

Kim, M. et al. COLOR CHARACTERISTICS ANALYSIS FOR THE COLOR  
DEVELOPMENT OF ARCHITECTURAL COLOR GUIDE

## Color Characteristics Analysis for the Color Development of Architectural Color Guide

-Conduct a research and analysis on the existing domestic and international Color Guide-

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### ABSTRACT

The numerous existing color guides are intended to express and show direct representation of the brand image to the consumers. At the same time, consumers are able to easily pick their choice by presenting samples in the original color space developed by the company which functions as a facilitator in communicating color. The purpose of this research was to establish a more efficient color system and to ensure that the color guide could be frequently used by the consumers. This was achieved by analyzing the characteristics of the domestic and international color guide in architectural interior and exterior color samples. Our research of, First, the color characteristics of each Munsell based color guide, was studied by analyzing the value, chroma space distribution, and further research on the overall number of colors based on 10 hues led to the analysis of hue distribution. Second, the current color trend was analyzed based on the characteristics of the contemporary trends and the current constructed apartment's exterior colors. The result of the research showed that, out of all the colors, the intensity of YR, Y was measured the highest, the colors P, RP was measured to have the lowest distribution. In the case of Munsell distribution coefficient, it was analyzed that value was concentrated intensively around 9~4, and chroma around at 0~8. On the other hand, in the case of interior trend and exterior color trend, the value was 2~3 stages lower than the color groups that showed intense concentration. Also colors in the middle saturation domain showed higher distribution. Therefore, by developing an interior, exterior color guide that reflects changes in the architectural trends and characteristics mentioned above, the consumers can meet their needs but this development also assist in securing the existing architectural color guide.

**KEYWORDS:** Color Guide Book, Architectural Color Guide, Interior& Exterior Color Sample

### INTRODUCTION

#### 1-1. Research Background and Purpose

Color guides with various purposes that are currently being marketed are used as media to communicate consumers' distinctive brand power and communicate colors clearly as a result of the integration of the color technology possessed by each company. Recently, the use of these color guides has become a diverse target not only for designers who deal with color professionally or

# Kim, M. et al. COLOR CHARACTERISTICS ANALYSIS FOR THE COLOR DEVELOPMENT OF ARCHITECTURAL COLOR GUIDE

intermediary distributors, but also for consumers who direct space in DIY and want to make their own lifestyle. Therefore, the problem of whether the desired color is appropriately arranged or the color reproduction is possible is a very important issue in releasing the color guide. For this reason, it is difficult to collect all reproducible colors in many types of color guides, which are widely available at present. Therefore, the number of colors, glossiness, and sample size are determined according to the purpose.

In the case of multiple color sampling targeting the environmental design field, the gap of the color is not constant compared to the state including many colors, so that the limitation of the gamut configuration is questionable. These problems are usually target highly demanded colors that are popular with consumers. It is true that the hue of low saturation induces a lot of weight compared with other type of hue, and it confronts with limit of color in design aspect.

Therefore, this study analyzes the colors of domestic and foreign color guides, which are frequently used in interior design and exterior parts of the environment design field, so that the users using the color guide can easily and quickly select the color. The purpose of this study is to establish the basic data for color guide that meet the needs of consumers.

## 1-2. Purpose and Method of Research

The study analysis the color guides of six companies, which are available for domestic and overseas construction consumers. The research is conducted as follows.

First, the study examines the general characteristics of color guides of each company. It measures the release year, the total number of colors, the gloss of the guide specimen, and the specimen size. The gloss measurement is carried out using a micro TRI gloss meter (2015) manufactured by BYK Gardner, Germany. Second, the study analyzes color features and color space. The instrument used for the color space analysis of the color guides was measured by an X-rite 'i7' spectroscopic colorimeter to measure  $L^*a^*b^*$  values and Munsell symbols. Then, the colorimetric values were classified into brightness and Chroma according to color. The study applies the method of measuring the color gamut of each 10 color by visual observation.

## 2. Theoretical Background

### 2-1. Color guide types and features

The primary purpose of using the color guide is to collect ideas on coloring, to compare the target color with the result color, or to use color management before and after selecting the color, in addition to serving as a sample book for color designation. Depending on the application and target consumer, the color guide types are available in a wide variety of applications including paper, fiber, plastic, acrylic, glass, and wood. In this study, color guide, which is a sample made of paper specimen, among the color guides frequently used by design experts and the general public, is summarized as follows.

