Urban Acupuncture for Darkness

Value of Darkness in Pedestrian Experience
Sudirman Street, Jakarta

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abstract

As much as we thought about artificial lighting in the planning of our urban nightscape, it is necessary to balance it with consideration regarding darkness. In response to the problems caused by artificial lighting, such as light pollution and disruption to human circadian rhythm, darkness should be seen as a value that brings balance for the environment. There are nine values of darkness in urban illumination; efficiency, sustainability, ecology, healthiness, happiness, connection to nature, stellar visibility, heritage & tradition, wonder & beauty (Stone, 2019). In Designing for Darkness, Stone (2019) described three concepts to bring darkness into urban illumination design; Incremental Darkening, Environmentally Responsive Lighting, and Urban (Dark) Acupuncture.

Urban Acupuncture is an effort to revitalize the area and its surroundings through intervention in the strategic key point. (Leiner, 2014). In terms of urban lighting, the concept of Urban (Dark) Acupuncture described as an attempt to accentuate a strategic location in a city with darkness (Stone, 2019). This master thesis aims to explore design possibilities for re-introducing darkness into our urban environment, by applying the Urban (Dark) Acupuncture concept with Sudirman Street, Jakarta as the case study. Functioned as a Central Business District of Jakarta, Sudirman Street is considered as a strategic key point for the intervention. The design proposal will be focusing on the pedestrian facility of the street, and the final result will be evaluated by the user.

Keywords: Urban Lighting, Urban Acupuncture, Light Pollution, Darkness Preservation
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“Tonight, wherever you are, go outside and look at the sky. Can you see the wonders? Overhead are countless distant fires, stars upon stars in clusters and constellations, a natural darkness where the faintest colors and lights shine. For most of human history, wherever on the globe, this was the night we knew. This was the darkness in which all life evolved and which our body and spirit still crave. Art and science and religion all flowed from our experience of natural darkness and a starry night sky. This is where we came from, this is who we are.”

–Paul Bogard, The End of Night (2013)

In his book The End of Night, Bogard (2013) discussed how the night sky has disappeared from our daily lives and how living creatures suffer from losing the night sky. He mentioned that although some lights are beneficial for human, most of the light in cities are a waste. These light shine into the sky, illuminating little of what it was purposed to and causing a significant amount of cost. Bogard (2013) also discussed that only a few of the population experience nights with natural darkness. He mentioned that population with age younger than forty most probably grown up flooded in artificial light, and never knew that the night could be any different.

This concern is somehow illustrated in the work of Thierry Cohen, in his project titled “Darkened Cities.” According to Cohen (2014), this series of photographs combine two realities; the city and the night sky, and showing the existence of a third reality that people could not see, a parallel universe without artificial light. Looking at this artwork has created a feeling of reminiscence of how our starry night sky is not completely gone but hidden behind an excessive amount of light in cities. For me, in lighting design perspective, these visuals have created a statement that subtly encourages the need to reimagine how we design our urban nightscape in relation to darkness.
The idea of losing the night sky has made me reflect on the lighting condition in my hometown, Jakarta. Living in Jakarta all my life, my expectations and perception of the nighttime environment have always dominated by artificial light. Artificial light is considered to have a significant role in emphasizing the identity of the city, supporting the nighttime economy and tourism, and significantly influenced the sense of safety and security. This way of thinking resulted in an excessive amount of light in the urban nightscape of Jakarta. Public spaces and landmarks of the city are illuminated with colorful, dynamic lighting with a high level of illumination to pursue attractiveness and provide comfort for pedestrians. Therefore, along with many big cities, Jakarta is facing a light pollution issue, the city is losing the balance between light and dark. Light pollution is known for causing a multi-scaled problem and negatively impacts energy consumption, night sky, ecology, and human wellbeing. In order to pursue this balance, awareness regarding light pollution needs to be raised, and the darkness of the night sky needs to be preserved. This initiated my interest in developing a design proposal that revives darkness in the urban nightscape, using Jakarta as the case study.

When finding information regarding methods to develop a lighting design concept with the purpose of preserving darkness, I found a dissertation by Dr. Taylor Stone titled Designing for Darkness. This dissertation described three concepts to permeate darkness into the urban environment; Incremental Darkening, Environmentally Responsive Lighting, and Urban (Dark) Acupuncture, along with nine values of darkness; efficiency, sustainable, ecology, healthiness, happiness, connects to nature, stellar visibility, heritage & tradition, wonder & beauty (Stone, 2019). These concepts are developed to permeate darkness into an urban environment, starting with valuing darkness. In comparison with the two other concepts, Urban (Dark) Acupuncture is described as the most radical and transformative approach for permeating darkness in the city.

The thesis aims to explore design possibilities for re-introducing darkness in urban spaces. This project will take a new perspective on the design process. Instead of starting with how to use less light, the design process will start with valuing darkness. The thesis’s goal is to create a design proposal in a conceptual stage by applying the transformative approach of Urban (Dark) Acupuncture. Through this concept, the intervention will be created in specific areas, allowing darkness to be experienced attractively and comfortably, and communicate an environmental message regarding darkness preservation. This project will use Sudirman Street, Jakarta, as the case study. This area considered strategic due to its significant value for Jakarta city as a central business district, historical values, and existing lighting condition.

1.2 Research Question

How can Urban Dark Acupuncture be utilized to create attractive and comfortable pedestrian experiences of darkness, as well as convey an environmental message to users?
This thesis project will follow different phases to answer the thesis question and reach the goal to create a conceptual design proposal that applies Urban Dark Acupuncture concept for Sudirman Street, Jakarta. The first phase is a background study. The topic which will be studied is Darkness as Environmental Value and Urban (Dark) Acupuncture. The second phase of the thesis is the case study. The final part of the case study is the conceptual design proposal. The design proposal will only be focused on the pedestrian facilities of Sudirman Street. Recommendation regarding exterior lighting of buildings and billboards will not be considered for the design proposal. The main area for the small-scale intervention will be determined based on the site analysis. The main area will also become a medium to communicate an environmental message regarding light pollution and darkness preservation. Apart from the primary intervention, the other elements and key points of the street will also be designed. This design proposal will also include the overall brightness level and color temperature for Sudirman Street.

