RESEARCH ARTICLE

The association between situational, technical and tactical parameters and performance in football: analysis of a sample from the Croatian First Football League

Bruno Baćina, Jakša Škomrlj, Šime Veršić

University of Split, Faculty of Kinesiology, Split, Croatia

Correspondence to:
Šime Veršić
University of Split Faculty of Kinesiology, 21000 Split, Croatia
simeversic@gmail.com

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Objective: To determine and analyse the influence of technical and tactical parameters on performance in the Croatian First Football League during the first phase of the competition in the 2021/2022 season.

Methods: The sample comprised 90 matches in the Croatian First Football League, which was played in a round-robin tournament and included 10 clubs in the season. A sample of 30 situational efficiency variables obtained from the SofaScore application was used to assess the significance of individual variables' impact on match outcomes: Multinomial logistic regression was conducted.

Results: The variables with a statistically significant influence on the outcome of matches in the First Croatian Football League were=ball possession (odds ratio (OR)=0.045; 95% confidence interval (CI)=0.002–0.951), shots OR=0.922; 95% CI=0.863–0.985), shots on target (OR=0.669; 95% CI=0.557–0.805), offside (OR=0.684; 95% CI=0.515–0.907) and big chances (OR=0.538; 95% CI=0.393–0.737).

Conclusion: An attacking style of football, characterised by a high proportion of possession and a high attacking frequency (shots, shots on target, offside and big chances), has been shown to be significantly related to a team's success. This study can help coaches and football experts to better plan and structure training processes, strategy and match execution.

Keywords: Croatian First Football League; football; performance; situational efficiency; SofaScore

Introduction

Football is a team sport in which two teams compete against each other in different phases of the game to score a goal and at the same time prevent the opposing team from doing the same. During a football match, players perform many technical and tactical elements with specific physical demands. Previous studies highlight shots on target, successful passes and ball recoveries from the opponent in one-on-one situations during the match are key factors that differentiate successful teams from less successful ones (*1*). The results suggest that players on more successful teams cover greater distances with the ball, run more intensively with the ball and have more touches, successful short passes, tackles, dribbles, shots and shots on target compared to less successful teams (*2*). Moreover, research has shown that players in the English league cover greater distances by sprinting, while players in the Spanish league cover greater distances while their team is in possession of the ball (*3*).

In the world of football, there is a consensus that the number of goals scored is the most important success variable, which is strongly influenced by the number of shots and accurate passes (*4*). Goal efficiency, defined as the number of goals scored divided by the number of shots, is also the most important performance parameter (*5*). Teams that won, drew or lost differ in variables such as total number of shots, shots on target, crosses, goals conceded, ball possession and match location (*6*). An analysis of matches from three World Cups has shown that winning, losing and drawing teams can be distinguished based on the variables of ball possession and performance in the attacking phase (*7*). Nine football variables were identified as predictors of a positive match outcome: shots, shots on target, shots after counterattacks, shots inside the penalty area, possession, short passes, average number of passes, ball recoveries in the air and ball recoveries on the ground (*8*).

In a sample of matches from one season of the Croatian First Football League, it was found that the losing teams (i.e., teams with a consequently lower final standing in the ranking) had a significantly higher number of blocked shots and crosses, which is probably due to a lower level of technical and tactical knowledge and consequently more time spent in the defensive phase (*9*). However, there are no studies that include enough situational performance variables for all phases of a football match to comprehensively and accurately identify the key determinants of efficiency in top division of Croatian First Football League. As the physical demands of football are constantly changing and increasing, it can be assumed that the technical and tactical demands of the game will also change accordingly. Therefore, further research is needed to refresh and complement knowledge about the demands of modern football.

The main objective of this study was to analyse the influence of technical and tactical parameters obtained from the SofaScore application on the results of matches in the Croatian First Football League during the first phase of the competition in the 2021/2022 season. The main hypothesis of this study was that the ball possession, passing and attacking variables had a greater influence on the result and match performance than the defensive variables.

Methods

Sample of matches

The analysed sample consisted of matches of the Croatian First Football League played during the first part of the competition in the 2021/2022 season. The research was conducted on a total of 90 matches of the above-mentioned season of the Croatian First Football League, which was played in a round-robin tournament and in which 10 teams participated: GNK Dinamo, HNK Hajduk, NK Osijek, HNK Rijeka, NK Lokomotiva Zagreb, HNK Gorica, NK Slaven Belupo, HNK Šibenik, NK Istra 1961 and NK Hrvatski Dragovoljac. The Croatian First Football League match data was collected by the SofaScore application (https://www.sofascore.com/).

