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Effects of the Goal Parameters of the Football Teams Coming in the First Four and Last Three Places in the Bundesliga 2020-2021 Season on the League Ranking

Esin ERGİN[1], Reşat KARTAL[2], Alper KARTAL[1], Oğuz GÜRKAN[3]
[1]Aydın Adnan Menderes University, Aydın, TURKEY
https://orcid.org/ 0000-0002-9645-1863
[2]Kilis 7 Aralık University, Kilis, TURKEY
https://orcid.org/ 0000-0001-7302-1919
[1]Aydın Adnan Menderes University, Aydın, TURKEY
https://orcid.org/ 0000-0001-5209-5134
[3]Yozgat Bozok University, Yozgat, TURKEY
https://orcid.org/ 0000-0001-5886-4758

Email: esinergin7@gmail.com, resat.kartal@kilis.edu.tr, alper.kartal29@gmail.com, oguz.gurkan@yobu.edu.tr

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Abstract
This study aims to investigate the effects of the goal parameters of the football teams coming in the first four and last three places in the German Bundesliga league 2020-2021 season on the league table.
The teams competing in the 2020-2021 season of the Bundesliga and coming in the first four places, Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg, and in the last three places, Köln, Werder Bremen, and Schalke were analyzed in the study. Goals, the number of goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling included in the analysis. The study data were obtained from the InStat data analysis software. The ANOVA model was utilized to investigate the difference in these parameters among the teams.
Based on the study results, a statistically significant difference has been observed in the variables of goals, the number of goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling ($p<0.05$).
Conclusively, considering the league positions of the teams included in the study, the numbers of goal attempts, shots, shots on goal, successful passes, and key passes affect ranking. Therefore, it is advised that teams give importance to training sessions to increase their dribbling and pass quality in their tactical training programs to become successful.

Keywords: Football, Match Analysis, Germany Bundesliga

Introduction

To be successful in football depends on a complex structure; the readiness, football-specific technical development, and tactical perceptive of football players are at the forefront in this sport in which countless internal and external factors play a role (Souza et al., 2019a). One part of this structure is technical teams of elite clubs analyzing both their teams and their rival teams via expansive data (Santos et al., 2017). Game analysis is extremely important for sportive success (Sarmento, 2014) and plays a crucial role in increasing performance and making better tactical decisions on part of coaches and players (Agras et al., 2016). Football is a sport in which favorite clubs are not the sole winners; this stems from being dependent more on analysis and tactical discipline rather than physical or technical conditions. Based on these factors, increasing the win rate of a club is dependent on the diversity of analysis in today's football. Coaches can gain an advantage over their rivals with correct and diverse analyses. Teams today prepare for their games with tactical training by analyzing the last few games of the rival club (Kurak, 2018). While teams are trained with the help of technology, analyzing the rival properly will be a critical factor in gaining an edge. The absolute duty of the technical team and analyzers of a club should be enabling the coach to make decisions by getting him/her to understand the pluses and minuses of their teams and rivals, and increasing the team's performance (Herold et al., 2021). Winning and losing in football are hidden in very fine details; presenting the team with fine details, obtained with analytic methods, such as possession, running distance, and pass rates in game-based meetings affect how successful the team is on the pitch (Perl, 2017). However, the indispensable factor for teams to win is of course their goals and goal-specific activities. Succeeding in scoring or developing multiple scoring organizations and plans is a key factor in winning and progressing further with the team. Reep et al. (1968) put forth that 80% of the goals are scored after three or fewer touches. Taking advantage of the positions can also affect teams' rankings. In the literature, differences are observed in terms of some performance parameters among teams with different positions in league standings. In a study comparing the first ten and last ten teams in the 2012-2013 season standings of the English Premier League, the first ten teams were found to have higher average crosses, shots, and shots on goal than the last ten teams (Araya et al., 2013). In a study conducted in the Turkish Football First League (Gürkan and Kırkaya, 2021), it was concluded that the teams that completed the league in the top ranks had higher averages of goals, total shots, and shot on target. In a study conducted in the Turkish football super league in the 2016-2017 season (Gürkan et al., 2019), it was found that the goal averages per match of the teams that completed the league in the top 9 places (1-9) were higher than the averages of goals per match of the teams that completed the league in the last 9 places (10-18). conclusion has been reached.

The objective of this study is to analyze the effects of the goal parameters of the football teams coming in the first four and last three places in the German Bundesliga league 2020-2021 season on the league table.

Material and Method

Participants

The 2020-2021 season of the Bundesliga was played by 18 teams and the data from the first four teams in the final league table earning the right to compete in the Champions League, namely Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg in order, and the last three teams in the league table relegating to the second division and competing in play-outs, namely Köln, Werder Bremen, and Schalke were used in the study. A total of 238 matches have been analyzed.

