

Determination of Important Game-Related Statistics in the UEFA Champions League: A 5-year follow-up

UEFA Şampiyonlar Ligi Müsabakalarındaki Önemli Oyun İlişkili İstatistiklerin Belirlenmesi:
5 Yıllık Bir İnceleme

Research Article / Araştırma Makalesi

 Enescan KILCI¹

 Özkan IŞIK^{1,2}

¹ Balıkesir University, Faculty of Sports
Sciences, Balıkesir, TÜRKİYE

² Balıkesir University, Directorate of Sports
Sciences Application and Research Center,
Balıkesir, TÜRKİYE

Corresponding Author / Sorumlu Yazar
Assoc. Prof. Dr. Özkan IŞIK,
ozkanisik86@hotmail.com

Received / Geliş Tarihi : 13.02.2024
Accepted / Kabul Tarihi : 11.04.2024
Published / Yayın Tarihi : 29.04.2024

Ethical Statement / Etik Bilgilendirme
This study was ethically approved by
the decision of the Balıkesir University
Ethics Committee dated 10.03.2021 and
numbered 2021-73.

DOI: 10.53434/gbesbd.1436301

Abstract

The research aimed to examine the effect of important game-related statistics on the success of the teams that made it to the knockout stages of the Champions League for 5 years (between 2015-2016 and 2019-2020 seasons). In the research, 139 matches of 35 teams that took part in the top 16 rounds, quarter-finals, semi-finals, and final tours of UEFA Champions League competitions were examined. The teams were divided into two groups the teams that qualified and the teams that were eliminated. Independent samples t-test was used to compare the in-game variables of the teams that passed the round and were eliminated. Linear discriminant analysis was used to determine important in-game variables between teams. The results of this research show that the number of statistical data related to the game between the teams that passed the round and the eliminated teams differed or decreased as they progressed from the round of 16 to the final. (Last of 16: goals scored, ball possession (%), duels won (%), passes, shots, number of shots on target, shots outside the penalty area, shots inside the penalty area, tackle, and red cards; Quarter-final round: shots on target; Semi-finals: aerial won (%), duels won (%), attacking sides rates (%)). In the study, it was found that only the goals scored and conceded in the last 16 and quarter-finals in the knockout stages had distinctive power, but no distinguishing variable was found in the semi-final and final stages. Therefore, the Champions League is one of the most followed organizations by football coaches and professionals. The tactical approaches of the teams that are successful in this tournament should be followed by football coaches at all levels and it is recommended to include variables that ensure success in training and matches.

Keywords: Football, Competition analysis, Game-related statistics, UEFA Champions League

Öz

Bu araştırmada, 5 yıl boyunca (2015-2016 ve 2019-2020 sezonları arasında) Şampiyonlar Ligi'nde eleme turlarına çıkan takımların maçlarla ilgili önemli istatistiklerinin takımların başarısına etkisinin incelenmesi amaçlanmıştır. Araştırmada, UEFA Şampiyonlar Ligi müsabakalarının ilk 16 turu, çeyrek final, yarı final ve final turunda yer alan 35 takımın 139 maçı incelenmiştir. Takımlar, galip ve mağlup takımlar olmak üzere iki gruba ayrılmıştır. Turu geçen ve elenen takımların oyun içi değişkenlerini karşılaştırmak için bağımsız örnekler t testi kullanılmıştır. Takımlar arasındaki önemli oyun içi değişkenleri belirlemek için doğrusal diskriminant analizi kullanılmıştır. Bu araştırmanın sonuçları, turu geçen takımlar ile elenen takımlar arasındaki maça ilişkin istatistiksel verilerin sayısının, son 16 turundan finale ilerledikçe farklılık gösterdiğini veya azaldığını göstermektedir (Son 16 için: atılan goller, topa sahip olma (%), ikili mücadele (%), paslar, şutlar, kaleyi bulan şutlar, ceza sahası dışından şutlar, ceza sahası içinden şutlar, top çalma, ve kırmızı kartlar; Çeyrek Final için: kaleyi bulan şutlar; Yarı Final için: hava topu kazanma (%), ikili mücadele (%), kenar hücumları (%)). Araştırmada eleme turlarında sadece son 16 ve çeyrek finalde atılan ve yenilen gollerin ayırt edici güce sahip olduğu ancak yarı final ve final aşamalarında herhangi bir ayırt edici değişkene rastlanmadığı tespit edilmiştir. Bu nedenle futbol antrenörlerinin ve profesyonellerinin en çok takip ettiği organizasyonların başında Şampiyonlar Ligi gelmektedir. Bu turnuvada başarılı olan takımların taktiksel yaklaşımları her seviyedeki futbol antrenörleri tarafından takip edilmeli, antrenman ve maçlarda başarıyı sağlayan değişkenlere yer verilmesi önerilmektedir.

Anahtar Kelimeler: Futbol, Müsabaka analizi, Oyun ilişkili istatistikler, UEFA Şampiyonlar Ligi

Introduction

Football, which appeals to considerable masses in the world, makes a lot of investments, and attracts the attention of people of all ages, is accepted as a universal value that grows like an avalanche daily in continuous development and transformation (Acar, Yapıcıoğlu, Arıkan, Yalçın, Ateş & Ergün, 2009). Although the internal elements of the football game do not change much over time, the football players on the field, technical staff, the perspective of the fans to the game, and the new dimensions brought by technology take different values (Kyle Bennett, Roel & Job, 2019). Europe is accepted as the center of football in the world, and for this reason, the first choice of talented football players in career development is football clubs in Europe. Among the reasons for this situation are the financial budgets of the European leagues and their desire to participate in the UEFA Champions League, one of the largest football organizations in the world (Lago, Lago-Peñas & Lago-Peñas, 2019). The UEFA Champions League is an annual transnational competition organized by the Union of European Football Association (UEFA) in which only the clubs with the best results in the previous season of the domestic football leagues can participate (Liu, Yi, Giménez, Gómez & Lago-Peñas, 2015a). Since the Champions League includes the most successful teams of national leagues, technical and tactical studies analyzing this elite tournament provide up-to-date and effective information that can lead football professionals to success.

Performance analysis in football is a popular research topic (Gómez, Gómez-Lopez, Lago & Sampaio, 2012; Lago, 2009; Sampaio, Lago, Casais & Leite, 2010), which helps to better understand the sports phenomenon and to achieve better results by identifying critical situations that coaches often deal with. A better understanding of the dynamic factors (eg, match-related statistics and situational variables) that affect the outcome of a football match allows for good team management and a successful team (García-Rubio, Gómez, Lago-Peñas & Ibáñez, 2015). Therefore, to determine the factors that lead to success in football, it is necessary to determine the performance indicators that distinguish the winners from the losers (Lepschy, Wäsche & Woll, 2018). In football performance analysis, performance indicators are observed as a) technical skills, b) tactical skills, and c) physical skills (Modric, Versic & Jelcic, 2022; Yi, Jia, Liu & Gomez, 2018). However, within these parameters, there is a global consensus on the necessity of observing technical skills as better predictive parameters than physical skills for success (Rampinini, Impellizzeri, Castagna, Coutts & Wisloff, 2009; Liu, Gomez, Goncalves & Sampaio, 2016).

