

URBAN THEORIES AND A LIGHTING MASTER PLAN FOR HISTORIC QUARTERS IN BANGKOK

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ABSTRACT In recent years, a lighting master plan has been widely included as an integral part of urban planning and conservation to ensure comfortable, safe and pleasant atmosphere and also to enhance the night-time image of a historic city. Among the principles often used in western cities are the five elements that form the image of the city described by Kevin Lynch. However, the urban fabrics of old Bangkok and how people interact with their environment are different from that of the west. Thus these principles may not be directly applicable in Thai context. This study investigated how two urban theories, Lynch's *The Image of the City* and *Serial Vision*, may support the development of a lighting master plan for a Bangkok's historic quarter on the Chao Phraya River. Field studies were carried out using photographic records and photometric measurements; fifty people participated in the surveys. The participants were also requested to draw a 'mental map' of the area and to identify preferred paths and most interesting scenes along them. Day-time assessments indicated that the characters and cultural attachment of historic landmarks, the park, the temple, the river and canals were unique and contributes to people's impressions of the area. These were identified as landmarks, paths, nodes and edges, while 'districts' were relatively vague. At night, however, the existing lightings put more emphasis on motor vehicles and the entertainment zone. Historic landmarks, edges, and cultural activities were indiscriminately illuminated and inadequate, resulting in low perceived safety and a lack of visual continuity and hierarchy. The night-time image, therefore, didn't seem to represent the real value and sense of place of this old quarter. The results indicated that while the mental maps provided main elements and general impression of the area, the serial vision could fill in with paths and scenes which could contribute to a stronger sense of place.

1. INTRODUCTION

1.1 Night-time image of historic quarters

Urban lighting is an essential infrastructure as it facilitates people's night-time activities, provides safety and security, and enhances the image of a city. (Narboni, 2004; Santen, Christa Van, 2006). Particularly for a city with historic and cultural significance, urban lighting is also used as a marketing tool to promote tourism as well as to boost local businesses (LUCI, 2003). With competitions among cities where cultural tourism contributes greatly to its economy, urban lighting strategies have been in high demand in order to strengthen its night-time identity and offer unique experiences to its visitors. In recent years, a lighting master plan has been used as a tool for strategic lighting and widely adopted as part of the urban planning and conservation. In Southeast Asia, with the exception of Singapore (URA, 2009), this concept is still not well developed. Historic areas in this region are often indiscriminately illuminated and large areas of dynamic colour light, having a negative effect on night-time image and cultural identity of the place.

1.2 Urban fabrics of old Bangkok

Bangkok is a water-based city where its urban fabric is characterized by traditional urban planning that centers on religious buildings and a closely-knit social structure (Kulsrisombat, N. and Chuntamara, C., 2013). Phra-arthit neighbourhood selected for this study is located on the east bank of the Chao Phraya River, in the main Bangkok's historical district. The old topography of the area, such as *Troks* (small alleys) and *Khlongs* (canals), has remained intact. The area has been evolved from multi-ethnic communities for the past 230 years to Bangkok's centers of trade and traditional entertainments

such as Thai classical music. Until some 25 years ago 'Khaosarn Road' has been transformed into a famous area for low-cost accommodations and entertainment. Its image has since overshadowed a wealth of historical landmarks such as the Sumeru fort and other cultural attractions. Nevertheless the pathways on the riverfront provide a link between the district and the larger urban area of old Bangkok and cultural tourism by bicycle has increased. To promote tourism, permanent lighting were installed along the riverfront and some other landmarks.

1.3 Strategic lighting and urban theories

Many European cities including Lyon and Ghent were among the first to implement a lighting master plan, based on research and analysis of the area's history and usage as well as characteristics of its heritage (European Regional Development Fund, 2009). In the UK, following a call in 1994 by the Royal Fine Art to all local authorities to adopt lighting strategies; Glasgow and Coventry were among the first cities that apply a *Lynch-style* structure of lit components.

Kevin Lynch's *Image of the City* (1960) is the concept of place legibility which explains how people understand and recognize the layout of a city. Lynch carried out questionnaire surveys and interviews with the citizen of selected cities with different urban forms and characters. He requested the resident to describe the city, sketched maps and provide a description of an imaginary trip through the city. The results showed what type and qualities of area and path that people preferred to go through. It also helped evaluating the quality of a physical environment that gave an observer a strong and vivid image. People understand their surroundings in consistent and predictable ways. The image of a city would be formed to contain very distinct parts and recognizable. It comprised of five elements - *paths, edges, districts, nodes and landmarks*.

