Ball Possession Strategies in Elite Soccer According to the Evolution of the Match-Score: the Influence of Situational Variables

by

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In soccer, the ability to retain possession of the ball for prolonged periods of time has been suggested to be linked to success. The accuracy of this assertion was investigated by examining 380 matches involving Spanish League First Division teams during the 2008-2009 season. Possession of the ball, according to the status of the match (winning, drawing and losing), was recorded during the different matches using a multiple-camera match analysis system (Gecasport®). The results suggest that the best classified teams maintained a higher percentage of ball possession and that their pattern of play was more stable. The coefficient of variation, with respect to ball possession per match, was smaller for the best placed teams. Indeed, first placed F.C. Barcelona had the smallest coefficient of variation for possession time (8.4%), while bottom placed Recreativo showed the highest values with 17.1%. Linear regression analysis showed that possession strategies were influenced by situation variables. Team possession was greater when losing than when winning (p<0.01) or drawing (p<0.01), home teams enjoyed greater possession than visiting teams (p<0.01), and playing against strong opposition was associated with a reduction in time spent in possession (p<0.01). The findings indicate that strategies in soccer are influenced by situational variables and that teams alter their playing style accordingly during the match.

Key words: match analysis; possession strategies; soccer; team performance; tactical component

Introduction

Performance analysis refers to the objective recording and examination of behavioral events that occur during sporting competition (Carling et al., 2005; Dellal, et al., 2010). The main aim of analyzing one’s own team’s performance is to identify strengths that can be further developed, and weaknesses that might be improved. Understanding the differences between the patterns of play developed by successful and unsuccessful teams, as well as those of the same team in different matches, is an area of great interest in performance analysis (Hughes and Bartlett, 2002).

In soccer, for a goal to be scored a team usually has to have possession of the ball. Although it might be anticipated that longer periods of possession should predict goal scoring, support for this notion is divided. Bate (1988), for example, found that the higher number of possessions a team had, the greater the chance they had of entering the attacking third of the field and consequently more goal scoring opportunities were created. On the basis of this finding, Bate (1988) rejected the notion of possession soccer and advocated a direct strategy. However, Hughes and Franks (2005), Grant et al. (1999), Hook

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and Hughes (2001) and Bloomfield et al. (2005a) reported that successful teams (e.g., European Champions League, World Champions, Europa Cup) maintained possession for longer than unsuccessful teams. In contrast, Stanhope (2001) found that time in possession of the ball was not indicative of success in the 1994 World Cup.

Many of the equivocal findings of previous studies examining the possession strategies of successful and unsuccessful teams may originate from conceptual and methodological issues. For example, Jones et al. (2004) indicate that many have failed to demonstrate the reliability of the data gathering system used. In addition, selecting matches played as part of individual tournaments means that the chosen teams (successful and unsuccessful) are imbalanced in terms of the strength of opposition and number of matches played. Such factors are likely to influence a team’s performance and might explain the discrepancies seen among studies.

According to Taylor et al. (2008), effective evaluation of soccer performance requires knowledge of the contextual factors that can potentially affect behaviour incidence and outcomes (Carling et al., 2005; Dellal, 2008). Existing literature (Jones et al., 2004; Shaw and O’Donoghue, 2004) suggests that the variables match location (i.e., playing at home or away) (Tucker et al., 2005), match status (i.e., whether the team was winning, losing or drawing) (Bloomfield et al., 2005a, 2005b; Lago and Martin, 2007; Taylor et al., 2008; Tucker et al., 2005) and the quality of the opposition (strong or weak) (Taylor et al., 2008), which all require consideration when evaluating soccer performances. Unfortunately, these findings are still inconclusive given that most of these studies were based on small sample sizes, and with the exception of Lago and Martin (2007) and Taylor et al. (2008), the existing performance analysis literature has examined situation factors independently, thereby neglecting to account for the complex and dynamic nature of soccer performance (MacCarrick and Franks, 2003; Reed and O’Donoghue, 2005; Taylor et al., 2008).

However, the results of Lago and Martin (2007) and Taylor et al. (2008) have two limitations in their findings. First, Taylor et al. (2008) adopted a fine-grained approach to soccer analysis by considering the performances of a single team over a sustained period (two seasons). An obvious limitation of case studies designs is that generalization of findings is precluded. The contradictory effects of match location found in this study and those of Sasaki et al. (1999) and Tucker et al. (2005) emphasize the need to validate the models developed across numerous additional teams. Secondly, Lago and Martin (2007) did not incorporate into their study the quality of opposition as an independent variable to explain the determinants of possession of the ball in soccer.