Performance analysis of the UEFA Champions League often includes a set of situational statistical measures, including goals scored, assists, shots on goal, possession, passing hits, and more (Lago-Peñas, Lago-Ballesteros & Rey, 2011). These measurements are used to evaluate individual and team performances and achievements throughout the tournament or over

the years (Zambom-Ferraresi, García-Cebrián, Lera-López & Iráizoz, 2017). In addition, performance analysis includes examining game footage and tactical analysis by looking at how teams play and how they react to various situations (match location as home and away; match status as winning, losing, or drawing; quality of opposition as strong and weak) (Almeida, Ferreira & Volossovitch, 2014; García-Rubio et al., 2015;). This provides valuable information about the strengths, weaknesses, and overall performance levels of teams and players. When past research about the Champions League is analyzed, various situational performance variables have been examined longitudinally (García-Rubio et al., 2015; Liu et al., 2015a; Yi, Gómez-Ruano, Liu, Zhang, Gao, Wunderlich & Memmert, 2020) or within an only one-year tournament (Almeida et al., 2014; Modric et al., 2022). In addition to creating technical performance profiles in these studies, it is very important to determine the factors that lead to success between the qualified-not qualified or the winner-loser teams by making a discriminant analysis. Castellano, Casamichana and Lago (2012) used discriminant analysis to differentiate the performance indicators of the teams that were successful or unsuccessful in three World Cup tournaments held in various years. In a rare discriminant-based study on the Champions League, successful and unsuccessful teams were examined only in the tournament in a single year and only in the group stage matches (Modric et al., 2022). To the researchers' knowledge, no research has been found that examines the longitudinal technical performance data of successful and unsuccessful teams in the knockout stages of the Champions League teams. Therefore, this research aimed to examine the effect of critical game-related statistics on the success of the teams that made it to the knockout stages of the Champions League for 5 years (between 2015-2016 and 2019-2020 seasons).

Method

Match Samples

This study intended to investigate the technical performance of the 35 teams that qualified for knockout stages between the seasons 2015-2016 and 2019-2020 UEFA Champions League. 139 knockout stages (round of 16, quarter-finals, semi-finals, and finals) matches of the tournament were sampled. Due to the COVID-19 pandemic in the 2019-2020 season, the matches were played with a single-match elimination method in the quarterfinals and semi-finals. For this reason, 6 matches were played less than in other seasons in the 2019-2020 season.

Data Collection

In the study, official websites named "www.uefa.com" and "www.sahadan.com" which publish the results of the in-game variables of the UEFA Champions League competitions, were used as data collection tools. 29 different variables that affect the results of the teams that qualified to participate in the

round of 16, quarter-finals, semi-finals, and finals in the UEFA Champions League were determined and analyzed.

Variables

The 29 different game-related technical variables in the study are listed below; goals scored, goals conceded, ball possession (%), duels won (%), aerial won (%), interception, off-sides, corners, passes, long passes, pass accuracy (%), pass accuracy on opponents' field (%), crosses, cross accuracy (%), shots, shots on target, shot blockings, shots outside the penalty area, shot inside the penalty area, shot accuracy (%), tackles, tackle success (%), clearances, number of fouls, yellow cards, red cards, attacking side (right) (%), attacking side (center) (%), attacking side (left) (%).

Data Reliability

To ensure data reliability, 10 randomly selected matches were observed by two experienced football coaches. The coefficient of agreement between the observed values and the data obtained from the official website was tested with Cohen's Kappa analysis. According to the comparison results, it was seen that the coefficient of fit (κ) for all in-game variables was 1.0. This result shows that the reliability of the obtained data was in perfect agreement (Landis & Koch, 1977).

Statistical Analysis

Results

Table 1. The teams that qualified for the UEFA Champions League between 2015-2019

| No | Teams | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 | 2019/2020 |
|----|---------------------|-----------|-----------|-----------|-----------|-----------|
| 1 | AFC Ajax | - | - | - | + | - |
| 2 | Arsenal FC | + | + | - | - | - |
| 3 | Atalanta BC | - | - | - | - | + |
| 4 | Atletico Madrid | + | + | - | + | + |
| 5 | FC Barcelona | + | + | + | + | + |
| 6 | FC Basel | - | - | + | - | - |
| 7 | FC Bayern München | + | + | + | + | + |
| 8 | Bayer 04 Leverkusen | - | + | - | - | - |
| 9 | SL Benfica | + | + | - | - | - |
| 10 | Beşiktaş | - | - | + | - | - |
| 11 | Borussia Dortmund | - | + | - | + | + |
| 12 | Chelsea FC | + | - | + | - | + |
| 13 | FK Dinamo Kiev | + | - | - | - | - |
| 14 | KAA Gent | + | - | - | - | - |
| 15 | Juventus FC | + | + | + | + | + |
| 16 | Leicester City FC | - | + | - | - | - |
| 17 | Liverpool FC | - | - | + | + | + |
| 18 | Olympique Lyon | - | - | - | + | + |
| 19 | Manchester City FC | + | + | + | + | + |
| 20 | Manchester United | - | - | + | + | - |
| 21 | AS Monaco FC | - | + | - | - | - |
| 22 | SSC Napoli | - | + | - | - | + |
| 23 | FC Porto | - | + | + | + | - |
| 24 | Paris Saint-Germain | + | + | + | + | + |
| 25 | PSV Eindhoven | + | - | - | - | - |
| 26 | RB Leipzig | - | - | - | - | + |
| 27 | Real Madrid CF | + | + | + | + | + |
| 28 | AS Roma | + | - | + | + | - |
| 29 | FC Schalke 04 | - | - | - | + | - |
| 30 | Sevilla FC | - | + | + | - | - |
| 31 | Shakhtar Donetsk | - | - | + | - | - |
| 32 | Tottenham Hotspur | - | - | + | + | + |
| 33 | Valencia CF | - | - | - | - | + |
| 34 | VFL Wolfsburg | + | - | - | - | - |
| 35 | FK Zenit | + | - | - | - | - |

The independent sample t-test was used to compare the descriptive results obtained from the game-related statistics of the two groups. In addition, discriminant analysis was used to find game-related statistical team variables that better contributed to the differences between both groups. Discriminant analysis; is a method that develops distinguishing functions between group mean factors to distinguish groups with common characteristics (Özdamar, 2010). The interpretation of the obtained discriminant functions is based on the examination of the structure coefficient greater than |0.30| According to this structure coefficient, it means variables with higher absolute values contribute effectively to distinguishing between groups (Doğan, Işık & Ersöz, 2016; Tabachnick & Fidell, 2007;). In this study, the covariance matrix of the group was found to be homogeneous due to Box's test ($F=1.076$, $p>0.05$). Linear discriminant analysis is used in the assumption that the whole group covariance matrix is homogeneous (Özdamar, 2010). For this reason, linear discriminant analysis was used in the study. Statistical analyses were performed using the SPSS 22.0 software program and the level of significance was determined as $p<0.05$.

Ethical Statement

This study was ethically approved by the decision of the Balıkesir University Ethics Committee dated 10.03.2021 and numbered 2021-73.

When Table 1 was examined, the years in which the teams qualified for the UEFA Champions League’s last 16 rounds, quarter-finals, semi-finals, and finals participated between the years of 2015-2016 and 2019-2020 were listed.

