

Integrating Façade Design with Perceptions of Light to Shape the Spatial Experience in Libraries: A Systematic Literature Review

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ABSTRACT

Natural lighting in research spaces such as libraries often only prioritizes arrangements that meet functional needs. Meanwhile, users as the subjects most affected by light quality, need visual stimuli that can influence emotional and comfort in carrying out visual-intensive activities. The facade as an exterior mediator in the interior plays a crucial role in distributing light to form the visual aesthetics and ambience of space, through the diffusion patterns and character of the light formed. This study adapted the Systematic Literature Review method to identify the relationship between facades, natural light, and visual perception in shaping spatial experience in the library. The synthesis of these findings indicates that the dimensions, position, and the complexity of façade geometry and openings affect the perception of light and visual comfort in space. The results of the synthesis of findings in the literature show that the dimensions and position of openings, as well as the complexity of patterns in facade design, affect the perception of light and visual comfort in space. The facade design and light character can modify the visual quality and meaning of the space holistically, especially in the spatial design arrangement of the library. Thus, these findings confirm that interior and facade design not only need to meet technical standards but also must integrate a user-based design approach that is oriented towards the quality of space and subjective experience.

INTRODUCTION

Libraries with contemporary interior design provide a higher value of attraction and space experience, through visual elements that not only function statically but also evolve into more dynamic. Visual comfort through natural lighting settings can be realized with visual illusions in the form of geometric patterns and light and shadow effects (Narkhede, 2021). The rhythm of light, contrast variations, and the play of shadows can influence the visual formation of more complex and aesthetic spaces. Thus, dynamic light is not only able to affect visual comfort, but also has an impact on the perception of space holistically.

The experience of space is basically created through the stimulus of interior and exterior design of buildings, namely in the visual context it can be influenced by elements of light, color, complexity and geometry of design, as well as nature views (St-Jean et al., 2022). In this case, the façade is an architectural element that is able to manipulate the visual of the space and plays a role in shaping the aesthetic quality of the space (Fathy et al., 2020). This has an effect on stimulating emotional satisfaction and cognitive responses of users in the space.

Facades as intermediaries that integrate the interior and exterior spaces of buildings contribute to increasing users' positive perception of their environment (Ibrahim et al., 2020).

Referring to the definition of a façade, the dynamics of natural light patterns into the space are presented through several façade design approaches in the form of openings, sun shading elements, and secondary skin (Unluturk & Kazanasmaz, 2024). There are two main patterns that trigger visual perception, namely the illumination pattern and the shadow pattern. The illumination pattern is formed from the distribution of light and dark light on the surface of the room based on the intensity and direction of light. Meanwhile, shadow patterns can produce depth, texture, and shape perception.

Referring to this, each façade typology and its opening pattern has different characteristics and performance, even more so the impact on the interior space. Based on various façade classifications, dynamic or kinetic façade designs are considered to be able to channel higher light into the space, while visual discomfort can be further effectively minimized with parametric façade design (Elzeyadi, 2017). Although most façade designs tend to have a positive effect on the visual quality of interior spaces, there are still limitations to studies that explore the character of light patterns formed by closed or partially open façade conditions in obtaining visual comfort.

Visual comfort is greatly influenced by the integration between natural lighting systems (daylighting) and adaptive façade design (Tabadkani et al., 2021). The use of secondary skin facades tends to be widely used as the most effective façade design in reducing visual disturbances, because the light distributed into the space is diffuse and more varied (Unluturk & Kazanasmaz, 2024). Nonetheless, the limits of visual comfort and the risk of discomfort glare still have uncertainty regarding the agreement, especially in the context of spaces with high visual-intensive activity functions.

Natural lighting plays a more crucial role in the context of library spaces. The library itself is a reading and learning space that must not only meet functional needs, but also demand visual comfort, support concentration, and improve a positive space experience (Swaris & Perera, 2017). Façade designs that produce certain light patterns can enliven the atmosphere of the space for users through the distribution of dark light, to the received diffusion character. Thus, the interaction between users and the space will trigger a sense of ownership of the space.

Various aspects of façade design, natural lighting, and user perception have been examined in previous studies conducted separately. Therefore, there are still limitations in studies that discuss façade design, light patterns, and visual experience of space in an integrative manner, especially in the context of library space.

Based on this, a study is needed that assimilates a number of findings from the research related to understanding the integration of the role of façade design and light patterns in shaping the spatial experience, as well as its implications for library interior design. Therefore, this study proposes a systematic review of relevant literature, to identify the relationship between façade design, light pattern distribution, and its effect on the visual quality of the interior and the user space experience. This review is expected to contribute to developing a more user-centered approach to interior design.

