Journal of Physical Education and Sport ® (JPES), Vol. 25 (issue 3), Art 71, pp. 661 - 671, March 2025
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

An in-depth evaluation of the financial performance of Turkish Football Clubs using entropy-based RAWEC, FUCA, and SAW Methodologies

MEHMET METE KARADAĞ
Assist. Prof., Dr., Department of Management and Organization, Anadolu Bil Vocational School, Istanbul Aydın University TURKEY

Published online: March 31, 2025
Accepted for publication: March 15, 2025
DOI:10.7752/jpes.2025.03071

Abstract
Football, the world's most popular sport, has evolved into a multi-billion-dollar global enterprise. As the football industry expanded and attracted a wider audience, clubs increasingly adopted corporatization strategies, seeking funding through capital markets and establishing publicly traded entities. This study aims to assess, compare, and rank the financial performance of football teams listed on Borsa Istanbul by applying multi-criteria decision-making methods. In doing so, it aims to provide valuable insights to clubs and stakeholders for informed financial decision-making and to enrich the existing literature by providing a fresh perspective on evaluating financial performance in the context of sport enterprises. The sample comprises four Turkish football clubs, with data drawn from the years 2022 and 2023. Twelve financial performance indicators were identified as the criteria for analysis, and their respective weights were determined using the Entropy methodology. To rank and compare the alternatives, the recently developed "Ranking of Alternatives with Weights of Criterion" (RAWEC) approach was applied alongside the Faire Un Choix Adéquat (FUCA) and Simple Additive Weighting (SAW) multi-criteria decision-making (MCDM) methodologies. The final rankings obtained from these MCDM methods were then combined through Borda count and Copeland techniques to obtain a conclusive assessment. The adoption of the RAWEC methodology stems from the lack of comprehensive financial analyses focused on football entities using this particular model. According to the Entropy results, "Net Profit Margin" emerged as the most critical performance indicator in 2023, with the highest value of 0.0884, whereas in 2022, "Debt to Equity Ratio" was the dominant indicator, recording a value of 0.1025. The integrated evaluation results revealed that Galatasaray (GSRAY) achieved the highest ranking in 2023, while Beşiktaş (BJKAS) ranked lowest. Conversely, in 2022, BJKAS secured the top position, with Trabzonspor (TSPOR) finishing last.
Keywords: Financial Performance Evaluation, Football Clubs, Multi-Criteria Decision-Making Methods

Introduction

Today, football has gone beyond being just a sport and has become a major industrial sector. This industrialization has led to considerable expenditures for football clubs, driving them to adopt corporatization strategies in an increasingly competitive landscape (Aydın et al., 2007). Unlike commercial enterprises, which focus solely on financial success, football clubs must balance both sporting and financial achievements. A decline in sporting performance often results in financial challenges and inadequate revenue generation. As a consequence, football teams must seek alternative sources of revenue (Uluyol, 2024).

A corporation's performance reflects its ability to achieve predefined objectives or outcomes, ideally assessed through quantifiable metrics. A key component of overall performance is financial performance, which pertains to the company's effectiveness in managing assets, shareholder equity, liabilities, revenue, and expenses (Jacková, 2020; Alimohammadlou & Bonyani, 2017). Evaluating financial performance is essential for any company to identify strengths and weaknesses, enhance productivity, enhance competitiveness, and ensure fiscal stability. Multi-criteria decision-making (MCDM) methods, widely recognized as performance measurement tools, have been extensively applied to compare, evaluate, and rank the financial performance of corporations across various industries.

Key stakeholders in the football industry include textile companies, terrestrial and digital broadcasting agencies, tourism enterprises, and entities with sponsorship ties to football clubs (Güngör & Sarı, 2021). Additionally, creditors, managers, regulators, investors, and shareholders represent the primary stakeholders. Conducting a thorough financial performance analysis is essential for football clubs and all associated stakeholders. Such analysis enables investors to distinguish between high-performing and underperforming teams, helping them identify the most suitable investment opportunities. Similarly, for football clubs, it aids in identifying financial strengths and weaknesses, enabling them to gain a competitive edge over other clubs.

Football clubs in Turkey began transitioning to incorporated entities in the 1980s, moving away from their association status (Özdağoğlu & Keleş, 2019). However, only Beşiktaş, Galatasaray, Fenerbahçe, and

Corresponding Author: MEHMET METE KARADAĞ, E-mail: metekaradag@aydin.edu.tr

Trabzonspor have become publicly traded. Beşiktaş and Galatasaray were the first to become publicly traded in 2002, followed by Fenerbahçe in 2004 and Trabzonspor in 2005.

Successful football clubs generate higher revenue from TV rights, merchandise, and ticket sales. Globalization and technological advancements, particularly in the pay-TV industry, have further increased the sport's popularity and profitability (Bank of England, 2019). The income streams of Turkish football teams include membership fees, revenue from television broadcasting rights, ticket sales, sponsorship deals, merchandise sales, and transfer earnings (Kocaoğlu, 2011).

