

Artificial Light as A Supporting Element to Achieve Sacredness in the Holy Spirit Cathedral Church of Denpasar

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Abstract. The sacred space in Catholic Church buildings is intended for people to experience the mystery of God's work of salvation and the epiphany of faith through light as one of its design elements. Light is seen as a significant aspect of Catholic teachings, representing divine manifestation through its symbolic function. The presence of artificial light in the worship room of the Holy Spirit Cathedral Denpasar was designed to accommodate all worship activities in conveying symbolic meanings. This study aimed to determine how artificial lighting through pragmatic, psychological, and symbolic functions is present in the prayer room. The data collection techniques used were observation, interviews, and questionnaires. The study results showed that the pragmatic function of light in the worship room of the Holy Spirit Cathedral Denpasar is considered a supporting aspect, while light with its psychological and symbolic functions is considered to be the main aspect, which is very influential in creating a spatial atmosphere that facilitates the religious experience of the churchgoer. Although the presence of artificial lighting in the worship room does not fulfill visual comfort, churchgoers consider the presence of artificial light to be able to accommodate the whole procession of worship activities.

Keywords: *artificial light; catholic church in Bali; sacred space.*

1 Introduction

Sacred spaces in Catholic Church buildings are intended for liturgical congregations to experience the mystery of God's work of salvation and the epiphany of faith as a fulfillment of spiritual needs through the application of design elements. Light is one of the design elements in Catholicism that is considered important because it is seen as a symbol of Christ [1]. Light in the Catholic church has a large influence on the formation of a sacred atmosphere and experience in the worship room; church visitors will feel that they are small in front of the Creator [2]. The presence of light through its psychological and

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symbolic functions in the prayer space of Catholic church buildings has a significant impact on the churchgoer because it can provide a religious experience by achieving a sacred and contemplative atmosphere. The Bishops' Committee on Liturgy explains that light is an element of a church's built environment that contributes significantly to the creation of an overall spatial experience [3]. The lighting in the worship room of the Holy Spirit Cathedral Denpasar was designed to accommodate all worship activities and convey symbolic meanings in a sacred atmosphere, especially by artificial lighting. The diversity of people with different socio-cultural backgrounds has an impact on their perception of the presence of artificial light in the church. This opinion is confirmed by the statement of Wardono & Wibisono in [4] that the symbolic role of light in sacred spaces works in different ways because cultural differences affect how people interpret the relationship between the light and God in liturgical celebrations.

2 Methodology

This study aimed to find out how the elements of artificial lighting through pragmatic functions, psychological functions, and symbolic functions are presented in the worship room of the Holy Spirit Cathedral Denpasar. The data analysis in this study was carried out qualitatively, while data collection was carried out quantitatively. The data collection techniques used were observation, interviews, and questionnaires with a purposive sampling technique. Digital lux meters were used to measure the distribution pattern and intensity of light in the prayer room. The measurement results were compared with the standard minimum levels for lighting in places of worship so that it could be seen if the lighting power in the worship room was above or below the standard levels. Then the results were correlated with the perceptions of church visitors obtained from the questionnaire. Thus, the results of the data analysis were obtained in the form of an interpretation of the results of the questionnaire and in-depth interviews with congregation members, pastors, and the church construction team to find out their perceptions of the presence of artificial light in the worship room of the Holy Spirit Cathedral Church in Denpasar.

3 Discussion

The Holy Spirit Cathedral Denpasar is located at Jalan Tukad Musi No. 1, South Denpasar. The church was built in 1994 on 58.14 acres of land with a building area of 5,930 m² and consists of a basement and a worship room located on the 1st and 2nd floors (mezzanine). Artificial lighting in the worship room of the Holy Spirit Cathedral Denpasar uses downlights, spotlights, and neon lights with a mix of warm white and cool white colors.



Figure 1 Artificial lighting in the Holy Spirit Cathedral Denpasar.

