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Analysis of the Floodlight Lighting Effect on the Visual Quality of the Phinisi Tower Building Facade

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Abstract

Lighting is one of the important factors to recognize the environmental situation. Lighting is needed by humans, with good lighting we can visually recognize objects clearly. The suitability of lighting with recommended light standards and the arrangement of building facades in accordance with the distribution of lighting will have an impact on the visual quality of a building. Along with the development of technology and information, people's lifestyles are increasingly advanced and developing. Likewise, the function of artificial lighting, which used to only function as lighting at night, has now developed into an important part of the aesthetic forming factor of a building. So there is a need for a survey to see how big the difference in perception of the visual quality of lighting using floodlights on the Phinsi Tower. The survey method of data collection used quantitative and qualitative research methods. Mixed methods are divided into quantitative methods (research using questionnaires and SPSS data processing) and qualitative (respondent perception, interview and observation). Based on the results of surveys and tests conducted on 17 simulation models, different results were obtained in each test model. This explains that the use of floodlights greatly influences the visual quality of the Phinisi Tower facade. Of the 17 lighting simulation models that have been made, Model 17 has the highest average score of 5.08 and the lowest is Model 10 of 2.53 (a rating scale of 1 to 7).

Keywords: Lighting; lighting simulation; visual quality

1. Introduction

Exterior lighting of buildings and their appearance at night is an important issue in architectural design. While the effect of natural daylight on the appearance of a building during the day is not completely under the control of the designer, exterior lighting at night is a design choice that can strongly effects the beauty of a building. The current research Delft University of Technology examined the effect of exterior lighting on the appearance of buildings at night using a questionnaire-based research methodology accompanied by in-depth statistical analysis of the results [1].

To get the desired impression and character, a flexible lighting system is needed. The use of spotlights is considered the most appropriate because spotlights have high flexibility in terms of lighting levels (lux) to lighting angles (angle). Not only that, spotlights also have a wide beam angle that can be adjusted as needed.

The lighting quality of a building is largely determined by the feelings that arise in someone who visually accesses it. The perception of lighting is the result of the brain's interpretation and physiological reactions to the lighting regulation. The psychological perception of lighting depends not only on the intensity of light, the pattern of light and the color of the light, but also on the experience, culture, and mood of the person who observes it. Thus, the quality of building lighting is not something that can be measured quantitatively, but must go through a direct approach to everyone who visually accesses it.

To optimize the lighting, all relevant aspects that together make lighting quality need to be considered. It is not straightforward to determine all these aspects, as this research is extensive and complex; therefore, this kind of research is limited. The first step in optimizing the lighting quality is measuring all relevant photometric aspects, related to the understanding of lighting quality [2].

Therefore, in maintaining the information and visual quality of a building, it is necessary to conduct research to see the quality of its lighting. To know this, it takes a perception from the community's point of view to assess so that the results obtained are objective.

By considering the philosophy, the shape of the building and the lighting applied to the Phinisi Tower, this building is very interesting to be used as research material for a visual quality of the building facade, to study the factors and the phenomena that exist in shaping the pattern of lighting arrangements on the unique Phinisi tower facade.

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2. Literature Review

2.1. Facade

The word facade is taken from the Latin word "facies" which is a synonym for the words *face* and *appearance* Therefore, the facade is translated as the front part facing the street [3]. The facade of this building is also often called the appearance, the outer skin or the appearance of the building, because the facade of a building is the one that is most often given an assessment by observers without firstly checking the entire building, both on the outside and on the inside of the building.

In rural areas of Europe, however, facade lighting is often the brightest and most conspicuous source of lighting in a region. For example, Jechow et al. recently reported that 9% of the public light sources in a Spanish town of about 16,000 were for ornamental lighting, and that switching these lamps off reduced the artificial sky brightness overhead on a clear night by 20% at a location 1 km from the town center [4].

The appearance of the building facade in an area has an important role to build a visual character of the area that can describe the image of the area itself. A character will make it easier for people to recognize the area itself [5].

2.2. Floodlight lighting

Spotlights are lights that shine their rays in one direction. This tool projects light which is usually sourced from a high-pressure sodium lamp or LED lamp, with a parabolic reflector mirror.