MCDM methods are procedures and mathematical algorithms designed to facilitate decision-making in the presence of multiple objectives. These methods contain a set of evaluation criteria, corresponding weights that reflect their relative importance, various alternatives, and performance indicators to assess each alternative's effectiveness concerning each criterion (Howard, 1991; Hajkowicz et al., 2000). Since the 1960s, MCDM methods have undergone substantial improvements and have been widely applied in various studies (Türegün, 2022). Additionally, new methodologies continue to be introduced in the academic literature. Recently, there has been a growing body of research focused on evaluating the financial performance of football clubs using MCDM approaches. These methods are commonly used by managers, investors, academics, and others as essential tools for performance evaluation and decision-making.

Several studies have directly examined the financial performance of publicly traded sports enterprises using various MCDM methodologies (Sönmez, 2023; Atmaca, 2012; Anbarcı & Sönmez, 2024; Balçıklı & Kocabıyık, 2024; Düzakın et al., 2022; Ecer & Boyukaslan, 2014; Erdoğan et al., 2020; Güngör, 2024; Hoş, 2022; Oral, 2016; Özdağoğlu & Keleş, 2019; Sarkınç, 2014; Süslü & Hızlıer, 2023). Additionally, some of these studies have investigated the relationship between financial performance and athletic success (Ergül, 2017; Kaya, 2023; Sakinc et al., 2017).

Among the various classifications of multi-criteria decision problems, three of the most important are: i) Choice problem: the process of identifying the ideal subset from a range of options based on specific criteria. ii) Sorting problem: the classification of a collection of options according to a specific criterion. iii) Ranking problem: the arrangement of each alternative from most favorable to least favorable (Yoe, 2002). In this context, the aim is to determine and rank the most financially efficient organization based on a series of indicators. Each aspect, with the potential for both positive and negative implications, represents a complex decision-making process that can be classified as an MCDM problem (Karadağ, 2024). The financial performance of football teams is influenced by multiple factors of varying significance. Therefore, assessing and comparing football team performance fundamentally intersects with the applications of MCDM.

This study examines Turkish football clubs listed on Borsa Istanbul (BIST), evaluating their financial performance and ranking using an MCDM framework. The goal is to aid clubs and stakeholders in making informed financial decisions while contributing a new perspective to the existing literature on financial performance assessment in the context of sports enterprises. In this framework, the criteria weights were calculated using the Entropy approach. Performance rankings were established through the Ranking of Alternatives with Weights of Criterion (RAWEC), Faire Un Choix Adéquat (FUCA), and Simple Additive Weighting (SAW) MCDM methodologies. This study is innovative because it is the first to analyze the financial performance of football clubs listed on BIST using RAWEC, FUCA, and SAW approaches concurrently.

Materials and methods

In this study, the Entropy, RAWEC, FUCA, and SAW methodologies were applied to evaluate the performance of the companies. The Borda count and Copeland techniques were used to consolidate the MCDM rankings.

The study is based on data obtained from the financial statements and annual reports of the relevant football organizations. The sample includes football clubs listed on BIST, focusing on financial information for the years 2022–2023. A total of four sports companies were analyzed, and the list of selected sports clubs for this analysis is provided in Table 1.

Table 1. Football Clubs Traded on Borsa Istanbul (Alternatives)

Code:	**Constituent Name:**
BJKAS	Beşiktaş Futbol Yatırımları Sanayi ve Ticaret A.Ş.
FENER	Fenerbahçe Futbol A.Ş.
GSRAY	Galatasaray Sportif Sınai ve Ticari Yatırımlar A.Ş.
TSPOR	Trabzonspor Sportif Yatırım ve Futbol İşletmeciliği Ticaret A.Ş.

Source: Borsa Istanbul (2024), BIST SPOR, https://www.borsaistanbul.com/tr/endeks-detay/234/bist-spor. [Accessed 16 September 2024].

First, 12 financial ratios were identified as criteria for evaluating financial performance. The criteria, along with their corresponding codes and impact directions, are presented in Table 2:

Table 2. Categories, Assessment Criteria, Codes, and Impact Directions

Category	*Criteria for Assessment*	*Code*	*Impact Direction*
Capital Adequacy	Equity-to-Total Assets Ratio	C_1	Benefit
Returns and Profitability	Return on Asset Ratio (ROA)	C_2	Benefit
	Return on Equity Ratio (ROE)	C_3	Benefit
	Net Profit Margin (Net Profit Ratio)	C_4	Benefit
Liquidity	Current Ratio	C_5	Benefit
	Quick Ratio (Acid Test Ratio)	C_6	Benefit
	Cash Ratio	C_7	Benefit
Indebtedness	Debt Ratio (Financial Leverage Ratio)	C_8	Cost
	Debt-to-Equity Ratio	C_9	Cost
Market Value (Valuation)	Price-to-Earnings Ratio	C_{10}	Cost
	Price-to-Book Ratio	C_{11}	Benefit
Operating	Assets Turnover Ratio	C_{12}	Benefit

Entropy methodology

The weights assigned to the criteria indicate their importance and can significantly influence the outcome of the decision-making analysis (Mukhametzyanov, 2021). The study favoured objective weighting methods over subjective ones owing to the latter's reliance on the judgments of decision-makers. The criteria weights were determined using the Entropy approach, which is an objective method. All MCDM approaches used in the study used these Entropy-derived criteria weights.

