AUC Kinanthropologica, Vol. 60, No. 2, pp. 113–130

Evaluating football clubs using ORESTE and AGREPREF

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ABSTRACT

In already published research, we observe that continuous multi-criteria decision-making models are often used to evaluate professional football clubs. However, some publications suggest that discrete models can also be applied. The aims of this study are to assess English Premier League clubs using two discrete multi-criteria evaluation methods and to compare their results. The chosen methods were ORESTE, which is based on an ordinal comparison of criteria and alternatives, and AGREPREF, which relies on pairwise comparisons. Six criteria were selected to represent the sporting, economic, and social objectives of the clubs. Both methods produced only a quasi-arrangement of clubs. The AGREPREF method provided a ranking more closely aligned with the clubs' final league positions. However, the final ranking is significantly influenced by the selection of criteria and the weights assigned to them. Both methods highlighted the performances of Wolverhampton Wanderers and Watford.

KEYWORDS

decision-making methods; Premier League; performance

DOI

10.14712/23366052.2025.4

INTRODUCTION

European football is a major industry with distinctive characteristics. First, European professional football clubs tend to focus on utility maximization rather than profit maximization (Avgerinou, 2007; Kesenne, 2000). Another unique characteristic is the environment in which the clubs operate. The top European competitions can be considered cartels (Kesenne, 2003), as the clubs, despite competing against each other, must collaborate on various issues to ensure the league season takes place, including certain revenue-sharing agreements.

In recent years, the decision-making process in professional clubs has been highly influenced by the UEFA (Union of European Football Associations) regulations, which were designed to ensure the financial sustainability of clubs, to prevent insolvencies, and to promote competitive balance. As some researchers expected (Peeters & Szymanski, 2014), the regulations do not resolve all these issues (Caglio, Laffitte, Masciandaro, & Ottaviano, 2023). Also, UEFA has reacted to the latest developments and has changed the rules (UEFA, 2023).

Also, for these reasons, many researchers are attempting to evaluate the overall performance of football clubs. However, there is no scientific consensus on how to approach this problem. The scientists do not agree on what areas to evaluate. A professional football club achieves three types of goals – sporting, economic, and social (Freyer, 1991). These goals are interconnected and influence one another (Šíma, 2019).

The sporting goal is typically linked to performance in the domestic league and the domestic and European cups. However, it can also represent the development of young players. The economic goal is represented by the financial stability of the club to secure future growth. The social goal relates to expanding the fan base, enhancing the club's image, and engaging in corporate social responsibility (CSR) activities (Čáslavová, 2009; Šíma, 2019).

According to the complexity of a club's goals, selecting the most suitable variables to represent its performance for a single season is challenging. Many researchers have decided to evaluate only sporting performance (Beck & Meyer, 2012; Dawson & Dobson, 2002; García-Sánchez, 2007). Others have focused exclusively on evaluating economic performance (Barros & Garcia-del-Barrio, 2008; Forker, 2005).

There is already a large group of researchers who have focused both on sporting and economic goals (Badmus, Akinwande, & Ukaegbu, 2017; Barros & Douvis, 2009; Carmichael, McHale, & Thomas, 2011; Guzmán & Morrow, 2007; Haas, 2003), but only a few authors have decided to evaluate complex performance by including the social goal (Šíma, Voráček, Kraft, & Krause, 2023; Zambom-Ferraresi, Lera-López, & Iráizoz, 2017). Authors who evaluate more objectives tend to use the data envelopment analysis (DEA) to evaluate the clubs' performance.

The DEA is a multi-criteria decision-making method based on linear programming, first introduced by Charnes, Cooper, & Rhodes (1978). It measures performance in terms of efficiency. Given that DEA is based on linear programming and is therefore a continuous model, the question arises of whether a discrete multi-criteria decision model could be used to evaluate clubs.

In recent decades, several multi-criteria decision-making methods have been invented (Triantaphyllou, 2010) and are now used to make decisions across various industries These methods can be applied to analyze location planning for urban distribution centres amid uncertainty, evaluate suppliers in supply chain management, or assess banking performance based on a balanced scorecard (Aruldoss, Lakshmi, & Venkatesan, 2013).

The discrete multi-criteria decision-making methods can also be used to evaluate corporate entities and organizations. Thus, the decision-making unit is influenced by numerous factors, making the assessment of its performance multidimensional. Evaluation through a discrete multi-criteria decision-making method can help to recognize

its strengths and weaknesses and to increase its performance through management changes (Zopounidis & Doumpos, 2002).