The design process will begin with identifying the values of darkness for the design proposal and doing a study regarding project reference with the identified values. The process will continue with analyzing the site to observe the existing condition, define the zoning, and formulate the concept for the design proposal. The design proposal will be evaluated by the user of Sudirman street. This evaluation will be conducted through a questionnaire. Before filling the questionnaire, a presentation session for the design proposal will be conducted. The design proposal will be evaluated with three parameters:

1. How is the response from the user concerning attractiveness for the new installation?
2. How is the response from the user concerning comfort for the new installation?
3. How well the installation communicates environmental message regarding darkness preservation?
3 Background

In the recent century, human life has centralized in cities. Nighttime illumination is known as a fundamental tool for expressing the identity of a city, aesthetic purposes, and supports the nighttime economy and tourism. In Stone’s Designing for Darkness, it was mentioned that throughout history, artificial nighttime lighting has close associations to values such as safety and security, civic order, nightlife, prosperity, and progress (Ekirch 2005; Nye 1990; Schivelbusch 1988).

On the other hand, darkness has quite diverse interpretations. Bogard’s The End of Night (2014), some perspective regarding darkness in different cultures were described. In Japanese culture, darkness has a vital role in aesthetics, because their meaning of beauty is found not in the object, but in the pattern of shadows that the object created, the light and the darkness (Tanizaki, 1977). Native American also has a unique perspective regarding darkness. In the darkness, high spirituality can be seen. Darkness has a meaning of protection, as it represents the womb. The night sky is seen as the passage of souls, way from life to the afterlife. The darkness of the night sky is also seen as a time of healing where the ceremonies and rituals take place, sense of possibility where spirits are released to travel space and time, and a place for the earth to rest. This culture sees darkness as something positive, as beauty, something protective, healing, and contains limitless possibilities. This contradicts the perspective of western culture for darkness. Western culture emphasized good versus evil, and darkness often described as the representation of evil. The western thinking of darkness, supported by western technology, developed to the artificial light we have now in our urban night environment.

This perception of light and darkness has influenced how urban nightscape was designed. Bogard (2013) described that the western perception of darkness has the most significant impact on our current urban nightscape. Based on the data (Falchi et al. 2016), 83% of the population live under a light-polluted sky. The term “light pollution” has been recognized worldwide. The organization that pioneered movement regarding this topic is the International Dark Sky Association, which founded in 1988. Currently, this organization already has 64 chapters operating in 18 countries worldwide (International Dark Sky Association, 2018). It is also known for impacting the night sky, ecology, human wellbeing, and energy usage. One of the ways to overcome the light pollution issue is to increase consideration regarding darkness in the design stage should be increased, and a transformative approach should be utilized.

This chapter will discuss the basics of the project: darkness as an environmental value and urban (dark) acupuncture. The value of darkness will become the starting point in the design process, and Urban (Dark) Acupuncture will be utilized as a concept that pursues these values through a transformative approach.

3.1 Darkness as Environmental Value

Darkness has shifted from a symbol of backwardness to a luxury of our nightscape in an urban environment. The darkness during the night is found to be essential for physical and psychological wellbeing. As darkness in the city became limited, artificial light at night has become pollution. Darkness became something valuable for the nighttime environment, something that promotes balance, supports wellbeing. As the amount of artificial light during night time keeps increasing, darkness should start to be seen as environmental values. To create a better understanding of the importance of preserving darkness, Stone (2019) reframing the different effects of light pollution. Four aspects affected by light pollution, which are night sky, ecology, energy, and health, were reconceptualized as the environmental values derived from the darkness. Stone(2019) explained that this perspective aims to shift the discussions and analysis from the negative impacts of artificial light into the positive impacts of a limited amount of artificial light; changing the question of why we should have less artificial light, and instead of asking why we should have more darkness.

The changing of framework resulted in the nine values of darkness, which are efficiency, sustainability, ecology, healthiness, happiness, connection to nature, stellar visibility, heritage and tradition, wonder & beauty. Inefficiency, darkness could be understood as its manifesto, which can influence economic values in urban regions. Sustainability value is multi-interpreted, but in this context, the sustainability value of darkness is its concern on development, energy usage, and mitigating climate change. Ecology value indicates the effect of light on wildlife. Healthiness relates to natural cycles of light and dark in human bodies. Happiness relates to psychological and emotional wellbeing, linked with access to the natural night sky. Connection to nature is the ability to experience natural settings. Stellar visibility also concerns connection to nature, especially visibility of starlight. Heritage and tradition value relate to cultures around the world, mythology, religion, art literature, navigation, conceptions of time, and scientific discovery (Gallaway, 2014). Wonder and beauty is the value that relates to the sublime experience of the dark sky.
Jaime Lerner first establishes the concept of urban Acupuncture. The urbanist played a significant role in transforming Curitiba, Brazil in 1970-1980s into a role model for a sustainable and livable community. The definition of Urban Acupuncture is revitalization through a small-scale intervention, to initiate positive changes, and begin a process of urban renewal. It can be in different forms and placed on a particular service, amenity, or structure. Even though the planning process of a city takes time and involves different stakeholders, issues, a focused intervention has the possibility of creating new energy, demonstrating how space can motivate people to engage more with the community (Lerner, 2014). These small interventions can contribute to the planning process. The chosen area for the intervention should be a strategic location, the key point for the area. This concept has been applied in many countries in the context of the architecture and spatial design. The purpose of the development in the urban acupuncture concept is to enhance placemaking in the space.

3.2 Urban Dark Acupuncture

Jaime Lerner first establishes the concept of urban Acupuncture. The urbanist played a significant role in transforming Curitiba, Brazil in 1970-1980s into a role model for a sustainable and livable community. The definition of Urban Acupuncture is revitalization through a small-scale intervention, to initiate positive changes, and begin a process of urban renewal. It can be in different forms and placed on a particular service, amenity, or structure. Even though the planning process of a city takes time and involves different stakeholders, issues, a focused intervention has the possibility of creating new energy, demonstrating how space can motivate people to engage more with the community (Lerner, 2014). These small interventions can contribute to the planning process. The chosen area for the intervention should be a strategic location, the key point for the area. This concept has been applied in many countries in the context of the architecture and spatial design. The purpose of the development in the urban acupuncture concept is to enhance placemaking in the space.