Step 1: Constructing the initial decision matrix

First, a decision matrix x is constructed, containing x_{ij} values and comprising m alternatives and n criteria (Equation (1)).

$$x = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad ; \quad i = 1, 2, \ldots, m \text{ and } j = 1, 2, \ldots, n \tag{1}$$

where x_{mn} represents a component of the decision matrix for the m-th alternative in the n-th criterion.

Following the development of the decision matrix in the Entropy process, a coordinate transformation table was created to convert the negative values in the decision matrix into positive values. This was achieved using a modified Z-score standardization technique as outlined by Zhang et al. (2014). The formula for Z-score standardization is as follows (Zhang et al., 2014):

$$x_{ij} = \frac{X_{ij} - \bar{X}_i}{S_i} \tag{i}$$

where x_{ij} represents the standardized data; X_{ij} indicates the original data; $\bar{X}_i$ and S_i signify the mean and standard deviation of the index, respectively.

$$x'_{ij} = x_{ij} + A \tag{ii}$$

where x'_{ij} denotes the standardized value after translation

$A > |\min(x_{ij})|$

Step 2: Normalization of the decision matrix

$$p_{ij} = \frac{x'_{ij}}{\sum_{j=1}^{m} x'_{ij}} \tag{2}$$

Step 3: Determination of entropy values (e_i) for the criteria

$$e_i = -k \sum p_{ij} \ln(p_{ij}), \qquad k = \frac{1}{\ln(m)} \tag{3}$$

where m represents the number of alternatives.

Step 4: Determining the degree of differentiation

$$d_j = 1 - e_j \tag{4}$$

Step 5: Calculating the entropy criteria weights

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \tag{5}$$

RAWEC methodology

The RAWEC is a new, user-friendly, and effective MCDM approach introduced by Puška et al. (2024). This methodology encompasses two normalization processes, along with the calculation of deviations from both optimal and suboptimal values. The steps of the RAWEC process are outlined below (Puška et al., 2024):

Step 1: Constructing the decision matrix

Step 2: Normalizing the decision matrix using Equations (6) and (7).

$n_{ij} = \frac{x_{ij}}{x_{j\,max}}$, and $n_{ij}^{r} = \frac{x_{j\,min}}{x_{ij}}$, for benefit criteria

(6)

$n_{ij} = \frac{x_{j\,min}}{x_{ij}}$, and $n_{ij}^{r} = \frac{x_{ij}}{x_{j\,max}}$, for cost criteria

(7)

where $x_{j\,min}$ is the minimum value of the alternatives, $x_{j\,max}$ is the maximum value of the alternatives, and n_{ij}^{r} denotes the second normalization.

Step 3: Calculating the deviation from the criterion weight

$v_{ij} = \sum_{i=1}^{n} w_j \cdot (1 - n_{ij})$

(8)

$v_{ij}^{r} = \sum_{i=1}^{n} w_j \cdot (1 - n_{ij}^{r})$

(9)

where w_j denotes criteria weights.

Step 4: Determining the final values (Q_i) and ranking

$Q_i = \frac{v^{r}{}_{ij} - v_{ij}}{v^{r}{}_{ij} + v_{ij}}$

(10)

The alternative with the higher *Qi* values is considered the optimal alternative.

FUCA methodology

The FUCA technique is based on the individual ranking of objectives. For a given criterion, the maximum value receives rank one, while the minimum value is assigned rank m (Mendoza Luis Fernando et al., 2011). Dudic et al. (2024) note that numerous published studies demonstrated the improved effectiveness of the FUCA method compared to various other MCDM procedures, particularly as the number of alternatives being evaluated increased.

During the implementation process, the optimal value is determined based on the criteria of maximization or minimization, reflecting the highest or lowest value, respectively. After ranking the alternatives according to all criteria, a weighted sum of the rankings is calculated for each alternative. The alternative with the lowest cumulative ranking score is recommended as the optimal choice (Wang et al., 2024).

FUCA is an MCDM methodology that eliminates the need for the normalization process. The first phase involves building the decision matrix and ranking the alternatives for each criterion (r_{ij}). Rankings are determined based on the maximum value for benefit-oriented criteria and the minimum value for cost-oriented criteria.

$r_{ij} = 1$ if alternative *i* meets the optimal criterion *j*. Conversely, $r_{ij} = m$ if alternative *i* meets the least favorable criterion *j*, where *m* represents the total number of alternatives to be ranked (Trung et al., 2024).

The next step is to calculate the scores for each alternative using Equation (11).

$v_i = \sum_{j=1}^{n} n_{ij} * w_j$

(11)

where w_j represents the weight of the *j*th criterion, and n denotes the number of criteria.

Consequently, the alternative with the lowest rating is preferred.

SAW methodology

The SAW method is a widely used MCDM technique known for its straightforward implementation. The steps for applying the SAW approach are summarized below (Taherdoost, 2023).

First, the initial decision matrix is constructed. Next, the matrix is normalized using Equation (12) for cost-oriented criteria or Equation (13) for benefit-oriented criteria. In the final stage, the performance values (V_i) for each alternative are calculated using Equation (14), and the alternatives are ranked in descending order. The alternative with the highest score is considered the most suitable option.

