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Effectiveness of Indirect Free Kicks in Elite Soccer

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Abstract

The aims of this study were to determine the effectiveness of indirect free kicks, identify variables associated with a successful outcome, and propose a model for taking free kicks with an increased probability of success. The analysis focused on 783 free kicks taken in 124 matches at the 2010 FIFA World Cup, the final stages of the UEFA Champions League in 2010/11, and the 2010 UEFA European Championships. The following variables were studied by univariate, bivariate, and multivariate analyses: time of the match when the indirect free kick was taken, position and laterality of the kick, number of attackers, number of defenders, interaction context, delivery of ball, path of ball, type of marking, number of intervening attackers, area to which the ball was passed, shooting area, offensive organization, type of shot, and match status. The results show that almost 36 indirect free kicks are needed to score a goal, but that 64% of goals from indirect free kicks have a decisive influence on game outcome. Goals were more common when the attack was organized dynamically and three or four players touched the ball before a shot was taken. These findings could help coaches to improve free-kick performance.

Key words: observational methodology, performance analysis, logistic regression

1. Introduction

Goals are one of the most difficult and attractive aspects of soccer due to their relative scarcity and the permanent expectation they create as a single goal can have a decisive impact on the outcome of a match (Dufour, 1993; Castelo, 1994; Castellano, 2009; Marques, 1995; Garganta & Pinto, 1995; Wallage & Norton, 2013). Research in the field has increasingly focused on tactical and offensive performance factors to identify elements of play that could, among other things, improve the effectiveness of attack strategies tactics and generate more goals (Hughes, Robertson, & Nicholson, 1988; Griffiths, 1999; Stanhope, 2001; Hook & Hughes, 2001; Taylor & Williams, 2002; Horn, Williams, & Ensum, 2002; Jones, James, & Mellalieu, 2004; Scoulding, James, & Taylor, 2004; Hughes & Churchill, 2005; Hughes & Franks, 2005; Lago Peñas, Lago Ballesteros, Dellal, & Gómez, 2010; Casal, 2011; Castellano, Álvarez, & Blanco Villaseñor, 2013; Ardá, Maneiro, Rial, Losada, & Casal, 2014).

Castelo (1999) and Mombaerts (2000), perhaps aware of the ever-changing nature of soccer and the trend towards fewer goals per match, reported that set-piece goals can decide the outcome in important or close matches between teams with similar skills and levels of play. The search for set-piece goals, resulting from either individual actions (penalties or direct free kicks) or group actions (throw-ins, corner kicks, or indirect free kicks) is a feature of all soccer matches. Elite soccer is increasingly characterized by high-pressure matches between teams of similar quality, hence the importance of set plays as they have a direct influence on performance and often lead to goals that decide the outcome of a match (Silva, 2011).

The importance of set-piece goals has been highlighted by numerous studies. Mombaerts (2000) and Greghaigne (2001) reported respectively that 30% and 25% of all goals come from set play, while Bangsbo and Peitersen (2003) indicated that 32% of all goals in the 1990 World Cup in Italy and 25% of those in the 1994 World Cup in the USA were scored from set-play situations. Casáis (2006) has reported a rate of 33.4% and Vázquez (2007a, 2007b) an even higher rate of 41.5% for goals generated by dead-ball situations. On analyzing FIFA World Cup Final Competitions, Acar *et al*. (2009) reported the following rates for set-piece goals: 37% for Germany 2006, 29% for Korea/Japan 2002, 24.6% for France 1998, 27.3% for Mexico 1986, and 26% for Spain 1982. Finally, according to Silva (2011), one-third of all goals scored in the top division of the Spanish football league (*La Liga*) in 2008-09 were from set play.

Set-play, or dead-ball, situations are situations in which the ball is returned to open play following a stoppage. The ball can be thrown (from the sidelines) or kicked back into play (kick-off, corner kicks, penalties, or direct or indirect free kicks). Indirect free kicks have been studied, but not extensively. In one analysis of 100 goals in *La Liga* during the 1993-94 season, De Paz and Yagüe (1995) found that 29% of the goals were set-piece goals and that almost a third of these (31.03%) were from indirect free kicks. Roxburgh and Turner (2008, 2009, 2010, 2011, 2012), on analyzing different aspects of goals scored in the UEFA Champions League between 2007/08 and 2011/12, reported that almost 6% of goals came from an indirect free kick. Njororai (2013), in turn, reported a rate of 28.57% for the 2010 FIFA World Cup in South Africa.