Warm white lamps in the worship room not only fulfill a pragmatic function of lighting but also its psychological and symbolic functions by creating a warm, intimate, and contemplative atmosphere that shown in Figure 1. The atmosphere in the worship room thus supports various worship activities and stimulates active participation of believers through an atmosphere of kinship that can be seen in the lighting design on the ceiling plan of the Holy Spirit Cathedral Denpasar as shown in figure 2.

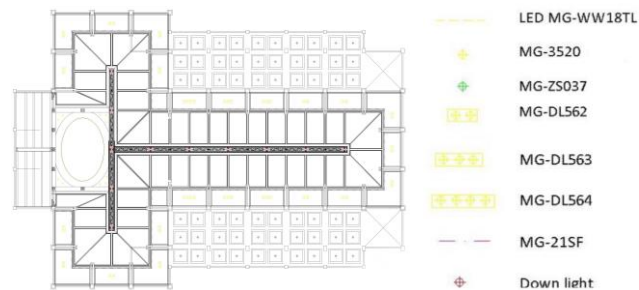


Figure 2 Ceiling plan of the Holy Spirit Cathedral Denpasar.

While the cool white-colored lights in the altar area are intended to fulfill a pragmatic and symbolic function, the artificial lighting on the back wall in the form of a *gunungan*/Balinese *kayon* uses T5 warm white lamps. The artificial lighting on the altar is designed to support the liturgical activities and creates a sacred atmosphere. The altar as a symbol of God's presence should be designed in a place that can be the center of attention so that the attention of all churchgoer's is directed towards the altar as described in the General Instruction

of the Roman Missal (GIRM 299) [5]. Thus, the artificial lighting on the altar is designed to attract the focus of attention of all churchgoers during worship activities, as stated by Lechner in [6] that lighting can help create arrangements and clarify areas to become the focus of attention.

The presence of artificial lighting in the worship room has a large influence on artificial lighting from the fourteen meters high ceiling of the church building. The application of a monumental scale in places of worship, with towering ceilings, affirms the presence of God and provides an experience of the verticality of space that reveals the divine and His majesty [7]. Meanwhile, the entrance area gets illumination from the lower ceiling (4.73 meters) that functions as a support for the second floor (mezzanine) as shown in Figure 3.

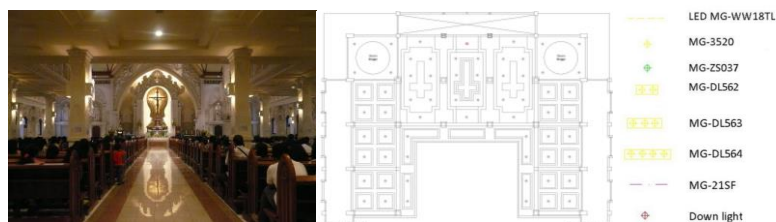


Figure 3 Artificial lighting in the worship hall and ceiling plan.

3.1 Distribution Pattern and Strong Illumination of Artificial Light in the Holy Spirit Cathedral Denpasar

In accommodating all processions of worship activities, it is necessary to know the power of artificial light in the Holy Spirit Cathedral Denpasar through the pattern of light distribution. The pattern of distribution of artificial light in the worship room is divided into seven areas in the area of the sanctuary and the nave as shown in Figure 4.



Figure 4 Light spread patterns on the first floor of the worship room.

The greatest strength of artificial lighting is seen in Area 2, namely the altar as the center of orientation for worship activities of 95 lux. Meanwhile, the smallest artificial lighting strength is in Areas 5 and 7, at 17 lux and 23 lux respectively. This is because Area 5 and Area 7 are located in corners of the building, so that the light is divided by the staircase area leading to the second floor (mezzanine). The presence of artificial light in the circulation area is accommodated by general lighting. This lighting can illuminate the entire space evenly so that the faithful can feel comfortable when participating in the processions of worship activities, even though there is no specific lighting in the area.

