

ORIGINAL RESEARCH PAPER

Window view in Facade of Notre Dame Cathedral Cases study; Paris, Lyon, Marseille, and Nice of France

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Abstract: The purpose of this paper is to examine the role of windows in the architecture facade of Notre Dame Cathedral in France. One of the important elements of architecture facade is window. It is mainly located in the facade of the building depending on its condition. Window in some cases interferes with the performance and in other cases contributes to the aesthetics of architecture. But given the minimalist architecture of Cathedral churches in urban contexts, the landscape of the windows is more colorful than other functions. The research method is descriptive-survey. So, the statistical samples are four traditional Notre Dame Cathedral churches that have windows with special motifs in the facades. These samples were selected in a targeted manner to examine their windows. Research findings indicate that the windows of Notre Dame Cathedral in France have three important functions due to their place of worship. These three tasks are function, beauty, and identity. These three components are function, beauty, and identity, which due to the religious values in this architecture, the identity role of windows is more prominent than other components. The root of this prominence is in the Christian view of the worship space.

Keywords: Window view, Notre Dame, Cathedral, Facade, France



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1. Introduction

Many studies have been done with quantitative and qualitative methods on the subject of window architecture. In these researches, components such as light loss rate, attention to climatic conditions, glass color, window size, etc. have been used as the main components of research. However, by examining these components, it can be seen that the element of the window and its location in the facade of architectural buildings is not only focused on those components.

Two different layers for the window in architecture are conceivable, which are:

- The first layer, which is the appearance layer, is related to the physical characteristics of the window and is focused on its function and the inherent function of the window.
- The second layer, which is the hidden layer, is related to its meaning in different cultures. These layers include: aesthetics, culture and religions.

The appearance components are focused on the function of the window, which is one of their intrinsic functions and is known as the appearance layers. But in addition to them, there are other components that are the

meaning and secret of the window, including aesthetics, culture and, religions.

Fatemeh Kateb et al. conducted a study on the aesthetics of windows in Safavid painting and found that windows in Iranian architecture, especially after Islam, have gone beyond a more physical form that plays the role of providing light and air conditioning. In other words, the aesthetics of the window have three general goals: functionality, beauty, and identity (Kateb& Advand, 2014).

In appearance, the window is known for three functions: illumination, visibility and internal and external connection. In religious and introverted buildings such as mosques and bazaars, windows are more designed for lighting. In this building, the window does not make much sense to be seen, and the required light is provided by a hole in the stairwell or shoulder of the arch. According to the above meanings in the window literature of different European countries and especially by focusing on the position of the window in the churches of Notre Dame the France, it can be seen that the window in these uses, seeks performance and meaning in line with other countries and cultures and Its

pronunciation is not without its uses. Window decorations and drawings are one of the most important architectural elements of churches, especially Notre Dame Churches in France. Their development was reflected in the new Gothic architectural style, which was able to transfer pressure from the arches to their side bases, resulting in reduction the length of the wall and the opening of a large window (Binding & Masswerk, 1989; Viollet-le-Duc, 1866–1875). The city churches that built around 1250 AD, they have large windows (Kozaczewska-Golasz & Golasz-Szołomicka 2008). The height of these windows in the main courtyard of the church, due to its high height, is more than the windows located in the side corridors of these churches. The

dimensions and size of the windows increased in the third half of the 13th century, so the distance between the supporting pedestals next to the windows increased and the windows were able to cover the distances between the pedestals. While in the main courtyard of the churches the windows were at a low height, in the Basilica churches, their height was limited to the height of the corridors around the courtyard. Also, due to the width of the facades of these churches, they used single-pane, two-ply, three-ply and four-ply windows, as the case may be. Therefore, the variety of windows in terms of appearance in these churches necessitated the need to pay attention to them in order to closely evaluate the author's research trip to France in 2015. (Figs 1-4)



Fig.1. Main façade of the Notre-Dame Cathedral Church in Marseille

Fig.2. Main façade of the Notre-Dame Cathedral Church in Lyon

Fig.3. Main façade of the Notre-Dame Cathedral Church in Nice

Fig.4. Main façade of the Notre-Dame Cathedral Church in Paris

The cathedral's structure used in the completion of a new supporting system, to take the each part of the load and can be implemented unusually sizable windows filled with stained glass. Further, they have been exposed to high arcades and windows of the main nave, which allow penetration of large amounts of light into the interior. The cathedral has a number of statues, contoured walls and magnificent windows. Holy light is preserved in the cathedral. Stained glass windows illuminate the interior in tones of many colors and depict a variety of scenes (Vondráčková & Nývlt & Němec, 2016).