Data collecting

The study data were obtained through the InStat (Moscow) analysis software. The InStat index is an objective indicator of players' performance within a game based on numeric data. The InStat index of a player is calculated by marking the position-specific prominent characteristic of the numeric data of the player's performance exclusive to each game. The necessary permission for the use of the data was obtained from the InStat software company.

Statistical Analysis

The statistical analysis of this study was conducted with the SPSS 25.0 package software. As a result of the Shapiro-Wilk test done to determine which test would be suitable for the data set, the significance level of the data per the test of normality results was found to be bigger than 0.05 and the data were determined to show normal distribution, and parametric tests were deemed suitable for the analysis. Descriptive statistic calculations were carried out and the ANOVA method was used to determine the differences among the teams in terms of their goal parameters. Upon finding a difference, the Tamhane T2 test was utilized to determine between which teams this difference occurred. The significance level was accepted as $p<0.05$ in the study analysis.

Analyzed Parameters

238 games in total played by these clubs throughout the season were reviewed, and their goals, numbers of goals, shots, shots on goals, passes, successful passes, key passes, successful key passes, and dribbling statistics were analyzed to review their goal parameters.

Results

Based on the data obtained from 238 games in this study the objective of which is to reveal the differences among the goal parameters of the teams finishing the 2020-2021 season of the Bundesliga in the first four places, namely Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg in order, and the teams finishing the season in the last three places, namely Köln, Werder Bremen, and Schalke, and investigate the effects of these differences on the league standings, the numbers of goals and goal attempts of the teams and the differences among the teams are given in Table 1.

Table 1: The anova results based on the goal and goal attempt numbers of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	*p*	Tamhane
Goal	(1) B. München	34	2,9	1,7	14,5	0,000*	1>2,4,5,6,7 2>7 3,4>5,6,7
	(2) Leipzig	34	1,7	1,10			
	(3) B. Dortmund	34	2,2	1,12			
	(4) Wolfsburg	34	1,8	1,20			
	(5) Köln	34	0,97	0,93			
	(6) W. Bremen	34	1,05	0,95			
	(7) Schalke	34	0,73	1,05			
Number of Goal Attempts	(1) B. München	34	9,44	3,76	30,794	0,000*	1,3>4,5,6,7 2,4>5,6,7
	(2) Leipzig	34	7,94	3,22			
	(3) B. Dortmund	34	8,67	2,99			
	(4) Wolfsburg	34	6,18	2,50			
	(5) Köln	34	3,76	1,93			
	(6) W. Bremen	34	3,79	1,85			
	(7) Schalke	34	3,29	2,05			

$P<0.05$*

As a result of the ANOVA test done based on the Table 1 analysis results, a statistically significant difference can be seen in the goal and number of goal attempts parameters ($p<0.05$). Based on the Tamhane test results done to determine differences, it was concluded for the goal parameter variable that the goal percentage of Bayern München was higher than those of Leipzig, Wolfsburg, Köln, Werder Bremen, and Schalke, the goal percentage of Leipzig was higher than that of Schalke, and the goal percentages of Borussia Dortmund and Wolfsburg were higher than those of Köln, Werder Bremen, and Schalke. As for the number of goal attempts variable, it was found that the numbers of goal attempts by Bayern München and Borussia Dortmund were higher than those by Wolfsburg, Köln, Werder Bremen, and Schalke, and the numbers of goal attempts by Leipzig and Wolfsburg were higher than those by Köln, Werder Bremen, and Schalke.

The distribution of the number of shots and shots on goal based on the teams, which are among the goal parameters of the teams included in the study, and the ANOVA test results determining their differences are given in Table 2.

Table 2: Anova test results based on the number of shots and shots on goal of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	*p*	Tamhane
Shots	(1) B. München	34	16,67	5,32	18,93	0,00*	1,2,3,4>5,6,7
	(2) Leipzig	34	14,88	4,97			
	(3) B. Dortmund	34	14,00	3,79			
	(4) Wolfsburg	34	13,60	3,70			
	(5) Köln	34	9,67	3,95			
	(6) W. Bremen	34	9,79	3,77			
	(7) Schalke	34	8,14	3,97			
Shots on Goal	(1) B. München	34	7,61	3,42	21,07	0,00*	1,2,3,4>5,6,7
	(2) Leipzig	34	6,11	2,57			
	(3) B.Dortmund	34	5,97	2,51			
	(4) Wolfsburg	34	5,51	2,09			
	(5) Köln	34	2,91	1,74			
	(6) W. Bremen	34	3,58	1,74			
	(7) Schalke	34	2,73	1,94			

P<0.05*

As a result of the ANOVA test done based on the Table 2 analysis results, a statistically significant difference can be seen in the numbers of shots, and shots on goal ($p<0.05$). Based on the Tamhane test results done to determine differences, it was concluded for the numbers of shots, shots on goal, and passes that Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Wolfsburg, Köln, Werder Bremen, and Schalke.