To provide specific examples of the use of multi-criteria decision-making methods in business, several concrete cases will be mentioned. The first example is the application of these methods to solve the problem of optimal portfolio selection for securities Marasović & Babić (2011) employed a model based on PROMETHEE II (Preference ranking organization method for enrichment evaluation), structuring the methodology around two interconnected pillars: the selection of different industries to form the overall portfolio and the selection of a portfolio for each industry individually. Additionally, the authors defined specific forms of criterion functions for each criterion.

Another example of the practical application of multi-criteria decision-making methods is supplier selection. Adali & Isik (2017) performed a web designer selection based on ORESTE (Organization, Rangement Et Synthese De Donnes Relationnelles) method and a set of seven criteria affecting their selection decision as price, technical skills, communication skills, reference, time, experience and technical support. According to Chatterjee & Chakraborty (2013) the ORESTE method might be also used to select of advanced manufacturing systems.

Čabala & Jadlovský (2017) demonstrated, using the ELECTRE III (ELimination Et Choix Traduisant la REaite), TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution), and AGREPREF (AGgREgation PREFerences) methods, that these approaches can be applied to find the optimal configuration of an automated assembly line model. They also recommend using multiple methods for evaluating alternatives when addressing significant problems and comparing the results obtained from each method. Olivková (2017) demonstrated, that the AGREPREF method might be also used to compare and evaluate fare collection technologies in the public transportation. From the above, it is evident that multi-criteria decision-making methods have a remarkably wide range of potential applications.

This wide range of potential applications also includes the sport environment because professional sport is a business. Górecka (2020) presented an approach that could be used by a company to select the best football club to sponsor. The selection was based on EXPROM IIv (EXtension of the PROMethee), PROMETHEE IIv, ELECTRE III, and TOPSIS, and the criteria represented all three major goals of a football club – sporting, economic, and social. Like Čabala & Jadlovský (2017), she also recommends using multiple methods for evaluating alternatives.

Another potential application in the sports environment might be the selection of the best football player, the Golden Ball Award. As research has shown, the winner selected using discrete multi-criteria decision-making method AHP (Analytical Hierarchy Process) may differ dramatically from the winner ultimately selected by the judges (Mu, 2016).

Returning to the evaluation of football clubs, there are only a few approaches that use a discrete multi-criteria decision-making model. One example comes from Greek football (Chelmis, Niklis, Baourakis, & Zopounidis, 2019). Using the PROMETHEE II method and a set of 38 criteria, which represented all three goals of a football club, this approach was very comprehensive. On the other hand, such a large set of criteria complicates their actual use by the governing sports organizations.

In a study evaluating German football clubs, only six criteria were used with two different discrete multi-criteria decision-making methods, AHP and TOPSIS (Mavi, R., Mavi, N., & Kiani, 2012). The six selected criteria represented only the economic and social goals, as the sporting performance of the club was not included.

It is difficult to decide whether discrete multi-criteria decision-making methods are better than a continuous one, and which exact method to use to evaluate football clubs. There is not enough evidence that discrete multi-criteria decision-making methods might be more accurate and usable. The scientific community also disagrees on which criteria should be selected to represent a club's complex performance in a way that is not overly complicated to apply.

Therefore, the aim of this article is to evaluate the performance in achieving the sporting, financial, and social goals of football clubs using two multi-criteria decision-making methods that are not commonly employed for this purpose.

METHODS AND DATA

Both selected multi-criteria decision-making methods are quite common in other business fields, but not for evaluating football clubs. The ORESTE and AGREPREF methods were chosen because they require minimal additional information, only the order/weights of criteria. The calculations are based on the procedure described in Fiala (2013).

The ORESTE method is based on ordinal information about inputs and criteria. Since the existence of indifferent criteria and alternatives is allowed, it is a quasi-arrangement. The quasi-arrangement of criteria is expressed as a vector q, and the quasi-arrangement of inputs as a matrix P.

$$q = (q_1, q_2, ..., q_k) \tag{1}$$

$$P = (p_{ij}),\ i = 1, 2, ..., p, j = 1, 2, ..., k. \tag{2}$$

Then the distance from the fictitious origin is calculated according to the following formula:

$$D = (d_{ij}),\ i = 1, 2, ..., p, j = 1, 2, ..., k, \tag{3}$$

$$d_{ij} = \left(\tfrac{1}{2}(p_{ij})^r + \tfrac{1}{2}(q_j)^r\right)^{1/r},\ r = 3. \tag{4}$$