In this context, the aim of this investigation was to provide a large-scale study of elite professional soccer teams and examine the effects of situational variables on ball possession strategies. It was hypothesized that ball possession was influenced by such variables as match location, match status, quality of opposition and by the level of the team. On the basis of these findings, it is hoped that the information will be of value in contributing to more tactical knowledge for the prescription of specific exercises within the training regimen and for analyzing match performance.

Materials and Methods

Study Design

Although it might be anticipated that longer periods of possession should predict increased goal scoring opportunities, support for this notion is divided. To verify this, all 380 matches of the Spanish soccer League played throughout the 2008-2009 season were assessed. The dependent variable was the proportion of time (%) during matches in which the team had possession of the ball when the ball was in play. Empirical evidence suggests that the variables match location, match status (winning, drawing and losing) and the quality of the opponent can affect soccer performances. These factors were included in the study as independent variables.

Match Sample

The examined sample consisted of 380 Spanish Soccer League First Division matches played throughout the 2008-2009 season. The performance of one team obviously impacts upon the second (i.e., the frequency and duration of possession is dependent on the opposition). As a consequence, data were analyzed using one team from each match. The number of observations was therefore 380. The collected data (possession of the ball, especially according to the match status: winning, drawing and losing during a match) were provided by a multiple-camera match analysis system (Gecasport®), a pri-
vate company dedicated to assessing the performance of teams in the Spanish Soccer League. The accuracy of the Gecasport® System has been verified by Gómez et al. (2009). Written permission to analyze data was provided by Gecasport®. Ethics approval for all experimental procedures was granted by our institute’s Human Research Ethics Committee.

Reliability Testing

Reliability of the data was assessed through inter- and intra-observer test procedures. Inter-observer reliability was assessed by the authors, coding five matches randomly selected, with data being compared with those provided by Gecasport®. Intra-observer reliability was completed by the authors, coding five random matches selected from the data sample. Following a six-week period, to avoid any possible negative learning effects, the matches were recoded and the two data sets compared. The Kappa (K) values recorded from 0.93 to 0.98. The parameters included in the inter- and intra-observer reliability were ball possession, the time each team was losing, drawing or winning during a match, where the match was played (match location) and the distance between end-of-season rankings of the competing teams.

Statistical analysis

All statistical analysis was performed using SPSS for Windows, version 17.0 (SPSS Inc., Chicago, USA). The level of significance was set at p<0.05. To examine the inter-match variation in the teams’ ball possession times, Pearson coefficients of variation (CV) were calculated. The CV is defined as the relationship between the standard deviation and the arithmetic mean:

$$CV = \frac{S}{\bar{x}}$$

A standard multiple regression was used to examine how much the ball possession (Possession: PO) was explained by the contextual variables (match status, match location, quality of opposition and by the level of the team). Possession was deemed to start when a player on the analyzed team had sufficient control over the ball to enable a deliberate influence on its direction. Possession continued until the ball either went out of play, an opposing player touched the ball or the referee blew the whistle for an infringement (Jones et al., 2004). A possession of 50% means that a team possessed the ball for half the time the ball was in play. To measure the variable “match status”, the lengths of time each team was winning (Minutes Winning: MW), drawing (Minutes Drawing: MD) and losing (Minutes Losing: ML) during a match were included. This means that the panel match status in the regression model presents two coefficients from the comparison of Drawing to Losing and from the comparison of Winning to Losing. Match location was recorded as “home” or “away”, depending on whether or not the sampled team was playing on its own ground or that of its opponent: 0 = playing at home, 1= playing away (Match Location: ML). Quality of opposition was the distance in the end-of-season-ranking between competing teams (Quality of Opposition: QO). The 20 teams were divided into four groups according to their final league ranking (Team: TE). Group 1 contained the top five teams, Group 2 contained those that finished 6th through 10th, and Group 3, those that finished 11th through 15th, and Group 4, those that finished 16th through 20th. $\beta_1$ is the intercept and, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$, and $\beta_6$, the impact of each one of the independent variables. $\epsilon_i$ is the disturbance term. The regression model used was therefore:

$$PO = \beta_1 + \beta_2 . MW_i + \beta_3 . MD_i + \beta_4 . ML_i + \beta_5 . QO_i + \beta_6 . TE_i + \epsilon_i \ [1]$$

When estimating the regression models, no evidence of heteroscedasticity in the residuals or multicollinearity among the regressors was found. Moreover, the Ramsey Regression Equation Specification Error Test (RESET) (Ramsey, 1969) revealed no specification problems. When interpreting the statistical results, positive or negative coefficients indicate a greater or lower propensity to increase/decrease ball possession.

