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MEASURING THE IMPACT OF COVID-19 AND THE UKRAINE-RUSSIA WAR USING ACCOUNTING INDICATORS: AHP AND TOPSIS METHODS – AN EXAMPLE FROM BIST (BORSA ISTANBUL) FOOTBALL CLUBS

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ABSTRACT

This study evaluates the financial performance of Turkish Super League clubs listed on Borsa Istanbul (BIST) amid the COVID-19 pandemic and the Ukraine-Russia conflict using AHP and TOPSIS methods. It analyzes Galatasaray, Fenerbahçe, Beşiktaş, and Trabzonspor, correlating financial indicators with sporting success. AHP determines the weight of financial criteria, while TOPSIS ranks clubs based on their proximity to an ideal financial state. Key indicators include liquidity, leverage, operating efficiency, and profitability. The findings highlight the economic impact of global crises on football clubs, offering insights for managers, investors, and policymakers. The study also serves as a model for other leagues to enhance financial sustainability. Results show that Galatasaray led in 2019, while Fenerbahçe dominated from 2020 to 2023. This research provides a crucial perspective on financial resilience in sports, aiding strategic decision-making in crisis management and long-term planning.

Keywords: Ahp, Topsis, Accounting Indicators, Covid-19, Ukraine- Russia War

JEL Classification: M40, M41, M49

COVID-19 VE UKRAYNA-RUSYA SAVAŞININ ETKİLERİNİN MUHASEBE GÖSTERGELERİ VE AHP, TOPSIS YÖNTEMİ İLE ÖLÇÜLMESİ BIST (BORSA İSTANBUL) FUTBOL KULÜPLERİ ÖRNEĞİ

ÖZ

Bu çalışma, Borsa İstanbul'da (BIST) işlem gören Türkiye Süper Ligi kulüplerinin COVID-19 salgını ve Ukrayna-Rusya çatışması dönemindeki finansal performanslarını AHP ve TOPSIS yöntemlerini kullanarak değerlendirmektedir. Galatasaray, Fenerbahçe, Beşiktaş ve Trabzonspor'u analiz eden çalışma, finansal göstergeleri sportif başarı ile ilişkilendiriyor. AHP finansal kriterlerin ağırlığını belirlerken, TOPSIS kulüpleri ideal finansal duruma yakınlıklarına göre sıralamaktadır. Temel göstergeler arasında likidite, kaldıraç, işletme verimliliği ve kârlılık yer almaktadır. Bulgular, küresel krizlerin futbol kulüpleri üzerindeki ekonomik etkisini vurgulamakta ve yöneticiler, yatırımcılar ve politika yapıcılar için içgörüler sunmaktadır. Çalışma aynı zamanda diğer ligler için de finansal sürdürülebilirliği artırmaya yönelik bir model teşkil etmektedir. Sonuçlar, Galatasaray'ın 2019'da lider olduğunu, Fenerbahçe'nin ise 2020'den 2023'e kadar hakim olduğunu gösteriyor. Bu araştırma, sporda finansal dayanıklılık konusunda önemli bir perspektif sunarak kriz yönetimi ve uzun vadeli planlamada stratejik karar alma süreçlerine yardımcı olmaktadır.

Anahtar Kelimeler: AHP, TOPSIS, Muhasebe Göstergeleri, COVID-19, Ukrayna-Rusya Savaşı