The distances d_{ij} are arranged in ascending order and rated by an ordinal number in the matrix R. After that, we can calculate the line of sums r_i in the matrix. By arranging these values in ascending order, we obtain a quasi-ordering of alternatives.

$$R = (r_{ij}),\ i = 1, 2, ..., p, j = 1, 2, ..., k. \tag{5}$$

$$r_i = \sum_{j=1}^{k} r_{ij},\ i = 1, 2, ..., p. \tag{6}$$

Based on the values of r_{ij} we can calculate the values of the preference intensities c_{mn}.

$$c_{mn} = \sum_{h \in K}(r_{nh} - r_{mh}),\ m, n = 1, 2, ..., p, \tag{7}$$

where K represents the set of indices of criteria in terms of which alternative a_m is better than alternative a_n. These preference intensities are normalized and used to identify the relations of preferences, indifferences and incomparability.

$$c^*_{mn} = \frac{c_{mn}}{c^{max}},\ m, n = 1, 2, ..., p, \tag{8}$$

$$c^{max} = k^2(p - 1). \tag{9}$$

To identify the relations, the thresholds α, β, and γ were chosen as follows:

$$\alpha = 0.0263 \tag{10}$$

$$\beta = 0.00877 \tag{11}$$

$$\gamma = 1. \tag{12}$$

The thresholds were chosen according to the recommended maximum or minimum threshold values as suggested by Fiala (2013) to make the sensitivity analysis less strict when evaluating individual relationships. At the same time, this minimizes the subjective perspective of a single author. In order to perform the last two steps of the analysis, we need to assume the following relation:

$$c^*_{mn} \geq c^*_{nm}. \tag{13}$$

If the following holds, the alternatives a_m and a_n are mutually indifferent.

$$c^*_{mn} \leq \alpha, \text{ and } c^*_{mn} - c^*_{nm} \leq \beta. \tag{14}$$

In another case, we can observe a preference relation or incomparability. If the following equation holds, the alternatives a_m and a_n are incomparable. Otherwise, alternative a_m is preferred to alternative a_n.

$$\frac{c^*_{nm}}{c^*_{mn} - c^*_{nm}} \geq \gamma. \tag{15}$$

The results from the ORESTE method are based on the r_i value and the analysis of preference intensities.

The AGREPREF method is based on pairwise comparisons of preference according to individual criteria. For the set of alternatives $A = \{a_1, a_2, ..., a_p\}$ and the system of criteria $f_1, f_2, ..., f_k$, we can define the degree of preference for alternative a_m over a_n

$$s_{mn} \in < 0,1 >. \tag{16}$$

The importance of each criterion is defined by the weights:

$$v_1, v_2, ..., v_k, \sum_{h=1}^{k} v_h = 1, v_h \geq 0. \tag{17}$$

For each pair of alternatives a_m and a_n, we group the criteria as follows

- The set of indexes I_{mn} in case a_m is preferred to alternative a_n,
- The set of indexes I_{nm} in case a_n is preferred to alternative a_m,
- The set of indexes $I_{m\sim n}$ in case that both alternatives have the same values of the criterion and have an indifferent relation.

The degrees of preference s_{mn} (for a_m preferred to a_n), s_{nm} (for a_n preferred to a_m), and indifferences $s_{m\sim n}$ (for indifference between a_m and a_n) are calculated:

$$s_{mn} = \sum_{h \in mn} v_h, \tag{18}$$

$$s_{mn} = \sum_{h \in I_{nm}} v_h, \tag{19}$$

$$s_{m\sim n} = \sum_{h \in I_{m\sim n}} v_h. \tag{20}$$

The final relation between the pair of alternatives is determined based on thresholds α and β, which were chosen as follows:

$$\alpha = 0.5\,, \tag{21}$$

$$\beta = 0.2. \tag{22}$$

The thresholds were chosen by the author to balance sensitivity and robustness in the decision-making process. This setting allows for identifying indifference when alternatives have moderate similarity while ensuring preference is determined even with small but meaningful differences.

If this is the case, the following equation holds, as there is an indifferent relation between alternatives a_m and a_n. If not, then we can observe a relation of preference or incomparability.

$$s_{m\sim n} \geq \alpha. \tag{23}$$

The alternative a_m is preferred to alternative a_n, if:

$$s_{mn} - s_{nm} > \beta. \tag{24}$$

The alternative a_n is preferred to alternative a_m, if:

$$s_{nm} - s_{mn} > \beta. \tag{25}$$

If none of these last three equations holds, then there is a relation of incomparability between those alternatives.

