QUALITATIVE METHODS OF PERFORMANCE EVALUATION IN FOOTBALL

Pompilio Cusano¹ and Roberta Rosa²

¹University of Naples "Parthenope", Italy
²IUL Telematic University, Rome, Italy

Review paper

Abstract
Monitoring the behavior of an athlete or a team can also be developed through an objective data analysis of a sports performance, and is methodologically framed in the context of the performance analysis. In a specific sports competition it is possible to determine a series of specific factors through quantitative and qualitative methods, which may predict the outcome of the competition itself. New reference models are being developed, called Expected Score, which are used for the qualitative analysis of what happens during the dynamics of the football game, from which useful interdependencies with the final result can arise. The elements of the analysis are identified by means of different types of probability measures, aimed at identifying the most statistically useful constants for a sport-specific evaluation of the performance capacity of a team, such as offensive or defensive capacity indexes. These evaluations reveal some significant data on the athletes' performance related to the competition, and may predict its result.

Key words: match analysis, sport, performance, expected score, index.

Introduction

In the framework of the quantitative and qualitative research related to the monitoring of the sports performance, more specifically in football, which is the one with the highest number of participating athletes in the world, we can recognize some innovative aspects concerning the ability to observe and analyze the competition. In order to be able to deepen new tools useful to technicians and professionals working in the sports sector, we will focus our attention on some performance evaluation indexes. These indexes are called Expected Score (xS) and represent a measure of the probability that a certain shot has to turn into a goal. It is a qualitative data, on a scale from 0 to 1, resulting from the analysis of more than 300,000 shots made, in order to calculate the probability that a given shot, from a given position and at a given moment of the match, can end up in the net or not.

Each shot thus has its own "Expected Score" (xS) value, which corresponds to the percentage it has to turn into a goal. This is a mathematical model, the result of the analysis of a number of shots (300,00) that is increasing, because the monitoring is constantly updated. This statistic is able to determine the probability that a given shot, kicked from that particular position by that particular player and with a specific assist using a specific body part, came from a volley or an inactive ball, and can reveal if it is able to turn into a goal or not.

For example, let us make as if 10,000 shots of the same type were taken from a given point, and 1,000 of these became goals: we would then have a 10% chance of success and a consequent 0.1 xS, regardless of whether the shot would have ended up in the net or not. If the shot ended up in the net, we would then have a goal measured as a 0.1 xS.

The value is between 0 and 1, in the case of a usual position from which a goal is scored: for example, if the shot starts from the goal line or from that area we would have a 0.99 xS, because there could also be someone kicking the ball too high or being stopped on the line by the defender, and this would lower the average. Another example includes the penalty kicks, analyzed on a very large sample of data, because the position (and the game situation) from which they are kicked is clearly always the same: the average is just over 3 out of 4, so the Expected Score (xS) on penalty kicks is always around 0.79.

Discussion

Case Study Description: the Italian Serie A League
The most straightforward application is related to the analysis and monitoring of the performance of individual players and teams. For example, an attacker simplistically defined as "cynical" will be able to take chances which may seem too difficult in theory, ending up with perhaps a haul of 10 goals scored against an overall Expected Score (xS) (the sum of the Expected Scores of all his shots made) which is perhaps equal to 6 or 7. Conversely, an attacker who creates a lot of chances but maybe wastes a lot of them, will have a very high Expected Score (xS) and this may be higher than the number of goals actually scored. The Expected Score (xS) can also provide a different interpretation of the actual performance of a team. The most sensational case, a real school case, is that of the Juventus football club in the year 2015/16, which started the championship badly after 10 days just a few points from the relegation zone. In fact, by analyzing the Expected Scores (xS) of that period and comparing them with those of the second half of the season (where the club won almost all the games), we can see...
that it was creating chances in the same proportion as the period in which it was performing badly and when it then started to play better. Apparently, in the early days they were unlucky, they lacked of lucidity and goalkeepers were maybe down... but the number of Expected Scores (xS) was much higher than the goals actually scored.

Therefore, in that case, what many sportscasters were already saying in those weeks was confirmed by the data, i.e. that Juventus football club was playing well without reaping what they deservedly sowed. On the contrary, Inter football club coached by Roberto Mancini, in those same days, won all the matches by scoring 1-0 or similar results, despite the Expected Scores (xS) were very low: this is because they were very good at taking the few chances created and also at not conceding goals. But in the long run it couldn't go on like that, and in fact, the team got back into the ranks. The Expected Score (xS) can therefore help understand the real performance of a team beyond the results and ranking positions, which can often be misleading and determined by game chances.

In addition we can find the Expected Assists, employed to observe a player's ability to make a teammate shot a goal, regardless of the final outcome of the attempt. Moreover, there is a data that monitors the performance of goalkeepers, called "Goalkeeper Goals Prevented", which analyzes only the shots on goal and is calculated on the expected scores on target, the position from which it is kicked and the point of the goal towards which it is directed. If the goalkeeper stops it, he manages to avoid a shot having a certain chance of being scored. However, the model is constantly being updated and improvements have already been identified, which will be implemented in the future.