METHOD

The research was conducted by applying the Systematic Literature Review (SLR) approach to review the relationship between façade design, natural light patterns, and its

implications for the user's space experience more comprehensively. The selection of the SLR approach is intended to provide opportunities for researchers to carry out a structured and systematic process, starting from identification, quality assessment, to transparent synthesis of scientific findings from various previous studies (Lame, 2019). The literature used is based on scientific articles and International Proceedings indexed by SINTA, Scopus, and Google Scholar, which is processed through the SLR method with two main phases, namely the planning phase and the conducting phase as can be seen in Figure 1. The planning phase is carried out through several stages, namely: (1) defining keywords and synonyms related to the study topic; (2) formulate research questions; (3) determine the literature database; (4) defining inclusion and exclusion criteria; (5) formulate a quality assessment index; (6) data extraction (Carrera-Rivera et al., 2022).

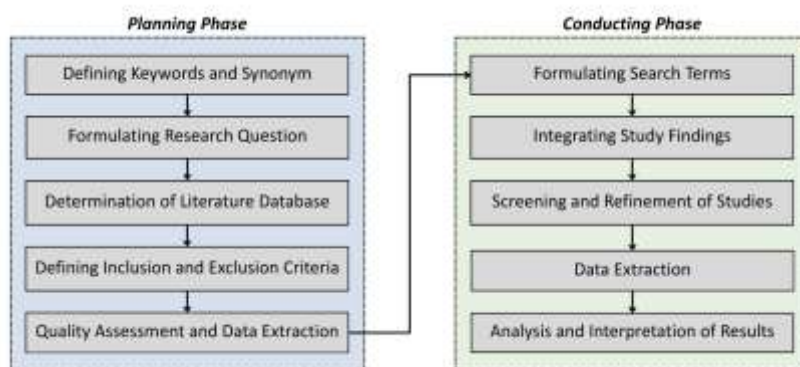


Figure 1. Visualization of the Method Framework Systematic Literature Review
 Source: Author's Processing based on Carrera-Rivera et al. (2022)

The stage of defining keywords and synonyms is processed by mapping interconnected keywords through VOSviewer analysis, as can be seen in Figure 2. Keyword mapping is carried out by involving the process of extracting data from the literature, then the results of the analysis are grouped based on color clustering. The use of the VOSviewer approach serves to identify thematic groups and the relationships between dominant concepts in the literature.

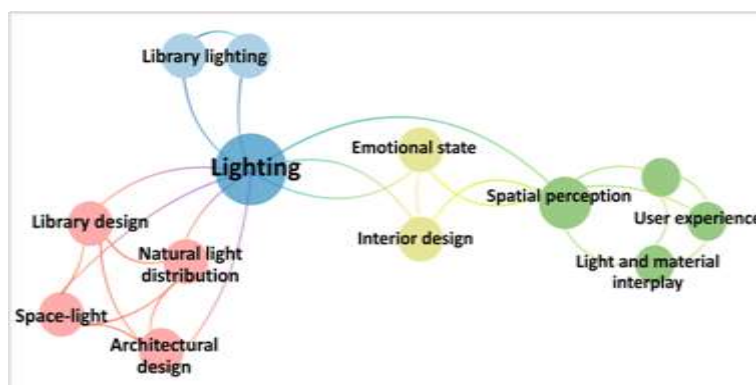


Figure 2. Mapping the Relationship between Keywords in the Literature
 Source: Author's Processing based on VOSviewer Analysis, 2026

Furthermore, formulate the focus of the study and search of literature based on the results of keyword mapping. The literature search was selected based on inclusion criteria which included: (1) scientific articles with novelty of studies in the last ten years; (2) focus on studies relevant to façade design and natural lighting in the context of interior design; (3) research that examines the relationship between natural light and user perception, visual comfort, or spatial experience; (4) studies that are relevant to the context of learning spaces, such as libraries and academic buildings; (5) fully validly accessible articles. On the other hand, articles in the exclusion category are articles that only examine the technical aspects of energy, are not relevant to the context of interior design, articles with a span of more than 10 years, and articles that are not fully accessible.

The next stage, namely the conducting phase, is carried out through stages that include: (1) formulating search conditions; (2) combining study findings; (3) screening and study refining; (4) data extraction; (5) analysis and interpretation of results (Carrera-Rivera et al., 2022). The series of SLR stages is adjusted to the qualifications of the needs of the research topic in order to obtain a substantial analytical synthesis. A number of scientific articles that were assessed in accordance with the inclusion and exclusion criteria were then selected based on the suitability of the criteria that more referred to the needs of the study discussion. Thus, 20 articles were considered to be most relevant to the context of the study. The flow of systematic literature screening through PRISMA analysis (Haddaway et al., 2022) can be seen in Figure 3.

