

The role of artificial lighting techniques in forming sacred expressions at the sanctuary of the St. Laurentius Catholic Church Bandung, Indonesia

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received August 24, 2021 Received in revised form Sept. 30, 2021 Accepted October 19, 2021 Available online April 01, 2022</p> <p><i>Keywords:</i> Artificial lighting technique Sacred expression Sanctuary St. Laurentius Catholic Church Bandung</p> <p>*Corresponding author: Aldyfra Luhulima Lukman Department of Architecture, Faculty of Engineering, Universitas Katolik Parahyangan, Indonesia Email: aldyfra@unpar.ac.id</p>	<p><i>The interpretation differences of the policies implemented by the Second Vatican Council have a significant influence on the increasingly diverse views and manifestations of the sacred expressions in the Catholic Church. Therefore, this research focuses on the sacred expression of the Sanctuary as the most important space of the Catholic Church. It was carried out at St. Laurentius Catholic Church Bandung because it applies various artificial lighting techniques to its worship space. Furthermore, this research discusses how and to what extent artificial lighting techniques are able to support the sacred expression of the contemporary Catholic Church Sanctuary. Data were quantitatively collected through working drawings, measuring the illumination level in the work area, and determining the brightness of space-forming materials. Meanwhile, data were also qualitatively collected through field observations and visual recordings. The analysis process was used to analyze the architectural sacredness, such as orientation, hierarchy, balance, and symbols. In addition, visual analysis was used for clarity, uniformity, balance, brightness, and spatial intimacy. The results showed that artificial lighting techniques play a significant role in forming sacred expressions of the Sanctuary of the St. Laurentius Catholic Church Bandung.</i></p>

Introduction

Catholics worldwide carry out their lives and religious doctrines based on the guidelines of the Catholic Church lead by the Pope. From 1962 to 1965, the Second Vatican Council convened and proposed reforms related to liturgical processions. This renewal had a significant influence on the increasingly diverse physical formations of the Catholic Church and the fading expression of its sacredness (Lake 2019). According to Srisadono (2012); Gojnik and Gojnik (2018), the varying interpretation of the policies of the Second Vatican Council regarding liturgy are some of the factors that influenced this process.

The liturgical procession is broadly distinguished into profane and sacred spaces, ranging from "less" to "most" sacred. In terms of liturgy, the most sacred space in the Catholic Church is in the Sanctuary. This is because it is the most representative part used to assess the sanctity of a church. Therefore, a reduction in the level of sacredness is proportional to a decrease in the Catholic Church. The position of the Sanctuary is the most important area; therefore, it demands the most intensive processing and attention from the worshippers during the Liturgical procession.

Trisno and Lianto (2018b) stated that the liturgical procession consists of stages that symbolize peoples' journeys to achieve better

spiritual conditions. The first process is the Preparation Stage, where the people undergo the transition process from the profane to the sacred area by taking holy water, making the sign of the Cross, kneeling facing the Sanctuary, and walking towards their seats. The second is the Opening Rite Stage, whereby the Priest and Church Officers enter the Sanctuary. Furthermore, the people sing hymns, perform the Rite of Repentance and offer the opening prayer. The third is The Liturgy of the Word, the Priest conveys God's teachings, which the people understand and interpret. The fourth stage is the Liturgy of the Eucharist, the most important stage and is carried out in the Sanctuary, where the people receive Communion and the Shiori or the chalice containing the Most Holy Sacrament is appointed by the Priest to form the sign of the Cross. The fifth is The Closing Rite Stage, where the people perform a closing prayer and asks for strength to carry out their life activities according to Catholic teachings. The entire liturgical procession takes place inside the church.

The Catholic Church's liturgical-related spaces consist of Narthex, Nave, and Sanctuary (Trisno and Lianto 2018a; Srisadono 2012). The Narthex between profane and sacred areas, with the lowest level of sacredness, includes the areas around the Church building, the entrance, and the Preparation Stage (Trisno and Lianto 2020). The Nave or Panti Ummah is horizontal to the liturgy and stretches from Narthex to the Altar (Trisno and Lianto 2020). The Sanctuary, which generally includes the Altar, Tabernacle, Cross, Sacred Room, Reading Room, and Priest's Chair, facilitates the Eucharistic Liturgy Stage. It symbolizes the communication vessel between God and humans as the spatial center of the church, therefore, it is considered a sacred area, which can only be accessed by the Priests and Eucharistic officers in most liturgical processions (Stroik 2012; Trisno and Lianto 2020). Furthermore, the Sanctuary hierarchy is characterized by a higher floor surface than other rooms, the arrangement of structural elements, or the use of ornaments, curtains (Chancel), and altar railings (Stroik 2012; Trisno and Lianto 2020).