Table 2. Comparison of important game-related statistics of teams that qualified and were eliminated in UEFA Champions League's last 16 round competitions between 2015-2019

| Variables | Qualified (n=40) | Eliminated (n=40) | t | p |
|---|------------------|-------------------|--------|---------------|
| Goals scored | 4.48 ± 2.04 | 1.83 ± 1.34 | 6.875 | 0.001* |
| Goals conceded | 1.83 ± 1.34 | 4.48 ± 2.04 | -6.875 | 0.001* |
| Ball possession (%) | 53.53 ± 11.9 | 46.47 ± 11.9 | 2.653 | 0.010* |
| Duels won (%) | 51.43 ± 4.67 | 49.07 ± 3.89 | 2.456 | 0.016* |
| Aerial won (%) | 51.54 ± 9 | 48.46 ± 9 | 1.528 | 0.131 |
| Interception | 26.45 ± 5.25 | 27.93 ± 9.25 | -0.877 | 0.383 |
| Offsides | 4.93 ± 3.68 | 4.23 ± 2.78 | 0.960 | 0.340 |
| Corners | 10.45 ± 4.65 | 8.9 ± 3.84 | 1.626 | 0.108 |
| Passes | 1081.03 ± 278.48 | 933.7 ± 228.63 | 2.586 | 0.012* |
| Long Passes | 114.25 ± 24.53 | 111.9 ± 24.11 | 0.432 | 0.667 |
| Pass accuracy (%) | 83.11 ± 6.83 | 80.85 ± 5.24 | 1.662 | 0.101 |
| Pass accuracy on the opponent’s field (%) | 74.84 ± 8.53 | 70.56 ± 7.46 | 2.388 | 0.0019 |
| Crosses | 32.95 ± 13.88 | 32.5 ± 15.27 | 0.138 | 0.891 |
| Cross accuracy (%) | 23.57 ± 8.13 | 22.49 ± 10.29 | 0.517 | 0.607 |
| Shots | 29.18 ± 10.05 | 22.43 ± 7.19 | 3.455 | 0.001* |
| Shots on target | 10.7 ± 3.62 | 7.6 ± 3.71 | 3.786 | 0.001* |
| Shot blockings | 6.7 ± 3.68 | 5.65 ± 2.56 | 1.482 | 0.142 |
| Shots outside the penalty area | 10.78 ± 4.42 | 8.55 ± 3.61 | 2.465 | 0.016* |
| Shots inside the penalty area | 18.4 ± 6.82 | 13.88 ± 5.66 | 3.230 | 0.002* |
| Shot accuracy (%) | 38.08 ± 8.85 | 33.87 ± 13.14 | 1.677 | 0.097 |
| Tackles | 38.88 ± 9.42 | 34.58 ± 7.81 | 2.222 | 0.029* |
| Tackle success (%) | 64 ± 10.63 | 66.04 ± 8.69 | -0.943 | 0.348 |
| Clearances | 37 ± 15.86 | 39.1 ± 15.03 | -0.608 | 0.545 |
| Number of fouls | 24.3 ± 6.58 | 25.1 ± 6.63 | -0.542 | 0.590 |
| Yellow cards | 4.03 ± 2.35 | 4.08 ± 1.8 | -0.107 | 0.915 |
| Red cards | 0.08 ± 0.27 | 0.33 ± 0.53 | -2.682 | 0.009* |
| Attacking side (right) (%) | 34.98 ± 5.77 | 36.08 ± 5.8 | -0.851 | 0.398 |
| Attacking side (center) (%) | 25.96 ± 4.52 | 25.54 ± 3.57 | 0.453 | 0.652 |
| Attacking side (left) (%) | 39.06 ± 4.34 | 38.38 ± 5.5 | 0.614 | 0.541 |

*p< 0.05

When the important game-related statistics of the teams that qualified and were eliminated in the Champions League's last 16 round competitions were compared, It was determined that there was a significant difference in goals scored, goals conceded, ball possession (%), duels won (%), passes, shots, shots on target, shots outside the penalty area, shots inside the penalty area, tackles, and red card variables (p<0.05), whereas there was no statistically significant difference between other game-related variables (p> 0.05; Table 2).

Table 3. Structure coefficients obtained from the discriminant analysis results for game-related statistics and tests of statistical significance for qualifying from the last 16 rounds to the quarter-finals

| Discriminant Function Coefficient | Function | | Structure Coefficients (SC) |
|--|--|---|-----------------------------|
| | Function 1 (Qualified) (Y ₁) | Function 2 (Eliminated) (Y ₂) | |
| Goals scored (X ₁) | -2.29 | -4.40 | -0.454 |
| Goals conceded (X ₂) | 2.57 | 4.68 | 0.454 |
| Ball possession (%) (X ₃) | -0.36 | -0.13 | -0.175 |
| Duels won (%) (X ₄) | 12.12 | 11.93 | -0.162 |
| Aerial won (%) (X ₅) | -1.24 | -1.26 | -0.101 |
| Interception (X ₆) | 2.14 | 2.21 | 0.058 |
| Offsides (X ₇) | -2.41 | -2.33 | -0.063 |
| Corners (X ₈) | 5.77 | 5.52 | -0.107 |
| Passes (X ₉) | -0.15 | -0.15 | -0.171 |
| Long Passes (X ₁₀) | 1.52 | 1.53 | -0.029 |
| Pass accuracy (%) (X ₁₁) | 25.66 | 25.67 | -0.110 |
| Pass accuracy on the opponent’s field (%) (X ₁₂) | -6.40 | -6.41 | -0.158 |
| Crosses (X ₁₃) | -1.48 | -1.45 | -0.009 |
| Cross accuracy (%) (X ₁₄) | 0.71 | 0.79 | -0.034 |
| Shots (X ₁₅) | 1.10 | 0.47 | -0.228 |
| Shots on target (X ₁₆) | -7.60 | -5.97 | -0.250 |
| Shot blockings (X ₁₇) | -3.54 | -2.97 | -0.098 |
| Shots outside the penalty area (X ₁₈) | 6.96 | 6.81 | -0.163 |

| | | | |
|--|----------|----------|--------|
| Shots inside the penalty area # | | | -0.213 |
| Shot accuracy (%) (X ₁₉) | 2.69 | 2.40 | -0.111 |
| Tackles (X ₂₀) | -1.57 | -1.61 | -0.147 |
| Tackle success (%) (X ₂₁) | 0.25 | 0.21 | 0.062 |
| Clearances (X ₂₂) | 2.83 | 2.88 | 0.040 |
| Number of fouls (X ₂₃) | 5.73 | 5.81 | 0.036 |
| Yellow cards (X ₂₄) | -3.73 | -4.24 | 0.007 |
| Red cards (X ₂₅) | -1.88 | -0.39 | 0.177 |
| Attacking side (right) (%) (X ₂₆) | 5.08 | 5.12 | 0.056 |
| Attacking side (center) (%) (X ₂₇) | 5.90 | 5.94 | -0.030 |
| Attacking side (left) (%) # | | | -0.040 |
| (Constant) | -1449.33 | -1441.99 | |
| Wilks' Lambda | | | 0.253 |
| Eigenvalue | | | 2.945 |
| Chi-Square | | | 88.522 |
| P | | | 0.001 |
| Canonical Correlation | | | 0.864 |
| Reclassification (%) | | | 100.0 |

These data were not used in statistical analysis

The results of the discriminant analysis of the game-related variables that are effective for qualifying from the last 16 rounds to the quarter-finals are shown in the table below. According to Table 3, the discriminant function has an important distinction (p<0.05). In addition, the correct classification rate of the discriminant function was found to be 100%. Considering the discriminant function coefficients, the discriminant function can be written as follows.

$$Y1 = -1449.335 - 2.288 X1 + 2.572 X2 - .358 X3 + 12.120 X4 - 1.237 X5 + 2.141 X6 - 2.413 X7 + 5.766 X8 - .146 X9 + 1.519 X10 + 25.656 X11 - 6.396 X12 - 1.478 X13 + .714 X14 + 1.104 X15 - 7.597 X16 - 3.542 X17 + 6.964 X18 + 2.695 X19 - 1.568 X20 + .246 X21 + 2.834 X22 + 5.732 X23 - 3.726 X24 - 1.877 X25 + 5.079 X26 + 5.903 X27$$

$$Y2 = -1441.992 - 4.402 X1 + 4.676 X2 - .129 X3 + 11.932 X4 - 1.260 X5 + 2.206 X6 - 2.327 X7 + 5.520 X8 - .147 X9 + 1.529 X10 + 25.666 X11 - 6.407 X12 - 1.449 X13 + .786 X14 + .475 X15 - 5.966 X16 - 2.971 X17 + 6.810 X18 + 2.398 X19 - 1.612 X20 + .208 X21 + 2.880 X22 + 5.811 X23 - 4.236 X24 - .395 X25 + 5.117 X26 + 5.936 X27$$

In the determination of the discriminant functions, shots inside the penalty area and attacking side (left) (%) variables were not included in the analysis. When the game-related variables that contributed to the quarter-final round were examined, it was observed that the goals conceded (SC= 0.454) and the goal scored (SC= -0.454) variables contributed to the team's success (Table 3).