None of the studies analyzing indirect free kicks in soccer have specifically focused on determining or examining the factors that might influence the effectiveness of these kicks. The aim of the current study was to add to this body of knowledge by providing information on the execution and effectiveness of indirect free kicks in elite soccer and analyzing factors associated with successful outcomes. Our findings might provide valuable insights into how soccer professionals could improve their performance.

2. Methods

2.1. Study design

A non-participative observational approach was applied, using a folow-up / nomothetic / multidimensional design (quadrant IV), as described by Anguera, Blanco and Losada (2001) and Anguera, Blanco Villaseñor, Hernández Mendo and Losada (2011).

2.2. Participants

In total, 783 of 3775 direct and indirect free kicks were analyzed. The kicks were taken in 124 matches in the 2010 FIFA World Cup in South Africa (N = 64), the final stages of the UEFA Champions League 2010/11 (N = 29), and the 2012 UEFA European Championships in Poland/Ukraine (N = 31). To select the sample, we took into consideration the following contextual variables: match status and the quality of the teams. We coded indirect free kicks awarded as such by the referee in addition to direct free kicks taken as if they were indirect kicks during the regulatory 90 minutes of play. Kicks taken during extra time were not included as these were considered special cases. In all cases, the purpose of the kick had to be to score a goal and not simply to put the ball back into play (Pérez & Vicente, 1996). It was considered that the team intended to score a goal when up to four players touched the ball before a shot was taken or up to three players touched it before the ball reached the shooting area.

2.3. Observation tool

An ad hoc observation tool with a field-format design, as described by Anguera, Blanco, Losada, and Hernández Mendo (2000) was designed (Table 1). Data were recorded using the software program NAC SPORT ELITE 42 and analyzed using the binary logistic regression model in IBM SPSS Statistics, version 20.

Table 1. Summarized description of the variable criteria within the observational tool.

Criterion	Categories
Time (T)	0' - 30'(30)
	31'- 60' (60)
	61'- 90' (90)
Position of free kick (LS)	Far right (ED)
	Far left (EI)
	Near right (ID)
	Near left (II)
	Area in front of penalty box (FAP)

Laterality of kick (LG)	Natural: Right-foot kick from right wing or left-foot kick from left wing (LN)
	Switched: Right-foot kick from left wing or left-foot kick from right wing (LC)
No. of attackers (JA)	Two or three players on the team being observed are attacking and in a position to receive the ball (2-3)
	Four or five players on the team being observed are attacking and in a position to receive the ball (4-5)
	Six or more players on the team being observed are attacking and in a position to receive the ball (6 or more)
No. of defenders (JD)	Four or five players on the team not being observed are defending and in a position to recover the ball (4-5)
	Six or more players on the team not being observed are defending and in a position to recover the ball (6 or more)
Interaction context (COI)	Numerical Inferiority: The attacking team has fewer players than the defending team in the shot zone (INF)
	Numerical Equality: The attacking team has the same number of players as the defending team in the shot zone (IGU)
	Numerical Superiority: The attacking team has more players than the defending team in the shot zone (SUP)
Delivery of ball (EDF)	Direct: The ball is sent to the shot zone with just one touch (ED)
	Indirect: The ball is sent to the shot zone after several touches (EI)
Path of ball (TB)	Ground: The ball is considered to be delivered to the shot zone along the ground when it rolls along the ground at all moments (TRS)
	Air: The ball is considered to be delivered to the end of play zone through the air when it leaves the ground at some point during its path (TA)
Type of marking (MAR)	Man-to-man: Each attacker is marked by a defender (IND)
	Zone: Each player on the team not being observed is responsible for a clear, predefined area of the pitch and intervenes when the ball or an attacker, with or without the ball, enters this zone (ZO)
	Combined: Some players are defending man-to-man, while others are playing a zone defense (COM)
No. of intervening attackers (NJ)	One or two players on the team being observed interact with the ball (1-2)
	Three or four players on the team being observed interact with the ball (3-4)
Zone to which pass is	Near post: Area between centre of crossbar and right sideline

made (ZEPP)	(PP)
	Far post: Area between centre of crossbar and left sideline (SP)
Shooting area (ZFJ)	Near post (PPF)
	Far post (SPF)
Offensive organization (MOO)	Static: The players on the team being observed stay in their set positions throughout the course of the indirect free kick (MOE)
	Dynamic: The players vary theirs positions in the coded end of shot zone throughout the course of the free kick (MOD)
Type of shot (FF)	Header (FC)
	Kick (FP)
Match status (RP)	Winning (GA)
	Drawing (EM)
	Losing (PE)

Set out below, in Figure 1, is the division into areas of the pitch used to determine the location of the indirect free kick shot, with the dimensions corresponding to each of its areas.

