Analyzing the Uniform Colors of Professional Team Sports in South Korea

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Abstract

Although an extensive body of research exists on sports uniform colors in the West, there is a dearth of research on South Korean sports uniforms, especially in the domain of professional team sports. This study aims to identify and analyze the colors of sports uniforms of 56 professional teams listed on the Korea Professional Sports Association (KPSA) for a range of team sports (e.g. football, baseball, basketball, volleyball, and golf). The number of colors of each team's uniform and the ordinal ranking of these colors were recorded and analyzed. Furthermore, the number of colors and parent company colors were grouped by gender and league. Overall, 80.4 % of the teams preferred three to four colors with white, black, blue, and red being the most popular colors. Every team's primary, secondary, or graphic logo colors on their uniforms included white. The gender variable was partially significant, emphasizing culturally significant colors such as pink. The parent company's color showed a significant connection with the team's uniform colors. This result was related to the historical origins of South Korean professional team sports and their unique relationship with chaebols. Based on the findings, this study concludes that visibility and contrast factors, as well as historical aspects relating to the concept of glocalization play an important role in the color choices of South Korean team uniforms.

I. Introduction

Color is a ubiquitous element in team sports uniforms. Why is color important in sports uniforms, and what determines color choices? Most studies agree that visibility of uniform colors plays a crucial role in distinguishing competitors from each other (Goldschmied, Furley, & Bush, 2020; Hill & Barton, 2005; Piatti, Savage, & Torgler, 2012; Spencer, 2017). Goldschmied et al. (2020) argues that without this fundamental contrast, sport is almost impossible to play. Unlike in many individual competitions, team sports uniforms require multiple colors. The number of participating players, often large area of the playing field, and wider distance from the viewer requires greater visibility. Performance is propelled by relative color differences among teams (Piatti et al., 2012) and visibility of an opponent is critically important in the perceptual effect of a game (Hill & Barton, 2005) requiring more contrasting color combinations in team uniforms.

This was apparent even in the earliest examples of colors in team sports uniforms. A visual record from 1867 of sports team uniforms at Forest School (later known as Snarebrook) in England illustrated a horizontally striped jersey and long white flannels (Davidson as cited in Craik, 2005), already showing contrasting colors through garish stripes. Early examples of sporting outfits for games such as crickets, rugby, tennis, and baseball showed dominance in white as the main color. Furthermore, storied franchises have tendencies to prefer fewer uniform colors in North America, reflecting the tradition and limited color choices available during their inception (Spencer, 2017).

Early examples of baseball uniforms—the oldest professional league established in 1869 in North America, featured affiliated cities and logos in red, blue, or black against a mutual tone background of white and gray (Spencer, 2017). With the increasing popularity of American baseball, teams in other countries have also adopted American-style uniforms. The expansion of the American Football League (AFL) in 1960 and the National Hockey League (NHL) in 1996 led to the broader use of new colors in uniforms for both marketing and identification purposes (Spencer, 2017). Throughout the 1980s and 1990s, the most dominant American professional teams—National Basketball Association (NBA) and Major League Baseball (MLB)—succeeded in establishing highly profitable international campaigns to advertise the game and its stars and sell their products on markets globally (Le Faber as cited in Kelly, 2007). This led to uniforms and their associated colors being applied to a variety of sporting goods, from uniforms used in actual tournaments to those that represent keepsakes, replicas, and souvenirs for spectators and fans of events (Fullerton, 2022).

With increasing profits and the global scale of professional sports teams, the visual identity (VI) of sports franchises and their uniform design, particularly color, have become the subject of numerous Western studies. These studies enabled us to discuss the different roles of color in uniforms. Despite studies on individual sports in South Korea, no comprehensive profile of uniform color choices exists among professional sports teams. Furthermore, to fully understand choices of uniform colors, a wider range of cultural phenomena, including the origin of sports and its leagues and associations, must be considered (Giulianotti & Robertson, 2012). Therefore, this research aims to provide an analysis of uniform color choices in South Korean professional sports teams by determining whether teams prefer specific number of colors, if certain colors are favoured, and if these choices parallel prior research. This research includes a literature review of uniform color and glocalization to provide a foundational background for later discussion and analysis of the uniform colors of South Korean professional sports teams listed in the Korea Professional Sports Association (KPSA).

II. Literature Review

1. Uniform Color

Extensive studies on sports uniform colors in the West have discussed a variety of choice factors from sensory, cultural, and performance perspectives (Spencer, 2017). The sensory aspect is related to a biological predisposition to color perception (Hill & Barton, 2005). Color perception in humans involves low-level

mechanisms in the retina, thalamus, and brain pathways (this process is discussed in detail by Siuda-Krzywicka & Batolomeo [2020]). Through this process, objects can be compared based on the differences in the wavelengths of light reflected or emitted (Price, 2017). Gottwalde, Singh, Haubrich, Regett, and von der Embe (2018) stated that compared with pure intensity contrast, color enhances the contrast of relevant objects against the background more clearly. To allow for identification, the uniform must have visible contrast between the base, logo, player's number, and player's names. The use of color and its greater contrast also allows fans, commentators, and officials to exercise similar capabilities at greater distances (Spencer, 2017). Many sighted animals use color as a pivotal and dependable cue for conspecifics, predators, and food (Gottwalde et al., 2018). Similarly, to differentiate friends from foes, highly visible color combinations are preferred in team uniforms. Regarding the number of colors in a single uniform, an experiment on human enumeration using multi-colored dots suggested that human adults can identify approximately three-color subsets at a single view (Halberda, Sires, & Feigenson, 2006). The sensory aspect of color perception extends to the knowledge that color perception can change dramatically depending on previously seen colors (Webster, 2012). Moreover, prior knowledge arising from life experiences, education, and culture can interact with visual perception (Siuda-Krzywicka & Batolomeo, 2020), ultimately affecting color choice and how viewers perceive it in a uniform design. Sensory marketing, defined as "marketing that engages the consumer's senses and affects their perception, judgment, and behavior" (Krishina cited in Krishna, Cian, & Aydınoğlu, 2017, p. 43), can ultimately utilize color as one of the main tools to make a product (uniform) appealing to consumers (fans).