JEL Sınıflaması: M40, M41, M49

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1. Introduction

This study conducts a detailed examination of the effects of the COVID-19 pandemic and the Ukraine-Russia war on the financial conditions of Turkish Super League football clubs traded on Borsa Istanbul. The primary aim is to evaluate the impact of these significant global events on the club's accounting indicators using the Analytic Hierarchy Process (AHP) and TOPSIS methods. The COVID-19 pandemic, which began as a global health crisis in March 2020, significantly affected the sports industry, among others. Football leagues were either postponed or continued without spectators, leading to a substantial loss in ticket sales, matchday revenues, and other commercial incomes from stadiums (Parnell et al., 2022). Consequently, clubs saw near-zero matchday revenues, while sponsorship deals and merchandise sales drastically decreased due to pandemic restrictions, leading to significant cash flow constraints and challenges in managing short-term debts (Sato et al., 2020). The four major Turkish football clubs also experienced revenue losses during this period; Galatasaray saw a decrease of approximately 40%, Fenerbahçe 35%, Beşiktaş 30%, and Trabzonspor 25% (Ataman et al., 2022). In early 2022, the onset of the Ukraine-Russia war exacerbated global economic uncertainties (Liadze et al., 2023). The Ukraine-Russia war has had profound and widespread impacts on the global economy. The onset of the conflict dealt a severe blow to the Russian economy, leading to rapid inflation. Global economic growth has slowed, and economic uncertainties have increased in many regions. Additionally, the war-induced refugee crisis has created both humanitarian and economic challenges. Major economies like the Eurozone and the United Kingdom have experienced declines in growth rates, while rising energy prices have driven up inflation and living costs. This situation has destabilized global economic stability and prompted many countries to reconsider their economic policies (Halabi et al., 2024). While exchange rate fluctuations impacted transfer budgets and debt servicing (Franke et al., 2023). This period further destabilized the financial balance of Turkish football clubs (Dunbar et al., 2022). The conflict also affected the broader European professional soccer industry, reducing ticket and merchandise sales and complicating the retention and signing of international players due to geopolitical and economic instability (Boungou and Yatié, 2022). By employing AHP and TOPSIS methods, this research systematically analyzes the influence of these events on clubs' financial indicators, focusing on liquidity ratios, debt ratios, operating efficiency, and profitability. By calculating weighted scores for each indicator, the study identifies the most impacted areas and suggests improvements for clubs in light of these findings. Ultimately, the research aims to equip football club managers,

investors, and policymakers with the necessary information to enhance financial management strategies during crises such as pandemics and wars, thereby improving financial sustainability (Lindholm et al., 2022; Aslan, 2018). The motivation for this research stems from the unique financial structures of Galatasaray, Fenerbahçe, Beşiktaş, and Trabzonspor, which are listed on Borsa Istanbul (BIST) and are among Turkey's most successful football clubs. Unlike other Turkish football teams, these clubs are publicly traded, ensuring transparency through mandatory financial reporting, which provides comprehensive and reliable datasets. Additionally, these clubs stand out as prominent and historically successful teams in the Turkish Super League, making their financial performance evaluations crucial for sectoral modeling. Since other Turkish football clubs are not listed on the stock exchange, similar financial analyses cannot be conducted for them. This distinction makes the research valuable not only for sports financing in Turkey but also for the international sports management literature.

2. Literature Review

Managers are always in search of improved methods for evaluating organizational performance, aiming to enhance efficiency and effectiveness in their respective fields. In professional soccer, team performance is commonly assessed based on results in national leagues. However, ranking teams presents a multi-criteria decision-making (MCDM) challenge. MCDM methods generally focus on financial indicators. For instance, methods like TOPSIS and AHP are effective in analyzing metrics such as liquidity, profitability, and debt ratios. However, these analyses often fail to account for external factors like sporting success or the long-term effects of economic fluctuations.

In the existing literature, several limitations regarding the use of MCDM methods in sports financing stand out. Many studies apply these methods to a specific period or dataset, presenting results in a limited context. Moreover, comparative analyses among different MCDM methods are lacking, highlighting the need for further discussion on their applicability and reliability. Specifically, the relationship between financial indicators and sporting success, as well as the development of models that evaluate these two dimensions together, remains an underexplored area in literature.

This article aims to fill these gaps by utilizing AHP and TOPSIS methods in sports financing to analyze both financial performance and the impacts of crises within a broader context. By doing so, it seeks to provide a more comprehensive understanding of the financial

sustainability strategies of Turkish football clubs, offering valuable insights for decision-makers. Such an approach contributes significantly to both the theoretical testing of these methods and the expansion of current research in sports financing.

This paper employs an MCDM approach to evaluate the performance of football teams in the German Bundesliga, utilizing the Analytic Hierarchy Process (AHP) and the Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS). The research findings are validated using nonparametric Spearman's correlation test (rs) and Kendall's Tau correlation test (τ) (Kiani et al., 2012).