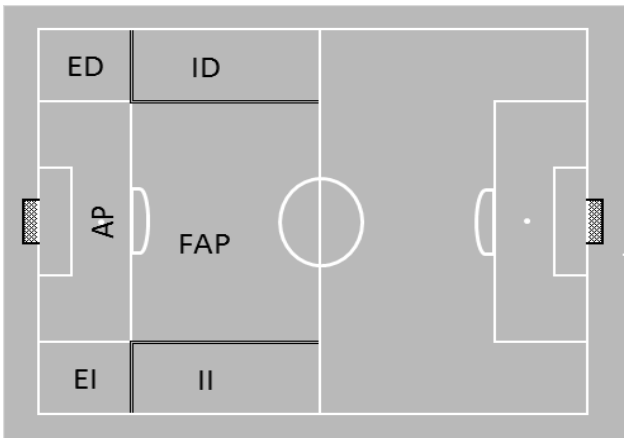

Figure 1. Area division used to position of free kick (LS).

2.4. Procedure

The observers were trained following the protocols described by Losada and Manolov (2014), which encompass basic and applied training. The quality of the data was evaluated by comparing pairs of data recorded by each of the four observers, and calculating Cohen's kappa statistic for interobserver agreement. The results (Table 2) show a good level of agreement for observer 2 versus observer 4 and observer 1 versus observer 3 and an excellent level of agreement for the rest. These results reflect the high quality of the data used. The time, position of the kick, laterality, interaction context, path of ball, type

of marking and match status, categories are constant and meaningless calculating kappa coefficient (its value is always 1).

Table 2. Interobserver Agreement

Categories	Ob_1-Ob_2	Ob_1-Ob_3	Ob_1-Ob_4	Ob_2-Ob_3	Ob_2-Ob_4	Ob_3-Ob_4
No. of attackers (JA)	0.87	0.81	0.70	0.58	0.7	0.79
No. of defenders (JD)	0.89	0.85	0.56	0.8	0.71	0.8
Delivery of ball (EDF)	0.81	0.76	0.54	1	0.71	0.84
No. of inter. attackers (NJ)	0.84	0.88	1	0.85	0.7	0.8
Zone pass (ZEPP)	0.78	0.84	1	0.38	0.71	0.82
Shooting area (ZFJ)	0.82	0.82	0.81	1	0.64	0.79
Offensive organiz. (MOO)	0.81	0.81	0.45	1	0.64	0.78
K_{total}	**0.83**	**0.82**	**0.73**	**0.97**	**0.68**	**0.81**

In line with the objectives of our study, we performed three complementary analyses: a descriptive or univariate analysis, a comparative or bivariate analysis, and a predictive or multivariate analysis. The univariate analysis was used to describe how indirect free kicks are taken in elite soccer (number of kicks per match, technique used, and effectiveness of technique); the bivariate analysis was used to identify, via contingency tables (chi-square and association measures), variables that were significantly associated with free-kick success (defined as shot or goal); and the multivariate analysis was used to identify factors that predict the success of indirect free kicks.

3. Results

3.1. Descriptive analysis

The findings show that in an average match each team takes three indirect free kicks aimed at scoring a goal. In total, 2.9% (SD=0.98) of these kicks ended in a goal (in other words, almost 36 indirect free kicks are needed to score a goal), 9.3% (SD=3.07) ended in a shot between the posts, and just 21.8% (SD=7.54) ended in a shot (Figure 2).