Cultural and social aspects relate to the historical factors of the teams as well as the social connotations of colors in specific regions. Many teams have created images using specific colors (Sorokowski, Szmajke, Hamamura, Jiang, & Sorokowska, 2014). For example, the Cincinnati Reds (identified with the Cincinnati Red

Stockings, 1869) have utilized red and white as official colors since their inception. The name originated from the high-red socks that the team wore with its uniform, creating a recognizable image of the team. In South Korea, teams such as the KOVO's Samsung Bluefangs use blue in their uniforms, connoting the historical aspect of Samsung's blue signature and the name of the franchise. Social connotations relate to certain colors that are attributed to stereotypes in different countries (Lee & Lim, 2014). Red's cultural conditioning and learned associations (Goldschmeid, Furley, Trejo, Hadda, & Boning, 2022) of warning and caution (in stop signs, sirens, and anger cues when viewed on the face or neck) prompted its significance and linked red to having motivational as well as symbolic implications for human perceivers in the West (Meier, D'Agostino, Elliot, Maier, & Wilkowski, 2012). These qualities are often rooted in a culture of stereotypically Western perceptions (Adams & Osgood, 1973). In contrast to Western countries, Asian countries often view red as having more positive attributes. This is most significant in China, where red often symbolizes courage, loyalty, honor, success, and fortune (Cullen, 2000). However, South Korea, especially after the Korean War, developed an ideological bias against red, which was ultimately turned over by the success of the 2002 World Cup with the Red Devil phenomenon (Bing, 2021). Colors denoting classic masculinity, such as blue, and femininity, including pastel hues, such as pink, are controversial. Arguably, in South Korean professional teams, Heungkuk Life Pink Spiders (KOVO)'s association in pink denotes a feminine bias.

The association between particular sports and uniform colors has become so strong that it has given rise to popular speculation about performance (Goldschmied et al., 2020). Accordingly, color performance in sports uniforms has been a much-debated field thanks to groundbreaking research by Frank and Gilovich (1988) Hill and Barton (2005) and Rowe, Harris and Roberts (2005). Their argument that certain colors determine the outcome of a game has led to various studies on individual and team sports uniforms in the West. Studies by Hill and Barton (2005), Attrill, Gresty, Hill and

Barton (2008), and Tiryaki (2005) garnered highly ambiguous results, ultimately disputing the effect of color on sports performance. Goldschmied et al. (2020) provided a critical review of recent findings related to this topic. The research agrees that, although the argument that color sway performance is doubtful, the refereeing element (Greenlees, Eynon, & Thelwell, 2013; LeMaire et al., 2007) is the most probable color influence because it only requires a perceptual effect to influence the score. Considering these findings, Spencer's (2017) straightforward examination and evaluation of team uniform colors in North America is the most suitable approach for examining team sports uniform colors in South Korea. Spencer (2017) examined 122 North American major league basketball, baseball, hockey and football teams, evaluating the number of preferred colors, ordinal scale of those colors, and providing statistical analyses. By comparing this with other research on the topic, Spencer's study reaffirmed the assertion that uniform color choice is an interaction between visibility and contrast factors, historical determinants, and societal significance (Spencer, 2017). This study focuses on the colors of South Korean professional sports team uniforms and, by comparing previous research, discusses the concept of glocalization (Robertson, 1995). This allows for a broader discussion on the typically narrow and predetermined outcomes of sports uniform color studies in South Korea.

2. Glocalization

Undoubtedly, North America greatly affected the origin of South Korean professional team sports, with the introduction of the quintessential American sport of baseball (KBO) in 1982 as the first professional team sport in Korea. Global popularity of the NBA and joint establishment of global–local sports media company by Entertainment and Sports Programming Network (ESPN) and Munwha Broadcasting Corporation (MBC) in 2001 further ingrained the dynamics and system of the North American professional sports league in South Korea (Cho, 2009). However, the historical

origin of South Korean team sports after the inhibition period of Japanese colonialism was essentially a consequence of political priorities (Ha & Mangan, 2010). With the goals of "nation building and national identity construction" (Hong, 2011, p. 978), establishing a foundation essentially depended on the relationship between sports and business, particularly Korean conglomerates and chaebols (Hong, 2011). This historical factor shows a significant difference between North American professional teams and South Korean teams. Unlike the leagues in South Korea and Japan, which are primarily owned by companies that provide financial and organizational support, individuals in North America can also own professional clubs. Owing to individual ownership and a strong emphasis on tradition, North American uniform designs and colors are often historically consistent and recognized as local symbols (Lee & Lee, 2013). However, in Japan and South Korea, the visual identity of leagues, including uniform color, alters with changes in ownership. For example, the visual identity of the KBO lacks consistency because of its frequent change in logos and uniform colors compared to the consistent visual identity of historical clubs such as the Yankees (Lim & Lee, 2013).

The unique history of Korean professional team sports in its adaptation and selective absorption of foreign influences, such as NBA and ESPN, as well as its relationship with chaebols, leads to the concept of "glocalization" (Robertson, 1995). First introduced and developed by Robertson (1994, 1995), the concept is explained by the indigenization process, whereby foreign objects and practices are appropriated through the recontextualization of local meanings and values (Kelly, 2007). This term has been widely used since the early 1990s across a broad range of academic disciplines and research fields (Giulianotti & Robertson, 2012) and its association with Asian sports, particularly South Korea, has garnered extensive research on this topic (Cho, 2009; Giulianotti & Robertson, 2012; Lee, Jackson & Lee, 2007).