$\tilde{r_{ij}} = \frac{\min_i r_{ij}}{r_{ij}}$ for cost attributes (cost criterion) (12)

$\tilde{r_{ij}} = \frac{r_{ij}}{\max_i r_{ij}}$ for benefit criterion

(13)

where $\tilde{r_{ij}}$ is the normalized performance value of the *i*th criterion for the *j*th alternative.

$V_i = \sum_{i=1}^{n} w_i \tilde{r_{ij}}$

(14)

where w_j denotes the criteria weights.

Borda count and Copeland techniques

Borda count (Borda rule) and Copeland are popular aggregation techniques. The Borda count was introduced by Borda in the 18th century (Borda, 1784). This method is commonly used in various fields, including sports events and scientific research assessments, to aggregate the preferences of different voters (Liu et al., 2023). According to the Borda count, in a set of n alternatives, the alternative ranked lowest receives zero points, while the highest-ranked alternative is awarded (n − 1) points. Therefore, the alternative with the highest cumulative score is deemed the best option.

The Copeland technique, developed by Copeland in 1951, involves several phases. First, the "wins" scores for each alternative are calculated to establish their rankings. Next, the "losses" scores are determined by subtracting each alternative's total score from the cumulative scores of all alternatives. Final scores are then calculated by finding the difference between wins and losses. The alternative with the highest final score is ranked first. The option with the top score, known as the Copeland winner, is considered the preferred choice (Munda, 2008).

Results

Determination of weights using the Entropy methodology

Originally, a decision matrix was created. The 12-criteria decision matrix for four football organizations, developed using Equation (1), is shown in Tables 3 and 4.

Table 3. Decision Matrix for 2023

F. Club / Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}
BJKAS	−0.47	0.07	−0.16	0.14	0.62	0.59	0.00	1.47	−3.12	16.66	−2.61	0.53
FENER	−0.13	0.19	−1.50	0.29	0.90	0.86	0.05	1.13	−8.89	7.22	−10.04	0.66
GSRAY	0.05	0.25	15.17	0.35	0.36	0.28	0.01	0.95	20.24	3.09	15.21	0.71
TSPOR	0.08	−0.13	3.94	−0.42	0.78	0.74	0.00	0.92	12.20	−6.44	10.66	0.30

Table 4. Decision Matrix for 2022

F. Club / Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}
BJKAS	−0.51	0.13	−0.26	0.34	1.30	1.26	0.07	1.51	−2.95	3.46	−0.89	0.39
FENER	−0.32	0.03	−0.11	0.07	1.28	1.23	0.01	1.32	−4.17	16.10	−1.74	0.49
GSRAY	−0.29	−0.07	−1.14	−0.21	0.20	0.17	0.03	1.29	−4.42	−6.02	−1.44	0.33
TSPOR	−0.17	−0.12	−2.17	−0.31	0.83	0.77	0.01	1.17	−6.78	−2.65	−1.77	0.38

Because the implementation processes for 2023 and 2022 are similar, the following section will primarily focus on the steps for 2023.

A coordinate transformation table was initially created using Equations (i) and (ii) to adjust the negative values in the decision matrix to their positive equivalents. Following this, a normalized decision matrix was established using Equation (2). The normalized decision matrix for 2023 is presented in Table 5.

Table 5. Normalized Decision Matrix for 2023

0.022	0.227	0.153	0.273	0.222	0.233	0.155	0.478	0.151	0.446	0.168	0.233
0.245	0.342	0.124	0.342	0.413	0.406	0.491	0.255	0.081	0.285	0.064	0.347
0.357	0.400	0.482	0.371	0.036	0.031	0.206	0.143	0.433	0.215	0.416	0.392
0.376	0.031	0.241	0.014	0.329	0.330	0.149	0.124	0.336	0.054	0.352	0.028

In the final phase, the weights for the entropy criteria were calculated using Equation (5). Table 6 shows the calculated entropy criterion weights for 2023, while Table 7 shows those for 2022.

Table 6. Entropy Criteria Weights for 2023

	C_1	C_2	C_3	C_4	C_5	C_6
w_j	0.0876	0.0865	0.0765	0.0884	0.0857	0.0863

Table 6. Entropy Criteria Weights for 2023 (Cont.)

	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}
w_j	0.0747	0.0773	0.0829	0.0827	0.0843	0.0869

Table 7. Entropy Criteria Weights for 2022

	C_1	C_2	C_3	C_4	C_5	C_6
w_j	0.0980	0.0755	0.0963	0.0743	0.1012	0.0993

Table 7. Entropy Criteria Weights for 2022 (Cont.)

	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}
w_j	0.0688	0.0749	0.1025	0.0699	0.0680	0.0713

The application results show that the most important criterion for 2023 is C_4 (0.0884), while for 2022, it is C_9 (0.1025).

The weights (w) for each criterion, calculated using the Entropy approach and shown in Tables 6 and 7, were applied in the RAWEC, FUCA, and SAW methodologies.

RAWEC application

For 2023, the decision matrix presented in Table 3 was used during the RAWEC implementation phase. The matrix was normalized using Equations (6) and (7). Next, the deviation from the criteria weights was determined through Equations (8) and (9). Finally, the final values (Q_i) were obtained by applying Equation (10), followed by the ranking process. Tables 8 and 9 show the RAWEC ranking results for 2023 and 2022, respectively.