According to this introduction, this paper intends to address the position of aesthetics in the windows of the cathedrals of Notre Dame de France in Lyon, Marseille, Nice and Paris; Churches whose common denominator is their names, each built in a distinct historical period. It will also answer these questions through reviews: Has the design of windows in the cathedrals of Notre Dame de France been considered? Or have there been other aspects to their aesthetics?

1. Literature Review

1.1. Window

Undoubtedly, the sign of the complexity of research on the window is its linguistic dissimilarity in each of the world's languages, which is the word Wind and its root is Window in English. "Viento" and its Spanish root "Ventana", the long-standing link between

languages in Europe, show that the word wind is the main source of the concept of the word window in these languages. The word "Window" in English is derived from the root word "Vindaga" meaning "Wind eye".

The word Window has been used in English since the 13th century, when it was used before the term "Eagpyrl", which means the Latin word for wind or wind eye. In many German-speaking languages, the word "Finstira" is used instead of a glass window. In the everyday speech of European languages, the blue gap in the middle of a piece of cloud is also called a window (Schultz & Norberg, 2008). Another aspect that seems important about windows is their visual appearance from the outside of the building. Also, in some Slavic languages, such as Russian, Polish, and Czech, the word "Okno" means window, and the word oko, which is a word meaning "eye". In Iranian culture, window is called (panjareh) and made up of two words: Pan+Jareh. "Pan" means to "close" and "Jareh" means to "symmetrical" (Hassan Doust, 2004).

Finally, according to the study in France, the window indicates an empty space such as void, as in Italy the window is called Finestra and in France the window is called Opening, which means Fenetre and Light. The window is one of the architectural foundations (Pierre, 2005). The amount of illumination of the window near

the ceiling is many times higher than its illumination near the ground (ibid.).

1.2. Notre Dom Cathedral church of the France

The cathedral is one of the Christian religious architectures. These churches are a kind of church belonging to a Christian sect and special group with a bishopric hierarchy, which is the residence of bishops, and therefore these centers are considered a diocesan center. Although cathedrals are usually large and luxurious churches, they are not always a large church (Britannica Encyclopedia of World Religions, 2006). These churches exist only in Episcopal systems (Churches in which the distribution of power from top to bottom, that is, from the bishop to other spiritual ranks, takes place in front of the congregational churches, etc.) and refer to churches where the bishop resides.

1.3. Research Hypothesis

Window Aesthetics in the Notre Dame Cathedral Churches de France is a viewing that, in addition to the actual functions of the window, simultaneously affects three conceptual components: function, beauty, and identity.

1.4. Background research

A brief review of the published research and the works presented in domestic and foreign conferences related to the subject of the role and position of windows in architecture, it was found that despite its importance, research has been done in this field.

Hosseini et al. have research for about reintroduce the main application of colorful glass as a light controller in the window that considerably affects climatic-luminance- based metrics containing daylight autonomy (DA), useful daylight illuminance (UDI), exceeded UDI and daylight glare probability (DGP). Parametric simulation analysis proved that colored glass has the capability to improve occupant's visual comfort during office time. Moreover, an appropriate combination of lattice frame and Iranian-Islamic patterns with colored glass in the Orosi window considerably depends on function, climate and occupant behavior (Hosseini & Mohammadi & Rosemann & Schröder, 2018).

Hannah Gulaz emphasizes in a paper the importance of the role of Polish church window decorations in the second half of the 13th century (Kozaczewska-Golasz & Golasz-Szołomicka, 2008).

Nevnihal Erdoğan et al 2018, in their books with title of "Traditional Window Designs of Kirklareli, Turkey" is original research on window design and presents readers the unique culture of Turkey. The theme of this book is based on samples of windows of the late 19th and early 20th century in (Erdoğan & Yüksek, 2018).

Koramaz, 2006 in a paper emphasizes in Turkey, shutters and small windows above traditional views have been used to control light and heat storage (Koramaz & Fatih & Saadet, 2006).

Sammer Akbar in Saudi Arabia has also done research in this regard, the rows of windows that have played an effective role in the past architecture, architects seek to revive this building element, including harmony with the existing nature and also compatible with the culture of the people of this country (Sammeer, 1994).

Other research in this field is related by Hassan Feridonzadeh et al (2014) that examined and analyzed the design of windows in traditional houses of Ardabil with 4 examples of them to find determine the relationship between the dimensions of the windows of traditional houses with the light loss (Feridonzadeh & Cyrus Sabri, 2014).

