

Tracing The Representations Of Light In The Contemporary Church Architecture

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Religious architecture has been an important facility for educating people about the beliefs that were prevalent in a certain location at a particular period. The church serves as the centre of worship for Christians. For many years church design seemed to have remained constant, but now its design languages have been changed radically. Contemporary churches have a greater emphasis on community, global issues, and a more style of delivering the word of God. Volume, ornament, status, materials, texture, and light are used in the architecture of church to provoke the spiritual feeling. Under the Onslaught of digital trends of architecture and the rise of new building construction technology, the meaning of light representation in church became mostly disappeared. The main aim of this paper is to trace the representation of light in contemporary church architecture as a catalyst to enrich spiritual value. To achieve this aim, the paper followed a scientific methodology, starting with a literature review defining the meaning of contemporary church, its value, and its relation to the representation of light. To collect this data, the author depended on desk research and reviewed previous readings to highlight the examples that put the lighting factor at the first place in contemporary church. A deep analysis of three case studies were conducted, based on observations, photos, and documentation. This paper ends with proposing several recommendations to architects. One of them is playing by openings' proportions, dimensions, materials, and positions may enrich the spiritual state of the user through creating meaningful light.

Keywords— “Contemporary Architecture, Church, Design, Light, Meaning, Religion”

I. INTRODUCTION

Most religions do not have a written set of rules when it comes to the architecture of religious structures; instead, architects are inspired by historical examples and customs. Replicate the components exactly as they were in the current specimens. Few religions, like the Baha'i faith, continue to uphold a documented set of guidelines for the layout of their houses of worship [1]. Religion therefore unites humanity with divine in the manner of custom and myth. Religion serves as a source of spiritual inspiration for creativity and human civilisation [2]. According to the Persian religion man, Abdu'l-Bahá:

“The divine religions were founded for the purpose of unifying humanity and establishing universal peace. Any movement which brings about peace and agreement in human society is truly a divine movement; any reform which causes

people to come together under the shelter of the same tabernacle is surely animated by heavenly motives [3].”

From the modest beginnings in crypts⁵ to the great Gothic cathedrals replete with flying buttresses and stained-glass windows, and the paintings of the Renaissance Period, the architecture of churches has undergone changes on several times as new architectural styles came into being. Sacred architecture changed because of the introduction of new technology and materials, and this change was fuelled by the increased creativity and flexibility that designers and architects in the 20th and 21st centuries were given [1]. In Christianity, light is revered, and God is regarded to be light. One of the key components of a church that may foster a reverent atmosphere is light. When people are praising God, it might make them feel closer. Negligence of natural light and focusing on materials and new building construction technologies can be one of the reasons why the meaning of light is lost in church architecture, and all focus became on the use of technology and became a substitute for value, so the value, identity, and spiritual message required for worshipers were lost. The significance of light representation mostly vanished with the advent of new building construction technologies and the onslaught of digital trends in architecture. When choosing the architectural design of a church for the 21st century, seasoned church builders warn against excessive extravagance. Architects have always been creative people. One of the pieces provided was a futuristic glass church proposal and several courageous efforts that are comparable to one variety that also includes unconventional features as shown in Fig. Although you can experiment with non-traditional forms, it is seldom essential to overdo it, confound the public, and shock them. Some architect working on digital architecture and construct contemporary churches, focused on material, form, parametric design ignoring the spiritual feeling that light gives. Famous architects' designs for Western religious structures built using contemporary techniques and aesthetic principles once again demonstrate that the number of believers does not increase because of the appearance of the temple [4].



Fig.1 (a) & (b): Contemporary churches with non-traditional forms focus on volumes and materials.

Source: M. Sidorenko. “Influence of traditions and innovation on church architecture,” IOP Conference, Series: Materials Science and Engineering. 451. 012136. 10.1088/. December 2018.

According to Pyotr Kondratiev, the rector of Sodeistvie Institute:

“Unfortunately, it did not result in a renaissance of really Christian art, since the current state of modern art, including that produced in Russia, genuinely represents the spiritual condition of the average person in the modern world [5].”

The main aim of this paper is to trace the representation of light in contemporary church architecture as a catalyst to enrich the spiritual value. The hypothesis is based on the study that the light intensity in contemporary churches’ interiors can have a positive impact on how spiritually people feel in the place. This research is a qualitative type of work. The study depends on a scientific methodology, starting with literature review defining the meaning of ‘Church’, briefing its value, role, and giving a historical background about it using desk-research method. The paper then presents the different design approaches of contemporary church architecture, then it analyses two similar examples, and concludes certain parameters of analysis, that are used to analyse three focused cases studies. It reaches to a comparison and a questionnaire form distributed on 75 architecture students and 15 academic staff members in one of the architectural schools in Lebanon, to recognise their opinion. The research ends with proposing a list of light representations and recommended specific architectural elements that can enrich the spiritual experience of the church’s visitor.

II. LITERATURE REVIEW

Based on reviewing the literature, a theoretical base was detected to relate the church, the contemporary architecture and light as multidisciplinary research. It covers religion and architecture among others. To comprehend this sensitive relation, the study begins with highlighting precise definitions, values, and characteristics of contemporary church architecture.

A. Definitions and Insights

According to Christian doctrine, a church is a gathering space for Christians who practice their Christian religion [6]. The New Testament uses the word ‘Church’ more than 100 times. It is derived from the Greek word *ekklesia*, which means ‘an assembly’ and ‘to call out’ or “the called-out ones” and is composed of two words. A group of Christians known as the New Testament church is one that God has called out of the world to dwell as his people under the leadership of Jesus Christ [7]. Contemporary architecture is a trend in which modern styles combine and share features, relying less on traditional building principles. It basically refers to the current architectural style. The imperative to be unconventional and to depart from the past by using innovation and imagination rather than copying older styles is what unites contemporary architecture, which is not defined by a single style. People can see, locate themselves, and learn about their surroundings thanks to light. Beyond simply exposing things for them to see and touch, light models those things to improve vision and aid in the definition of the physical world. Nothing would be visible without light, which also enables them to express and visualize things that are invisible to the physical eye. Redefining human interactions with the environment and with oneself is made easier by light. There are two types of light: natural light and artificial light. Nature's gift to us is natural light. The use of artificial

light sources by civilized man allows him to be completely independent of daylight. Light is fundamental to space, necessary for human health, and essential to any successful structure. Health, comfort, mood, and behaviour are all impacted by light quality. According to the pioneer Le Corbusier:

“Space and light and order. Those are the things that men need just as much as they need bread or a place to sleep [8].”

