

## Analysis of Match Performance Indicators of Women Soccer Players in World Cups

### Kadın Futbolcuların Dünya Kupalarındaki Maç Performans Göstergelerinin Analizi

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**Abstract:** Abstract: The aim of this study is to compare the technical analysis of the successful and unsuccessful countries in the FIFA Women's World Cup held in France in 2019. The study group of the research consisted of the countries that finished their groups in the first 2 places and the countries that finished their groups in the last 2 places in the FIFA World Cup held in France in 2019. As match technical analysis criteria, Instat Index, Goal, Position, Successful Goal Position, Goal from Penalty, Counterattack, Corner, Shot, Accurate Shot, Pass, Accurate Key pass and midfield were considered. SPSS v25 package program was used to analyse the data obtained from the research. Normal distribution test was applied to determine the hypothesis test type (parametric / non - parametric) to be applied in data analysis. Skewness, Kurtosis, Shapiro Wilk, Kolmogorov - Smirnov and Q - Q plots values were examined whether the data were normally distributed or not, and a decision was made. Since the obtained data showed normal distribution, independent sample t-test, one of the parametric tests, was applied. It was determined that there was a statistically significant difference between successful and unsuccessful countries in all technical parameters in favor of successful countries. As a result, it highlighted the team performance variables that differentiated successful and unsuccessful countries during the 2019 FIFA Women's World Cup. The findings showed that winning countries had more possession and made more total passes, accurate passes, shots and shots on target, successful aerial challenges, ball recoveries and corner kicks compared to losing countries.

**Keywords:** Match Analysis, world Cup, women Soccer

**Özet:** Bu çalışmanın amacı, 2019 yılında Fransa'da düzenlenen FIFA Bayanlar Dünya Kupasında başarılı ve başarısız olan ülkelerin teknik analizlerinin karşılaştırılmasını yapmaktır. Araştırmanın çalışma grubunu 2019 yılında Fransa'da düzenlenen FIFA Dünya Kupasında gruplarını ilk 2 sırada bitiren ve gruplarını son 2 sırada bitiren ülkeler oluşturmuştur. Maç teknik analiz kriterleri olarak, Instat Index, Gol, Pozisyon, Başarılı Gol Pozisyonu, Penaltıdan gol, Kontra atak, Korner, Şut, İsabetli Şut, Pas, İsabetli Kilit pas ve orta olarak ele alındı. Araştırmadan elde edilen verilerin analizinde SPSS v25 paket programı kullanılmıştır. Veri analizinde uygulanacak olan hipotez test türünün (parametrik / non - parametrik) tespit edilmesi için normal dağılım testi uygulanmıştır. Verilerin normal dağılıp dağılmadığına Skewness, Kurtosis, Shapiro Wilk, Kolmogorov - Smirnov ve Q - Q plots değerleri incelenerek karar verilmiştir. Elde edilen veriler normal dağılım gösterdiği için parametrik testlerden bağımsız örneklem t - testi uygulanmıştır. Başarılı ve başarısız ülkeler arasındaki bütün teknik parametrelerde başarılı ülkeler lehine istatistiksel olarak anlamlı bir fark olduğu tespit edildi. Sonuç olarak, 2019 FIFA Kadınlar Dünya Kupası sırasında başarılı ve başarısız ülkeleri farklılaştıran takım performansı değişkenlerini vurgulamıştır. Bulgular, kazanan ülkelerin kaybeden ülkelere kıyasla daha fazla topa sahip olduğunu ve daha fazla toplam pas, isabetli pas, şut ve isabetli şut, başarılı hava mücadelesi, top kurtarma ve köşe vuruşu yaptığını göstermiştir.

**Anahtar Kelimeler:** Maç analizi, dünya kupası, bayan futbol

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## INTRODUCTION

The FIFA World Cup is the most prestigious tournament in international football and is held every four years. The World Cup is a month-long tournament in which national football teams from different countries around the world participate. This tournament is a platform where the best teams of world football come together to compete fiercely and represent the pinnacle of football. (Furley & Schweizer, 2019).

Football is a popular sport in which team performance is affected by the interaction of technical, tactical, physical and mental factors (Chatzopoulos, 2006). Due to these factors, only watching the match live does not provide the coach with accurate information, does not allow him/her to make analyses and does not contribute enough to the coaches to achieve field results (Ekman, 1992).

