Original Article

Offensive and defensive team performance: relation to successful and unsuccessful participation in the 2010 Soccer World Cup

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ABSTRACT

Delgado-Bordonau, J.L., Domenech-Monforte, C., Guzmán, J.F. & Mendez-Villanueva, A. (2013). Offensive and defensive team performance: relation to successful and unsuccessful participation in the 2010 Soccer World Cup. *J. Hum. Sport Exerc., 8*(4), pp.894-904. The present study was conducted to analyze the impact of selected offensive and defensive performance indicators in relation to teams' success in the 2010 soccer World Cup. The sample used corresponded to 54 matches played in both the group and knockout stage. The game-related statistics gathered were: total shots, shots on goal, shots off goal, % of shots on goal from total shots, % of shots off goal from total shots, offensive and defensive effectiveness 1 (goals /total shots), and offensive and defensive effectiveness 2 (goals/shots on goal). In addition, the first's goal influence in the match's outcome (for the team scoring the goal: win, draw, lose) was also investigated. The results showed that, during the group stage, successful teams had better values ($P < 0.05$) in all offensive and defensive performance indicators, with the exception of shots off goal for and shots off goal against, respectively, than unsuccessful teams. In the knockout stage, successful teams were able to maintain the same offensive performance that in the group stage while most defensive performance indicators, with the exception of shots off goal against ($P=0.80$), tended ($P<0.2$) to worsen. During the group stage, the team scoring the first goal had 66.7% of victories, 4.2% of defeats and 29.2% of draws ($P<0.001$). In the knockout stage, the first goal effect had a stronger influence in game's outcome than in the group stage ($P<0.01$) since in 81.3% of the cases the team scoring first won the match, versus 6.3% of defeats and 12.5% of draws. Thus, offensive variables related to shots on goal and goal effectiveness appear to be better indicators of team's success in the last World Cup than defensive variables. This information has directly implications for coaches, providing relevant feedback to plan finishing (goal scoring) practices. **Key words**: SOCCER, GAME-RELATED STATISTICS, SCORING EFFECTIVENESS, FIRST GOAL EFFECT, MATCH ANALYSIS.

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INTRODUCTION

Scoring goals is the ultimate determinant of a successful soccer team and has received extensive attention in the soccer literature (Hughes & Franks, 2005; Reep & Benjamin, 1968; Tenga et al., 2010). With the rarity of goals in the game, it is vital that teams create goal-scoring opportunities frequently while preventing the opposition to create them. Several studies have related different statistics on goal-scoring opportunities with the final outcome of the game (win or lose). For example, previous studies have reported that successful (winning) teams have a higher number of total scoring trials (Luhtanen et al., 1997), attempts on target (Horn et al., 2000; Low et al., 2002) and success per cent in the amount of goals per attempts than unsuccessful (losing) teams (Bishovets et al., 1993; Horn et al., 2000; Lago et al., 2010a; Low et al., 2002; Luhtanen, 1992; Szwarc, 2004; 2007; Taylor & Williams, 2002). In addition, in ~70% of the matches the team scoring first will eventually win the game, the so-called first goal effect (Armatas & Yiannakos, 2010). Thus, it is generally believed that winning teams are stronger in the variables related to attacking rather than defence (Lago et al., 2010a). However, only one study to date (Lago et al., 2010a) has simultaneously analyzed both attacking and defensive performance in relation to team results.

Therefore, the aim of the present study was to assess the impact of selected offensive and defensive performance indicators in relation to team's success in the 2010 World Cup soccer matches. Based on the data available to date we specifically tested the following hypotheses; (1) successful teams will have better offensive performance than unsuccessful teams; (2) the poorer the opponent in a match, the greater the offensive performance (3) successful teams will score the first goal of the match more often than unsuccessful teams. A secondary aim of the present study was to analyze the time distribution of goals scored as previous studies reported more goals as match progressed (Abt et al., 1999; Armatas & Yiannakos, 2010; Armatas et al., 2007; Grant et al., 1998; Grant et al., 1999; Ridder et al., 1994).