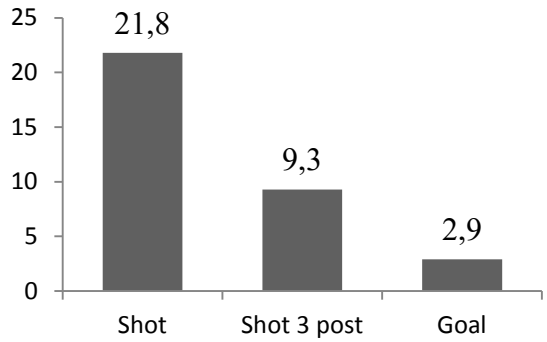

Figure 2. Effectiveness of indirect free kicks according to criteria used.

Although the indirect free kicks analyzed were decidedly ineffective, those that did end in a goal tended to be decisive, as 64% contributed in some manner to the final result of the match (Figure 3).

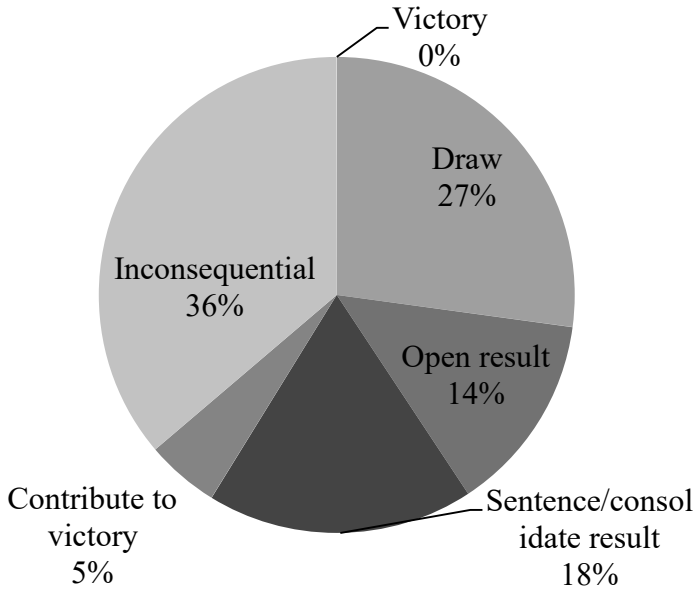

Figure 3. Significance of the indirect free kicks in the final result of the match.

3.2. Bivariate analysis

The bivariate analysis was used to identify variables that were significantly associated with the effectiveness of indirect free kicks. We constructed contingency tables to compare effectiveness according to the different categories or conditions analyzed. The results of the chi-square tests with calculation of contingency coefficients showed a significant association between free-kick success and certain variables. Table 3 shows the variables that were significantly associated with a shot (yes/no): delivery of ball (EDF) ($\chi2 = 11.90$; $p = 0.001$), path of ball (TB) ($\chi2 = 41.31$; $p < 0.001$), number of intervening attackers (NJ) ($\chi2 = 36.15$; $p < 0.001$), and offensive organization (MOO) ($\chi2 = 63.75$; $p < 0.001$).

Table 3. Effectiveness of indirect free kicks according to shot criterion (yes/no).

Variable		Criterion 1: Shot				
		% Yes	% No	χ^2	Sig.	Contingency Coefficient
T	0’ - 30’	17.8	82.2			
	31’- 60’	24.4	75.6	3.24	0.19	---
	61’-90’	22.8	77.2			
LS	ED	27.3	72.7			
	EI	19	81			
	ID	21.7	78.3	2.11	0.71	---
	II	19.2	80.8			
	FAP	23.2	76.8			

LG	LN	21.8	78.2	<0.001	1	---
	LC	21.8	78.2			
JA	2-3	18.5	81.5			
	4-5	22.3	77.7	1.49	0.47	---
	6 or more	24.1	75.9			
JD	1-4	17.9	82.1			
	5-6	22.8	77.2	0.84	0.65	---
	7 or more	21.9	78.1			
COI	INF	21.3	78.7			
	IGU	35.5	64.5	4.05	0.13	---
	SUP	0	100			
EDF	ED	19.5	80.5	11.90	0.001	0.12
	EI	33.6	66.4			
TB	TRS	55.9	44.1	41.31	<0.001	0.22
	TA	19.1	80.9			
MAR	IND	32.1	67.9			
	ZO	21.9	78.1	1.82	0.40	---
	COM	21.4	78.6			
NJ	1-2	18.6	81.4	36.15	<0.001	0.21
	3-4	47.2	52.8			
ZEPP	PP	22	78	0.004	0.94	---
	SP	21.6	78.4			
ZFJ	PPF	22.4	77.6	0.08	0.76	---
	SPF	21.3	78.7			
MOO	MOE	9.7	90.3	63.75	<0.001	0.27
	MOD	33.5	66.5			
FF	FC	43.6	56.4	0.15	0.90	---
	FP	41.1	58.6			
RP	GA	29.2	70.8			
	EM	20.7	79.3	5.74	0.05	---
	PE	19.2	80.8			

The data show that indirect free kicks are more effective when the ball is passed to another player before it reaches the shooting area (short pass), when it is not passed through the air, when three or four attackers touch the ball, and when the offensive organization is dynamic.