Light is an element that plays a significant role in forming the sacred expression of architectural works (Mishra and Dave 2019; Matracchi and Sadeghi habibabad 2021a; 2021b; Abrianti and Salura 2019). Light and shadow can make architectural spaces touch the emotional side of humans by connecting them to the cosmic

dimension (Foroughmand et al. 2015; Mishra and Dave 2019; Pallasmaa 2015; Paiva 2015). Light in sacred spaces provides clarity to the elements, order, and scale of existing spaces to give the impression of an invisible or hidden power (Hoffman and Crosbie 2010; Livingston 2014; Salama 2019). It allows people to visually access space and its constituent elements, and forms the aesthetic aspects and atmosphere of the sacred space (Hoffman and Crosbie 2010; Stroik 2015). In the context of worship activities, it also directs the focus or concentration of the people (Lechner 2015). According to Hoffman and Crosbie (2010), Trisno and Lianto (2018a), it is considered as a determinant of the atmospheric-symbolic aspect in marking or forming the architectural sacredness of the Catholic Church.

The Sanctuary area generally gets the most intensive lighting because it accommodates communication activities between God and the People (Trisno and Lianto 2018b). The natural light in this area signifies the presence of God in the church as a way of motivating people to do good deeds (Trisno and Lianto 2018b). Generally, the Sanctuary in the Catholic Church designed and built before the 20th century is placed on the Eastside to obtain a significant amount of natural light to accommodate the liturgy and form sacred expressions (Trisno and Lianto 2018b).

Although it has many positive impacts on Church activities, the application of natural lighting causes problems such as glare and overheating due to the dynamic character of its sources. Therefore, artificial lighting becomes an alternative to provide light with an intensity and distribution that can be adjusted to the needs and desires. According to Sutanto (2017); (2018), the design includes the following elements: 1) Lighting system and 2) technique (includes the ability to accent objects, display specific effects or atmosphere, become decorative, and emphasize architectural elements). Other includes: 3) The direction of light (up, down, side, front, back), 4) Light distribution (direct or indirect), 5) Angle of light distribution angle (wide, medium, or narrow angles), 6) Type of lamp (halogen/fluorescent/metal halide/LED, etc.), 7) Mounting (includes placement of space elements), and 8) Other elements, such as the use of shielding, reflector, glare control, and adjusting the light distribution. Mandala (2015) stated that the artificial lighting strategies used to support architectural forms and spaces in the church include lighting design intended to 1) provide

direction or orientation towards a particular space or element, 2) emphasize scale, hierarchy, verticality/horizontality in a room and 3) reinforce liturgical symbols such as crosses, images or statues of Jesus, Mary, and the Saints.

This research focuses on artificial lighting techniques to support sacred expressions in the Sanctuary of the Catholic Church. It also includes natural lighting, based on the consideration that worship activities in the church occur at evening, morning, and afternoon. Similarly, this research aims to determine the relationship between the Sanctuary and other spaces within the Catholic Church.

This research is expected to provide input for the planning and evaluation of lighting in Catholic Churches. Previous researches focused on natural lighting. However, this research combined both natural and artificial lighting to increase the sacredness and quality of worship activities in worship buildings, which can improve the community's quality of life in general.

Method

This is a qualitative research which emphasizes the quality sacred expression of the Catholic Church Sanctuary. Data collected from the objects were analyzed based on theories, the principles of arrangement, and the effects of lighting. Hoffman and Crosbie (2010) stated that a sacred architecture with its symbols must have the following 3 attributes, namely: 1) architectural, 2) archetypal, and 3) atmospheric ambiguity elements.