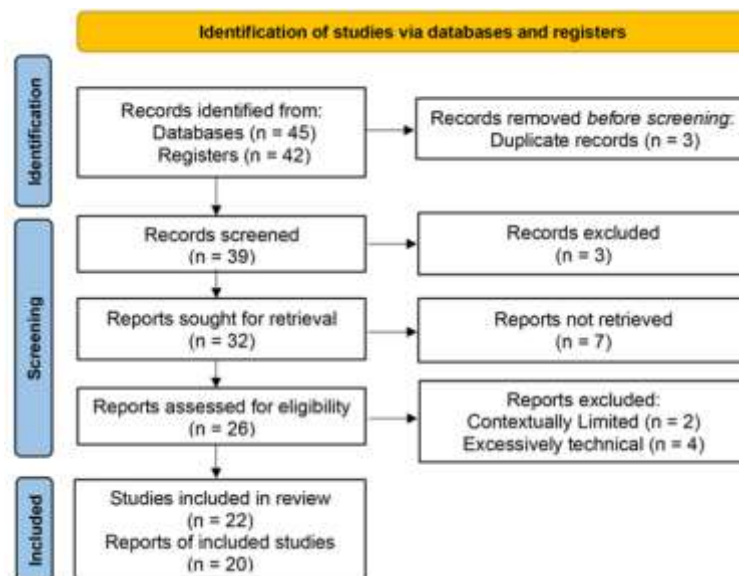


Figure 3. Systematic Literature Review Flow with PRISMA Flow Chart

Source: PRISMA Analysis, 2026

The entire process of the above stages starts from the mapping of keywords and synonyms to the stage of literature filtering explains the process systematically, in order to obtain key findings from a number of selected literatures to be reviewed and elaborated further.

RESULTS AND DISCUSSION

The Systematic Literature Review (SLR) approach is carried out to identify and synthesize studies related to the integration of the role of facades and natural lighting in the formation of visual perception and experience of library interior spaces. The literature was explored through several scientific-based data sources using keywords relevant to the study topic, namely façade design, daylighting, perception of light, spatial experience, and library interior.

The literature screening process is carried out in stages referring to the PRISMA approach, which includes the stages of identification, screening, feasibility, and inclusion. The results of the literature screening process resulted in a number of selected articles which were subsequently used as the basis for analysis in this study. A systematic description of the characteristics and research findings of each analyzed literature can be seen in Table 1.

Table 1. Literature Review

Author and Year	Method	Scope of Research	Key Findings
(Cucuzzella et al., 2023)	Qualitative	Exploration of contemporary facades along with characteristic classification through analytical induction methods.	Most of the buildings in the case study use formal and image-based façade designs just to display the building's iconic impression.
(Elsiana & S Arifin, 2024)	Quantitative	Evaluation of natural lighting in workspaces using perforated façade and light shelf design.	Perforated facades and light shelves are able to increase daylight distribution and reduce the probability of glare, because they diffuse incoming light.
(Elzeyadi, 2017)	Qualitative	Comparative exploration of façade classification to evaluate performance and its effect on the distribution of natural lighting in workspaces.	Each typology of the façade produces different light characteristics and impacts on the interior space. Dynamic facades distribute light more clearly in the space, while visual discomfort can be effectively minimized with parametric façade design.
(Unluturk & Kazanasmaz, 2024)	Qualitative	The research is based on an empirical study analysis method related to the performance of natural lighting in the space formed through the design of a double skin façade.	Double skin facades (DSF) provide high visual interest and can control excess light because it is diffuse. DSF is the right design solution to reduce visual distractions, as the distribution of light produced is homogeneous.
(Deng et al., 2022)	Quantitative	Design analysis with dynamic natural light sensitivity simulation to explore its role in visual comfort in the reading room.	A space opening with considerable dimensions is highly recommended. The aperture ratio and light transmission affect visual comfort significantly when compared to other parameters.
(Chamilothori et al., 2022)	Mix-methods	Analysis of spatial perception and experience of 4 façade typologies based on Virtual Reality (VR), through façade geometry parameters, daylight conditions, types of activities, and location.	Facade geometry plays a significant role in shaping the perception of space through dark light visuals, light contrast, and the resulting visual distribution. This has an impact on emotional responses, cognitive abilities, and spatial context in the space.
(Nabil et al., 2025)	Mix-methods	Virtual Reality (VR) simulation to analyze the relationship between the sensory aspects of light,	High light intensity with a subtle texture makes the space feel bright, while spaces that are too contrasting and textured tend to result in a gloomier atmosphere. The