The calculated relations between all pairs of alternatives are transferred to the matrix P. The value p_{mn} is equal to 1, if alternative a_m is preferred to a_n. If alternative a_m is not preferred to a_n, the value p_{mn} is equal to 0. The matrix P is subsequently rearranged so that the upper right corners have ones, which creates a quasi-arrangement of alternatives. To arrange the matrix P, we use the values d_h.

$$d_h = d_h^+ - d_h^-, \text{ where } d_h^+ = \sum_{n=1}^{p} p_{hn}, \; d_h^- = \sum_{m=1}^{p} p_{mh}. \tag{26}$$

The set of alternatives for both methods consists of all Premier League clubs from the 2018/2019 season, meaning there are 20 alternatives. The set of criteria was chosen based on inputs and outputs from Badmus et al. (2017) and Šíma et al. (2023). A total of six criteria were selected, three minimizing and three maximizing – the number of points obtained in the league (points), total revenue (rev), change in the number of fans on Facebook (fans), total wages (wage), the number of employees (employ), and assets consumed (assets). Each criterion was evaluated with points b from 1 to 20 according to its importance. From these points, the weights v were calculated as follows:

$$v_j = \frac{b_j}{\sum_{j=1}^{k} b_j}, j = 1, 2, ..., k. \tag{27}$$

The final weights and order of selected criteria are presented in Table 1. The sports performance in the season fundamentally influences the flow of finances in the following years and thus the club's possibilities on the transfer market. As a result, the number of points was selected as the most important criterion. The second most important criterion is the total amount of the club's revenue, followed by total wages in third place. These represent the economic goal and sustainable management. On the other hand, the number of employees can vary due to various factors, which is why the weight of this criterion is the lowest.

Table 1 Criteria ranking (Source: Own research)

Criterion	Points	Rev	Fans	Wage	Employ	Assets
Order	1	2	5	3	6	4
Points	20	18	10	16	4	12
Weight	0.25	0.225	0.125	0.2	0.05	0.15
Type	max	max	max	min	min	min

The actual data come mostly from the clubs' financial statements, while the full data set (Table 2) is from Krause (2022).

Table 2 Data set (Source: Krause, 2022)

	Points	Rev	Fans	Wage	Employ	Assets
Manchester City	98	535 169 000	6 173 000	315 257 000	463	140 206 000
Liverpool	97	533 022 000	4 670 000	309 917 000	853	122 939 000
Chelsea	72	423 637 000	224 000	262 795 000	409	173 777 000
Tottenham Hotspur	71	460 695 000	2 218 000	178 602 000	561	72 365 000
Arsenal	70	367 459 000	−191 000	230 463 000	707	96 164 000
Manchester United	66	601 935 000	−440 000	324 004 000	816	135 373 000
Wolverhampton Wanderers	57	172 463 000	745 000	92 131 000	365	38 859 000
Everton	54	187 664 000	73 000	159 985 000	456	104 105 000
Leicester City	52	178 429 000	52 000	149 512 000	320	67 474 000
West Ham United	52	190 695 000	14 000	135 796 000	542	59 432 000
Watford	50	147 661 000	717 000	83 599 000	297	40 524 000
Crystal Palace	49	155 404 000	65 000	119 295 000	236	54 905 000
Newcastle United	45	176 448 000	39 000	96 798 000	274	41 428 000
Bournemouth	45	131 134 000	46 000	110 894 000	621	37 544 000
Burnley	40	137 791 000	22 000	86 619 000	255	38 755 000
Southampton	39	144 649 000	510 000	111 444 000	385	55 301 000
Brighton and Hove Albion	36	143 132 000	66 000	100 581 000	954	34 473 000
Cardiff City	34	122 574 000	8 000	53 651 000	190	29 368 000
Fulham	26	137 748 000	30 000	92 591 000	273	44 550 000
Huddersfield Town	16	119 320 000	12 000	64 175 000	303	33 373 000

Note: Revenues, wages, and assets are listed in British pounds

RESULTS

First, the results calculated using the ORESTE method will be presented. The matrix R, which represents the average ranking based on alternatives and criteria, is shown in Table 3.

The final evaluation of the clubs according to ORESTE is shown in Table 4, along with their final positions in the Premier League season for comparison. The ranking from the R matrix is complete. However, based on the results of the preference analysis in Table 6, several alternatives were detected that are not comparable to each other. As a result, we only obtain the final quasi-arrangement of the clubs.