According to Hoffman and Crosbie (2010), the first attribute of sacred architecture is architectural elements, which symbolize transformation or displacement. This is in accordance with Barrie (2013) view on the effect of sacred space as a medium of the spiritual journey. Hoffman and Crosbie (2010) further stated that the architectural elements representing the transformation or movement from the profane to the sacred consist of the following: 1) Gate, which represents the intention to achieve a better condition. 2) Path denotes the process to realize the intention and 3) Place, the goal at which better conditions are achieved. Generally, the Gate is manifested in the form of an entrance into the site and the Church building. The path is manifested in the form of a circulation space that directs the

faithful from outside the site to the church building or from the entrance to the seats. This transformation process also shows the relevance of Hoffman and Crosbie (2010) view with Jones (2016) thinking on orientation (as a reference point of the journey) and hierarchy (which shows profane differences - sacred or less sacred - very sacred) as important aspects of ritual-architectural relationships.

According to Hoffman and Crosbie (2010), the second attribute of sacred architecture is archetypal elements. This is in accordance with Carl Gustaf Jung's archetype theory on the image or form of the collective character that exists in the world, inherent in various individuals' psychic structures. Therefore, the influence of Eliade (1987) thoughts on hierophany is defined as a manifestation of sacredness or holiness. The archetypal elements consist of: 1) universal or fundamental elements such as air, earth, water, and fire, 2) Religious/mystical elements that are culturally identified, such as the Mundi/cosmic axis, mountains, and stone trees, and 3) Geometric elements, including basic shapes such as squares, circles, and triangles.

The third attribute of sacred architecture is atmospheric ambiguity. This involves contradictory elements that complement and maintain balance, such as: 1) Silence – noise, 2) Light – Darkness, 3) Emptiness – Abundance, 4) and Humility-Monumentality. Hoffman and Crosbie (2010) attribute is similar to Barrie (2013) view of sacred architecture, an intermediary between 2 contradictory conditions.

The researches carried out by Eliade (1987), Jones (2016), Barrie (2013), Hoffman and Crosbie (2010) regarding sacred architecture were used as references by Trisno and Lianto (2020) for the development of an analytical model related to the spatial configuration and architectural form of the Catholic Church. The aspects that need to be possessed by a spatial configuration of sacred architecture are orientation, hierarchy, balance, and symbols. When associated with Hoffman and Crosbie (2010) thinking, architectural, archetypal, and atmospheric elements are related to hierarchy, orientation, balance, and symbols. Hoffman and Crosbie (2010), Trisno and Lianto (2020) studies on the sacredness of the Catholic Churches using the subjective attributes of Lo and Steemers (2020), were used to determine the concert of hall lighting and used as the basis of this research. The attributes of Lo and Steemers (2020) are used as criteria for visual analysis based on the following

considerations: 1) These attributes are related to various aspects of sacred architecture, and 2) The layout of the concert hall is similar to the Catholic Church, with audience and staging areas.

Result and discussion

The attributes related to lighting from the research carried out by [Lo and Steemers \(2020\)](#) were used as criteria for analyzing this research. These include: 1) Visual clarity, which relates to the ability to identify and distinguish details, 2) Visual uniformity, associated with the distribution of lighting that allows the observer to focus on activities and physical elements in space, 3) Visual balance, which is associated with the dark-light comparison between visually perceived physical elements, 4) Brightness, which is the relative brightness and contrast between areas, 5) Spatial intimacy is associated with the direction in which observer responses and the behavior is driven. The analytical framework based on [Lo and Steemers \(2020\)](#) and the thoughts of [Hoffman and Crosbie \(2010\)](#), [Trisno and Lianto \(2020\)](#) are shown in [figure 1](#).

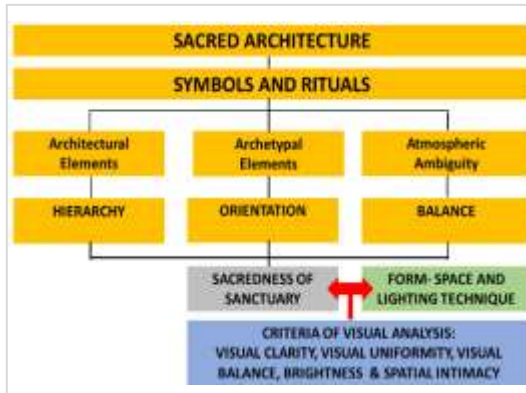


Figure 1. Research analysis framework

St. Laurentius Church, which was built in 1987 and located on 223 Sukajadi Street, Kotamadya Bandung, was used as the object of this research. The main considerations in the selection are: 1) the horizontal character, which differs from the vertical attributes of the pre-Vatican II churches, 2) the existence of architectural elements in the object that support natural and artificial lighting techniques, and 3) Ease of accessing information from Church administrators, as well as data related to its design. The process of collecting quantitative