Table 4. Comparison of the important game-related statistics of the teams that qualified and were eliminated in the UEFA Champions League quarter-final round competitions between 2015-2019

| Variables | Qualified (n=20) | Eliminated (n=20) | t | p |
|---|------------------|-------------------|---------|---------------|
| Goals scored | 3.8 ± 1.64 | 1.8 ± 1.15 | 4.460 | 0.001* |
| Goals conceded | 1.8 ± 1.15 | 3.8 ± 1.64 | -4.4460 | 0.001* |
| Ball possession (%) | 47.99 ± 13.85 | 51.96 ± 13.76 | -0.909 | 0.369 |
| Duels won (%) | 50.37 ± 5.12 | 49.64 ± 5.12 | 0.450 | 0.656 |
| Aerial won (%) | 49.81 ± 8.02 | 50.19 ± 8.02 | -0.148 | 0.883 |
| Interception | 23.35 ± 9.06 | 20.85 ± 8.32 | 0.909 | 0.369 |
| Offsides | 3.8 ± 3.24 | 4 ± 2.83 | -0.208 | 0.836 |
| Corners | 8.6 ± 4.47 | 9.15 ± 4.8 | -0.375 | 0.710 |
| Passes | 858.6 ± 352.65 | 920.5 ± 335.36 | -0.569 | 0.573 |
| Long Passes | 107.7 ± 34.75 | 105 ± 36.54 | 0.239 | 0.812 |
| Pass accuracy (%) | 79.86 ± 8.3 | 81.61 ± 5.97 | -0.767 | 0.448 |
| Pass accuracy on the opponent's field (%) | 71.34 ± 9.5 | 72.1 ± 7.86 | -0.277 | 0.783 |
| Crosses | 28.95 ± 15.64 | 32.55 ± 14.63 | -0.752 | 0.457 |
| Cross accuracy (%) | 23.75 ± 11.02 | 20.36 ± 11.17 | 0.965 | 0.340 |
| Shots | 24.85 ± 10.41 | 23.05 ± 8.38 | 0.603 | 0.550 |
| Shots on target | 9.6 ± 4.17 | 6.75 ± 3.01 | 2.478 | 0.018* |
| Shot blockings | 4.6 ± 2.74 | 6.65 ± 3.92 | -1.915 | 0.063 |
| Shots outside the penalty area | 8.7 ± 3.93 | 9.6 ± 4.43 | -0.679 | 0.501 |
| Shots inside the penalty area | 16.15 ± 8.09 | 13.45 ± 5.38 | 1.244 | 0.221 |
| Shot accuracy (%) | 41.28 ± 14.15 | 32.3 ± 15.7 | 1.899 | 0.065 |
| Tackles | 33.3 ± 14.21 | 28.9 ± 10.78 | 1.103 | 0.277 |
| Tackle success (%) | 64.83 ± 8.12 | 65.87 ± 10.51 | -0.350 | 0.728 |
| Clearances | 42.35 ± 21.21 | 31.15 ± 12.99 | 2.014 | 0.051 |
| Number of fouls | 22.5 ± 7.32 | 22.4 ± 6.66 | 0.045 | 0.964 |
| Yellow cards | 3.8 ± 2.09 | 4.2 ± 1.88 | -0.636 | 0.529 |
| Red cards | 0.05 ± 0.22 | 0.25 ± 0.64 | -1.322 | 0.194 |
| Attacking side (right) (%) | 36.86 ± 3.94 | 34.02 ± 5.31 | 1.923 | 0.062 |
| Attacking side (center) (%) | 25.37 ± 2.94 | 26.45 ± 4.31 | -0.929 | 0.359 |
| Attacking side (left) (%) | 37.77 ± 4.01 | 39.53 ± 6.43 | -1.037 | 0.306 |

*p< 0.05

When the important game-related statistics of the teams that passed the round and were eliminated in the quarter-final round competition were compared, there was a significant difference ($p < 0.05$) in the variables of goals scored, goals conceded, and shots on target. It was determined that there was no statistically significant difference between other game-related variables ($p > 0.05$; Table 4).

Table 5. Structure coefficients obtained from the discriminant analysis results for game-related statistics and tests of statistical significance for qualifying from the quarter-final round to the semi-final round

| Discriminant Function Coefficient | | | |
|--|-------------------------------|--------------------------------|-----------------------------|
| Game-related variables | Function 1 | Function 2 | Structure Coefficients (SC) |
| | (Qualified) (Y ₁) | (Eliminated) (Y ₂) | |
| Goals scored (X ₁) | 3.88 | 0.20 | 0.316 |
| Goals conceded (X ₂) | -9.36 | -5.83 | -0.316 |
| Ball possession (%) (X ₃) | -3.84 | -3.54 | -0.064 |
| Duels won (%) (X ₄) | 19.94 | 19.17 | 0.032 |
| Aerial won (%) (X ₅) | -6.45 | -6.49 | -0.010 |
| Interception (X ₆) | -1.27 | -0.96 | 0.064 |
| Offsides (X ₇) | 3.17 | 3.42 | -0.015 |
| Corners (X ₈) | 1.37 | 1.36 | -0.027 |
| Passes (X ₉) | -0.19 | -0.18 | -0.040 |
| Long Passes (X ₁₀) | 0.65 | 0.65 | 0.017 |
| Pass accuracy (%) (X ₁₁) | 6.46 | 6.96 | -0.054 |
| Pass accuracy on the opponent's field (%) (X ₁₂) | 5.68 | 4.85 | -0.020 |
| Crosses (X ₁₃) | 2.77 | 2.29 | -0.053 |
| Cross accuracy (%) (X ₁₄) | 2.29 | 2.33 | 0.068 |
| Shots (X ₁₅) | -0.84 | -1.63 | 0.043 |
| Shots on target (X ₁₆) | -13.56 | -11.05 | 0.176 |
| Shot blockings (X ₁₇) | 14.97 | 15.68 | -0.136 |
| Shots outside the penalty area (X ₁₈) | 4.27 | 3.44 | -0.048 |
| Shots inside the penalty area # | | | 0.088 |
| Shot accuracy (%) (X ₁₉) | 6.03 | 5.37 | 0.135 |
| Tackles (X ₂₀) | -1.84 | -1.83 | 0.078 |
| Tackle success (%) (X ₂₁) | -0.38 | -0.21 | -0.025 |
| Clearances (X ₂₂) | 2.49 | 2.37 | 0.143 |
| Number of fouls (X ₂₃) | 8.52 | 8.25 | 0.003 |
| Yellow cards (X ₂₄) | -6.39 | -6.34 | -0.045 |
| Red cards (X ₂₅) | -67.43 | -62.37 | -0.094 |
| Attacking side (right) (%) (X ₂₆) | 7.61 | 6.97 | 0.136 |
| Attacking side (center) (%) (X ₂₇) | -2.87 | -2.50 | -0.066 |
| Attacking side (left) (%) # | | | -0.073 |
| (Constant) | -1025.13 | -944.23 | |
| Wilks' Lambda | | | 0.160 |
| Eigenvalue | | | 5.243 |
| Chi-Square | | | 44.871 |
| p | | | 0.017 |
| Canonical Correlation | | | 0.916 |
| Reclassification (%) | | | 97.5 |