Seyed Morteza Hosseini in his paper explores, for the first time, the possibility of coupling a kinetic façade with colored glasses to improve the daylight performance. This research builds on a combination of relevant literature and parametric simulation to investigate the development of integration of colored glass from Orosi with interactive kinetic facades, triggered by sun timing and occupants' positions. With the background of the above studies in the field of windows from different countries, we can understand the role and importance of study in different cultures of the world. The simulation results confirm the high performance of the interactive kinetic facades for improving daylight performance regarding a base case (Hosseini & Mohammadi & Schröder & Guerra-Santin, 2020).

Terezie Vondráčková et al in their papers explored that Gothic architecture has brought new structural solutions along with a new style. The beginnings of the Gothic style belongs to France, therefore, the publication presents one of the greatest French cathedral associates with the development of Gothic. It is one of the first Gothic Cathedral, Notre-Dame in Charters, which became a model for future Gothic buildings, the Notre-Dame cathedral in Paris and Notre-Dame cathedral in Reims. For all these buildings were used ribbed vaulting, along with the pointed arch, which together represent an enormous contribution to the stability of the cathedral, needed to ensure the safety of palatial chorus. Their solutions adapted to transmit of horizontal forces. It was also possible to make thinner walls and substantially increase the building without compromising its stability (Vondráčková & Nývlt & Němec, 2016).

Table.1. Research methods and functions of window in Architecture

Author	Year	Method	Function
Seyed Morteza Hosseini et al.	2018	The main application of colorful glass as a light controller in the window	Parametric simulation analysis proved that colored glass has the capability to improve occupant's visual comfort during office time.
Kozaczewska-Golasz Hanna et al.	2008	Emphasizes the importance of the role of Polish church window decorations in the second half of the 13th century	Role of window shape in Polish churches for about get daylight inside the architecture
Nevnihal Erdoğan et al.	2018	103 homes of traditional style have been observed in the old districts of the city	Some details are important with their color, with their ornaments and details, with their place in the façade having architectural elements belonging to certain periods
Mustafakorumaz et al.	2006	Use the shutters and small windows above traditional views Primary reason for the diminishing role of rowshans, which were important architectural pieces in traditional houses of Jeddah, has been what suits people in terms of utility and meaning	Control light and heat storage
Sammer Akbar	1994	Case study, qualitative research and numerical calculation of "the amount of light loss" in traditional houses of Ardabil	Utility and meaning effects
Hassan Feridonzadeh et al.	2014	The possibility of coupling a kinetic façade with colored glasses to improve the daylight performance.	Aesthetic, privacy, controlling the light, psychological effects
Seyed Morteza Hosseini et al.	2020	Case study, the structural design of the building in Cathedral of the France	The high performance of the interactive kinetic facades for improving daylight performance regarding a base case
Terezie Vondráčková et al.	2016		The use of structural elements in Notre-Dame cathedral architecture is to take advantage of their aesthetic and structure sustainability

Source: Author, 2021

According to the background of the above research, the element of light has its main axis. In addition to the aspect of absorbing light in the architectural space, another aspect of the window is found in the discussion of architectural aesthetics. Therefore, the window is a member of the architecture, which is firstly placed in the facade of the building and secondly, in providing light for architecture and aesthetics. But there is another aspect of the window that has not performed the above functions and in contrast to providing daylight in architecture is aimed at reviving the Christian identity.

The window is one of the main architectural elements in Notre-Dame Cathedral Church of de France, Which are also involved in the aesthetics of the landscape of churches and are also effective in conveying image

messages to the audience from within the architecture (Fig. 1.2.3 and 4).

3. Methodology

The research method based on the scope and objectives of the research, a combination of qualitative research methods has been applied. It's based on four samples of Notre-Dame Cathedral churches which are located in different provinces of de France. So, the statistical population of this study is four traditional Notre-Dame Cathedral churches that have windows with special decorations in the facades (Fig. 1.2.3 and 4). These samples were selected in a targeted manner to examine their windows. The reason for choosing these 4 examples is to name them to the Notre-Dame Cathedral, which is the architectural index of churches in France. The research method in this article was done in three stages before, during and after the trip.

- The first step (before the trip) is dedicated to library studies in the field of windows and its place in the research churches, and it was at this stage that the study community was selected and categorized.
- The second step (during the trip) was to explore the windows of the churches studied by Notre Dame in four cities, Paris, Marseille, Nice and Lyon, France, and to evaluate and draw sketches, photographs and field shots. At this stage, the information related to the first stage was matched with the facts and observations.
- The third step (after the trip) is dedicated to refining the information obtained before and during the trip. The results of this refinement were presented and analyzed in the form of specific formats in the tables.