#### ① PANTON SOLID CHIPS

Pantone solid chips released by Pantone in the United States are produced by spot coloring of inks by materials or by color sampling made of various materials such as actual fabric or metallic, which is a popular color book used by experts in the field of fashion and visual design. The arrangement of colors is irregular, but it is composed of colors that are high in usage frequency and color, so that it is composed of colors that are colorful and high in saturation, and are widely used by designers. It is sold with one set of coated and uncoated swatches in the same color, and is reproduced with 6 kinds of the same color together with a fan-shaped form with only a fan-shaped monochrome. The color guide is a typical item. The number of colors in the Pantone Book differs from one release to another, but it is made up of about 1,755 colors based on the process color of graphics. (Figure 1)

#### ② DIC Color Guide

DIC Color Guide is an abbreviation of 'Dainippon Ink and Chemicals Industry'. It is a color guide used for design, construction, printing, etc., and CMYK value is displayed for each color. One set contains a total of 3 pan books and generally 4 sets can be released. Even though each set consists of nuance of tone, perceptual rankings of the colors are not uniformly systematized. Same colors are consisted in one page and they can be cut along 13 horizontal dotted lines so that consumers can detach them. Also each set consists of almost 650 colors. (Figure 2)

#### ③ THE MUNSELL BOOK OF COLOR

The most recent (2016) Munsell color book in the United States, X-Rite, is made up of two sets of gloss and matte. In particular, Munsell's 10 colors are divided into 4 levels and arranged in such a way

## Kim, M. et al. COLOR CHARACTERISTICS ANALYSIS FOR THE COLOR DEVELOPMENT OF ARCHITECTURAL COLOR GUIDE

that lightness and chromas are visually selected in 40 colors. In the case of glossy, 1596 colors are used. In case of matte, 1312 colors are used. In the case of lightness, the colors from 1 stage to 9 stage can be distinguished by the naked eye, and the colors from every 2 stages in the case of saturation can be distinguished as 2, 4, 6, 8, 10, 12 and 14. For user's convenience, it is a color sampling designed to be put in pocket again after color comparison. (Figure 3)



Figure 1: pantone solid chips



Figure 2: DIC Color Chips



Figure 3: the munsell book of color

### ④ NCS Color Guide

NCS, which was launched by the Swedish Color Research Institute, stands for 'Natural Color System' and it is a specimen made with the concept of the most natural flow to human sight. The research started in the 1920s and published the first NCS color sampling in 1979. In 1995, the second NCS color sampling was published. It is a color guide widely used by color experts in Europe and the world because it shows the standard system of color based on universal natural color unlike the trend color, which changes according to the age. It has been released in various versions such as Pantone and Sampler form that is used by cutting with scissors according to the shape and size of the fan book. And the total number of colors is 1950 colors. (Figure 4)

### ⑤ Public Design Color Standard Guide

Based on KS A 0011 " Public Design Color Standard Guide " revised in 2005 by Korea Technology Standards Agency, 1,519 colors are provided for KS symbol and related color information, so that it can be used for various applications in public design industry. In addition to the name of system color and the name of tolerance color, it also includes the colors of public facilities used in Korea, the national symbol colors of the, the color of the governmental institutions' symbol, and the colors of Seoul. The color standard is suitable for symbols and guidelines of the organization. Especially, it is evaluated that the convenience of communication is given priority by collecting various marks for each color. The color information is convenient to refer to the color information by marking each color as KS triplet,  $L^* a^* b^*$  value, YDxDyD, sRGB, CMYK value on the backside of the color surface. However, it is characterized by a wide spacing of colors stressing only a specific color, which is not suitable for use as a designer's idea. (Figure 5)



Figure 4: NCS Color Book Series



Figure 5: Public Design Color Standard Guide Color

# Kim, M. et al. COLOR CHARACTERISTICS ANALYSIS FOR THE COLOR DEVELOPMENT OF ARCHITECTURAL COLOR GUIDE

## 2-2. Literature Review

Regarding the color guide, if you research the materials which have been recovered in this subject till today such as < Making a step-by-step standard color sampling for strengthening the capacity of color education > (Kyung-hee Lee, 2011) which was aimed for colored education to be used. However, in case of <"The proposing efficient

utilization of a foliage plant after analyzing the current market within a country> (Kim Yu-sun, Choi Sun-Ran, Jeon bong, 2014), which was adopted by proposing some examples about utilization of a foliage plant and the same case for the <Planning for the coloration by effective using of silk> (Kim, Eun-a, 2003) is also limited to the study of color sampling for color application in Hanbok. In the field of environmental design, according to the color guidelines for city and province as follows: "Study on the extraction of local color in Seoul" (Kim Hyunsun, 2010), and <"Establishment of environmental color guideline to Chungcheongnam- 2012> (Lim Oh Yeon, 2012), and <"Suggestion of color guidelines for street environment in Haeundae Geunnam Road"> (Lee Sang-hee, Park Yeon-seon, 2013). In general, there are a lot of studies on the identity and symbolism of a city in the field of environmental design. However, analysis and research on color guide or color sampling focused on environmental design are insufficient. The purpose of this study is to analyze the color range of domestic and foreign architectural color guides and to use them as data to grasp the characteristics of each color guide prior to the establishment of systematic color guides.