Figure 1 describes light scattering patterns in floodlights lighting. Spotlights and floodlights are two types of light scattering patterns, the term refers to how the light is projected. Floodlights are generally used to illuminate a large area. On the contrary, spotlights are designed to travel a longer distance but in a much narrower beam [6].

2.3. Outdoor lighting

Good exterior lighting with decorative luminaires also underlines the stylistic statement made by the building's architect and adds to the appeal of the complex as a whole [7].

The following aspects should be taken into account for outdoor lighting (squares, gardens, buildings and facades) [8]:

a. The illumination according to the target area to be visualized, both horizontally and vertically.

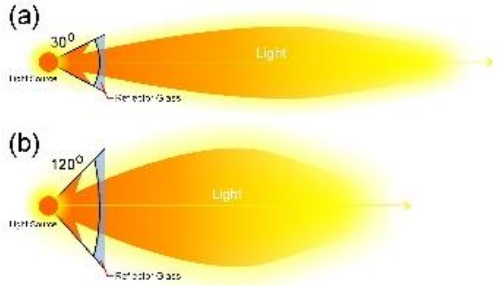

Figure 1. Light scattering patterns: (a) Spotlight; (b) Floodlight

b. The creation of a three-dimensional perception of a room through different levels of brightness and nuance.
c. A balanced brightness distribution.
d. The avoidance of strong dark-light contrast.
e. The limitation of glare effect for occupants and passersby
f. Choosing a suitable light color and color rendering.
g. No "unused" light.
h. When lighting a horizontal area there is no light emission at the top of the room.

2.4. Visual quality

Some experts say that 80% of information is received by humans visually through the senses of sight or eyes. While on the other hand, the eyes will be able to see an object if there is light with adequate intensity [9]. According to Lam, our judgment of space depends on how it meets our expectations. We base our judgment on whether a room is bright or dark not actually because of the level of lighting, but the state of whether environmental lighting can meet expectations and satisfy visual information needs or not [10].

There are 3 important things that support visual quality: a series of views (optic), the reaction of the observer with the place (place), and the elements of space in it (content) [11].

Different light sources have their own spectral characteristics and we might therefore be able to characterize the chromaticity and pollution performance of some of these sources. Hale's work showed that some traditional light sources, low pressure sodium, high pressure sodium, metal halide and mercury vapor lamps, could be classified from aerial night photograph using color information with a good accuracy [12].

Those things are also found in the design of outdoor lighting (building facades). Where by considering the arrangement of lights, the perception or assessment of respondents, and the influence of the elements forming the facade, we can obtain a good visual quality assessment of the building. The approach is based on photographic method to measure the luminance of the facade. Using qualitative assessment, pictures will be indexed with a qualitative criterion (aggressive or attractive), but most important, with a quantitative criterion (measured luminance). The approach is based on photographic method to measure the luminance of the facade. Using qualitative assessment, pictures will be indexed with a qualitative criterion (aggressive or attractive), but most important, with a quantitative criterion (measured luminance) [13].

3. Research Methods

This research uses mixed method. Mixed research method basically emerge from problems that arise when researchers cannot obtain complete data using quantitative or qualitative methods [14]. The focus of mixed method is to collect, analyze and combine quantitative and qualitative data in one study or one research session.