data, include working drawings and measurements of space, illuminance, and brightness levels of light reflections. Qualitative data, such as interviews and visual recordings of the Church rooms in the morning (9.00 am) and at evening (05.00 pm) were used to determine the use of natural and artificial light. Measurement of space, illuminance, and light brightness level is carried out in the field using a digital measuring tape and lux and luminance meters. The data is then entered into Microsoft Excel software to be processed and presented in graphical form using AutoCAD software (for those in the form of working drawings and space sizes) and SketchUp (for light direction and distribution data).

In the Church Plan shown in [figure 2](#), the blue, green, and yellow areas indicate Narthex, Nave, and the Sanctuary. Natural lighting comes from openings such as skylights, stained glass windows, and folding doors. The position and types of artificial lighting features in the church's interior are shown in [table 1](#) and [figure 3](#). The side and center ceiling lights use a combination of metal halide lamps and LED PAR 30 at a distribution angle of 300. The lamps that illuminate the elements of the Cross in the Sanctuary and the walls around the church hall use the LED-TL lamp (tubular lamp). Therefore, spotlights on the altar fence use a type of halogen lamp.

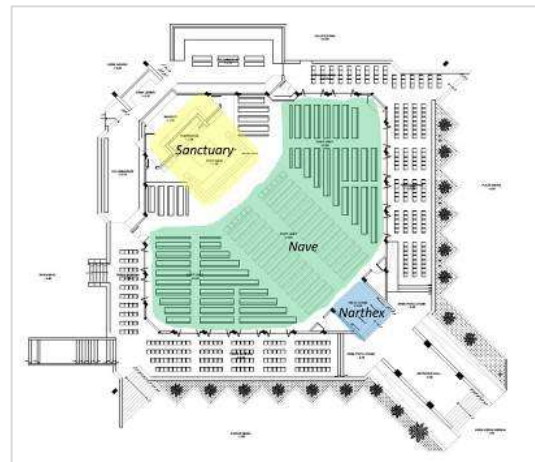


Figure 2. The division of space in the Catholic Church of Saint Laurent

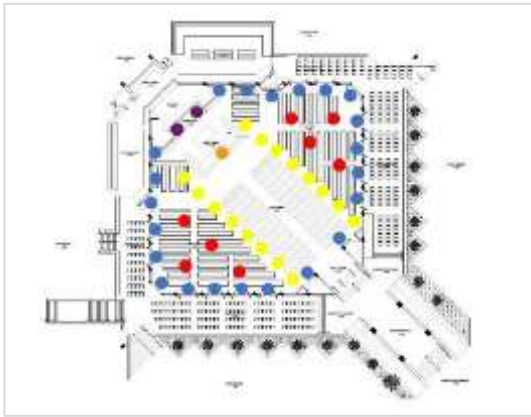


Figure 3. Placement of light points in the interior of St. Laurentius Catholic Church

Table 1. Description of the color code, position, type of lamp, and the nature of the light

Code	Lamp position and type	Nature of light
●	Ceiling lights (downlights) Type: LED PAR 30	Warm white, 2900 K, CRI>90
●	Ceiling lights (downlights) Metal halide PAR 30 type	Warm white, 2900 K, CRI>90
●	Ceiling light (accent light), Type: Halogen	Warm white, 2900 K, CRI>90
●	Wall lamp (Indirect-lamp), Type: TL LED	Warm white, 2900 K, CRI>90
●	Wall lamp (Indirect-lamp), Type: TL LED	Daylight white, 4200K, CRI<60

Figure 4 shows the position of the illuminance measurement using a lux meter. The meaning of each color is explained in table 2, which is presented in figures 5 and 6. Furthermore, the lighting strength in the Sanctuary ranges from 300 – 5000 Lux, as shown in figure 5. However, natural lighting, with its high fluctuations, plays a more dominant role. At evening, the lighting intensity in the Sanctuary ranges from 100 – 300 lux, as shown in figure 6.