The numbers of passes, successful passes, key passes, ad successful key passes of Bayern München, Red Bull Leipzig, Borussia Dortmund, Wolfsburg, Köln, Werder Bremen, and Schalke, and the differences among the teams are shown in Table 3.

Table 3: The anova test results based on the numbers of passes, successful passes, key passes, and successful key passes of the bundesliga teams

Parameters	Team	N	$\bar{X}$	SS	F	p	Tamhane
Passes	(1) B. München	34	640,11	74,33	34,07	0,00*	1,2,3>4,5,6,7
	(2) Leipzig	34	628,52	107,46			
	(3) B. Dortmund	34	656,70	128,43			
	(4) Wolfsburg	34	508,84	81,87			
	(5) Köln	34	457,85	86,42			
	(6) W. Bremen	34	453,73	110,45			
	(7) Schalke	34	429,02	92,53			
Successful	(1) B. München	34	86,17	2,61	21,02	0,000*	1,2,3>4,5,6,7

Passes	(2) Leipzig	34	85,11	3,52			
	(3) B. Dortmund	34	86,70	3,85			
	(4) Wolfsburg	34	80,51	3,41			
	(5) Köln	34	80,79	3,56			
	(6) W. Bremen	34	80,44	5,07			
	(7) Schalke	34	80,76	3,36			
Key Passes	(1) B. München	34	12,47	5,53	24,20	0,000*	1,2,3,4>5,6,7
	(2) Leipzig	34	10,55	4,15			
	(3) B. Dortmund	34	11,73	5,08			
	(4) Wolfsburg	34	9,42	5,60			
	(5) Köln	34	4,38	2,44			
	(6) W. Bremen	34	5,20	2,59			
	(7) Schalke	34	4,20	3,02			
Successful Key Passes	(1) B. München	34	6,29	3,47	21,99	0,000*	1,2,3>4,5,6,7
	(2) Leipzig	34	5,02	2,72			
	(3) B. Dortmund	34	6,20	2,96			
	(4) Wolfsburg	34	4,30	2,75			
	(5) Köln	34	2,05	1,51			
	(6) W. Bremen	34	2,11	1,49			
	(7) Schalke	34	1,73	1,54			
	(7) Schalke	34	43,44	7,22			

P<0.05*

As can be seen in Table 3, a statistically significant difference is observed in the successful pass, key pass, and successful key pass of the teams (p<0.05). Based on the Tamhane test results done to determine differences, it was concluded for the successful pass, key pass, and successful key pass parameters that Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Wolfsburg, Köln, Werder Bremen, and Schalke. As for the parameters of steals in rival territory, Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Schalke.

The dribbling rate distribution based on the teams, and the ANOVA test results determining their differences are presented in Table 4.

Table 4: The anova test results based on the dribbling parameters of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	p	Tamhane
Dribbling	(1) B. München	34	30,79	12,29	11,358	0,00*	1>2,4,5,6 2>6 3>4,5,6 7>6
	(2) Leipzig	34	23,79	6,78			
	(3) B. Dortmund	34	29,26	9,07			
	(4) Wolfsburg	34	22,60	7,12			
	(5) Köln	34	22,85	6,14			
	(6) W. Bremen	34	17,11	4,86			
	(7) Schalke	34	28,23	9,09			

p<0.05*

As a result of the ANOVA test results seen in Table 4, there is a statistically significant difference in the dribbling variables of the teams (p<0.05). Based on the Tamhane test results conducted to determine differences, it was concluded for the dribbling parameter that Bayern München had a higher point average than Leipzig, Wolfsburg, Köln, and Werder Bremen. As for the steal on rival territory parameter, it was found that Bayern München, Leipzig, and Borussia Dortmund had higher point averages than Schalke; Leipzig had a higher point average than Werder Bremen; Borussia Dortmund had a higher point average than Wolfsburg, Köln, and Werder Bremen; and Schalke had a higher point average than Werder Bremen. For the parameter of team press percentage, it was

determined that Bayern München had a higher point average than Köln, Werder Bremen, and Schalke; and Leipzig, Dortmund, and Wolfsburg had higher point averages than Werder Bremen and Schalke.