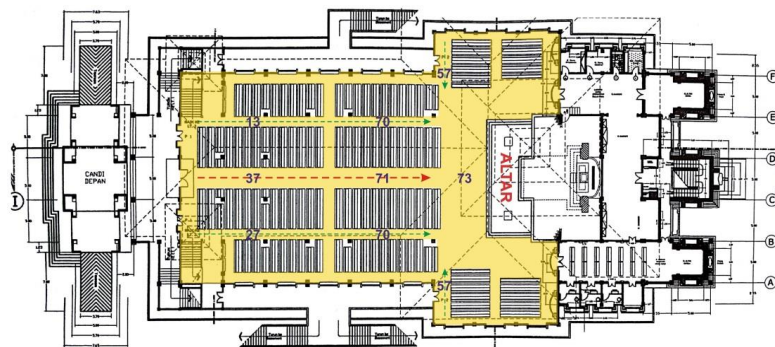


Figure 5 Artificial lighting distribution in the first floor of circulation area.

In Figure 5, it can be seen that the light strength of the circulation path for priests and congregants on the first floor shows a significant difference between the front area (green box) of 71 lux and the rear area (blue box) of 37 lux. The strength of the light in the area is getting higher towards the altar, at 73 lux. This shows that when entering the prayer room, the congregation is greeted with a dim atmosphere and then led to the altar by an increasingly bright atmosphere. The presence of this artificial light attempts to reveal its religious meaning as an appreciation or manifestation of God's work of salvation to save human beings as written in the Gospel of John (8:12) in the New Testament [8]. People who are in darkness who come to enter the worship room of the Holy Spirit Cathedral Denpasar are guided through the application of strong artificial lighting toward the altar to be saved.

The front circulation lane area receives direct artificial lighting from downlights and fluorescent lamps on the 14-meter-high ceiling of the building. Meanwhile, the back circulation path area is lit by warm white downlights shining down from the lower roof of the building as high as 4.73 meters with a strong lamp that is not as large as the lighting on the 14-meter-high ceiling of the building.

The ceiling plan in the first floor of worship room can be seen in the ceiling plan as shown in Figure 6.

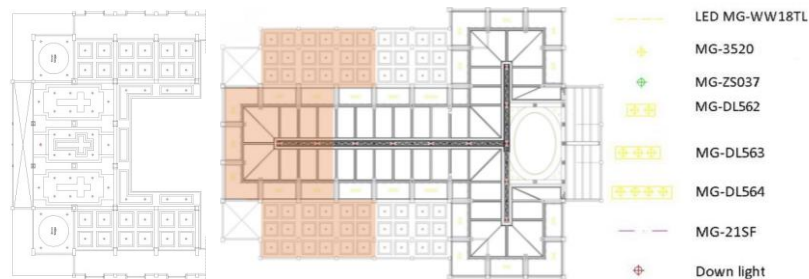


Figure 6 Ceiling plan in the first floor of worship room.

On the second floor of the worship room that shown in Figure 7, the largest artificial light distribution pattern is in Area 10 in the middle of the worship room with the strength of lighting equal to 923 lux. Area 9 and Area 11 on the left and right sides have a smaller light intensity than Area 10, at 597 lux and 593 lux respectively. Meanwhile, the smallest artificial light distribution pattern is in Area 12 on the south side of the church building with an illumination strength equal to 330 lux, which is almost same as that in Area 8, at 370 lux. These two areas have a similar position because the church building is symmetrical; they are both illuminated by warm white downlights.

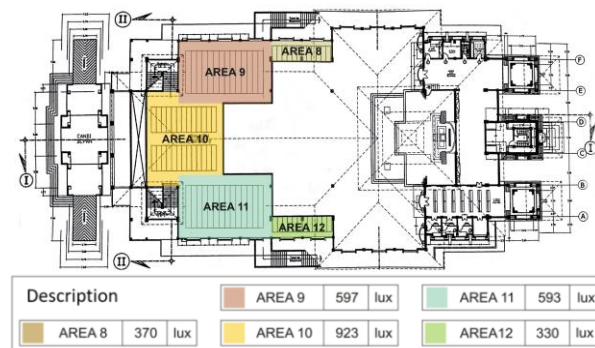


Figure 7 Artificial light spread in the second floor of worship room.