		space, materials, and their impact on users' emotions and perceptions.	integration between the aspects of light and space helps the user in recognizing and interpreting the space.
(Swaris & Perera, 2017)	Mix-methods	Descriptive-comparative analysis related to light and spatial perception in reading rooms, based on three types of aperture directions and their effects on light distribution and visual experience.	Users find it most comfortable to read with 300 lux lighting compared to 500 lux according to the standard. The use of clerestory openings and lighting from above is more comfortable compared to regular openings on the wall, as the light is more diffused and glare is minimal.
(Tabadkani et al., 2021)	Literature Review	Comparative assessment through various visual comfort metrics to evaluate the limits of visual comfort and the risk of discomfort glare as a major problem in natural lighting.	The user's perception of comfort plays a role in assessing the quality of lighting, as technical evaluations cannot determine visual comfort completely. Visual experiences are subjective, multidimensional, and dynamic, so they cannot be comprehensively measured with a single metric.
(Kong, Hou, et al., 2022)	Mix-methods	Experiments based on user perception and physiology on aperture design, interior daylight and space experience through Virtual Reality (VR) simulation.	The façade design (aperture design) in the form of geometry and the size of the opening shape the space experience by influencing the user's perception of the sense of interest, comfort, spaciousness, and complexity.
(Fathy et al., 2020)	Quantitative	Assessment of illumination control in minimizing spatial damage. Simulation analysis of facades with small apertures to find out the sensations produced from the distribution of light patterns into the space.	Natural lighting is not only judged based on its performance on space, but also considers how it is distributed to the spatial. Based on user perception, the high spatial contrast of natural light patterns has a higher level of visual interest.
(Kong, Zhang, et al., 2022)	Mix-methods	Identify the performance of natural lighting in educational building spaces, as well as its effect on user impressions and visual comfort.	High light intensity is able to increase stimulation, which is interpreted through aspects of brightness, contrast, and the sensation of satisfaction. High brightness is more pleasant for users compared to rooms that tend to be dim.
(Li et al., 2024)	Quantitative	Quantitative-simulation research to identify potential glare exposure from natural light and its impact on the user's assessment of visual comfort.	The experience of space and visual comfort is largely determined by the perception of the user. Visual comfort is considered to be the most dynamic and spatial, depending on the context of the place, the point of view, the type of activity, and the context of the time.
(Dai & Zheng, 2021)	Kuantitativ-Empiris	Analysis with a statistical approach and user perception survey aimed at identifying the role of multisensory aspects as shaping spatial experience.	The atmosphere of the space is affective and situational, where the multisensory experience will shape the quality of the space by modifying the space into a place that has an identity and is more meaningful.
(Saber, 2019)	Literature Review	The research is based on a literature review approach and is based on conceptual understanding that focuses on examining the relationship between natural light and the quality of	There are three classifications of openings, namely direct, semi-direct, and indirect daylight. The high-contrast light creates a dramatic atmosphere, while the subtle reflections create a reflective and calm space. Layered light and shadows tend to form sharpness and emotional

		interior space.	impressions.
(St-Jean et al., 2022)	Literature Review	Identify the role of multisensory stimuli of architectural elements in shaping the user's psychological and physiological responses.	Provide a theoretical understanding of various design stimuli that affect human psychology through elements of light, colour, geometry, design complexity, and nature views.
(Yıldırım & Yener, 2024)	Quantitative	Evaluate the influence of interior design elements on spatial perception and emotional response, involving the relationship between light and spatial perception.	Light is proven to be transformative because it is able to create space, manipulate by camouflaging and sharpening space, and directly change the meaning of space. The distribution of light in the direction of coming sideways produces a perception of space that feels spacious and dynamic.
(Abdelhamid et al., 2023)	Mix-methods	Parametric façade simulation and subjective assessment to analyse the impact of opening design on light quality and visual comfort.	A new interpretation that explains that the reduction of glare and the improvement of the quality of light distribution are realized by a regular rhythm of openings, especially in learning spaces such as academic studios.
(Çelik & Inan, 2023)	Quantitative	Identify natural light distribution, illumination, light luminance, and furniture layout, to determine the relationship between natural lighting aspects and library spatial arrangement.	Natural light diffusion plays a role in determining spatial design, such as orientation, space zoning, and furniture layout and position. In the context of a library room, the position of the furniture is recommended following the direction of light distribution, while the reading area is closer to the window opening.
(Umayrah et al., 2024)	Literature Review	The research with a literature review approach related to the role of light in shaping the atmosphere and visual comfort in the library space.	Natural lighting in a study room needs to be aesthetically modified to build the atmosphere of the space. Spatial design such as furniture arrangement has a major impact on the uneven distribution of light.

Source: Author Analysis, 2026

Studies of previous studies have shown that the availability of natural lighting in the study space in the average tropical context has exceeded the visual requirements, with light intensity also exceeding the standards of visual-intensive activities such as learning and reading. High light intensity does not necessarily guarantee visual comfort. This is because uncontrolled distribution that causes glare has the potential to interfere with user visibility. Therefore, the opening strategy and façade design that also functions as shading are the main determinants in maximizing natural lighting, especially in library rooms with high visual-intensive activities. Thus, the results of the literature identification described in Table 1 are further grouped based on the scope of the study to determine the focus of the study.