Good performance in team sports depends on the unity and competition between players, and both team performance and individual performance are needed for high performance (Shariff & Tracy). The complexity of this relationship between players is analysed using new research methods such as dynamic systems (Güldenpenning et al., 2017 ; Kunde et al., 2011).

In a football competition, there are many factors that affect the result of the field. The most important of these factors are technical factors such as goal, shot, centre, pass, etc. Teams that perform these factors correctly at the highest level leave the field with a victory. Therefore, the coaches should plan

the analysis of these parameters correctly and provide the team with accurate information (Furley & Schweizer, 2016).

Match analysis is an important tool for understanding the strategic and technical aspects of football, evaluating player performance and developing strategies for future matches. This analysis contributes to a deeper understanding of football for both teams and fans (Vast et al., 2010 ; Moll et al., 2010).

Women's football is becoming a very popular branch compared to the past (Schüler et al., 2023). Studies on defensive and offensive success and failure in women's football in terms of technical-tactical criteria have been carried out in recent years (Allen & Coggan, 2006 ; Jeffries et al., 2021). In addition to these studies, the most important criterion affecting the field result in women's football has been the first goal (Mengütay, 1997 ; Balyi et al., 2013). In studies examining match results, it was observed that the team that scored the first goal won 68% of the time (Wasserman et al., 2011).

When Kubayi and Larkin analysed the matches in the 2019 FIFA Women's World Cup in France, they stated that the winning teams had more possession of the ball, more shots and more passes (Hill & Poole, 2002 ; Gordon et al., 1998). In addition to this study, Scanlan et al. In the same championship, it was determined that technical parameters such as offensive possession time, number of passes, set-

pieces (corners and free kicks) were the technical parameters affecting the match result (Rusdiana,2020).

When the match results of women's football were analysed in terms of match results, it was found that playing offensive game positively affected the match result. In addition to this, it was determined that counterattack, accurate shot, accurate key pass and high number of midfield passes were also important technical parameters affecting the field result in women's football (De Bosscher,2006).

The aim of this study is to make a technical analysis of women's football, which has become a popular branch in recent years, in the match. Therefore, the technical analysis of the successful and unsuccessful teams in the World Cup held in France in 2019 was carried out.

## METHODS

**Participants and Design:** The study group of the research consisted of the countries that finished in the first 2 places and the countries that finished in the last 2 places of their groups in the FIFA World Cup held in France in 2019.

In this study, the technical analysis parameters of all matches from the group matches to the final match were examined. All technical performance data of the study were obtained through the InStat Kinematic system (Instat. Moscow, Russia). This system, which monitors the performance indicators of footballers during the match, is used by many football clubs because it provides information to coaches in a fast and reliable way. In general terms, this system, which analyses the contribution of footballers to the success of the team, their effective movements during the match and the general situation of the team by using an automatic algorithm, has been accepted by football clubs around the world.

The criterion defined for successful countries is to go to the next round when the group matches are over, and the criterion defined for unsuccessful countries is to be eliminated when the group matches are over.

**Match Technical Analysis Criteria:** According to the group rankings in the tournament, 6 different performance indicators of the successful and unsuccessful countries in the match were analysed. These are;

**Instat Index:** An objective indicator based on numerical data of the performance of the players in the match,

**Goals:** The total number of goals scored by the countries during the tournament,

**Position:** The offensive position of the countries during the tournament,

**Successful Goal Position:** The number of successful offensive goals scored by the countries during the tournament,

**Goals from Penalties:** The number of goals scored by the countries from penalties during the tournament,

**Counter Attack:** Countries winning the ball from the opponent in their own half and passing the ball quickly into the opponent's half during the tournament,

**Corners:** The corner kick used by countries throughout the tournament,

**Shots:** The shots taken by the countries to the opponent's goal during the tournament, both close and from distance,

**Shots on target:** The number of shots that countries have taken at the opponent's goal during the tournament, both from close range and from distance,

**Pass:** The passing of the ball between the teams during the match between the countries during the tournament,

**Accurate Key Pass:** The offensive passing of the ball between the teams during the match during the tournament

**Crosses:** Countries' edge crosses during the tournament

**Analysis of Data:** SPSS v25 package programme was used to analyse the data obtained from the research. Normal distribution test was applied to determine the hypothesis test type (parametric / non - parametric) to be applied in data analysis. Skewness, Kurtosis, Shapiro Wilk, Kolmogorov - Smirnov and Q - Q plots values were analysed to determine whether the data were normally distributed. Since the obtained data showed normal distribution, independent sample t-test, one of the parametric tests, was applied.

