Original Article

Analysis of discriminant performance indicators of the FIFA Ranking in the 2018 World Cup

ROBERTO COPPOLA[1], SALVATORE PIGNATO[2], GIULIO D'AMBROSIO[3], MARIO LIPOMA[4]
[1]University of Split, Faculty of Kinesiology, ITALY
[2,4]Università degli Studi di Enna "Kore", ITALY
[3]Università degli studi di Foggia, ITALY

Abstract:
Nowadays the evaluation of performance in football is a subject of study, both in terms of technical and tactical aspects, indeed very often innovative methods are used for its assessment. The FIFA ranking classification is included in this perspective. This work aims to identify which indicators are discriminating compared to the FIFA ranking, through the analysis of the matches of the World Cup played in Russia in 2018. The selected indicators concern: goals, throws, offside, corners, effectiveness, assists, penalties and ball possession. Through the method of k-means cluster analysis the national teams participating in the world championship were grouped into three groups: high-level teams, intermediate-level teams and low-level teams. The subsequent analysis (one-way ANOVA) revealed statistically significant differences for the shots, corners, assists and ball possession, and above all the differences between high and low level teams. The results obtained lead to think about how decisive can be, to be able to discriminate the strength of a team based on game indicators and how these data can be useful to coaches and performance analysts to assess the performance of their team and those they will have to face.
Key words: Soccer, performance analysis, FIFA ranking, World Cup, performance indicators

Introduction

The establishment of the FIFA ranking dates back to August 1993, in cooperation with the Coca-Cola Company, in order to classify the clubs and national teams recognized by FIFA and then making comparisons between them (Paul & Mitra, 2008).

The ranking is updated every month and its score takes into account the results of the last four years, the previous meetings count less than the new ones, this testifies to the evolution over time. Specifically, the ranking is given by a system that considers the results of the matches by attributing a specific score to them. As observed in a previous work, the method used by FIFA, even though it is simple, has some inconsistencies because in order to avoid eliminations in the early stages of the competition, the teams at the top of the ranking, are less likely to meet other teams which are also strong (Lasek, Szlavik, Gagolewski, & Bhulai, 2016).

A study conducted by Wang and Vandebroek analyzed in detail how the score is calculated in all the matches, both for national teams and for clubs, recognized by FIFA. This score derives from the multiplication between the outcome of the match (i.e., victory, draw, defeat), the importance of the race (i.e., friendly matches, FIFA World Cup qualification or FIFA Confederations Cup, Confederation-level final phase or FIFA Confederations Cup and FIFA World Cup), the value of the opponent (i.e., placement in the ranking) and the continental confederations (i.e., UEFA/ CONMEBOL, CONCACAF, AFC/CAF, OFC) represented by the competing teams (Wang & Vandebroek, 2013).

The evaluation of performance in football has been the subject of study by various authors (Lago-Peñas, Lago-Ballesteros & Rey, 2011; Liu, Yi, Gimenez, Gomez & Lago-Peñas 2015), both technical and tactical and very often the FIFA ranking was used for this purpose. Performance analysis in sport can be considered as a combination of various indicators whose purpose is to assess the performance of an individual athlete or team (O'Donoghue, 2013). The performance of the individual player or team is linked to the performance coming from different games (Hughes et al, 2001; O'Donoghue, 2013).

In relation to the performance as far as club teams are concerned in the Champions League competition, a previous study has shown in the results that the teams, previously divided into three strength levels, have fixed performance regardless of the opponent, the pressure for the result or where they play, unlike the teams that fall into the middle and intermediate levels where the different variables have their influence. While in the study of Oberstone (2009) on the Premier League and the study of Armatas and colleagues (2009) in the Greek Football First League they highlight a difference between the high and low level teams therefore belonging to different ranking groups.

Corresponding Author: ROBERTO COPPOLA, E-mail: robertogcoppola@gmail.com

Previous studies have had a different impact of different indicators examined. In the study by Almeida and colleagues (2014) the objective was linked to the recovery of the ball, showing how the teams with a better UEFA ranking had a greater recovery in the offensive zone, therefore a different quality that allowed these differences to be obtained (D'Isanto et al., 2019). Instead, another work takes into consideration the ball possession indicator in Spanish Liga matches, which showed statistically significant differences in relation to teams with a high, medium and low ranking level (Castellano, Casamichana, & Lago, 2012).

