

## **THE EFFECT OF UNCONTROLLED DATAS AND TECHNICAL VARIABLES IN THE LEAGUE MATCHES TO SUCCESS IN ELIT VOLLEYBALL PLAYERS**

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(Original scientific paper)

**Burak Emre Dirier<sup>1</sup> Serdar Uslu<sup>2</sup> Andrijana Misovski<sup>3</sup> Josko Milenkoski<sup>4</sup> Mehmet Görkem İşgüzar<sup>5</sup> Rıza Barak<sup>6</sup> İlayda Barak<sup>7</sup>**

### **Abstract**

*The main purpose of the study was the analysis of the effectiveness of the winning and losing in Efeler League, 2018-2019, of the Turkey Volleyball Federation and the impact on unsupervised data. Statistical analysis of the 132 matches played in competitions such as Efeler in the 2018-2019 season was performed by using the Volley Professional 4.0 statistics program. Age of the team, height, body weight, and block height values of the Turkey Volleyball Federation (TVF) was obtained from the official website. The values of age, height, body weight, attack and block height have been averaged in "Microsoft Excel" program and graphed. "In Vol Data Volley Professional 4.0", averages of the teams for each variable were found by using the data in the competition analysis reports generated with the values obtained at the time of the competition. Ear Spearman's rho 'test was used in SS' SPSS 22 'program to find out the success and their relationship with each other. The margin of error was accepted as  $p < 0.05$  and  $p < 0.01$ . As a result of the research, a high level ( $r = .836^{**}$ ) significant correlation was found between success and excellent heading percentage ( $r = .891^{**}$ ) and average of headline error per match. In addition, a high level ( $r = 819^{**}$ ) significant relationship was found between success and the average number of blocks per game.*

**Keywords:** Volleyball, Competition Analysis

### **Introduction**

Volleyball, which has a history of a 100 years, is a team game that incorporates various sportive skills and that is advanced in terms of sportive games. Volleyball helps individuals improve themselves physically, emotionally, mentally and socially (Bayraktar ve Sunay, 2007).

The purpose of the volleyball branch is to displace the opposing team on the other side of the game field by sending the ball over the net and to prevent the opposing team from doing the same. The teams can hit the ball three times when sending it to the opponent's side. The ball is brought into the game with a serve and the serving player sends the ball to the opponent's side over the net. A rally continues until the ball touches the game field, or the ball exits the field, or one of the teams make a mistake and lose the point (Rally Point System). When the team that receives the serve wins a rally, that team gains a point and a serve, and the players rotate clockwise once (Federation International Volleyball [FIVB], 2017b).

Volleyball is not only a sportive branch that individual skills and technical features are enough, but it is also a sport that requires athletes to have a certain level of physical and physiological features in order to reach an elite performance (İpek & Ziyagil, 2002).

The general purpose in all sports is to improve the performance of the athletes by adapting them to the required physical features, psychological factors and motor coherence, and to achieve the desired success. Today, scientists, trainers and athletes make great efforts to bring the performance of the athletes and teams to the highest level. While the performance of the athlete is increased through appropriate trainings in terms of techniques, tactics and strength; the question of whether the physical, physiological and psychological adaptation is attained through trainings are at the desired level or not is generally asked by the team managers, athletes and trainers. Therefore, various observation, measurement and evaluation methods are utilized to identify the variables that affect the performance and such variables' scales (Koçak, 2012).

In team sports, the main purpose of the findings which are attained by statistical analyses conducted after the competitions is to inform the teams about the competitions they have completed. Furthermore, these analyses are also impactful in putting forth the reasons that impacted the win or loss and studying

those reasons, putting forth the overall performance of the team and the performances of the individuals, and putting forth the reasons that affect the performances. Since competition analysis can reach an objective result, it is an important factor that keeping such separate from the general errors (Korkmaz ve Gültekin , 2000).

Considering all such issues, this research aims to detect the correlation between some technical and physical variables of the teams that have participated in the league matches of the Turkish Efeler Men's Volleyball League (Türkiye Erkekler Voleybol Efeler Ligi) Season 2018-2019.

## **Methodology**

### *Research Model*

General survey model was used in this research. In a population that is comprised of many components, the general survey model is a model that is used for the purpose of reaching a general understanding about the population by using either the entire population or a group, example or sample from the population. In this kind of approach, the relevant event, matter, individual, group, subject, etc. units and the variables of the situation are tried to be described separately (Karasar, 2007).

### *Population-Sample*

The population of this study is comprised of Halk Bank, Arkas Spor, Galatasaray, Maliye Piyango, Fenerbahçe, Istanbul BBSK, Tokat Belediye Plevne, Ziraat Bankası, Inegöl Belediye, Afyon Belediye Yüntaş, Arhavi Bld, Jeopark Kula Bld. clubs that competed in the 2018-2019 Turkish Efeler Men's Volleyball League. The sample of the study is comprised of the analysis of the 132 games played by the teams during the first and second half of the 2018-2019 Turkish Efeler Men's Volleyball League. The study is limited to 12 teams and 132 games.