Sample of variables

A sample of a total of 30 situational efficiency variables was used, taken from the SofaScore application and divided into 3 categories. A total of 26 variables were analysed in relation to ball possession and passing as well as attack and defence variables: ball possession, ball losses, passes, accurate passes, percentage of accurate passes, long balls, accurate long balls, percentage of accurate long balls, crosses, successful crosses, percentage of successful crosses, shots, shots on target, corner kicks, offside, big chances, dribbles, successful dribbles, percentage of successful dribbles, fouls, yellow cards, shots on goal, duels won, aerial duels won, ball recoveries and interceptions. In addition to the variables mentioned above, which were used as criteria, the study also considered additional information about individual matches, the outcome of which were expressed multinomially as wins, losses and draws.

Data analysis

The data was processed using the software programme Statistica for Windows, ver. 13.5.0 (StatSoft, Hamburg, Germany). Kolmogorov-Smirnov test was used to assess the normality of the distribution for all variables, and descriptive statistics parameters were determined. To determine the significance of the impact of individual variables on match outcomes, multinomial logistic regression was used in the IBM SPSS Statistics, ver. 20 (IBM, Armonk, NY, USA). The statistical significance for all calculations was set at $\alpha=0.05$ ($P<0.05$).

Results

The teams with the most wins scored 2.40 goals per match (95% confidence interval (CI)=1.11–1.56), teams with a draw scored 1.24 goals per match, while teams that lost scored 0 goals (**Table 1**). The winning teams had an average of 52% possession, while the teams that drew had an average of 50% possession and the teams that lost had an average of 48% possession in the Croatian First Football League matches. The results of the descriptive statistics also show that teams that won a match in the Croatian First Football League took

an average of almost 14 shots per match, with more than 5 shots on target. On average, the winning teams had twice as many big chances as the losing teams (**Table 1**).

Table 1. Descriptive statistics (mean±standard deviation) of attack, defence and ball possession variables of matches in the first part of the 2021/2022 season of the Croatian First Football League

Parameter	Win	Draw	Loss
Goals	2.40±1.29	1.24±0.82	0.63±0.81
Possession	0.52±0.11	0.50±0.12	0.48±0.11
Shots	13.99±4.73	13.81±6.38	11.76±5.16
Shots on target	5.21±2.03	4.36±2.38	3.50±1.95
Corner kicks	5.04±3.20	5.50±3.96	4.57±2.45
Offsides	1.97±1.41	1.70±1.32	1.33±1.24
Fouls	12.38±3.94	13.05±3.46	12.01±4.09
Yellow cards	2.28±1.44	2.38±1.51	2.68±1.65
Big chances	2.10±1.43	1.52±1.33	1.06±1.22
Saves	2.81±1.74	3.00±2.12	2.88±1.89
Passes	429.47±112.65	414.57±109.31	393.38±100.27
Accurate passes	341.81±114.56	324.95±110.92	304.72±99.29
Accurate passes (%)	0.78±0.07	0.76±0.08	0.76±0.07
Long balls	66.5±10.33	67.62±10.84	64.03±12.22
Accurate long balls	33.09±8.36	32.4±11.2	30.96±9.02
Long balls (%)	0.50±0.11	0.47±0.13	0.49±0.11
Crosses	18.93±9.53	20.95±12.15	18.00±7.33
Successful crosses	4.91±3.67	5.10±4.27	3.96±2.24
Successful crosses (%)	0.25±0.12	0.23±0.16	0.22±0.13
Dribbles	12.78±4.67	12.02±5.39	12.31±5.65
Successful dribbles	6.75±3.26	6.07±3.74	6.34±3.45
Successful dribbles (%)	0.54±0.22	0.49±0.22	0.53±0.22
Duels won	47.43±9.37	46.36±10.39	45.15±11.1
Aerial duels	14.76±5.62	15.05±6.25	13.29±6.3
Possessions lost	138.93±17.41	145.43±16.34	139.96±19.92
Balls recovered	14.32±4.42	12.88±3.93	13.75±4.51
Interceptions	12.09±5.82	11.29±5.58	12.22±5.06

The logistic regression results show that ball possession, shots, shots on target, offsides, and big chances are the only variables that significantly increase the likelihood of winning a match in the Croatian First Football League (**Table 2**).