Paul and Mitra (2008) instead achieved a study on the predictability of football results in relation to the different ranking classes. Among the other indicators, the goal is also analyzed and the goal scored first is shown to affect the final result (Ibáñez, Pérez-Goye, Courel-Ibáñez, & García-Rubio, 2018). Otherwise, the study carried out by Bootsma and Bhulai (2015) analyzes as an indicator the choice of teams against which to play in friendly matches and the subsequent impact on the FIFA ranking. It can be observed that playing at home with respect to travel is among the factors that favor final victory and consequently the calculation of rankings (Brown, Van Raalte, Brewer, Winter, & Cornelius, 2002; Carron, Hausenblas, & Eys, 2005).

Material & methods
Procedure and Instruments
The following study aims to identify which indicators are discriminating in relation to the FIFA ranking concerning the world championship played in Russia in 2018. The hypothesis of this study is whether the indicators chosen are able to discriminate the national teams' strength. In this study, all 64 matches played during the 2018 World Cup were examined and the methodology used was chosen according to a previous study (Liu, et al., 2015).

The analysis of the games took place off-line through the LongoMatch software (LongoMatch by Fluendo) which allowed to extrapolate the selected variables in the different matches and the subsequent export to Microsoft Excel (Microsoft Office).

To define three groups, conforming to a previous study, the points of each national team (i.e., FIFA world rankings or FIFA world rankings) were updated to the ranking preceding the competition in question. Through the method of k-means cluster analysis the national teams participating in the world championship were grouped into three groups: high-level teams, intermediate-level teams and low-level teams (Liu, et al., 2015).

The indicators used (Table 1) were chosen based on the bibliography previously consulted. The ball possession data, expressed as a percentage, was obtained by consulting the official reports from the FIFA website. With regard to effectiveness, it was estimated by multiplying the goals by 100 and dividing by the total of throws (Lago-Peñas, et al., 2011).

Table 1: Description of the indicators used

Performance indicators	Description
Goal	Number of goals in the match
Shots	Total number of shots terminated on the net or outside
Efficacy	Shooting effectiveness, estimated using the following formula: Goal*100/Total shots (Lago-Peñas, et al., 2010)
Assist	number of passes completed with a goal
Offside	Number of offside identified during an offensive action
Corners	Number of corner kicks identified furing an offensive action
Penalty kick	Number of penalty kicks during the game
Ball possession	Percentage of ball possession

Statistical analysis
According to the study by Liu and colleagues (2015) the same methodology was adopted with reference to the statistical analysis, including, as in the case of the subdivision in the three strength levels, the use of the mean, the standard deviation, the median and the quartiles. After verifying the data distribution (i.e., Kolmogorov Smirnov test) to determine the differences between the three groups of teams a one-way Anova was performed with the post-hoc test to determine which differences were statistically significant. All statistical tests were performed with SPSS v.21.0 software (SPSS Inc. Chicago, IL, USA). The level of significance was set to p <.05.

Results
Tables 2, 3, 4 and 5 show the averages and standard deviations of the variables selected for the three strength levels of the teams and the differences between them respectively.

Table 2: Mean and Standard Deviation respective to the performance variables analyzed for the three different levels.

Performance indicators	High-level teams		Intermediate-level teams		Low-level teams	
	M	SD	M	SD	M	SD
Goal	1,59	1,235	1,3	1,11	1,03	1,082
Shots	14,86	6,21	12,63	4,573	10,22	4,155
Efficacy	13,11	12,423	11,46	10,892	10,25	10,399
Assist	1,14	0,948	0,7	0,768	0,61	0,934
Offside	1,22	1,228	1,52	1,24	1,14	1,15
Corners	5,89	2,797	4,43	2,089	3,94	2,203
Penalty kick	14,41	4,166	13,06	4,66	13,19	5,317
Ball possession	54,81	9,48	49,91	10,226	45,06	9,865

Table 3: Mean and standard deviation based on the FIFA rank.

High-level teams		Intermediate-level teams		Low-level teams	
M	SD	M	SD	M	SD
1297,8	132,093	977,8	93,367	614,36	102,943

Table 4: Analysis of the differences between high, medium and low level teams.

Performance indicators	ANOVA		
	F	df	sig.
Goal	2,26	2,126	
Shots	7,865	2,126	**
Efficacy	0,598	2,126	
Assist	3,912	2,126	**
Offside	1,262	2,126	
Corners	7,006	2,126	**
Penalty kick	0,994	2,126	
Ball possession	8,837	2,126	**

$**p < .001$

Table 5: Bonferroni post-hoc test results.