### *Collection of the Data*

General information about the teams have been collected from the official web page of the TVF (Turkish Volleyball Federation). This information was accepted as correct since they were reported to the TVF by the team leaders. The statistical competition analysis of the 132 games played in 2018-2019 Turkish Efeler Men's Volleyball League were collected by the teams during the games by using the volleyball statistics software Data Volley Professional 4.0.

### *Analysis of the Data*

**Averages** of the physical values for the athletes were calculated with a Microsoft Office package software, Excel, and the calculated averages were placed in a graph. The data were collected from the analysis in the Data Volley Professional 4.0 software, and averages of each team were calculated for every variable. The correlations of these averages were calculated in SPSS 22 software by applying the Spearman's rho test.  $P < 0.05$  and  $p < 0.01$  significance levels were used when applying the test. When the significance between the variables and success was being tested the value 1 was assigned to top team and the bottom team was assigned the value, and their correlations were calculated.

## **Findings**

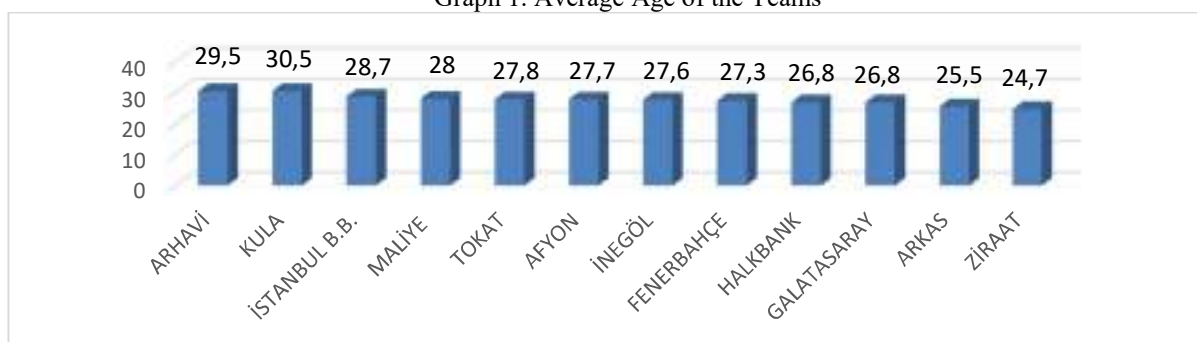
According to Table 1, 12 teams have participated in the 2018-2019 Efeler League games. A total of 132 games were played throughout the season. Each team played 22 matches throughout the season. "Halkbank Spor Kulübü" achieved the top spot at the end of the season with its 19 wins, 3 losses and 56,460 points. "Arkas Spor Kulübü" finished the season in the second spot with its 15 wins, 7 losses and 48,440 points. "Galatasaray Spor Kulübü" finished the season in the third spot with 16 wins, 6 losses and 45,140 points. "Maliye Milli Piyango Spor Kulübü" finished the season in the fourth spot with 14 wins, 8 losses and 42,260 points. "Fenerbahçe Spor Kulübü" finished the season in the fifth spot with 12 wins, 10 losses and 40,080 points. "İSTANBUL BBSK" finished the season in the sixth spot with 12 wins, 10 losses and 39,080 points. "Tokat Bld. Plevne Spor Kulübü" finished the season in the seventh spot with 10 wins, 12 losses and 36,020 points. "Ziraat Bankası Spor Kulübü" finished the season in the eighth spot with 11 wins, 11 losses and 34,360 points. "İnegöl Belediye Spor Kulübü" finished the season in the ninth spot with 8 wins, 14 losses and 24,320 points. "Afyon Bld. Yüntaş Spor Kulübü" finished the season in the tenth spot with 8 wins, 14 losses and 23,200 points. "Arhavi Bld. Spor Kulübü" finished the season in the eleventh spot with

7 wins, 15 losses and 20,700 points. “Jeopark Kula Bld. Spor Kulübü” finished the season in the last spot with 0 wins, 22 losses and 5,300 points

Table 1. Ranking of the 2018-2019 Efeler League Teams

Takım	Oynadığı Maç Sayısı	Galibiyet	Mağlubiyet	A	V	P
<b>HALKBANK</b>	22	19	3	61	23	56.460
<b>ARKAS SPOR</b>	22	15	7	55	31	48.440
<b>GALATASARAY</b>	22	16	6	54	36	45.140
<b>MALİYE PİYANGO</b>	22	14	8	49	37	42.260
<b>FENERBAHÇE</b>	22	12	10	48	42	40.080
<b>İSTANBUL BBSK</b>	22	12	10	49	42	39.080
<b>TOKAT BLD. PLEVNE</b>	22	10	12	47	44	36.020
<b>ZİRAAT BANKASI</b>	22	11	11	47	47	34.360
<b>İNEGÖLBDL.</b>	22	8	14	32	51	24.320
<b>AFYON BLD. YÜNTAŞ</b>	22	8	14	34	49	23.200
<b>ARHAVİ BLD.</b>	22	7	15	31	52	20.700
<b>KULA BLD.</b>	22	0	22	13	66	5.300