Glocalization in Asian sports refers to the interplay between the heterogenization and homogenization

processes (Giulianotti & Robertson, 2012). Heterogenization of sports in Asia refers to Western sport being transformed through cross-cultural and ethnically creative means referred to as 'Trobriand cricket' (Leach, 1975; Neumann, 2006). Homogenization is an example of technical coaching and the development of elite sports in East Asia, with substantial direct influence from Western methods and techniques (Giulianotti & Robertson, 2012). This 'glocal' relationship is clearly illustrated by the managerial strategy of Guus Hiddink with the South Korean national football team during the 2004 World Cup (Lee, Jackson & Lee, 2007). Recently, a reverse glocalization effect has occurred with Park Hang-Seo, a former South Korean associate of Hiddink, whose Western Korean managerial strategy homogenized the Vietnamese National Football team. Other reverse examples can refer to Japanese 'Samurai' baseball, whereby "free-spirited, hard-hitting, fun-loving, and independent spirited American baseball" was glocalized into team-spirited, cautious, and self-sacrificing spirit of Japanese baseball (Kelly, 2007, p. 194-195). Recruitment of Japanese star baseball players, such as Otani Shohei, to the Major League Baseball (MLB) and Chinese basketball players to the NBA also illustrates this reverse glocal effect of Asian sports. Glocalization is also apparent in sports marketing and business for Asian sports clubs, where Western logic, techniques, and strategies are used to escalate consumer interest, turnover, and profitability (Giulianotti & Robertson, 2012). Furthermore, local and national identities are commodified, and such 'corporate nationalism' is promoted in Asia (Kobayashi, 2012). Consequently, it can be argued that the glocalization of sports marketing is related to sports uniforms and, ultimately, color.

III. Method

1. Research Subject

KPSA (Korea Professional Sports Association) lists 8 partners of professional team sports in South Korea. Five

major team sports in South Korea are baseball, football, basketball, volleyball, and golf. Although South Korean football is soccer in North America, official Korean federation names the game as football and therefore it will be stated as such in this research. These sports are divided into professional leagues namely; Korea Professional Golfer's Association (KPGA), Korea Ladies Professional Golf Association (KLPGA), Korea Baseball Organisation (KBO), K-League 1 or Korea Football Association (KFA), Korea Women's Football Federation (KWFF), Korea Basketball League (KBL), Women's Korean Basketball League (WKBL), Korea Volleyball Federation (KOVO).

In this study, four sports were initially chosen based on the following characteristics; "long duration, team and ball-orientated sport where aggression plays a much lesser role on the game's outcome" (Goldschmied et al., 2020, p. 319). These sports were football, baseball, basketball and volleyball. Since there are no female baseball teams in South Korea, golf was evaluated instead for women's sports together with football, basketball, and volleyball. KPGA (Men's golf) could not be evaluated due to insufficient and inaccurate information available on official website. Consequently, for men's sports team, data was drawn from 4 leagues namely KBO for Baseball (10 teams: SSG Landers, Kiwoom Heroes, LG Twins, KT Wiz, KIA Tigers, NC Dinos, Samsung Lions, Lotte Giants, Doosan Bears, Hanwha Eagles), K league 1 for Football (12 teams: Gangwon FC, Gwangju FC, Daegu FC, Daejeon Hana Citizen, FC Seoul, Suwon Samsung Bluewings FC, Suwon FC, Ulsan Hyundai, Incheon United FC, Jeonbuk Hyundai, Jeju United FC, Pohang Steelers), KBL for Basketball (10 teams: Goyang Carrot Jumpers, Pegasus, Suwon KT Sonic Boom, Seoul Samsung Thunders, Seoul SK Knights, Anyang KGC Red Boosters, Ulsan Hyundai Phoebus, Wonju DB, KCC Egis, LG Sakers) and KOVO for Volleyball (7 teams: Korean Air Jumbos, KB Stars, KEPCO Vixtorm, Woori WON, Ansan OK Financial Group OKMAN, Daejoeon Blue Fangs, Hyundai Capital Sky Walkers). For the women's team, data were drawn from 4 leagues namely KWFF for football (7 teams:

KHNP FC, Sports TOTO, Sangmu WFC, Seoul Metropolitan Government, Suwon FC, Incheon Red Angels, Changhyeong WCF), WKBL for basketball (6 teams: Samsung Life Blueminx, Shinhan Bank S Birds, Woori Won, Hana One Q, BNK SUM, KB Stars), KLPGA for golf (36 teams: Golden Blue, Nike, Nexencorp, Norang Tongdak, Daebo Golfteam, DH, Dongbu, Doosan, Divella, Lotte, Mediheal, Samil Pharm, Samchully, Celltrion, I-Bridge.com, Angang, Yojin, Woori Financial Group, Kakao VX, Cosball, Q-Capital, Taewhang Honors, Pharma Research, Pepper Savings Bank, KOREIT, Hanwha Q-cell, Amano, BNK, DB, DS, MG, NH, On Off Golf, SK, Wemix, Zivent), and KOVO for volleyball (7 teams: Heungkuk Pink Spiders, Hyundai Hill State, Korean Expressway Hi-Pass, KCG, GS Caltex KIXX, IBK Altos, Pepper Savings Bank AI Peppers). For women's golf, 13 teams were excluded from this study due to insufficient or conflicting information on their official uniforms. For example, one of the excluded teams; Kyochon 1991: listed three players all wearing different colored sports clothing, with one player wearing a simple white top without any visible team logos. This gave incoherent data and was excluded from the official count. The number of team uniform colors and ordinal listings of those colors are recorded from the total of 95 teams from these leagues. The total uniform number was 217.

