

## Architectural Coloured Illumination Application for Wayfinding in Exhibition Centre

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Colour is one of the powerful wayfinding elements that helps the users to navigate inside the building space. This research will explore and identify the wayfinding performance using architectural coloured illumination in the exhibition centre, in terms of user's perception and preference of colours and illumination method using architectural elements. The reason for this subject matter is due to the issue of less effective wayfinding performance from conventional way finding method such as signage, landmarks or even spaces themselves. Thus, coloured illumination as universal wayfinding method has potential to maximise the wayfinding capability. Mixed method data collection is used in this research, consists of qualitative and quantitative method. Case studies regarding the certain buildings in Malaysia that uses artificial coloured illumination is used as qualitative method. The data obtained from the qualitative method is used to structure the quantitative method, which is the questionnaire survey. An online survey conducted in the form of questionnaire for designer target group with different age groups regarding the research and the subject matters. From the survey, respondents are given with choices of preferred colour of basic colours. They are also given with choices of preferred architectural coloured illumination technique of illumination using wall, floor and ceiling. As the result, the overall preferred architectural coloured illumination is yellow coloured hue with illumination on the wall. The findings from this research can be used as an information for designers and architects to further maximise the wayfinding performance to create more effective wayfinding in buildings.

**Keywords:** Architectural Wayfinding, Architectural Elements Coloured, Illumination Artificial, Illumination Exhibition Centre

### 1. INTRODUCTION

There are several methods of wayfinding process in providing the information. The wayfinding process effectiveness depends mainly on how the users perceive the information, process and generate the navigation message to bind them inside the mental mapping, based on the knowledge from the wayfinding elements or cues (Sandstrom, Kaufman, & Huettel, 1998). This research explores the coloured illumination as the subject matter, which has potential in the wayfinding or navigation process in the building.

Like other wayfinding tools, it can function as communication tool between people and the objects or surfaces surrounding them. The only main difference is that this elements mainly involving human natural emotion, in terms of colour and lighting intensity. Thus, it can play a crucial role in the recognition and analytical processes and enhancing the visual memory, mainly in images in building spaces. Therefore, coloured illumination are able to provide accurate message to people through the spaces in the architectural built environment. The research objectives of this paper are to determine the

effective architectural coloured illumination method, consists of illumination method and the optimum colour used. The second objective is to identify the impact of gender and age on the preference of colour. The method of the study comprises of studying the available literature and case study on wayfinding strategies to find out possible solutions for applications of architectural coloured illumination, and acquiring information from participants about human perception of preferred colour and used in wayfinding process of exhibition centre.

## 1.1 WAYFINDER IN ARCHITECTURE

Wayfinding in architecture as described by Lynch (1960), it is all about the way of navigation among individuals in environment made and planned by man. Wayfinding process as “a consistent use and organisation of definite sensory cues from the external environment”. In the 1970s, Lynch’s concept of spatial orientation extended from static to a more dynamic, process-oriented understanding of wayfinding by the researchers in the domain of cognition and cognitive mapping. This way, the explanation is more relatable to realities of human’s information gathering and decision making in daily life. The idea is opposed by the researchers, that the people’s cognitive mapping are involving information from their surroundings, acquiring, storing and analyse the information, to be organised in more structured form.

## 1.2 LOCAL ARCHITECTURE CUES IN ARCHITECTURAL WAYFINDING

In architectural way finding, local architectural cues refer to knowledge that that are perceived by the people from several common local architectural forms, such as transitional spaces such as corridors, staircases and openings. There are two kinds of information from the architectural form. They are hinted architectural object notion, such as the direction of ingress or egress from the form. Passini (1996) stating that users can know the privacy of space from the design of the door openings and its direction with difference in size, colour and materials. From this explanation, there are four kinds of sources that can provide local architectural cues:

- Different types of architectural elements or features in the circulation system
- The spans or distance from the architectural elements to the users