MATERIAL AND METHODS

Case report

The final phase of the 2010 World Cup comprised a group stage, and four knockout rounds. At the group stage, the clubs were split into eight groups of four teams, which played once against each of their pool opponents, to decide which two teams from each pool will advance to the first knockout round. The teams that finish in the third and fourth position were eliminated. From the last 16 until the final, teams played a single match against each other. Altogether, the final phase of the World Cup tournament consisted of 63 matches, 48 at the group stage (6 matches in every group) and 15 matches (8 + 4 + 2 + 1) at the knockout stage. Each team played from 3 to 7 matches. In order to carry out this study, 56 matches (87.5% of total) were selected for the subsequent analysis. The collected data during the matches of interest from the present study were downloaded from the official FIFA website (http://www.fifa.com/worldcup/matches/index.html) available in the public domain.

Procedures:

Team quality was dichotomized into two categories (successful and unsuccessful teams) based on which round the team finished the tournament; successful teams (which made it at least to the semifinals) and unsuccessful teams (teams which did not get throughout the group stage) (Table 1). The studied variables were divided into two groups (i.e., offensive and defensive performance) (Table 2 and 3). The following game-related statistics were gathered:

-Offensive performance (attempts for): total shots, shots on goal, shots off goal, % of shots on goal from total shots , % of shots off goal from total shots, offensive effectiveness 1 (goals /total shots), offensive effectiveness 2 (goals/shots on goal).

-Defensive performance (attempts against): total shots, shots on goal, shots off goal, % of shots on goal from total shots , % of shots off goal from total shots, defensive effectiveness 1 (goals /total shots), defensive effectiveness 2 (goals/shots on goal).

Table 1. *Successful and unsuccessful teams in the 2010 Soccer World Cup (see Methods)*

World Cup 2010 final ranking	Team	Study Category
1	Spain	Successful
2	Netherlands	Successful
3	Germany	Successful
4	Uruguay	Successful
Groups stage	Algeria	Unsuccessful
Groups stage	Australia	Unsuccessful
Groups stage	Cameroon	Unsuccessful
Groups stage	Côte d'Ivoire	Unsuccessful
Groups stage	Denmark	Unsuccessful
Groups stage	France	Unsuccessful
Groups stage	Greece	Unsuccessful
Groups stage	Honduras	Unsuccessful
Groups stage	Italy	Unsuccessful
Groups stage	Korea DPR	Unsuccessful
Groups stage	New Zealand	Unsuccessful
Groups stage	Nigeria	Unsuccessful
Groups stage	Serbia	Unsuccessful
Groups stage	Slovenia	Unsuccessful
Groups stage	South Africa	Unsuccessful
Groups stage	Switzerland	Unsuccessful

Table 2. *Operational definition of the performance indicator "Shot attempt" (see Methods)*

Operational definition			
Behavior		**Outcome**	
Shot attempt	When a player on the analyzed team had sufficient control over the ball to enable a deliberate influence (kicking or heading) on its direction towards the opponent's goal, with the purpose to score	**Goal**	If the ball passes completely over the goal line and under cross bar.
		On goal	If the ball is saved or deflected by the opponent goal keeper. If it contacts the crossbar or the post, directly or after the opponent goal keeper, an opponent outfield or a team mate deflects its trajectory towards the goal.
		Off Goal	If an opponent outfield player touches the ball, deflecting its trajectory towards the goal. If the ball goes out of play, directly or being deflected by a teammate.
		Own goal	If a goal is scored after the ball is kicked or deflected by a team mate into their own net.

Table 3. *Operational definition of the performance indicator "Effectiveness" (see Methods)*

Operational definition			
Definition		**Outcome**	
Effectiveness	The degree to which something is successful in producing a desired result; success.	Offensive Effectiveness 1 (goals /total shots)	Percentage of goals scored from the total of shots for.
		Offensive Effectiveness 2 (goals/shots on goal)	Percentage of goals scored from the total of shots on goal for.
		Defensive Effectiveness 1 (goals /total shots)	Percentage of goals received from the total of shots against.
		Defensive Effectiveness 2 (goals/shots on goal).	Percentage of goals received from the total of shots on goal against.

In addition, the first's goal influence in the match's outcome (for the team scoring the first goal: win, draw or loss) (Armatas and Yiannakos, 2010) and the frequency of goal scoring per 45, 15 and 5 minutes were also investigated in the present study (Armatas et al., 2007).