**Table 1.** Countries finishing in the top 2 places in their groups

Group	Group ranking	Country
A	1	France
A	2	Norway
B	1	Germany
B	2	Spain
C	1	Italy
C	2	Australia
D	1	United Kingdom
D	2	Japan
E	1	Netherlands
E	2	Canada
F	1	America
F	2	Sweden

**Table 2.** Countries finishing in the last 2 places in their group

Group	Group ranking	Country
A	3	Nigeria
A	4	South Korea
B	3	China
B	4	South Africa
C	3	Brazil
C	4	Jamaica
D	3	Argentina
D	4	Scotland
E	3	Cameroon
E	4	New Zealand
F	3	Chile
F	4	Thailand

## RESULTS

**Table 3.** Independent sample T-test comparison of match technical analysis values of the countries

Variable	Country	n	X	SS	t	p
Instat Index	Successful	12	166,25	6,27	7,424	<b>0,001*</b>
	Unsuccessful	12	146,17	6,97		
Goal	Successful	12	9,83	6,04	4,097	<b>0,001*</b>
	Unsuccessful	12	2,33	1,92		
Position	Successful	12	32,92	13,06	5,476	<b>0,001*</b>
	Unsuccessful	12	10,17	6,04		
Successful Goal Position	Successful	12	10,17	6,07	4,260	<b>0,001*</b>
	Unsuccessful	12	2,33	1,92		
Goal from Penalty	Successful	12	1,67	1,56	2,927	<b>0,008*</b>
	Unsuccessful	12	0,25	0,62		
Counter Attack	Successful	12	73,08	27,38	2,508	<b>0,020*</b>
	Unsuccessful	12	49,67	17,21		
Corners	Successful	12	29,42	10,90	5,171	<b>0,001*</b>
	Unsuccessful	12	10,25	6,78		
Shot	Successful	12	74,75	25,04	5,800	<b>0,001*</b>
	Unsuccessful	12	28,33	11,88		
Accurate Shot	Successful	12	30,25	14,32	4,842	<b>0,001*</b>
	Unsuccessful	12	9,42	4,12		
Pas	Successful	12	2753,58	754,93	6,415	<b>0,001*</b>
	Unsuccessful	12	1239,33	314,06		
Accurate Lock Pass	Successful	12	40,67	14,24	5,313	<b>0,001*</b>
	Unsuccessful	12	14,83	8,99		
Centre	Successful	12	71,50	25,42	4,905	<b>0,001*</b>
	Unsuccessful	12	30,08	14,45		

\* $p < 0,005$ 

When the above table is examined, it is seen that there is a statistically significant difference between successful and unsuccessful countries in favour of successful countries in all technical parameters. It is seen that there is a significant difference especially in goal, positioning, successful goal position and passing, and this difference has a significant effect on the field results. It is seen that the countries that have the ball and the countries with a high rate of set-piece utilisation affect the field results more in women's football than in men's football. ( $p < 0,05$ )

## DISCUSSION

The main purpose of this study is to make a technical analysis of the matches played during the tournament by the countries that finished in the first 2 places in their groups in the 2019 FIFA Women's World Cup and the teams that finished in the last 2 places in their groups. The results show that there is a significant statistical difference in technical performance between successful and unsuccessful teams.

In fact, it would not be a very correct approach to compare the success and failure of the teams only with match performance indicators. Because, instant performances, which are one of the most important features of tournament matches, affect the field results very much. We have come across this feature especially in the men's World Cup. Therefore, I believe that it would be more accurate to evaluate the performance indicators of the teams in the medium term rather than in the short term according to the tournament results.

When the literature was examined, it was found that many parameters such as physical parameters, match internal load, external load, ranking of the opponent, home and away factors, and type of the tournament affected the match results in studies supporting both our study and the studies in the literature (Augusto et al., 2021 ; Lago et al., 2010 ; Barrera et al., 2021).