This study examines the financial performance and sporting success of Beşiktaş, Fenerbahçe, Galatasaray, and Trabzonspor, which were listed on Borsa Istanbul between 2005 and 2015. Using the TOPSIS method, the analysis reveals a positive correlation between the on-field success of Turkish football clubs and their financial statements. Financial ratios such as the debt ratio and net profit margin were analyzed, showing a direct link between the clubs' economic performance and their sporting achievements (Ergül, 2017).

Furthermore, this study investigates the financial performance of Beşiktaş, Fenerbahçe, Galatasaray, and Trabzonspor from 2014 to 2016 using the ratio analysis method. Nineteen different financial ratios were calculated from the clubs' financial statements to assess liquidity, financial structure, asset utilization, and profitability. The results indicated that the 'Big Four' clubs struggled to meet their financial obligations, effectively utilize their assets, and generate profits, highlighting a need for improved financial management (Aslan, 2018).

Additionally, this research proposes an objective fuzzy inference system based on fuzzy logic for evaluating players in team sports, specifically soccer. The study employs the Characteristic Objects Method (COMET) to develop a multi-criteria model based on match statistics of striker players. The COMET method allows for model specification without predefined weights for decision criteria. The model's validity is enhanced by using symmetric and asymmetric fuzzy triangular numbers to identify and demonstrate variations in criteria weights within the problem's state space. This method precludes the need for other multi-criteria decision analysis (MCDA) methods. To highlight the benefits of this approach, the model is compared with the Rank Preference Similarity Technique (TOPSIS) method (Vavrek et al., 2021).

According to economic forecasts, Russia's GDP is expected to decrease by 1.5% in 2022 and by 2.6% by the end of 2023, with inflation projected to exceed 20% in 2022. The war is

anticipated to cause a global GDP decline of 0.5% in 2022 and 1% in 2023. The UN High Commissioner for Refugees forecasts a net influx of two million refugees annually in 2022 and 2023. The Eurozone's GDP growth is expected to fall by 0.9% in 2022 and 1.5% in 2023, with inflation projected at 5.5% in 2022 and 2.1% in 2023. The UK's GDP growth is anticipated to decline by 0.8% in 2022 and 0.5% in 2023. Natural gas prices have risen by 20% since the onset of the war, inflating both inflation and energy bills (Tank, 2022).

Another analysis evaluates the financial performance of Beşiktaş, Fenerbahçe, Galatasaray, and Trabzonspor between 2017 and 2021 using the MABAC method, which correlates financial ratios with weights to rank the club's performance. According to the results, Beşiktaş was the top performer in 2017, Galatasaray in 2018 and 2019, and Trabzonspor in 2021. Conversely, Fenerbahçe in 2018 and Beşiktaş in 2019 and 2020 were identified among the clubs with poorer financial performance (Sönmez, 2023).

Finally, the financial performances of the four major Turkish football clubs were systematically evaluated for 2020 and 2021 using the multi-criteria decision-making methods CRITIC, MULTIMOORA, and TOPSIS. The CRITIC method ranked the clubs based on registration weights, while MULTIMOORA and TOPSIS were used for the overall ranking. The findings from both studies agree that Trabzonspor had the best financial performance during the analyzed periods (Süslü and Hızlıer, 2023).

In this research, the Entropy power method and TOPSIS analysis were employed to comprehensively evaluate the development of competitive sports across 31 provinces and cities in China. Strategies for further development in competitive sports were proposed to promote its growth. The developed framework and methodology provide a set of objective and scientifically based decision-making guidelines that can be adopted by government agencies and related industries to formulate successful strategies for the sustainable growth of competitive sports. This growth is expected to enhance the country's global influence, foster social cohesion, and drive economic development. The study's findings offer valuable insights for policymakers and can significantly advance the development of the sports sector in China, positioning it as a vital driver of regional socio-economic progress (Xu et al., 2024).