Statical Analysis:

Data are presented as means ± standard deviations (SD). Differences between the successful and unsuccessful teams were examined using Student's independent t-test. The first goal effect and the time distribution of goals scored were analyzed with the chi-square ($\chi 2$) statistic. All analyses were carried out using SPSS 15.0 (SPSS Inc, Chicago, USA) software with the level of significance set at $P \leq 0.05$.

RESULTS

Offensive and defensive performance

Successful and unsuccessful teams' offensive and defensive outcomes are presented in Table 4. Successful teams had better values in all offensive and defensive performance indicators, with the exception of shots off goal for and shots off goal against, respectively, than unsuccessful teams.

Table 4. *Offensive and defensive outcomes in unsuccessful and successful soccer teams during the Soccer World Cup 2010*

	Unsuccessful Teams	Successful Teams	P value
Offensive Variables			
Goals	0.7 ± 0.8	1.7 ± 1.2	<0.001
Total shots for	12.3 ± 5.9	14.8 ± 4.3	0.06
Shots on goal for	4.1 ± 2.8	6.3 ± 2.0	<0.001
% Shots on goal for	32.6 ± 14.6	43.4 ± 9.6	<0.001
Shots off goal for	8.2 ± 4.0	8.5 ± 3.3	0.76
% Shots off goal for	67.4 ± 14.7	56.6 ± 10.0	<0.001
% Offensive effectiveness (Goals for/Total shots for)	6.2 ± 7.7	11.3 ± 8.1	<0.001
% Offensive effectiveness (Goals for/Shots on goal for)	15.7 ± 20	26.0 ± 19.3	0.03
Defensive Variables			
Goals against	1.5 ± 1.3	0.8 ± 0.9	0.02
Total shots against	16 ± 6.3	13.1 ± 4.6	0.04
Shots on goal against	6.3 ± 3.1	4.4 ± 2.3	<0.01
% Shots on goal against	40.2 ± 14.9	33.6 ± 12.3	0.05
Shots off goal against	9.7 ± 4.3	8.7 ± 3.3	0.29
% Shots off goal against	59.8 ± 14.9	66.4 ± 12.3	0.05
% Defensive effectiveness (Goals against/Total shots against)	9.8 ± 8.4	5.8 ± 7.0	0.04
% Defensive effectiveness (Goals against/Shots on goal against)	24.5 ± 22.7	15.0 ± 15.7	0.05

Successful teams' offensive and defensive performance in relation to competition phase (group and knockout stages) are displayed in Table 5. No differences were observed in any of the offensive performance variable. Significant differences were observed in the following defensive performance variables; goals against, shots on goal against , % shots on goal against and % shots off goal against .

Table 5. *Successful teams offensive and defensive outcomes in the two different competitive phases (group and knockout) during Soccer World Cup 2010*

Offensive Variables	Group stage matches	Knockout stage matches	P values
Goals for	1.5 ± 1.2	1.8 ± 1.2	0.51
Total shots for	15.2 ± 5.2	14.4 ± 3.6	0.66
Shots on goal for	6.1 ± 2.2	6.4 ± 1.8	0.64
% Shots on goal for	41.2 ± 11.1	45.0 ± 9.0	0.32
Shots off goal for	9.1 ± 4.0	8.0 ± 2.7	0.39
% Shots off goal for	58.8 ± 11.1	55.0 ± 9.0	0.32
% Offensive effectiveness (Goals for/Total shots for)	10.2 ± 8.2	12.2 ± 8.2	0.51
% Offensive effectiveness (Goals for/Shots on goal for)	24.3 ± 20.4	27.3 ± 19.0	0.69
Defensive Variables			
Goals against	0.3 ± 0.5	1.1 ± 1.0	0.02
Total shots against	11.3 ± 3.4	14.4 ± 5.1	0.07
Shots on goal against	2.8 ± 1.2	5.6 ± 2.2	<0.01
% Shots on goal against	25.8 ± 11.6	39.4 ± 9.3	<0.01
Shots off goal against	8.5 ± 3.1	8.8 ± 3.5	0.80
% Shots off goal against	74.2 ± 11.6	60.6 ± 9.3	<0.01
% Defensive effectiveness (Goals Against /Total Shots Against)	3.4 ± 5.3	7.6 ± 7.7	0.11
% Defensive effectiveness (Goals Against /Shots On Goal Against)	10.4 ± 15.5	18.4 ± 15.4	0.18