Figure 4. Lighting measurement points in St. Laurent's Catholic Church

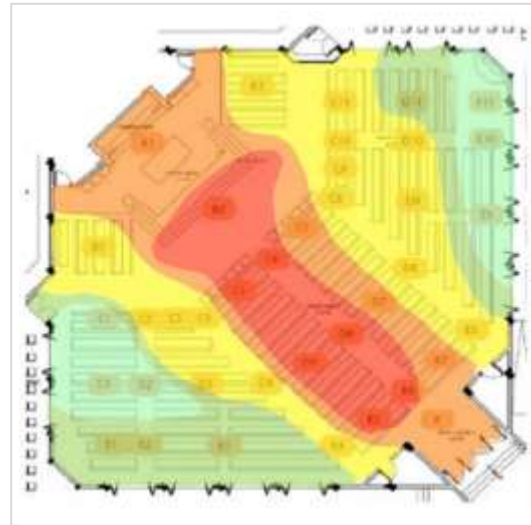


Figure 5. Results of mapping the space's lighting in the St. Laurent Catholic Church in the morning

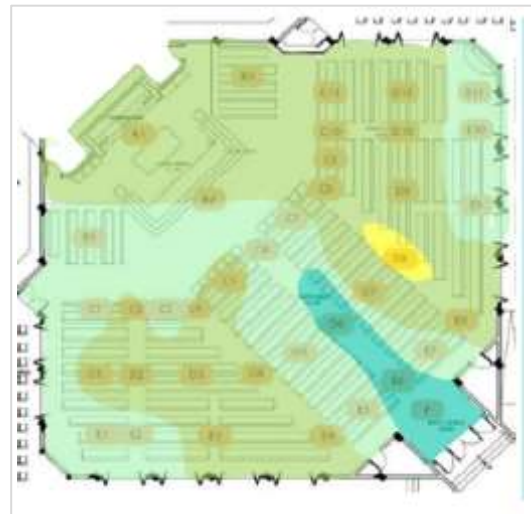


Figure 6. Results of mapping the lighting of space in St. Laurent's Catholic Church at evening

Table 2. Description of color code and illumination

Color code	Illumination Level
●	10- <50 lux
●	50- <100 lux
●	100- <300 lux
●	300- <750 lux
●	750-5000 lux
●	>5000 lux

The position of the light reflection measurement on various surfaces of space

elements is shown in figures 7 and 8. The light reflection mapping in table 3 shows the difference in the brightness level of the room in the morning and evening. The light brightness level in the Sanctuary area in the morning and evening ranges from 7 to 2127 cd/m² and 0-26 cd/m².

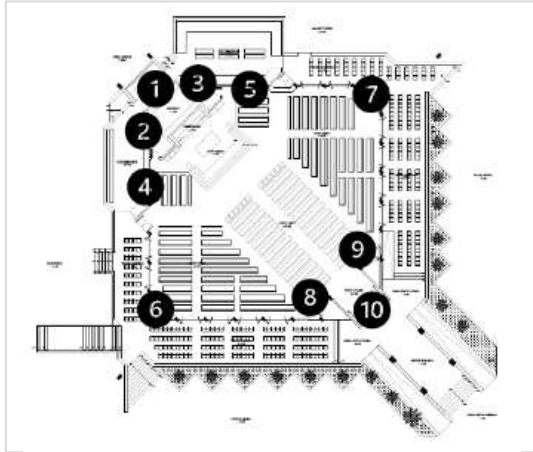


Figure 7. The measuring points of the luminance of space in the St. Laurentius Catholic Church