B. Origin of ‘Church’

Following Jesus Christ's execution and resurrection, his followers carried out his instructions to preach the gospel and build facilities for those who had been converted [6]. The term ‘Church’ in the English language derives from the Old English word ‘cirice,’ which was derived from the West Germanic root ‘kirika,’ which itself is derived from the Greek word ‘kuriak,’ which means ‘of the Lord.’

C. Architectural Design Components of ‘Church’

Traditional churches typically have several common components that contribute to their overall architecture and design. These components may include:

- Nave: This is the main central space of the church where the congregation gathers for worship. The nave is usually a long, rectangular space, and is often flanked by aisles.
- Transept: In many traditional churches, the nave is intersected by a shorter, perpendicular space known as the transept. This forms the shape of a cross, with the nave representing the vertical part and the transept representing the horizontal part.
- Apse: This is a semicircular or polygonal projection from the main body of the church, often located at the east end (opposite the entrance). The apse usually contains the altar and is the focal point of the church.
- Aisles: These are typically located on either side of the nave and may be separated from it by columns or piers. Aisles provide additional space for worshippers and may contain smaller altars or shrines.
- Narthex: This is an entryway or vestibule located at the west end of the church, between the exterior entrance and the nave.
- Bell tower or steeple: This is a tall, usually narrow structure that rises above the main body of the church, often housing bells or a clock.
- Windows: Stained glass windows are a common feature in many traditional churches, and often depict scenes from the Bible or other religious themes.
- Ornamentation: Many traditional churches feature elaborate ornamentation, such as carvings, sculptures, frescoes, mosaics, and decorative painting. These components can vary depending on the specific style of the church and the time in which it was built. Moreover, components including a pulpit, baptismal font, altar backdrop, and enormous church bells were included in the new church criteria.

The most known sects of the Christian Religion are the Catholicism, Orthodoxy, and Protestantism.

D. Architectural Elements provoking ‘Spiritual Values’

Christians refer to a structure as a "church" that is used for their religious activities, particularly for the congregational worship sessions. The church is a place that helps and is important for the neighbourhood. Therefore, when designing a church, the architect must consider the following elements.

- **Dimensions, size, and scale of church**

Despite the rise of megachurches, it is not apparent how membership in a religious organisation is impacted by its size. The ideas that size is both an asset and a burden are in direct opposition to one another. Size has a detrimental impact on churchgoers' religious views and activities because it causes them to be less motivated and less coordinated. The second premise holds that a large church experiences economy of scale and, as a result, has a positive impact on religious beliefs and practices. The outcome variables may be curvally connected to size as a third possibility. Cross-sectional and longitudinal data projects showed that while medium-sized churches (501–1,000 attendees) might be more successful at luring and keeping believers who are more devoted to their religion and positive about their congregation, they are neither better nor worse than smaller or larger churches at fostering religious commitment or fostering relationships among the congregants. The statistics additionally demonstrated that larger churches are more successful than smaller ones in maintaining the "vertical" part of faith maturity. Yet, they are less successful at encouraging a sense of camaraderie among guests [9]. Thus, the dimensions and proportions the architect decide while designing the church influences the spiritual values and the sacred feeling people feel when they visit a church.

- **Design language of openings**

Designing openings in religious spaces can be the creative and magical part of the place designing concept. The openings forms and shape of design effects the light and shadow inside the space. Especially in religious places as the church, light and shadow has an important effect on the spiritual values and the sacred experience. Therefore, many architects in the contemporary church design created different patterns and forms of openings to enhance the light and the effect of it. However, the churches that are constructed before have openings of similar designs and these openings are covered with stained coloured glass. In essence, stained glass windows emerged as a type of art with significant theological significance - a technique to make clear to the populace the things the church wanted people to see, consider, and comprehend, such as Christ's suffering on the cross and His subsequent resurrection [10].

- **Light**

Lighting design has played a significant role in the spirituality of architecture throughout history. Houses of worship have been around for a very long time; they were built with controlled use of fire and illumination with meaningful daylight orientation. Both natural and artificial interior lighting in churches are essential components that can significantly improve the ambiance inside the structure during different rituals. It

promotes serenity and strengthens Christians' faith in God. One of the key components that aids in attracting the attention of the worshipers during religious procedure is the outside lighting of a church, such as the delicate design of the Church of the Light in Osaka, shown in Fig.2. This is in addition to the necessity to provide sufficient illumination for the priests and congregants to appreciate the ritual. It contributes to improve the church's atmosphere in terms of faith, the calmness of grief, as well as introspection and intellectual elevation. To increase the value of religious rituals, both the lighting system and the control system within a church should be properly planned and should be flexible to provide for the demand of different events [11]. There are codifying principles and regulations to measure the necessary light in the indoor spaces of churches and guide the interior effectiveness of the space to improve the sacred feeling and spiritual value based on these principles because the lighting confusion in the churches, caused problems.

- Interior features

Many various internal elements in churches and chapels are intended to facilitate worship. Different denominations can have slightly different features and designs. The sanctuary is located at the east end of the building and includes:

- At the Eucharist, the bread and wine are blessed at a table known as the altar.
- The lectern, which is a platform where the Bible is read from the pulpit during sermons.
- A crucifix, or cross bearing Jesus

A rail serves as a partition between the nave, where the congregation sits, and the sanctuary. The congregation usually sits in rows on benches in the seats found in the nave. The Stations of the Cross, 14 framed images that depict the Crucifixion of Jesus, are placed around the church.



Fig.2: Church of The Light in Ibaraki-shi, Osaka, Japan. This church was designed by Tadao Ando 1999. It is a contemporary church having a special treatment with the daylight through subtracting parts of the altar's elevation to draw a cross of light.

Source: A. Kroll, "AD Classics: Church of the Light / Tadao Ando Architect & Associates," An article published by Archdaily

Posted on the link: <https://www.archdaily.com/101260/ad-classics-church-of-the-light-tadao-ando>

E. Historical Background of Light in Church Architecture

Light is an electromagnetic radiation that is usually defined as a wavelength corresponding to a specific frequency between the infrared and ultraviolet. Light was firstly demonstrated by Humphry Davy in which he demonstrated the light to royal Institute of Great Britain using bank batteries and two charcoal rods. The evolution of architectural lighting starts with the gas lamp fixtures of the 19th century and then progresses to the technological advancement of electric lighting. Combining electric and gas lamps were even used as the public transitioned from one technology passing to another. The incandescent lamp reigned supreme for more than 50 years until the introduction of fluorescent lighting, in the 1930s, which quickly took over as the principal illumination source for the modern office and store. Churches have been gathering for centuries with little or no lighting. Before dawn and at night, they depended on candlelight or fire or met with moonlight. With the advent of electricity, churches that had once gathered in darkness could now meet to the glow of bulbs and lamps. As early as the early 20th century, dynamic pastors were testing the potential benefits of influencing people's emotions through lighting. In the last decades of the 1900s, young pioneers turned off the lights at their rallies, thinking that half-dark places would make people especially teens feel less conspicuous and more comfortable. Low light will enable unbelievers to hear the gospel [12]. To illuminate a specific area, the light must be localized and prevented from reaching other areas. Bright modern luminaires usually have a narrow beam to illuminate only a specific area. It is easier to reduce glare with a fixture with a narrower beam width. This principle also applies to lighting in decorative fixtures. It is best to direct the light to a well-defined area to avoid glare. Lighting in areas used by worshippers and other visitors should be somewhat vertical to avoid glare. The vertical downward lighting also looks natural and comfortable [13].