The football club with the best performance was Wolverhampton Wanderers, while the club with the worst performance was Manchester United. Both Manchester United and Arsenal finished at the top of the league, but their overall performance was the

Table 3 R matrix (Source: Own Research)

	Points	Rev	Fans	Wage	Employ	Assets	Sum	Rank
Manchester City	1	4	16.5	111	77	112	321.5	4
Liverpool	2.5	7.5	19.5	105	114	100	348.5	8
Chelsea	5.5	19.5	41	99	66	118	349	9
Tottenham Hotspur	10.5	12.5	21.5	87	90	82	303.5	3
Arsenal	16.5	27.5	113	93	102	88	440	19
Manchester United	25.5	2.5	119	117	108	106	478	20
Wolverhampton Wanderers	36	62	23.5	21.5	55	32.5	230.5	1
Everton	42	43	47	81	72	94	379	12
Leicester City	53.5	49	65	74	48	75	364.5	11
West Ham United	53.5	37	95	69	84	70	408.5	16
Watford	61	73	31	9	40	39	253	2
Crystal Palace	67	68	59	63	27.5	58	342.5	7
Newcastle United	78.5	56	76	38	34.5	46	329	5
Bournemouth	78.5	104	71	50	96	18	417.5	18
Burnley	85	92	89	14.5	29.5	23.5	333.5	6
Southampton	91	80	34.5	57	60	64	386.5	13
Brighton and Hove Albion	97	86	52	44	120	14.5	413.5	17
Cardiff City	103	110	107	5.5	25.5	10.5	361.5	10
Fulham	109	98	83	29.5	32.5	51	403	15
Huddersfield Town	115	116	101	7.5	45	12.5	397	14

weakest. Their poor performance is linked to high wages, large staff numbers, and the fact that both clubs lost fans on Facebook during the period under review.

Although Wolverhampton and Watford finished the season around mid-table, they were rated as the best-performing clubs by the ORESTE method. This is due to their low staff costs, low numbers of staff, and the low amount of assets consumed. Watford had the third-lowest total wage bill in the league.

The AGREPREG method revealed different results. In Table 7, there is the final *P* matrix, which was compiled based on values from the preference matrix (Table 5) and indifference matrix. As we can observe, ones still occur below the diagonal even after ordering by d values, indicating a cycle that implies a complete ordering of the alternatives. Also, the occurrence of zeros above the diagonal is a sign that the arrangement will not be complete, because there is an indifference or incomparability relation between some alternatives. The final quasi-arrangement of clubs is shown in Table 8.

Table 4 Final rank according to ORESTE (Source: Own research)

	Rank in the league	Rank in R matrix	Final rank ORESTE
Manchester City	1	4	4
Liverpool	2	8	7–9
Chelsea	3	9	7–9
Tottenham Hotspur	4	3	3
Arsenal	5	19	19
Manchester United	6	20	20
Wolverhampton Wanderers	7	1	1
Everton	8	12	10–12
Leicester City	9	11	10–12
West Ham United	10	16	16
Watford	11	2	2
Crystal Palace	12	7	7–9
Newcastle United	13	5	5
Bournemouth	14	18	17–18
Burnley	15	6	6
Southampton	16	13	13
Brighton and Hove Albion	17	17	17–18
Cardiff City	18	10	10–12
Fulham	19	15	15
Huddersfield Town	20	14	14

Table 5 Preference Table – AGREPREF (Source: Own Research)