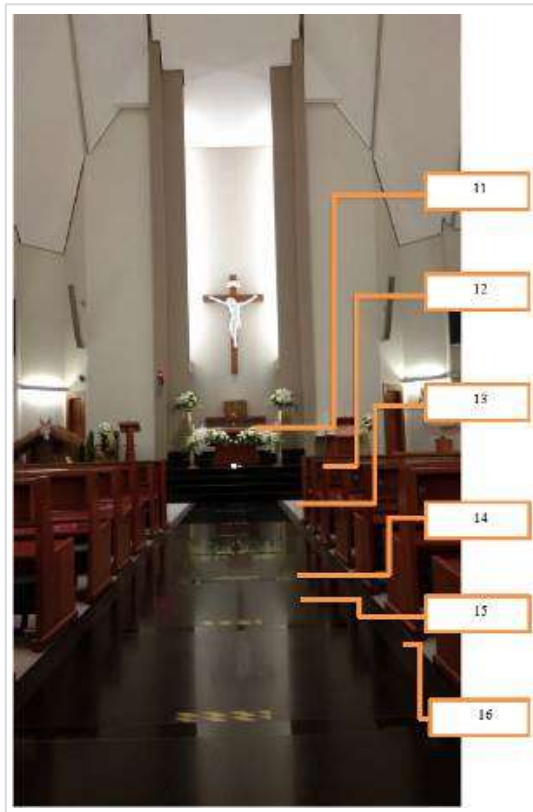


Figure 8. Luminance measuring points on the floor and furniture of St. Laurentius Catholic Church

Table 3. Description of color code and illumination

No	Location	Luminance (cd/m ²)	
		Morning	Evening
1	Back wall of the cross	117.9	15.81
2	Priest's house wall (left side)	123.4	5.030
3	Priest's house wall (right side)	126.8	6.379
4	Prodiacon/ lector zone wall	72.71	4.512
5	Choir zone wall	55.10	3.578
6	Wall of the parish (left side)	32.84	5.29
7	Wall of the parish (right side where the statue of Mary)	7.105	2.645
8	The front wall of the confessional (left)	36.54	18.53
9	The front wall of the confessional (right)	42.42	10.99
10	Entrance	17.32	0
11	Altar Surface	30.90	26.11
12	The surface of the seat (back) of the parish	90.97	1.244
13	White tile floor	2127	12.44
14	Black tile floor (opaque/doff)	18.17	0
15	Black tile floor (gloss/gloss)	18.27	0
16	Black natural stone floor	167.8	0.259

The form and space of the St. Laurent Catholic Church show a strong orientation and balance. According to figure 9, the orientation includes the horizontal and vertical axes. The horizontal provides a spatial path that directs people from the receiving room (Narthex) to the parish (Nave) and the Priest's home (Sanctuary). Lighting also plays a significant role in strengthening the vertical and horizontal orientation. The lighting mapping in the morning, shown in figure 5, strengthens the distribution of the horizontal orientation axis in the Nave and Sanctuary spaces. Most of the Nave and Sanctuary's living rooms have very high lighting (750 – 5000 lux) due to the openings in the form of skylights in the middle of the room and stained-glass windows near the entrance. The opposite condition occurs at evening, where artificial lighting dominates those in the church. Artificial lighting, both in terms of the level of illumination and its distribution, plays little role in strengthening the horizontal axis in the church's interior, as shown in figure 7. This is because the technique used is uniform lighting. Although the placement of the light points is attempted to be lined up towards the altar, the shape of the ceiling, which increases towards the Sanctuary weakens the downward light effect. Therefore, it is

necessary to consider the use of artificial lighting techniques at several points in the interior to strengthen the presence of a horizontal orientation axis.

St. Laurent's Catholic Church also shows a hierarchy of spaces. The sanctuary is a sacred area in accordance with the liturgy therefore, it is characterized by differences in floor heights and processing the forms and interior spaces. The section surrounding the Sanctuary is the highest part of the church building with an elevated roof section, as shown in figure 9. The processing of the St. Laurent Catholic Church building about the hierarchy is in line with the design guidelines proposed by Trisno and Lianto (2020), which states that the more sacred a room, the higher the floor from the roof. Artificial lighting is able to strengthen the Sanctuary's position as the most important space in the Catholic Church, compared to natural lighting, as shown in figure 10. The use of special lighting techniques such as accent and indirect lighting around the area of the Cross strengthens the presence of the Cross, Altar, The Tabernacle, and the symbolism of the Sanctuary. This seems to be able to reinforce the vertical orientation axis, which is commonly associated with the cosmic axis (*axis mundi*).