Graph 1. Average Age of the Teams



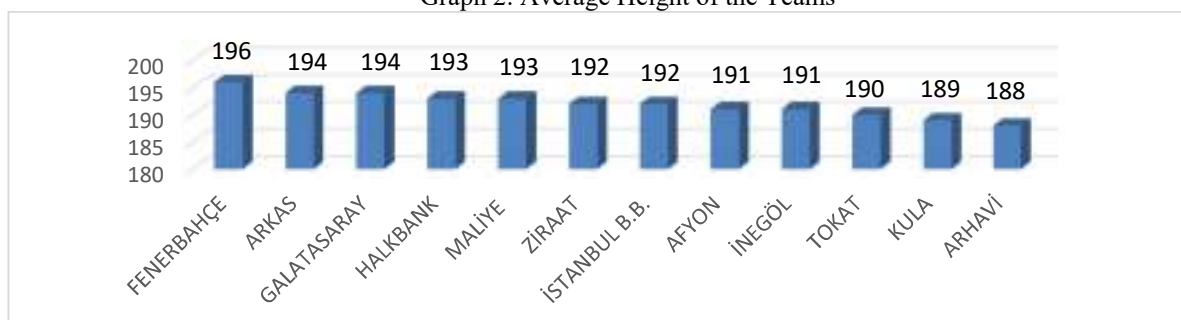
The average ages of the teams are shown in Graph 1. According to Graph 1, the oldest team is Jeopark Kula Bld. with its average age of 30.58, and the youngest team is Ziraat Bankası with average age of 24.7.

Table 2. Correlation between Age and Success

Success	Success		The average age
	Correlation Coefficient	1,000	,452
Sig. (2-tailed)	,	,431	
N	12	12	

Correlation between the age and success is provided in Table 2 ( $r = .452$ ). According to Table 2, no statistical correlation was found between the age and success.

Graph 2. Average Height of the Teams



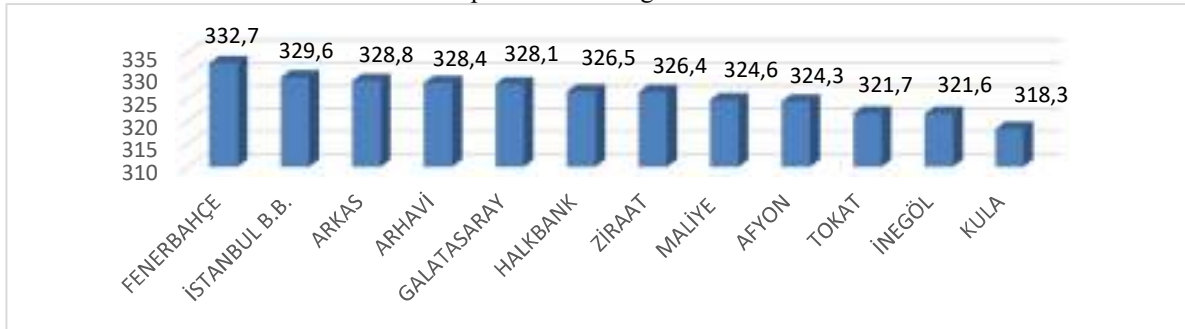
The average heights of the teams are shown in Graph 2. Fenerbahçe was the longest team with its 196 cm average height, and the Arhavi Belediyesi Spor Kulübü had the lowest average height with 188 cm.

Table3. Correlation between Height and Success

	Success		Boy Ortalaması
Success	Correlation Coefficient	1,000	,397
	Sig. (2-tailed)	,	,238
	N	12	12

Correlation between the height and success is provided in Table 3( $r = .397$ ). According to Table 3, no significant correlation was found between the height and success.

Graph3. Attack Height of the Teams



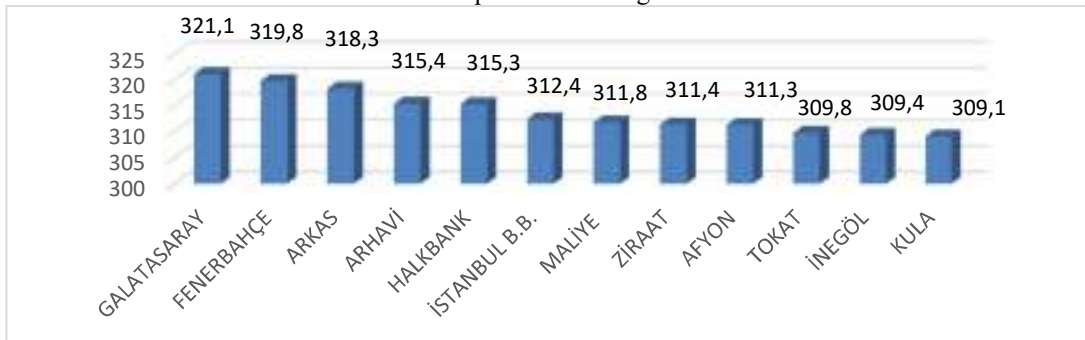
The average attack heights of the teams are presented in Graph 3. Fenerbahçe has the highest attack height average with 332.7 cm. Jeopark Kula Bldhas the lowest attack height average with 318.3 cm. Halkbankası, team finished in the top spot in 2018-2019 season, has an average attack height of 326.5 cm and is placed the fifth among all other teams.