Discussion

The increasing game rate and workload during matches and training sessions make it mandatory that football be analyzed in detail (Soylu, 2021). Some technical, tactical, and psychological concepts such as game perception can be improved during the game with video analysis methods (Souza et al., 2019b). Efforts have been made to explain the complicated aspect of football in previous football analyses; in this respect, studies have been conducted such as team quality, home and away game analyses, and the match results of successful teams (Taylor et al., 2008; Sarmento, 2014). Physical characteristics, tactical details, game rate, individual technical capacities, and detailed analysis data, increasing lately in the Bundesliga, have aroused curiosity in researchers to analyze the Bundesliga.

238 Bundesliga matches played in the 2020-2021 season were analyzed in this study. The data analyzed as the goal parameters were determined as the goal, goal attempt, shot, shot on goal, pass, successful pass, key pass, successful key pass, and dribbling numbers of the teams. Based on the analysis results, a statistically significant difference was observed in goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling among the teams' goal parameters ($p<0.05$). Mitrotasios et al. statistically put forth that the shots on goal of winning teams in UEFA Euro 2012 were higher in number than those of losing teams. Based on their results of analyzing the success factors in the 2014 and 2018 World Cup matches, Lepschy et al. (2021a) put forth that shots in counter-attacks, goal percentages, and the number of crosses from wings are among the factors that affect success. In another success analysis study, Lepschy et al. (2021b) analyze 918 Bundesliga games, based on which they conclude that total shots, shots on goal, the number of goals, and shots in counter-attacks all play a crucial role in success. In their analysis of the first nine and last nine teams of the Turkish Super League, having a similar characteristic to our study's subject matter, Gürkan and Gumusdag (2018) find a statistically significant difference between the performance parameters of the first nine and the last nine teams (the number of goals, total passes, successful passes, ball possession, etc.). In another similar study, in their analysis of the first ten and the last ten teams of the English Premier League, Araya et al. (2013) state that the first ten teams had more shots and scored from the box more. Sgro et al. (2015) state that in Euro 2012, the winning teams' goal average was 2.17 while the losing teams' was 0.58. Castellano et al. (2012) inform that in the 2002, 2006, and 2010 World Cup championships, the winning teams had higher goal, shot, and shot on goal averages and ball possession percentages than the losing teams. Investments in football and progressive statistical methods enable increased performance. The competitive aspect of football has enabled the game to develop; therefore, new variations have been created, the game momentum has increased, physical developments have been experienced, and goal expectations have gone up. Some teams prefer long passes, while others prefer short ones during a game (Njororai, 2013). The developing aspect of the game makes it difficult for coaches as well, who prefer offense and defense-based analysis methods. In another study done on analysis methods, Lago-Penas et al. (2010) analyze the game statistics of the teams that won, had draws, and lost. As a result of this study analyzing 380 games, it has been statistically determined that the winning teams had more shots, crosses, and shots on goal. In a study (Gürkan et al., 2020) conducted on 721 matches in a total of 5 seasons (2014/2015- 2019/2020) in the UEFA Champions League, it was concluded that the teams that left the matches with a win had higher goals, shots and averages. Kartal and Ergin (2019), 2018 World In a study where they analyzed the success of the French National Team, which won the Cup; France team's total shooting average is 11.00, successful shooting average is 4.14 have reached their conclusion. In the 2016 European Football

Championship (Gürkan and Müniroğlu, 2018), it was concluded that the teams leaving the competitions with a win had higher total shooting and positive shooting averages.

The most played and watched sport in amateur and professional levels, football has a league in almost every country. The big five European leagues, the Champions League and Europa League organized by UEFA, the European Cup, and the World Cup are the most beloved organizations and the most desired leagues by professional football players; therefore, competition intensity is high in these leagues. One of the important aspects brought along by this sense of competition is correct analysis methods for success. In studies done on this subject, having more shots in the penalty area, scoring more within the box, having more goal attempts, and having more ball possession and shots have been concluded to be the key factor for teams' success (Kapidzic et al., 2010; Broich et al., 2014). In their study analyzing the first and the last three teams in the last eight seasons of La Liga, Souza et al. (2019b) state that the first three teams had higher pass numbers, and shot and pass on-target percentages.

The analysis results of a study reviewing football teams' performance show that shots on goal, the total number of crosses into the box, goal percentages per game, the number of goals scored during a running game, and goals scored based on the duration are among performance criteria (Ecemiş et al., 2021; Njororai, 2013). Revealing these criteria to affect success, this study also has parallels with and similarities to studies in the literature.

Conclusion

The increasing competition in football affects the ranking and condition of teams. Pursuing varieties for success, teams try to obtain it through analysis methods. Correct analysis studies may affect standings. Analyses compared to previous studies should be implemented in teams through training. The results obtained from this study show that teams should have more goal attempts, shots, successful shots, successful passes, and key passes to go higher up in league tables. It is believed that coaches can carry their teams higher in league rankings by doing training sessions centered on increasing dribbling and pass qualities.

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