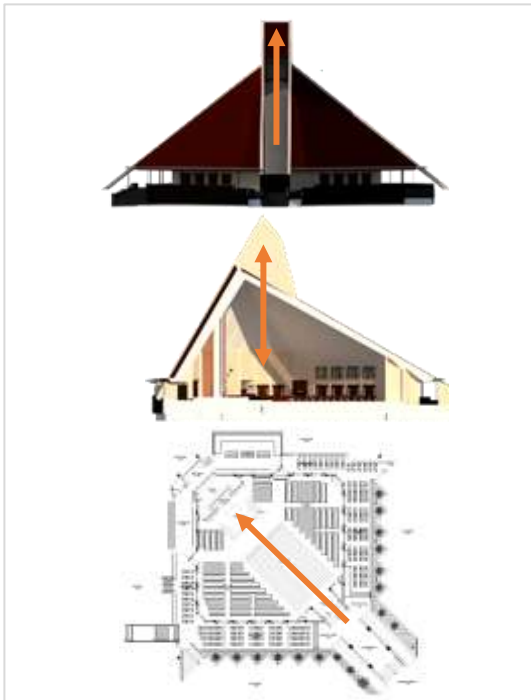


Figure 9. Horizontal and vertical orientation scheme of St. Laurent's Catholic Church

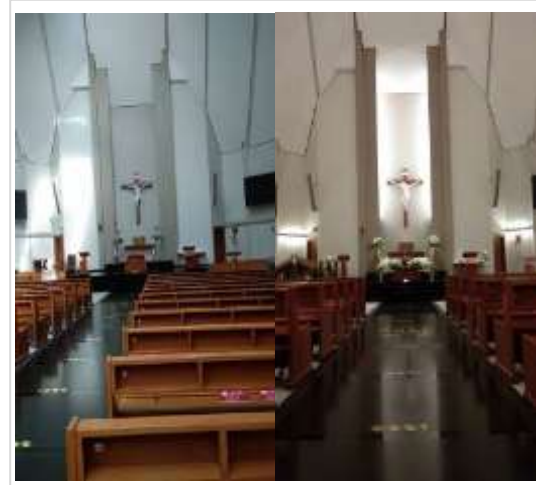


Figure 10. Comparison of the sanctuary hierarchy formed by lighting in the morning and evening

The extent to which the physical elements of the Sanctuary space and lighting form sacred expressions with visual perception, made from 9 positions in the Nave area, are shown in figure 11. These represent the actual position of the people during worship with a different point of view towards the Sanctuary. This varying observation position, which is also placed in different contexts of time (morning and evening), is expected to provide a comprehensive picture of the Sanctuary of Saint Laurentius Catholic Church. The criteria used to discuss the integration of lighting techniques and physical processing of the Sanctuary refers to the subjective attributes of Lo and Steemers (2020). These include visual clarity, uniformity, balance, brightness, and spatial intimacy.



Figure 11. Position measurement of the sacred expression of the sanctuary of the Catholic Church of St. Laurentius

Table 4 shows the visual clarity and uniformity of lighting in the church in accordance with Lo and Steemers (2020), visual clarity, and uniformity process. Lighting and position, associated with time and distance, significantly affect the ability of observers to identify elements and activities in the Sanctuary. Artificial lighting, which is dominant at evening, is able to strengthen the presence of elements and activities in the Sanctuary. Furthermore, it is able to provide a sharp contrast to the walls of the Cross in the Sanctuary area with a ratio of 3:1 when combined with elements and materials. The farther the observer from the Sanctuary, such as in zones 3, 6, and 9, the fewer the elements or activities that can be identified. Sacred aspects such as orientation, hierarchy, and symbols are still present in the Sanctuary when viewed from any position. This is because the figures of all elements and activities are recognized even though certain details are difficult to identify when the observer is in the furthest position. One of the advantages of observing the Sanctuary from the farthest position is the reduced possibility of "visual clutter" due to the large number of elements that appear close together and stacked on each other.

Furthermore, the position seems to influence another aspect of sacredness, known as balance. The closer the observer to the Sanctuary, the stronger the verticality, specifically at evening, with the accent lighting around at a 3:1 ratio with the Cross and the walls, as shown in table 4. Therefore, the farther the observer from the Sanctuary, the more balanced the proportion between the vertical and horizontal space of the TL lamps along the church's interior walls.


According to Lo and Steemers (2020), visual balance is the artificial lighting in the space within a Catholic Church. In the context of artificial lighting, balance in the Sanctuary is closer, according to Hoffman and Crosbie (2010) atmospheric ambiguity research on darkness-light, silence-noise and humility-monumentation. The physical elements of the Sanctuary, such as the Altar, Tabernacle, Cross, Wall, Floor, Ceiling, as well as details and ornaments, can also be combined properly to maintain the overall visual balance.