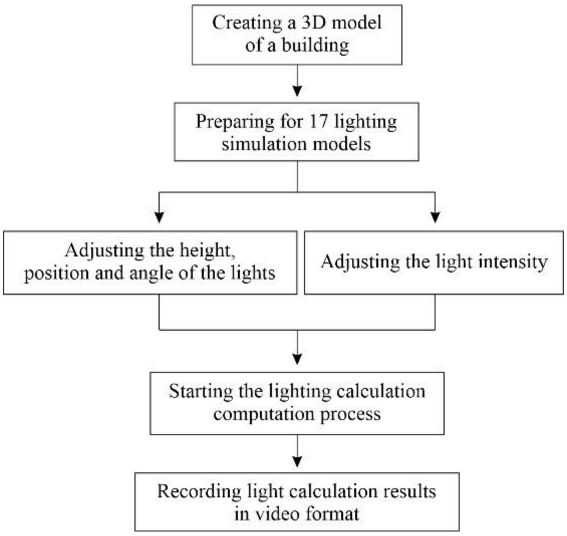

Figure 2. Light simulation setup using the dialux evo application

In this study, what was observed was the visual quality of the facade lighting of the Phinisi Tower. In the case of research on the visual quality of artificial lighting, especially at the Phinisi Tower, experimental research is used. In the experimental method, researchers must carry out three requirements, namely controlling, manipulating, and observing activities.

Figure 2 describes the setup of simulation. After conducting a field analysis and collecting all the necessary data, the researcher then made a simulation using the DIALux evo application to calculate the light scattering pattern and then presented it to the respondents in the form of a video simulation to be assessed.

3.1. Research Location

Figure 3 is the research location. The research is located on Jalan Andi Pangeran Pettarani, Rappocini District, Makassar City, South Sulawesi and the object of research is the iconic Makassar City building, the Phinisi Tower.

Phinisi Tower was chosen because the building is considered full of meaning and full of philosophy in each of its parts. The Phinisi Tower building consists of 17 floors and has openings in the building envelope on each floor with the same area and shape, except for the front left and right sides of the building. the shape of the Phinisi Tower building with a Paraboloid hyperbolic facade model [15]. On the front and back sides of the tower, there are 3-dimensional folding materials formed from a series of triangular and trapezoidal planes made of aluminum composite panels shown in Fig. 4.

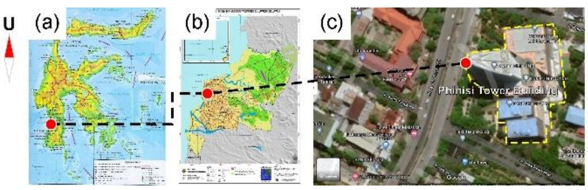

Figure 3. Research location: (a) Map of Sulawesi; (b) Map of Makassar; (c) Map of Phinisi Tower Building Location

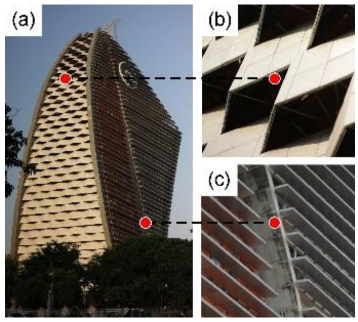

Figure 4. Buliding detail: (a) Phinsi tower; (b) Folding material (ACP); (c) Sun shading

3.2. Visual quality assessment variables

This study aims to see and analyze the effect of lighting on the visual quality of the Phinisi Tower facade at night. Figures 6 to 14 is a visualization simulation of lighting used to assess respondents' perceptions of the visual quality of the buildings.

In the design of illumination, it is expected that some of the light rays emitted from the floodlights towards the upper facade parts after reflection could be directed towards observers, ensuring the proper level of luminance of the facade [16].

Table 1 shows researchers use 14 variables of assessment. Respondents can give a value to each variable to finally be used as an assessment of the visual quality of the building facade.

Observations were made on the facade of the Phinisi tower from the left side, front side and right side of the building. The height of the phinisi tower is 97.5 meter (including lightning rod elements) with a base length of 25 meter at the front and 45 meter from the side. The front facade that faces to Andi Pangeran Pettarani street gets more highlights or lights than the side of the building.

Table 1. Visual quality assessment variables

No.	Variable (X)
1	Brightness (Dark – Light)
2	Texture (Blur - Clear)
3	Shadow (Irregular shading pattern - Regular)
4	Lighting (Not Applicable - Applicable)
5	Harmony (Harmony - Contrast)
6	Symmetrical (Asymmetric - Symmetrical)
7	Attractiveness (Monotone – Varied)
8	Lighting effect (Not dominant – Dominant)
9	Ambience (Not Inviting – Inviting)
10	Arts (Not Interesting - Interersting)
11	Proportionality (Disproportionate - Proportionate)
12	Visual comfort (Boring – Fun)
13	Basic form (Simple - Complex)
14	Effect (Dislike - Like)

Figure 5. Lighting angle and height information

By adjusting the angle, height and intensity of the light used, different facade lighting patterns are found, especially in the front facade lighting shown in figure 5.

