

AN ANALYSIS ON THE GOALS SCORED IN TURKISH SUPER LEAGUE IN 2011-2012 FOOTBALL SEASON⁹

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ABSTRACT

With the attempts to change the game rules in favor of attack football, the aim of football that has speeded up in recent years is to achieve gather audiences at tribunes and in front of television. The number of goals plays a vital role in a football match becoming and finalizing in a great and exciting way. Changes in football playing rules have increased the number of goals and made the football even more attractive.

The winner of a football match is determined by the number of goals scored. If both teams score equal number of goals, or if no goal is scored, the match is counted as even. For a goal to be counted, the ball should completely pass the goalpost line between the posts and under the crossbar, and the team that scored the goal should not have violated the game rules.

In our study, an overall evaluation was made for the number of goals scored in 2011-2012 season. For this purpose, the number of goals scored in both halves of a match and the number of goals according to goal types were used as variables.

Firstly, normality test was applied to determine whether there is a difference between the number of goals according to halves, and it was found that data demonstrate a normal distribution. Independent samples t-test was made for data demonstrating normal distribution in order to compare the means. As a result of the test, it was found that there is no meaningful difference between the number of goals scored in the first half and second half, and mean number of goals according to halves was presented as graphic.

Eta coefficient was calculated to determine whether there is a relationship between the number of goals and goal types. According to eta coefficient, a relation of 92% was determined between the number of goals and goal types, and the number of goals according to goal types was presented as column chart.

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Normality of data was examined to determine whether there is a difference between the number of goals according to goal types, and it was found that the number of goals does not demonstrate a normal distribution. Hence, Kruskal-Wallis test was applied in order to determine whether there is a difference between the number of goals according to goal types. As a result of the test, it was concluded that there is meaningful difference between the number of goals according to goal types. Mann-Whitney test was applied to determine whether there is a difference between the number of goals and goal types. According to the results of the test, it was found that the number of goals scored by foot is more than those of other goal types; the number of goals scored by head is more than those of by penalty and own goal; there is no difference between the number of goals scored by own goal penalty.

Key Words: *Football, Super League, Goal, Independent Samples Analysis, Kruskal-Wallis Test*

INTRODUCTION AND OBJECTIVE

In 1954, when the World Football Championship was broadcast live for the first time in Sweden, with Germany being the World Football Champion, television sales in Germany increased from 11.000 to 85.000 in a year.

The broadcast of the World Cup in Mexico in 1970 proved that football had an importance role in unfold of technological innovations. In 1980s, wired communication-based private television organizations could find a place in media market through football broadcasts (Klose, 1993).

Today, football has become a phenomenon that directs worldwide economical, political, cultural and social changes, entering people's lives in different ways (Yıldız-Ekin, 2005). Since the beginning of 1990s, it has particularly attracted millions of peoples and become economical organizations toward an industrial process (Ünüvar et al., 2010). Increasing monetarization and commercialization of football has brought about an economy reaching hundred billions of dollars (Akşar, 2010).

Football is the most popular sport in the world (Kuper, 2006). It has a vast place both in visual and written media with its high number of audiences (Benzer, 2010). Scientific researches further advanced the football, enabling it to have a significant potential in national and international platform (İmamoğlu, Çebi and Kılıçgil, 2007). Football is a culture game and includes different perspective of individuals from different cultures (Arslanoğlu, 2005). Football is literature, sculpture, ballet, music, painting, theatre, and cinema. In short, football is everything (Aslan, 2003).

Football is considered as a sociological phenomenon as it reflects the characteristics of community (Akaya, 2008). Since football playing rules can be understood and interpreted by everyone, it has attracted many communities, leaving its mark on our age. In the end of 1980s, a proper regulation was made on the game rules because of "defense-based tactics" that made football ugly, impeded positive playing and goal, and triggered violence among audiences. In 1990, "obvious goal-scoring chance" and "severe foul play" concepts were included in football playing rules, and it was decided that players having "obvious goal-scoring chance" and making fouls be exported. In the same year, offside rules were changed, leading to an advantage for attacking team.

It was also decided that the player at the same line with penultimate player not be counted as offside. These changes resulted in vast increase in the number of goals (Orta, 2008).

The winner of a football match is determined by the number of goals scored. If both teams score equal number of goals, or if no goal is scored, the match is counted as even. For a goal to be counted, the ball should completely pass the goalpost line between the posts and under the crossbar, and the team that scored the goal should not have violated the game rules (FIFA, 2012).