The presence of artificial lighting in the area of the second-floor circulation path is not very significantly different, considering that the use of downlights and fluorescent lamps was carefully calculated to appropriately accommodate all processions of worship activities.

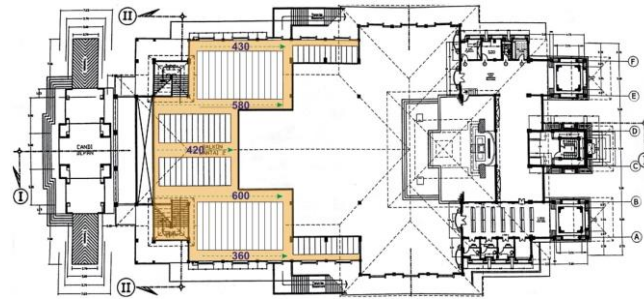


Figure 8 Artificial lighting distribution in the second floor of circulation area.

In Figure 8, it can be seen that artificial lighting in the community circulation path area that has the highest light strength (580 lux and 600 lux) is the area adjacent to the stairs. Sufficiently high light strength is needed to illuminate the area adjacent to the stairs as access from the worship room on the first floor to the second floor. The area adjacent to the stairs is the main circulation route, consisting of three lanes, with a light strength equal to 580 lux, 420 lux, and 600 lux. Meanwhile, the area of the circulation path on the left bank (430 lux) and the circulation path on the right bank (360 lux) is deemed sufficient to accommodate the activities of the faithful when interacting on the second floor of the worship room. In the Holy Spirit Cathedral Denpasar, it can be concluded that the strength of artificial light on the second floor (563 lux) is 510 lux greater than the light on the first floor (53 lux). Meanwhile, the presence of lights on the worship room circulation path on the second floor has an average lighting strength of 478 lux, 425 lux is greater than the lighting power on the circulation path on the first floor of 53 lux.



Figure 9 Artificial lighting in the second-floor worship.

The difference in light strength on the first floor and the second floor when viewed from the perspective of visual comfort through the average light distribution pattern is considered very significant. This is because the artificial

lighting on the ceiling of the worship room on the second floor is closer (5.8 meters) than the ceiling's distance to the first floor (14 meters). Although some areas on the first floor have ceilings with a height of 4.73 meters, most of the first floor receives artificial lighting directly from the upper roof of the building with a monumental scale, causing the second floor to get stronger light than the first floor (Figure 9).

3.2 Perception of Artificial Light in the Holy Spirit Cathedral Denpasar

The perceptions of churchgoers of artificial lighting in the worship room of the Holy Spirit Cathedral Denpasar were obtained through the results of a questionnaire distributed among fifty people using a purposive sampling technique. Respondent profiles were classified according to ethnicity, gender, age, and education level. The majority of visitors of the Holy Spirit Cathedral Denpasar were non-Balinese, as many as 41 people (82%), while 9 people are ethnic Balinese (18%). As many as 33 people (66%) of the population were male, and 17 people (34%) were female. The age range of the people was quite diverse, namely 18 people (36%) were 46 to 50 years old occupied the highest position, as many as 14 people (28%) were 36 to 45 years old, as many as 10 people (20%) were 17 to 25 years old. Meanwhile, among people aged 26 to 35 years were 5 people (10%) and people aged over 60 years were as many as 3 people (6%). Based on the level of education, people with a bachelor's degree education occupied the highest position with as many as 32 people (64%), people with senior high school were as many as 15 people (30%), and people with a postgraduate degree were as many as three people (6%).

As can be seen in Table 1, the artificial lighting in the altar area was considered to have very bright light, while the artificial light in the parish area and circulation area was perceived to have bright light. To determine the strength of the artificial light, a digital lux meter was used to measure several areas where worship activities take place, namely, the sanctuary area, the first floor of the nave area, the second floor of the nave (mezzanine), the circulation area of the first floor and the area of second floor circulation (mezzanine). The division of the areas is based on the hierarchy and level of importance, namely the sacred area (sanctuary) and the profane area (nave and circulation). The measurement results using a digital lux meter were compared with the minimum lighting level standards for worship buildings according to the Ministry of Public Works (1978) to determine whether the three areas meet or do not meet the specified standard.