Stone (2019) explained Urban (Dark) Acupuncture applied the Urban Acupuncture concept in the context of preserving darkness. The idea is to accentuate a strategic place in cities, with darkness. The determined site for the intervention could be square, bridge, or monumental places. Additionally, the intervention could also become a medium to communicate educational material for the user, regarding the importance of preserving the night sky, and values of darkness. As people became more used to experiencing darkness in the urban environment, it could open up possibilities to permeate darkness through our cities, and changing the expectations and perceptions of artificial light at night.
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Case Study
4 Case Study

4.1 Identifying Values

The project aims to explore design possibilities to re-introducing darkness into the urban nightscape. The goal is to create a design proposal in a conceptual stage by applying Urban Dark Acupuncture concept for Sudirman Street, Jakarta, with several objectives; focusing on lighting for the pedestrian facility, creating an attractive and comfortable environment, and communicating environmental message regarding light pollution. From the nine values of darkness, four values of darkness considered suitable for the site context located in the city center: Efficiency, Sustainability, Healthiness, and Happiness. These values relate with two aspects, energy and health. Both efficiency and sustainability emphasize responsible way use of light, only put light where it is needed. Efficiency focused on money-saving and sustainability-focused on energy-saving and preserving non-renewable resources. These two values considered a priority because Sudirman Street aimed to initiate a responsible lighting strategy for Jakarta. The other two values represent terrestrial value and atmospheric value. Healthiness is promoting and fostering human health, physiological well-being, and happiness is promoting psychological well-being. Connection to Nature and Wonder & Beauty will be communicated to the user through the Environmental Message. Three other values are Ecology, Heritage & Traditions, and Stellar Visibility, which are considered to have a weak relation with the site context.

4.1 Reference Projects

This project studied in this chapter have similarities in exploring new material and using an interactive lighting scenario to provide a unique nighttime experience by using both light and darkness. These projects also considered having strong relations with values identified in the previous chapter (Chapter 4.1 Identifying Values)

4.2.1 Smart Highway Project by Studio Roosegarde and Heijmans Infrastructure

Smart Highway is a project designed by Studio Roosegarde and engineers from Heijmans, aiming to create a self-luminous road using solar power. Technology utilized in this project is smart coatings, energy harvesting, and sensor (Studio Roosegarde, 2014). According to Studio Roosegarde, the project’s goal is to make smart roads using light, energy, and information that interact with the traffic situation. The smart highway project consists of several sub-project in different areas, which are Glowing Lines and Van Gogh Path. This project launched in 2014.

The glowing lines project located in Oss, Netherlands. It utilizes photoluminescent paint to replace road lighting. The lines will be painted on the edges of the road to mark the boundaries and become a guide for drivers’ visibility. The photoluminescent paint will absorb solar energy during the day and illuminates at night. In the Smart Highway proposal’s further development, the photoluminescent paint will be interactive, utilize as a medium to communicate the condition of the road. By using temperature-reactive paint, the lines indicated when the road is icy. (Smart City Hub, 2017) The similar concept idea applied in the Van Gogh Path project, which located in Nuenen. This project consists of a self-emitting bicycle path with a twinkling effect, made to commemorate the area where the artist lived in the 19th century. According to Roosegarde, the design concept aimed to connect the cultural heritage of the Netherlands with innovation. The installation is inspired by the Starry Night, the painting made by Van Gogh (Studio Roosegarde, 2017).

This project considered suitable to become a reference for the conceptual lighting design proposal. The purpose of the project strongly related to the value of darkness identified in the previous chapter. The Glowing Lines project holds sustainability value, as it can replace road lighting, by transforming solar energy during the day for giving light during nighttime. The second project holds happiness value, as it is created an exciting nighttime experience without disrupting the darkness.
### 4.2.2 Gates of Light by Studio Roosegarde

Gates of Light is also a project designed by Studio Roosegarde. This project is located in the Netherlands. The project’s site is on an Afsluitdijk; an old structure functioned to guard the Netherlands against flooding (Studio Roosegarde, 2017). Gates of Light project aimed to highlight historical architecture without contributing to light pollution and required zero energy. This project utilized the retro-reflective layer and the headlamps of passing cars. The retro-reflective layer is a device or a surface that can reflect light radiation to the direction of the source of light. The device can reflect light from a wide-angle of incidence (Palmer, 1985). This project is considered to have a strong relation in sustainability, efficiency, as it requires no electricity and attempted to minimize the environmental impact of artificial light. This project also holds happiness value, as it can create a unique driving experience in the area.

### 4.2.3 Musicon Path by AF Lighting

Musicon Path is a project by AF Lighting located in Roskilde, Denmark. The project aims to provide a highly interactive public space that invites people to stay and play in the area and encourage movement and physical interaction while ensuring visibility (AF, 2019). According to AF, the design consists of two-layer, which defined as the architectural layer and the behavioral layer. The architectural layer provides functional and aesthetic light, while the behavioral layer provides interaction with the user. The form of interaction is a detection of movement and speed. The light will detect user riding on the track and shaping a tail of light that follows the user’s movement. When the speed is increasing, it will shape the longer tail of colored light. This project is considered to be related to happiness value, as it provides a playful environment for the user.
4.3 Site Overview

Sudirman Street is considered as a strategic area to apply the concept of Urban (Dark) Acupuncture, due to its function and value. Functioned as a Central Business District of Jakarta, this street is exposed to many users, which potentially became a sufficient area to create an intervention. Sudirman street also holds a historical value of the city as a symbol of modern infrastructure, which also carries the vision of the founding father of Indonesia, Soekarno (Hanggoro, 2019).

Sudirman Street was built between 1949 and 1953, in the purpose of connecting Central Jakarta and Kebayoran Baru. In 1948, Kebayoran Baru was newly developed in order to fulfill the need for settlement in Jakarta (Hanggoro, 2019). The plan to build the street was initially made in 1930, during Dutch colonization. The construction of Sudirman Street began in 1949, with the dutch name “weg naar Kebayoran Baru,” or the road to Kebayoran Baru. The street does not yet have the quality of the city street, without planned development on both sides of the road. In 1950, the name of the street was nationalized, changed to Jalan Jendral Sudirman (Kemendikbud, 2010). From 1970 until 1980, there are constructions of buildings along the road. The first construction was started in the northern part of the Semanggi district.

Sudirman Street is 4 kilometers long, spanned through Dukuh Atas, Tanah Abang, Central Jakarta, Senayan, Kebayoran, and South Jakarta. This street also fell across seven districts: Setiabudi, Setiabudi, South Jakarta; Karet, Setiabudi, South Jakarta; Karet Tengsin, Tanah Abang, Central Jakarta; Karet Semanggi, Setiabudi, South Jakarta; Bendungan Hilir, Tanah Abang, Central Jakarta; Senayan, Kebayoran Baru, South Jakarta; Gelora, Tanah Abang, Central Jakarta. As one of the busiest street in Jakarta Sudirman Street has been the priority for public transport development. In 2004, Transjakarta, Bus Rapid Transit in Jakarta opened their first route (Transjakarta, 2016), from Southern Jakarta (Blok M) to Central Jakarta (City Station), passing through Sudirman Street. Currently, there are five Transjakarta stop in Sudirman. The newly developed public transport in Sudirman Street is MRT (Mass Rapid Transit), which opened for public in 2019. The plan for this mode of transportation has started in 1985, but not yet stated as national project (Jakarta MRT, 2017). In 2013, the first phase construction for MRT (Mass Rapid Transit) is constructed. In 2019, some pedestrian facilities such as bridge and sidewalks. The first phase of MRT construction aimed for connecting the southern part of Jakarta (Lebak Bulus) to Central Jakarta (Bundaran HI). Sudirman is also a part of Jakarta’s bycicle lane construction in 2019.