## 3. Color guide analysis.

Architectural color guides refer to the color guides that are mainly used for interior and exterior designs and are produced mainly by paint companies. In this study, five domestic color guides and one foreign color guides has been selected to analyze the primary characteristics, color number, gloss, and color mark size. Second, color distribution by color was compared and analyzed by showing the distribution in Munsell space.

## 4. Research Results

### 4-1. General analysis of color guides.

The results of color guide analysis of six companies in Korea and abroad are as follows. The analysis has focused on color characteristics, the release year, number of colors, size of the specimen, and degree of gloss. The results are shown in Table 1 below. In the case of gloss, 4% or less is flat, 5 ~ 10% is matte, 10 ~ 35% is egg shell, 35 ~ 70% is semi gloss. In case of luminous intensity of 70% or more, it is classified into gloss.

Table 1. General characteristics of color guides

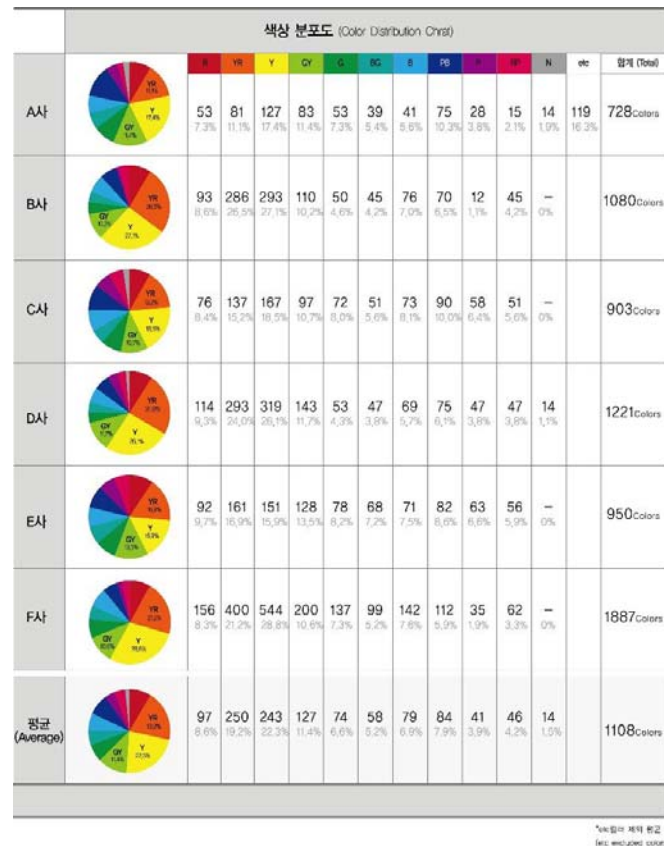
	A사	B사	C사	D사	E사	F사
출시년도	2012	2006	2011	2014	2012	2015
색상수	728색	1080색	903색	1221색	950색	1887색
시문크기	5,0×2,2mm	5,0×3,2mm	5,0×3,2mm	4,5×2,3mm	5,0×3,0mm	4,9×3,1mm
광택정도 (60°기준)	5,4%	19,0%	15,7%	2,1%	14,5%	4,5%

### 4-2. Color distribution of each color guide

As a result of analyzing the color distribution of color guides of six companies in Korea and abroad, the color which occupies the largest proportion among the total number of analyzed colors is Yellow then YellowRed, GreenYellow, Blue, and PurpleBlue are the next largest components. This is because it is a color guide for interiors and exteriors. Therefore, it is judged to be the reason why the color proportion considering the harmony with the natural landscape of the local color is high in the location of each building. The color distribution ratio for each company is as follows.

Table 2. Color guide characteristics by color of six companies

# Kim, M. et al. COLOR CHARACTERISTICS ANALYSIS FOR THE COLOR DEVELOPMENT OF ARCHITECTURAL COLOR GUIDE



## 4-3. Result of distribution of Brightness and Chroma in Color Guide

① In case of Red, A company's color guide showed little distribution around middle-chroma • middle-brightness part. F Company's color guide showed large distribution of colors from high-brightness to middle-brightness and from middle-chroma to high-chroma compared to low-chroma colors.)

② In case of Yellow Red, A company has less middle-brightness and low-brightness colors compared to high-brightness colors. On the other hand, C Company has fewer colors in middle-brightness and middle-chroma, which makes us feel Yellow Red heavy. 6 companies showed the same result that similar colors are focused around high-brightness and low-chroma area.