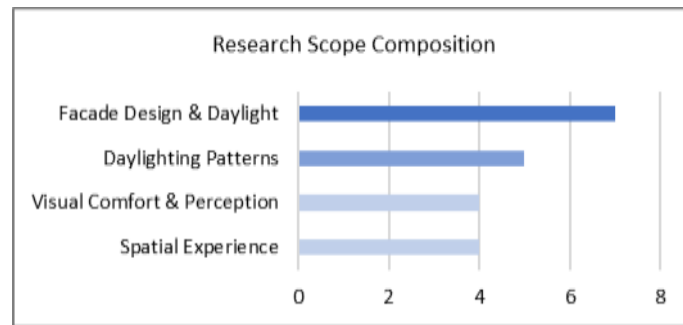


Figure 4. Composition of the Research Scope

Source: Author Analysis, 2026

Based on Figure 4, it can be seen that most of the research focus is dominated by technical analysis of natural lighting performance. On the other hand, there are still limitations in studies that are oriented towards visual perception and subjective spatial experience. The results of the review show that there is still a gap in the literature, especially regarding understanding the role of façade design and natural lighting as part of the formation of a more holistic spatial experience.

Characteristics of Facade Design and Natural Light Distribution in Interiors

Based on a review of the literature, façade design plays a crucial role in creating quality natural lighting on the exterior and interior. Facades are understood as mediums that regulate the distribution of natural light, form light patterns on the interior, and improve the visual quality of spaces, although facades as a building envelope are often only considered to display the iconic image and impression of a building (Cucuzzella et al., 2023). In understanding the role of facades, aspects such as spatial orientation, secondary skin, opening shape, and shading elements are directly involved in determining the distribution of light entering the space (Chamilothori et al., 2022).

Facade typology based on the results of synthesis in the literature consists of several main classifications, which include transparent facades (massive opening), facades with vertical shading, facades with horizontal shading, combination facades (hybrid), secondary skin facades, and adaptive facades. Each typology has different light distribution characteristics and impacts on the visual quality of space (Elzeyadi, 2017). Transparent facades tend to be dominated by large glass openings and minimal use of shade elements, resulting in high illumination and tend to cause light penetration into interior spaces (Deng et al., 2022). Nonetheless, light has the potential to cause a glare effect due to its often-uneven distribution. This confirms that visual comfort is not always linear with a high amount of light.

Meanwhile, facades with horizontal and vertical shading are able to regulate light intensity and minimize the potential for glare entering the space (Elsiana & S Arifin, 2024). The use of facades with vertical shading tends to optimize the control of light through the side direction, while horizontal shading tends to be effective in reducing light from the high side. However, a more controlled and even distribution of light can be achieved by integrating the use of the two facades, so that the quality of natural lighting in the space is further improved.

In addition, secondary skin facades or additional layered facades play a role in reducing light contrast by diffusing light entering the space, thus making visual conditions more

comfortable (Elsiana & S Arifin, 2024). In tropical contexts, the secondary skin approach is very relevant to apply because it tends to be adaptive in controlling the high intensity of natural light. One type of secondary skin façade that is widely used in the tropics is perforated facade (perforated metal). Visualization of light diffusion and pattern character formed through perforated façade elements can be seen in Figure 5.

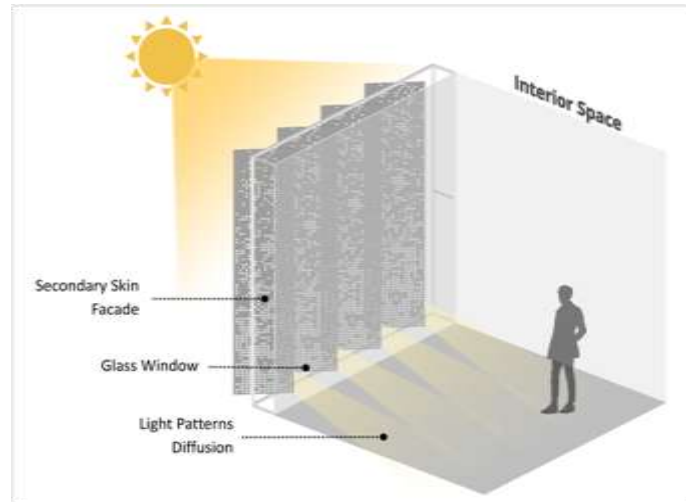


Figure 5. Illustration of Light Diffusion into Interior Space through Facades

Source: Author's Processing based on Literature Synthesis, 2026

Light diffusion in interior spaces is also studied based on four types of façade geometry (aperture design) in the context of opening configurations with the same dimensions. These geometries include centralized openings, distributed openings, strip openings, and patterned openings (Chamilothori et al., 2022). Centralized openings with a single large aperture in the middle, ensure that light enters in a focused and high-contrast manner at a single point, while distributed openings in the form of several small openings that are evenly dispersed tend to form more diffused and homogeneous light. In addition, strip openings with elongated aperture characters allow horizontal distribution of light, while patterned openings with asymmetrical geometric patterns tend to form dynamic light patterns and add visual complexity. The apparent visual complexity of the dynamic light distribution through the patterned façade geometry can be seen in Figure 6.