Table 8. RAWEC Ranking Results for 2023

	Q_i	Rank
BJKAS	−1.15746	4
FENER	−0.11278	3
GSRAY	0.494585	1
TSPOR	0.259112	2

Table 9. RAWEC Ranking Results for 2022

	Q_i	Rank
BJKAS	−0.06435	2
FENER	1.150547	1
GSRAY	−0.59708	3
TSPOR	−0.92075	4

The RAWEC approach identified GSRAY as the best alternative for 2023, demonstrating the highest Q_i value, while FENER was recognized as the optimal alternative for 2022.

FUCA application

The decision matrix presented in Table 3 was used for the 2023 FUCA application, while Table 4 was applied for 2022. The normalized performance values ($\tilde{n}_{ij}$) were calculated using Equations (12) and (13). The performance values (V_i) for each alternative were determined through Equation (14), which includes the weights (w_j) established by the Entropy approach. Table 10 shows the performance values (V_i) for 2023.

Table 10. Performance Values (V_i) for 2023

Rank	Football Clubs	v_i
1	GSRAY	2.087362
2	FENER	2.239435
3	TSPOR	2.508548
4	BJKAS	3.164655

Tables 11 and 12 present the final FUCA rankings. The FUCA rankings identified GSRAY as the football club with the highest overall financial performance in 2023 and BJKAS in 2022.

Table 11. FUCA Final Ranking Results for 2023

FUCA final ranking results for 2023	
BJKAS	4
FENER	2
GSRAY	1
TSPOR	3

Table 12. FUCA Final Ranking Results for 2022

FUCA final ranking results for 2022	
BJKAS	1
FENER	2
GSRAY	3
TSPOR	4

SAW application

The normalized decision matrix for 2023, determined using Equations (12) and (13), is presented in Table 13.

Table 13. Normalized Decision Matrix for 2023

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}
BJKAS	−6.22	0.30	−0.01	0.40	0.69	0.69	0.09	0.63	2.84	−0.39	−0.17	0.75
FENER	−1.67	0.76	−0.10	0.82	1.00	1.00	1.00	0.82	1.00	−0.89	−0.66	0.93
GSRAY	0.62	1.00	1.00	1.00	0.40	0.32	0.23	0.97	−0.44	−2.08	1.00	1.00
TSPOR	1.00	−0.50	0.26	−1.20	0.87	0.86	0.08	1.00	−0.73	1.00	0.70	0.42

Following normalization, the performance values (V_i) for each alternative were calculated using Equation (14), and the corresponding scores were established. Table 14 shows the performance values for 2023.

Table 14. Performance Values for 2023

BJKAS	−0.05592
FENER	0.329144
GSRAY	0.422427
TSPOR	0.306703

As shown in Table 14, the most suitable alternative for 2023 is GSRAY, with the highest score of 0.422427.

Tables 15 and 16 present the SAW final rankings. The SAW rankings identified GSRAY as the football club with the highest overall financial performance in 2023 and TSPOR in 2022.

Table 15. SAW Ranking Results for 2023

BJKAS	4
FENER	2
GSRAY	1
TSPOR	3

Table 16. SAW Ranking Results for 2022

BJKAS	3
FENER	4
GSRAY	2
TSPOR	1

Overall and combined ranking results

In the Borda count method, scores from three different MCDM approaches for four alternatives were first ranked. The top-ranked alternative received a score of 3 (n − 1), while the lowest-ranked alternative in 4th place was assigned a score of zero. Each alternative's overall score was then calculated based on these rankings. The final ranking was established so that the alternative with the highest total score was placed in 1st position, while the one with the lowest total score was ranked last. In the Copeland rule, "wins" and "losses" were analyzed to determine the final scores and rankings. The final rankings of football teams, determined using the Borda count and Copeland techniques for 2023, are presented in Table 17, while the rankings for 2022 are shown in Table 18.

Table 17. Final Rankings of Football Clubs Based on Borda Count and Copeland Techniques for 2023

	Borda Count		Copeland			
Football Club	Total	Final Rank	Wins	Losses	Final Score	Final Rank
BJKAS	0	4	0	18	−18	4
FENER	5	2	5	13	−8	2
GSRAY	9	1	9	9	0	1
TSPOR	4	3	4	14	−10	3
Total	18					

Table 18. Final Rankings of Football Clubs Based on Borda Count and Copeland Techniques for 2022

	Borda Count		Copeland			
Football Club	Total	Final Rank	Wins	Losses	Final Score	Final Rank
BJKAS	6	1	6	12	−6	1
FENER	5	2	5	13	−8	2
GSRAY	4	3	4	14	−10	3
TSPOR	3	4	3	15	−12	4
Total	18					

Tables 19 and 20 present the Overall and Combined Ranking Results.