F. Previous Readings

Several understandings and definitions of lighting in architecture were introduced. These readings may review two parts; the first part reviews three previous publications that tackled light in architecture in general, while the second part highlights four studies of light in the church architecture.

Sage Russell [14] articulated a theory about light in his book 'The Architecture of light' saying that: 'In the built environment, it is reasonable to say that most of our experiences are visual. Sound, smell, and touch certainly play various roles, but most people rely on vision to deliver a very large quantity of information. Vision, by its very nature, is a product of light. In his paper 'Daylighting and Its Impact on Depth Perception in a Daylit Space', Nan-Ching Tai views that the visual perception within a daylit environment changes according to spatiality, sky conditions, time, and the point of observation. He focused on the interrelationships among the architectural configuration of skylights, luminance distribution patterns resulting from changing sky conditions, and the perception of spatial depth [15]. In their published paper 'Alerting Effect of Light: A Review of Daytime Studies,' Margarita Alwalidi and Sabine Hoffmann explain that light affects humans beyond only image formation. They indicate that light can increase daytime alertness and can therefore be positively utilised to counter daytime fatigue and increase productivity in the space [16]. In his published paper 'Light in church design,' Ahmet Hadrovic explores the representation of light in the church architecture. He discusses the role of natural light in contemporary architecture, highlighting the perspectives

of two prominent architects, Alvaro Siza and Tadao Ando [17]. Siza's approach to light is rooted in accuracy and synthesis, as exemplified in the Church of Santa Maria. On the other hand, Ando's understanding of light is influenced by traditional Japanese culture, where the potential of light is revealed through shadows, as seen in the Church of Light. In her published paper 'Light and Shadow. The importance of light in the Church of Sta. Maria and the Church of Light, of Siza and Ando,' Rita Paiva emphasised the same perspective. According to her, light has been perceived as synonym to metaphysics. She explains that both architects (Siza and Ando) view light as of fundamental importance regarding concept, aesthetics and objectives creating a sense of depth, austerity, silence and serenity, idiosyncratic of buildings of this nature [18]. Another paper entitled 'Prioritising the effect of 'Light' in the religious places and environments with an emphasis on the sense of spirituality' was authored by Pietro Matracchi and Ali Sadeghi Habibabad. They studied the light and its intensity in one of the churches. According to them, the lighting confusion in churches cause issues, which may encourage researchers to consider developing codified principles and regulations to measure the required light in the interior environment of churches and direct their interior spaces' quality to improve the spiritual aspect [19]. Iskandar Iskandar and his co-authors published a paper entitled 'The role of light in the architecture of religious buildings.' They found that the role of light in houses of worship is very important for the congregation, both spiritually and visually. Spiritually, the role of light can provide inner peace and the closeness of the servant to his God. From a visual point of view the role of light can provide beauty and comfort to the room [20].

G. Analysing two similar examples of the Contemporary Church Architecture

- The first example: Immanuel Church in Cologne, Germany (2014) - Designed by Sauerbruch Hutton

The architect created a multifunction religious space through the emphasis on the natural light being behind the users to create a focus point on the altar at the centre of the church, shown in Fig. 3. The south aisle is broader to make room for the main parsonage, kitchen, and restrooms, despite the aisles on either side appearing to be symmetrical [21]. A coloured wood screen behind the altar extends all the way to the roof, giving away where the organ is hidden behind [22].



Fig.3: Immanuel Church in Cologne. (a) Left: The entrance elevation of the church. (b) Right: An interior shot showing the accessing daylight to church's main space. Source: Immanuel Church / Sauerbruch Hutton', 2019.

- The second example: Catholic Church in Suzuka, Japan (2015) - Designed by Alphaville Architects: Kentaro Takeguchi and Asako Yamamoto

The dramatic canopy has been designed by Alphaville to contain three separate areas, which serve different purposes. the church is positioned to the north, while a conference area for meetings and other functions is prominently situated at the centre of the plan. at the opposite end of the site, a series of smaller rooms contain the priest's residence as well as a chapel and an office. To provide space for parishioners to park their cars, the entire structure is elevated forming a sheltered parking lot the size of the building at ground level. The important here is the smart treatment with the roofline, shown in Fig.4. The jagged roofline ensures that natural light reaches each area of the church. Openings at every five meters allow indirect daylight to illuminate the nave, reducing the need for artificial lighting [23].

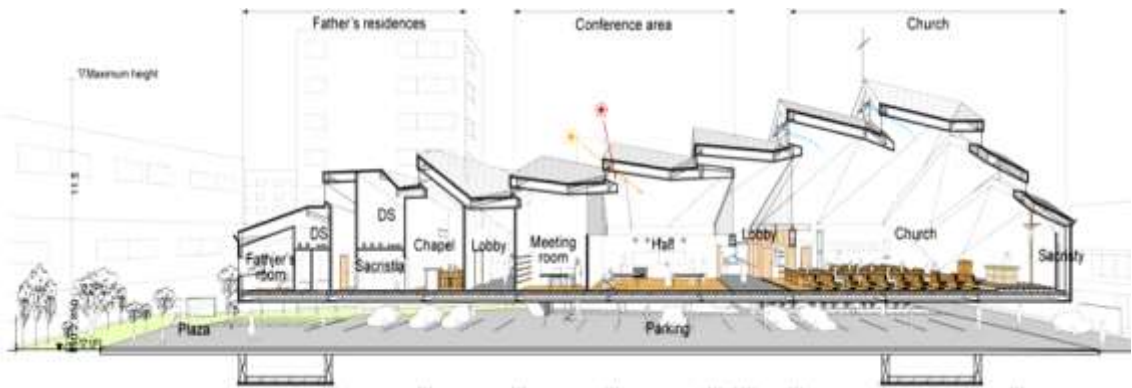


Fig.4: A longitudinal section in Suzuka Church reflects the smart design creating a deconstructed roofline to allow daylight to enter the entire spaces of the church.

Source: Catholic Suzuka Church / Alphaville Architects.