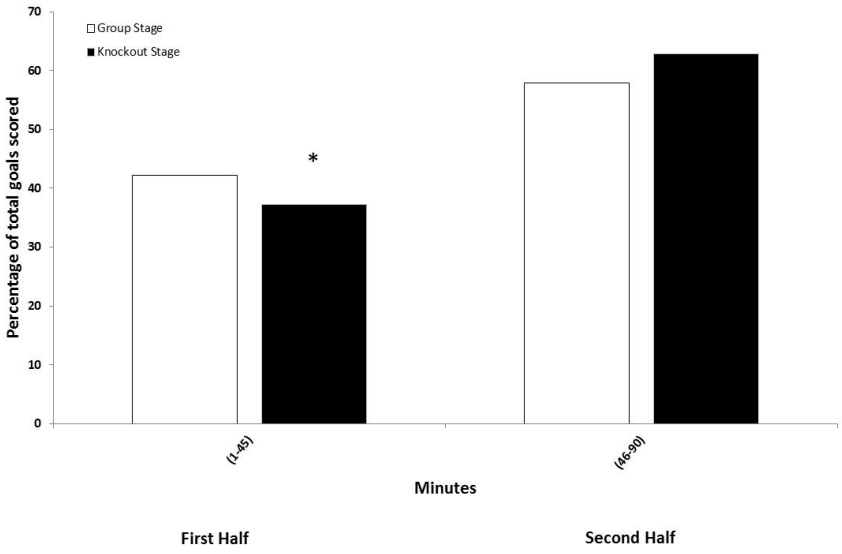
First goal effect

During the group stage, the team scoring the first goal had 66.7% of victories, 4.2% of defeats and 29.2% of draws (P<0.001). In the knockout stage, the first goal effect had a stronger influence in game's outcome than in the group stage (P<0.01) since in 81.3% of the cases the team scoring first won the match, versus 6.3% of defeats and 12.5% of draws.