Table 19. Overall and Combined Ranking Results Based on All Methods for 2023

	RAWEC	FUCA	SAW	BordaCount	Copeland
BJKAS	4	4	4	4	4
FENER	3	2	2	2	2
GSRAY	1	1	1	1	1
TSPOR	2	3	3	3	3

Table 20. Overall and Combined Ranking Results Based on All Methods for 2022

	RAWEC	FUCA	SAW	BordaCount	Copeland
BJKAS	2	1	3	1	1
FENER	1	2	4	2	2
GSRAY	3	3	2	3	3
TSPOR	4	4	1	4	4

Discussion

The study found that, according to the Entropy technique, the criterion with the highest value for 2023 is C_4, which represents "Net Profit Margin (Net Profit Ratio)," while for 2022, it is C_9, which stands for "Debt to Equity Ratio." Consequently, these ratios were identified as the most significant factors affecting the financial performance of the football clubs analyzed.

The findings from the overall MCDM rankings indicate that in 2023, the MCDM approaches produced similar ranking results. GSRAY achieved the highest ranking in all three MCDM approaches, while BJKAS obtained the lowest rank. In 2022, GSRAY ranked highest according to the RAWEC method, BJKAS secured the top position with the FUCA method, and TSPOR attained the highest ranking based on the SAW method. TSPOR was ranked lowest in both the RAWEC and FUCA techniques, while FENER held the lowest position in the SAW approach.

All three MCDM methods produced different results. To enhance the credibility of the performance evaluation and help decision-makers make more informed financial decisions, the final evaluation process was performed to aggregate the results using the Borda Count and Copeland techniques. Based on these methods, GSRAY ranked first in 2023, while BJKAS was ranked last. In 2022, BJKAS achieved the top position, whereas TSPOR was ranked last.

The findings for 2023 largely correspond with those of Sönmez (2023), who analyzed the financial performance of publicly traded football clubs from 2017 to 2021 using the MABAC approach. Sönmez (2023) identified GSRAY and TSPOR as the top-performing teams in the annual financial performance evaluations for 2018, 2019, 2020, and 2021.

This study introduces RAWEC, a new MCDM method, alongside the commonly used SAW and FUCA methods, to perform a comparative analysis of financial performance. In evaluating the performance indicators of the football clubs studied, it was found that, when using the established SAW approach, the RAWEC methodology serves as both a functional and effective MCDM technique for assessing the financial performance of football organizations.

A limitation of this study is the analysis of only four football clubs, primarily owing to the unavailability of financial data from other clubs. Future studies on financial performance could be more comprehensive if additional financial data from more football clubs became accessible.

Conclusions

Evaluating and measuring financial performance enables football clubs to benchmark against competitors, identify both financial vulnerabilities and strengths, make informed fiscal decisions, enhance managerial frameworks, and strengthen organizational structure. This evaluation also aids investors in identifying viable investment opportunities. MCDM approaches are increasingly used to assess the financial performance of various organizations. Assessing the financial performance of football clubs is a multi-criteria decision problem.

To determine the weights of the criteria, both subjective and objective approaches can be used. However, because subjective weighting methods depend on the discretion of decision-makers, this study opted for an objective weighting method instead. The criterion weights were established using the Entropy method, which is classified as an objective approach. Once the criterion weights were determined, the RAWEC, FUCA, and SAW methods were applied to rank and assess the financial performance of the football clubs listed on BIST, thus aiding clubs and stakeholders in addressing existing financial challenges. Finally, the Borda count and Copeland techniques were used to aggregate the ranking outcomes obtained from the MCDM methodologies used. Thus, the results from the three different MCDM methodologies were combined into a single integrated approach.

In 2023, the applied methodologies generally produced consistent findings across the assessed football clubs. However, in 2022, discrepancies emerged in the ranking results derived from the different methodologies.

This study provides decision-makers with a more effective decision-making tool using a novel methodology alongside existing methods and assessing the compatibility of its results with those of alternative approaches. The focus is not on determining which methodology performs best, but rather on recognizing that each has its unique strengths and weaknesses.

As new MCDM methods continue to emerge, future analyses of the financial performance of football clubs, corporations, and other institutions can incorporate these innovative techniques, thereby improving the decision-making process for all stakeholders involved.

References

Alimohammadlou, M., & Bonyani, A. (2017). A novel hybrid MCDM model for financial performance evaluation in Iran's food industry. *Accounting and Financial Control*, 1(2), 38-45. https://doi.org/10.21511/afc.01(2).2017.05

Anbarcı, M., & Sönmez, F. (2024). Financial evaluation of companies in Borsa Istanbul sports index using SD and EDAS. *Business Economics and Management Research Journal*, 7(2), 93-104. https://doi.org/10.58308/bemarej.1506348

Ata Yatırım (2024). https://atayatirim.com.tr [Accessed 28 October 2024].

Atmaca, M. (2012). Financial Performance Evaluation of Sports Companies Quoted in İstanbul Stock Exchange With TOPSIS Method. *The Journal of Economy, Business and Finance, 27* (320), 91-108. https://doi.org/10.3848/iif.2012.320.3478

Aydın, A. D., Turgut, M., & Bayırlı, R. (2007). Going Public of Sport Clubs by Examining the Applied Methods Done in Turkey Before. *Gazi University Journal of Commerce & Tourism Education Faculty,* (1), 59-7.