H. Suggested parameters of analysis

Based on the preceding literature review, the study concluded a set of parameters to be used in the analysis of the following case studies. Churches have a greater emphasis on community, global issues, and a more style of delivering the word of God. Volume, ornament, status, materials, texture, and light are used in the architecture of church to provoke the spiritual feeling. These parameters of light representations in the church design can be suggested as follows:

- Parameter One: Type of light
- Parameter Two: Form and location of the opening
- Parameter Three: Meaning of light
- Parameter Four: Intensity of light
- Parameter Five: Capacity of space
- Parameter Six: Material of the opening

These parameters the author referred to when investigating light in the following contemporary case studies.

III. RESEARCH METHODOLOGY

The paper depends on the inductive, analytical, and comparative analytical methods to analyse selected three cases studies, based on specific criteria. These case studies are analysed using the parameters concluded from the previous theoretical part to reach a reasonable answer of the main aim of tracing the representation of light in the contemporary church architecture as a catalyst to enrich the spiritual value. The author determines specific criteria of selection to choose appropriate and effective case studies. This selection assures the applicability of these projects on designing under the contemporary church architecture theme that offers different approaches of light representations. These criteria of selection are:

- The case studies' construction and opening dates match with the present contemporary architecture trends.
- Case studies target the parameters concluded in the previous part.
- Case Studies that have diverse design approaches of light representations.

A. Case Study One: Shonan Christ Church, Japan

- Architect/s: Takeshi Hosaka Architects
- Location: Japan
- Opening Date: 2014
- Built-up area: 175 m²

- Analysing Parameter One: Type of light

The church is designed to allow daylight to access the space in a magical and controlled way. The amount of direct and indirect light is controlled by the time of day. There was no direct exposure to sunlight during the time of service, but there was the rest of the time. As a result, this structure was constructed to receive an adequate amount of indirect light during its service life [24]. Light was thus recreated using computer software at 30-minute intervals on the designated days over a period of 12 months and modified depending on the time of day. Throughout the year, there would be an area under a soft light for service. Direct sunlight begins to cast a ray of light on the wall surface at the end of the service. There is only one line of direct sunlight in the afternoon [24].

- Analysing Parameter Two: Form and location of the opening

The construction composition is a one-story building with a low height to blend in with a low-rise residential area, and it attempts to create a space suited for prayer and worship with six curving surface roofs at varied heights, allowing natural light to flow down between those roofs, shown in Fig.5. The curved slabs are designed for sound and lighting benefits. The roof has a curvature with gaps from both sides to allow natural light to spread and reflect in the space and brighten it up. As well, this curved form avoids direct intensive sunlight rays into the space in the time of prayer or service [24].

- Analysing Parameter Three: Meaning of light

"We hope to have a chapel suited to give worship to the Lord," church members remarked. At worship, the Bible's words are read and listened. Six curving surface roofs of varying heights allowed natural light to stream down between them. Six roofs

represent the first through sixth days of Creation in the Bible, and worship represents the seventh day.

- Analysing Parameter Four: Intensity of light

This structure is meant to generate a skylight room for service (10:30-12:00 on Sunday morning) and directs sunshine during other time zones. As a result, light was recreated at 30-minute intervals on 12 sample days and adjusted according to time zones. As a result, throughout the year, the time zone for service comes to create a space beneath a gentle skylight. When the service nears completion, direct sunshine begins to cast a ray of light on the wall surface. Light intensity study is shown in Fig.6.

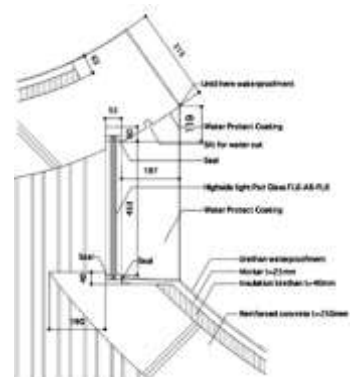
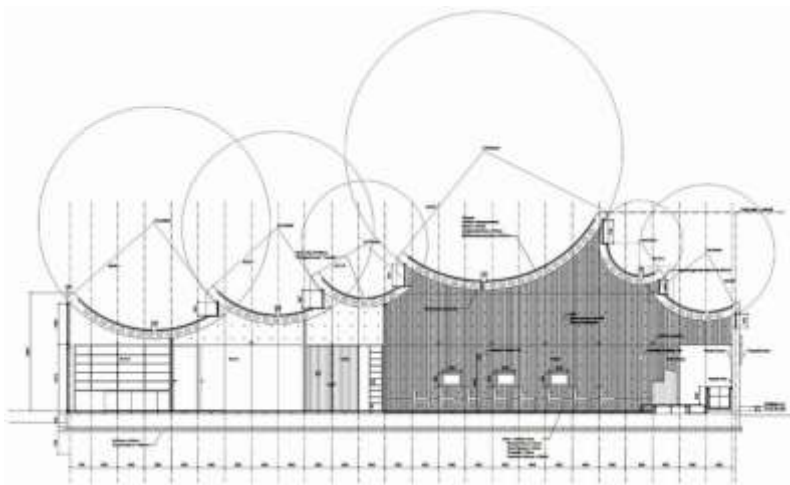


Fig.5: Shonan Christ Church. (a). Up left: The elevation of the church. (b). Up right: An interior shot for the church's nave showing the accessibility of daylight. (c). Down left: A section showing fragmenting the roofline into discontinued curvy parts which allow the daylight to enter in between. (d). Down right: Two details of the curvy openings.

Source: Shonan Christ Church / Takeshi Hosaka Architects.