These data were not used in statistical analysis

The results of the discriminant analysis of the game-related variables that are effective for advancing from the quarter-final round to the semi-final round are shown in the table below. According to Table 5, the discriminant function has an important distinction ($p < 0.05$). In addition, the correct classification rate of the discriminant function was found to be 97.5%. Considering the discriminant function coefficients, the discriminant function can be written as follows.

$$Y_1 = -1025.135 + 3.880 X_1 - 9.360 X_2 - 3.844 X_3 + 19.939 X_4 - 6.448 X_5 - 1.275 X_6 + 3.171 X_7 + 1.372 X_8 - .189 X_9 + .648 X_{10} + 6.459 X_{11} + 5.682 X_{12} + 2.770 X_{13} + 2.294 X_{14} - .840 X_{15} - 13.563 X_{16} + 14.971 X_{17} + 4.272 X_{18} + 6.027 X_{19} - 1.842 X_{20} - .380 X_{21} + 2.489 X_{22} + 8.520 X_{23} - 6.391 X_{24} - 67.430 X_{25} + 7.611 X_{26} - 2.871 X_{27}$$

$$Y_2 = -944.230 + .203 X_1 - 5.833 X_2 - 3.544 X_3 + 19.172 X_4 - 6.494 X_5 - .962 X_6 + 3.418 X_7 + 1.356 X_8 - .180 X_9 + .646 X_{10} + 6.959 X_{11} + 4.854 X_{12} + 2.287 X_{13} + 2.330 X_{14} - 1.635 X_{15} - 11.053 X_{16} + 15.685 X_{17} + 3.436 X_{18} + 5.373 X_{19} - 1.832 X_{20} - .211 X_{21} + 2.372 X_{22} + 8.252 X_{23} - 6.336 X_{24} - 62.371 X_{25} + 6.970 X_{26} - 2.499 X_{27}$$

In the determination of the discriminant functions, the left (%) variables in the penalty area and attack directions were not included in the analysis. When the game-related variables that contributed to the semi-final round were examined, it was observed that the goals scored (SC= 0.316) and goals conceded (SC= -0.316) were variables that contributed to team success (Table 5).

Table 6. Comparison of important game-related statistics of teams that qualified and were eliminated in UEFA Champions League semi-final round competitions between 2015-2019

| Variables | Qualified (n=10) | Eliminated (n=10) | t | p |
|---|------------------|-------------------|--------|---------------|
| Goals scored | 3.5 ± 1.58 | 2 ± 1.89 | 1.928 | 0.070 |
| Goals conceded | 2 ± 1.89 | 3.5 ± 1.58 | -1.928 | 0.070 |
| Ball possession (%) | 50.59 ± 11.53 | 49.41 ± 11.53 | 0.229 | 0.822 |
| Duels won (%) | 53.54 ± 6.35 | 46.46 ± 6.35 | 2.494 | 0.023* |
| Aerial won (%) | 56.89 ± 10.4 | 43.12 ± 10.4 | 2.960 | 0.008* |
| Interception | 23.8 ± 11.19 | 24.7 ± 10.27 | -0.187 | 0.854 |
| Offsides | 4.3 ± 3.2 | 2.8 ± 2.39 | 1.187 | 0.251 |
| Corners | 9.8 ± 3.71 | 10.8 ± 5.39 | -0.483 | 0.635 |
| Passes | 866.2 ± 232.39 | 870.5 ± 312.65 | -0.035 | 0.973 |
| Long Passes | 108.4 ± 35.17 | 102.1 ± 31.47 | 0.422 | 0.678 |
| Pass accuracy (%) | 80.45 ± 9.09 | 81.3 ± 4.24 | -0.269 | 0.791 |
| Pass accuracy on the opponent's field (%) | 71.68 ± 9.62 | 71.77 ± 5.01 | -0.028 | 0.978 |
| Crosses | 26.9 ± 11.02 | 37.8 ± 21.08 | -1.449 | 0.165 |
| Cross accuracy (%) | 26.73 ± 9.81 | 21.46 ± 9.91 | 1.196 | 0.247 |
| Shots | 25.3 ± 8.29 | 25.5 ± 14.2 | -0.038 | 0.970 |
| Shots on target | 10 ± 3.02 | 8.4 ± 5.36 | 0.823 | 0.421 |
| Shot blockings | 6.5 ± 3.34 | 6.5 ± 5.02 | 0.001 | 1.000 |
| Shots outside the penalty area | 8.7 ± 3.13 | 10.4 ± 7.53 | -0.659 | 0.518 |
| Shots inside the penalty area | 16.6 ± 6.9 | 15.1 ± 9.17 | 0.413 | 0.684 |
| Shot accuracy (%) | 41.7 ± 12.73 | 31.63 ± 9.19 | 2.029 | 0.059 |
| Tackles | 32.1 ± 13.01 | 34.3 ± 15.27 | -0.347 | 0.733 |
| Tackle success (%) | 62.56 ± 9.11 | 65.64 ± 14.16 | -0.578 | 0.571 |
| Clearances | 42.2 ± 18.07 | 34.2 ± 16.86 | 1.024 | 0.320 |
| Number of fouls | 20 ± 6.55 | 24.4 ± 7.83 | -1.363 | 0.190 |
| Yellow cards | 3 ± 1.89 | 4.2 ± 1.55 | -1.555 | 0.137 |
| Attacking side (right) (%) | 36.49 ± 4.2 | 30.4 ± 5.81 | 2.684 | 0.015* |
| Attacking side (center) (%) | 26.93 ± 2.91 | 27.47 ± 5.01 | -0.295 | 0.772 |
| Attacking side (left) (%) | 36.59 ± 4.44 | 42.14 ± 4.74 | -2.702 | 0.015* |

*p< 0.05

When the important game-related statistics of the teams that qualified and were eliminated for the semi-final round in the UEFA Champions League competitions between 2015-2019 were compared, it was determined that there was a significant difference in duels won (%), aerial won (%), attacking side (right) (%) and attacking side (left) (%) variables (p<0.05), whereas there was no statistically significant difference between the other game-related variables (p> 0.05; Table 6).

Table 7. Structure coefficients obtained from the discriminant analysis results for game-related statistics and tests of statistical significance for qualifying from the semi-final round to the final round

| Discriminant Function Coefficient | Function | | Structure Coefficients (SC) |
|--|--|---|-----------------------------|
| | Function 1 (Qualified) (Y ₁) | Function 2 (Eliminated) (Y ₂) | |
| Goals scored (X ₁) | -523.46 | -579.52 | -0.084 |
| Goals conceded (X ₂) | 443.35 | 501.12 | 0.084 |
| Ball possession (%) (X ₃) | 10.68 | 13.85 | -0.010 |
| Duels won (%) (X ₄) | -93.37 | -106.20 | -0.109 |
| Aerial won (%) (X ₅) | 61.62 | 69.75 | -0.130 |
| Interception (X ₆) | 63.09 | 68.62 | 0.008 |
| Offsides (X ₇) | 75.30 | 86.01 | -0.052 |
| Corners (X ₈) | -10.19 | -2.38 | 0.021 |
| Passes (X ₉) | -3.23 | -3.46 | 0.002 |
| Long Passes (X ₁₀) | 9.29 | 9.42 | -0.018 |
| Pass accuracy (%) (X ₁₁) | 275.30 | 299.02 | 0.012 |
| Pass accuracy on the opponent's field (%) (X ₁₂) | -137.89 | -152.89 | 0.001 |
| Crosses (X ₁₃) | -30.93 | -34.95 | 0.063 |
| Cross accuracy (%) (X ₁₄) | 24.20 | 27.91 | -0.052 |
| Shots (X ₁₅) | 53.11 | 53.27 | 0.002 |
| Shots on target (X ₁₆) | 60.43 | 63.18 | -0.036 |
| Shot blockings (X ₁₇) | -30.86 | -30.11 | 0.000 |
| Shots outside the penalty area (X ₁₈) | 37.36 | 44.79 | 0.029 |
| Shots inside the penalty area # | | | -0.018 |
| Shot accuracy (%) # | | | -0.049 |
| Tackles # | | | -0.258 |
| Tackle success (%) # | | | -0.459 |
| Clearances # | | | -0.044 |