Balçıklı, S., & Kocabıyık, T. (2024). Investigation The Financial Performances of Sports Clubs Traded on Borsa Istanbul by Gray Relational Analysis Method. *Anadolu University Journal of Economics and Administrative Sciences*, 25(2), 256-284. https://doi.org/10.53443/anadoluibfd.1196596

Bank of England (2019). Why are football players paid so much?. https://www.bankofengland.co.uk/explainers/why-are-football-players-paid-so-much [Accessed 29 October 2024]

Borda, J.C. de (1784) Mémoire sur les élections au scrutin, in *Histoire de l' Académie Royale des Sciences*. Paris.

Borsa Istanbul (2024). BIST SPOR. https://www.borsaistanbul.com/tr/endeks-detay/234/bist-spor. [Accessed 16 September 2024]

Copeland, A.H. (1951). *A reasonable social welfare function*, University of Michigan, mimeo.

Çam, A. V. (2015). The Effects of Sporting Success on Stock Returns: An Application in Istanbul Stock Exchange. *Journal of Economics Library*, KSP Journals, 2(3), 147-154. http://dx.doi.org/10.1453/jel.v2i3.453

Düzakın, H., Özekenci, S. Y., & Konak, T. (2022). Analysis of the Financial Performance of Football Clubs by TOPSIS and VIKOR Methods: Turkish Super League Application. *International Conference on Eurasian Economies*.

Ecer, F. & Boyukaslan A. **(**2014). Measuring Performances of Football Clubs Using Financial Ratios: The Grey Relational Analysis Approach. *American Journal of Economics*, *4*(1), 62-71. https://doi.org/10.5923/j.economics.20140401.06

Erdoğan, N. K., Altınırmak, S., Şahin, C., & Karamaşa, Ç. (2020). Analyzing the Financial Performance of Football Clubs Listed in BIST Using Entropy-Based Copras Methodology. *Dumlupınar University Journal of Social Sciences,* (63), 39-53.

Ergül, N. **(**2017). The Investigation of the Relationship Between Financial Success of Sport Companies and Football Victories of Sport Clubs. *Hacettepe University Journal of Economics and Administrative Sciences, 35*(3), 43-71. https://doi.org/10.17065/huniibf.340696

Fintables (2024). https://fintables.com [Accessed 28 October 2024].

Güngör, H. Y. (2024). Analysis of Financial Performance of Public Sports Clubs in Türkiye via CRITIC-Based SAW Method. *MANAS Journal of Social Studies*, 13(2), 499-509. https://doi.org/10.33206/mjss.1366043

Güngör, N., & Sarı, E. S. (2021). Analysis of the Relationship Between the Sportive Success and Financial Performances of the Football Clubs in BIST 100. *Journal of Administrative Sciences*, 19 (Special Issue), 165-186. https://doi.org/10.35408/comuybd.970195

Hajkowicz, S., Young, M. & MacDonald, D.H. (2000). Supporting Decisions: Understanding natural resource management assessment techniques. A Report to the Land and Water Resources Research and Development Corporation, CSIRO Land and Water, Adelaide, Australia.

Halk Yatırım (2024). https://analizim.halkyatirim.com.tr [Accessed 28 October 2024].

Hoş, S. (2022). Evaluation of The Financial Performances of Four Big Football Clubs By Entropy-Based Gray Relational Analysis Method*. Journal of The Faculty of Applied Sciences of Usak University*, 2(2), 12-2

Howard, A. F. (1991). A critical look at multiple criteria decision making techniques with reference to forestry applications. *Canadian Journal of Forest Research*, 21(11), 1649-1659. https://doi.org/10.1139/x91-228

Investing.com (2024). https://tr.investing.com [Accessed 28 October 2024].

İş Yatırım (2024). https://www.isyatirim.com.tr [Accessed 28 October 2024].

Jacková, A. (2020). The Process of Financial Performance Evaluating of the Company. *Journal of Interdisciplinary Research*, 10(2), 161-164. https://www.magnanimitas.cz/ADALTA/1002/papers/A_jackova.pdf.

Karadağ, M. M. (2024). Analyzing the Turkish insurance companies' financial performance traded on BIST implementing the critic-based PIV method. *Insurance Markets and Companies*, 15(2), 47-60. http://dx.doi.org/10.21511/ins.15(2).2024.05

Karadeniz, E., & İskenderoğlu, Ö. (2024). Financial Strenght Assesment of Football Clubs: An International Comparison. *Research of Financial Economic and Social Studies*, 9(2), 145-156. https://doi.org/10.29106/fesa.1453695

Kaya, F. (2023). "Sportive and Financial Performance Analysis of Football Clubs by Using MULTIMOOSRAL Method: An Application on Football Clubs Traded in Borsa Istanbul" in Proceedings of International Conference of Eurasian Economies 2023, 150-159, Izmir- Turkey. https://doi.org/10.36880/C15.02828

Kevser, M. & Doğan, M. (2022). Comparative Analysis of the Financial Performance of 5 Major Football Clubs In UEFA Rankings. *The World of Accounting Science*, 24(2), 436-460. https://doi.org/10.31460/mbdd.984685

Kocaoğlu, N. K. (2011). Securities Offerings of Soccer Clubs. *Journal of Ankara Bar Association* (*4*).