	ManC	Liv	Chel	TotH	Ars	ManU	Wolv	Eve	Leic	WHU	Wat	CrP	NU	Bou	Burn	Sou	Bri	CaC	Ful	Hud
Manchester City		0.65	0.75	0.65	0.65	0.625	0.6	0.6	0.6	0.65	0.6	0.6	0.6	0.65	0.6	0.6	0.65	0.6	0.6	0.6
Liverpool	0.35		0.75	0.6	0.6	0.725	0.6	0.6	0.6	0.475	0.6	0.6	0.6	0.6	0.6	0.6	0.65	0.6	0.6	0.6
Chelsea	0.25	0.25		0.3	0.65	0.625	0.475	0.65	0.6	0.65	0.475	0.6	0.6	0.525	0.6	0.475	0.65	0.6	0.6	0.6
Tottenham Hotspur	0.35	0.4	0.7		1	0.775	0.6	0.75	0.6	0.6	0.6	0.6	0.6	0.65	0.6	0.6	0.65	0.6	0.6	0.6
Arsenal	0.35	0.4	0.35	0		0.775	0.475	0.625	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.525	0.475	0.475	0.475
Manchester United	0.375	0.275	0.375	0.225	0.225		0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.525	0.475	0.475	0.475
Wolverhampton Wanderers	0.4	0.4	0.525	0.4	0.525	0.525		0.775	0.725	0.775	0.75	0.95	0.725	0.85	0.6	1	0.6	0.6	0.95	0.6
Everton	0.4	0.4	0.35	0.25	0.375	0.525	0.225		0.6	0.425	0.475	0.6	0.6	0.65	0.6	0.475	0.65	0.6	0.6	0.6
Leicester City	0.4	0.4	0.4	0.4	0.525	0.525	0.275	0.4		0.175	0.475	0.475	0.6	0.65	0.6	0.525	0.525	0.6	0.6	0.6
West Ham United	0.35	0.525	0.35	0.4	0.525	0.525	0.225	0.575	0.575		0.475	0.475	0.475	0.525	0.475	0.475	0.525	0.6	0.475	0.6
Watford	0.4	0.4	0.525	0.4	0.525	0.525	0.25	0.525	0.525	0.525		0.725	0.725	0.85	0.8	1	0.85	0.6	0.95	0.65
Crystal Palace	0.4	0.4	0.4	0.4	0.525	0.525	0.05	0.4	0.525	0.525	0.275		0.425	0.65	0.65	0.675	0.525	0.6	0.65	0.65
Newcastle United	0.4	0.4	0.4	0.4	0.525	0.525	0.275	0.4	0.4	0.525	0.275	0.575		0.475	0.6	0.875	0.725	0.6	0.75	0.65
Bournemouth	0.35	0.4	0.475	0.35	0.525	0.525	0.15	0.35	0.35	0.475	0.15	0.35	0.275		0.525	0.6	0.3	0.6	0.75	0.6
Burnley	0.4	0.4	0.4	0.4	0.525	0.525	0.4	0.4	0.4	0.525	0.2	0.35	0.4	0.475		0.65	0.5	0.6	0.875	0.65
Southampton	0.4	0.4	0.525	0.4	0.525	0.525	0	0.525	0.475	0.525	0	0.325	0.125	0.4	0.35		0.65	0.6	0.6	0.6
Brighton and Hove Albion	0.35	0.35	0.35	0.35	0.475	0.475	0.4	0.35	0.475	0.475	0.15	0.475	0.275	0.7	0.5	0.35		0.6	0.75	0.6
Cardiff City	0.4	0.4	0.4	0.4	0.525	0.525	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		0.65	0.875
Fulham	0.4	0.4	0.4	0.4	0.525	0.525	0.05	0.4	0.4	0.525	0.05	0.35	0.25	0.25	0.125	0.4	0.25	0.35		0.65
Huddersfield Town	0.4	0.4	0.4	0.4	0.525	0.525	0.4	0.4	0.4	0.4	0.35	0.35	0.35	0.4	0.35	0.4	0.4	0.125	0.35	

Table 6 Preferance analysis matrix – ORESTE (Source: Own research)

	ManC	Liv	Chel	TotH	Ars	ManU	Wolv	Eve	Leic	WHU	Wat	CrP	NU	Bou	Burn	Sou	Bri	CaC	Ful	Hud
Manchester City	I	>	>	N	>	>	<	>	>	>	<	N	N	>	N	>	>	N	>	>
Liverpool	<	I	N	<	>	>	<	>	N	>	<	N	N	>	N	>	>	N	>	>
Chelsea	<	N	I	<	>	>	<	>	>	>	<	N	N	>	N	>	>	N	>	>
Tottenham Hotspur	N	>	>	I	>	>	<	>	>	>	<	>	>	>	N	>	>	>	>	>
Arsenal	<	<	<	<	I	>	<	<	<	<	<	<	<	N	<	<	<	<	<	<
Manchester United	<	<	<	<	<	I	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Wolverhampton Wanderers	>	>	>	>	>	>	I	>	>	>	>	>	>	>	>	>	>	>	>	>
Everton	<	<	<	<	>	>	<	I	<	>	<	<	<	>	<	N	>	N	>	N
Leicester City	<	N	<	<	>	>	<	>	I	>	<	<	<	>	<	>	>	N	>	>
West Ham United	<	<	<	<	>	>	<	<	<	I	<	<	<	N	<	<	N	<	N	N
Watford	>	>	>	>	>	>	<	>	>	>	I	>	>	>	>	>	>	>	>	>
Crystal Palace	N	N	N	<	>	>	<	>	>	>	<	I	<	<	N	>	>	>	>	>
Newcastle United	N	N	N	<	>	>	<	>	>	>	<	>	I	>	N	>	>	>	>	>
Bournemouth	<	<	<	<	N	>	<	<	<	N	<	>	<	I	<	<	N	<	<	<
Burnley	N	N	N	N	>	>	<	>	>	>	<	N	N	>	I	>	>	>	>	>
Southampton	<	<	<	<	>	>	<	N	<	>	<	<	<	>	<	I	>	<	>	N
Brighton and Hove Albion	<	<	<	<	>	>	<	<	<	N	<	<	<	N	<	<	I	<	N	<
Cardiff City	N	N	N	<	>	>	<	N	N	>	<	<	<	>	<	>	>	I	>	>
Fulham	<	<	<	<	>	>	<	<	<	N	<	<	<	>	<	<	N	<	I	N
Huddersfield Town	<	<	<	<	>	>	<	N	<	N	<	<	<	>	<	N	>	<	N	I