Performance indicators	post-hoc test			
	Team Level		Mean differences (SD)	p
Goal	High	Intermediate	0,298 (0,24)	
		Low	0,567 (0,27)	
Shots	High	Intermediate	2,235 (1,1)	
		Low	4,643 (1,2)	**
Efficacy	High	Intermediate	1,645 (2,4)	
		Low	2,858 (2,6)	
Assist	High	Intermediate	0,431 (0,2)	
		Low	0,524 (0,2)	*
Offside	High	Intermediate	0,302 (0,3)	
		Low	0,077 (0,3)	
Corners	High	Intermediate	1,466 (0,5)	*
		Low	1,947 (0,5)	**
Penalty kick	High	Intermediate	1,350 (1,0)	
		Low	1,211 (1,1)	
Ball possession	High	Intermediate	4,903 (2,1)	
		Low	9,755 (2,3)	**

$*p < .05$ $**p < .001$

1822--

JPES ®   www.efsupit.ro

Discussion

Tables 3 and 4 show how shots, assist, corners and ball possession are the indicators that can discriminate the levels calculated by the FIFA ranking. The results show a statistically significant difference between the high and low level teams for the previously mentioned indicators. In addition, corners are an element that also discriminates the difference between high and mid-level teams. Evidently, the difference between high and low level teams could be determined by the different technique of the players as evidenced in a previous study (Liu, et al., 2015).

The shots, especially, are related not only to the differences between the high and low level teams, but also had clear positive relationships with the probability of winning the match (Lago-Peñas, Lago-Ballesteros, Dellal, & Gómez, 2010; Lago-Peñas et al., 2011; Liu & Gómez, 2014; Yue, Broich, & Mester, 2014; Silvestri et al. 2019). The ball possession and assist seems to be performance indicators that are able to discriminate FIFA ranking and consequently the strength level of the teams. These indicators are also able to discriminate winning and losing teams in club championships (Lago-Peñas et al., 2010, 2011). The assist are also discriminant in relationship to the match results between the National teams as evidenced by a previous study (Sgrò, Barresi, & Lipoma, 2015). The FIFA ranking of the national teams used for the classification was taken from the official FIFA website. In accord According to a previous study, the field factor variable, which is used in the calculation algorithm, influences the organization of the ranking (Pollard, 2008). As evidence of the results obtained, the possession of the ball appears to be particularly frequent in the bibliography and as also found by Collet (2013) it appears to be discriminating in the FIFA ranking positioning. In accordance with the studies already analyzed and confirming what was previously analyzed by previous studies, the variable shots and ball possession are the most important for the discrimination of victorious or losing teams (Castellano, 2012; Dinnie, 2015), while the variables assist and angles considered not decisive in the studies just mentioned in this work show an interesting different interpretation probably due to the evolution of the tactics used in modern football (González-Víllora, Serra-Olivares, Pastor-Vicedo, & Da Costa, 2015).

Conclusions

Today the analysis of the performance of a single player or team is increasingly supported by new equipment and new methods of analysis. The study on the performance of football teams, the creation of different profiles and the level of play could provide useful means and facilitate the work of coaches and analysts in assessing the performance of teams and/or players, so the choice to rely on the ranking could result innovative. The ranking depends not only on the good performance of the team, that is on the scores obtained, but also on the choice of the right opponent, who does not favor the clash between two high ranking teams (Lasek, et al., 2016). Moreover, as described in a previous study whose purpose was to develop a new method of calculating points, an advantage emerges in the calculation of the final score from the field factor, that is considering the games played at home. The results obtained show that some variables have been able to discriminate the results based on a classification deriving from the FIFA ranking. In conclusion, the results obtained lead us to think about how decisive it can be to be able to discriminate the strength of a team based on game indicators and how these data can be useful to coaches and performance analysts to assess the performance of their team and those which they will face.

Conflicts of interest

The authors declare that they have no conflict of interest.

References

Almeida, C. H., Ferreira, A. P., & Volossovitch, A. (2014). Effects of match location, match status and quality of opposition on regaining possession in UEFA Champions League. *Journal of human kinetics, 41*(1), 203-214.

Armatas, V., Yiannakos, A., Zaggelidis, G., Papadopoulou, S., & Fragkos, N. (2009). Goal scoring patterns in Greek top leveled soccer matches. *Journal of Physical Education and Sport, 23*(2), 1-5.