Table4. Correlation between the Attack Height and Success

	Success		Attack Height
Success	Correlation Coefficient	1,000	,361
	Sig. (2-tailed)	,	,143
	N	12	12

Correlation between the attack height and success is provided in Table 4( $r = .361$ ). According to Table 4, no significant correlation was found between the attack height and success.

Graph4. Block Height of the Teams



The average block heights of the teams are presented in Graph 4. Galatasaray has the highest average block height with 321.1. Jeopark Kula Bldhas the lowest block height average with 309.1 cm. Although

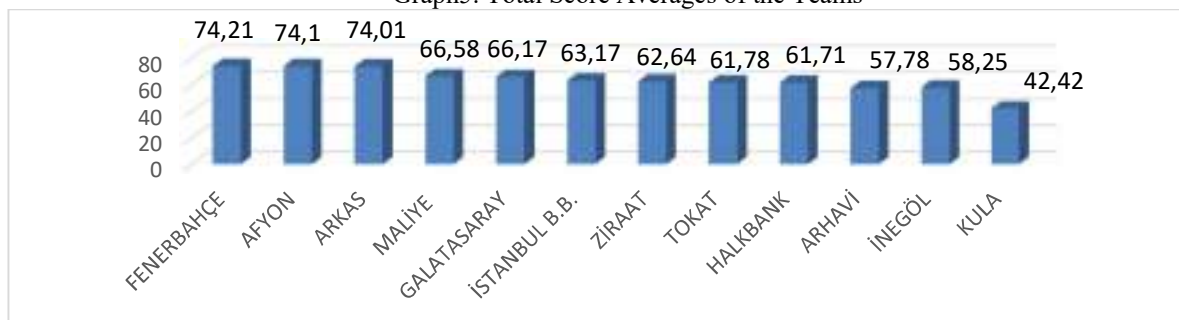
Fenerbahçe has the highest attack height average, their block height is the second highest. Halkbankası, the team finished in the top spot in 2018-2019 season, has an average block height of 315.3 cm and is placed the fifth among all other teams.

Table5. Correlation between the Block Height and Success

		Success	Blok Height
Success	Correlation Coefficient	1,000	,518
	Sig. (2-tailed)	,	,126
	N	12	12

Correlation between the block height and success is provided in Table 5 ( $r=.518$ ). According to Table 4, no statistical correlation was found between the block height and success.

Graph5. Total Score Averages of the Teams



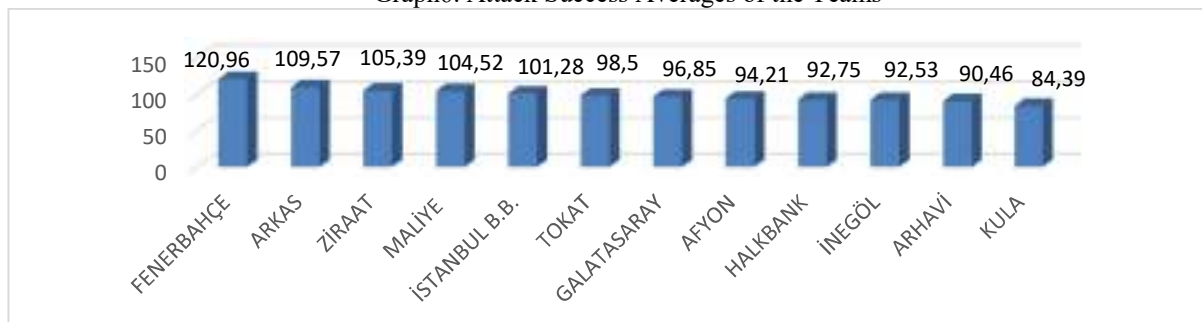
The averages of the teams' total scores in all games are presented in Graph 5. According to this, the team that has the highest average score, 74.21, is Fenerbahçe which finished the tournament in the fifth place. Jeopark Kula Bld. has the lowest average score of 42.42. The top finisher of the season, Halkbankası is in the ninth place with its 61.71 score average.