Explanatory: I = indifference, N = incomparable

Table 7 P matrix – AGREPREF (Source: Own research)

	ManC	Liv	TotH	Wolv	Chel	Wat	Eve	WHU	Leic	NU	CrP	Ars	Sou	Bri	ManU	Bou	Burn	CaC	Ful	Hud
Manchester City		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Liverpool	0		1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
Tottenham Hotspur	0	0		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wolverhampton Wanderers	0	0	0		0	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1
Chelsea	0	0	0	0		0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
Watford	0	0	0	0	0		0	0	0	1	1	0	0	1	0	1	1	1	1	1
Everton	0	0	0	0	0	0		0	1	1	1	0	0	1	0	1	1	1	1	1
West Ham United	0	0	0	0	0	0	0		1	0	0	0	0	0	0	0	0	1	0	1
Leicester City	0	0	0	0	0	0	0	0		1	0	0	0	0	0	1	1	1	1	1
Newcastle United	0	0	0	0	0	0	0	0	0		0	0	1	1	0	1	1	1	1	1
Crystal Palace	0	0	0	0	0	0	0	0	0	0		0	1	0	0	1	1	1	1	1
Arsenal	0	0	0	0	0	0	1	0	0	0	0		0	0	1	0	0	0	0	0
Southampton	0	0	0	0	0	0	0	0	0	0	0	0		1	0	0	0	1	1	1
Brighton and Hove Albion	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1	0	1	1	1
Manchester United	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Bournemouth	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		0	1	1	1
Burnley	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		1	1	1
Cardiff City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	1
Fulham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Huddersfield Town	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 8 Final Evaluation according to AGREPREF (Source: Own research)

	Rank in the league	Rank in AGREPREF
Manchester City	1	1
Liverpool	2	2
Chelsea	3	5
Tottenham Hotspur	4	3
Arsenal	5	12
Manchester United	6	14–15
Wolverhampton Wanderers	7	4
Everton	8	7
Leicester City	9	8–11
West Ham United	10	8–11
Watford	11	6
Crystal Palace	12	8–11
Newcastle United	13	8–11
Bournemouth	14	16–17
Burnley	15	16–17
Southampton	16	12
Brighton and Hove Albion	17	14–15
Cardiff City	18	18
Fulham	19	19
Huddersfield Town	20	20

Also, according to AGREPREF, both the Wolverhampton Wanderers and Watford were ranked higher than in the league. But they were not ranked as high as according to ORESTE. According to AGREPREF, the best performances were shown by Manchester City and Liverpool, which corresponds with the league results.

Once again, the bottom of the table corresponds to league results. The clubs Manchester United and Arsenal were also ranked as worse performing clubs than the league overall, but not as the worst-performing clubs overall.

From the results, it seems that the AGREPREF method more closely follows the results from the league season than the ORESTE method. The comparison is shown in Table 6, where the rank differences between the rank in the league and the rank according to the method are also shown. Since both methods resulted in only a quasi-arrangement, the difference is calculated from the mean ranking. A positive value in the difference means that the club is ranked higher by the method than in the league, while a negative value means that the club was ranked lower by the method than in the league.