3.3.Population and sample

Determination of population and sample using purposive sampling technique. The purposive sampling technique, also called judgment sampling, is the deliberate choice of a participant due to the qualities the participant possesses. It is a nonrandom technique that does not need underlying theories or a set number of participants. Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience [17].

A total of 60 respondents are active students or architectural scholars who come from outside and within the city of Makassar.

3.4. Data collection

The data collected are divided into primary and secondary data. Primary data includes observations and questionnaires. Through observation techniques, researchers can obtain data on the pattern of lighting arrangements, types of lamps, the level of illumination in the building and the visual impact felt by the community around the Phinisi Tower. The researcher used a semi-open questionnaire in this study, which was supported by interviews to crosscheck the answers to the questions in the questionnaire that were not understood by the respondents.

In terms of data collection techniques, this research is quantitative, namely prioritizing the use of questionnaires, while qualitative research is used during interviews and observations [18].

The measurement scale used is a semantic differential scale type. The differential scale is a scale to measure attitudes and perceptions, but the form is not multiple choice or checklist, but is arranged in a continuum line where the most positive answer is located on the rightmost and vice versa [19].

Secondary data are obtained by taking documentation or information that has been collected by other parties or related agencies. This documentation function is used as a support and a complement to the primary data obtained through observation and questionnaires.

3.5.Data analysis

Data analysis in mixed method research refers to a research methodology that emphasizes the systematic integration or "mixing" of qualitative and quantitative data in single research or continuous programs. This integration allows for a more complete and synergistic use of data than the separate collection and analysis of quantitative and qualitative data. The use of this mixed method is needed to achieve results in form of values or percentages, visual quality, and respondents' perceptions of the Phinisi Tower facade lighting.

In comparing the visual quality of each building facade lighting model, the results of the questionnaire were formulated into a table and then processed using the SPSS 16 analysis program using the Multiple Linear Regression analysis method to obtain the average value and the percentage of assessment, in order to determine the aspects that affect respondents' perceptions of a lighting quality. Linear regression is used to determine the effect of one or several independent variables on one dependent variable. In general, linear regression is divided into two, namely simple linear regression with one independent variable and one dependent variable, and multiple linear regression with several independent variables and one dependent variable [20].

4. Results and Discussion

4.1. Model characteristics and lighting simulation results

In this study, researchers used 17 models of lighting patterns. Table 2 shows a description of the detail specifications and the pattern of laying the lights in the simulation.

Table 2. Specifications and patterns of laying lights on the simulation

Model	Light Type	Number of Lamps	Height (Ev)	Angle	Light intensity (hm)	Power (w)
Existing	*SVHPL*	3	± 0,00	45◦	-	250
Model 1	*SVHPL*	1	± 0,00	45◦	500878	250
Model 2	*SVHPL*	2	± 0,00	45◦	500878	250
Model 3	*SVHPL*	1	± 0,00	45◦	500878	250
Model 4	*SVHPL*	1	± 0,00	45◦	500878	250
Model 5	*SVHPL*	3	± 0,00	45◦	500878	250
Model 6	*SVHPL*	3	± 0,00 + 12,00	45◦, 0º	500878	250
Model 7	*SVHPL*	2	± 0,00 + 12,00	45◦, 0º	500878	250
Model 8	*SVHPL*	2	± 0,00 + 79,00	45◦, -40º	500878	250
Model 9	*SVHPL*	2	± 0,00, +79,00	45◦, -65◦	500878	250
Model 10	*SVHPL*	2	± 0,00, ± 0,00	45◦	500878	250
Model 11	*SVHPL*	4	± 0,00	45◦	300878	250
Model 12	*SVHPL*	2	+ 12,00	0◦	300878	250
Model 13	*SVHPL*	1	+79,00	-78◦	300878	250
Model 14	*SVHPL*	6	± 0,00, +12,00	45◦, 0◦	300878	250
Model 15	*SVHPL*	4	± 0,00, +79,00	45◦, -78◦	300878	250
Model 16	*SVHPL*	3	+ 12,00 +79,00	0◦, -78◦	300878	250
Model 17	*SVHPL*	7	± 0,00, +12,00, +79,00	45◦, 0◦, -78◦	300878	250