Table 6. Correlation between the Total Score and Success

		Success	Total Score
Success	Correlation Coefficient	1,000	,-172
	Sig. (2-tailed)	,	,281
	N	12	12

Correlation between the average scores and success rating can be seen in Table 6 ( $r=-.172$ ). According to Table 6, there is a negative but not significant correlation between the total score and success. This negative correlation was caused due to the season's top finisher Halk Bank being in the ninth place and İkbal Afyon Bld., which finished the season in the tenth place, being in the second place.

Graph6. Attack Success Averages of the Teams



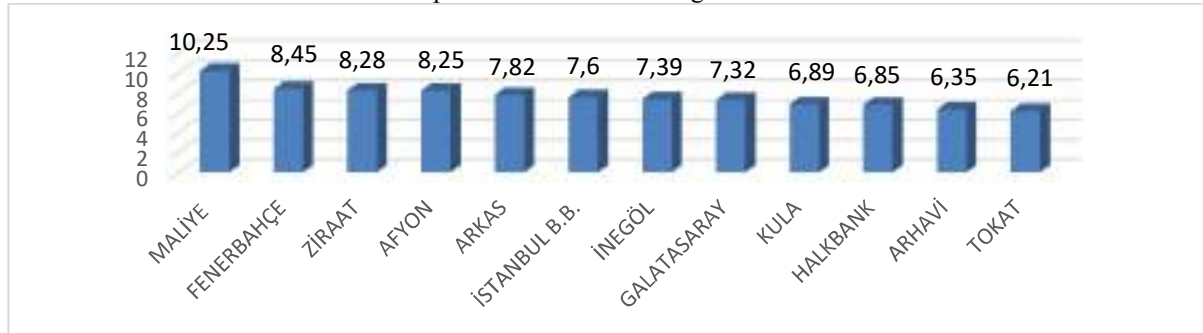
Averages of the total attacks per game for each team are provided in Graph 6. According to this, the team that attacked the most is also the team that has the highest spike height (Graph 3), Fenerbahçe. While Fenerbahçe had the most attacks per game with 120.96 attacks, Jeopark Kula Bld. had the lowest number of attacks per game with 84.39 attacks.

Table7. Correlation between the Attack Success and Success

		Success	Attack Success
Success	Correlation Coefficient	1,000	,-119
	Sig. (2-tailed)	,	,249
	N	12	12

Correlation between the success rating and attack success can be seen in Table 7( $r=-.119$ ). According to Table 7, there is a negative but not significant correlation between the attack success and success. This negative correlation was caused due to the season's top finisher Halk Bank being in the eighth place and Ziraat Bankası, which finished the season in the eighth place, being in the third place.

Graph7. Attack Fault Average of the Teams



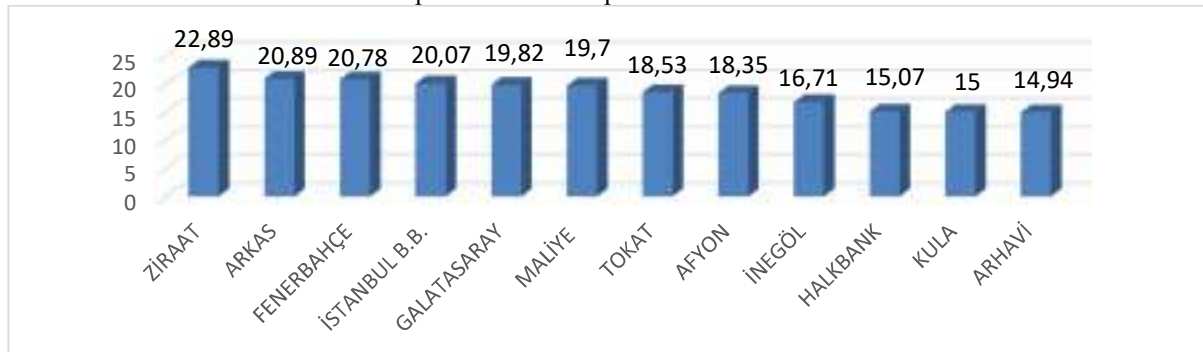
The attack fault averages of the teams are presented for all games in Graph 7. In the graph, the team that has the highest attack fault average, 10.25, is Maliye Milli Piyango, and the lowest ranking team in this respect was Tokat Plevne with 6.21.

Table 8. Correlation between the Attack Fault Averages and Success

		Success	Attack Fault Averages
Success	Correlation Coefficient	1,000	,109
	Sig. (2-tailed)	,	,251
	N	12	12

Correlation between the attack fault averages and success can be seen in Table 8 ( $r=.109$ ). According to Table 8, no statistical correlation was found between the attack fault averages and success.