In the study which analysed the match load and fitness levels of world cup and friendship matches of elite female football players, it was found that there was a statistically low relationship between world cup matches and friendship matches in the parameter of total running distance, the internal load and external load of the matches in the world cup were higher than the friendship matches, but the result of the match was higher in the friendship match. The reason for the high internal load and external load is that the physical demands of a very important tournament such as the World Cup are very high even compared to normal league competitions (McLean et al., 2010 ; Malone et al., 2015), and the reason for the low score may be thought to be due to the fact that the motivation level is very high compared to normal league competitions and it is very difficult to compensate for the mistake (Menting et al., 2022 ; Malone et al., 2015 ; Thorpe et al., 2016).

Manning et al. reported that there was no statistical difference between the height (<1.65 cm) of the football players (<1.65 cm), the duration of the match they played and the performance indicators in the study in which the relationship between the match playing time, performance indicators and the height of the football players was examined in the World Cup held in 2019 by elite level female football players in 2023 (Manning, 2022).

In Kubayi and Larkin's study comparing the physical data and technical analyses of 48 competitions of elite level female football players in the World Cup held in 2019 in 2020, it was reported that the teams that won the match had more running distance than the losing teams and the numerical data were higher in the technical parameter. These results seem to support the results of our study. According to the data obtained from the results of both studies, it is seen that there is a difference between successful and unsuccessful teams in both physical and technical terms (Kubayi & Larkin, 2020).

In a study conducted by Goncalves et al. on elite level footballers, it was reported that there was a significant

positive correlation between the fitness level of elite level footballers and match running parameters (Gonçalves et al,2021). In addition to this study, it was also reported that the teams that had superiority over their opponents in terms of field results used more corner kicks and free kicks (Liu et al,2016).

It was reported that the total running distance of English Premier League players during the competition was below the average, but high speed running distance and technical components (forward accurate pass, ball possession and total number of passes) were well above the average. In a study examining the technical performance of match venue (home and away), opponent quality and match results on English domestic teams, it was reported that time on the ball had no effect on match results, but set-pieces (corner, free-kick, free-kick, free-kick) had an effect on match results (Modric et al,2021).

As a result, it highlighted the team performance variables that differentiated successful and unsuccessful countries during the 2019 FIFA Women's World Cup. The findings showed that winning countries had more possession and made more total passes, accurate passes, shots and shots on target, successful aerial challenges, ball recoveries, and corner kicks compared to losing countries. In addition, the losing teams committed more turnovers, lost more duels and received more yellow cards than the winning teams. With these results, it is suggested that the coaches of female football players should work on technical parameters that will increase their winning rate.

**Ethics Text:** In this article, journal writing rules, publication principles, research and publication ethics rules, and journal ethics rules were followed during the research process. Responsibility for any violations regarding the article belongs to the author. Ataturk University Sport Science Faculty ethics committee Number: 2300160191, Date: 23.05.2023.

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**Author Contribution Rate:** In this study, the contribution rate of the first author is 50%, the contribution rate of the second author is 50%.

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## GENİŞLETİLMİŞ ÖZET

**Çalışmanın Amacı:** Bu çalışmanın amacı, son yıllarda popüler branş haline gelen kadın futbolunun maç içindeki teknik analizini yapmaktır. Bundan dolayı, Fransa da 2019 yılında gerçekleştirilen Dünya kupasındaki başarılı ve başarısız takımların maç içindeki teknik analizi yapılmıştır.

**Araştırma Problemleri:** Teknik parametreler müsabaka sonucuna etki ediyor mu?

**Literatür Araştırması:** FIFA Dünya Kupası, uluslararası futbolun en prestijli turnuvasıdır ve dört yılda bir düzenlenir. Dünya Kupası, dünya genelindeki farklı ülkelerin milli futbol takımlarının katıldığı, yaklaşık 1 ay süren bir turnuvadır. Bu turnuva, dünya futbolunun en iyi takımlarının bir araya gelerek kıyasıya rekabet ettiği ve futbolun zirvesini temsil ettiği bir platformdur.