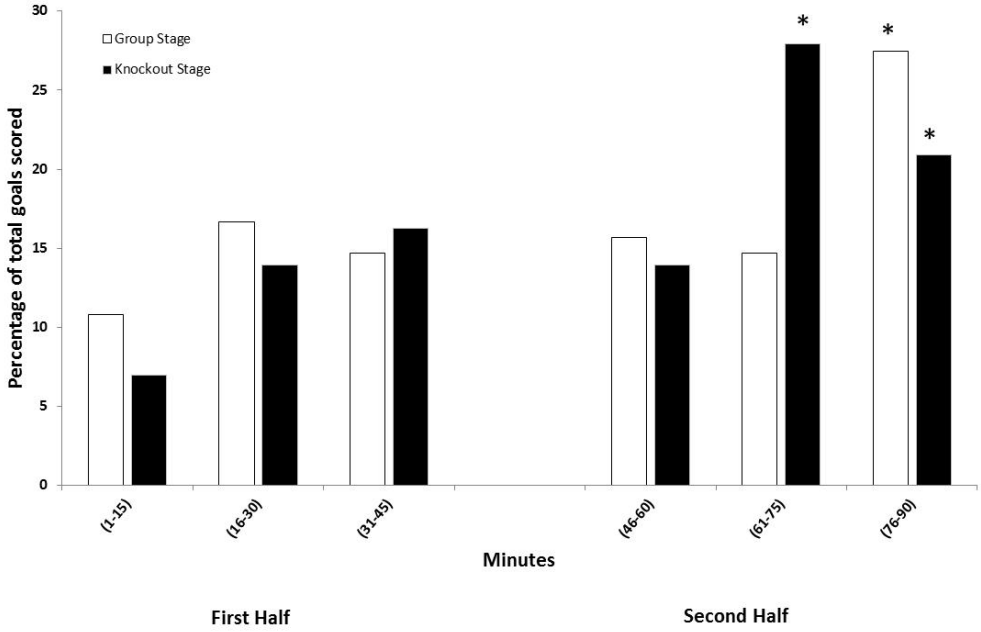
Time distribution of goals scored

In the group stage, although more goals were scored in the second (57.8%) than in the first half (42.2%), no statistical differences were observed (P=0.12) (Figure 1). The 15-min period analysis revealed that more goals (27.5%) were scored in the last 15 min of the game (76-90 min) than in any other 15-min period, with differences approaching significance (P=0.09) (Figure 1). The 5-min period analysis showed that more goals were scored during the last period (10.8%), but no statistical differences were observed (P=0.57) (Figure 1). In the knockout stage (Figure 1), more goals were scored in the second compared with the first half (62.8% vs 37.2%; P=0.01). The 15-min analysis showed that the highest percentage of goals were scored during the last two periods: 27.9% in the fifth period (61-75 min) and 20.9% in the sixth period (76-90 min) (P<0.001). The 5-min period analysis revealed that the highest percentage of goals were scored between minutes 66 to 70 (14.0%; P<0.001).

A)



B)



C)

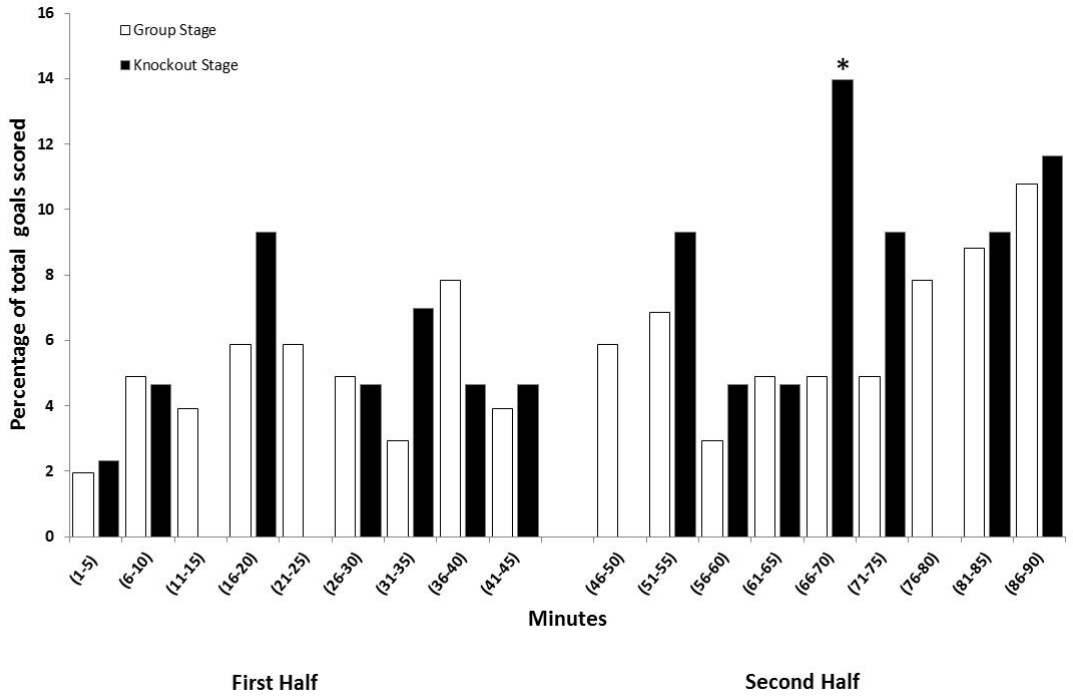


Figure 1. *Frequency of goal scoring per half (panel A), 15 min (panel B), and 5 min (panel C) during the Soccer World Cup 2010 - * significantly different than any other period*

DISCUSSION

The present study was conducted to analyze the impact of selected offensive and defensive performance indicators in relation to teams' success in the 2010 soccer World Cup. The main findings were as follow; 1) during the group stages, successful teams were offensively and defensively better in all the analyzed variables than unsuccessful teams; 2) despite facing theoretically stronger opponents and the different competitive format, successful teams were able to maintain the same offensive performance in both the group and knockout stage games while defensive performance was worsened in the latter.