In the multinomial regression, a win as the match outcome was taken as the reference category, while the odds ratios for a draw and a loss are shown in **Table 2** and graphically in **Figure 1**, **Figure 2** and **Figure 3**. When analysing the passing and possession variables, only possession was significantly associated with the outcome (loss), while the other variables showed no significant association (**Figure 1**, **Table 2**).

Table 2. The results of multinomial logistic regression (odds ratio, 95% confidence interval) of situational efficiency indicators for all three possible outcomes of matches in the First Croatian Football League

Parameter	Draw	Loss
Goals	2.770 (1.610–4.780)	8.61 (4.620–16.030)
Possession	0.213 (0.007–6.519)	0.045 (0.002–0.951)*
Shots	0.994 (0.926–1.067)	0.922 (0.863–0.985)*
Shots on target	0.835 (0.694–1.003)	0.669 (0.557–0.805)*
Corner kicks	1.044 (0.928–1.173)	0.95 (0.849–1.062)
Offsides	0.871 (0.652–1.162)	0.684 (0.515–0.907)*
Fouls	1.045 (0.946–1.155)	0.976 (0.894–1.065)
Yellow cards	1.046 (0.810–1.351)	1.183 (0.948–1.477)
Big chances	0.757 (0.567–1.009)	0.538 (0.393–0.737)*
Saves	1.055 (0.861–1.294)	1.021 (0.853–1.223)
Passes	0.999 (0.995–1.002)	0.997 (0.994–1.000)
Accurate passes	0.999 (0.995–1.002)	0.997 (0.994–1.000)
Accurate passes (%)	0.013 (0.000–2.964)	0.017 (0.000–2.112)
Long balls	1.009 (0.975–1.044)	0.98 (0.950–1.011)
Accurate long balls	0.992 (0.952–1.034)	0.975 (0.940–1.012)
Long balls (%)	0.116 (0.004–3.376)	0.335 (0.108–6.410)
Crosses	1.021 (0.982–1.062)	0.989 (0.953–1.026)
Successful crosses	1.014 (0.912–1.128)	0.912 (0.818–1.015)
Successful crosses (%)	0.474 (0.026–8.634)	0.237 (0.017–3.296)
Dribbles	0.972 (0.902–1.048)	0.983 (0.921–1.048)
Successful dribbles	0.943 (0.842–1.057)	0.966 (0.876–1.065)
Successful dribbles (%)	0.375 (0.062–2.266)	0.772 (0.161–3.701)
Duels won	0.990 (0.954–1.028)	0.978 (0.946–1.011)
Aerial duels	1.007 (0.947–1.072)	0.959 (0.905–1.016)
Possessions lost	1.020 (0.998–1.042)	1.003 (0.985–1.022)
Balls recovered	0.925 (0.844–1.013)	0.97 (0.898–1.048)
Interceptions	0.972 (0.903–1.046)	1.004 (0.945–1.067)

*P<0.001.

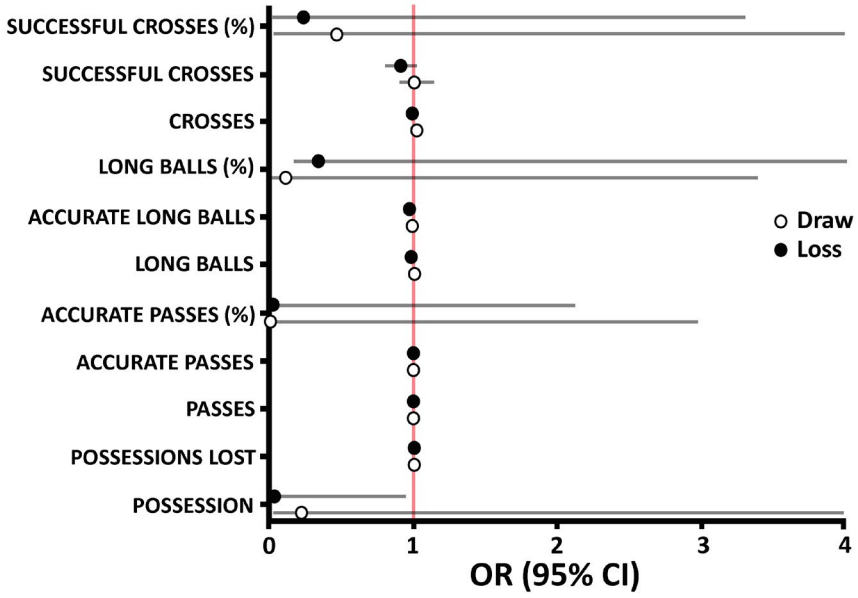

Figure 1. Multinomial regression of possession and passing variables and outcomes as categorical criteria variables for all three possible match outcomes (wins are set as the reference category). OR – odds ratio, CI – confidence interval.