For the goal scored by the player of Galatasaray, Metin Oktay during the first Fenerbahçe-Galatasaray derby match in Turkish Super League (then-called Turkish League) played in 10 June 1959, it was mentioned as “a fabulous goal that football will remember for years and that will be told from one generation to another” (Bapçum, 1959).

His goal scored in the 37th minute of the match that made Galatasaray the winner was found to break the side strings of the goalpost of Fenerbahçe. The following headline was given for the goal that caused Fenerbahçe to lose the title unbeaten: “Nets tearing goal”, “Like Rocket Pass” (Sevik, 1959).

That a goal passed ahead of the match, which had been communicated through newspaper headlines, affected the football team Fenerbahçe and it won its first championship of Turkish Super League by 4-0, taking the revenge of that match. Regarding the goals scored in this match, it was written “I guess it was these torn nets that whipped up Fenerbahçe players to a revenge with 4 goals (Kıvanç, 1959)” and “Rockets raise in Mithatpaşa... (Tanyolaç, 1959)”.

The most important matter in football is to be ahead on score table and win (Bromberger, 1993).

METHODOLOGY

The aim of our study was to make an overall evaluation on the number of goals scored in 2011-2012 football season. For that purpose, the following data was used:

- The number of goals according to halves
- The number of goals according to goal types

It will be analyzed whether there is a difference between the number of goals according to halves in 2011-2012 season. Normality of the number of goals according to halves will be examined, appropriate mean comparison test will be applied, and it will be found whether there is a difference between the number of goals according to halves, in other words, whether there is a change in the number of goals according to halves.

The relationship between the number of goals and goal types will be examined. That is, to what extent the goal types explain the number of goals will be determined. Additionally, it will be examined whether there is a difference between the number goals according to goal types. Hence, the normality of the number of goals according to goal types will be determined. Normality will be examined, as well as whether there is a difference between the number of goals according to goal types.

Appropriate mean comparison test will be selected accordingly.

FINDINGS

The following data were used in order to make an overall evaluation on the number of goals scored in 2011-2012 football season:

- The number of goals according to halves
- The number of goals according to goal types

The relationship between the number of goals and goal types will be examined. That is, to what extent the goal types explain the number of goals will be determined. Additionally, it will be examined whether there is a difference between the number goals according to goal types. Hence, the normality of the number of goals according to goal types will be determined. Normality will be examined, and it will be determined whether there is a difference between the number of goals according to goal types. Appropriate mean comparison test will be selected accordingly.

ANALYSIS ON THE NUMBER OF GOALS ACCORDING TO HALVES

It will be examined whether there is a difference between the number of goals according halves in 2011-2012 season. For that purpose, it will firstly be found whether the number of goals demonstrate a normal distribution. Then, parametric and nonparametric tests will be used according to the distribution of data to compare the means.

Normality test will be made for the number of goals according to halves in 2011-2012 season.

Ho: The number of goals according to halves in 2011-2012 season demonstrates a normal distribution.

H1: The number of goals according to halves in 2011-2012 season do not demonstrate a normal distribution.

Tests of Normality

Half		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
The Number of Goals	1. Half	,180	45	,001	,784	45	,000
	2. Half	,174	48	,001	,748	48	,000

a. Lilliefors Significance Correction

The results of the normality test can be seen above. The number of observations is lower than 50, and therefore, Shapiro-Wilk test is applied. According to the test results, it was found that meaningfulness values for the number of goals according to halves in 2011-2012 season are $0,000 < 0,05$ and $0,000 < 0,05$. So, the hypothesis that the number of goals according to halves demonstrates a normal distribution at a significance level of 5% is denied. As a result, it was decided that the number of goals according to halves does not demonstrate a normal distribution.