4. Examine the window in case studies

4.1. Notre-Dame Cathedral Church of Paris

Notre-Dame de Paris, known as the "Lady of Paris", is one of the best examples of the Gothic style. (Fig. 4). In Gothic-style churches, the statues and images used in them were used to acquaint people with the themes and stories of the Old and New Testaments. This

acquaintance can be done through symbolic images or with the help of images that tell a story to the viewer. The construction of this church started in 1163, but its work was not completed until 180 years later, in 1345. Built in the age of illiteracy, the architecture of the building tells the story of the Bible on the eve of the entrance, paintings and stained glass. The appearance of this building changed in the middle of the thirteenth century, the small windows of the church's outer wall, representing the early Gothic style, gave way to large windows that removed the narrow porch inside the church. In the plan of this church, there are five significant corridors, in which the method of blocking Romanesque is combined with the method of arching six parts of the courtyard in the early Gothic period. The main arm is short and extends beyond the outer side corridors. The main courtyard in the Gothic style is the beginning of four sections and has a row of sub-dome windows with reddish carvings. The three openings are in the form of a red floral map string. In the eighteenth century, the stained glass of this church was replaced by ordinary glass (Hugo, 2001).

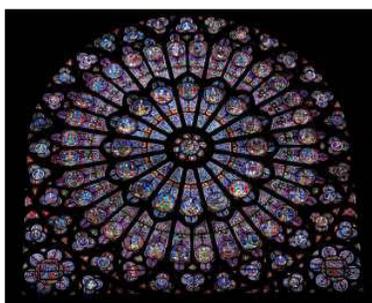


Fig.5. North Window of Notre-Dame de Paris



Fig.6. South Window of Notre-Dame de Paris

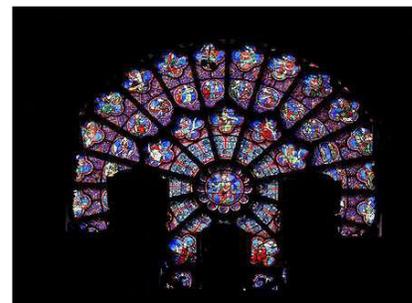


Fig.7. West Window of Notre-Dame de Paris

These windows with painted and colored glass try to create a space that is not completely bright, but seeks to create a space that is disconnected from the crowded and dynamic outdoor space of the church (space of material) and immerses the person in the existential depth of worship. Therefore, the paintings on these windows have been able to play an important role in this regard are some of the windows of this church:

4.1.1. Western Flower Rose Window

This window, which is located in the main facade of this church with two towers with a height of 69 meters, is formed with a combination of colored glass with cold and warm colors and in the form of a circular shape. This window has an approximate diameter of 9.60 meters, most of the glass of which has been preserved in its original form. The window starts from a central geometry in the middle and is radially developed, and the motifs on it are mainly related to human folk life (Fig.7).

The upper half of the window features twelve pieces of engraved glass, featuring virtues in battles and the coronation of kings, as opposed to 12 vices. In the first circle of this window, the twelve companions and relatives of the Prophet surrounded Christ.

4.1.2. South Rose Flower Window

This circular window was installed in 1260 AD and its inner diameter is designed and executed at 12.90 meters. Topics engraved on the windows of this window include the role of the New Testament and the victories of Jesus Christ. In addition, this window has an extraordinary splendor from the view of the south side of the church to the river (Fig. 6).

4.1.3. North view window

This window, which was installed 10 years before the South Front window and has an approximate diameter of 12.90 meters, has themes such as: Old

Testament or, the Blessed Virgin Mary and the childhood of Jesus Christ on its glass. This window is similar to the southern window, but has a higher elegance than it is (Fig. 5). Other windows in the church are 4-ply windows with arches at the top, and the entire glass is painted with

images of the Blessed Virgin Mary and Jesus Christ. But during the reign of Louis XIV and Louis XV at the end of the 17th century, the cathedral underwent major change, windows were destroyed many of the painted glass windows.

