

## ANALYSIS OF CROSSES IN THE CROATIAN FIRST FOOTBALL LEAGUE

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### Abstract

Based on 88 matches of 2014/2015 first Croatian football league we determined the importance of crosses with regard to final outcome of the match and competition. Using Mann-Whitney test and Pearson coefficient we gathered data that crosses do not pose a significant difference between winning and defeated team ( $p=0,38$ ), and they show a medium positive relation to the final placement in league system of competition ( $r=0,63$ ). This data points to the necessity of a more quality training of crosses from the position on the field it's kicked from, the direction of the ball going towards the co-player, and the position of co-players who are supposed to make the cross happen.

**Key words:** crosses, notational analysis, situational efficacy, football

### Introduction

Team and individual sports or martial arts combats can be observed as complex dynamic systems where two opponents clash (two teams or two individuals) and their performance is determined by the level of abilities, skills, and knowledge which players and competitors use in order to eventually win. In football, this clash occurs during a match. Observing the football match you can notice many characteristic events which can be recognized and noted, and which show the degree of situational efficacy of player and team, and the level of their performance. The cross is one of the most recognizable events happening during the match.

It happens in the offense phase when the ball is directed (via ground, above it, or via air) from the different wing zones of the field into a central space of offense at a distance greater than 15 meters (in relation to the co-player to whom the ball is directed to), and all in order to create a good opportunity for scoring a goal (Bašić et al., 2015.)

Depending on spatial relations of wing places and opponent goal, the direction of the cross can be a forward diagonal cross, backward diagonal cross, and parallel cross. Crosses need to be noted as indicators of situational efficacy so that we can see the possible differences between winning and defeated teams and relation to final placement.

### Method

#### Material for analysis

Research was conducted on 88 matches of Max TV first Croatian football league. For the needs of this study we analyzed a half-season consisting of 90 matches. Due to certain technical issues, one match was not filmed, and one ended in 3:0 score because the rules were not upheld.

#### Sample

Entities of this research are teams. First Croatian football league has 10 clubs.

#### Variable sample

Matches were described using notated performance indicators (variables) of the crosses (Bašić et al., 2015).

#### Data collection

Matches were filmed to HDD/DVD in the form of video. Using a special computer tool called Courteye, matches were analyzed and prepared for data study. Five notators worked on analyzing the matches.

#### Statistical analysis

For determining the reliability of gathered data, we used the intra-observer variability for differences between data gathered by the same notator on two different occasions (Hughes et al., 2002, 2003, 2004). For crosses we gathered a 92% reliability. For determining the differences between winning and defeated teams, we used t-test and Pearson correlation coefficient to establish the connection between performance indicators and final outcome of the competition.

### Results

Structure of crosses with regard to outcome

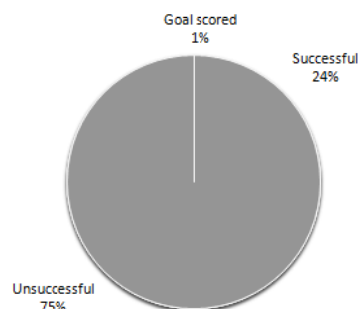


Image 1. The percentage of successful and unsuccessful crosses and crosses which led to a goal score.

Table 1. Final placement of teams after a half-season (TEAM), total number of matches played (NM), number of wins (POB), draws (DRAW) and losses (LOS), as well as number of points (PTS), number of points per match (P/M) and a total number of crosses (N-CS), arithmetic mean of center shots (AM-CS) and correlation coefficient of crosses and final placement (r).

TEAM	NM	WI	D	LOS	PT	P/M	N-CS	AM-
Dinamo	17	13	4	0	43	2,53	524	30,82
Rijeka	18	12	3	3	39	2,17	411	22,83
Hajduk	17	8	5	4	29	1,71	352	20,71
Lokomotiva	18	7	4	7	25	1,39	265	14,72
Zagreb	18	6	6	6	24	1,33	242	13,44
Sl. Belupo	17	5	5	7	20	1,18	314	18,47
Split	17	3	8	6	17	1,00	386	22,71
Istra 1961	18	3	7	8	16	0,89	288	16,00
Osijek	18	4	3	11	15	0,83	416	23,11
Zadar	18	3	3	12	12	0,67	265	14,72
<b>r=0,63</b>								

Table 2. Arithmetic mean (AM) and standard deviation (SD) of crosses of the winning team (WIN) and the losing team (LOS) and z-value (z) for determining differences and errors (p).