Table 9 Comparison Table (Source: Own research)

	Rank in the league	Rank in AGREPREF	Difference AGREPREF	Final rank ORESTE	Difference ORESTE
Manchester City	1	1	0	4	−3
Liverpool	2	2	0	7–9	−6
Chelsea	3	5	−2	7–9	−5
Tottenham Hotspur	4	3	1	3	1
Arsenal	5	12	−7	19	−14
Manchester United	6	14–15	−8.5	20	−14
Wolverhampton Wanderers	7	4	3	1	6
Everton	8	7	1	10–12	−3
Leicester City	9	8–11	−0.5	10–12	−2
West Ham United	10	8–11	0.5	16	−6
Watford	11	6	5	2	9
Crystal Palace	12	8–11	2.5	7–9	4
Newcastle United	13	8–11	3.5	5	8
Bournemouth	14	16–17	−2.5	17–18	−3.5
Burnley	15	16–17	−1.5	6	9
Southampton	16	12	4	13	3
Brighton and Hove Albion	17	14–15	2.5	17–18	−0.5
Cardiff City	18	18	0	10–12	7
Fulham	19	19	0	15	4
Huddersfield Town	20	20	0	14	6
Standard deviation			3.248		6.755

When we examine the standard deviation of the differences between the two methods, the AGREPREF method appears to more closely follow the final league standings of the clubs. This is because the sum of the weights for the criteria "total points" and "total revenue" is almost 0.5. This makes sense, as clubs with a strong sporting record usually generate higher revenues. As a result, clubs with a better sporting performance tend to be ranked higher more often in the pairwise comparisons.

However, it is not possible to claim that the AGREPREF method is more efficient just because it is more consistent with the league results. Similarly, it is also not possible to claim that the ORESTE method is preferable for this reason. The choice of the final method would deserve a more thorough analysis and, above all, the inclusion of the results of other methods. Clubs can be compared using these methods, and while they do not always produce a complete ranking, this is not necessarily a drawback. In some cases, an incomplete ranking is actually preferable, as clubs may achieve identical performance in the evaluated criteria, and this should be properly reflected.

DISCUSSION AND CONCLUSION

As mentioned above, using multiple methods for comparison would be essential to determine which method is more appropriate. While the choice of criteria itself is also highly debatable. Although the criteria are chosen to encompass all three objectives of a football club, this does not mean that they are the most appropriate criteria. As evidenced by the fact that researchers disagree on the choice of these criteria. One question to consider is whether to choose total profit/loss instead of revenue and wage costs. Additionally, the sporting results do not include performances in European leagues, which is also a very important factor.

Furthermore, there is the question of whether to include the number of employees at all, as this figure is partly reflected in the total wage bill. On the other hand, it may indicate a level of efficiency in staff utilization. Similarly, one could debate whether it is more appropriate to consider the number of fans on social media or the number of fans in the stadium. The preference for social media metrics stems from the global reach of the English Premier League, which the number of stadium attendees cannot fully represent.

Additionally, the weights and order of the criteria are open to discussion. A different prioritization or weighting could significantly alter the final ranking of the clubs. For this reason, a broader academic discussion on the selection and appropriateness of possible criteria would be highly beneficial.

The very fact that Premier League clubs are examined in this article influences the choice of criteria. Each league is different, so it is not possible to compare, for example, the Czech, Scottish, and English leagues. If a different league is chosen, it would be appropriate or even necessary to choose different criteria. For example, in the Czech league, including wages in the analysis would be problematic because players and many employees in club management are self-employed. As a result, these costs are presented together with other services in the financial statements. In smaller leagues, the revenue structure of clubs is different. While English clubs generate most of their income from sponsorships and broadcasting rights-making it meaningful to include fans from around the world in the analysis-clubs in smaller leagues primarily rely on UEFA rewards from European cups or ticket sales. Therefore, depending on the league, it would be appropriate to include stadium attendance or sporting performance in European cups as criteria.

If we want to evaluate clubs in a comprehensive way it would be beneficial to compare their performance across several consecutive seasons. A single poor season does not necessarily indicate mismanagement. However, the aim of this article was not to provide a comprehensive evaluation of football clubs but rather to contribute to the ongoing discussion about the most suitable evaluation methodologies.

Future research should explore additional methods and compare their results with those presented here. It would be valuable to apply methods such as UTA (UTility Additive), WSA (Weighted Sum Approach) and ELECTRE. Both UTA and WSA could give a full ranking of the clubs, while some of the ELECTRE methods can divide clubs into efficient and inefficient ones.

In conclusion, both methods can be utilized to evaluate football clubs; however, they typically provide only a quasi-arrangement. As such, other multi-criteria deci-

sion-making methods may prove more suitable. Further research is necessary to determine the optimal set of criteria for such evaluations.

Based on the results of the observed season, the Wolverhampton Wanderers and Watford demonstrated strong performances, while Manchester City and Tottenham Hotspur also performed well. Conversely, Manchester United, Arsenal, and the relegated clubs exhibited the poorest overall performances during the season.

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