Advanced statistics applied to football is concerned with measuring the performance of athletes and teams in an objective way, by means of multiple measurements that analyze shots, goal chances, passes, space occupation, pressing and many other factors, both in quantitative and qualitative terms. All the most important clubs have a staff of analysts and video-analysts today, who study both their own team and other teams, and are more and more of fundamental support to the coach. In team sports, the one who scores as many points as possible wins. In basketball, each basket scored corresponds to a point awarded; in football, each goal scored corresponds to a point. But in basketball or other sports there are many other points scored during a match, while in football there are on average less than 1.5 goals scored (sometimes there are even no goals scored). This means that, in other sports, the performance is strongly correlated with the results, even in the single match; instead, in the game of football, the correlation between performance and result is weak in the single match, and is more significant - but still less strong than in other sports- only in the span of several games. The ExpectedScores are simply the shots made by a team, which are then assigned a probability of scoring goals. Through the "Expected Score" we try to measure not only the quantity of the shots, but also their quality, that is the probability of turning them into goals. This probability is not assigned randomly, but is the result of the analysis and classification of thousands of shots made over the years in the 5 major European Championships, each classified according to position, distance, shooter's angle, type of pass received, presence or absence of a man marking, presence or absence of players covering the goal, and so on. Once classified, we simply measure how many goals were scored with "that shot", i.e. from that position and with those characteristics. To give a very simple example, out of thousands of penalty kicks taken, the penalty shooters - playing in the Liga, Serie A, Bundesliga, Premier League and Ligue 1 championships -scored a goal 76% of the time. In terms of decimals, a penalty kick is therefore worth 0.76 goals, i.e. 0.76 xS or 0.76 expected goals, and expresses the probability that an average penalty-taker from one of the 5 biggest European leagues has of scoring goals from a penalty. During a match a team makes a certain number of more or less dangerous shots. Each one is assigned a value by the software, recognizing position and characteristics and associating it with the probability of shots in that category.

**Defensive Production Assessment Indexes**

Among the elements of the statistics applied to football, the "Expected Score Against" (xSA) are measured. For example, at the end of a match, team A produced 8 shots equal to 0.20 xS + 0.13 xS + 0.30 xS + 0.37 xS + 0.10 xS + 0.50 xS + 0.25 xS + 0.30 xS, the sum of which is equal to 2.15 xS overall, meaning that team A could have scored 2 goals during that match. Similarly, the opposing team (called team B) could have made shots on goal too. These shots are the xS produced by team B, while from team A's point of view they are the shots conceded, which are called xSA (Expected Score Against). In the example, in the same match in which it produced a total of 2.15 xS, teamA conceded a total of 0.45 xSA. Likewise, team B produced 0.45 xS and conceded 2.15 xSA. From the point of view of the performance, team A should have produced enough to win, but as pointed out above, while in basketball it would almost certainly be so, in football it wouldn't because of the difficulty of scoring goals; this does not happen regularly, and the correlation between performance and result in the single match is weak, unless there is a big difference also in the xS. The following graph shows the xS produced from the beginning of the championship until March 15th by each Serie A team (red bar, left scale), the goals actually scored (blue bar, left scale) and the positive/negative percentage of the goals scored compared to the xS produced (green line, right scale).
Under the name of each team there is the ranking position at the time of the survey. The first figure that stands out includes the goals scored by Juventus football club and Lazio football club compared to the xS produced, as well as 55% less of goals scored by Sassuolo football club compared to the chances (measured in xS) that the team created. The second graph shows the actual ranking points compared to the xPTS (expected points). The xPTS assign a score from 0 to 3 to each team in each match, calculated according to a series of parameters (including xS and xSA) then converted into the probability of victory, draw and defeat.
Therefore, there are no 3 or 1 or 0 scoring points in the xPTS as it actually happens, but for example, 2.3 or 1.8 scoring points could be assigned to the winner. Moreover, no more 0 scoring points could be assigned to the loser, but maybe 0.3 or 0.9, or sometimes it could be assigned even a higher score than the one obtained by the team that has won the match. This happens because, from the point of view of the performance of the team that has lost produced a lot but then didn’t score goals, and maybe it has been due to the only shot made by the opponent. Thus, it is a ranking based on the team’s performance and not on the results.

The xPTS, for the way they are conceived, tend to be always lower than the actual points (PTS) in the leading teams, since they win very often for they are at the top of the ranking, and when they win they actually always gain 3 points (not 2.1 or 1.7 or 1.3). Similarly, the xPTS tend to be higher than the real points in the teams fighting for relegation, since they should have lost a lot of games to end in that precarious position, but when they lose they actually always gain 0 points (not 0.3, 0.6 and so on). The PTS compared to the xPTS also depend on the characteristics of the teams and the type of game, i.e. if it is more markedly proactive or reactive. Finally, the actual points gained depend on the qualities of each team member, being football both a game for individuals and for teams.

Conclusion

In the search for qualitative methods for the evaluation of sports performance in the game of football, some indexes that can turn game actions into useful statistical data have been detected. These could be investigated in-depth and can draw new research horizons in the performance analysis. These data are useful for the development of skills and capabilities by sports operators and their specific training. The xPTS (Expected Points) tend to illustrate the output of teams at the same or similar rank position, regardless of the presence of more or fewer champions in the team, which more tend to be expressed precisely by the gap between PTS and xPTS (if that gap is fairly marked and constant in the football seasons). The xPTS are useful to a coach, like the xS or the xSA and other more complex parameters, in order to evaluate and then improve the overall quality of the team game, regardless of the presence of players able to solve problems in the matches alone. Therefore, by means of the Expected Score, the Performance Analytic allows to assign a certain value to a shot made from a specific area of the field, and then to get to a hypothetical difference on the total number of shots between the teams. The inverse value difference, instead, is a useful index to define the ability in terms of a team defensive performance in that match. Considering the set of data available for any trend at that time of the season, we believe that they are objectively interesting indicators in the analysis of the sports performance of the football game, and can be useful to observe, together with the objective data, the performance level and the possibility of succeeding for the teams taking part in the competition. The development of these parameters can also represent, from the methodological-didactic point of view, a new quantitative and qualitative observation focus of the athletes’ motor actions by the technicians.

References