	AM	SD	z	p
WIN	19,70	9,75	0,87	0,38
LOS	18,14	9,33		

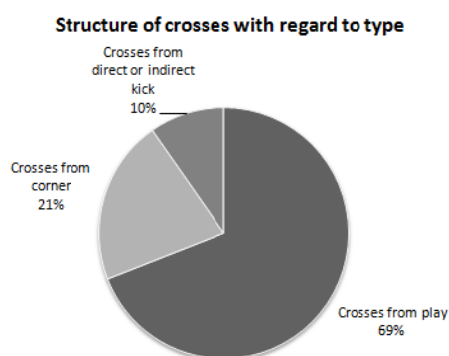


Image 2. Percentage of crosses from corner (CSC), from play (CSP) and from direct and indirect kick (CSK).

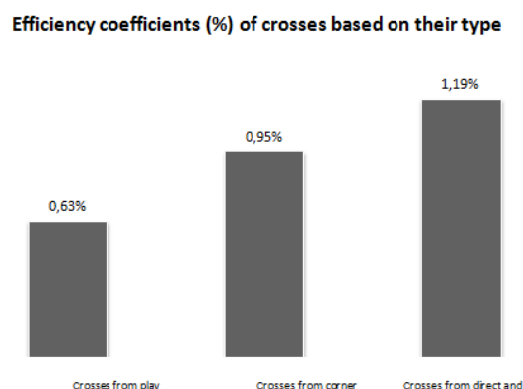


Image 3. Percentage of success of crosses from play, from corner, and from direct and indirect kicks.

## Discussion and conclusion

Based on results (Table 1 and 2) of correlation coefficient ( $r=0,63$ ) and the difference between the arithmetic mean of winning (AM=19,70) and defeated teams (AS=18,14), which is not statistically significant ( $p=0,38$ ), we can conclude that crosses, as situational efficacy indicator, does not differentiate the winning and the defeated teams, but there is a medium positive relation to final placement in league system of competition. These results are in accordance with some others (Lago-Penas and assoc., 2010; Lago-Penas and Lago-Ballesteros, 2011; Redwood-Brown, Bussell and Bharaj, 2012) where there is either the same number of crosses no matter the placement, or the number of crosses of the winning team is not significantly greater. Sometimes there are more crosses in a defeated team's play. A very small number of studies noted a greater number of crosses in a winning team's play. According to the definition, the cross is the ball directed via ground or air from the wing/side space into a central space of the field, but we should also keep in mind that not all crosses are the same – those in opening sub-phase or the middle of the offense or ending sub-phase, when the ball is thrown from the side space into a central space in front of opponent's goal. The weaker teams, who do not have the abilities for quality combinatorics, often „skip“ the play and have many crosses as long kicks from side space in opening sub-phase or middle of the offense into a central space of ending sub-phase.

This type of crosses usually go diagonally forward. In order to do a cross in offense ending sub-phase, the team must be very good at spatial and time components of the game and transfer the ball into offense ending sub-phase through the side. Image 1 shows that crosses have a low efficiency. Only 1% of a relatively big number of crosses (AM=19,70) and total number (more than 300 or even 500 in best teams) end up in a goal score, while 24% of crosses are successful in a way of contact with the ball. 74% are unsuccessful.

But we must mention that the success of crosses does not depend solely on the player performing it but the defending player as well. So when we observe the crosses which scored a goal and which ended successfully, we can see that 25% of them created a certain advantage for the offense team. This rate of 25% coincides with the research of Shafizadeh, Taylor and Lago-Penas (2013). Based on Image 2 we can see types of crosses. The largest number of them is done from play (69%) – the defending team defends their goal, and the shortest way to opponent goal is through center space but because there are many opponent defense players in that space, they cannot directly pass through so they need to include combinatorics to find different solutions. Side spaces (wings) generally have less players present so that space can be won in order for the ball to pass through central space (in front of opponent's goal). Corner kick are defined by football rules.