Table 4 shows the results for the criterion goal (yes/no). As can be seen, just two variables were significantly associated with free-kick success in this case: number of intervening attackers (NJ) ($\chi2 = 11.6$; $p = 0.001$) and offensive organization (MOO) ($\chi2 = 16.05$; $p = <0.001$). The rate of goals was higher when three or four attackers touched the ball and when the attack was organized dynamically.

Table 4. Effectiveness of indirect free kicks according to goal criterion (yes/no).

Variable		Criterion 2: Goal				
		% Yes	% No	χ^2	Sig.	Contingency Coefficient
T	0’ - 30’	3.1	96.9			
	31’- 60’	1.8	98.2	1.13	0.56	---
	61’-90’	3.3	96.7			
LS	ED	2.3	97.7			
	EI	7.1	92.9	3.99	0.40	---
	ID	2.1	97.9			
	II	3.5	96.5			
	FAP	2.3	97.7			
LG	LN	2.1	97.9	1.15	2.84	---
	LC	3.6	96.4			
JA	2-3	1.3	98.7			
	4-5	3.2	96.8	1.71	0.42	---
	6 or more	3	97			
JD	1-4	2.6	97.4			
	5-6	1.3	98.7	4.97	0.08	---
	7 or more	4.1	95.9			
COI	INF	2.9	97.7			
	IGU	0	100	0.99	0.60	---
	SUP	0	100			
EDF	ED	2.3	97.7	2.66	0.10	---
	EI	5.3	94.7			
TB	TRS	5.1	94.9	0.47	0.49	---
	TA	2.6	97.4			
MAR	IND	0	100			
	ZO	2.6	97.4	0.87	0.64	---
	COM	3	97			
NJ	1-2	2	98	11.6	0.001	0.13
	3-4	9	91			
ZEPP	PP	2.3	97.7	0.49	0.48	---
	SP	3.4	96.6			
ZFJ	PPF	3	97	0.008	0.98	---
	SPF	2.6	97.4			
MOO	MOE	0.3	99.7	16.05	<0.001	0.14
	MOD	5.2	94.8			
FF	FC	12.9	87.1	<0.001	1	---
	FP	12.9	87.1			
	GA	2.8	97.2			

RP	EM	2.2	97.8	1.62	0.44	---
	PE	3.9	96.1			

3.3. Multivariate Analysis

Using the results from the bivariate model, a theoretical explanatory model was built to explain the effectiveness of indirect free kicks. Two binary logistic regression analyses were performed for empirical testing. The dependent variable was shot in the first model and goal in the second. Variables that were significantly associated with each of these criteria in the bivariate models (4 for shot and 2 for goal) were used as independent variables, or predictors. Stepwise regression using the Wald statistic was used to build the model. The shot criterion model was expressed by the following equation:

$$\text{Logit SHOT} = \alpha + \beta_1 (\text{EDF}) + \beta_2 (\text{TB}) + \beta_3 (\text{NJ}) + \beta_4 (\text{MOO}) + \varepsilon \quad (1)$$

The results are shown in Table 5. As can be seen, the model was statistically significant ($\chi 2=124.58$; $p<0.001$) but had moderate explanatory power. The rate R^2 indicates the effect size, is defined how the part of the criterion variable that can be controlled, predicted or explained by the predictor variables (Snyder and Lawson, 1993). There are different ways of calculating a R^2 in logistic regression, and there is no consensus on which is better. The two most common methods have been proposed by McFadden (1974) and another that is attributed to Cox and Snell (1989), together with its "corrected" version of Nagelkerke. Shown that the value Shot ($R^2 = 0.23$) had its substantive importance, but at the statistical level was some powerful.