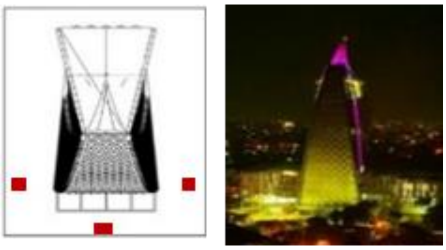

Figure 6. Existing condition

Table 3. Average luminance value of the phinisi tower existing conditions

Average Value	
Existing	4.48
X < 4 = negative value; X > 4 = positive value	

Figure 6 shows the position and height of the phinisi tower lights. Lighting in the existing Phinisi Tower currently uses a Sodium Vapor High-Pressure Lamp (SVHPL) type, floodlight which is located in the middle-front of the building and on the left and right side of the building.

Table 3 shows the average value of the visual quality of lighting in the existing condition of the Phinisi Tower given by the respondent of 4.48 and has a positive value (X>4), which means it has good lighting. Figure 7 shows the position and height of the phinisi tower lights. Table 4 shows the average value of the visual quality of the lighting of the Phinisi Tower between model 1 and model 2 given by respondents ranging from 4-5 with an average of 4.32 for model 1 and 4.55 for model 2. the visual quality of lighting on model 1 and model 2 is positive (X>4) which means it has good lighting.

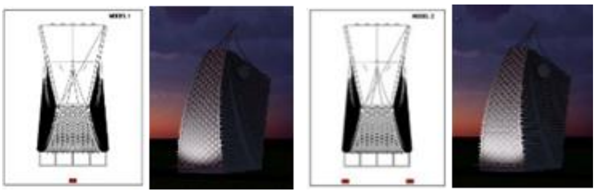

Figure 7. Model 1 and Model 2

Table 4. Average luminance value of the Model 1 and Model 2

Average Value	
Model 1	4.32
Model 2	4.55
X < 4 = negative value; X > 4 = positive value	

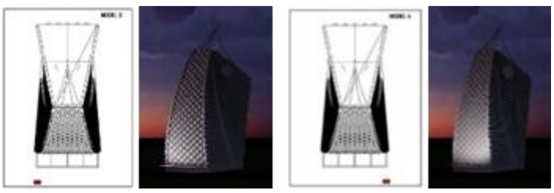

Figure 8. Model 3 and Model 4

Table 5. Average luminance value of the Model 3 and Model 4

Average Value	
Model 3	4.53
Model 4	4.05
X < 4 = negative value; X > 4 = positive value	

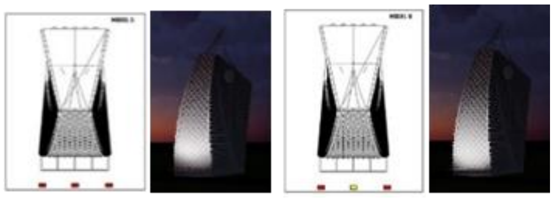

Figure 9. Model 5 and Model 6

Table 6. Average luminance value of the Model 5 and Model 6

Average Value	
Model 5	4.50
Model 6	4.25
X < 4 = negative value; X > 4 = positive value	

Figure 8 shows the position and height of the phinisi tower lights. Table 5 shows the average value of the visual quality of the lighting of the Phinisi Tower between model 3 and model 4 given by respondents ranging from 4-5 with an average of 4.53 for model 3 and 4.05 for model 4. These results indicate that the assessment the visual quality of lighting on model 3 and model 4 is positive (X>4) which means it has good lighting.

Figure 9 shows the position and height of the phinisi tower lights. Table 6 shows the average value of the visual quality of the lighting of the Phinisi Tower between model 5 and model 6 given by respondents ranging from 4-5 with an average of 4.50 for model 5 and 4.25 for model 6. the visual quality of lighting on model 5 and model 6 is positive (X>4) which means it has good lighting.