Graph8. Perfect Reception Ratios of the Teams



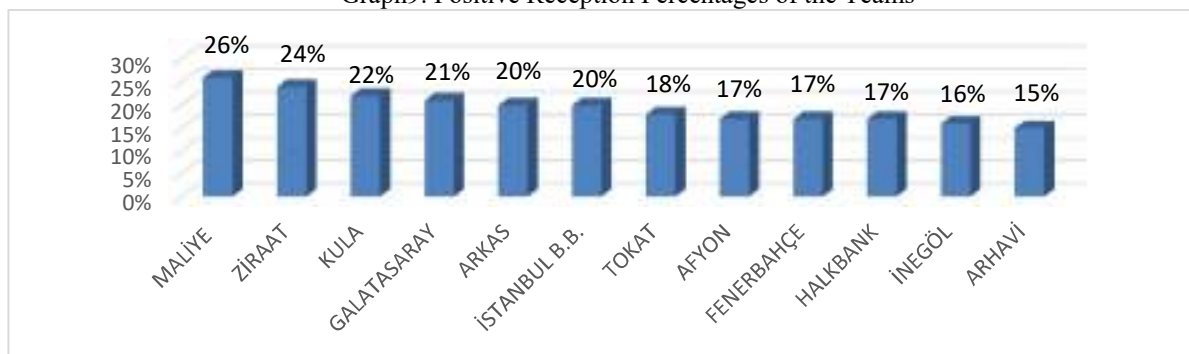
The perfect reception averages of the teams are presented for all games in Graph 8. In the graph, the team with the highest perfect reception average, 22.89, is Ziraat Bankası, and the team with the lowest perfect reception average, 15, is Jeopark Kula Bld.

Table9. Correlation between the Teams' Perfect Reception Ratios and Success

		Success	Perfect Reception Ratios
Success	Correlation Coefficient	1,000	,891**
	Sig. (2-tailed)	,	,375
	N	12	12

Correlation between the perfect reception sand success can be seen in Table 9 ( $r = .891$ ). According to Table 9, there is a highly significant correlation ( $r = .891^{**}$ ) between the success and perfect reception.

Graph9. Positive Reception Percentages of the Teams



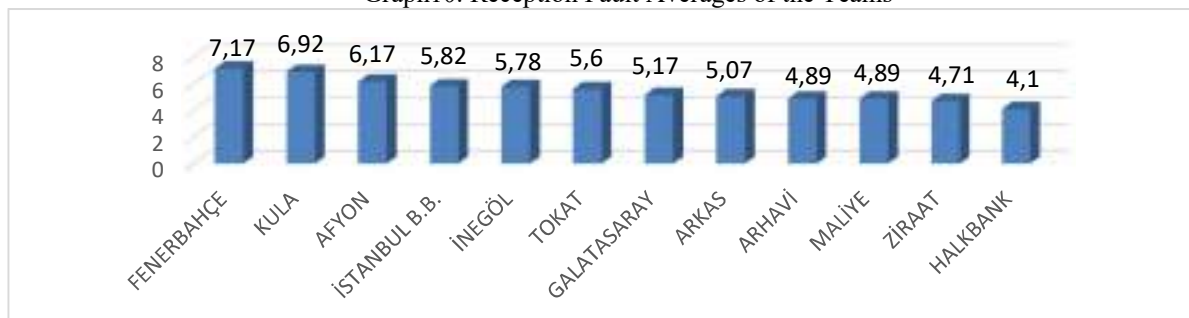
The positive reception percentages of the teams are presented for all games in Graph 9. According to this, Maliye Piyango which finished the season in the fourth place had the highest positive reception ratio of 26%, and Arhavi Bld. which finished the season in the eleventh place had the lowest positive reception ratio of 15%.

Table10. Correlation between the Teams' Positive Reception Ratios and Success

		Success	Positive Reception Ratios
Success	Correlation Coefficient	1,000	,027
	Sig. (2-tailed)	,	,598
	N	12	12

Correlation between the positive receptions and success can be seen in Table 10 ( $r = .027$ ). According to Table 10, no significant correlation was found between the positive reception sand success.

Graph10. Reception Fault Averages of the Teams



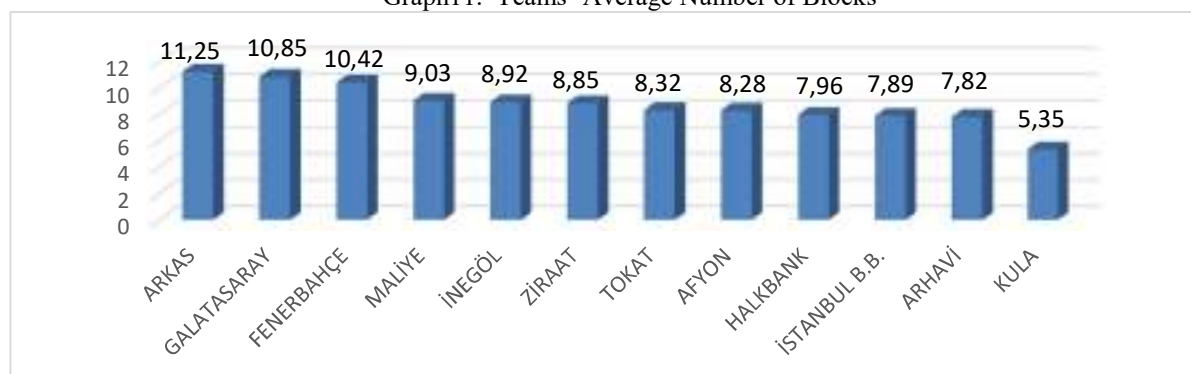
The reception fault averages of the teams are presented for all games in Graph 10. As it can be seen from the graph, the team with the highest reception fault average, 7.17, is Fenerbahçe, and the team with the lowest reception fault average, 4.1, is Halk Bank.