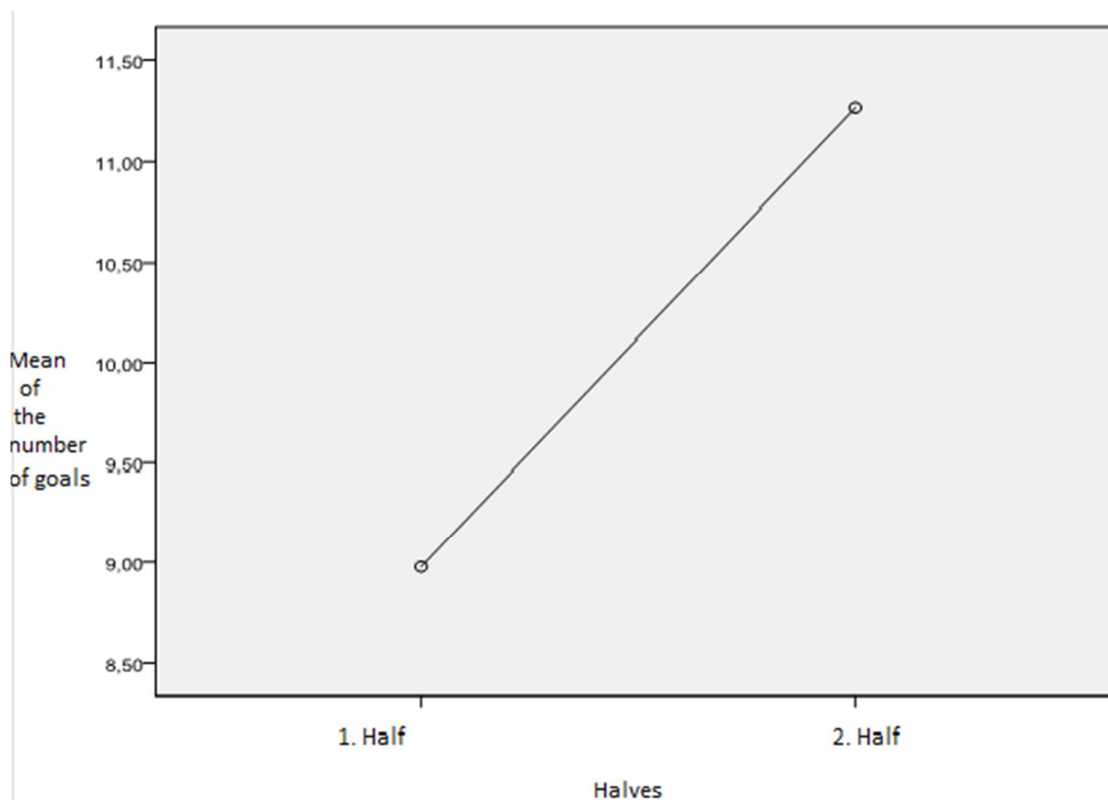
INDEPENDENT SAMPLES T-TEST

Independent samples t-test will be applied to determine whether there is a difference between the number of goals according to halves in 2011-2012 season.

Group Statistics

	Half	N	Mean	Std. Deviation	Std. Error Mean
The Number of Goals	1. Half	45	8,9778	4,14229	,61750
	2. Half	48	11,2708	7,05522	1,01833

Mean, standard deviation and standard deviation mean values from descriptive statistics are presented in the Table above.



Mean of the number of goals for each half is presented in the graphic above.

	Levene's Test for Equality of Variances	
	F	Sig.
The Number of Goals	3,257	,074
Equal variances assumed		
Equal variances not assumed		

The results of the Levene test applied to test the homogeneity of variances are seen in the Table above. The meaningfulness value of the Levene test statistics was calculated as $0,074 > 0,05$. So, it can be said that the variances of the number of goals scored in both halves are homogenous at a significance level of 5%.

t-test for Equality of Means						
T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-1,895	91	,061	-2,29306	1,21000	-4,69658	,11046
-1,925	76,823	,058	-2,29306	1,19093	-4,66458	,07847

As the assumption on the homogeneity of variances are provided, evaluation will be made according to the results on the top row. Double-sided credit margins are demonstrated at a significance level of 5% for t-statistics, the meaningfulness value of t-statistics, differences between means, standard deviation of differences and mean differences in the Table above. According to it, the meaningfulness value for the test statistics as calculated as $0,061 > 0,05$. With regard to the meaningfulness value, no meaningful difference is found between the number of goals according to halves in 2011-2012 season at a significance level of 5%.