To prevent false interpretation for gender analysis, it was important to use data from same type of sports for both genders. Therefore, results of both inclusive and exclusive of baseball (KBO) and golf (KLPGA) data were measured for overall gender analysis to show comparison. The total uniform number excluding those data was 148. Research was conducted from the official website, official goods shop and in some cases where official data was not available, from the most recent match photos of these teams. For all five sports, uniform colors were collected from the seasons beginning in 2021.

2. Analysis Method

Uniform colors were classified into 13 colors: white,

blue, red, black, gold, orange, green, purple, burgundy, pink, grey, yellow and neon. Often the range of hue, value and chroma were vastly different. In the instances where they had significant differences, colors were categorized according to the base color closest to the 13 available. For example, navy or light pastel blue colors were classified as blue. There were various types of neon colors such as neon green, neon pink and neon yellow. Due to the small number of neon colors, they were classified together as a single color. Once each color was identified, ordinal listing of colors was recorded according to placement within a single uniform; principal color (taking most surface area of the uniform), secondary color 1 and 2 (colors taking second most surface area of the uniform), graphic or logo color 1, 2 and 3 making the total range of colors between 2 to 6. For example, KBO's KT Wiz's official colors are white (principal color), black (secondary color), red (first graphic-logo color) and black (secondary graphic-logo color) making the total number of color in single uniform to be 6.

Uniforms were categorized into 14 types. In average, two main uniforms (either Home and Away or Uniform 1, 2 or 3) and additional two (Goal Keeper's uniform for football and Libero uniform for volleyball) were examined. Baseball had additional uniforms due to weekday and weekend uniforms. Some leagues have in addition to the official home and away uniforms, alternative or commemorative uniforms which bear different colors from the official kit. Since most of these commemorative kits were used for seasonal marketing tools they were excluded from this study. Principal colors of uniforms of the teams were also statistically examined with corresponding parent company's official colors through ANOVA test to evaluate its significance.

## IV. Results

1. Men's team uniform color analysis

The data of the number of uniform colors for each league are presented in Table 1. The 39 teams studied

Table 1. *Number of Uniform Colors per Men's League*

No. of uniform colors	K-League	KBL	KBO	KOVO	ALL
2	0	1	0	8	9
3	30	8	5	9	52
4	12	9	16	3	40
5	5	3	6	1	15
6	1	0	0	0	1
Total	48	21	27	21	117

Table 2. *ANOVA (differences in number of uniform colors by leagues)*

	K-League	KBL	KBO	KOVO	ALL
Mean	3.52	3.67	4.04	2.86	3.55
SD	0.772	0.796	0.649	0.854	0.846
N	48	21	27	21	117
F			9.568		
df			3		
p			.001		
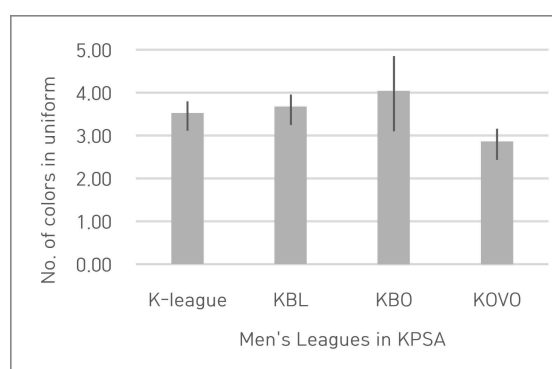
Figure 1. *Mean of Total Uniform Colors per Men's League*
(drawn by author)

held 117 uniforms with various color combinations between them, preferring three to four colors with an overall mean of 3.55.

Figure 1 shows the mean of number of uniform colors per league. As league means did differ moderately, and variances were comparable, a one factor analysis of variance was performed on number of colors grouped by league. The result in Table 2; F= 9.568, p= .001 shows the difference in variance between number of uniform colors and leagues is statistically significant. With 44.4 % of the total teams accounted, three color combination was most popular followed by four colors with 34.2 %.

There was only one team with six colors, Daejeon Hana Citizen's away uniform. There were no teams with more than six colors.

Overall uniform colors grouped by league data is presented in Table 3. Apart from white (131), black (87) was a clear second favorite followed by blue (57), red (56), gold (19) and orange (15).

Noteworthy is the popularity of less traditional colors such as gold, orange, grey and neon. In K-league, blue was featured 58 % of all teams as principal color of their uniform. Blue, despite being a third favorite color, had the most variance in lightness ranging from light to dark blue. K-league's Ulsan Hyundai had three different blue values used in their uniforms. White varied in colors with 'cream' hues identified as white. Many KBO teams including SSG Landers, Lotte Giants and NC Dinos had different colors of white in their official uniforms. Green was less favorable than other RGB colors as well as being less utilized than gold and orange. Gold was a popular trim color though it was never used as a principal color. Another significant result was the use of pastel colors such as pink in men's sports uniform.

Figure 2 illustrates that K-league has the mostwide-ranging use of colors in its uniforms. White is clearly the favorite in all categories. Every team included white in their uniforms whether it was a home or an away kit. Significantly white was featured as the principal color for every KBO team's weekday home uniforms. For K-league and KBL, all away uniforms except one team (Seoul Samsung Thunders) had white as their principal color.

2. Women's Sport team color analysis

The data of the number of uniform colors for each league are presented in Table 4.

Figure 3 shows the mean of number of uniform colors per women's league. The 56 female sports teams claimed a total of 100 uniform colors, preferring mostly three and four colors with overall mean of 2.87. Four colors accounted for 19 % of total teams. The result in Table 5; F= 11.492, p= .001. shows the difference in variance between number of uniform colors and leagues is statistically significant.

Overall uniform colors grouped by league data is presented in Table 6 and Figure 4. Similar to men's data, white (118) was a clear favorite with black (79) coming second followed by blue (61) and red (36).