Table 1 Respondents' perceptions of artificial light in the Holy Spirit Cathedral of Denpasar.

Area	Very Bright		Bright		Not Bright		Total		Valuation	
	Num of Res p	%	Num of Resp	%	Num of Resp	%	Num of Resp	%		
Sanctuary (altar)	27	54	23	46	0	0			Very Bright	
Nave	First floor	16	32	34	68	0	0	50	100	Bright
	Second floor									
Circulation	First floor	16	32	27	54	7	14			Bright
	Second floor									

Based on the description of Table 2, the following conclusions were obtained:

1. The presence of artificial lighting in the sanctuary area of 95 lux is considered to be able to accommodate worship activities, although it is still far from the standard minimum levels of lighting that apply. However, most respondents perceived the lighting in the altar area as very bright (54%), and they can follow the entire worship procession centered in the area well. Meanwhile, as many as 46% of the respondents thought that the nave area has bright lighting so that the area where the priest resides can be seen clearly, as prescribed in the General Instruction of the Roman Missal (GIRM 295) [9].
2. The nave area on the first floor has strong artificial lighting, which is considered to not meet the minimum standard level of 45 lux. Meanwhile, the lighting strength of the artificial lighting on the second floor of the nave of 563 lux is considered to meet the minimum lighting level standards. It can be concluded that the area of the nave on the first and second floors has a significant difference in light strength, namely 45 lux against 563 lux. However, as many as 68% of the respondents thought that the two areas have bright lighting levels and can accommodate all the worship activities well.
3. The circulation in the places of worship has a linear pattern similar to that of Catholic church buildings in general. The first-floor circulation area has a light luminance of 53 lux, which is considered to not meet the standard minimum level of lighting. Meanwhile, the presence of artificial lighting in the second-floor circulation area has a high lighting level equal to 478 lux. The artificial lighting in the circulation area of the first floor and the second floor has a significant difference in light

intensity. However, as many as 54% of respondents considered that the presence of artificial light in the circulation area on the first and second floors was able to appropriately accommodate all worship activities.

Table 2 Analysis of the presence of artificial lighting in the worship room.

Artificial Lighting Area		Field Measurements (lux meter)	Lighting Level Standard	Valuation Result	Perception
Sanctuary (Altar)	Sacred	95 lux	300 lux or more	Doesn't meet the standards	Very Bright (54%)
Nave (First floor)	Profane	45 lux	100 - 200 lux	Doesn't meet the standards	Bright (68%)
Nave (Second floor)		563 lux	100 - 200 lux	Meets the standards	
Circulation (First floor)		53 lux	100 lux	Doesn't meet the standards	Bright (54%)
Circulation (Second floor)		478 lux	100 lux	Meets the standards	

The worship space as a gathering place for believers in liturgical celebrations cannot be separated from the presence of artificial light through its pragmatic, psychological, and symbolic functions. The pragmatic function of the artificial light in the worship room of the Holy Spirit Cathedral Denpasar, based on the measurement of the strength of the lighting in several areas, is considered to not have a significant influence on liturgical celebration activities. Devotees who participate in worship activities are not disturbed by the strong lighting that does not meet the standard minimum levels of lighting, as long as the artificial lighting can still accommodate all worship activities through its psychological and symbolic functions. Such a condition is based on the view that God is described as a mystery beyond human comprehension, as the only one who is eternal, He resides in an unfathomable light, and no one has ever seen Him (1 Tim 6:16) [10].

According to the Catholic faith, if humans love their lives, they should respect mystery, because God is the source, support, and purpose of our lives in the form of mystery. The relationship between a person and God is very personal and transcendent, which can only be reached through faith and sacred religious experience. The Indonesian Bishops' Conference in [11] states that religious experience comes from humans themselves, whereas faith originates from the word of God. Thus, the presence of artificial lighting in the worship room of the

Holy Spirit Cathedral Denpasar does not only rely on its pragmatic function but prioritizes its psychological and symbolic functions.