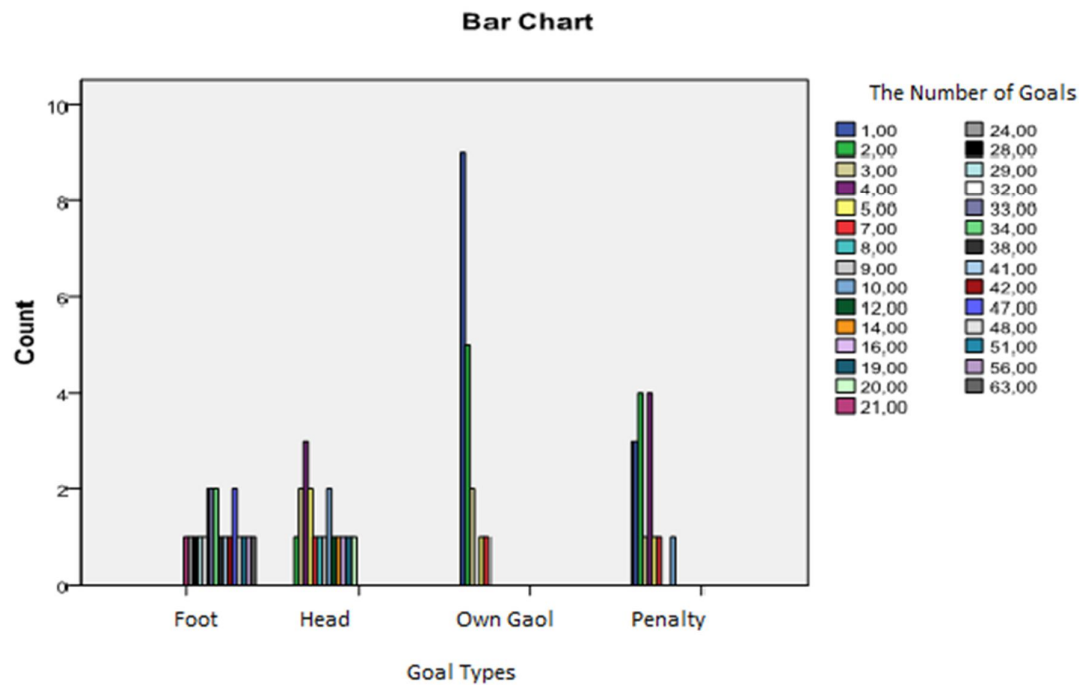
ANALYSIS ON THE NUMBER OF GOALS ACCORDING TO GOAL TYPES

Relationship between the number of goals and goal types in 2011-2012 season will be examined. Eta coefficient will be used to determine the relationship between the number of goals and goal types. For, a relationship between variances having a nominal scale type and interval scale type is measured using eta coefficient.

Directional Measures

				Value
Nominal	by Eta	Goal	Type	,847
Interval		Dependent		
		The Number of	Goals Dependent	,921

Eta coefficient can be seen in the Table above. Since the goal types affect on the number of goals, the number of goals will be selected as variable, and the eta coefficient in the second row will be used. Eta coefficient was calculated as 0,921. According to it, a relation of 92% is found between the number of goals and goal types. In other words, goal types explain the number of goals at a rate of 92%.



The number of goals according to goal types can be seen in the graphic above.

It will be examined whether there is a difference between the mean number of goals. Firstly, normality of the number of goals according to goal types will be determined.

Tests of Normality

Goal Type		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
The Number of Goals	Foot	,169	18	,187	,969	18	,770
	Head	,184	18	,108	,900	18	,057
	Own Goal	,291	18	,000	,692	18	,000
	Penalty	,215	15	,061	,848	15	,016

a. Lilliefors Significance Correction

Normality test results can be seen in the Table above. The number of observations is lower than 50 for all 4 groups, and therefore, Shapiro-Wilk test is applied. According to the test results, meaningfulness values for the groups of own goal and penalty was found as $0,000 < 0,05$ and $0,016 < 0,05$. According to it, as the data for own goal and penalty do not demonstrate a normal distribution at a significance level of 5%, the number of goals according to goal types do not demonstrate a normal distribution.

KRUSKAL-WALLIS TEST

The number of goals according to goal types demonstrates a normal distribution. Hence, Kruskal-Wallis test will be applied to determine whether there is a difference between the mean number of goals according to goal types.

Ranks

Goal Type	N	Mean Rank
The Number of Goals		
Foot	18	60,50
Head	18	38,53
Own Goal	18	15,14
Penalty	15	24,00
Total	69	

The mean ranks and sum of ranks for the number of goals according to goal types can be seen in the Table above.

Test Statistics ^{a,b}	
	The Number of Goals
Chi-Square	52,310
df	3
Asymp. Sig.	,000
a. Kruskal Wallis Test	
b. Grouping Variable: Goal Type	

Kruskal-Wallis test result can be seen in the Table above. According to it, chi-square for the test statistics was calculated as 52,310 and meaningfulness value as 0,000<0,05. With regard to the meaningfulness value, there is meaningful difference between the number of goals according to goal types at a significance level of 5%. After difference was found between the groups, paired Mann-Whitney test will be applied as multiple comparison in order to determine between which groups there is a difference.