Table 3. *Overall Incidence of Specific Uniform Colors of South Korean Men's Professional Leagues*

Colors	K-League	KBL	KBO	KOVO	ALL
White	49	29	30	23	131
Blue	24	10	11	12	57
Red	16	11	27	2	56
Black	36	18	25	8	87
Gold	8	1	6	4	19
Orange	5	2	7	1	15
Green	5	3	0	0	8
Purple	2	0	0	0	2
Burgundy	4	0	1	0	5
Pink	1	0	0	1	2
Grey	4	1	2	6	13
Yellow	5	0	0	3	8
Neon	10	2	0	0	12

White had a big majority in KLPGA as main color, accounting to 61 % of total number used in all leagues.

Apart from white, black also had a clear majority in KLPGA with 53.8% of total times used. Although black was used by every team, its use as the main color was disproportionately smaller accounting for only 12 % of total time used. Contrarily as secondary and graphic / logo color, black was used generously with 34 % and 52 % respectively.
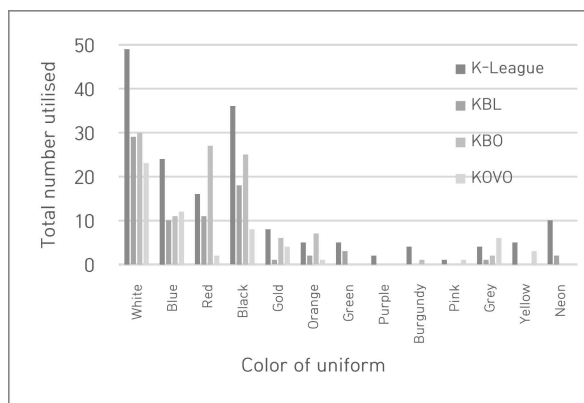
Unlike men's data, popularity in color was

Figure 2. *Total Number of Colors Used in Men's Professional Sport League Teams*
(drawn by author)

Table 4. *Number of Uniform Colors per Women's League*

No. of uniform colors	KWFF	WKBL	KLPGA	KOVO	ALL
2	1	0	8	1	10
3	16	3	26	6	51
4	7	6	7	10	30
5	0	3	1	4	8
6	0	1	0	0	1
Total	24	13	42	21	100

Table 5. *ANOVA (differences in number of uniform colors by leagues)*

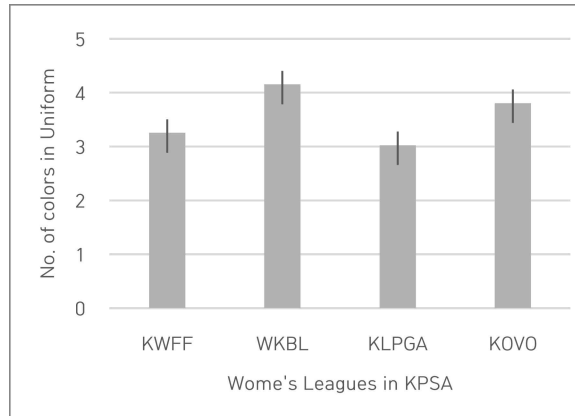|	KWFF	WKBL	KLPGA	KOVO	ALL
Mean	3.25	4.15	3.02	3.81	3.39
SD	.532	.899	.680	.814	.815
N	24	13	42	21	100
F			11.492		
df			3		
P			.001		

Figure 3. *Mean of Total Uniform Colors per Women's League*
(drawn by author)

Table 6. *Overall Incidence of Specific Uniform Colors by South Korean Women's Professional League Teams*

Colors	KWFF	WKBL	KLPGA	KOVO	ALL
White	24	17	48	29	118
Blue	13	12	17	19	61
Red	8	4	14	10	36
Black	15	11	44	9	79
Gold	4	0	0	0	4
Orange	0	2	5	2	9
Green	2	3	1	3	9
Purple	4	0	1	3	8
Burgundy	0	0	0	0	0
Pink	2	4	0	5	11
Grey	0	0	1	0	1
Yellow	4	1	3	0	8
Neon	2	0	0	0	2

concentrated in traditional RBG colorways such as red and blue. Some colors had a noteworthy profile. Although not substantial in overall number, pink (3.2 %) was used in both KWFF, WKBL and KOVO as main and secondary colors. Neon colors were used only in KWFF as goalkeeper uniforms.

3. Overall Color Analysis

In overall analysis, the number of colors in uniform and type of color differences were analyzed grouped by gender. For gender analysis, two examinations were conducted; inclusive or exclusive of KBO (baseball) and KLPGA (golf) data. For the rest of overall analysis, data

excluding KBO and KLPGA was analyzed to prevent incomplete interpretation.

Figure 5 shows the difference in number of colors in uniform by gender group including all data. Overall, both genders preferred three colors (47.7%) followed by four colors (31.9%) in a uniform. In this instance the results; $\chi^2(4)$ =2.464, p=.651 shows difference between variable of gender and number of uniform colors were not significant.

Figure 6 illustrates data excluding KBO and KLPGA. Overall both gender preferred three colors (48.6 %) followed by four colors (31.8%). Although there was a bigger difference in three colorways compared to figure 5, cross tabulation showed the difference between variable of gender and number of uniform colors excluding KBO and KLPGA were also not significant; $\chi^2(4)$ =4.751, p=.314.
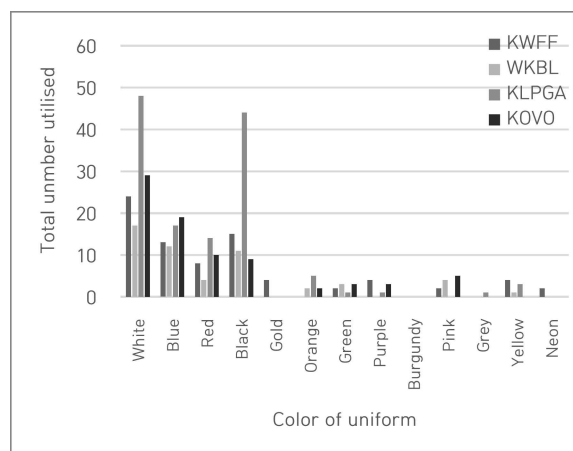
Figure 7 shows the difference of uniform colors