Regarding the existing artificial lighting, Jakarta is facing a significant amount of light pollution. Fig 4.7 shows Jakarta in the Light Pollution Map, from the World Atlas 2015. According to this map, Jakarta reached 18.38 to 17.80 in Zenith Sky Brightness. As explained in The Journal of the Royal Astronomical Society of Canada, the scale of 18.38 to 17.80, which equals to 8 in Bortle Scale have these characteristics: the entire sky is grayish or brighter, familiar constellations are missing stars, fainter constallations are absent, less than 20 stars visible over 30 degrees of elevation in brighter areas.
The map shows several elements and axis of Sudirman street. The street elements consist of Bus Rapid Transit (BRT) Stop, Mass Rapid Transit (MRT Stop), Skate Park, and Landmarks. The axis is the MRT Line, BRT Line, Sidewalk, and Bicycle Path. BRT Stop of Sudirman street is located in the middle of the street, connected from the sidewalk with a pedestrian bridge. The Pedestrian bridge in Sudirman is newly refurbished in February 2019. This bridge connects the sidewalk with Bus Rapid Transit stop in the middle of the street, complete with ramp and stairs. The refurbishment aimed to create a spatial experience for the citizen. The MRT of Sudirman stop located between every BRT stops in Sudirman street, connects the sidewalks with MRT stations underneath the street. The MRT stop includes the entrance, space for shelter, stairs, and elevator. Along Sudirman Street, there are two Skate Park, which includes a seating area. Both of these public spaces located near a landmark of the street, one skate park located near the Pemuda Membangun monument, and the other located near Sudirman Statue.
There are four landmarks in Sudirman Street, which is Pemuda Membangun Monument, Semanggi Interchange, Sudirman Statue, and Selamat Datang Monument. Pemuda Membangun monument was constructed in July 1971 and officially finished in March 1972. This statue was built to commemorate Youth Pledge (Jakarta City Council, 2017). This monument is designed by the architectural firm of Imam Supardi. Currently, this statue is maintained by the Parks Department of Jakarta. The second landmark of the street is Semanggi Interchange Semanggi. Interchange first built as Semanggi Bridge in 1961, design by famous Indonesian architect, Soetami. This project initiated by Soekarno, founding father of Indonesia. The structure resembles Semanggi leaves, because this bridge was built above marsh filled with semanggi trees. Semanggi leaves also became the national symbol as it represents unity of the nation (Nuramdani, 2017). In 2016, this bridge is developed into Semanggi Interchange and inaugurated on the 2017 Independence Day. The third monument is Sudirman Statue. This landmark was the result of a design competition held in 1999, and officially finished in August 2003. It was made by famous Indonesian artist Sunario. General Sudirman was the leader of guerrilla force during the war in 1945-1949 (Jakarta by Train, 2012). This statue located in Dukuh Atas, stands the same axis with National Monument. This 12 meter statue is made of bronze. The fourth landmark, is Selamat Datang Monument, which is the oldest monument in Sudirman Street. It was built when Asian Games IV was held in Jakarta. In 1962, this area welcome athletes who will compete in Gelora Bung Karno, Senayan, Jakarta (Dinas Museum dan Sejarah, 1982). The statue is made of bronze, held by 10 meters of concrete structure, surrounded by waterscape. This statue directed to the north side, welcoming people who came from the direction of National Museum.

### 4.4 Site Analysis

Site observation was conducted in Sudirman Street. Due to the pandemic situation, there are many limitations to the process. By the time the observation was conducted, Jakarta was on partial lockdown. Because of this, the observation was done with a very limited amount of time, and there was not enough time to measure the light level of the street. However, the photograph could still be taken on the street. Some parts of the street did not show its usual lighting scenario due to the partial lockdown. The design proposal was intended to focus on pedestrian facilities and elements of the street mentioned in the site overview. Based on the analysis, the main area for the intervention will be determined. The analysis consists of observation on the existing luminaire, and analysis from visual impression and experience.

### 4.4.1 Existing Luminaire

The luminaire of Sudirman street is categorized into five categories based on the area: pedestrian bridge, skate park, sidewalk, landmark, and road lighting. Pedestrian bridges lit up with two different types of luminaires. The first type is using color-changing linear LED light directed upward to wash the exterior form of the bridge. The luminaire is unshielded, and the LED dots are visible from the street. The second type of luminaire is a linear LED integrate with railing, using a warm temperature. The skate park is four types of luminaire. This area is using two types of pole light with general distribution and cold temperature light. To lit up the trees, it utilizes small uplight with warm temperature light. In several points near the seating areas, several floodlights are mounted, providing high-intensity light with neutral color temperature. On the sidewalk, there are two types of pole light. The first type of pole light has a height of 4m, directed downward with wide light distribution and neutral color temperature. This type of pole light is functioning to lit up the wider sidewalks. The second type of pole light aimed to lit up the narrowed sidewalk. However, the scale is not appropriate because the sidewalk is too narrow. This second pole light provides a cold temperature light with wide lighting distribution, directed downwards. The luminaire for the road is using a two-side street lighting with the total for LED. These luminaires are unshielded, provides a general distribution with cold temperature light.

In all landmarks except the Sudirman Statue, a color-changing floodlight is used. In the Pemuda Membangun monument, these floodlights are placed beneath the statue and above, which lit up the fire element of the statue. In Selamat Datang Monument, the floodlight is placed beneath the statue figure and beneath the base of the statue. In Sudirman Statue, a white floodlight is placed beneath the figure. All landmark with the form of the statue is also lit up by white temperature floodlight mounted on a pole, located across the monument. These floodlights are unshielded and directed horizontally. These luminaires provide high-intensity light, also illuminated the surrounding area of the monument. Semanggi Interchange utilized a large amount of color-changing floodlight in the exterior part of the structure. These lights were unshielded and has a wide beam.
Figure 4.8 Existing Luminaires
4.4.1 Analysis from visual impression and experience.

