Hongjialou Church, Beitang Church, and Daimyo Catholic Church have adopted a localized laminating technique, which makes the doors look heavier rather than more transparent as in the Cologne Cathedral. Nevertheless, the entrance gate of Hongjialou Church is still in the Gothic style, with some localized features only in the details.

The main entrance gate of Hongjialou Catholic Church adopts gray brick as the building material, which is not the traditional stone construction in the West and has localized characteristics. While the lintels of Western churches are often decorated with stone carvings, the entrance gate made of gray

bricks cannot be copied from the Western style of construction, thus reflecting a different decorative technique from that of the West.

Intercepting the triangular lintel of the entrance of Honglou Church and comparing it with the practice of the nave wall of the church itself, it can be seen that the forms of the two are extremely close to each other. The border of the triangular lintel shows a side effect similar to that of the ridge of the wall, and the same building materials and similar construction methods are used. Under the doorframe, the same stacking technique is used, and under the stacking, a stone surface similar to the style of the Bofeng board is built, with animal decorations on the doorframe, such as the spine beasts crawling on top of the doorframe [9]. If only the triangular lintel part of the entrance door is intercepted, the cross is like a roof ridge with flying horns, and the overall appearance is like the side of the mountain wall of a Chinese-style hard mountain building [10], as shown in figure 6.



Fig. 6 Schematic diagram of the church's earthen ramp.

After comparing with the mountain wall surface of Shandong native architecture, it is found that the construction of the triangular cross-section of the entrance of Honglou Church does have a lot of similarities with the style of the mountain wall of Chinese architecture. This similarity is found in the entrances of many local churches. Whether the two are related or not needs to be further verified, but the connection between the two clearly exists. A comparison of the entrance gates of Honglou Church is summarized in table 8.

In the context of the construction of Honglou Church, this phenomenon should be the result of the construction inertia of the craftsmen rather than the intention of the church designers, and it should be a compromise between the designers and the local craftsmen to cope with the problem of having to change the original Western church construction methods due to the building materials.

Table 8. Comparison of the entrance gates of Honglou Church.

Honglou Church	Cologne Cathedral	North Hall	Daimyo Catholic Church
East Hall	West Hall	Notre Dame de Paris	Guangzhou Shilu Sacred Heart Cathedral

4. Study of the Interior Decoration of Hongjialou Church

The building components inside Hongjialou Church follow the construction requirements of Western churches, whether it is the building structure, columns, sculptures, and other architectural entities, all basically follow the construction principles of the church, the localized features are only slightly reflected in the color painting. For example, the practice of decorating the vaults with frescoes is very representative. Comparing the North Church and the East Church in Beijing, and the Sacred Heart Cathedral in Shihmu, Guangzhou, we find that their vaults are not painted, because according to the decorative tradition of European Gothic churches, this practice is not in line with the paradigm [11].

Hongjialou Church's vault painting with the traditional Chinese blue cloud head pattern around the vault flower decorations constitute the center of the small group of flowers, the external cross-twisted flower branches fill the arch surface, which is embellished with a single floral pattern, with a large group of flowers around the vault flower decorations [12]. As shown in figure 7. The choice of motifs ranges from lilies, figs, and vines, which represent religious meanings, to the traditional Chinese plum blossom style. The richness of the patterns corresponds to the spatial hierarchy of "altar - transept - nave - side corridors", and the composition and colors reflect the traditional Chinese aesthetics and the traditional idea of being close to nature, which to a certain extent eliminates the sense of separation between the church and the local residents. To a certain extent, the sense of separation between the church and the local residents is eliminated.

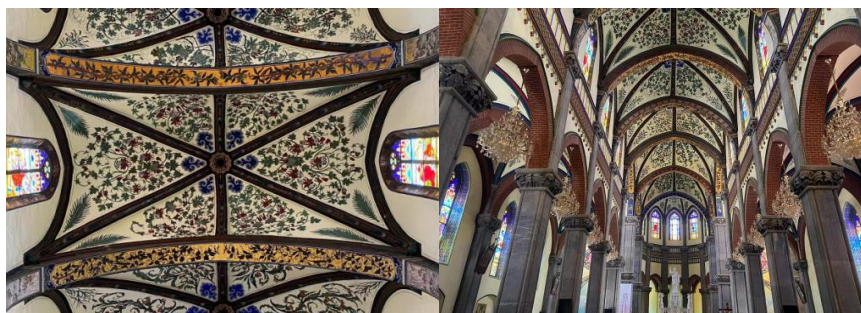


Fig. 7 Painted roof.