Corner kicks are usually done in a simplest manner – directing the ball into central space in front of opponent's goal – that is because the team performing the corner kick is at risk of leaving their own goal door unattended. Since there is a large number of both offense and defense players present, there is a certain possibility that corner kick (cross from corner kick) will become a goal score if the offense team has good quality crosses executives and jumpers. As in a corner kick, the crosses from direct or indirect kick are performed when the opponent's defense players break the rules, leaving the possibility for the offense team to go for the cross from the given situation. Data shows that 10% of crosses are done from direct and indirect kicks. In order to perform crosses from situations mentioned, we need to conform to spatial component of the play – the restart of the match needs to happen closer to team's own goal door.

If the match is stopped closer to team's own goal door, a short playoff is usually utilized. For crosses from direct and indirect kicks we apply similar rules as for corner kicks – the offense team needs to have players specialized for performing and realization of crosses. Through a good cooperation of those players crosses can be efficiently performed from mentioned game stops. The advantage of crosses from game stop (corner, direct, indirect kick) is the fact that the ball remains still so the performer faces an easier task – there is no disturbance by the opponent defense player. On the other hand, crosses from play, since it is not performed dynamically, is a greater surprise factor for opponent defense players, since defense players have an easier time foreseeing the opponent's offense action from game stops. In training, teams should equally work on crosses from all aspects of the play. Image 3 shows efficiency of different types of crosses. Most of them are performed from play so it can be expected they have a lower efficiency (0,63%). Bear in mind that when the ball is directed into central space in front of opponent's goal door, there is often less offense players and defense players outnumber them, which adds to possibility of their success. Also, as we already mentioned, the success and efficiency of crosses depend not only on type but the performer as well, and other offense players. Efficiency of crosses from corner kick is 0,95%, which is in accord with

research done by De Barand and Lopez-Riquelma (2012). Corner kick poses a certain offense advantage, but also – due to a large number of defense players – often offense players cannot utilize that advantage and claim the ball to score a goal. Also, speaking of crosses from corner kick, they are usually performed using the head, which is less precise than the leg, so the probability of scoring a goal is also smaller. A somewhat greater efficiency (1,19%) is seen in crosses from direct and indirect kicks. The total number of these types is smaller, so the total efficiency is greater. Based on the results for *crosses* variable, we can conclude that it does not have a significant impact on the match outcome, but there is a certain positive correlation with final placement in league system of competition. *Efficiency* of crosses is very low (1%) – only in 24% of situations offense players managed to claim the ball, but we must say that there was an above average number of crosses in matches ( $AM=19,70$ ). The low efficiency should not be surprising because the most difficult thing in a match is to score a goal.

Teams that are better ranked will have slightly more crosses throughout the whole competition (state championship), but there is still no significant difference between the winning and defeated teams nor is there a high correlation between crosses and final placement of a team in a league system of competition. On the other hand, a greater number of crosses can have a positive correlation (as mentioned earlier) with other offense actions (ball possession, goal kicks, ball passes) which are significantly related to the final outcome of the match or competition. It is also obvious that crosses represent a complex tactical play device, dependent on a great number of factors such as the position of the player performing the cross, the position of co-player to whom the cross is directed at, the number of players who are able to receive the ball or react to cross, and the success of technical ball elements (receiving, passing) and elements without the ball (reveal, free space run-in). In training, attention must be paid to perfecting crosses regardless of factors mentioned, and eventually seek other solutions for scoring a goal (combinatorics through central space), and especially for performing crosses from game stops.

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## ANALIZA CENTARŠUTEVA U PRVOJ HRVATSKOJ NOGOMETNOJ LIGI

### Sažetak

Na temelju 88 utakmica prve Hrvatske nogometne lige sezona 2014/2015 utvrđivana je važnost centaršuteva s obzirom na konačan ishod utakmice i natjecanja. Primjenom Mann-Whitneyjevog testa i Pearsonovog koeficijenta korelacije dobiveni su podaci da centaršutevi statistički značajno ne razlikuju pobjedničke od poraženih ekipa ( $p=0,38$ ), te da pokazuju srednje pozitivnu povezanost s krajnjim plasmanom u ligaškom sustavu natjecanja ( $r=0,63$ ). Dobiveni podaci ukazuju na potrebu kvalitetnije metodike obuke centaršuteva sa stajališta pozicije na igralištu koje je upućen, smjera lopte koja se upućuje suigraču, te pozicioniranju suigrača koji bi trebali centaršut realizirati.

**Ključne riječi:** centaršutevi, notacijska analiza, situacijska efikasnost, nogomet

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