The analysis from visual impression and experience will be focused on three elements that most experienced by pedestrian: sidewalk, pedestrian bridge, and skate park. On the sidewalk, from personal visual impression as a lighting designer, the ambiance provided a uniform distribution of light—the edges of the light beam resulting in a diffused transition between brighter and darker areas. The luminaire has a height of approximately 6m. The light level perceived as bright, especially in the edges of the sidewalk near the bicycle path and the landscaping. The material of the sidewalk smoothly reflected the light without creating any hotspot. However, the overall experience perceived as monotonous, due to lack of variety in scale, color temperature, lighting scenario, and lighting effect, even though the sidewalk consists of several elements such as bicycle parking, bench, and the entrance to MRT Stop, and shelter.

On the pedestrian bridge, the visual impression is perceived as playful and bright. These areas consist of a two-layer of light, static, and dynamic light. The static light accentuated the horizontal element in the railing, and the dynamic color-changing light accentuates the vertical element and the ceiling element. The colored light also reflected in the faces of people, creating a unique experience. In terms of architecture, both lights seemed to be intended to enhance the sense of space, shaping the three-dimensional spatial experience inside the pedestrian bridge. The reflective surface on the ceiling reflects some colored light. This reflection became an unexpected additional element in the scene. The overall impression perceived that these two-layered of light are overlapping each other, creating a unified zone of light. The ambiance is also considered as having too many elements because every element of the bridge is lit up, without any variety of light and dark in the experience. However, compared to other areas, the pedestrian bridge provides the most memorable experience, due to the temporality of light and its enclosed space. As a result, this area has the highest potential to become the leading site of intervention, which will carry an environmental message.
On the skate park, the visual impression is perceived as unattractive. Lighting distribution in the area is considered as too general. Although these areas are using a different type of luminaire from the sidewalk, the lighting distribution is similar. Most luminaires in the area are using the cold temperature of light, except small uplight beneath the trees. The lighting scheme did not represent the dynamic characteristic of the space as a place for people to interact and playing skateboard. In the seating area, there is no human scale light, and the ambiance is perceived as not encouraging to stay and interact. Some areas of the skate park have also appeared as darker in comparison to the sidewalk, which could influence a sense of safety.

4.4.3 Conclusion of Analysis

To have as background to the lighting strategy in the proposal.
- Pedestrian bridge is determined to became the main site for the intervention
- Temporality aspect of light provides a memorable experience
- Experience in the sidewalk is monotonous due to lack of variety in lighting scale, effect, and scenario
- The current lighting ambience of the skate park considered as unattractive
- The landmarks are lit by excessive amount of light
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Conceptual Design Proposal
Urban Acupuncture for Darkness

Guiding Vision

Fig. 5.1 Vision and Values

Fig. 5.2 Value of Darkness

Night sky
Connection to nature
Stellar visibility
Heritage and tradition
Wonder and beauty
5 Design Proposal

5.1 Urban Dark Acupuncture: Guiding Vision

5.1.1 Responsible Lighting

Responsible lighting is a strategy that applies to the whole area of Sudirman Street. Based on the observation, the sidewalk in Sudirman Street has low contrast and uniformity in the horizontal illuminance. The first aspect of responsible lighting includes lowering the light level of the street. Although the light level is lowered, the contrast ratio should be maintained in order to keep the visual comfort and perception of safety for the user. In several areas, a large amount of excess light should be eliminated. For instance, decorative light for landmarks or bridges should consider the direction and distribution of light. The strategy strives for a more subtle way to give nighttime characteristics for the landmark of the street. The third aspect of responsible lighting strategy is to eliminate the negative impact of light on human health. The new design proposal should focus on visual comfort, avoid glare for the user, and use the preferred color temperature suitable for nighttime exposure.

5.1.2 Experience and Temporality

The second strategy focused on creating a unique nighttime experience for the user of Sudirman Street. The unique experience is created by using a coherent lighting language for the whole street and adding temporality to the experience based on time, occupancy, and special occasion. This experience aimed to emphasize the new identity as the site of Urban Acupuncture for Darkness. Based on the observation, the functional light in Sudirman Street is mostly static lighting. Light on the landmarks are color-changing, but the color scenario is mostly random, except for special events. All the lights are turned on for the whole night. In the new design proposal, the light should categorize by its function, what it has used for. Based on this category, the light will be determined if it is dynamic if it’s based on time, or based on occupancy. This strategy relates to happiness value and sustainability. The unique experience could impact psychological wellbeing, and by adding temporality, with using light only when it’s needed, could reduce energy consumption and operational cost for Sudirman Street.

5.1.3 Environmental Message

This strategy focused on the central area of intervention. In the main site, the installation will be used as a medium to educate the user regarding darkness preservation. This aimed to raise awareness in responsible lighting in an urban environment. This environmental message will be expressed through a lighting intervention in one of the pedestrian facilities, the bridge. This space is considered strategic for the intervention because it was made to become a futuristic icon of the street and succeeded in catching the public’s attention and became a focal point. Therefore, there’s a potential for this bridge to become an icon for permeating darkness in the urban environment. It also considers as effective, as it modular, located in five points on the street. As a result, the message could reach more users and a larger audience.

5.2 Principles

Based on the guiding vision, these are the lighting principles which will be applied on the design proposal:

1. Eliminate excess light
2. Avoid high contrast
3. Support visibility and wayfinding
4. Plan for control capabilities: time, occupancy, scene experience
5. Highlight public spaces for social interaction
6. Implement fixture at appropriate scale
5.5 Concept

Urban (Dark) Acupuncture defined by accentuating a strategic area in a city with darkness. The design proposal interpreted this concept by creating a multi-scaled intervention by using a layered approach. The intervention will be categorized into two different layers. The first layer is the pedestrian bridge, which became the primary intervention that creates an immersive experience of darkness and carries an environmental message. This area is chosen based on the site analysis, due to the potential to create a focused experience, the current role as the icon of Sudirman Street, and also the modularity as there are five of this bridges along Sudirman Street, allowing the experience and the message to reach more audience. The second layer of intervention aims to extend the intervention and experience in several strategic points along the street, which are landmarks, public spaces, and sidewalks. Therefore, pedestrian bridges became the main point of the Urban (Dark) Acupuncture in Sudirman Street, but the experience of Sudirman Street also can be seen as a whole, became the larger scale of Urban (Dark) Acupuncture.