Another theory investigated here is *Serial Vision* by Gordon Cullen (1961). The purpose of this concept is to describe pedestrian experiences when moving through a built environment. The changing view provides a sense of discovery and drama. It encourages urban designer to manage elements of the built environment in ways that provide an emotional impact. A combination of view-based series of dramatic events and the social interactivity of people increases the city's capacity to engage its users and cause them to engage each other. It is also a tool to measure a city's dramatic effect which involves measuring a traveler's serial vision as they passes through it. It can describe into two elements: the existing view and the emerging view. Based on these two urban concepts, the questionnaire and data collection tools were developed and described below.

2. METHODS OF STUDY

2.1 Questionnaire surveys

Field studies and observations of the Phra-Arthit neighbourhood were carried out, using photographic records, photometric measurements, and questionnaire

surveys and interviews. A questionnaire was designed to collect demographic data, activities and subjective evaluations of existing lightings. The 5-point Likert scales were used for the evaluation of perceived brightness, aesthetics, safety, visibility and overall satisfaction of lighting in 6 areas. These include the riverfront, Santichaiprakarn Park, Phra-Arthit and Sumeru Fort, Rambutri and Chanasongkram Temple, Khaosarn, and Banglamphu. Some sixty people were selected but only fifty agreed to participate in the survey. Sixty percent of the respondents were self-identified as visitors i.e. they were not regular users and the other forty percent were residents and local business owners.

To investigate Lynch's theory, a blank space was provided as part of the questionnaire and the respondents were requested to draw a 'mental map' of the area as well as to identify key points of reference. Also, to measure the respondents' serial vision, they were asked to draw their most preferred path(s) and to identify view points they considered important to the experiences on a copy of area map obtained from Google Map. The images obtained from each method were transformed into a digital format then overlaid on top of one another using Photoshop software. As a result, the most distinctive physical elements and the most vivid scenes in people's perception emerged in darker shades.

2.2 Photometric measurements

The results from the overlay of mental images, in turn, determined the locations for spot measurements of illuminance and luminance using Konica-Minolta LS-110 Luminance meter and T-10 meter (for illuminance and correlated colour temperature). At each location and scene seven photographs with different light exposures were taken, then converted into the HDR images and luminance maps using Anywhere software. These two sets of photometric data were correlated with the subjective assessment of the respondents. Also in order to determine whether the existing lightings were complied with design guidelines, illuminance on streets and paths were recorded and compared with the recommended values by CIBSE LG6 (1992) according to types, widths and volume of traffic.

3. ANALYSIS

3.1 Users' experiences

Fifty local residents and Thai visitors participated in the study; the proportion of male and female respondents were roughly equal. Some 84% were age between 15-40 years old and only 16% were older than 40 years old. The areas they used the most were Santichaiprakarn Park, Phra-Arthit and Sumeru Fort, riverfront area and Rambutri & Chanasongkram Temple, Khaosarn and Banglamphu respectively. While the park and the fort areas were most visited by both groups, the residents reported more frequent use of the temple area than the visitors. At the same time, the visitors appeared to use more of the riverfront area than the residents. This

confirmed that most local residents still involved in religious activities and traditional ways of life. These information correlated with the mental maps and serial visions drawn by each group. Figure 1 shows the temple during daytime (left) and not illuminated at night (right).



Fig. 1 Chanasongkram temple

All respondents agreed that urban lighting had an influence on their feelings and experiences of the area. Their perceived brightness also corresponded to the measured data, particularly the highest light levels of the Khaosarn area and the darkest zone of the riverfront and parks. These seemed to be in line with their assessments of safety and visual clarity. In terms of aesthetic, the riverfront and the park received highest scores (average of 3.5). For overall satisfaction, however, Rambutri and Chanasongkram Temple along with the Khaosarn area received the highest scores of 3.7 and 3.5. At night, both areas - with the exception of the temple ground - be described as 'active' entertainment zone and were illuminated with high illuminance and bright signage.

3.2 Mental maps and serial vision

The overlay of mental maps revealed that nodes, paths and edges were the three most frequently used elements respectively. There seemed to be a lack of visual cues, particularly on the vertical planes, to enhance clearer boundaries of the districts. Specific buildings and shops, temple, park and traffic junctions were frequently illustrated as nodes (40%). One-third of the edges were the river bank and canals, while the other two-third were man-made such as building facade and temple walls. Since these edges were either not illuminated or had very low light levels, the mental maps appeared to reflect the day-time image of the area rather than night-time. Figure 2 illustrated the mental maps.