The results of the present study indicate that successful teams had better offensive performance than unsuccessful teams. In this line, (Armatas et al., 2009; Lago et al., 2010b) reported that top teams in the Greek First League and in the Spanish First League, respectively, made more shots and more shots on goal than the bottom teams. In addition, top and winning teams had better effectiveness (Lago et al., 2010b) That is, they scored more goals in relation to the total number of attempts. Thus, in line with previous studies, differences between successful and unsuccessful teams in the last World Cup were partially related to both the frequency (number) and effectiveness of shots on goal (Low et al., 2002).

One novel aspect of the present study is the inclusion of variables related to defensive performance. To date, defensive performance has received very limited attention in the soccer literature (Suzuki & Nishijima, 2004). In the present study, unsuccessful teams were worse than successful teams in all the defensive performance variables analyzed. Thus, in addition to variables related to offensive performance, success in the last World Cup was also related to team's defensive performance.

Another novel aspect of the current study was the offensive and defensive performance comparison between the group and knockout stage. Offensive performance between these two different stages did not differ. That is, successful teams were able to maintain their offensive potential in the knockout stage despite theoretically facing stronger opposition than in the group stage. On the contrary, in the knockout stage several defensive performance variables (i.e., goals against, shots on goal against, % shots on goal against and % shots off goal against) were worse than in the group stage. The reasons for the maintained offensive performance and the worsened defensive performance in the knockout stage might be related with the higher level of the opposition in comparison with the group stage and/or with the nature of the competition; only the winner will progress to the next round. Interestingly, a comparison between the unsuccessful teams (group stage) and the successful teams (knockout stage) defensive performance revealed no significant differences in any of the variables analyzed (comparison not shown). Albeit speculative, these results might suggest that the success of a team during the last World Cup was primarily dependent on their offensive rather than their defensive ability. It is worth noting that since the 1998, when the new format of competition (32 teams) was implemented, the last World Cup had the lowest number of goals scored per match contested (2.30 goals per game) (see Table 6).

Table 6. *Goals scored in all men Soccer World Cup Tournaments*

Year	Host	Games	Goals	Average goal / game
1930	Uruguay	18	70	3.89
1934	Italy	17	70	4.12
1938	France	18	84	4.67
1950	Brazil	22	88	4.00
1954	Switzerland	26	140	5.38
1958	Sweden	35	126	3.60
1962	Chile	32	89	2.78
1966	England	32	89	2.78
1970	Mexico	32	95	2.97
1974	West Germany	38	97	2.55
1978	Argentina	38	102	2.68
1982	Spain	52	146	2.81
1986	Mexico	52	132	2.54
1990	Italy	52	115	2.21
1994	USA	52	141	2.71
1998	France	64	171	2.67
2002	Korea Republic, Japan	64	161	2.52
2006	Germany	64	147	2.30
2010	South Africa	64	145	2.26

Concerning the effect of the first goal on the final outcome of the game (i.e., winning, drawing or losing) for the team that scores it, our results are in line with previous studies (Armatas et al., 2007). The greater influence of the first goal in the knockout stage in comparison with the group stage could be related with the

fact that nature of the competition (see above) which may have encouraged teams to apply more defensive caution after scoring the first goal. In accordance with previous research (Armatas & Yiannakos, 2010) the frequency of goals scored during the last World Cup was time dependent, with more goals scored in the second half and the trend of more goals scored as match progress. While several factors such player's deterioration in physical and cognitive conditions (fatigue), manager's tactical decisions have been suggested to lead to the higher frequency of goals towards the end of the match, to date it has not been possible to identify the most important factors (Armatas & Yiannakos, 2010).

In summary, ours results present important information in relation to some aspects of the game which can differentiate between successful and unsuccessful teams in soccer. Overall, offensive variables related to shots on goal and goal effectiveness appear to be better indicators of team's success in the World Cup than defensive variables. This information has directly implications for coaches, providing relevant feedback to plan finishing practices. Finishing situations from offensive and defensive perspective has to be considered crucial as they are directly related with the match outcome. As per first goal effect, team's tactical and psychological reaction after getting back in the score sheet should be included on training practices. Also, more attention should be given from coaches and players to the latter period of matches where more goals appeared to be scored.

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