Table 11. Correlation between the Teams' Reception Fault Averages and Success

		Success	Reception Fault Averages
Success	Correlation Coefficient	1,000	,836**
	Sig. (2-tailed)	,	,002
	N	12	12

As it can be seen from Table 11, there is a highly significant negative correlation ( $r=.836^{**}$ ) between the success and reception fault average per game.

Graph 11. Teams' Average Number of Blocks



Teams' average number of blocks for all games can be seen in Graph 11. Findings indicate that the highest blocking team is Arkas Spor Kulübü with 11.25 average blocks, and the lowest blocking team is Jeopark Kula Bld. with 5.35 average blocks. Although Galatasaray has the highest block height average, it is only second with 10.85 average blocks. The top finisher of the tournament, Halk Bank, is ninth in the list.

Table 12. Correlation between the Number of Blocks and Success

		Success	Blok Num.
Success	Correlation Coefficient	1,000	,103
	Sig. (2-tailed)	,	,327
	N	12	12

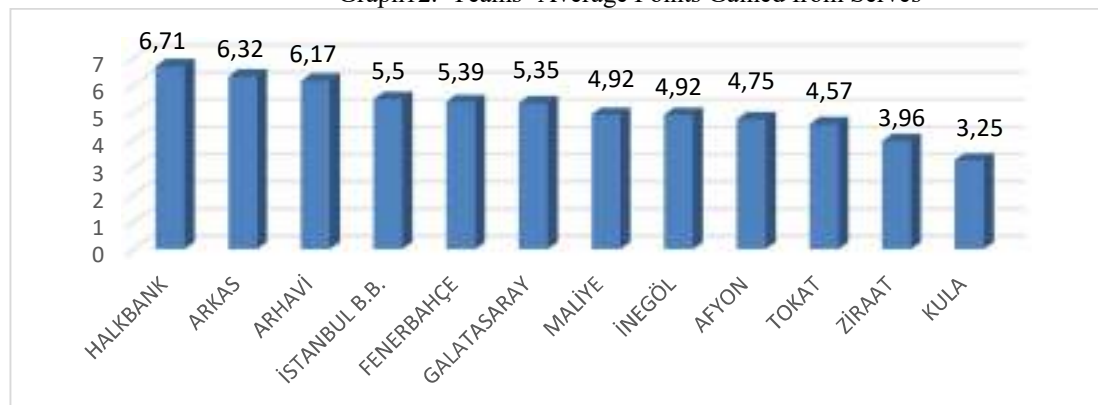
Correlation between the success and number of blocks can be seen in Table 12 ( $r=0,103$ ). According to Table 12, no significant correlation was found between the success and number of blocks.

Table 13. Correlation between the Points Gained from Serves and Success

		Success	Points Gained from Serves
Success	Correlation Coefficient	1,000	,819**
	Sig. (2-tailed)	,	,003
	N	12	12

As it can be seen from Table 13, there is a highly significant correlation ( $r=.819^{**}$ ) between the number of serve point per game.

Graph12. Teams' Average Points Gained from Serves



The average of the points gained from serves for the teams are presented for all games in Graph 12. The top finisher of the season, Halk Bank, has the most points gained from serves with an average of 6.71, and the lowest ranking team of the season, Jeopark Kula Belediye, has the least amount of points gained from serves with a per game average of 3.25.

Table 14. Correlation between the Serve Fault and Success

		Success	Serve Fault
Success	Correlation Coefficient	1,000	,-210
	Sig. (2-tailed)	,	,308
	N	12	12

Correlation between the success and serve faults is provided in Table 12 ( $r = -.210$ ). According to Table 12, no statistical correlation was found between the success and serve faults. However, it can be seen that there is a negative correlation. This negative correlation was caused due to the second placer of the season, Arkas Spor Kulübü being in the second place and Jeopark Kula Bld., which finished the season in the last place, being in the first place.

### Argument

The aim of the study conducted is to determine the technical, tactical and physical features affecting team success in the 2018- 2019 Volleyball Efeler League category and is to reveal the relationships between these features. The factors which may affect the success in volleyball branch are the athlete's anthropometric features, psychological features and technical performance as well as tactical organization as a team. The effects of individual characteristics (height, age etc.) and volleyball techniques (reception, blocks, spike etc.) on success have been examined in this study.