MULTIPLE COMPARISON RESULTS

Mann-Whitney test will be applied for multiple comparison test. Therefore, margin error selected normally as 0,05 will be divided into the number of groups, and updated accordingly. Evaluation will be made over the new error margin. As there are four groups, the error margin was calculated as $0,05/4=0,0125$.

Ranks

	Goal Type	N	Mean Rank	Sum of Ranks
The Number of Goals	Foot	18	27,50	495,00
	Head	18	9,50	171,00
	Total	36		

The mean ranks and sum of ranks for the goals scored by foot and head can be seen in the Table above.

Test Statistics ^b		The Number of Goals
Mann-Whitney U		,000
Wilcoxon W		171,000
Z		-5,129
Asymp. Sig. (2-tailed)		,000
Exact Sig. [2*(1-tailed Sig.)]		,000 ^a

As the meaningfulness value of the test statistics is $0,00 < 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, the number of goals scored by foot is higher than that of goals by head.

Ranks

	Goal Type	N	Mean Rank	Sum of Ranks
The Number of Goals	Foot	18	27,50	495,00
	Own Goal	18	9,50	171,00
	Total	36		

The mean ranks and sum of ranks for the goals scored by foot and own goals can be seen in the Table above.

Test Statistics^b

	The Number of Goals
Mann-Whitney U	,000
Wilcoxon W	171,000
Z	-5,174
Asymp. Sig. (2-tailed)	,000
Exact Sig. [2*(1-tailed Sig.)]	,000 ^a

As the meaningfulness value of the test statistics is $0,00 < 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, the number of goals scored by foot is higher than that of own goals.

Ranks

	Goal Type	N	Mean Rank	Sum of Ranks
The Number of Goals	Foot	18	24,50	441,00
	Penalty	15	8,00	120,00
	Total	33		

The mean ranks and sum of ranks for the goals scored by foot and penalty can be seen in the Table above.

Test Statistics^b

	The Number of Goals
Mann-Whitney U	,000
Wilcoxon W	120,000
Z	-4,892
Asymp. Sig. (2-tailed)	,000
Exact Sig. [2*(1-tailed Sig.)]	,000 ^a

As the meaningfulness value of the test statistics is $0,00 < 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, the number of goals

scored by foot is higher than that of goals by penalty.

Ranks

Goal Type	N	Mean Rank	Sum of Ranks
The Head	18	26,28	473,00
Number Own Goal	18	10,72	193,00
of Goals Total	36		

The mean ranks and sum of ranks for the goals scored by head and own goals can be seen in the Table above.

Test Statistics^b

	The Number of Goals
Mann-Whitney U	22,000
Wilcoxon W	193,000
Z	-4,480
Asymp. Sig. (2-tailed)	,000
Exact Sig. [2*(1-tailed Sig.)]	,000 ^a

As the meaningfulness value of the test statistics is $0,00 < 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, the number of goals scored by head is higher than that of own goals.

Ranks

Goal Type	N	Mean Rank	Sum of Ranks
The Head	18	21,75	391,50
Number Penalty	15	11,30	169,50
of Goals Total	33		

The mean ranks and sum of ranks for the goals scored by head and penalty can be seen in the Table above.

Test Statistics^b

	The Number of Goals
Mann-Whitney U	49,500
Wilcoxon W	169,500
Z	-3,116
Asymp. Sig. (2-tailed)	,002
Exact Sig. [2*(1-tailed Sig.)]	,001 ^a

As the meaningfulness value of the test statistics is $0,00 < 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, the number of goals scored by head is higher than that of goals by penalty.