Based on the guiding vision and principles, five concepts is created for the conceptual lighting design proposal; Resembling the (Unpolluted) Night Sky, Dynamic and Responsive Lighting Experience, Interactive Social Spaces, Self-Glow Materials, and Subtle Nighttime Characteristics of Landmarks. In the new design proposal, the elements of light will be defined into four different categories based on when the temporality:
Concept 1: Resembling the (Unpolluted) Night Sky

The main area for the intervention is the pedestrian bridge, where the installation works during nighttime. As the main site of intervention for Urban (Dark) Acupuncture, this area is intended to provide a darkness experience for the user, which carries an environmental message regarding darkness preservation. The environmental message communicates two values of darkness: “Connection to Nature” and “Wonder & Beauty.” The message is communicated with bringing a sense of space and sense of time into space. The sense of place represents the actual pattern of star constellations Jakarta which created by photo-luminescent paint. The sense of time will be represented with a dynamic scenario in the area, based on time.

The installation aimed to resemble the night sky and light pollution. This installation relates to the surrounding light, as the luminous pattern will be lit up during nighttime, the light will reflect the reflective transparent ceiling. Therefore, the reflection will be more visible when the light on the bridge’s surrounding area has a lower light level. The installation resembles the night sky and light pollution. It carries a message to lower the light level of the other light sources in the street, such as the light from buildings and billboards. While the bridge is modular, people can compare and evaluates the light level in each area. This intervention aimed to give a memorable experience for pedestrians, subtly articulate that dark space with a minimum amount of light could be attractive, and support nighttime activity in an urban environment.

There are two elements of light in the space, light on a vertical surface and horizontal surface. On the horizontal surface, the floor will be painted black, with a starry sky pattern created by photo-luminescent paint inspired by “Van Gogh Path” by Roosegard Studio, Netherland. This paint will absorb solar energy during the day and emit yellowish light during nighttime. On the vertical surface, hidden luminaires are placed in some segments, directed diagonally to the segments of the bridge. The purpose of the light on the vertical surface is to support the sense of safety and the visibility to recognize other pedestrians as it reflects on the faces. Lights on the vertical surface will be turned on based on occupancy inside the bridge.
The pedestrian bridge will have a different scenario during the transition time between light and dark, which is the sunset and sunrise hour. The lighting scenario will mimic the movement of the sun. Right before the sunrise hour, the light will mimic to be rising from the east side of the bridge with amber-colored light. As the sun rises, the light starts to move towards the ceiling with warm temperature light and lower level. When the sky is brighter, this light will eventually disappear. A similar scenario will happen during sunset hour in a different direction, and the light will be disappearing towards the ground. This scenario is supported by luminaire with an adjustable light beam. After rush hour, light on the vertical elements will be user-responsive, based on the occupancy of the bridge. The fixture will use sensors that turning on the lights ahead of the user on the bridge to support wayfinding and reassurance.
In the new design proposal, the light on the sidewalk will be responsive based on time and occupancy. The light will be lit up starting the sunset hour, begin with a lower light level. In Jakarta, sunset hours ranged from 17.44 until 18.17. According to the Model Lighting Ordinance by the International Dark-Sky Association, the light level on the surface will be determined based on maximum permitted value for average surface luminance in Urban Area. According to the Lighting Zone guide, Sudirman Street categorized as LZ-3. After sunset hour, during rush hour (18.30 - 20.00), the light will be on its highest level (7.5 lumens per SF). After rush hour, the light level will be lowered until 2.5 lumens per SF. The uniformity on the sidewalk will be maintained to enhance the feeling of safety for the pedestrian.

Apart from the pole light in the sidewalk, there are also some elements of the street that will be lit up with a low level of light the whole night. These elements could become a visual reference to increase a sense of brightness and safety. It includes the exterior of the pedestrian bridge, MRT Station, shelter, bench, and bicycle parking. The pedestrian bridge exterior will use reflective material, which will be further explained in Concept 4. On the shelter, there will be two elements of light, categorized by how the light controlled. There will be luminaire that accentuates some part of the shelter structure, which will be turned on the whole night. This accent lighting is intended to become a visual reference for pedestrians after rush hour and for safety reasons for drivers, highlighting the shelter location. The second element is the LED panel on the ceiling, which will be turned on based on the occupancy inside the shelter. The bench and bicycle parking will use luminous material on some parts, and will be turned on manually, requires interaction between object and user. The bench will be lit up when the user stepped on a specific point of the hardscape. The light on the bicycle parking will be turned on with some button pro. This personalized interaction with light and the object is aimed to encourage users to use the facility for social interaction, using bikes for transportation, and the increasing sense of belonging with the facilities.
On the MRT Stop Entrance, the lighting inside the entrance will be lowered to avoid high contrast on the transition zones between the interior area and the exterior area. As the street light on the sidewalks became lower after rush hour, the guiding light on the perimeter of the MRT Entrance will be turned on. This aimed to become a guiding light for pedestrians and accentuate the MRT Stop to become a visual reference. The light inside the entrance will use dimmed warm temperature light and a more comfortable ambiance. The light projected on the interior ceiling of the entrance connects to the weather data of Jakarta. The light will create an environment-based scenario, projecting a raindrop’s effect when the surrounding area is raining. This aimed to inform the pedestrian who came up from the escalator or stairs about the current weather condition and help them prepare, as Jakarta is often exposed to hard rain.

Fig. 5.14 Environment-based Scenario on MRT Stop Entrance
In order to create an attractive public space with a robust nighttime identity, public space in Sudirman Street will be facilitated by interactive lighting. Rather than lit up the area generally, the light focused on two elements of the public space. The first element is the playing area, which uses cold temperature light. The hardscape for the skate path is divided by the pattern and reflective paint. This area is lit up by pole light with a dynamic beam spotlight that responds to movement. The responsive light for the skate path is inspired by a project of AF Lighting, Musicon Pumptrack Lighting, a bicycle park that utilizes a sensor to detect movement of the bicycle. As the sensor detected movement on the skate path, the initially narrow spotlight will get wider and lit up the skater and the surrounding area. The second element is lighting for the bench, highlighting the space for social interaction. This area is lit up by warm temperature light, a medium beam spotlight mounted on the trees—this space aimed to create an ambiance of the public living room and encourage people to get comfortable. The interactive part in this space is the luminous bench, which requires the user to touch the bench’s surface.
Concept 4: Self-Glow Materials