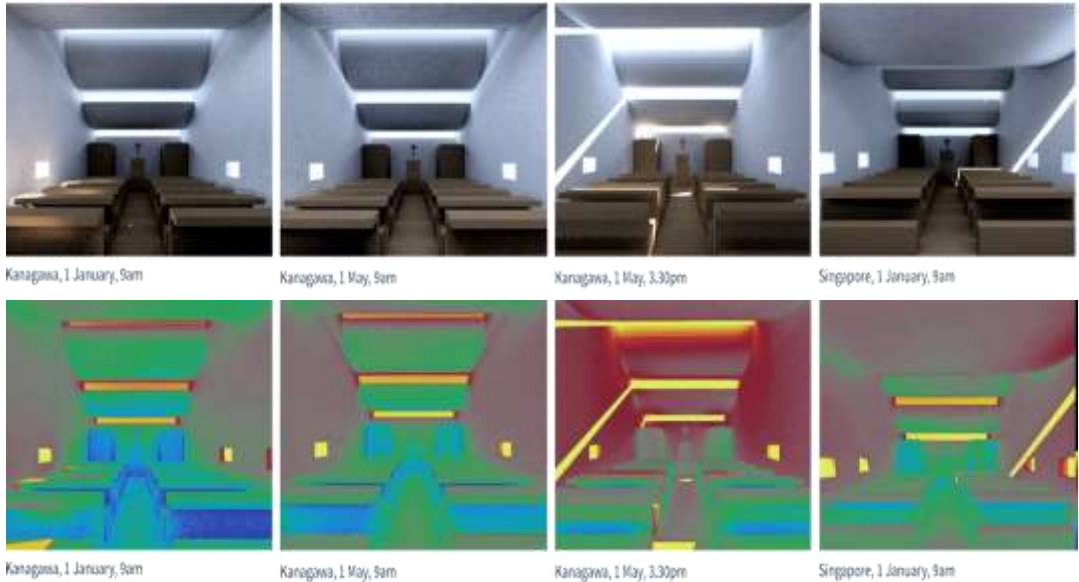


Fig.6: Diagram showing the intensity and the stimulation of light in different times of the day using the concave surfaces and in-between openings. Source: Ibid.

- Analysing Parameter Five: Capacity of space

The space exposed to direct sunlight displays different expressions depending on the time of day, which is appropriate for one person's or numerous people's prayer. After prayer in the afternoon, it becomes a space for a limited number of people to pray, and direct sunlight alters the number of rays from one to two or three, and its angle by the minute.
- Analysing Parameter Six: Materials of the opening

Uneven longitudinal ribs were cut in a random rhythm into the chapel's exposed RC concrete wall, and dark grey acoustic boards were installed between ribs. Concave acoustic boards made it easy to hear priests' preaching and Bible readings, while RC convex surfaces made it easy to hear liturgical music like hymns. Random rib pitches reduce flutter echo. The contrast of grey concave surfaces against light is highlighted by the light grey brightness of direct sunlight striking the convex surfaces [25].

B. Case Study Two: Light of Life Church, South Korea

- Architect/s: Shinslab architecture + IISAC
- Location: South Korea
- Opening Date: 2014
- Built-up area: 4109 m²

- Analysing Parameter One: Type of light

The worship area has a square shape and a circular seating-benches. As shown in Fig.7, this area is covered by a pyramidal roof, which has an internal ceiling as a dome with subtracted openings to allow daylight to enter the space. The worshiping process has happened through erecting a huge thin steel cross in the middle of the worship space, which is placed directly beneath the light, giving a holy and sacred feeling.

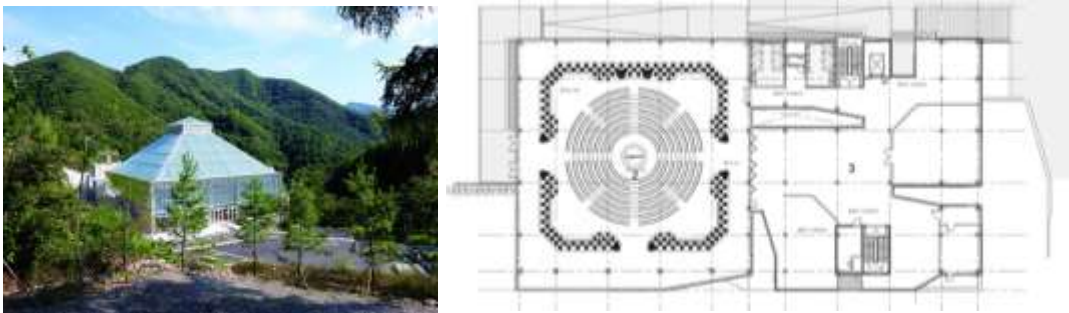


Fig.7: Light of Life Church, South Korea. (a). The perspective of the church within a natural context. (b). The plan of the church shows the square-geometry prayer space that has a pyramidal roof including an inner dome with circular openings. This plan has a circular setting of seats. Source: Light of Life Church / shinslab architecture + IISAC.

- Analysing Parameter Two: Form and location of the opening

It has been prescribed that a circular worship space that is in keeping with the ethos of the Early Church and Reformation. While the Catholic Church preferred a cruciform basilica design, the Reformation churches used a circular shape. The openings above this space are circular. They are subtracted from the inner parametric dome. This dome is held by a tree trunk structure and made of wood with a grid structure. The design of the openings is driven from the concept of subtracting forms of circular spheres from a huger circular sphere. The large one is the space of worship as shown in Fig.8.

- Analysing Parameter Three: Meaning of light

Light's gravitational pull. A hemispherical dome protects the worship area. This dome, which can be found in the Pantheon in Rome and other Renaissance architecture, represents the entire world. As shown in Fig.8, it alludes to the Celestial vault, a mythical structure between 'the waters that were under the firmament and the seas that were above the firmament' recorded in Genesis. This form is, in some respects, the inverse of a globe, which may be the Earth; it could also be the image of Divine perfection in mathematics. The Dome's surface is constructed by the ends of the cut red

cedar trees. Unlike cut wood that is placed down horizontally, all trunks are standing upright like forest trees; 834 unique pieces appear to depict the story of the resurrection. They are not made of wood, but of trees [26].

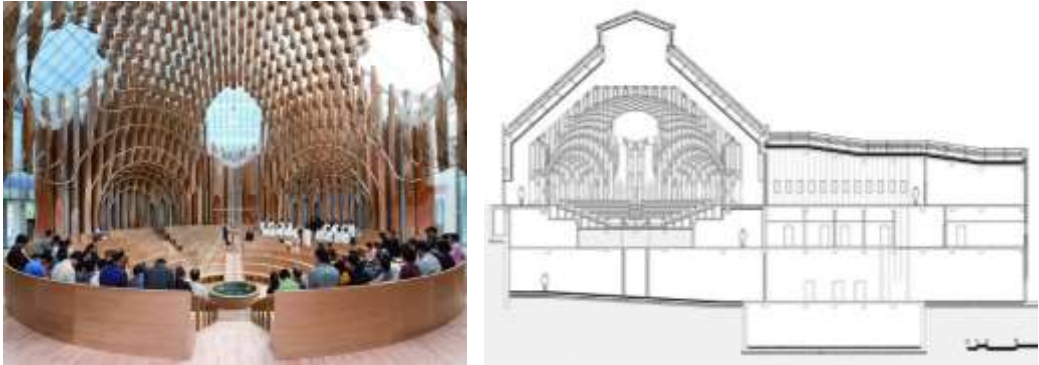


Fig.8: (a). Left: An interior shot for the worship space inside the church. The wooden parametric dome includes circular openings to access daylight. (b). Section in the church. This special design of the dome generates ambiance of elevating the spiritual sense for the worshippers. Source: The photo of Fig.8 (a) is photographed by Jin Hyo-Sook, posted on the website of Archdaily.