| | | | |
|-------------------------------|----------|----------|--------|
| Number of fouls # | | | -0.126 |
| Yellow cards # | | | -0.241 |
| Attacking side (right) (%) # | | | 0.187 |
| Attacking side (center) (%) # | | | -0.228 |
| Attacking side (left) (%) # | | | -0.003 |
| (Constant) | -6094.41 | -6993.03 | |
| Wilks' Lambda | | | 0.033 |
| Eigenvalue | | | 29.004 |
| Chi-Square | | | 30.612 |
| P | | | 0.032 |
| Canonical Correlation | | | 0.983 |
| Reclassification (%) | | | 100.0 |

These data were not used in statistical analysis

The results of the discriminant analysis of the game-related variables that are effective for advancing from the semi-final round to the final round are shown in the table below. According to Table 7, the discriminant function has an important distinction ($p < 0.05$). In addition, the correct classification rate of the discriminant function was found to be 100%. Considering the discriminant function coefficients, the discriminant function can be written as follows.

$$Y1 = -6094.411 - 523.463 X1 + 443.346 X2 + 10.677 X3 - 93.373 X4 + 61.617 X5 + 63.093 X6 + 75.296 X7 - 10.191 X8 - 3.229 X9 + 9.291 X10 + 275.305 X11 - 137.888 X12 - 30.930 X13 + 24.201 X14 + 53.113 X15 + 60.428 X16 - 30.864 X17 + 37.359 X18$$

$$Y2 = -6993.030 - 579.520 X1 + 501.118 X2 + 13.850 X3 - 106.197 X4 + 69.752 X5 + 68.623 X6 + 86.015 X7 - 2.376 X8 - 3.462 X9 + 9.418 X10 + 299.020 X11 - 152.893 X12 - 34.946 X13 + 27.915 X14 + 53.272 X15 + 63.180 X16 - 30.111 X17 + 44.789 X18$$

In determining the discriminant functions, shots inside the penalty area, shooting accuracy (%), tackle, tackle success (%), clearances, number of fouls, yellow cards, attacking side (right) (%), attacking side (center) (%) and attacking side (left) (%) variables were not included in the analysis. When the game-related variables that contributed to the final round of the UEFA Champions League between 2015-2019 were examined, the contribution of all the variables in the separation was not found to be significant (Table 7).

Table 8. Comparison of important game-related statistics of champion and eliminated teams in UEFA Champions League final round competitions between 2015-2019

| Variables | Qualified (n=5) | Eliminated (n=5) | t | p |
|---|-----------------|------------------|--------|---------------|
| Goals scored | 2.2 ± 1.3 | 0.6 ± 0.55 | 2.530 | 0.035* |
| Goals conceded | 0.6 ± 0.55 | 2.2 ± 1.3 | -2.530 | 0.035* |
| Ball possession (%) | 53.3 ± 12.03 | 46.7 ± 12.03 | 0.868 | 0.411 |
| Duels won (%) | 51.54 ± 5.95 | 48.46 ± 5.95 | 0.819 | 0.437 |
| Aerial won (%) | 54.62 ± 8.15 | 45.38 ± 8.15 | 1.793 | 0.111 |
| Interception | 13.4 ± 9.34 | 11 ± 4.24 | 0.523 | 0.615 |
| Offsides | 2.2 ± 2.77 | 2.6 ± 0.55 | -0.316 | 0.760 |
| Corners | 6 ± 3.46 | 4.8 ± 2.59 | 0.621 | 0.552 |
| Passes | 507 ± 141.35 | 439.6 ± 133.15 | 0.776 | 0.460 |
| Long Passes | 62.8 ± 3.42 | 58.8 ± 10.35 | 0.820 | 0.436 |
| Pass accuracy (%) | 82.32 ± 10.31 | 78.84 ± 3.57 | 0.713 | 0.496 |
| Pass accuracy on the opponent's field (%) | 72.34 ± 15.11 | 65.02 ± 7.06 | 0.982 | 0.355 |
| Crosses | 18.6 ± 6.69 | 19.4 ± 6.77 | -0.188 | 0.856 |
| Cross accuracy (%) | 17.6 ± 7.02 | 22.22 ± 11.22 | -0.781 | 0.457 |
| Shots | 16.6 ± 5.18 | 13 ± 3.54 | 1.284 | 0.235 |
| Shots on target | 4.6 ± 2.3 | 4.2 ± 2.28 | 0.276 | 0.790 |
| Shot blockings | 6.4 ± 2.97 | 4 ± 2.35 | 1.419 | 0.194 |
| Shots outside the penalty area | 8.8 ± 4.32 | 5.4 ± 2.07 | 1.585 | 0.152 |
| Shots inside the penalty area | 7.8 ± 2.86 | 7.6 ± 2.19 | 0.124 | 0.904 |
| Shot accuracy (%) | 26.72 ± 7.72 | 32.66 ± 14.38 | -0.814 | 0.439 |
| Tackles | 17.4 ± 7.3 | 16 ± 7.31 | 0.303 | 0.770 |
| Tackle success (%) | 67.58 ± 9.95 | 62.34 ± 16.29 | 0.614 | 0.556 |
| Clearances | 21.4 ± 13.54 | 18 ± 5.34 | 0.522 | 0.616 |
| Number of fouls | 13.8 ± 7.76 | 15.6 ± 6.58 | -0.396 | 0.703 |
| Yellow cards | 2.8 ± 2.68 | 2 ± 1.58 | 0.574 | 0.582 |
| Red cards | 0 ± 0 | 0.2 ± 0.45 | -1.000 | 0.347 |
| Attacking side (right) (%) | 35.86 ± 5.97 | 33.3 ± 1.59 | 0.927 | 0.381 |
| Attacking side (center) (%) | 25.28 ± 6.21 | 25.2 ± 1.25 | 0.028 | 0.978 |
| Attacking side (left) (%) | 38.86 ± 6.54 | 41.5 ± 1.58 | -0.877 | 0.406 |

* $p < 0.05$

When the important game-related statistics of the champions and eliminated teams in the Champions League final round competitions were compared, it was determined that there was a significant difference in the variables of goals scored and goals conceded ($p < 0.05$), however, there was no statistically significant difference between other game-related variables ($p > 0.05$; Table 8).