The exterior of the pedestrian bridge will use a retro-reflective layer without any additional luminaire. The structure will be illuminated by the car light that passing the bridge. This bridge functioned as a visual reference for pedestrians walking on the sidewalk with lowered lighting levels after rush hour. For the car road, the streetlight will be replaced by silvery lines inspired by Roosegard’s Glowing Lines Smart Highway project in the Netherlands. These lines made of paint that contains a “photo-luminescent” powder that charges up in the daytime and slowly releases a green glow at night. Although this concept adapted in the street surrounded by pedestrians, the safety of pedestrians will be supported by the light on the sidewalk, enables the driver to recognize pedestrian areas. Instead of lit up the road, the new design proposal highlighted the boundaries of the street and areas for pedestrians.
In the new design proposal, the landmarks of Sudirman Street illuminated with a coherent lighting language. The landmarks illuminated with neutral white light, contrast with warm temperature light in the pedestrian facilities. The nighttime characteristic of these landmarks is to highlight more on the user or visitor. The landmark will not fully be lit up, only focused on some part of it, and avoiding light directed upwards. On the Pemuda Membangun Monument, the light lit up only the fire and the base of the statue. The surrounding hardscape will apply the same concept as the bridge, using a luminous pattern with a yellowish color. On Semanggi Interchange, the part that will be lit up is only on the surface that passed Sudirman Street. On Sudirman Statue, the light will only accentuate the base, while the statue became a silhouette. On Selamat Datang Monument, the light will only accentuate the upper part of the tower, leaving the statue as a silhouette. The surrounding hardscape applies the same concept with Pemuda Membangun Monument, using a luminous pattern.
Overall Light Level

Fig. 5.19 Zoning of Light Level

Very low light level
Low light level
Medium light level
Overall Color Temperature

Fig. 5.20 Zoning of Color Temperature

Cold Temperature Light

Warm Temperature Light
6.1 Aim
In order to evaluate the application of Urban (Dark) Acupuncture into the conceptual lighting design proposal of Sudirman Street, a questionnaire was given to six respondents. All respondents are Indonesian, a Jakarta citizen who familiar with the street and had frequent experience being a pedestrian in the street. Three of the respondents had experienced working in the area for more than two years, and three other respondents frequently visited the street. From 6 respondents, two respondents had an architecture background, and none respondent had a lighting design background. Before filling the questionnaire, the respondents were given a verbal and visual presentation of the design proposal through a conference call. The presentation was conducted two separate sessions based on the time availability of the respondents. Each session involved three respondents. The presentation was given in the Indonesian language in order to make it more understandable for the respondents. The questionnaire aims to address the following points:

How is the response from the user in relation to the attractiveness of the design proposal?
How is the response from the user in relation to comfort for the new installation?
How well the installation communicates environmental message regarding darkness presentation?

6.2 Question
The questionnaire includes twelve questions, with ten linear scale questions, and two open questions. Questions number 1 to 5 evaluated the attractiveness of each design concept. Question number 5 to 10 evaluated the comfort of each focused area in the new design proposal. There are three areas evaluated in the questionnaire, which is a pedestrian bridge, sidewalk, and skate park. These areas are considered as high exposure to the pedestrian. The other areas, such as landmarks and car roads, are considered as having minimum interaction with pedestrians. Question number 11 to 12 evaluated how well the installation communicates the environmental message regarding darkness preservation. Concerning the topic, the knowledge of the user regarding light pollution was also asked.

**questionnaire**

1. In the scale of 1 to 5, how would you rate the attractiveness of Concept 1 (Resembling The Night Sky)?
   - not attractive
   - 1
   - 2
   - 3
   - 4
   - very attractive
   - 5

2. In the scale of 1 to 5, how would you rate the attractiveness of Concept 2 (Dynamic and Responsive Lighting Experience)?
   - not attractive
   - 1
   - 2
   - 3
   - 4
   - very attractive
   - 5

3. In the scale of 1 to 5, how would you rate the attractiveness of Concept 3 (Interactive Social Spaces)?
   - not attractive
   - 1
   - 2
   - 3
   - 4
   - very attractive
   - 5

4. In the scale of 1 to 5, how would you rate the attractiveness of Concept 4 (Self Glow Materials)?
   - not attractive
   - 1
   - 2
   - 3
   - 4
   - very attractive
   - 5

5. In the scale of 1 to 5, how would you rate the attractiveness of Concept 5 (Subtle Nighttime Character of Landmarks)?
   - not attractive
   - 1
   - 2
   - 3
   - 4
   - very attractive
   - 5

6. In the scale of 1 to 5, how do you rate the comfort of Concept 1 (Pedestrian Bridge)?
   - not comfortable
   - 1
   - 2
   - 3
   - 4
   - very comfortable
   - 5

7. In the scale of 1 to 5, how would you rate the comfort of Concept 2 (Pedestrian Bridge, Sidewalk)?
   - not comfortable
   - 1
   - 2
   - 3
   - 4
   - very comfortable
   - 5

8. In the scale of 1 to 5, how would you rate the comfort of Concept 3 (Skatepark)?
   - not comfortable
   - 1
   - 2
   - 3
   - 4
   - very comfortable
   - 5

9. Which element makes you feel comfortable?
   Your answer

10. Which element makes you feel uncomfortable?
    Your answer

11. In the scale of 1 to 5, how would you rate your knowledge regarding light pollution?
    have no clue
    - 1
    - 2
    - 3
    - 4
    - know it well
    - 5

12. In the scale of 1 to 5, how well does this installation communicate environmental message regarding light pollution?
    unsatisfactory
    - 1
    - 2
    - 3
    - 4
    - satisfactory
    - 5

Fig. 6.1 Zoning of Color Temperature
6.3 Result

The result shows that most respondents tend to perceive the concept as attractive. According to the result, Concept 1 (Resembling the night sky) is considered the most attractive compared to other concepts with an average rating of 4.67. This followed by Concept 3 (Interactive Social Spaces) with an average rating of 4.5, Concept 2 (Dynamic and Responsive Light Experience), and Concept 5 (Subtle Nighttime Characteristic of Landmarks with resulted in the same average rating of 4. The concept considered the least attractive is Concept 4 (Self Glow Materials), which resulted in an average rating of 3.33. The first three concepts that considered most attractive are a concept that includes a temporality aspect: time-based scenario, occupancy-based scenario, and environment-based scenario.

The second part of the questionnaire is to evaluate the comfort of three areas in the new design proposal, which is the pedestrian bridge, sidewalk, and public space (Skate Park). Some respondents found it tricky to evaluate this aspect through verbal presentation and visual images. However, they tried to give their opinion based on the explanation and the visual illustrations. The area that rated the highest regarding comfort is the public space (skate park), which resulted from an average rating of 4.33, followed by a pedestrian bridge with an average rating of 4.167, and the sidewalk with an average rating of 4. The respondents were asked with an open question, which element in the concept that made them feel most comfortable. Half respondents answered the time-based scenario experience, two respondents answered the interactive features, and one respondent answered the sidewalk experience. The respondents were also asked which element in the design proposal that they find made them feel uncomfortable, and the reason. The answer is quite varied. Two respondents answered self-glow materials, especially on the exterior of the bridge, which utilizes reflective material. In their opinion, they consider the possibility of glare for the driver if the reflection of light is too strong. Two respondents answered the occupancy-based scenario because the movement of light made them anxious. One respondent answered the time-based scenario because the fixture might disturb the continuity of light level. One respondent answered the luminous bench because it creates a feeling of being the center of attention, which is not preferable for some people.