Table 5. Results of logistic regression for shot criterion.

Criterion 1: Shot					
Variable	**B**	**E.T.**	**Wald**	**Sig.**	**Exp (B) [IC]**
MOO	1.69	0.22	59.01	<0.001	5.43 [3.53-8.37]
TB	-1.78	0.33	28.84	<0.001	0.17 [0.09-0.32]
NJ	0.92	0.27	11.87	<0.01	2.51 [1.49-4.24]
Constant	-1.69	0.78	4.77	<0.05	0.18
χ^2 (sig)	R^2Nagelkerke	Hosmer & Lemeshow			% correctly classified actions
124.58 (p<0.001)	0.23	3.04 (p=0.22)			80.1%

Three variables entered the shot criterion equation: offensive organization (MOO), ball path (TB), and number of intervening attackers (NJ). Delivery of ball (EDF) was not statistically significant ($p > 0.05$).

Offensive organization (MOO) had a positive coefficient (B = 1.69), revealing that indirect free kicks are more effective when the attack is organized dynamically. The odds ratio was 5.43, which indicates that the chances of success are over five times greater than in static attack situations.

The coefficient for ball path (TB) was negative (B = −1.78) and the odds ratio was 0.17, indicating that the likelihood of a shot resulting from an indirect free kick is 5.88 times higher (1/0.17) when the ball is passed along the ground than when it is passed through the air.

In the case of number of intervening attackers (NJ), the coefficient was positive (B = 0.92) and the odds ratio was 2.51, meaning that the chances of success are 2.51 times higher when three or four players as opposed to one or two players touch the ball in the shooting area.

Once estimated, the values for the different parameters, expressed as logit units, were included in the equation as follows:

$$\text{Logit}(p) = -1.69 + 1.69(\text{MOO}) - 1.78(\text{TB}) + 0.92(\text{NJ}) \quad (2)$$

The probability of a shot being taken following an indirect free kick under "optimal" conditions can be estimated by choosing the most favorable condition for each variable.

$$P(shot)/MOO(1)TB(2)NJ(1)\frac{e^{-1.69+1.69-1.78+0.92}}{1+e^{-1.69-1.69-1.78-0.92}} = 0.852 \quad (3)$$

In other words, if the ball is passed along the ground between three or four players in a dynamically organized attack, the estimated probability of a free kick resulting in a shot is 0.85.

The starting model for the goal criterion was expressed as follows:

$$\text{Logit GOAL} = \alpha + \beta_1(\text{MOO}) + \beta_2(\text{NJ}) + \varepsilon \quad (4)$$

As can be seen in Table 6 the model was statistically significant ($\chi 2 = 29.58$; $p < 0.001$) but had weaker explanatory power than the shot model (R^2=0.16).

Table 6. Results of logistic regression for shot criterion.

		Criterion 2: GOAL			
Variable	**B**	**E.T.**	**Wald**	**Sig.**	**Exp (B) [IC]**
MOO	2.96	1.03	8.28	<0.01	19.26 [2.57-14.35]
NJ	1.38	0.47	8.75	<0.01	3.99 [1.59-9.97]
Constant	-10.51	2.09	25.24	<0.001	0.001
χ^2 (sig)	R2Nagelkerke	Hosmer & Lemeshow			% correctly classified actions

29.58 (p<0.001)	0.16	0.39 (0.82)	97.2%

Just two variables entered the equation: offensive organization (MOO) and number of intervening attackers (NJ). The coefficient was positive for offensive organization and the corresponding odds ratio was 19.26, indicating that the rate of goals is almost 20 times higher when the attack is organized dynamically rather than statically. The coefficient for the number of intervening attackers was also positive (B = 1.38) and the odds of a goal being scored following a free kick were almost four times higher when three or four players intervened than when one or two players intervened (OR = 3.99).

The equation, following inclusion of the estimated values for the parameters, was expressed as follows:

$$\text{Logit}(p) = -10.51 + 2.96(\text{MOO}) + 1.38(\text{NJ}) \quad (5)$$

$$P(goal) / MOO(1), NJ(1) \frac{e^{-10.58+2.96+1.38}}{1+e^{-10.58+2.96+1.38}} = 0.4326 \quad (6)$$

In other words, the probability of scoring under these optimum conditions is 0.43.