Figure 4. *Total Number of Colors Used in Women's Professional Sport League Teams*
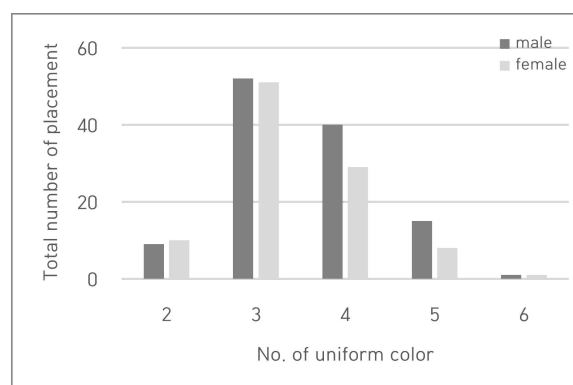(drawn by author)

Figure 5. *Number of Uniform Colors per Uniform by Gender Including All Data*
(drawn by author)

grouped by gender. Although four most popular colors; white (both gender 33 %), black (20 % male vs. 17 % female), blue 15 % male vs. 21 % female) and red (9 % male vs. 10 % female) appears similar, other colors such as grey (4 % male vs. 0 % female) and pink (1 % male vs. 5 % female) differ somewhat.

Also noteworthy was specific colors which were only used by certain gender; burgundy and grey were used only by male teams whereas pink was used more frequently in female teams. Table 7 illustrates there is a significant difference of color choices in uniform between gender variable; t=2.32, p=.04.
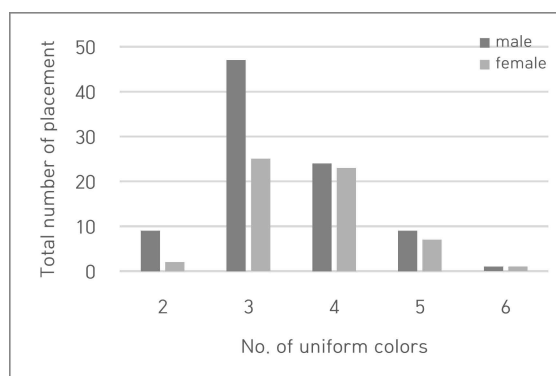

Figure 6. *Number of Uniform Colors per Uniform by Gender Excluding KBO and KLPGA*
(drawn by author)

Table 7. *t-test (difference in color or uniform between gender)*

Gender	Mean	SD	Case	t-value	df	P
Male	23.54	870.77	13	2.32	12	.04
Female	16.31	448.56				

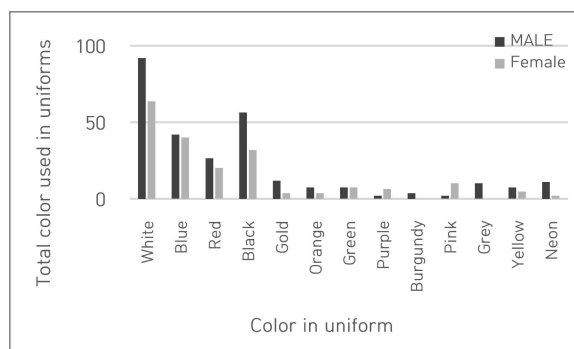**Figure 7.** *Uniform Color Preference by Gender*
(drawn by author)

Table 8. *League by Color of Uniform*

Color	Sports League						
	K-League	KBL	KOVO (men)	KWFF	WKBL	KOVO (Women)	Total
White	49 (29%)	29 (38%)	23 (38%)	24 (31%)	17 (31%)	29 (36%)	171 (33%)
Blue	24 (14%)	10 (13%)	12 (20%)	13 (17%)	12 (22 %)	19 (24%)	90 (17%)
Red	16 (9%)	11(14%)	2 (3%)	8 (10%)	4 (7%)	10 (13%)	51 (10%)
Black	36 (21%)	18 (23%)	8 (13%)	15 (19%)	11 (20%)	9 (11%)	97 (19%)
Gold	8 (5%)	1 (1%)	4 (7%)	4 (5%)	0 (0%)	0 (0%)	17 (3%)
Orange	6 (4%)	3 (4%)	1 (2%)	0 (0%)	2 (4%)	3 (4%)	15 (3%)
Green	4 (2%)	2 (3%)	0 (0%)	2 (3%)	3 (6%)	3 (4%)	14 (3%)
Purple	2 (1%)	0 (0%)	0 (0%)	4 (5%)	0 (0%)	2 (3%)	8 (2%)
Burgundy	4 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (1%)
Pink	1 (1%)	0 (0%)	1 (2%)	2 (3%)	4 (7%)	5 (6%)	13 (3%)
Grey	4 (2%)	1 (1%)	6 (10%)	0 (0%)	0 (0%)	0 (0%)	11 (2%)
Yellow	5 (3%)	0 (0%)	3 (5%)	4 (5%)	1 (2%)	0 (0%)	13 (3%)
Neon	10 (6%)	2 (3%)	0 (0%)	2 (3%)	0 (0%)	0 (0%)	14 (3%)
Total	169 (100%)	77 (100%)	60 (100%)	78 (100%)	54 (100%)	80 (100%)	518 (100%)