Figure 6. The Phenomenon of Natural Light Distribution into Spaces through Facade Elements

Source: Results of the Author's Survey at the Taman Ismail Marzuki Library, 2026

These findings clarify the idea that light quantity is not the only absolute parameter that determines the quality of natural lighting, but rather that there are factors in light distribution, façade performance, and glare reflection that play a greater role in it (Tabadkani et al., 2021). This is because visual comfort and discomfort are caused through the opening of spaces with high light exposure, especially in the context of spaces with the need for visual-intensive activities such as study rooms and libraries. The distribution of natural lighting in the context of library spaces is closely related to spatial design and interior arrangement (Çelik & Ve İnan, 2023). Areas with optimal light distribution tend to be ideal for reading room functions, while areas with indirect light exposure are preferred for bookshelf areas to prevent potential damage. The findings suggest that façade design and light patterns are able to directly change the organization of spaces.

Visual Perception of Light Pattern Characters

Visual comfort is not only determined based on the aspect of illumination, but is also influenced by spatial conditions, multisensory interactions, and subjective judgments that create the meaning of space and depth of perception (Pallasmaa, 2016). Natural lighting triggers impressions that are formed through three aspects, namely distribution, stimulation, and affection (Kong, Zhang, et al., 2022). These aspects indicate that the user's emotional response can be triggered, one of which is through the distribution and quality of light to the space. The distribution of light along with the visual character that is formed can create the impression of a certain space, even build an atmosphere and hint at the identity of the space.

The findings also refer to a study that explains that aspects such as window size, opening design, and daylight conditions shape the composition of natural lighting in the space. These three aspects have a significant influence on generating variations in light patterns that then trigger new viewing angles, emotional responses, cognitive abilities, and spatial design modifications (Kong, Hou, et al., 2022). Perception of light triggers emotional responses related to a sense of calm and joy, while cognitive abilities are directly affected by visual complexity (St-Jean et al., 2022). Meanwhile, spatial design as a physical element of the interior is determined based on subjective assessment or impression of space (spaciousness). The impression of space in the context of a library is determined based on the visual quality of the diffusion of light patterns formed in the interior space, as can be seen in Figure 7.



Figure 7. Light Diffusion and Character Patterns Formed in Interiors

Source: Results of the Author's Survey at the Taman Ismail Marzuki Library, 2026

Based on this, the visual perception of light in the library room is closely related to the achievement of visual concentration and user comfort when reading and learning. Direct exposure to light in space tends to cause visual discomfort when compared to the distribution of diffused light (Swaris & Perera, 2017). This shows that user comfort is not always in line with technical lighting standards. Referring to visual perception and spatial impressions, visual comfort can change depending on visual activity, the direction of view, the user's position, and the rotation of light over time (Li et al., 2024). These findings show that visual perception of natural light patterns is a multidimensional process, meaning that the spatial experience can change continuously depending on user interaction and natural light movement (Tabadkani et al., 2021). This condition suggests that user-centered visual comfort is both dynamic and temporal.

The Role of Facade Design and Light in Shaping the Space Experience

The dynamic interaction between lighting and space users can shape the visual experience. This is because the play of natural light and shadow can create the identity of the space and the character of the interior in it (Saber, 2019). These findings show that light still increases the visual appeal and attractiveness of the space, without having to use high light intensity (Fathy et al., 2020). The natural light patterns formed through the façade create an impression and stimulate the user in shaping the experience of the space to be more emotional and expressive (Nabil et al., 2025). Interactions involving subjective perceptions and emotional responses of users will subsequently influence the user's decision to determine their behavior in the space.

Library spaces as visual-intensive environments require controlled and adaptive natural lighting to support high concentration (Abdelhamid et al., 2023). Although visually appealing, uneven natural lighting conditions that tend to spread patterns heterogeneously, can decrease the concentration and quality of the user's perceived space experience. Meanwhile, lighting with an even distribution and tends to be homogeneous is able to build a conducive and calm atmosphere (Unluturk & Kazanasmaz, 2024). In this case, the façade plays a crucial role in establishing visual balance by manipulating the light entering the space more evenly, reducing glare, and forming a spaciousness effect on the space (Yıldırım & Yener, 2024). Thus, space experiences are formed due to the complex interaction between architectural elements, light, spatial shapes, colors, material textures, and users' perceptions of their environment.

The Influence of Space Experience on Library Interior Design

In addition to influencing the formation of visual experiences, lighting patterns also have an impact on determining spatial design approaches, which include spatial orientation, space zoning, and furniture layout and positioning (Çelik & Ve İnan, 2023). In the context of libraries, the placement of bookshelves that are linear in the direction of light distribution tends to provide a visualization of the play of light and shadow (Umayrah et al., 2024), without blocking the exposure that enters the space, as seen in Figure 8. Meanwhile, the reading and learning zones tend to be modified closest to the window and oriented directly to the side of the opening to maximize visual needs.

Based on the analysis of the overall findings, the experience of interior space can be understood as an interaction that is multidimensional, that is, it does not only affect one aspect in the context of interior design. This is because the user's perception of the atmosphere of the room is constantly changing all the time, depending on the conditions and characteristics of light (Stokkermans, 2018). Thus, façade design and natural light patterns can shape the visual experience as well as determine adaptive spatial design for library spaces, thereby improving the quality of interior spaces holistically, more contextually, meaningfully and triggering a sense of belonging (Dai & Zheng, 2021).