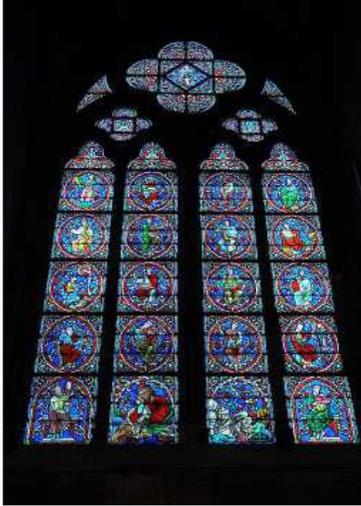


Fig.8,9.Four-pane windows used in Notre-Dame Cathedral in Paris (side corridors)

4.2. Notre Dame Cathedral Church of Nice

In the second half of the nineteenth century, Jean-Pierre Sola, in the historic city of Nice, decided to build a church with a neo-Gothic architectural style (Fig. 3). Notre Dame Cathedral of Nice is one of the most beautiful buildings in this urban area, which is very similar to the church due to its architectural form and having a red inflorescence window above the entrance, as well as the existence of two 31-meter high towers in its entrance and two statues of the Blessed Virgin Mary. It is very similar to Notre Dame Cathedral in Paris (Fig.4). The church's altar, once home to the Choir group, is now adorned with 19th-century sculptures of the Blessed

Virgin Mary. Painted windows with a range of colors in the altar of the church with themes including crowns of a wide range of kings of the era, including: St. Joseph, St. Joachim, St. Paul, St. Raphael, and St. Gabriel. Interestingly, the colored windows painted in this church are the result of people's gifts to this church in the 19th century (URL: <http://notredame-nice.com>). Notre Dame Cathedral today not only serves as a Catholic church, but also serves as a venue for local music throughout the year. The windows used in this church are in the form of one opening and two openings with colored stained glass, which are shown in the pictures below.

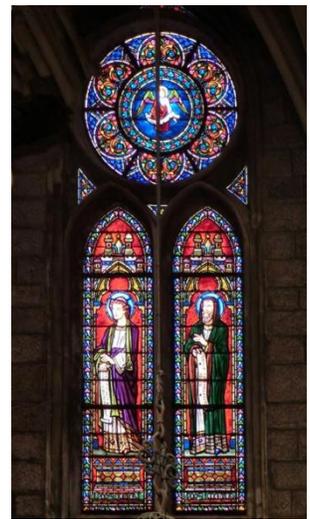
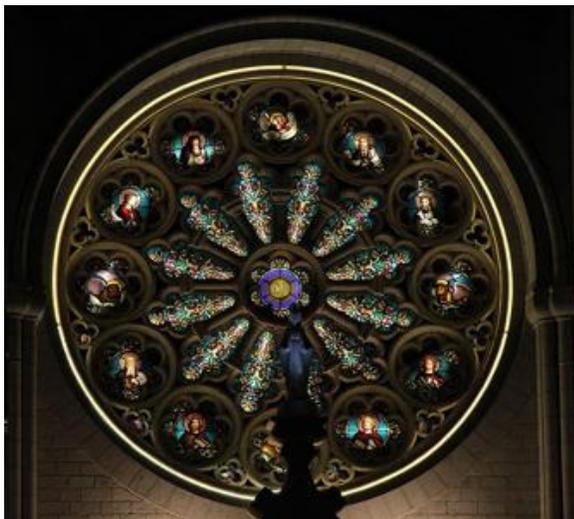


Fig.10. Circular window above the entrance

Fig.11. One-pane windows used in Notre Dame Cathedral of Nice

Fig.12. Tow-pane windows used in Notre Dame Cathedral of Nice

The colored glass in the circular window, which is designed in the form of a window with a central shape, in the center of it is a glass decorated with Jesus Christ, and around it, 12 glasses are formed in the form of 12 companions and companions of that Imam. This window and the bright lights that pass through it are the lighting of the corridors next to the entrance. But in the windows of one pane, which occupies the main axis of the churchyard, in the form of three images that refer to religious and religious events of the early Christian period and the difference between these paintings and the paintings on the glass of the double-opening windows. (Around the altar of the church) In the windows next to the altar, the subject of paintings has become more sublime and is dedicated to the spiritual images of Jesus Christ. Therefore, in these designs on the glass, we see a kind of hierarchy.