4. Discussion

This study had three objectives: to determine the effectiveness of indirect free kicks in soccer, to identify the factors associated with free-kick success, and to generate an explanatory/predictive model to maximize the chances of success. These aspects were studied by a combination of univariate, bivariate, and multivariate analyses.

A total of 3775 free kicks were taken in the 124 matches analyzed. This corresponds to a mean of 30.44 free kicks per match, a figure that is in agreement with data from studies by Castelo (1986), Olsen and Larsen (1997), Ensum *et al*. (2000), Gómez López (2000), Mota (2007), Hernández Moreno *et al*. (2011), and Siegle and Lames (2012), who reported a mean of between 30 and 37 kicks per match. In our series, 20.5% of the kicks recorded were classified as indirect free kicks, which is in agreement with rates reported by Van Meerbeek, Van Gool, and Bollens (1988). The percentage of kicks that ended in a shot was 21.8%, which is lower than the figures of 27.1% and 51.2% reported respectively by Silva (2011) and Pérez and Vicente (1996) and higher than that reported by Marra, Weeler and Lyons (2012) (14%). Just 9.3% of the kicks analyzed in our 124 matches resulted in a shot between the posts, which is lower than the rate of 17.7% reported by Pérez and Vicente (1996). Finally, 2.8% of indirect free kicks ended in a goal. This result is similar to the rates of 1% and 3.2% reported by Castelo (1996) and Silva (2011), respectively, and lower than that reported by Pérez and Vicente (1996) (6.4%). Notwithstanding, goals scored from an indirect free kick influenced the outcome of the game in 64% of the cases analyzed. This observation is consistent with the claim by Mombaerts (2000) and Castelo (2009) that set-piece goals can be decisive in matches between opponents of a very similar quality.

It was also observed that indirect free kicks were more effective when the ball was passed to another player (short pass) before being sent to the shooting area. This greater effectiveness was also seen when the ball was passed along the ground rather than through the air. These findings are very similar to those reported by Silva (2011), who found that 6.35% of all goals from an indirect free kick taken from the side of a pitch were preceded by a pass or several passes, but not by an airborne cross to the centre. It was also seen that the chances of success were significantly greater when three or four players touched the ball before a shot was taken or a goal was scored. Similarly, Silva (2011) reported the intervention of three or four attackers before a goal was scored in 63.63% of indirect free kicks. These findings are also similar to those reported by Gréhaigne (2001), who claimed that actions resulting in a goal do not involve more than three or four touches. Castellano and Zubillaga (1995) also concluded that a mean of 2.7 players touch the ball before a goal is scored. Similarly, Teodorescu (1984) indicated that actions executed at high speed by two or three players are the key element of attacks that end in goal. Casal (2011) also concluded that offensive actions involving two or three players are more common and effective. Offensive organization was also seen to influence the chance of success of an indirect free kick in our series. Specifically, dynamically organized attacks were associated with a higher probability of a shot at goal or a goal following an indirect free kick. This is consistent with claims by several authors that offensive mobility has an important role in improving the effectiveness of set-play actions (Cunha, 1987; Castelo, 1999; Bonfante & Perini, 2002).

The third analysis focused on factors that help to explain or predict whether an indirect free kick will end in a shot or a goal. The chances of an indirect free kick resulting in a shot were extremely high (0.85%) when the ball was passed along the ground and touched by three or four players within a dynamically organized attack. The probability of an indirect free kick ending in a goal was also considerable (0.43) when the ball was touched by three to four players within a dynamic offensive set-up.

5. Conclusions

Five main conclusions can be drawn from the present study. 1) Indirect free kicks are relatively common in soccer and have a large influence on the outcome of a game. 2) Despite their frequency, the effectiveness of indirect free kicks is very low (only 21.8% end in a shot and 2.8% in a goal. 3) Effectiveness does not depend on the position or laterality of the free kick, the score at the moment of the kick, the type of defense, or the shooting area. Effective kicks are in fact rather elaborate: they are passed along the ground, touched by three or four players, and form part of a dynamically organized attack. 4) When an indirect free kick is taken under optimal conditions, the percentage of shots at goal can increase fourfold (from 21.8% to 85%), while that of goals can increase 15-fold (from 2.8% to 43%). 5) Although these findings need to be demonstrated in the field, they have enormous practical implications in terms of providing soccer coaches with valuable tools and opportunities to improve team performance.

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