Liu, C., Yu, L., Liu, B., Wang, D., & Yang, J. (2023). A group decision-making and optimization method based on relative inverse number. Information Sciences, 644(6), Article 119327. https://doi.org/10.1016/j.ins.2023.119327

Mendoza Luis Fernando, M., Perez Escobedo, J. L., Azzaro-Pantel, C., Pibouleau, L., Domenech, S., & Aguilar-Lasserre, A. (2011). Selecting the best portfolio alternative from a hybrid multiobjective GA-MCDM approach for New Product Development in the pharmaceutical industry. 2011 IEEE Symposium on Computational Intelligence in Multicriteria Decision-Making (MDCM). https://doi.org/10.1109/smdcm.2011.5949271

Mukhametzyanov, I. (2021). Specific character of objective methods for determining weights of criteria in MCDM problems: Entropy, CRITIC and SD. *Decision Making: Applications in Management and Engineering*, *4*(2), 76–105. https://doi.org/10.31181/dmame210402076ip.

Munda, G. (2008). Social Multi-criteria Evaluation for a Sustainable Economy. Springer, Berlin. https://doi.org/10.1007/978-3-540-73703-2

Oral, C. (2016). Financial Performance Evaluation of Sport Clubs Traded in Borsa Istanbul by Using Grey Relational Analysis. *International Journal of Economics and Finance*, Canadian Center of Science and Education, 8(5). https://doi.org/10.5539/ijef.v8n5p293

Özdağoğlu, A., & Keleş, M. K. (2019). Financial Performance Analysis of 4 Great Football Clubs with Gray Entropy Based ROV Method in Terms of Sport Management. *Journal of Süleyman Demirel University Institute of Social Sciences,* (*35*), 107-123.

Public Disclosure Platform (KAP) (2024). https://www.kap.org.tr [Accessed 20 December 2024].

Puška, A., Štilić, A., Pamučar, D., Božanić, D., & Nedeljković, M. (2024). Introducing a Novel multi-criteria Ranking of Alternatives with Weights of Criterion (RAWEC) model. MethodsX, 102628. https://doi.org/10.1016/j.mex.2024.102628

Sakınç, İlker. (2014). Using Grey Relational Analysis to Determine the Financial Performance of Turkish Football Clubs. *Journal of Economics Library*, *1*(1), 22-33. https://doi.org/10.1453/jel.v1i1.160

Sakinc, I., Acikalin, S., & Soyguden, A. (2017). Evaluation of the relationship between financial performance and sport success in European football. *Journal of Physical Education and Sport* , 17 (1), 16-22. https://doi.org/10.7752/jpes.2017.s1003

Sönmez, Y. (2023). Analysis of the Financial Performances of Football Clubs Traded on BIST. *Istanbul Nişantaşı University Journal of Social Sciences*, 11 (Special Issue), 261-276. https://doi.org/10.52122/nisantasisbd.1351721

Süslü, C., & Hızlıer, S. S. (2023). Financial Performance Analysis with CRITIC-Based MULTIMOORA and TOPSIS Methods: A Study on BIST Sports Index Companies, *The Business Journal*, 4(1), 109-129. https://doi.org/10.57116/isletme.1253335

Taherdoost, H. (2023). Analysis of Simple Additive Weighting Method (SAW) as a Multi-Attribute Decision Making Technique: A Step-by-Step Guide. *Journal of Management Science & Engineering Research*, 6(1), 21-24. https://doi.org/10.30564/jmser.v6i1.5400

Trung, D. D., Bao, N. C., Van Duc, D., Ašonja, A., & Dudić, B. (2024). Selecting Mini Water Pump by Using Multi-Criteria Decision-Making Technique: Comparison of FUCA and PSI Methods. *23rd International Symposium. Infoteh-Jahorina (INFOTEH)*, East Sarajevo, Bosnia and Herzegovina, 1-7 https://doi.org/10.1109/INFOTEH60418.2024.10495970.

Trung D. D., Dudić B, Ašonja A, Bao N. C., Duc D. V., & Thuy D. T. (2024). Comparison of SRP and FUCA methods in selecting industrial tools and equipment. *International Journal of Advanced Technology and Engineering Exploration*, 11(116),1066-1078. https://doi.org/10.19101/IJATEE.2024.111100386

Türegün, N. (2022). Financial performance evaluation by multi-criteria decision-making techniques, *Heliyon*, *8*(5), e09361. https://doi.org/10.1016/j.heliyon.2022.e09361

Uluyol, O. (2014). Financial Performance Analysis of Super League Football Clubs. *Journal of Yaşar University*, 9(34), 5716-5731. https://doi.org/10.19168/jyu.78102

Wang, Z., Nabavi, S. R., & Rangaiah, G. P. (2024). Multi-Criteria Decision Making in Chemical and Process Engineering: Methods, Progress, and Potential. *Processes*, *12*(11), 2532. https://doi.org/10.3390/pr12112532

Zhang, X., Wang, C., Li, E., & Xu, C. (2014). Assessment model of ecoenvironmental vulnerability based on improved entropy weight method. *The Scientific World Journal*, *1-7.* https://doi.org/10.1155/2014/79781