4.3. Notre Dame Cathedral Church of Marseille

The church of Notre Dame Marseille, located on a limestone hill on the south side of Marseille, is 162 meters high and is located at the highest point of Marseille (Fig. 2). The architectural style of this church is called Neo Byzantine and at the same time this point has been created as a turning point in the urban landscape of this area, which has caused the presence of tourists and natives. The cornerstone was laid on September 11, 1853, and was completed in 1864. The church is based on a small church dating back to the 13th century. The bell tower of the church, along with a statue of the Blessed Virgin Mary and Christ, appears golden miles away. But in the end, the interior of the church is decorated with marble, mosaics and magnificent paintings



Fig.13. Single-pane window in the dome of Notre-Dame de Marseille Church



Fig.14. Combined Single-pane window of Notre-Dame de Marseille Church at exterior view



Fig.15. Single-pane window in the dome of Notre-Dame de Marseille Church at interior view

The single-opening windows in the dome-shaped body of the church are made of stained glass, which is soothing, but the clergy of the glass of the previous churches are not full of scenes of historical and religious events. The main windows used in this church are single-pane and in some cases they used in pairs, and in this case, a circular revolving window is decorated on top of it (Fig. 15). Therefore, it seems that the intensity of light entering this church is higher than the previous churches, and the reason for this is the decrease in the amount of paintings on the windows. Of course, in relation to the amount of light entering the space inside the church, other factors are also involved as variables, such as: the color of the materials used inside the architectural structure or the depth of the window relative to the outer wall (Heidari, 2009).

4.4. Notre Dame Cathedral Church of Lyon

Notre Dame Cathedral of Lyon is a small church built by the city's Charitable Association between 1872 and 1884 (URL: <http://www.fourviere.org>). According to historical records, in the years 1643, when Europe was

plagued by plague, the Blessed Virgin Mary saves the people and every year in December, people celebrate the candlelight vigil in Lyon (Fig. 1). (Brennan, 2013) During the war between France and Prussia in 1870, when Prussian forces were moving towards Lyon, the Prussian forces suddenly stopped and retreated with the intercession of the Blessed Virgin Mary. The architecture of this church uses two architectural styles, Romanesque and Byzantine, both of which are different from the Gothic style, and it was unusual to use them at that time. The church has four tall towers with a bell tower adorned with a statue of the Virgin Mary. The church is characterized by artistic mosaics, themed glass and the presence of St. Joseph's Cave. Carefully in the shape, form and color of the windows of this holy church, it can be understood that the main windows of the church are in the form of three-opening windows, and on top of these windows there are circular windows in the shape of a seven-pointed star and engraved with paintings. It is used in the main courtyard of the church and in its northern and southern facades. It should be noted that between these three opening windows columns have been used.



Fig.16. Seven-wheeled window in the main courtyard of Notre Dame Cathedral Church of Lyon

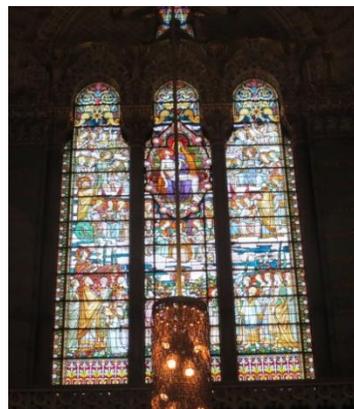


Fig.17. Three-pane window of Notre Dame Cathedral Church of Lyon

5. Results and discussions

5.1. The aesthetic goals of windows

Window as a view element in the field of urban landscaping has three important goals: functionality, aesthetics, and identity. In fact, this paper seeks to prove that the window is primarily a functional element in the Notre-Dame cathedrals of France, but by focusing on them we find that in addition to the functional aspect, they also have other aspects such as beauty and identity.

According to the researchers in the field of windows and by researching the characteristics of the windows of Notre Dame churches in France, including: the primary role of the window in their literal literature and its primary and secondary function, the geometry prevailing in their design and construction due to their location in the building façade system, and finally, the use of windows to create a background for paintings with religious and doctrinal themes in these churches examines the research findings from three perspectives: functionality, beauty, and identity perspective, respectively (Kateb & Adelvand, 2014), Which is described in detail below:

5.1.1. Functional

The window is usually for giving light, air flow and seeing the scenery outside without disturbing the privacy of the family (NematGorgani, 1996). In 2001, Hong conducted research in Korea, Japan, and China on windows in terms of functionality in historic homes and using patterns in contemporary architecture (Hong, 2001). Traditional art, in the deepest sense of the word, is current (functional), meaning it is made for a specific application. In traditional arts, there is a mixture of beauty and usefulness that turns any traditional subject into something that is beautiful and useful at the same time (Khazaei & Mousavi Hejazi, 2012). In the windows of the churches of Notre Dame Cathedral in France, attention is also paid to the functional role of the

window, which has been the entry of light into the architectural space.