Results

The mean ball possession values for all 20 teams, along with their CV were presented in the Table 1. Considerable differences can be seen between these possession times, with successful teams showing a smaller CV during the season. For example, first placed F.C. Barcelona had the smallest CV for possession time (8.42%), while bottom-placed Recreativo presented the highest at 17.1%. In addition, the more successful teams showed higher mean possession percentages than the other teams. For example, the mean for F.C. Barcelona (65.29%) was 16.24% greater than those found for the bottom-placed Recreativo (48.05%).

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The independent and interactive effects of situation variables on the teams’ ball possession were described in Table 2. The linear regression model involving the variables MW, MD, match location and quality of opposition explained about 48% of the variance in team ball possession. When all the predictor variables were equal to zero, possession was 55.22%. Possession was greater when losing than when winning (p<0.01) or drawing (p<0.01). For each minute winning the team possession decreased by 0.09% compared with each minute losing. For example, if team A were winning for the full 90 min, the expected possession would be 8 percentage points lower than the opponent’s possession (90 min losing multiplied by 0.09). For each minute drawing the team possession decreased by 0.04% compared with each minute losing. Playing against strong opposition was associated with a reduction in time spent in possession of the ball (p<0.01). Each point of difference in the end-of-season-ranking between the teams increases/decreases a corresponding team’s possession by 0.52%. Playing away reduced possession time by 2.43%, in comparison with playing at home. Moreover, the teams of Groups 2 and 3 showed, respectively, 4.01% and 3.01% less ball possession than those of Group 1 (p<0.01), whereas no significant differences were observed in ball possession between the teams of Group 1 and Group 4.

Finally, to illustrate the findings, Tables 3 and 4 provide different values for each variable in the regression model to simulate ball possession for F.C Barcelona in a match against Espanyol (10th in the end-of-season-ranking). The predicted possession differs considerably – by up to 9% - according to match status and match location.
The aim of the present work was to provide a large-scale study of professional soccer teams and identify the effects of match location, match status, quality of opposition and the level of the team on ball possession strategies.

Existing performance analysis studies have provided inconclusive information regarding the relationship between ball possession and competition success (Bate, 1988; Grant et al., 1999; Hook and Hughes, 2001; Hughes and Franks, 2005; Stanhope, 2001). Some authors have suggested the existence of patterns of play involving ball possession shown by successful and unsuccessful teams (Bloomfield et al, 2005a; Hughes and Franks, 2005), while others indicate that ball possession time is not a marker of success in a match (Bate, 1988; Stanhope, 2001). Moreover, the effects of situational variables on ball possession strategies are not well-known. Existing performance analysis has provided preliminary information on the effects of situation variables such as match location and match status on soccer performances (Bloomfield et al., 2005a, 2005b; Dellal, 2008; Jones et al., 2004; Lago, 2009; Taylor et al., 2008). However, the small sample sizes examined, the examination of situation variables independently, the limitation of case study designs and the evaluation of matches in competitions in which the selected teams (successful and unsuccessful) were imbalanced in terms of the strength of opposition and the number of matches played, make it difficult to come to any conclusion.

The results of the present study indicated that ball possession was influenced by situational variables, either independently or interactively. Losing-match status was associated with an increase in ball possession. Similar to the findings reported by Bloomfield et al. (2005a), Jones et al. (2004), Lago and Martin (2007) and Sasaki et al. (1999), the present results support that possession strategies are influenced by score-lines. Possession was always found to be greater when losing than winning (p<0.01) or drawing (p<0.01). This could be explained by changes in tactics and the style of play adopted by

<table>
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<th>Table 3</th>
<th>Simulated ball possession for F.C. Barcelona, depending on match location, quality of opposition and match status in the game between F.C. Barcelona and Espanyol</th>
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<td>Minutes winning</td>
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Note: The outcome measure is the percentage of time (%) in which F.C. Barcelona has the possession of the ball.

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<td>Minutes winning</td>
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<td>0</td>
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Note: The outcome measure is the percentage of time (%) in which F.C. Barcelona has the possession of the ball.

**Discussion**

The aim of the present work was to provide a large-scale study of professional soccer teams and identify the effects of match location, match status, quality of opposition and the level of the team on ball possession strategies.