- **Analysing Parameter Four: Intensity of light**
The light that enters the room isn't intense, since there is a grid-like shape of wood under the flowing light which makes it reflect and spread softly in the space. No intense direct rays that might be annoying except for the light projected on to the steel cross.
- **Analysing Parameter Five: Capacity of space**
This structure is in the heart of a hamlet project for retired missionaries, which was created by the Protestant and Presbyterian group Nam Seoul Grace Church. Hence, it is a space of reflection and meditation opening every day of the week, in addition to receiving Sunday services. Furthermore, with the provision of accommodations and meals in a restaurant and cafe, the institution can welcome a hundred individuals in religious retreat.
- **Analysing Parameter Six: Materials of the opening**
It took a lot of strength to suspend this mass of the dome and its openings as skylights. The logs on the ground serve as poles for a steel grid structure. A tree trunk is hung at each intersection. A lower structure with finer steel lines warns of any rocking action and supports the dome's depth. Light penetrates through this wood and steel structure, which is covered by a completely independent glass pyramid. Its light is tinted by the wood and appears to take on a body, a gravity [27].

C. Case Study Three: Santa Maria Goretti Church, Italy

- Architect/s: Mario Cucinella Architects

- Location: Town of Mormanno, Southern Italy.
- Opening Date: 2021
- Built-up area: 950 m²

The church of Santa Maria Goretti rises from the northern outskirts of the Calabrian hill town Mormanno, boasting views of the hilly Pollino National Park. The exterior of this elemental and sentinel-like building, designed by Mario Cucinella Architects, draws inspiration from natural forms as well as the tradition of austere and beautiful apsidal Calabrian churches built by monks fleeing conquest and persecution in the eastern reaches of the former Roman Empire.

- **Analysing Parameter One: Type of light**
A resolute focus on the eucharist and prayer, as well as the geometries of Italy's most captivating Baroque churches, such as Francesco Borromini's San Carlo alle Quattro Fontane and Sant'Ivo alla Sapienza, both in Rome, have inspired the ethereal interior, which is naturally lit diaphanously from above through folds of translucent fabric hung in the form of curvaceous drapes from the 16-meter.
- **Analysing Parameter Two: Form and location of the opening**
The openings are specialized in their form and effect. First the entrance of the church is all lighted up with artificial lighting; the lights are placed on the edges of the opening which have the form or shape of the Christian cross. The door of a form of a cross is emphasized by the lights. The other openings are in the slab above as skylights, with a square form and beneath them there is a translucent white fabric suspended from it. The reflection of the light on the white fabric gives the space an angelic, magical, and sacred feeling. The light from these high openings falls straight and smooth on the fabric. However, at other times of the day the light falls on the brownish material of the walls with the cross and the status of the Christ hanged on it [28].
- **Analysing Parameter Three: Meaning of light**
The beams of sunrays are coming through the folds of the suspended translucent fabric in the shape of curvaceous drapes. These beams of daylight are touching the faces of worshippers and the most importantly is lighting the crucified Christ on the altar's wall. This action creates a sort of spiritual connection between heaven and human.
- **Analysing Parameter Four: Intensity of light**
The light that enters the building is smooth and is not intense; especially because of the suspended fabric that breaks the rays of light and let it spread gently to be brightness with the fabric beneath it.
- **Analysing Parameter Five: Capacity of space**
A parish meeting room, church classrooms, and the priests' home are all located in this essentially orthogonal single-story, massive concrete-framed building. They are all gathered around a central planted courtyard and protected by a living "green" roof. Together with the church's four-leafed clover design and form, the north side of the

parish centre has a scalloped roofline. A sacristy hidden within the church's curved walls allows clergy to enter the building from behind the altar. In the walls are hidden church bells [29].

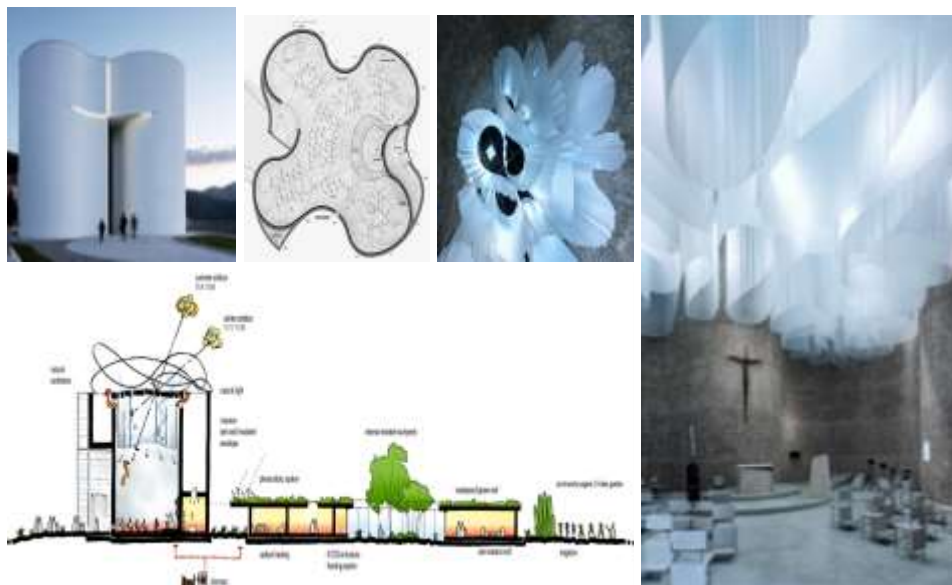


Fig.9: Santa Maria Goretti Church, Italy. (a). Up left: Perspective of the church, photographed by Duccio Malagamba. (b) Up right: An interior shot for the church's main hall shows the angelic entity generated by the suspended translucent fabric in the ceiling allowing daylight to enter. (c) Mid. Left: The plan of the worship hall. (d) Mid. Right: Looking up showing the ceiling's details. (e). A longitudinal section in the whole spaces of the church. It shows the curvy suspended fabric in the ceiling accessing daylight.




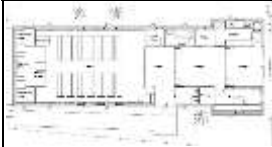
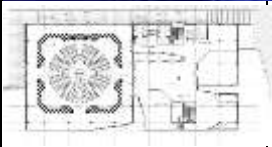







- **Analysing Parameter Six: Materials of the opening**
Minimalist and austere furniture made of wood and steel by Cucinella is used to draw attention to the interior of the church's sculptural and architectural features. On one day of the year, the 6th of July, the Feast of Saint Maria Goretti, a beam of sunlight beams directly on the crucifix placed on the altar's wall in addition to the continuous play of daylight provided by the veils hanging from the ceiling. In this place, symbolism, religion, and the arts coexist in spiritual harmony. The church's architecture and building techniques minimise energy consumption and maintenance requirements.