Thematic Synthesis of Findings

Based on a systematic review of 20 selected literature, a number of findings were obtained which were then synthesized based on five main themes to define the relevance and relevance between the literature. A description of the thematic synthesis of the findings can be seen in Table 2 as follows.

Table 1. Thematic Synthesis of Key Findings

Theme Synthesis	Key Findings	Implications	Source
The typology of façade design and its influence in shaping light patterns.	The geometry of the openings on the façade contributes to forming the pattern of light diffusion and perception of space.	Facade design with a more homogeneous geometry and adapted to the typology of the space.	Cucuzzella et al. (2023), Elsiana & S Arifin (2024), Elzeyadi (2017), Unluturk & Kazanasmaz (2024)
Classification of façade openings and light diffusion that affect the meaning of space.	The complexity of light patterns and glare exposure reduce visual comfort in interior spaces, despite high aesthetic value.	The use of shading elements and adjustment of the position of the aperture taking into account the visual perception of the user.	Chamilothori et al. (20220), Deng et al. (2022), Nabil et al. (2025), Swaris & Perera (2017), Tabadkani et al. (2021)
The distribution of natural light and its role as a visual attraction.	The distribution of natural light plays an important role in the context of aesthetic quality compared to the role of light intensity.	Consideration of façade design that can control light patterns and their distribution into the space.	Fathy et al. (2020), Kong, Hou, et al. (2022), Kong, Zhang, et al. (2022), Li et al. (2024)
Impression of light, atmosphere of space, and emotional response.	Natural light with varied characters can build ambience in the study room.	Maximizing the distribution of natural light during the day as a natural aspect of shaping space.	Abdelhamid et al. (2023), Saber (2019), St-Jean et al. (2022), Yıldırım & Yener (2024)
Modification of light perception, spatial experience, and its effect on the spatial perception of the learning space.	The façade design and natural light patterns affect the interior design concept of the study space holistically.	The organization of spaces and furniture zoning that is more adaptive to the character of light.	Celik & Ve Inan (2023), Dai & Zheng (2021), Umayrah et al. (2024)

Source: Author Analysis, 2026

The results of the identification in the thematic synthesis table show that there is a continuous flow in each finding in the literature. The synthesis results show an integration between façade design, natural light distribution, and visual user experience. Previous studies have largely confirmed that the level of illumination is not the only parameter that determines the quality of natural lighting in interior spaces, especially library spaces. This is because there is an influence of other parameters in the form of luminance distribution, glare potential, and natural light patterns that are also formed in it.

Referring to the results of synthesis, the role of natural light distribution in creating visual comfort is more significant than the role of the quantity of lighting itself. Based on perception, most of the literature indicates that contextual factors such as activity, direction of view, user position, and changes in light conditions have been shown to affect the formation of visual experiences of library users. This shows that the relationship between natural lighting and visual perception is nonlinear because it is formed by the complex interaction between the elements of the interior space and the subjective experience of the user, so an illustration of the relationship between façade design, light patterns, and the space experience in a structured manner can be seen in Figure 8.

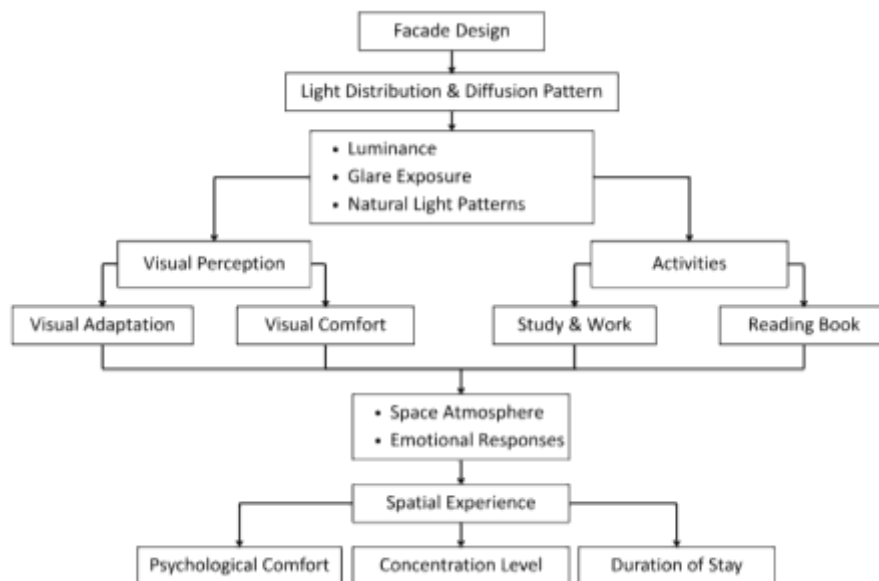


Figure 8. Diagram of the Relationship between Facade Design, Light Patterns, and Space Experience

Source: Processed by the Author based on the Results of SLR Synthesis, 2026

The synthesis diagram illustrates how the role of façade design in directing and determining natural light patterns is distributed into interior spaces. The natural light and pattern characters formed in the space then provide visual value and the quality of the space that influences the user's perception and the atmosphere of the space. Visual perception and the atmosphere of the space form an interaction that ultimately results in a holistic experience of space. Thus, the experience of the space determines the fulfillment of psychological comfort, concentration level, and duration of use in the library space.