Existing performance analysis studies have provided inconclusive information regarding the relationship between ball possession and competition success (Bate, 1988; Grant et al., 1999; Hook and Hughes, 2001; Hughes and Franks, 2005; Stanhope, 2001). Some authors have suggested the existence of patterns of play involving ball possession shown by successful and unsuccessful teams (Bloomfield et al, 2005a; Hughes and Franks, 2005), while others indicate that ball possession time is not a marker of success in a match (Bate, 1988; Stanhope, 2001). Moreover, the effects of situational variables on ball possession strategies are not well-known. Existing performance analysis has provided preliminary information on the effects of situation variables such as
teams according to the status within the match (evolving score). When ahead, teams decreased their possession, suggesting they preferred to play counterattacking or direct play (that is, move the ball quickly to within scoring range, often using long passes or long balls downfield). However, when behind, they increased their possession, suggesting they preferred to “control” the match by dictating play. This style of play is indirect play (also calling possession style, which is slower than direct play and uses many short passes, while weaknesses in the opposition defense are sought). Consequently, the tactical component directly influences the physical and the technical demands within a match-play, according to the findings of Dellal et al. (2010a, 2010b).

Playing away was characterized by a decrease in team possession. Visiting teams reduced possession by 2.43 percentage points in comparison with home teams. These results provide evidence of home advantage in soccer. This in line with the findings of Bloomfield et al. (2005b), Jones et al. (2004), Lago and Martin (2007), Sasaki et al. (1999), Tucker et al. (2005) and Taylor et al. (2008). Despite the fact that home advantage in soccer is a well-known and well-documented fact (Bloomfield et al., 2005a; Lago and Martin, 2007; Tucker et al., 2005), the precise causes and their simple or interactive effects on performance are still not clear. However, the most plausible explanations are: crowd effects, travel effects, familiarity, referee bias, territoriality, specific tactics, rule factors, and psychological factors (Carling et al., 2005).

The top-placed teams in the Spanish League for the 2008-2009 season presented a higher percentage ball possession per match than the less successful teams. The present results are similar to those reported by Jones et al. (2004) and Lago and Martin (2007), whose studies had designs similar to that of the present work. They found that top teams retained more possession than their opponents, suggesting that they prefer to control the match by dictating play. Bloomfield et al. (2005a), for example, showed that the top three teams in the English Premier League in the 2003-2004 season (Chelsea, Manchester, and Arsenal), dominated possession against their opponents whether winning, losing or drawing. Hughes and Franks (2005) suggested that because successful teams (League champions, World champions, European champions) do not resort to direct play, there are patterns of play for successful and unsuccessful teams. Taylor et al. (2008), however, found that the influence of quality of opposition on the technical aspects of performance within a professional soccer team was non-existent. Perhaps, the “strong-weak” dichotomy used in this study may lack the necessary sensitivity to differentiate changes in behavior incidence as a function of the quality of the opposition. Moreover, Taylor et al. (2008) adopted a fine-grained approach to soccer analysis by considering a single team’s performances over a sustained period (two seasons). This contrasts with previous soccer literature that has tended to aggregate performances of different teams during analysis.

This study also revealed that the characteristic of ball possession in each match varies depending on the team analyzed. The top-placed teams showed lower CVs for ball possession per match compared to those who finished lower in the table. For example, F.C. Barcelona (the champion) showed the smallest CV (8.4%), while Recreativo (bottom of the table) showed the greatest (17.1%). It would appear that the teams with the best performance are able to impose and maintain their pattern of play despite the alteration in variables over the match (e.g., evolving score) and between matches (e.g., playing at home or away). Different teams appear to employ different strategies when ahead, level or behind, reflecting the individual styles of coaching and management, the budget, the characteristics of the players, team formation and philosophy of play based on the tradition of the clubs.

The main findings of the present study emphasize the importance of accounting for match location, quality of opposition and match status during the assessment of tactical aspects of soccer performance (Carling et al., 2005; Taylor et al., 2008). Possession strategies appear to be influenced by situational variables, either independently or interactively. The characteristics of ball possession time in each match may differ for different teams. The top-placed teams showed lower CVs for ball possession per match compared to those who finished lower in the table. The detailed evaluation of the influence of match location, quality of opposition, and match status (winning, drawing and losing) on soccer performance within this study presents a number of implications for analysts and coaches. Existing recommendations suggest that the scouting of upcoming opposition should be carried out under circumstances that are reflective of the conditions under which the future match will occur. However, such procedures are unlikely to be practical due to time and resource
constraints. Consequently, by establishing the impact of particular situational variables on performance, teams can be observed, when possible, with appropriate adjustments being made to analyses based on knowledge of such effects. Similarly, post-match assessments of the technical, tactical, and physical aspects of performance can be made more objective by factoring in the effects of situational variables. Finally, if a notational analyst or coach has identified that the technical, physical or tactical aspects of performance are adversely influenced by specific situational variables, possible causes can be examined and match preparation focused on reducing such effects.

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