D. Comparison between the three case studies

A detailed comparison between the three case studies may detect the differences and commons and may conclude the design approach and the light representation that were used in each project. This comparison is shown in table 1.

TABLE 1 ANALYTICAL COMPARISON BETWEEN THE THREE CASE STUDIES

SOURCE: THE AUTHOR

Name of the Church		Case Study 1 Shonan Christ Church	Case Study 2 Light of Life Church	Case Study 3 Santa Maria Goretti Church
Location / Country		Japan	South Korea	Italy
Date of Opening		2014	2014	2021
Architect		Takeshi Hosaka Architects	Shinslab Architecture + IISAC	Mario Cucinella Architects
Area		175 m ²	4109 m ²	950 m ²
Main Perspective				
Main Plan				
Main Section				
Looking Up				
Representations of Light in Design	Type of Light	Natural light, direct sunlight, indirect sunlight, moonlight	Natural daylight and sunlight spread softly	Natural light and artificial light to be lit at night (entrance door)
	Form & Location of Opening	Openings within six curved roofs opened from both sides	Circular dome with circular formed openings	Cross-skylights (squared shape openings in ceiling)
	Meaning of Light (Metaphor)	Suited to give worship to the Lord. The six roofs represent the six	The waters that were under the firmament and the	An attempt to create an angelic entity coming from heaven to the ceiling of the

		days of creation in the Bible, and worship represents the seventh day	seas that were above the firmament	church, accessing sunrays to bless worshippers
	Intensity of Light	Indirect light in time of service – direct intense light in other times of the day pray	No direct intense rays of sunlight except for the one projected on the cross	The light is directed to translucent folds of fabric
	Capacity of Space	A space for a limited number of people	Hundreds of people weekly	Centre of the space can serve as classroom, meeting room, etc
	Materials of Opening	Longitudinal RC ribs, Reinforced concrete walls, glass, and RC convex	Steel lines, steel structures, wood, tree trunks, and glass	White concrete frames, steel, translucent fabric, wood, and glass
Concluded design approach of light representation		Subtracted parts of circles created the deconstructed roofs allowing daylight and moonlight to enter in-between. The design follows the Neo-Brutalism Trend	Turning the ceiling into a mesh allowing the penetration of rains of light. The design follows the Parametric Trend	Using a structure with skylights allowing daylight to enter through suspended white translucent fabric. The design follows the Installation Art Trend

IV. FINDINGS

Based on the comparison between case studies, the religion of the future might be a cohesive ideology with ‘light’ as one of the essential components considering the evolution of the usage of light and its role in spirituality. In the modern world, when disagreements between individuals of many theological backgrounds are on the rise, the novel applications of light may portend a spiritual revolution, nearing distances among people. To support the findings of this comparison, the author prepared a question form and distributed on 75 architecture students (from levels 4 and 5) and 15 academic staff members in the Faculty of Architecture, Beirut Arab University, Lebanon. This school is accredited by the Royal Institute of British Architects Part 1 and Part since 2012. Through this questionnaire, the author gathered information, addressed more ideas about the natural light representations in the contemporary church architecture. The poll included six questions concerning the different parameters of light representation and its aim. These six questions were as follows:

- Q1: What is the symbolic and spiritual meaning of light across different cultures and religions, and how has this influenced the use of light in art, architecture, and other forms of human expression throughout history? (Open question)

- Q2: Is natural light important in the church architecture?
- Q3: What is the role of natural light in church architecture?
- Q4: As an architect, do you think a contemporary project with non-traditional forms focusing on volumes and materials will only create a perfect church?
- Q5: When passing by a contemporary church, what is the most important element that attracts and catches your eyes?
- Q6: According to the American architect Louis Kahn: "A room is not a room without natural light," Do you agree with?

After taking their permission to fill in this questionnaire form, participants somehow tackled the important parameters of light representation in church architecture, and they gave more insights and diverse points of view from each participant. The answers were translated into charts, shown in figures 10-15.

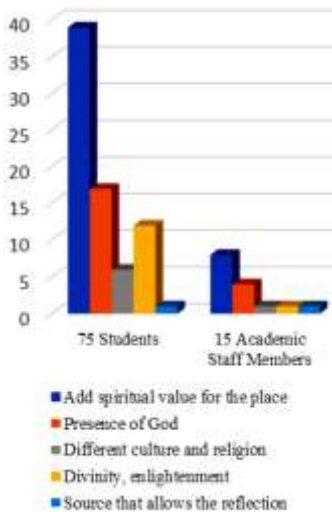


Fig.10: Chart answering

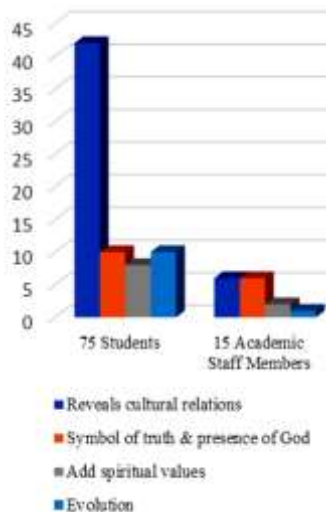


Fig.12: Chart answering question

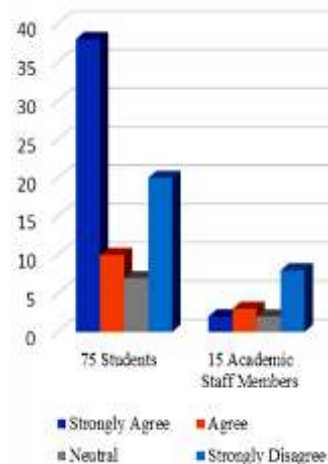


Fig.13: Chart answering question

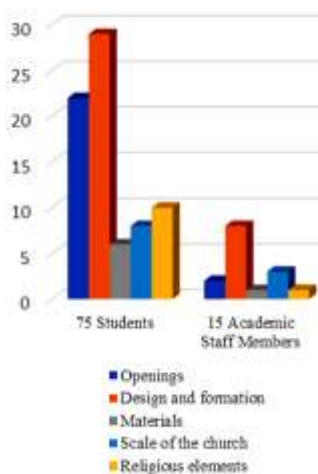


Fig.14: Chart answering question 5

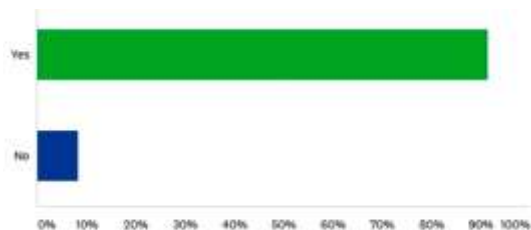


Fig.11: Chart answering question 2



Fig.15: Chart answering question 6

V. DISCUSSION

After turning the answers of participants into charts, we may analyse these charts and numbers as follows:

- The first question was “What is the symbolic and spiritual meaning of light for you”. It was an open question, provoking participants to share their opinions about light. Most answers (38 students and 8 academic staff members) think that light is life and provokes spiritual values, while the second preference interpreted that light is representing God and the source of life, or the illumination, or a type of energy. As there are many answers on this question, but we cannot deny that the existing of light is used in the architecture of church to provoke the spiritual feeling.
- Based on the answers of the second question, which was about the importance of natural light in church architecture, 92% of the participants answered yes, as it is important, and the 8% did not agree. This shows that the most people think that the natural light is an important feature in church architecture. There are many roles of natural light in church architecture.
- Answers of the third question shows the opinions of participants about the most important role of natural light in the church architecture. The reveal of cultural relations is chosen by (41 students and academic 6 staff members), which reflects the value and importance of traditions and culture of a city.
- Answers of the fourth question regarding the role of non-traditional forms that reveal perfect image of contemporary church testified discrepancy in the participants’ opinions. More than 35 students answered strongly agree, while just two academic staff members answered the same. It indicates that the academic staff members were contradicting with students’ points of view. Based on their expertise, they viewed that the image of the church can be more valuable and powerful if the design is simpler and implying strong expressive symbolic design.

- Answers of the fifth question about what is the catchy element that attracts your eyes the most when passing by a contemporary church gave a priority to design and form as the first catchy aspect in the church. 29 students and 8 academic staff members went to this preference.
- Answers of the sixth question ‘Do you agree with Kahn’s quote “A room is not a room without natural light”’ confirmed that it is true. More than 90% of both students. It means that natural light is inevitably necessary to give life, health, energy, and spiritual sense to the architectural space, especially the religious spaces.

As a serious pursuit to answer the main aim of this paper, the discussion can deduce significant representations of light in the contemporary church architecture, that can be tools and elements that the architect can employ in the design of church now and in future to generate a valuable experience for the church’s visitor. These representations of light and the architectural elements are shown in table 2.

TABLE 2 TRACING THE REPRESENTATION OF LIGHT IN THE CONTEMPORARY CHURCH ARCHITECTURE

SOURCE: THE AUTHOR

Representations of Light in Church Architecture

Natural Light	Artificial Light	Stained Glass	Light Fixtures	Shadows & Reflections
Many contemporary churches use natural light as ways to create a connection to the divine and to evoke a sense of awe and wonder. Large windows, skylights, and glass façades are often used to allow natural light to flood the space.	Artificial light can be used to create a sense of intimacy and warmth in a church and can be used to highlight important features such as the altar or the baptismal font. LED lighting systems can be used to create dynamic lighting effects that can change throughout the day or in response to different	Stained glass is a traditional element of church architecture that is still used in contemporary design. Stained glass windows can be designed to create beautiful and intricate patterns of light and colour that convey spiritual concepts and stories.	Contemporary churches often incorporate unique and modern light fixtures as ways to create a sense of identity and style. These fixtures can range from simple pendant lights to elaborate chandeliers that are designed to complement the overall aesthetic of the space.	The interplay of light and shadow can create a sense of mystery and depth in a church and can be used to highlight important features or create a sense of movement. Reflections on polished surfaces such as marble or metal can also be used to create a sense of infinity or transcendence.

	liturgical seasons.			
The Architectural Elements that enrich the 'Spiritual Values' in Church Architecture				
Skylight	Opening in Wall	Holograms	Kinetic Elements	Parametric Design
Skylights can play as important role in church architecture by providing natural light that creates a sense of openness, transcendence, and spiritual illumination.	Openings in walls provide a sense of sacred enclosure, create a contemplative environment, and serve as a canvas for religious art and ornamentation.	Holograms can be used in the future to enhance the spiritual experience of worshippers in innovative ways.	Kinetic elements create a dynamic, immersive, and transformative environment that may engage the senses and facilitate spiritual contemplation.	Parametric design allows the creation of meaningful architectural forms that reflect spiritual aspirations and values of the community. By using algorithms and advanced computational tools, parametric design can enable architects to explore new possibilities.

VI. CONCLUSION

At the end, the paper may conclude that architects can create a very special experience for the worshipper in the church through generating a state of spiritual transcendence considering daylight as a priority in design. To enrich this experience, the architect can concentrate the light on the following elements:

- The altar and sanctuary: The main axis of the nave ends with the altar and sanctuary. Usually, the altar hosts the main cross, other crosses, candles, and sculptures. To inspire awe, reverence, and transcendence, the space and the walls of the altar should allow daylight to enter and touch its elements.
- Sacred art: On the church's walls and ceilings, sacred artworks such as paintings, statues, icons, and stained-glass windows may generate a feeling of awe and respect. The design may concentrate light on these artworks for more interaction. These artworks are religious symbols acting as visual reminders of the supernatural and encourage believers to mediate with.
- Materials and texture: Natural materials like wood, stone, or marble can be utilised to evoke a sense of coziness and rootedness as well as connection with the church's past and

traditions. Architects can direct beams of sunrays on certain materials and texture to create a sense of asceticism and meditation.

- **Music:** A church can employ music to foster a spiritual ambiance because it is an integral feature of many religious traditions. Hymns and other religious songs can be led by choirs, soloists, and instrumentalists for the congregation to sing. The spiritual transcendence can reach high levels by integrating these two elements (light and music) in a special indoor environment.

Overall, a church's spiritual worth is based on the participation and dedication of its members. By include these components, a church may contribute to the spiritual growth of its members and foster a feeling of belonging and mission. Architects can depend on accessing light through (skylights, windows, reflectors, deconstructing roofline, parametric design, installation art, subtracting holes in walls or roofs, and others). Studying aspects of daylight such as (direction angles, intensity, colours, and temperature) may lead to a perfect experience. The paper proposes several architectural trends to be the design style of the contemporary church like: Brutalism, Structuralism, Post-Modernism, Symbolism, Deconstructivism, Metaphorical Approach, Parametric Design, Performative Design, and others. The important for the architect is to realise how to employ the representations of light in the church to achieve the best result. The secret to enhancing architecture's spiritual significance is to approach each project with an awareness of mindfulness, sensitivity, and inventiveness. To design environments that inspire and elevate people and contribute to a sense of spiritual well-being, architects must consider the human experience, cultural context, site, materials, and light.

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