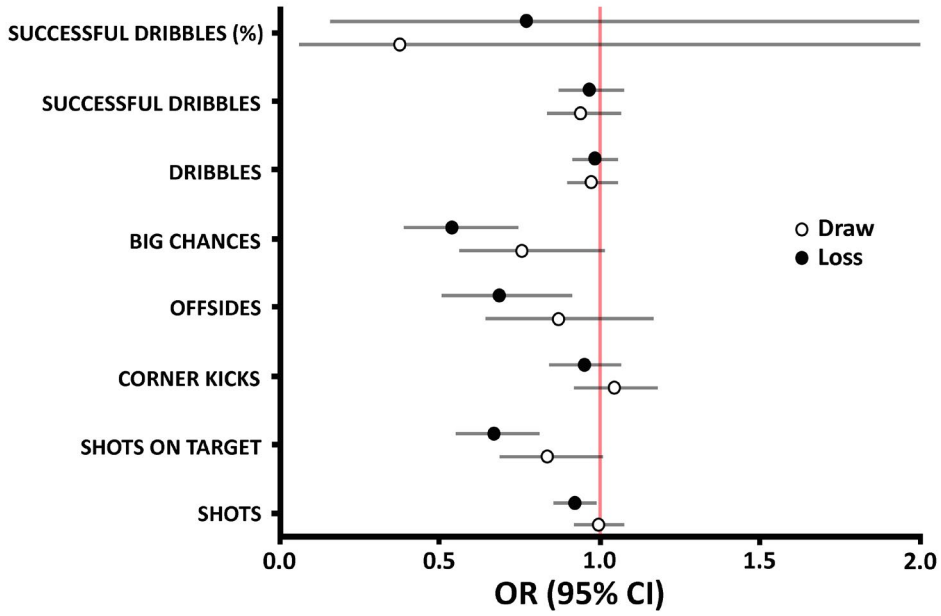

Figure 2. Multinomial regression of attacking variables and outcomes as categorical criteria variables for all three possible match outcomes (wins are set as the reference category). OR – odds ratio, CI – confidence interval.

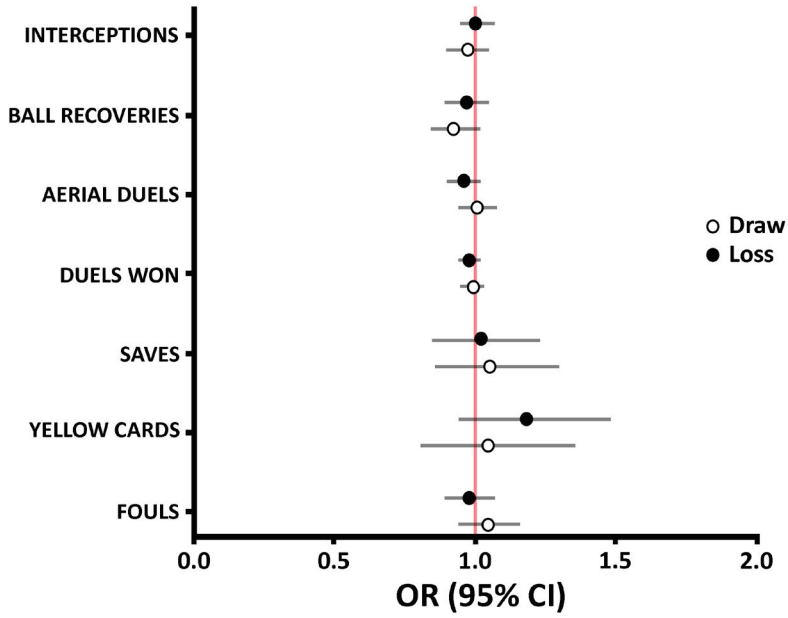

Figure 3. Multinomial regression of defence variables and outcomes as categorical criteria variables for all three possible match outcomes (wins are set as the reference category). OR – odds ratio, CI – confidence interval.

The analysis presented in **Figure 2** shows that the variables shots (OR=0.922, 95% CI=0.863–0.985, $P<0.001$), shots on target (OR=0.669, 95% CI=0.557–0.805, $P<0.001$), offsides (OR=0.684, 95% CI=0.515–0.907, $P<0.001$) and big chances (OR=0.538, 95% CI=0.393–0.737, $P<0.001$) are significantly associated with the outcome of the match, namely a loss.