The last part of the questionnaire is to evaluate how well the installation in the pedestrian bridge (Concept 1: Resembling the Night Sky). Firstly, respondents were asked to rate their own knowledge regarding light pollution. According to the result, the average rating of respondents' knowledge regarding light pollution is 3.33. Although none of them has a lighting design background, they have some understanding of the issue. On evaluating the installation on the pedestrian bridge as a medium to communicate an environmental message, respondents tend to be satisfied. It resulted in an average rating of 4.5.
7 Discussion & Conclusion

7.1 Discussion

The thesis aimed to discuss the possibility of applying the Urban Dark Acupuncture into a conceptual lighting design proposal for Sudirman Street, Jakarta. The process of developing the design proposal began with a background literature study regarding the value of darkness and Urban Dark Acupuncture. In this process, limitations are not many resources regarding a design-oriented approach that focused on darkness preservation. In terms of darkness preservation, there is a large amount of literature discussing the impacts of artificial light at night for humans, the environment, and ecology. There are some existing guidelines regarding the light level and recommendation on the type of fixture, light direction, and light distribution. However, there is only a limited amount of literature resources that discuss a comprehensive concept from the lighting designer perspective.

The process then continued in the case study phase, which uses Sudirman Street, Jakarta. This area is considered a strategic area for doing a multi-scaled intervention to apply Urban Dark Acupuncture concept. Before analyzing the site, values are identified to create the design requirement. The design proposal focuses on four values of darkness: sustainability, efficiency, health, and happiness. These values are considered suitable for the context of the site located in the city center. Other values (Ecology, Connection to Nature, Stellar Visibility, Heritage and Tradition, Wonder, and Beauty) considered more suitable for a site with more natural elements.

Site observation can be conducted in the street, although there are many limitations due to the pandemic situation. During the time for site observation, some areas are temporarily closed and secured, and the observation could only be conducted in a limited amount of time. As a result, light measurement in the area could not be conducted. During the observation, some of the light is also turned off due to the partial lockdown of the city, and not showing the actual lighting scenario. The design proposal is evaluated through a questionnaire targeting the user of Sudirman Street. This questionnaire has several limitations. Firstly, efficiency and sustainability could not be evaluated because the complete information regarding the luminaire specification could not be obtained. The second limitation is the evaluation regarding comfort. The evaluation of comfort will be more justifiable with a full-scale study, testing the placement and effect of the luminaire. However, due to the pandemic situation, a full-scale study could not be conducted, and the user has to evaluate the comfort based on the verbal presentation and visual illustration. However, the aspect related to two other values, Healthiness and Happiness, is evaluated through two aspects, comfort and attractiveness. Healthiness value represented by comfort includes visual comfort and lighting exposure, which influences the physical wellbeing of users. Happiness value is represented by attractiveness because providing an attractive experience influenced the psychological wellbeing of the user.

According to the questionnaire, respondents tend to react positively to the design proposal. Regarding attractiveness, the trend shows that the concept that includes the temporality aspect is considered more attractive. It seemed that the respondents are open-minded for a new nighttime experience in an urban environment. Even though temporality is considered attractive, most respondents perceived occupancy-based scenario as uncomfortable, due to creating anxiety feeling caused by the movement of light. A time-based scenario is more preferable regarding comfort.

Compared to the concept with temporality, lighting concepts with static scenarios are considered less attractive according to the result. The concept that categorized using static scenarios is Concept 4 (Self-glow Materials) and Concept 5 (Subtle Nighttime Characteristic of Landmarks). The user might find that this scenario did not provide any new experiences. However, it utilized new materials (road lighting, the exterior of the pedestrian bridge), and applying different concept than the initial lighting scenes (landmarks). However, apart from being attractive, Concept 4 has the primary purpose of pursuing sustainability and efficiency to replace road lighting and utilize the car light. Some respondents also considered the Self-glow concept as uncomfortable, especially on the bridge.

All respondent is already informed about the light pollution issue and satisfied with how the installation communicates the environmental message. This might be influenced by their interest in the installation’s temporality aspect, as they consider it attractive. Attractiveness and new experience seemed necessary when the installation aimed to communicate a message to the user.
7.1 Conclusion

Being in the process of doing literature study, case study, developed a design proposal, and conducted an evaluation survey built my perspective that it is possible to create an attractive and comfortable pedestrian experience and giving an environmental message through Urban Dark Acupuncture. To permeate darkness in an urban environment, several key points should be highlighted, which is attractiveness and comfort. An attractive new lighting experience can create enthusiasm for the street user once the user interested in the experience, the awareness for the environmental message could be raised. As a result, a small-scale intervention can be considered an effective way to raise public awareness regarding light pollution and darkness preservation. Additionally, although the light level in the area is lowered, the user could still find it enjoyable when it provides an attractive experience. In creating an attractive lighting experience, the comfort of the user must be considered. The variables that influence pedestrians’ impressions of outdoor lighting are luminaire, glare, light distribution, color temperature, and horizontal illuminance.

This project has done exploration of reintroducing darkness into the urban environment, which done not by turning off the light but creating an immersive experience of darkness—this experience created with using light responsibly and imaginatively. Urban Dark Acupuncture has potential as a transformative approach to realizing darkness night in cities. In applying this concept in a different site, a thorough site observation focused on the area’s existing light condition. According to my perspective, this concept is more suitable for areas that have an excessive amount of light; therefore, it could support to overcome light pollution problems. Creating an experience of darkness could give a more significant impression to the user, as they recognize the contrast between the space that accentuates with darkness and brighter surrounding areas.

The background and values of the area are also important when determining the site for intervention. When it’s located in a strategic area, more people are able to experience darkness in the urban environment and change the expectations and perceptions of artificial lighting at night. This thesis initiated a conceptual design proposal that applied the concept of Urban Dark Acupuncture and observed how a small sample of the user reacts to the concept in terms of attractiveness and comfort. However, in order to implement the concept, further research regarding the evaluation of sustainability and efficiency needs to be conducted.

*To go dark with a light is to know the light.*
*To know the dark, go dark. Go without sight,*  
*and find that the dark, too,*  
*blooms and sings,*  
*and is traveled by dark feet and dark wings*

*Wendell Berry*
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