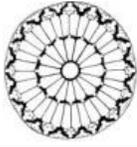
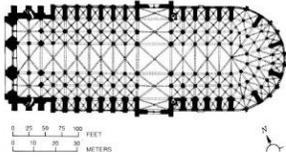
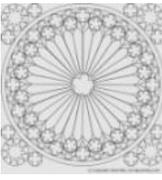
In fact, in designing the windows of these churches, two important points have been considered: First, in these churches, due to the need for a secluded and relaxing atmosphere for the worshipers, they have tried to raise the bumps of the windows (disconnect from the external environment of the church), and second, in order to take advantage of the spiritual space inside the churches from painting. The colored glass on the windows of these windows has tried to break down the white light of the sun into different color spectrums.

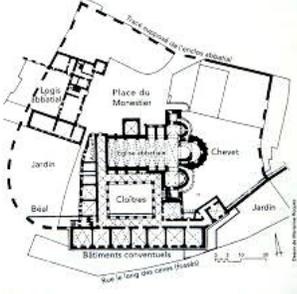
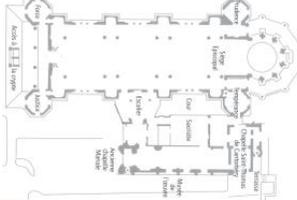
5.1.2. Aesthetic

Aesthetic is another goal that is followed by the nature of human friendship beauty. Shohreh Javadi, quoting Pirnia about decoration, states that the philosophy of decoration is to create beauty and productivity (Javadi, 2005). The windows used in these churches have enough aesthetic by observing the principle of harmony and symmetry in the facade of the church building and also by using decorations and paintings with religious-historical themes. The table below describes the case in detail. The windows used in these churches are presented in a variety of geometries, including a circle, a vertical rectangle in the form of one to five-panes and an imperfect circle (Table.2).

The relationship between the shape of the windows and the paintings on them tried to achieve decorations with productivity (ibid). For example, in the circular windows, the center of these windows, due to their visual energy, is dedicated to images on the subject of Jesus Christ and the rest of the parts around the center to the twelve companions of that window. In the other hand, these windows in the facade of the churches are located on the axis of their balance and symmetry, so that it has attracted the place of energy accumulation in the facade (Figs 1-4).

Table2. Investigating the themes of colored patterns on the windows of the studied churches, Source: Author, 2021

The subject of painting on the window	Window shape	Window type	Architecture Plan	Church
The Companions of Jesus Christ, Twelve Virtues of War and Crowning		Entrance Red Flower window West)(	Notre-Dame Cathedral of Paris
Its center is dedicated to Jesus Christ, the Companions of Christ around him, the martyrs of the French wars, the angels of the candle in his hand, the coronation, the flight in ancient Egypt, the healing of the sick by Solomon, the life of the Blessed Virgin Mary, the burning of Aaron in hell, the temptation of Adam and Eve		Entrance Red Flower Window(South and North)		
The Martyrdom of Jesus Christ, the Companions of Jesus Christ		Four-pane window in the main courtyard (South and North)		
The Martyrdom of Jesus Christ, the Companions of Jesus Christ		Three-pane window (South and North)		
The martyrdom of Jesus Christ, the ascension of the body of Christ by the angels		Two-pane window (South and North)		
The position of Jesus Christ, the position of the Blessed Virgin Mary		One-pane window (South and North)		
Jesus Christ at its center and the Twelve Companions around		Red Flower Window (West)		
The crucifixion of Jesus Christ, the position of Jesus Christ with a yellow crown appointed to the Prophet		One-pane window (South and North)		

<p>No paintings of sacred historical and religious scenes and figures</p>		<p>Pair one-pane window (north and south)</p>		<p>Notre-Dame Cathedral of Marseille</p>
<p>No paintings of sacred scenes and figures, central divisions of the circle</p>		<p>Circular window (North and South)</p>		
<p>The ascension of the holy body of Jesus Christ by the angels, the offering of bouquets by the Companions to the Blessed Virgin Mary, the embrace of the infant Christ by the Blessed Virgin Mary</p>		<p>Three-pane window (South and North)</p>		<p>Notre-Dame Cathedral of Lyon</p>
<p>The mystical status of the Blessed Virgin Mary, the birds of paradise, the presence of Christ among the Companions</p>		<p>Single-pane window next to the altar (north)</p>		
<p>The crown of Jesus Christ, adorned with seven flowers</p>		<p>Seven stars window (north and south)</p>		

Note: The geographic north direction in the above plans is towards the top of the page.