Futbol müsabakasında, saha sonucunu etkileyen birçok faktör bulunmaktadır. Bu faktörlerin başında gol, şut, orta, pas gibi teknik faktörler gelmektedir. Bu faktörleri en üst düzeyde doğru yapan takımlar sahadan galibiyet ile ayrılmaktadır. Bundan dolayı analiz antrenörlerin bu parametrelerin analizini doğru planlayıp, takıma doğru bilgi vermesi gerekmektedir .

Maç analizi, futbolun stratejik ve teknik yönlerini anlamak, oyuncu performansını değerlendirmek ve gelecek maçlar için

stratejiler geliştirmek için önemli bir araçtır. Bu analiz hem takımların hem de taraftarların futbolun daha derinlemesine anlaşılmasına katkı sağlamaktadır.

Kadın futbolu eskiye göre çok popüler bir branş olma yolunda ilerlemektedir (10). Kadın futbolu ile ilgili savunma ile hücum başarısını ve başarısızlığını teknik-taktik kriterler açısından belirleyen çalışmalar son yıllarda gerçekleştirilmiştir. Bu araştırmalara ek olarak, kadın futbol özelinde saha sonucunu etkileyen en önemli kriter ilk gol olmuştur. Maç sonuçlarını inceleyen çalışmalarda, ilk golü atan takımın %68 oranında galip geldiği görülmüştür.

Kubayi ve Larkin,2019 Fransa FIFA Kadınlar Dünya Kupasındaki maçların analizini yaptığında, galip gelen takımların topa çok fazla sahip oldukları, daha fazla şut attıkları ve daha fazla pas yaptıklarını belirtmişlerdir. Bu çalışmaya ek olarak Scanlan ve arkadaşları,2015 yılındaki Kanada FIFA Kadınlar Dünya Kupasındaki teknik analizini yaptığında, orta saha olarak adlandırılan 2.bölgede daha fazla pas yapan takımların galip gelme olasılığının daha yüksek olduğunu tespit etmişlerdir. Aynı şampiyonada, ofansif olarak topa sahip olma süresi, pas sayısı, duran toplar (korner ve serbest vuruş) gibi teknik parametrelerin de maç sonucunu etkileyen teknik parametreler olduğunu tespit etmişlerdir.

**Yöntem:** Araştırmanın çalışma grubunu 2019 yılında Fransa da düzenlenen FIFA Dünya Kupasında gruplarını ilk 2 sırada bitiren ve gruplarını son 2 sırada bitiren ülkeler oluşturmuştur. Bu çalışmada, grup maçlarından final maçına kadar olan bütün maçların teknik analiz parametreleri incelenmiştir. Çalışmanın bütün teknik performans verileri InStat Kinematik sistem (Instat. Moscow, Russia) aracılığıyla alınmıştır. Futbolcuların maç içerisindeki performans göstergelerini takip eden bu sistem hızlı ve güvenilir bir şekilde antrenörlere bilgi verdiği için birçok futbol kulübü tarafından kullanılmaktadır. Genel bir ifade ile otomatik bir algoritma kullanılarak futbolcuların takımın başarısına katkısını, maç içerisindeki etkili hareketlerini ve takımın genel durumunu inceleyen bu sistem dünyadaki futbol kulüpleri tarafından kabul edilmiştir. Başarılı ülkeler için tanımlanan kriter grup maçları bittiğinde üst tura çıkmak, başarısız ülkeler için ise tanımlanan kriter grup maçları bittiğinde elenmek olarak belirlenmiştir.

**Sonuç ve Değerlendirme:** Sonuç olarak, 2019 FIFA Kadınlar Dünya Kupası sırasında başarılı ve başarısız ülkeleri farklılaştıran takım performansı değişkenlerini vurgulamıştır. Bulgular, kazanan ülkelerin kaybeden ülkelere kıyasla daha fazla topa sahip olduğunu ve daha fazla toplam pas, isabetli pas, şut ve isabetli şut, başarılı hava mücadelesi, top kurtarma ve köşe vuruşu yaptığını göstermiştir. Ayrıca, kaybeden takımlar kazanan takımlara kıyasla daha fazla top kaybı yapmış, daha fazla ikili mücadeleyi kaybetmiş ve daha fazla sarı kart görmüştür. Bu sonuçlar ile, bayan futbolcuların antrenörlerine, kazanma oranlarını artıracak teknik parametreler üzerinde çalışması önerilmektedir.