Table 9. *Crosstabulation of Colors by Placements within Uniform*

Uniform color	Principal	Secondary	Graphic /Logo	Total
White	42 (29.2%)	46 (26.4%)	83 (41.9%)	171 (33.1%)
Blue	31 (21.5%)	31(17.8%)	28 (14.1%)	90 (17.4%)
Red	16 (11.1%)	20 (11.5%)	15 (7.6%)	51 (9.9%)
Black	11 (7.6%)	45 (25.9%)	41 (20.7%)	97 (18.8%)
Gold	0 (0.0%)	7 (4.0%)	10 (5.1%)	17 (3.3%)
Orange	4 (2.8%)	4 (2.3%)	4 (2.0%)	16 (3.1%)
Green	8 (5.6%)	4 (2.3%)	4 (2.0%)	16 (3.1%)
Purple	0 (0.0%)	2 (1.1%)	3 (1.5%)	5 (1.0%)
Burgundy	1 (0.7%)	2 (1.1%)	1 (0.5%)	4 (0.8%)
Pink	4 (3.5%)	5 (2.9%)	3 (1.5%)	12 (1.7%)
Grey	7 (4.2%)	6 (2.9%)	1 (0.5%)	13 (1.8%)
Yellow	10 (6.9%)	2 (1.1%)	1 (0.5%)	13 (15.0%)
Neon	10 (6.9%)	1 (0.6%)	4 (2.0%)	15 (2.9%)
Total	144 (100%)	174 (100%)	198 (100%)	516 (100.0%)

League and color crosstabulation are illustrated in Table 8. In numerical order of color preference are as follows; white (171), black (97), Blue (90) and red (51) followed by gold (17) in fifth place. In terms of individual league results, KBO demonstrated high proportion in the use of white. Pink and Grey had the
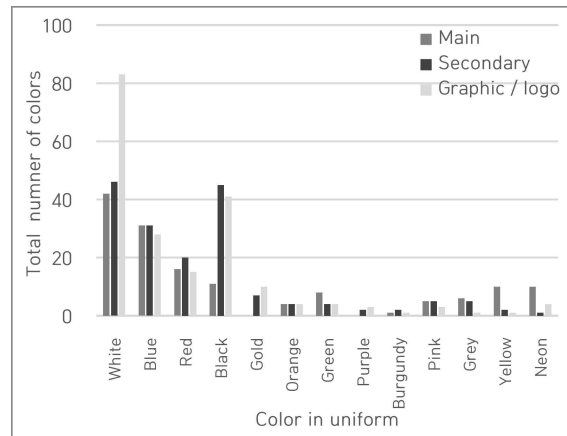
Figure 8. *Bar Chart of Crosstabulation of Colors by Placement within Uniform*
(drawn by author)

Table 10. *Uniform Colors Matching Parent Company Color Grouped by Leagues*

League	Agree	Not Agree	Total
K-League	22 (45.8%)	26 (54.2%)	48 (100.0%)
KBL	17 (81%)	4 (19%)	21 (100.0%)
KBO	12 (57.1%)	9 (42.9%)	21 (100.0%)
KOVO	8 (33.3%)	16 (66.7%)	24 (100.0%)
WKBL	11 (84.6%)	2 (15.4%)	13 (100.0%)
KWFF	14 (66.7%)	7 (33.3%)	21 (100.0%)
Total	84 (56.8%)	64 (43.2%)	148 (100.0%)

highest use in KOVO and neon in K-League due to goalkeeper uniform.

Table 9 and figure 8 shows distribution of color of uniform grouped by uniform placement. For principal color of uniform, white (29.2 %) was the clear favorite followed by blue (21.5 %) and black (7.6 %). Although blue appears more popular than black in principal colors, further data reveals that black's popularity as secondary (25.9 %) and graphic/logo (20.7 %) placements makes the color black as second overall. For secondary color placement such as on sleeves, stripe, or side panels; white (26.4 %) was also the most popular followed closely by black.

In graphic and logo placements, white (41.9 %) was again the most adopted, followed by black. In all three variations blue and red followed in tandem with white and black. Despite the comparable data, analysis of variance showed there was no significance of uniform color distribution between placements; df=2, p= .844.

Table 10 illustrates whether the original color of the parent company (franchise) matches the uniform color. KLPGA (Women's golf) was specifically excluded from the assessment because their main uniform colors were mostly white (63 %), regardless of franchise colors, thus making the data unreliable. For the rest of the leagues, most uniform colors (56.8%) matched their franchise

colors supporting the argument that franchise color affects the ultimate color choice of uniforms.

V. Discussion

This study aimed to examine and analyze South Korean uniform colors in professional team sports. Four principal topics in South Korean professional team uniform colors are discussed: the number of colors in uniforms, ordinal listing of these color preferences, significance of variables such as gender, league and company color, and their historical origin and relevance to glocalization.

First, the study found that South Korean professional teams prefer three to four colors in their uniforms. The range of uniform colors extended to six colorways, with 80.4 % of teams preferring three to four colors. Notably, basketball averaged 3.67 colors despite the sports characteristics of the smallest playing surface and smallest uniforms (Spencer, 2017). Interestingly, WKBL (women's basketball) had a higher average of 4.15 in contrast to KBL (men's basketball). The argument that basketball's small, uniform, and non-contrasting surfaces can benefit from additional colors (Spencer, 2017), agrees partially with women's basketball.

Second, the order of color preference was white, blue, black, and red, with a surprisingly poor overall preference for green. Despite being a universal color, green is less popular in South Korean professional team sports uniforms. White's unrivaled popularity of uniform color preference in South Korean team uniforms agrees with its superior visibility argument (Goldschmeid et al., 2020; Julio, Miarka, Rosa, Lima, Takito, & Franchini, 2015; Rowe et al., 2005) that white brings unparalleled contrast from the background. Furthermore, the ease of producing white (Spencer, 2017) most probably affects its popularity. Although the results placed black second overall, further investigation revealed that the main color preference placed blue as second in South Korean uniforms. Multiple lightness of blue was used. Blue's popularity correlates with the social connotations of certain colors, specifically its ubiquitous association with masculinity in male-dominated sports.