Ranks

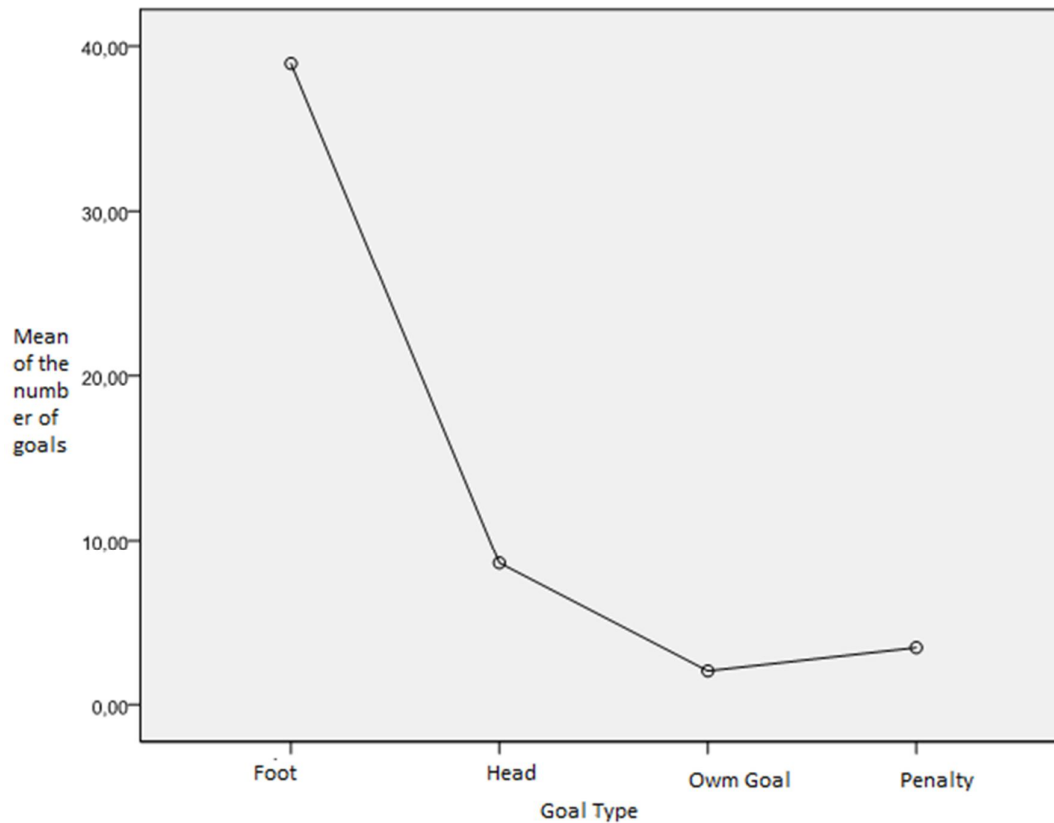
Goal Type	N	Mean Rank	Sum of Ranks
The Own Goal	18	13,92	250,50
Number Penalty	15	20,70	310,50
of Goals Total	33		

The mean ranks and sum of ranks for the goals scored by own goal and penalty can be seen in the Table above.

Test Statistics^b

	The Number of Goals
Mann-Whitney U	79,500
Wilcoxon W	250,500
Z	-2,081
Asymp. Sig. (2-tailed)	,037
Exact Sig. [2*(1-tailed Sig.)]	,044 ^a

As the meaningfulness value of the test statistics is $0,044 > 0,0125$, there is meaningful difference between the groups at a significance level of 5%. According to it, there is no meaningful difference between the number of goals scored by head and that of goals by penalty.



The mean number of goals according to goal types can be seen in the graphic above. According to it, the number of goals scored by foot is more than those of other goal types. The number of goals scored by head is more than those of by penalty and own goal. A low degree difference is seen between the number of goals by own goal and penalty. However, this difference is not statistically meaningful at a significance level of 5%. So, it can be concluded that the number of goals by own goal and penalty is approximately equal.

CONCLUSION AND ASSESSMENT

In our study, an overall evaluation was made for the number of goals scored in 2011-2012 season. For this purpose, the number of goals scored in both halves of a match and the number of goals according to goal types were used as variables.

Firstly, normality test was applied to determine whether there is a difference between the number of goals according to halves, and it was found that data demonstrate a normal distribution. Independent samples t-test was made for data demonstrating normal distribution in order to compare the means. As a result of the test, it was found that there is no meaningful difference between the number of goals scored in the first half and second half. Moreover, the mean number of goals according to halves was presented as graphic.

Eta coefficient was calculated to determine whether there is a relationship between the number of goals and goal types. According to eta coefficient, a relation of 92% was determined between the number of goals and goal types. In other words, goal types explain the number of goals at a rate of 92%. Moreover, and the number of goals according to goal types was presented as column chart.

Normality of data was examined to determine whether there is a difference between the number of goals according to goal types, and it was found that the number of goals does not demonstrate a normal distribution. Hence, Kruskal-Wallis test was applied in order to determine whether there is a difference between the number of goals according to goal types. As a result of the test, it was concluded that there is meaningful difference between the number of goals according to goal types. Multiple comparison test was applied to determine according to what types there is difference between the number of goals. Mann-Whitney test was used for multiple comparison. According to the test result, it was found that the number of goals scored by foot is more than those of other goal types; the number of goals scored by head is more than those of by penalty and own goal; there is no difference between the number of goals scored by own goal and penalty.

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