The interior columns of the church still maintain the Western architectural style, decorated only with plant motifs on the column heads, and the cusp coupons are only bare red bricks in their original color, without any painted decorations. Painting on the columns is reflected in the coupon arch is divided into three sections of painting, respectively, for the column head above the two ink paintings, as well as under the arch of the plant painting banners, the subject matter, and the top of the arch of the painted plants similar to the Western painting style mixed with some of the characteristics of Chinese painting [13]. The layout of the color painting on the columns is the same as that of the color painting on the beams and squares of traditional Chinese architecture, reflecting the localized characteristics. As shown in figure 8.



Fig. 8 Column head painting.

Generally speaking, the decoration of Hongjialou Church is still dominated by the Western style, and the localized characteristics are only slightly reflected in the details such as the painted theme, which also confirms the missionary's viewpoints on the application of the traditional Chinese culture in the church as mentioned before. Such a large area of painted decoration of the vaults is rare in both Chinese and foreign churches and is a typical artistic feature of the interior decoration of Hongjialou Catholic Church.

5. Conclusion

As the earliest Western religion to enter Shandong in modern times, Catholicism, along with its simultaneous arrival of Western church buildings, also became one of the earliest Western buildings to appear in Shandong. These church buildings are beautifully designed and skillfully constructed, and are architectural entities reflecting the historical status quo of that period, with important research value. Reviewing the whole text, firstly, based on the information of historical background and field research activities, the architectural features of Hongjialou Catholic Church are studied, including the construction date, stylistic features, spatial layout, and construction methods of the church and the building complex, which will lay a foundation for subsequent in-depth research. Later, the architectural style of Hongjialou Church and its unique features were studied in greater depth by comparing it with Gothic churches at home and abroad. It is hoped that the research on Hongjialou Catholic Church in this paper can provide reference materials and research perspectives for the future protection of the church, and make a small contribution to the protection of architectural heritage, and it is also hoped that in future research, it can be corroborated with other Catholic churches to enrich the research results.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

- [1] Su Weihong. Research on the Architectural Design of Hongjialou Catholic Church in Jinan. Nanjing: Nanjing Arts Institute, 2012.
- [2] Tian Xue. Research on the localization characteristics of modern Catholic Church architecture in Jinan Diocese. Jinan: Shandong University of Architecture, 2014.
- [3] Chen Huaxin, Wen Jing, Cui Fan. Exploration of the architectural characteristics of Hongjialou Church in Jinan. *Art Education*, 2015(10):279.
- [4] Shen Yannan. The architectural style of Hongjialou Catholic Church. *Modern Decoration*, 2011(8):102-103.
- [5] Jiao Mingqi. Exploring the regional localization of Hongjialou Catholic Church in Jinan. *New Architecture*, 2008(5):134-136.
- [6] Mu Qipeng, Xu Fengxia. Decorative ciphers: A preliminary analysis of the form of vaulted mural paintings in Hongjialou Church, Jinan. *Decoration: School of Architecture and Urban Planning*, Shandong University of Architecture, 2022.
- [7] Jin Ying. Research on Catholic Church Architecture in Beijing. Beijing: China University of Mining and Technology, 2011.
- [8] Wang Yuanyuan. Research on Architectural Environment Design of General Temple Catholic Church in Jinan. Jinan: Shandong Architecture University, 2014.
- [9] Liu Yanni. A century-old church combining Chinese and Western elements--remembering the General Temple Catholic Church in Jinan. *China Religion*, 2017(7):81-82.
- [10] Xing Chenyan. Research on Modern Catholic Church Architecture in Luzhong Region. Beijing: Beijing Architecture University, 2017.

- [11] Gothic churches in early 20th-century China: adapting western building techniques to chinese construction tradition.
- [12] Tian Lin, Xing Chenyan. Research on Catholic Church Architecture and Its Creation Concept in Luzhong Area. *Ancient Construction and Garden Technology*, 2017, 134(01):45-49.
- [13] Chen Jialin. *Research on Modern Church Architecture in Beijing*. Beijing: Beijing Architecture University, 2020.