The results of the discriminant analysis of the game-related variables that are effective to become the champion in the final round are shown in the table below. According to Table 9, the discriminant function has an important distinction ($p < 0.05$). In addition, the correct classification rate of the discriminant function was found to be 100%. Considering the discriminant function coefficients, the discriminant function can be written as follows.

$$Y_1 = -75.028 + 50.511 X_1 - 13.762 X_2 + 8.309 X_3 - 3.218 X_4 + 11.905 X_5 + 1.674 X_6 + 10.735 X_7 - .905 X_8$$

$$Y_2 = -120.655 - 85.717 X_1 + 39.914 X_2 - 13.356 X_3 + 9.592 X_4 - 20.647 X_5 - 8.134 X_6 - 14.060 X_7 + 1.543 X_8$$

In the determination of discriminant functions, aerial won (%), long pass, pass accuracy (%), pass accuracy on opponent's field (%), crosses, cross accuracy (%), shots, shots on target, shot blockings, shots outside the penalty area, shots inside the penalty area, shot accuracy (%), tackles, tackle success (%), clearances, number of fouls, yellow cards, red cards, attacking side (right) (%), attacking side (center) (%), and attacking side (left) (%) variables were not included in the analysis. When the game-related variables that contributed to becoming the champion in the UEFA Champions League final round were examined, the contribution of all the variables was not found to be significant (Table 9).

Table 9. Structure coefficients obtained from the discriminant analysis results for game-related statistics and tests of statistical significance for the championship in the final round

| Discriminant Function Coefficient | Function 1 (Qualified) (Y ₁) | Function 2 (Eliminated) (Y ₂) | Structure Coefficients (SC) |
|---|--|---|-----------------------------|
| Goals scored (X ₁) | 50.51 | -85.72 | 0.086 |
| Goals conceded (X ₂) | -13.76 | 39.91 | -0.086 |
| Ball possession (%) (X ₃) | 8.31 | -13.36 | 0.029 |
| Duels won (%) (X ₄) | -3.22 | 9.59 | 0.028 |
| Aerial won (%) # | | | -0.058 |
| Interception (X ₅) | 11.90 | -20.65 | 0.018 |
| Offsides (X ₆) | 1.67 | -8.13 | -0.011 |
| Corners (X ₇) | 10.73 | -14.06 | 0.021 |
| Passes (X ₈) | -0.90 | 1.54 | 0.026 |
| Long Passes # | | | 0.103 |
| Pass accuracy (%) # | | | -0.152 |
| Pass accuracy on the opponent's field (%) # | | | -0.149 |
| Crosses # | | | -0.090 |
| Cross accuracy (%) # | | | 0.197 |
| Shots # | | | -0.023 |
| Shots on target # | | | 0.318 |
| Shot blockings # | | | -0.416 |
| Shots outside the penalty area # | | | 0.138 |
| Shots inside the penalty area # | | | -0.224 |
| Shot accuracy (%) # | | | 0.574 |
| Tackles # | | | -0.229 |
| Tackle success (%) # | | | 0.498 |
| Clearances # | | | 0.367 |
| Number of fouls # | | | -0.249 |
| Yellow cards # | | | -0.035 |
| Red cards # | | | 0.433 |
| Attacking side (right) (%) # | | | 0.056 |
| Attacking side (center) (%) # | | | 0.031 |
| Attacking side (left) (%) # | | | -0.081 |
| (Constant) | -75.03 | -120.65 | |
| Wilks' Lambda | | | 0.009 |
| Eigenvalue | | | 108.236 |
| Chi-Square | | | 18.774 |
| P | | | 0.016 |
| Canonical Correlation | | | 0.995 |
| Reclassification (%) | | | 100.0 |

These data were not used in statistical analysis

Discussion

The purpose of this research was to compare the game-related statistics of the teams that qualified and were eliminated in the Champions League knockout stages for 5 years (between the 2015-2016 and 2019-2020 seasons) and to determine the distinguishing variables for passing the round. The main results of the research show that the number of significant game-related variables between the teams that qualified for the round and the eliminated teams differed or decreased as they progressed from the round of the last 16 to the final. It was found that the variables that were effective for passing the round were eliminated in the semi-final and final stages.

When the game-related statistics of the teams that qualified and were eliminated in the last 16 round competitions are compared; the averages of goals scored, ball possession (%), duels won (%), passes, number of shots, number of shots on target, shot outside the penalty area, shot inside the penalty area, tackles were higher in favor of the teams that qualified. It was determined that the averages of goals conceded and red cards were higher for the eliminated teams (Table 2.). The parameters that are effective for qualifying the last 16 rounds are only found in the data of goals scored and conceded (Table 3). The high game-related variables of the teams that passed the round in the last 16 are like the data of previous studies examining the group stages. For example, Yi, Ruano, Liu and Sampaio (2019) examined the tactical data of the teams eliminated in the group stage and passed the round for 8 seasons in the Champions League, and reported that the variables of ball possession, passing success, number of shots, and number of shots on target were high in favor of the teams that passed the round. In addition, different researchers examining similar variables stated that shot accuracy and ball possession data are key variables for success in football (Castellano et al., 2012; Liu, Gomez, Lago-Peñas & Sampaio, 2015b). On the other hand, the results of different studies prove that successful teams show more active defensive strategies in data such as duels won and tackles (Ruiz-Ruiz, Fradua, Fernández-García & Zubillaga, 2013). The results of the research show that teams eliminated in the last 16 rounds have more red cards. Missing the number of players during a football match can also affect the results of the match. Vecer, Kopriva, and Ichiba (2009) stated that when one of the teams received a red card, the scoring intensity decreased to about 2/3 of its original intensity, while the intensity of the opposing team increased by about 5/4. The results of the current research show that as the Champions League knockout stages progress, there is a decrease and differentiation in the number of technical variables in favor of the team that passes the stage, except for the semi-final round. For example, except for the goals scored and conceded according to the last 16 round in the quarter-final round, there was only a difference in the shots on target between the teams that qualified and were eliminated. In parallel with this situation, Lago-Peñas et al., (2011) in their research in which they examined the performance indicators

between the winning and losing teams in the Champions League, stated that the winning teams made more accurate shots to the opponent's goal than the losing and drawing teams. In the findings of the current research regarding the semi-finals, it was found that there was a difference in favor of the team that passed the round in the variables of aerial won and duels won. Also, there is an inconsistency regarding the number of attacking sides. Liu, Gomez, Goncalves, and Sampaio (2016) also stated that teams that are successful in aerial won tend to win more football matches. This is because teams that tackle effectively in the air balls are more likely to dominate both the defensive and offensive phases of the game, which can eventually lead to winning the match. Similarly, this attitude displayed to win the match is also valid for the high rate of winning the duels. Looking at the percentages of attacking directions in the semi-final round, it is seen that the teams that passed the round made more attacks from the left side, while the teams that were eliminated from the right side. This inconsistency may be due to the characteristics of both offensive and defensive players playing in these positions. In addition, it should not be forgotten that wing forward (WF) players are in a game style that is closer to scoring than in previous years.

In our research, the decrease in the number of differentiating variables as the Champions League qualifying rounds progressed may be due to the pairing of tactically strong and equal teams as the qualifying rounds progressed. Hewitt, Greenham, and Norton (2016) stated that it is difficult to create imbalances in the opposing team's defense line by having the ball in the match of teams with balanced defense in the qualifying rounds. This situation can reduce the differences in offensive and defensive in-game variables between teams. The fact that the teams are at equal levels in the Champions League may also have affected the results obtained from the discriminant analysis of this research. In the research, it was found that only the goals scored and conceded in the last 16 and quarter-finals in the qualifying rounds had distinctive power, but no distinguishing variable was found in the semi-final and final stages. Contrary to these results, Castellano et al. (2012) analyzed 177 matches in 3 different World Cups and reported that the variables of total shot, shot on target, total shot received, and shot on target received had a distinctive power among the winning, losing, and drawing teams. However, the researchers also noted that there were differences in the discrimination power of these variables between the 3 different World Cups. However, unlike the World Cup, Champions League matches should not be considered intercontinental national matches that may create level differences between teams. Countries with a high level of football in the World Cup can face teams of countries with relatively lower levels. The Champions League, on the other hand, is only played between the teams of the European continent with a high level of football and equivalent leagues.