- The different scale of the architectural elements
- The different angular positions of the architectural elements from the field of view of users



Figure 1: varies of wayfinding features or tools inside built environment  
([www.pickthebrain.com/](http://www.pickthebrain.com/))

## 2. PROBLEM STATEMENT

The reason for this subject matter is due to the issue of less effective wayfinding performance from conventional wayfinding method which divided into 2 problem areas:

- Relying on signage alone
- Not optimised wayfinding design with architectural space

### Relying on signage alone

Most complex or building environments are crowding signages and occupied the walls, ceilings and even on floor for wayfinding purpose. Signage alone cannot help users to differentiate the areas as there are no any environmental cues from it. The main issue of the signage are:

- Lacking of the visibility especially they are too far from view
- Inaccurate, ambiguous or unfamiliar messages
- Prone to be obscured by obstructions in viewing

According to Edward Luca and Bhuvan Narayan (2016), users will often skip the signage and either using their memory or asking for directions, rendering the wayfinding of the signage and the building as useless.

### **Not optimised wayfinding design with architectural space**

Wayfinding consultations are often implemented at the final stages of a project after the floor plans are finalised and during ongoing construction. Thus, the signages or wayfinding elements which are added might not fully utilised to the architectural space in wayfinding. This is because the wayfinding information feels tacked-on in the final stage without integrated with its surroundings characteristic in consideration. As the end result, most of the critical elements are either missing or lacking. Thus, this results in conflict between the architecture itself with the wayfinding features, rather than integrating with it for better performance of wayfinding (G.Neely, 2016)

### **3. RESEARCH QUESTIONS & STUDY PURPOSED**

The research will try to answer the questions which in line with the objectives for application of coloured illumination for architectural wayfinding process among users, which is crucial for effective wayfinding in the facility or building. Some of the research questions are listed below:

- **Which colour and method provides effective performance for architectural coloured illumination wayfinding in exhibition centre?**
- **Is there any gender or age group difference on the preferred colour of the architectural coloured illumination in wayfinding?**

As wayfinding process is crucial for all users inside a facility or a building. Thus, the application of coloured illumination as an element or tool for architectural wayfinding can help in leading the users to destination, as well as maximising the space performance in terms architectural wayfinding by the usage of architectural cues. Therefore, this study will try to fulfill the research objectives as stated below:

- **To determine the most effective method and colour used in architectural coloured illumination for users in exhibition centre**
- **To study the impact of gender and age on the preferred colour of the architectural coloured illumination in wayfinding.**

## **4. METHODOLOGY**

Mixed method consists of questionnaire as quantitative method and case study as qualitative method chosen for the data collection. For qualitative method, Malaysian building case study with artificial coloured illumination features is used to generate the survey. For quantitative method, online questionnaire is generated and distributed to specific group (design group) as respondent

### **Qualitative Method - Case Study**

SkyAvenue Mall, located in Genting, Malaysia is chosen as the case study for this research. SkyAvenue Genting offers a variety of retail, dining, and entertainment outlets in Genting Highlands. One of its most impressive feature is its main atrium with a massive LED display screens and a winch installation called SkySymphony. The LED illuminated lighting at atrium roof and wall panel contribute to the spatial hierarchy of that atrium as main gathering space. To enhance the shopping experience inside the building, as well as convey messages to the users digitally with motion graphics. The artificial illumination technology used in this case study the modular LED display panel with many LED screen panels combined for any size and shape to suit the space.

Kuala Lumpur International Airport 2, or KLIA2 located in Sepang, Malaysia is chosen as the second case study for this research. It is a low-cost carrier terminal with the concept of Next Generation Hub. One of its most impressive feature is its parasol-like structures coloured illumination feature used at the check in counter in the departure hall. The parasol-like structures are decked with bright, colour-changing lights to generate the architectural hue for the users for wayfinding purpose for that particular location. The technology used for the artificial illumination is multiple colour-changing LED strips mounted inside an aluminum channel of customised shape to fit the parasol structure.