Figure 10 shows the position and height of the phinisi tower lights. Table 7 shows the average value of the visual quality of the Phinisi Tower lighting between model 7 and model 8 given by respondents ranging from 4-5 with an average of 4.34 for model 7 and 4.30 for model 8. the visual quality of lighting on model 7 and model 8 is positive (X>4) which means it has good lighting.

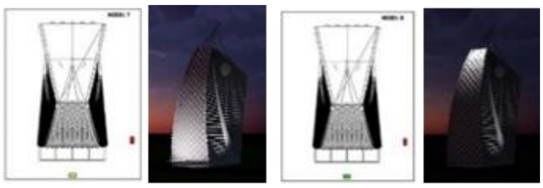

Figure 10. Model 7 and Model 8

Table 7. Average luminance value of the Model 7 and Model 8

Average Value	
Model 7	4.34
Model 8	4.30
X < 4 = negative value; X > 4 = positive value	

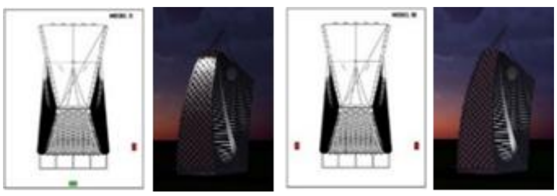

Figure 11. Model 9 and Model 10

Table 8. Average luminance value of the Model 9 and Model 10

Average Value	
Model 9	4.82
Model 10	2.53
X < 4 = negative value;	X > 4 = positive value

Figure 12. Model 11 and Model 12

Table 9. Average luminance value of the Model 11 and Model 12

Average Value	
Model 11	4.18
Model 12	4.11
X < 4 = negative value;	X > 4 = positive value

Figure 11 shows the position and height of the phinisi tower lights. Table 8 shows the average value of the visual quality of the lighting of the Phinisi Tower between model 9 and model 10 given by respondents ranging from 2-5 with an average of 4.82 for model 9 and 2.53 for model 10.

These results indicate that the assessment the visual quality of lighting on model 9 is positive (X>4) and model 10 is negative (X<4), which means that the value of visual quality of lighting for model 9 is quite good while model 10 has poor lighting.

Figure 12 shows the position and height of the phinisi tower lights. Table 9 shows the average value of the visual quality of the lighting of the Phinisi Tower between model 11 and model 12 given by respondents ranging from 4-5 with an average of 4.18 for model 11 and 4.11 for model 12. These results indicate that the assessment the visual quality of lighting on model 11 and model 12 is positive (X>4) which means it has good lighting.

Figure 13 shows the position and height of the phinisi tower lights. Table 10 shows the average value of the visual quality of the Phinisi Tower lighting between model 13 and model 14 given by respondents ranging from 2-5 with an average of 2.65 for model 13 and 4.95 for model 14.

Figure 13. Model 13 and Model 14

Table 10. Average luminance value of the Model 13 and Model 14

Average Value	
Model 13	2.65
Model 14	4.95
X < 4 = negative value;	X > 4 = positive value

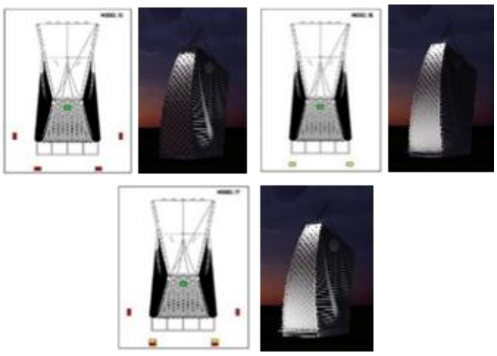

Figure 14. Model 15, Model 16 and Model 17

Table 11. Average luminance value of the Model 15, Model 16 and Model 10

Average Value	
Model 15	3.94
Model 16	4.47
Model 17	5.08
X < 4 = negative value;	X > 4 = positive value

These results indicate that the assessment the visual quality of lighting in model 13 is negative (X<4) and model 14 is positive (X>4), which means that the visual quality of lighting for model 13 is not good while model 14 has good lighting.