Therefore, based on the luminance measurement and visual data in tables 3 and 4, the contrast ratio in the Sanctuary area, related to Lo and Steemers (2020), brightness attributes, is stronger at evening. Although the level is lower in

the morning, the application of artificial lighting techniques is able to provide contrasting light that attracts the focus and orientation of the people to the Sanctuary. The back-wall material of the altar has a high reflectance level. Therefore, the placement of little light on the wall area with the indirect techniques creates a quite prominent contrast compared to the surrounding environment. Illumination of the light in the Sanctuary at evening is considered comfortable because it does not cause glare that interferes with the worship activities of the congregation. Due to the reflection of direct sunlight through the skylight, large brightness is usually seen on the surface of the white tiled floor in the morning. However, efforts have been made to reduce sunlight with the addition of cloth at the bottom of the skylight opening. The large contrast ratio of more than 1:20 has the potential to cause glare interference. However, the church management stated that the lighting of 100-300 lux in the Sanctuary area does not support the activities of the Priest in the Sanctuary at Mass at evening. Therefore, it is necessary to consider improving the lighting quality.

According to Lo and Steemers (2020), the lighting of the Sanctuary in the morning does not have a significant impact on observers in any position. Lighting in the Sanctuary at evening seems to be more capable of having different effects relative to the observer's position. For instance, the closer the observer to the Sanctuary at evening, the greater the ability of their response and behavior will be personally oriented (inward). Conversely, the farther the observer from the Sanctuary for activities at evening, the greater the public/communal oriented (outside of self).

Table 4. Viewpoint

Position	Sanctuary in the morning	Sanctuary in the evening
Zone 1		
Zone 2		
Zone 3		

Position	Sanctuary in the morning	Sanctuary in the evening
Zone 4		
Zone 5		
Zone 6		
Zone 7		
Zone 8		
Zone 9		

The analysis showed that artificial lighting in St. Laurent's Catholic Church was able to support aspects of sacred architecture in the Sanctuary such as orientation, hierarchy, balance, and symbols (Hoffman and Crosbie 2010; Trisno and Lianto 2020). The symbolic (Altar, Tabernacle, and Ornaments) and general-architectural (walls, floors, ceilings, and furniture) elements of space in the Sanctuary are still clearly identified with the presence of artificial lighting. Religious Archetypal elements such as the Cross and geometry that reinforce orientation, hierarchy, and symbols were clearly identified due to artificial lighting. It is able to support the ambiguity of the atmosphere and maintain a balance between contradictory and complementary elements. The problem related to artificial lighting in the Sanctuary of the St. Laurentius Catholic Church that needs to be addressed is the poor illumination at evening. This research generally focuses more on the functional aspects of liturgical activities to provide comfort to the congregation and the aesthetics of church architecture (Ola and Michelle 2021; Pelealu, Sangkertadi, and Waani 2017; Putra, Artayasa, and Raharja 2017; Suriyothin 2016; Velika, Sumintardja, and Widayani 2018; Sim, Lau, and Wong 2018).

Conclusion

In conclusion, this research shows that artificial lighting techniques play a significant role in forming sacred expressions in the Sanctuary of the Catholic Church, specifically at evening. Some of the concerns are the expected light intensity and distribution to form a strong orientation, hierarchy, balance, and symbolism to strengthen the Sanctuary's sacred expression. Although natural lighting can accommodate liturgical activities, artificial lighting contributed to its improvement at the Sanctuary of the St. Laurentius Catholic Church. Strong natural lighting seems to have an effective impact due to different intensity, directions, and distribution. Regarding the functional aspects of liturgical activities, it needs to be emphasized that although artificial string lighting plays a significant role in forming sacred expressions at evening (range 100-300 lux), users expect higher artificial lighting intensity (>300 lux) to make worship activities more optimal.

Further research is expected to focus on natural lighting in St. Laurent's Catholic Church to confirm the true extent of forming the sacred expression of the Sanctuary. The limitation and novelty of this research focuses on artificial lighting techniques to form sacred expressions. Further research needs to be carried out to obtain a comprehensive picture of the formation of sacred expressions of the Catholic Church, such as its experience of space and the direct visual perception due to the COVID-19 pandemic.

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Author(s) contribution

Aldyfra Luhulima Lukman contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

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