### **Quantitative Method – Questionnaire**

The questionnaire is carried out in two sections, aims to determine the architectural coloured illumination preference, and the gender effect on the preference of colour in wayfinding. Part one is regarding the respondent profile or background. This section consists of 65 males and 65 females which total up to total 130 respondent with designer background (with allocation of 100

standard samples and 30 extra to minimise error). 5 different gender group taken into consideration, which are, 19-25, 26-35, 36-45, 46-55 and 55 years old and above to determine the age difference in colour preference. Exclusion criterion (includes sickness, handedness of users, visual impairment, spatial skills, cognitive impairment, independent living, depression) are included in the questionnaire to eliminate inaccurate data of respondents.

Part two is regarding the preference of architectural coloured illumination method in navigation (wayfinding). 3 spaces in exhibition centre with different privacy and different characteristic are selected for this questionnaire with picture for respondent to visualise, such as exhibition hall (public), auditorium (semi-public) and office (private). 3 multiple choice questions for each spaces where respondents are required to choose one preferred answer for each questions. 3 coloured illumination options in wayfinding using architecture elements such as floor, wall and ceiling are provided.

The illustration diagram is presented with the lighting projected on a solid directing arrow signage are presented in each question as answers for respondents to choose. They consist of artificial illumination methods such as effect illumination technique to floor (method A), wall washing illumination technique on wall (method B) and indirect illumination technique at ceiling (method C). Each methods are given with 3 types of primary colour hues such as red colour, yellow colour and blue colour as the colour options. This is because these colours are the factor colours that can be combined to form the various types of other colours.

The result of preference of colour on each gender is taken to determine the gender effect on the colour preference in wayfinding based on percentage of colour preference result on each gender. The Result of preference of colour on different age group is taken to determine the effect of age on colour preference in wayfinding based on the percentage of colour preference result on each age group.

## 5. FINDINGS

The media for this survey is using online Google Form platform, for easier usage among the respondents and more efficient data collection. The questionnaire data collection took 2 months period, from February until April of

2020. Microsoft software is used to generate more detailed chart based on the data collected from Google Form for further analysis. Comparison of different data such as gender and age groups are also carried out.

### 5.1 PREFERENCE OF ARCHITECTURAL COLOURED ILLUMINATION METHOD IN WAYFINDING

The universal preferred architectural coloured illumination method is the method that is efficient and suitable to be used in wayfinding for all spaces ranging from public space, semi-public space and private space.

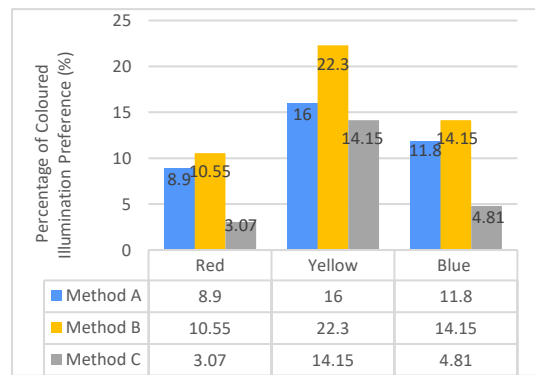


Figure 2: Chart of universal coloured illumination preference in wayfinding for exhibition centre

Based from the data collected from the previous three sections, the average data is calculated from the data of preferred architectural coloured illumination by the respondents. Based on the figure 2 above, the most preferred colour and method are chosen from the three spaces. Yellow coloured hue with method B is the most preferred data from the preference of the respondents. Thus, method B (wall washing on wall) coloured illumination method with yellow colour hue is the most optimum architectural coloured illumination method in exhibition centre. The least preferred architectural coloured illumination is method C with red coloured hue.