Bootsma, T., & Bhulai, S. (2015). Leverage position on the FIFA Ranking. *VU University Amsterdam Research Paper*.

Brown Jr, T. D., Van Raalte, J. L., Brewer, B. W., Winter, C. R., Cornelius, A. E., & Andersen, M. B. (2002). World Cup Soccer Home Advantage. *Journal of Sport Behavior, 25*(2).

Carron, A. V., Hausenblas, H. A., & Eys, M. A. (2005). *Group dynamics in sport*. Fitness Information Technology.

Castellano, J., Casamichana, D., & Lago, C. (2012). The use of match statistics that discriminate between successful and unsuccessful soccer teams. *Journal of human kinetics, 31*, 137-147.

Collet, C. (2013). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007–2010. *Journal of sports sciences, 31*(2), 123-136.

Dinnie, A. (2016). *Differences in attacking play between successful and unsuccessful teams at the 2014 FIFA World Cup* (Doctoral dissertation, Cardiff Metropolitan University).

D'Isanto, T., D'Elia, F., Raiola, G., Altavilla, G. (2019) *Assessment of sport* performance: Theoretical aspects and

---1823

----

practical indications, Sport Mont, 17 (1), pp. 79-82.

González-Víllora, S., Serra-Olivares, J., Pastor-Vicedo, J. C., & Da Costa, I. T. (2015). Review of the tactical evaluation tools for youth players, assessing the tactics in team sports: football. *SpringerPlus, 4*(1), 663.

Hughes, M., Evans, S., & Wells, J. (2001). Establishing normative profiles in performance analysis. *International Journal of Performance Analysis in Sport, 1*(1), 1-26.

Ibáñez, S. J., Pérez-Goye, J. A., Courel-Ibáñez, J., & García-Rubio, J. (2018). The impact of scoring first on match outcome in women's professional football. *International Journal of Performance Analysis in Sport, 18*(2), 318-326.

Lasek, J., Szlávik, Z., Gagolewski, M., & Bhulai, S. (2016). How to improve a team's position in the FIFA ranking? A simulation study. *Journal of Applied Statistics, 43*(7), 1349-1368.

Lago-Peñas, C., Lago-Ballesteros, J., Dellal, A., & Gómez, M. (2010). Game-related statistics that discriminated winning, drawing and losing teams from the Spanish soccer league. *Journal of sports science & medicine, 9*(2), 288.

Lago-Peñas, C., Lago-Ballesteros, J., & Rey, E. (2011). Differences in performance indicators between winning and losing teams in the UEFA Champions League. *Journal of Human Kinetics, 27*, 135-146.

Liu, H., Yi, Q., Giménez, J. V., Gómez, M. A., & Lago-Peñas, C. (2015). Performance profiles of football teams in the UEFA Champions League considering situational efficiency. *International Journal of Performance Analysis in Sport, 15*(1), 371-390.

Liu, H., & Gómez, M. A. (2014). Relationships between match performance indicators and match outcome in 2014 Brazil FIFA world cup. *In Conference: VIII Congreso Internacional de la Asociacion Espanola de Ciencias del Deporte. Spain.*

O'Donoghue, P. (2005). Normative profiles of sports performance. *International Journal of Performance Analysis in Sport, 5*(1), 104-119.

O'Donoghue, P. (2013). Sports performance profiling. In *Routledge Handbook of sports performance analysis* (pp. 145-157). Routledge.

Oberstone, J. (2009). Differentiating the top English premier league football clubs from the rest of the pack: Identifying the keys to success. *Journal of Quantitative Analysis in Sports, 5*(3).

Pollard, R. (2008). Home advantage in football: A current review of an unsolved puzzle. *The open sports sciences journal, 1*(1).

Paul, S., & Mitra, R. (2008). How predictable are the FIFA worldcup football outcomes? An empirical analysis. Applied Economics Letters, 15(15), 1171-1176.

Sgrò, F., Barresi, M., & Lipoma, M. (2015). The analysis of discriminant factors related to team match performances in the 2012 European Football Championship. *Journal of Physical Education & Sport, 15*(3).

Wang, C., & Vandebroek, M. L. (2013). A model based ranking system for soccer teams. *Available at SSRN 2273471.*

Yue, Z., Broich, H., & Mester, J. (2014). Statistical analysis for the soccer matches of the first Bundesliga. *International Journal of Sports Science & Coaching, 9*(3), 553-560.