For serial vision and preferred paths, on average 50% and 28% based their choices on how easy to reach the destination and convenience as well as safety. Only 22% selected because of aesthetic reason. Nevertheless historic buildings and landmarks were identified by 28% of both groups as most interesting viewing points. There were, however, some different impressions of the scene among the residents and the visitors. Higher percentage of residents tended to find the viewing points of the street and the temple more interesting, while the visitors seemed to be more impressed with the scenes from the river and canals. This again reflected the daily life and key visual environment that each group had vivid memories. Figure 3 shows the selected paths and scenes.

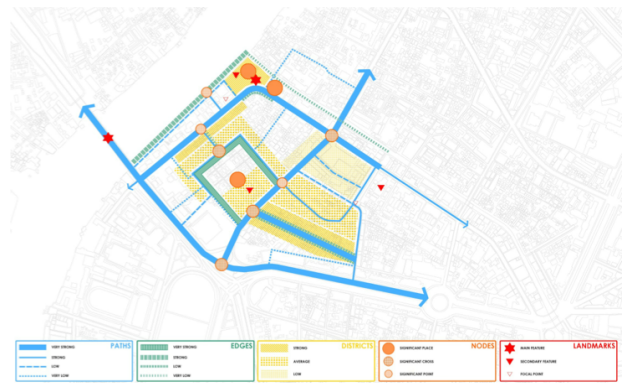


Fig. 2 The combined mental maps



Fig. 3 Selected paths and scenes

3.3 Day-time VS night-time assessments

For streets and paths, there were five luminaire types for streetlight and four types of pathway lighting, but most of them did not have proper optic and glare protections. There were general problems of discomfort glare and uniformity in most areas. The pole lights were 8-15 meter high with a range of light sources. Along the riverfront and in the park, pathways lighting used poles of 3-5 meter high. Correlated colour temperature (CCT) was 2200K for high-pressure sodium and 3200K-6500K for the metal halide, fluorescent and LED. It didn't seem to have a strategy for each type and choice of CCT. Nevertheless, the illuminance levels on most streets were in line with the recommended levels. Additional lights from bars and restaurants also contributed to a much higher brightness in Khaosarn and Rambutri areas.

By contrast, the riverfront paths and the park did not have adequate illumination, particularly the vertical illuminance which was important for the users' perceived brightness, face recognition and safety. Architectural lighting, particularly for the pavilion in the park (see Figure 4) and Sumeru fort, seemed to suffer from the inappropriate technique, CCT, and the use of LED colour-change. Although the average luminance ($>10 \text{ cd/m}^2$) made it outstanding from the background, the luminance distributions and colour of lights on the surfaces didn't establish visual hierarchy (see Figure 5). Also, it was unfortunate that the facade of historic buildings on Phra-Arthit Road such as the former royal mansions were not illuminated. These vertical facade could have played a significant role in defining the edges and also provided a soft indirect light for the pedestrians.



Fig. 4 Santichaiprakarn Pavillion



Fig. 5 Lighting of Sumeru Fort

4. CONCLUSION

This study investigated how the two urban theories can be applied to the research and analysis phase of developing a lighting master plan for Bangkok's old quarter. The day-time assessment of the Phra-Arthit neighborhood revealed that the physical characters and cultural attachment of historic landmarks, old building facade, the park, the temple, the river and canals were unique and contributed to strong impressions of this old quarter. These were identified as landmarks, paths, nodes and edges on the mental maps as well as the chosen routes and viewing points obtained from the surveys. The perception of district, however, was relatively vague. For the entertainment and commercial areas of Khaosarn and Banglamphu, although they were identified due to distinctive activities, there were a lack of unique characters and visual orders. At night, the existing lightings put more emphasis on providing illumination for motor vehicles and concentrated around the entertainment areas. Illumination for the unique historic landmarks and edges, i.e. old facade and riverfront, as well as social and cultural activities around the park and the temple were inadequate, resulting in high brightness contrast, a lack of visual continuity and visual interests. These also had an effect on the night-time image of the historic quarter and perceived safety. It also discouraged pedestrian activities and cycling, which could be a more sustainable way to explore the area and learn about the culture. Thus, it highlighted the need for a lighting master plan that is based on a thorough study of the history and evolutions of the area through the experiences of people.

In conclusion, the results indicated that while the mental maps provided main elements and general impressions of the area, the serial vision could fill in with paths and scenes where the visitors could feel a

stronger sense of place. However, further study should investigate with a larger group of local residents. Also, the measure of serial vision could use a mobile phone or inexpensive camera to record the scenes as they move along the chosen paths rather than identifying viewing points. Nevertheless, both methods could be applied as data collection and analysis tools during the research phases when developing a lighting master plan.

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