## 5.2 GENDER EFFECT ON COLOUR PREFERENCE IN WAYFINDING

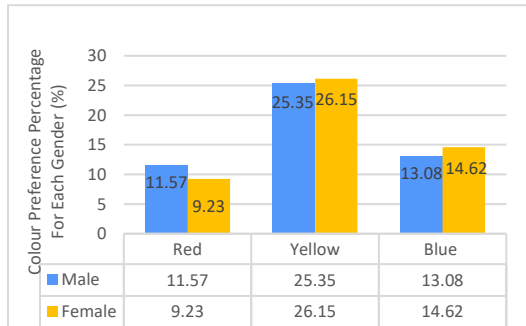


Figure 3: Chart of gender effect on colour preference in wayfinding

65 male and 65 female are compared to each other to find out the difference of colour preference among them. Based on figure 3 above, male and female has the same preference in wayfinding colour. This is perceived by the pattern of colour preference interval difference among the colour hues, with the highest being yellow colour hue and least as red colour hue. However, the male respondents prefer red colour hue more, compared to female respondents, while female respondents prefer more yellow hue and blue colour hue compared to Male respondents.

## 5.3 AGE GROUP EFFECT ON COLOUR PREFERENCE IN WAYFINDING

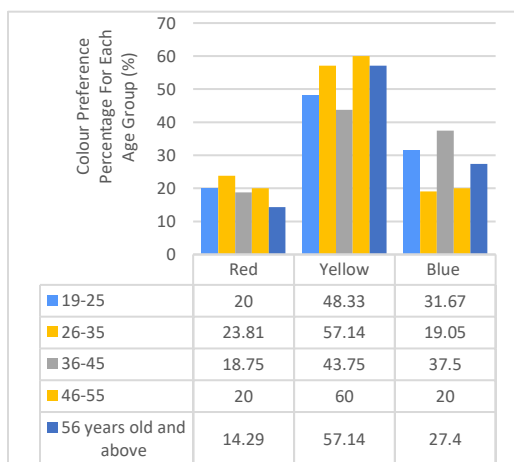


Figure 4: Age group effect on colour preference in wayfinding

The percentage of colour preference of the age group is measured within their own category due to the limitation of number for each age group category. Based on figure 4 above, age group 19-

25, age group 26-35, age group 36-45, age group 46-55 and age group 56 years old and above are having the similar pattern of the chart. This is perceived by the pattern of colour preference interval difference among the three colour hues, with the highest being yellow hue, followed by blue hue and least by red hue. Based from the chart, red colour hue is preferred mostly by age group 36-45 compared to other age group. Yellow colour hue is mostly preferred by the age group of 46-55 compared to other age group. Blue coloured hue is mostly preferred by the age group of 36-45.

## 6. CONCLUSION

The coloured illumination in wayfinding method works best with architectural elements with larger surface such as the wall. From the findings, wall washing method using artificial illumination is preferred by the users, as it is more visually attracting compared to other methods. Yellow colour is also preferred in architectural coloured illumination of wayfinding. Yellow is also a colour with energetic characteristic and has strong effectiveness in communication as a wayfinding colour option (Radeloff, 1990). When used on the wall, yellow colour can appear to be exciting to irritating (in high saturation). As exhibition centre where individuals gather to share interest in the in varieties of exhibition, yellow colour can enhance this building typology as gathering space for the users especially in wayfinding.

There is no significant difference between each colour preference in wayfinding among different gender group and age group. However, there are colour difference between each gender group and age group. For gender impact, male tends to prefer red colour hue more than female, which female prefers more yellow and green hue than male. According to Radeloff (1990), female prefers more soft colours such as yellow colour and blue colour, while male prefers bright colour such as red colour more. For age group impact, there is difference of colour preference between each age group but the specific colour preference between each age group is not consistent throughout every studies conducted by researchers. Furthermore, the preference is affected by various factors such as living environments, while yellow remains the most consistent among all age groups.

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