Black's significant popularity can be explained through social and biological arguments. Studies on animal melanism and the color black are often associated with strength, toughness, and resistance (Sorokowski et al., 2014). One can argue that the color black's social association with toughness and resistance can be automatic and subconscious, deeming an individual who wears a dark outfit, notably in a stressful situation, as more "tough on resistance" (Sorokowski et al., 2014, p. 323). Consistently, Frank and Gilovich's (1988) seminal field study argued that in football and hockey, subjects wearing black uniforms were more aggressive than their white counterparts. They argue that the association between black and aggressive connotations is particularly pounced in domains that already possess an overtone of competition, confrontation, and physical aggression (Frank & Gilovich, 1988). Along with black's social connotations, one can argue that its physical undertone plays a role in its relative popularity in South Korean uniforms. Black, a sufficiently contrasting color (Spencer, 2017), does not clash with other colors in the same manner as green or red. It is also a traditional color often used in companies and franchise logos as the main font or highlighted shadows that conclusively add to its popularity.

Red was the fourth most common color preference. Since the foundational study on the red wins hypothesis of Attril et al. (2008), most studies on uniform color relating to performance have been focused on red (Elliot, Moller, Friedman, Maier, & Meinhardt, 2007; Feltman & Elliot, 2011; Goldschmied et al., 2022; Hill & Barton, 2005; Piatti et al., 2012; Recours & Briki, 2015; Rowe et al., 2005; Schwartz, 2005; Sorokowski et al., 2014). According to the color in context (CIC) theory, red provides athletes with advantages through biological predispositions and/or past conditioning experiences (Goldschmied et al., 2020). However, a recent study (Goldschmied et al., 2022) has shown that past research on red, such as Attril et al.'s (2008) use of sports performance and competition outcomes as dependent variables, is problematic (Goldschmied et al., 2020). Despite these negative findings, belief in the effect of red

and its popularity remains strong in sports uniforms. This can be explained through the color red's relationship with the "observer" rather than the wearer" (Sorokowski et al., 2014, p. 319). Despite the popularity and cultural association of red through the Red Devils syndrome (another example of glocalization) in South Korea, coupled with the assumed advantage that previous research suggests red might bestow on football (Spencer, 2017), it was noteworthy in fourth place overall. Red was not the most popular color even in the K-League (football). This result signifies that, in South Korean uniforms, the performance and popularity of certain colors may not be the prime deciding factors. Instead, visibility and historical aspects are more likely to play the most significant roles.

Third, uniforms are significantly affected by the historical aspects of franchises (Spencer, 2017). Williams, Rhenwrick, Pantaleoni and Agyemang (2015) argued that using apparel to illustrate and identify brand extensions may enhance awareness of the parent company. This ultimately increases opportunities to engage fans outside the parent company's core product offerings (Walsh, Rhenwick, Williams, & Waldburger, 2014). The significant results in Table 10 illustrate that the uniform colors of Korean professional teams have a significant correlation with their company logos. The prevalent use of blue by mainstream companies and franchises in South Korea explains its overall popularity in sports uniforms. Even if they are not used as the main colors, many are used for secondary and graphic/logo placements, ultimately increasing their overall popularity. The significance between the founding company's colors and leagues' colors (x^2 (5) =17.660, p=.003) clearly supports the argument that the historical connection of sports affects the choice of colors in the uniforms. These findings support the argument that the development of professional team sports uniforms in South Korea is a compromise between the global consumption of a popular American commodity and its various adoption in local contexts (Cho, 2009). This is a clear glocalization effect, in which the Western origin of uniform colors is affected by local ideals, and in this case, South Korean historical connections with founding companies and their sports.

Finally, the statistical analysis of the variables, including the number of colors, uniform color, and color placement grouped by league or gender, generated mixed results. The number of colors in the uniform grouped by gender and the color of the uniform grouped by placement within the uniform showed insignificant differences. In contrast, the uniform color grouped by gender and franchise color grouped by league were significant. Pastel hues, such as lavender and light blue, are used by South Korean men's sports teams. This is contrary to Western uniforms, especially North American teams, where these colors carry connotations at odds with masculine images and are thus avoided (Spencer, 2017). Even in women's sports uniforms in North America, pink was not included in dozens of Women's National Basketball Association (WNBA) leagues and was only periodically worn for specific purposes such as raising breast cancer awareness (Spencer, 2017). South Korean women's team uniforms included pink more sparingly in their official uniforms, which could illustrate the social differences in accepting this color and ultimately its association with glocalization.

VI. Conclusion

Uniform color choice is a consolidation of contrast and complement and has cultural and historical significance (Spencer, 2017). Despite considerable research on this subject in the West, a comprehensive examination of South Korean professional team sports uniform color choices has been lacking. As such, this research provides a profile, and its findings demonstrate that although there are similarities in factors such as contrast and visibility, there are also differences in color choices based on the local context. The overall analysis demonstrated that Korean professional team uniforms are based on white, blue, black, and red, correlating with many Western studies. The superior preference for white and black, particularly in terms of graphics and logo placement, denotes a contrast and visibility argument that

parallels prior research. The overall significance of factors such as gender was partially significant. However, the use of specific colors, such as pastels, by both genders cannot be overlooked and shows cultural preferences relating to glocalization. Furthermore, the significant similarities between the parent company's color and its uniform color illustrate the glocal effect. The historical and political situation in South Korea forced chaebols to establish the sporting game and ultimately affected the color choices related to glocalization, whereby foreign practices were appropriated through the recontextualization of local meanings. That is, while the origin of this genre comes from North America, South Korean sports and their uniform color are essentially an outcome of glocalization.

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