Based on this overview, we can conclude that there is no significant association between any defence variables and the outcome of the matches in the Croatian First Football League (**Figure 3**).

Discussion

The main findings of this study show that the variables that make a significant difference between winning and losing teams are possession, shots, shots on target, offside and big chances. In addition, only shots on target have a statistically significant influence on the final ranking in the competition.

Possession is one of the most important aspects of modern football, as teams use possession in the attacking phase to create scoring opportunities. Teams with more possession use less energy as they control the tempo of the game and run less than teams without possession. On the other hand, possession is insignificant if it is not used proactively, i.e. if it is not used to create chances and score goals. At the same time, possession is a variable that distinguishes between teams that have won, teams that had drawn and teams that have lost the match (*6*). In addition to possession, the variables that relate to the attacking phase and have the greatest influence on the positive outcome of a match are the total number of shots and the total number of shots on target (*7*). Our results are in line with the already known fact that teams in the Croatian First Football League with more ball possession do not lose the game 77% of the time (*10*). However, there are also matches where teams with more possession do not win, which perfectly illustrates the complexity of the game of football (*11*).

Shots and shots on target are two variables that are closely related and crucial in football, as shooting is the most important technical and tactical means of attack. In addition, teams that reach the final third and finish their attacks with a shot tend to have fewer ball losses, as they have used the attacks to reach the final phase without their possession being interrupted. The results of this study confirm this, as they show significant differences in these variables between winning and losing games, with winning teams having significantly more shots overall and more shots on target. The number of shots on target is one of the key factors that differentiate successful from unsuccessful teams, and shots on target within 16 metres have a statistically significant effect on the criterion variable (number of goals), as more successful teams had higher values for this parameter (*1*, *4*). This result can be explained by the fact that most shots within 16 metres have a certain “surprise effect” because the goalkeeper and defenders do not have enough time to block such shots. Overall, the quality of the shots is much more important for winning a football match than the total number of shots (*5*).

More successful teams, i.e. teams that won more often, had on average more offsides per match, which is an interesting indicator of the style of play of the winning teams. Although offside is not in itself an indicator of efficiency in football, this result can easily be explained by the fact that teams with more possession and more shots are likely to be offside more often. Our findings are consistent with the results of previous studies conducted on both foreign teams and domestic league matches, which show that more successful and winning teams have a higher number of offsides per match (*6*, *12*).

One of the most important attacking variables that shows statistical significance in football is the “big chance”. Although this variable is statistically significant as a predictor of success in the Croatian First Football League, big chances are specific to the SofaScore ap-

plication and there are no studies to date in which this variable has been used. However, the results show that teams that create a greater number of big chances per match are more likely to win more games. These teams often play an attacking style of play with a high attacking frequency, which exposes the opposing team to a greater risk of scoring a goal. Big chances usually occur when the attacking team's technical and tactical skills outstrip the opposing team's defensive reactions, giving the attackers the opportunity to shoot at the opponent's goal unhindered, resulting in a high probability of a goal being scored (*13*, *14*).

Although this study found no statistically significant influence of defence variables on the outcome of a match, it cannot be said that these variables are not important for success in football. For a team to have a chance of scoring a goal, it must first gain possession of the ball, and to gain possession of the ball, it must have a well-organised and structured defence. Previous studies have shown that some defence variables (such as winning the ball in the air and on the ground) have a statistically significant influence on the outcome of the match (*8*). However, based on the analysis of the results of this study and a review of existing knowledge, we can conclude that in the highest division of Croatian football, possession and the attacking phase are indeed more important for the outcome of a match than the defensive phase.

In line with the aim of this study, the results suggest that variables such as ball possession, shots, shots on target, offside and big chances significantly influence the outcome of matches in the Croatian First Football League. Furthermore, the results have shown that teams that play an attacking style of football with a high percentage of possession and a high frequency of attacks (shots, shots on target, offside and big chances) are ultimately more successful, i.e. achieve a greater number of wins. We believe that this study, together with existing studies that have investigated situational efficiency in Croatian top-level football, will contribute to the knowledge about the determinants of efficiency due to the number of variables included and analysed (*9*, *10*, *12*, *15*).

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ORCID

Jakša Škomrlj https://orcid.org/0009-0006-6090-7773

Šime Veršić https://orcid.org/0000-0001-7203-0776

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