Artificial light with its psychological function plays a role in shaping the atmosphere and emotional experience of space (sense of place). This statement is confirmed by the opinion of Wibisono in [12] that the presence of light has the greatest influence in forming a sacred and contemplative atmosphere in a place of worship. Meanwhile, Russ *et al.* in [13] argued that a sense of place develops through personal experiences that determine how a person perceives, interprets, and interacts with their world. Thus, the sense of place that people feel in the worship room of the Holy Spirit Cathedral Denpasar will create a place attachment because religious buildings can provide emotional experiences through the atmosphere of space formed by the presence of artificial light. Meanwhile, the presence of artificial lighting in the worship room with its symbolic function is understood by churchgoers as a transcendent and immanent divine manifestation.

While God is described as a distant figure (transcendental) present to the world to approach his people, the delivery of this meaning is represented concretely through the presence of artificial lighting, which describes God's close relationship with his people (immanent) through the experience of faith that is transcendental. This statement is strengthened by the presentation of the Indonesian Bishops' Conference (1996:134) in the New Testament that humans are still far from God, "because our life is alive by belief, not by sight." (2 Cor 5:7) [14]. The relationship between humans and God cannot be reached through the visual aspect because faith is a belief that grows through a continuous inner struggle to seek and find God's light as a form of appreciation. The presence of light in the worship room should be able to convey a religious message, which can be realized through the right light arrangement so that the religious message can be responded to by the devotees and understood in the church as a religious setting [15]. Thus, the development of a good relationship between the Creator and His people can realize the active participation of the faithful so that it becomes the main source for fostering a true Christian spirit as declared in the document of the Second Vatican Council (SC 14) [16].

The artificial lighting in the worship room of the Holy Spirit Cathedral Denpasar that does not meet the standard minimum levels of lighting causes the atmosphere of the worship room to be dim, even tending towards dark, especially in the altar area, equal to 95 lux, as a place to present the sacrifice of the cross. However, the presence of a strong difference in lighting between the altar area and the nave can strengthen the sacred impression of the altar area [17]. The altar area as a sacred space is designed to represent the intimate

relationship between humans and God as part of the mystery of God's saving work.

Sacred space is a place where communication is possible between this world and the other world, which emerges after the breakdown of the level that allows communication with the transcendental world, or transcendent reality [18]. A dark situation creates a solemn and sacred atmosphere so that people who believe in Christ are encouraged to acknowledge all darkness within themselves and allow the light of God to shine through a very personal (intimate) and abstract relationship, based on faith and transcendental experience. This is an important finding because the relationship between humans and God is has to be based on conviction and belief, not on sight. Thus, the atmosphere of the room with strong artificial lighting below the standard level can still encourage people to contemplate welcoming the real presence of Christ through the celebration of the Eucharist as the source and culmination of all Christian life.

4 Conclusions

Artificial lighting in the worship room of the Holy Spirit Cathedral Denpasar is related to its symbolic function of creating a spatial atmosphere, most of which prioritizes fulfillment of the religious needs of its visitors rather than prioritizing visual comfort. The pragmatic function of light in the worship space is considered a supporting aspect, while light with its psychological and symbolic functions as the main design element is very influential and essential in creating an atmosphere of space that provides a religious experience for the adherents. Thus, although the presence of artificial lighting in the worship space does not meet the standard of visual comfort, churchgoers consider the presence of artificial light to be able to accommodate the entire procession of worship activities. However, the presence of light in the worship room of the Holy Spirit Cathedral Denpasar is considered to need improvement by paying attention to the visual comfort of the devotees. With the fulfillment of the pragmatic, psychological, and symbolic functions of artificial lighting, these functions are integrated, creating a harmonious relationship between God and humans through religious experiences that can be felt by the church visitors.

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