Figure 14 shows the position and height of the phinisi tower lights. Table 11 shows the average value of the visual quality of the Phinisi Tower lighting between models 15, 16 and model 17 given by respondents ranging from 3-6 with an average of 3.94 for models 15, 4.47 for models 16 and 5.08 for model 17. These results indicate that the assessment of the visual quality of lighting on model 15 is negative (X<4) and model 16, 17 is positive (X>4), which means that the value of the visual quality of lighting for model 15 is slightly less good, while models 16 and 17 have good lighting.

4.2. Analysis of the visual quality perception results

Previously, a visualization simulation test was carried out using the DIALux evo application and it was also known the average value of each lighting model. Then the data is compiled and arranged into a graph table to see the comparison of each simulation model.

From the graph (Fig. 15), it can be seen that the lighting simulation models 10 and 13 are simulation models that have poor lighting quality and are inversely proportional to the simulation model 17 which gets the highest rating from almost all respondents.

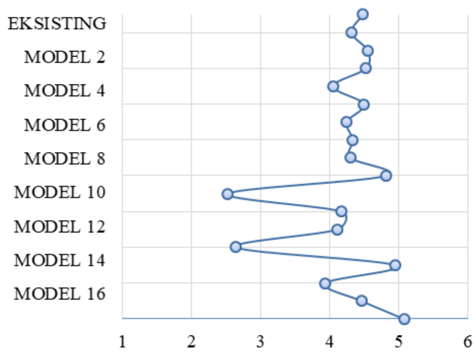

Figure 15. Average rating of each lighting model

Table 12. the percentage of respondents voted

Respondent Rating	%	EKS	%	Model 1	%	Model 2
X < 4 (Negative Value)	13	8	30	18	13	8
X > 4 (Positive Value)	87	52	70	42	87	52
Respondent Rating	%	Model 3	%	Model 4	%	Model 5
X < 4 (Negative Value)	12	7	43	26	27	16
X > 4 (Positive Value)	88	53	57	34	73	44
Respondent Rating	%	Model 6	%	Model 7	%	Model 8
X < 4 (Negative Value)	40	24	27	16	33	20
X > 4 (Positive Value)	60	36	73	44	67	40
Respondent Rating	%	Model 9	%	Model 10	%	Model 11
X < 4 (Negative Value)	10	6	87	52	37	22
X > 4 (Positive Value)	90	54	13	8	63	38
Respondent Rating	%	Model 12	%	Model 13	%	Model 14
X < 4 (Negative Value)	37	22	87	52	17	10
X > 4 (Positive Value)	63	38	13	8	83	50
Respondent Rating	%	Model 15	%	Model 16	%	Model 17
X < 4 (Negative Value)	53	32	30	18	10	6
X > 4 (Positive Value)	47	28	70	42	90	54

Table 12 is the detail of respondents' percentage choices for each simulation model. as many as 60 respondents participated in this study

4.2.1. Classic assumption test results

a. Normality test

Normality test in Table 13 was done by Kolmogorov Smirnov test. The results of the analysis showed that the significance of the Kolmogorov Smirnov test was 0.318 > 0.05 (α=5%). These results conclude that the assumption of normality has been met.

Table 13. Normality test result

One-Sample Kolmogorov-Smirnov Test[a)]

		Unstandardized Residual
N		60
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	.20969359
Most Extreme Differences	Absolute	.124
	Positive	.065
	Negative	-.124
Kolmogorov-Smirnov Z		.958
Asymp. Sig. (2-tailed)		.318

a) Test distribution is normal

Table 14. Multicollinearity test result

Variable	VIF
X1 (Brightness)	6.033
X2 (Texture)	4.246
X3 (Shadow)	5.265
X4 (Lighting)	4.340
X5 (Harmony)	5.265
X6 (Symmetrical)	7.912
X7 (Attractiveness)	2.296
X8 (Lighting effect)	3.715
X9 (Ambience)	4.125
X10 (Arts)	7.260
X11 (Proportionality)	5.262
X12 (Visual comfort)	4.767
X13 (Basic form)	2.548
X14 (Effect)	4.513