5.1.3. Identity

In order to perform worship, a person needs a quiet place to provide the necessary heart for him (Naghizadeh, 2008). This calm atmosphere is one of the main tools of thinking as a recommended activity in Islamic culture, and certainly this peace is not specific to certain ethnicities and geographies. Pirnia states that the introverted space of the place of worship places man behind the world (outer space) and facing the Hereafter (altar) (Pirnia, 2011). This rupture of the outer space and attention to the interior of the worship space is also evident in the French churches and is designed to pay attention to the spiritual needs of the users. What should be noted about the architectural identity of the churches under study is the colorful presence of paintings on religious and doctrinal subjects with a background of white sunlight. Paintings lead to the dynamic part of the material in design and construction of the windows of these churches. This dynamism is represented by the motifs used on the pieces of glass used in the generality of these windows, or in other words, the hierarchy of the painting subjects in the windows of these churches in order to sanctify the meaning of architecture. Carefully,

the architectural plans of the churches of Notre-Dame de Paris, Nice, Marseille and Lyon, whose plan extends east-west. The central corridor in these plans is dedicated to the main courtyard and the side corridors are in the form of porches, which generally have lower side corridors than the main courtyard, and this reduction in height has reduced the height of the windows of these corridors. In these porches and corridors, images related to Jesus Christ or the Blessed Virgin Mary have not been used, and only in the windows next to the altars and the main courtyard, these paintings have been used for the high value of the status of Jesus Christ. This suggests that even the choice of subject for the glass designs on the windows of Notre Dame Churches has been scrutinized in order to create a proper definition of the spatial hierarchy within architecture (Table1). In the table above, the windows facing the north or south of the churches are related to the main courtyard of these churches, and images of Jesus Christ or the Blessed Virgin Mary are used on these windows.

6. Conclusion

Window is one of the most important elements of architecture, which, due to the special function of

churches in Europe, especially in France, has gone beyond the mere physical aspect that has played the role of providing light or air conditioning, and as a spatial interface between inside and outside. It created human interaction with the environment. In this geography, the

window of a purely architectural element became a landscape element. Examining the status of the window in Notre Dame Cathedral in France, it can be seen that its scenic nature follows the interior view of the spaces.

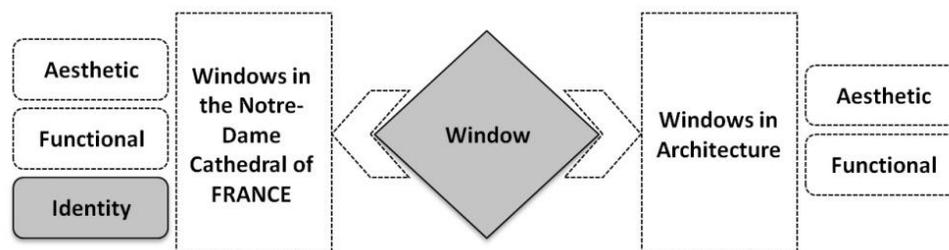


Fig.18. The difference between a window in architecture and a window in Notre Dame Cathedral, Source: Author, 2021

Window primary function is to absorb daylight in architecture, and its secondary function is to provide view and air conditioning. It seems that in the design of the windows of Notre Dame Churches in France, its primary and secondary functions have not been considered. Its roots lie in the Christian view of church architecture. A clear example of this type of architecture should be sought in the Mehrabs. The Mehrabs have been the shrines of Mehrparastan in the ancient world. Religious love of the Indo-Iranians and the Scythians was one of the main components of the worship of the sun (god). This religion also spread from Iran to the Roman Empire. The architecture of the Mehrabs is cave-like and underground, and its windows have no function. If these windows were placed on the ceiling, they would also have a symbolic aspect. So the windows were moving towards decoration and decoration. In the formation of the architecture of the Notre Dame Churches in France, the imitation of the architecture of the Mehrabs has been carefully considered that windows are not an important functional priority. But if it is considered, it has been used in the service of Christian beliefs.

Finally, it must be acknowledged that its aesthetics pursues the three main functional goals, beauty and identity, as well as the goals of the landscape. Its architect, in a functional way, has used painting on window glass to break down the sun's white light into different color spectrums and to create long bumps to cut off communication from outside the church. The ultimate goal of windows is to adhere to the principle of aesthetics by designing a trinity that matches the geometry of the windows in order to balance the windows, as well as to harmonize with the overall look of the church building. So, the choice of theme for the glass designs of the windows of the churches of Notre-Dame is to create a proper definition of the spatial hierarchy within the architecture of the churches, which can be approached in the identity branch of the aesthetic goals of the windows.

Subscript

During the Nazi occupation, the windows of the church were engraved with images of Marshall Pettin, all of which were removed after the war.

Conflict of interest

The authors declare that they have no conflict of interest.

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