③ In case of Yellow, A company has low distribution of middle-brightness and low-brightness colors. B Company has great distribution of middle-brightness colors in high-brightness area, but low-brightness colors are little distributed. Also C Company's colors around middle-brightness and middle-chroma have little portion while F Company includes almost all colors.

④ In case of Green Yellow, A company and C company have little distribution of middle-brightness and middle-chroma part. D company has little distribution of low-brightness colors. All companies have relatively high frequency of repeated and similar colors in high-brightness and low-chroma areas, so repeated phenomena of bright and light colors is noticeable compared to other colors.

⑤ In the case of Green, the overall number of colors was lower than that of R, YR, Y, and GY, which registered a high weight, and the ratio of color number was especially low in Company C, and in Company A, Company B, and Company D.

⑥ In case of Blue Green, middle-brightness and middle-chroma areas of A, C and E companies are weak compared to other colors. D company has little distribution of low-chroma part of Blue Green.

⑦ In case of Blue, A and D companies have little portion of low-brightness. C and F companies have appropriate distributions of colors.



⑧ In case of Purple Blue, color distribution of D company is lower than that of other's. Also A and E companies have group of colors which are not included in middle-brightness and middle-chroma.

⑨ In the case of Purple, the color distribution ratio of A, B, D and F was remarkably lower than that of other colors, and only the relatively high color proportion of C and E companies was shown.

⑩ In case of Red Purple, A, C and D companies showed even color distribution which is focused on group of high-brightness, low-chroma and high-chroma.

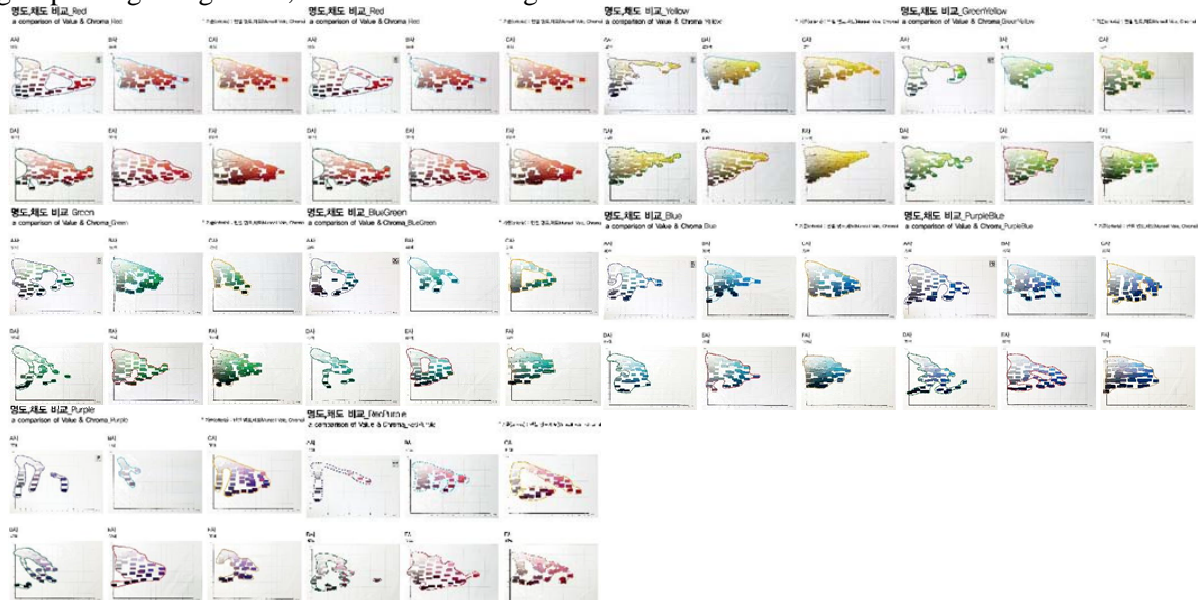


Figure 6: Comparing brightness and saturation

## CONCLUSIONS AND RECOMMENDATIONS

Analyzing color properties of total 6 color guides, all of them showed high distribution of Yellow Red, Yellow and Green Yellow compared to other color groups, and Purple and Red Purple were measured as the least distributed colors. The distribution inside Munsell area was focused on brightness 9~4 and chroma 0~8, however most of high-brightness and low-chroma colors have similar repeated colors which are hard to tell, therefore, when we apply them into environment color, they look all same. Even if interior and exterior colors have changes of style based on trends, it is considered that color guides with various color groups will help designers to choose colors more wisely. Thus if we develop interior and exterior design color guides with these properties and keep researching on color guides which corresponds to customers' needs, we can build data base of color guides for architecture and, furthermore, we can expect to catch academic world's interest into color guides.

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