Table 15. Coefficient of determination

Model Summary[b)]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.571[a)]	.326	.116	.11818

a) Predictors: (Constant), X14, X2, X13, X5, X7, X4, X8, X9, X12, X11, X3, X1, X10, X6
b) Dependent Variable: Y

b. Multicollinearity test

Multicollinearity test in Table 14 was carried out by looking at the variance inflation factor (VIF) value. The results of the analysis show that the VIF value is < 10.

c. Autocorrelation test

The autocorrelation test was carried out using the Runs Test, where the value of Asym. Sig. obtained is 0.118 > 0.05. So it can be concluded that there is no autocorrelation in the regression model or in other words the non-autocorrelation assumption has been fulfilled.

4.2.2. Coefficient of determination

Table 15 is the value of the coefficient of determination generated in the regression model in this study. The value of the correlation coefficient (R) shows how closely the relationship between the independent variable (X) and the dependent variable (Y), the value of the correlation coefficient is 0.571. This value indicates that the relationship between variable X and variable Y is 57.1%. The results of the SPSS calculation obtained the value of R2 = 0.326, which means that 32.6% of the lighting quality can be explained by the X variable. While the remaining 67.4% is influenced by other variables outside the model studied.

4.2.3. F test results

F test is a test that is carried out to see simultaneously (overall) the relationship between the Xn variable and the Y variable. Table 16 summarizes the results of the F test generated in the regression model in the study.

Table 16. F test results

ANOVA[b)]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.406	14	3.815	66.168	.000[a)]
	Residual	2.594	45	.058		
	Total	56.000	59			

a) Predictors: (Constant), X14, X2, X13, X5, X7, X4, X8, X9, X12, X11, X3, X1, X10, X6
b) Dependent Variable: Y

Table 17. t test results

Variable	Sig.
X1 (Brightness)	0.06
X2 (Texture)	0.285
X3 (Shadow)	0.514
X4 (Lighting)	0.031
X5 (Harmony)	0.057
X6 (Symmetrical)	0.004
X7 (Attractiveness)	0.588
X8 (Lighting effect)	0.131
X9 (Ambience)	0.495
X10 (Arts)	0.005
X11 (Proportionality)	0.055
X12 (Visual comfort)	0.088
X13 (Basic form)	0.087
X14 (Effect)	0.200

Based on the Table 16, it can be seen that the F test produces a calculated F of 66.168 with a significance value of 0.000 <0.05 (α=5%). From these results it can be concluded that the variable Xn simultaneously affects the quality of lighting.

4.2.4 t test result

t test is a test that is carried out to see partially (respectively) the relationship between the X variable and the Y variable. Table 17 are the results of the t test generated in the regression model in the study. Based on the Table 17, the significance value of the independent variable < 0.05 (α=5%) which has a partially significant effect on lighting quality is X1 (Brightness), X4 (Lighting), X6 (Symmetrical), and X10 (Arts).

From the comparison of visual perceptions above, it is clear that there are differences in perceptions that arise due to the variety of lighting designs. The reason is, lighting is not just dark or light, but rather to realize the desires that arise from the observers of the existing visual conditions related to the architecture of the building. A poor lighting approach to a building that has strong characteristics will actually give a negative perception when choosing or using an inappropriate lighting method.

5. Conclusion

The results of the assessment of respondents' perceptions of the visual quality of the Phinsi Tower facade lighting can be concluded several things, namely, the current lighting of the Phinisi Tower building (existing) is considered to be quite good and in accorandce with its designation as an iconic building in Makassar City. With an average rating of 4.48 (the highest rating is 7), it can be concluded that the Phinisi Tower currently has the right facade lighting.

The visual quality of lighting on the facade of the Phinisi tower can be further improved by using the lighting arrangement pattern of model 17. The visual quality of lighting that is very influential on the facade of the phinisi tower is in terms of "Brightness", "Lighting", "Symmetrical" and "Arts". With appropriate artificial lighting, it can improve the visual quality of the building so that it presents a positive impression.

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