In our study, no statistical relationship has been ascertained between age and success average. İlgüzar could not find any significant relationship between age and success in his/her study examining men's volleyball competitions at the 2011 Beijing Olympic Games. Koçak could not find any significant relationship between age and success in his/her 2012 study. It is the fact that the tall stature is the most important factor in anthropometric measurements in volleyball branch. By force of the game nature, there is a positive relationship between the effective performance of many technical skills and height. Although height is important for the performance of the agility, it is not the only factor. Possessing other necessary features for the volleyball shall be effective in success. According to the study, despite the fact that the teams with the average height have been seen to have an advantage, our research results has shown that there is no significant relationship between success and average height. When the body of literature is examined, the relationship between success and average height is similar to other studies (İlgüzar 2011; Koçak, 2012). Meanwhile, no significant relationship has been found between success and attack height. When the body of literature is examined, İlgüzar could not find any statistical relationship between success and attack height in his/her study examining men's volleyball competitions at the 2011 Beijing Olympic Games. The insignificant but negative relationship between total number and success is seen. The example of this negative relationship is as follows: Halk Bank is on the 1<sup>st</sup> rank in the season but the ninth range in

total number and İkbâl Afyon Bld. Yüntaş team finished the season on the 10<sup>th</sup> rank but second range in total number. When the body of literature is examined; Gürsoy found a positive correlation ( $R=.721$ ,  $R^2=.520$ ,  $p=.002$ ) between the total number of variable scored and the ranking when he/she examined FIVB 2014 volleyball men's world championship matches in 2018 (Dirier, 2019). Again Koçak could not find any significant relationship between the success rating and the total number averages of the teams in his study he examined in 2012. The insignificant but negative relationship between attack success and success is seen. The example of this negative relationship is as follows: Halk Bank is on the 1<sup>st</sup> rank in the season but eighth in attack success and Ziraat Bankası team finished the season on the 8<sup>th</sup> rank but third in attack success. Although there is no significant relationship between success and technical skills, there is consistency in the data. Although there is no significant relationship between success and height average, Fenerbahçe has been fixed as a team possessing the longest height on average. In the following findings, the tallest attack height and the best attack success came from the Fenerbahçe team. On the basis of these data, it can be said that the tall stature affects the attack technique positively. As long as the tactical insights develop in volleyball, the teams use the service to start the game as well as to score directly. In our study, it has been seen that there is a high significant relationship between success and the average number of teams scored from service. Pursuant thereto, it can be said that the success increases as the number scored from the service gets higher. In the study in which 75 matches played in the 2005 men's World League have been analyzed, Marcelino vd., (2005), ascertained that the best team of the tournament had the highest service failure percentage but also the highest service success percentage. In the study in which the young, elite and national teams' service differences have been examined in 2016 services in 19 matches; Lahtinen vd., (2007) also ascertained that the most common service type in men's volleyball is jump serve and jump float service. Likewise, in the study researching the effects of attack, service and blocks on team rankings in a total of 75 World League matches in men's World League competitions, Marcelino vd. (2005) ascertained that the missed services and the points scored from the service have had an effect on the rankings of the teams in the tournament. And again, Koçak and Yılmaz reported similar results with our study in their 2013 study. Good and excellent reception in volleyball is a prerequisite for the setter to establish a good attack organization and to score points by attacking powerfully (Zetou vd., 2007). In the study conducted, it has been seen that there is a high level of meaningful relationship between success and the average of the teams' reception rates. Accordingly, it can be said that the success increases as the excellent reception rates get higher. However, in his/her study concerning Men's Volleyball Competition Olympic Games in 2008, İşgüzar (in 2011) did not find any relationship between neither excellent reception rate nor positive reception rate and success. In the light of the findings, it has been seen that no matter how perfect the reception success is, it becomes meaningful with the attack success. In the study analyzing 4351 actions in 2007 Volleyball World Cup Men's Competitions; Monterio vd., (2009), ascertained that that there was no significant relationship between defense efficiency and set result. In 2007, Zetou vd. ascertained that the main factors between a team winning and losing of a match are reception and attack. In the study analyzing 10 high-level matches played in men's Olympic elimination and 2003 men's European championship; in 2004, Hayrine vd. found no significant difference in reception error rates. Good and excellent reception in volleyball is a prerequisite for the setter to establish a good attack organization and to score points by attacking powerfully. If the setter can pick up a ball through a good or excellent reception, he/she can release comfortably a quality pass to the desired area. Accordingly, a good hitter can make a good attack and score for the team. But the setter can also turn a worse reception into a better pass, depending on his/her abilities. Similarly, a good hitter can turn a shank into scores by using his/her physical and technical features. In 2011, Koçak reported that there was no significant relationship between success and reception fault ( $r=-.510$ ), but there was a negative relationship.

Consequently, it has been seen that there was no significant relationship between the physical characteristics of the teams (age, height, body weight, attack height and block height) and success. But, it has been determined that getting scores from the service, excellent reception percentage and reception fault averages are directly effective in winning the match in volleyball. The variables' meaningful relationships with each other also appear as another indirect effective factor in winning matches.

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