Conclusion

The results of this research show that the number of statistical data related to the game between the teams that passed the round and the eliminated teams differed or decreased as they progressed from the round of 16 to the final. (Last of 16: goals scored, ball possession (%), duels won (%), passes, shots, number of shots on target, shots outside the penalty area, shots inside the penalty area, tackle, and red cards; Quarter-final round: shots on target; Semi-finals: aerial won (%), duels won (%), attacking sides rates (%)). In the study, it was found that only the goals scored and conceded in the last 16 and quarter-finals in the knockout stages had distinctive power, but no distinguishing variable was found in the semi-final and final stages. Finally, in this study, the reclassification rate for the last 16, quarter-finals, semi-finals, and final matches was determined as 100%, 97.5%, 100%, and 100%, respectively. This result shows that a very high level of match results can be predicted when formulas obtained through the game-related variables evaluated for the UEFA Champions League are used. The Champions League is a tournament where the best teams of the European continent countries meet, and football is played at a high level. Therefore, it is one of the most followed organizations by football coaches and professionals. The tactical approaches of the teams that are successful in this tournament should be followed by football coaches at all levels and it is recommended to include variables that ensure success in training and matches.

Author Note

This research was produced under the supervision of Dr. Özkan IŞIK from Enescan KİLCİ's master's thesis.

Financial Support

No financial support was received from institutions and/or institutions during the preparation and writing of this study.

Conflict of Interest

There is no conflict of interest between the authors regarding the publication of this article

Authors Contributions

Research Idea: ÖI ve EK; Research Design: ÖI ve EK; Data Analysis: ÖI ve EK; Writing: ÖI ve EK; Critical Examination: ÖI

References

1. Acar, M. F., Yapıcıoğlu, B., Arıkan, N., Yalçın, S., Ateş, N., & Ergün, M. (2009). Analysis of goals scored in The 2006 World Cup. *Science and Football VI*. Chapter, 41, 35-242.
2. Almeida, C. H., Ferreira, A. P., & Volossovitch, A. (2014). Effects of match location, match status and quality of opposition on regaining possession in UEFA Champions League. *Journal of Human Kinetics*, 41(1), 203-214.
3. Castellano, J., Casamichana, D., & Lago, C. (2012). The use of match statistics that discriminate between successful and unsuccessful soccer teams. *Journal of Human Kinetics*, 31(2012), 137-147.
4. Doğan, İ., Işık, Ö., & Ersöz, Y. (2016). Examining the Turkish men's professional basketball team's success according to game-related statistics with discriminant analysis. *International Journal of Performance Analysis in Sport*, 16(3), 829-836.
5. García-Rubio, J., Gómez, M. Á., Lago-Peñas, C., & Ibáñez, J. S. (2015). Effect of match venue, scoring first and quality of opposition on match outcome in the UEFA Champions League. *International Journal of Performance Analysis in Sport*, 15(2), 527-539.
6. Gómez, M. A., Gómez-Lopez, M., Lago, C., & Sampaio, J. (2012). Effects of game location and final outcome on game-related statistics in each zone of the pitch in professional football. *European Journal of Sport Science*, 12(5), 393-398.
7. Hewitt, A., Greenham, G., & Norton, K. (2016). Game style in soccer: what is it and can we quantify it?. *International Journal of Performance Analysis in Sport*, 16(1), 355-372.
8. Kyle Bennett, J. M., Roel, V., & Job, F. (2019) Creating a framework for talent identification and development in emerging football nations, *Science and Medicine in Football*, 3(1), 36-42.
9. Lago, C. (2009). The influence of match location, quality of opposition, and match status on possession strategies in professional association football. *Journal of Sports Sciences*, 27(13), 1463-1469.
10. Lago-Peñas, C., Lago-Ballesteros, J., & Rey, E. (2011). Differences in performance indicators between winning and losing teams in the UEFA Champions League, *Journal of Human Kinetics*, 27, 137-148.
11. Lago, I., Lago-Peñas, C., & Lago-Peñas, S. (2019). Decentralization and football. *Social Science Quarterly*, 100(1), 163-175.
12. Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics* 33(1), 159-174. <https://doi.org/10.2307/2529310>.
13. Lepschy, H., Wäsche, H., & Woll, A. (2018). How to be successful in football: a systematic review. *The Open Sports Sciences Journal*, 11(1).
14. Liu, H., Yi, Q., Giménez, J. V., Gómez, M. A., & Lago-Peñas, C. (2015a). Performance profiles of football teams in the UEFA Champions League considering situational efficiency. *International Journal of Performance Analysis in Sport*, 15(1), 371-390.
15. Liu, H., Gomez, M.-Á., Lago-Peñas, C., & Sampaio, J. (2015b). Match statistics related to winning in the group stage of 2014 Brazil FIFA World Cup. *Journal of Sports Sciences*, 33(12), 1205-1213.
16. Liu, H., Gomez, M.-A., Goncalves, B., & Sampaio, J. (2016). Technical performance and match-to-match variation in elite football teams. *Journal of Sports Sciences*, 34(6), 509-518.
17. Modric, T., Versic, S., & Jelicic, M. (2022). Monitoring technical performance in the UEFA Champions League: differences between successful and unsuccessful teams. *Montenegrin Journal of Sports Science and Medicine*, 11(2), 3-11.
18. Özdamar, K. (2010). *Paket programlar ile istatistiksel veri analizi II (çok değişkenli analizler)*. Eskişehir: Kaan Kitabevi, 7. Baskı.
19. Rampinini, E., Impellizzeri, F. M., Castagna, C., Coutts, A. J., & Wisloff, U. (2009). Technical performance during soccer matches of the Italian Serie A league: Effect of fatigue and competitive level. *Journal of Science and Medicine in Sport*, 12(1), 227-233.
20. Ruiz-Ruiz, C., Fradua, L., Fernández-García, Á., & Zubillaga, A. (2013). Analysis of entries into the penalty area as a performance indicator in soccer. *Eur J Sport Sci*, 13(3), 241-248

21. **Sampaio, J., Lago, C., Casais, L., & Leite, N.** (2010). Effects of starting score-line, game location, and quality of opposition in basketball quarter score. *European Journal of Sport Science*, 10(6), 391-396.
22. **Tabachnick, B. G., & Fidell, L. S.** (2007). *Using multivariate statistics*. 5th ed Boston: Allyn and Bacon.
23. **Vecer, J., Kopriva, F., & Ichiba, T.** (2009). Estimating the effect of the red card in soccer: when to commit an offense in exchange for preventing a goal opportunity. *Journal of Quantitative Analysis in Sports*, 5(1).
24. **Yi, Q., Jia, H., Liu, H., & Gomez, M. A.** (2018). Technical demands of different playing positions in the UEFA Champions League. *International Journal of Performance Analysis in Sport*, 18(6), 926-937.
25. **Yi, Q., Ruano, M. Á. G., Liu, H., & Sampaio, J.** (2019). Variation of match statistics and football teams' match performance in the group stage of the UEFA Champions league from 2010 to 2017. *Kinesiology*, 51(2), 170-181.
26. **Yi, Q., Gómez-Ruano, M. Á., Liu, H., Zhang, S., Gao, B., Wunderlich, F., & Memmert, D.** (2020). Evaluation of the technical performance of football players in the UEFA Champions League. *International Journal of Environmental Research And Public Health*, 17(2), 604.
27. **Zambom-Ferraresi, F., García-Cebrián, L. I., Lera-López, F., & Iráizoz, B.** (2017). Performance evaluation in the UEFA Champions League. *Journal of Sports Economics*, 18(5), 448-470.