Implications of Interior Design in the Context of Libraries

The results of the literature synthesis show that a paradigm shift is needed related to facades as an architectural element that initially functions in displaying the exterior aesthetics of buildings and optimizing openings alone, becoming the main element that also plays a role in controlling and directing the distribution of natural light and visual display of light formed in interior spaces. In this case, a façade with a specific design and type of opening serves as a mediator capable of improving the aesthetic quality of the space and the visual experience of the user, through the light that enters and spreads into the room.

Based on this, natural lighting, which is a sensory element, not only has a technical function, but also plays the most significant role in determining visual perception and shaping the user's space experience. These findings indicate that ideal space quality does not always focus on fulfilling the quantity of light alone. On the other hand, natural lighting gives deep meaning to interior spaces through aesthetic value to psychological ambience. Natural light formed in interior spaces tends to sharpen the texture of the material, bring out the colors, and provide a dark light visual of light and shadows. Thus, as shown in Figure 9, natural light with controlled distribution and visual patterns can shape a space to be more vibrant, feel spacious, and connected to the outdoor environment.

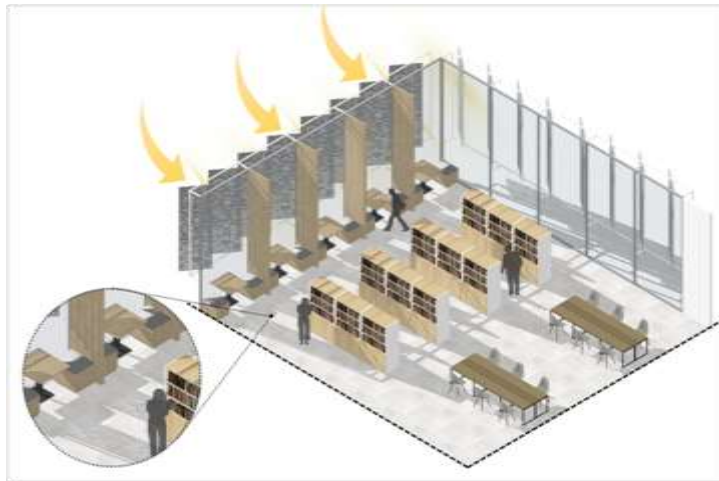


Figure 9. Conceptual Illustration of Facade Design and Light Pattern in Library Interior

Source: Processed by the Author based on the Results of SLR Synthesis, 2026

In the context of the library space, the implications become more significant and crucial considering that reading and learning activities are intensive visual activities that require a high level of concentration. Excessive, uncontrollable, and potentially glare-inducing natural lighting tends to distract the user's focus, while more even, subtle lighting can provide a conducive atmosphere. This indicates the need for an integrative design approach that is able to balance aspects of façade design, light intensity, and visual perception, and position them as part of the space experience. A more adaptive and contextual approach to design has the potential to create a more holistic and responsive space quality to user needs.

CONCLUSION

The results of this study confirm that façade design has a significant influence on the pattern of light distribution in the interior, because the façade plays a major role in controlling the entry of natural light. Not only in the quantity aspect, other aspects in the form of light distribution, glare potential, and light diffusion character have also proven to be the main factors that define the quality of space visually. Thus, an interior design approach that focuses solely on achieving technical standards. The findings from the analysis synthesis indicate that facades and natural lighting play a much larger and more complex role than just meeting the functional needs of building interiors. There has been a paradigm shift from a natural lighting approach that was initially focused on technical performance, to a more integrated and user-oriented approach. This shows that the quality of natural lighting has been understood as a component that shapes visual perception, atmosphere, and spatial experience. Furthermore, the synthesis results show that natural lighting affects the user's visual perception contextually and dynamically, depending on the context of the activity, the user's position, and changes in light conditions over time. This emphasizes that the experience of space cannot be reduced to a purely static aspect, because it is formed through the interaction between the lighting parameters of the space and the user in it. These findings also provide a critical understanding of the limitations in the use of conventional natural lighting metrics, which tend to overlook the perceptual and temporal dimensions. In the context of libraries as reading and learning spaces, the natural light patterns formed through façade design have an important role in improving the visual quality of the space and supporting activities that require a high level of focus. Therefore, natural lighting designs that include brightness, distribution, and light quality need to be directed and balanced to produce a more meaningful and comfortable space experience. Thus, the overall study emphasizes the significance of a design approach that integrates the physical aspects, perceptions, and subjective experiences of users in designing library interior spaces based on natural lighting.

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