The war has significantly disrupted food production and supply chains, causing increased food prices and inflation, which has made it difficult for the poor and vulnerable to access food. Diet quality and diversity have declined, negatively affecting food security and nutrition. Fluctuating food prices and uncertain future food supplies have impacted the stability

of food security. Local food production has decreased due to damaged production assets, rising input costs, land use changes, and labor shortages in rural areas. Increased fertilizer and energy prices have raised production costs in the agricultural sector. Export restrictions from Ukraine and Russia have disrupted global supply chains, driving up food prices worldwide. International trade in agricultural products and foodstuffs has been severely affected by the war and sanctions, limiting Ukraine's export capacity and causing global supply chain disruptions. Reduced fertilizer use, land use changes, and expanded agricultural production have complex impacts on environmental sustainability. Expansion of farmland, deforestation, and loss of biodiversity have negatively affected climate change and carbon emissions. The war has increased poverty and vulnerability, slowed economic growth, and delayed recovery from the COVID-19 pandemic. It has displaced millions, causing severe humanitarian crises in Ukraine and neighboring countries. The war has impacted international relations and multilateralism, leading to changes in global food system governance. Disruptions in food chains and rising food prices have increased risks of social and political unrest (El-Bilali and Ben Hassen, 2024).

3. Methodology and Research Methods

This study proposes that AHP and TOPSIS methods effectively evaluate the impact of significant global events such as the COVID-19 pandemic and the Ukraine-Russia conflict, on the financial health of Turkish Super League football clubs listed on Borsa Istanbul (BIST). This evaluation is based on analyzing accounting indicators, including liquidity, leverage, operating efficiency, and profitability ratios. The Analytic Hierarchy Process (AHP) and TOPSIS methods are highly suitable for evaluating the accounting indicators of football clubs. AHP determines the relative importance of various financial criteria by assigning weights, enabling a detailed analysis of clubs' financial conditions. TOPSIS ranks clubs based on their proximity to the ideal and negative-ideal solutions, providing an overall performance score. These methods offer a systematic approach for multi-criteria analysis and allow for comparisons of performance in areas such as liquidity, debt, and profitability.

However, both methods have certain disadvantages. AHP relies on subjective judgments of decision-makers, which can lead to consistency issues. TOPSIS involves subjectivity in determining weights and is limited to the specific time frame of the data used. Despite their advantages, these methods have limitations in evaluating factors like sporting success or external variables, highlighting the need for complementary analysis using additional methods.

In this research, we applied multi-criteria decision-making methods to examine the effects of the COVID-19 pandemic and the Ukraine-Russia conflict on the accounting indicators of Turkish Super League football clubs listed on Borsa Istanbul (BIST). The emphasis was on accounting indicators rather than solely financial metrics. The emphasis was on accounting indicators rather than solely financial metrics. In this study, the periods 2019-9, 2020-9, 2021-9, 2022-9, and 2023-9 were taken as the basis.

3.1 Data

We collected data from kap.org.tr, a public disclosure platform that provides detailed accounting information for companies traded in Borsa Istanbul.

3.2 Methodological Details

Application of AHP and TOPSIS:

The Analytic Hierarchy Process (AHP) was used to assign weights to various accounting indicators such as liquidity ratios, leverage ratios, operational efficiency ratios, and profitability ratios.

The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was employed to rank the clubs based on these weighted indicators.

The calculations were performed using multi-criteria decision analysis (MCDA) software to ensure precision and integrity in our analysis.

3.2.1. Key Accounting Ratios Analyzed

3.2.1.1. Liquidity Ratios: These ratios are used to evaluate a club's capacity to fulfill its short-term liabilities. The main ratios in this category are the Current Ratio (CR), Liquidity Ratio (LR), and Cash Ratio (CaR).

3.2.1.2. Leverage Ratios: These ratios measure the proportion of a club's capital that is financed through debt. Key ratios include the Leverage Ratio (LeR) and Financial Debt Ratio (FDR).

3.2.1.3. Operating Efficiency Ratios: These ratios analyze how efficiently a club manages its operational assets and liabilities. Significant ratios in this category are the Asset

Turnover Ratio (AT), Inventory Turnover Ratio (IT), Equity Turnover Ratio (ETR), and Debt Turnover Ratio (DTR).

3.2.1.4. Profitability Ratios: These ratios offer insights into a club's financial performance and stability. Important ratios include the Net Profit Margin (NPM), Return on Assets (ROA), and Return on Equity (ROE).

This methodology enabled us to conduct a comprehensive and structured assessment of the impacts of significant global crises on the accounting health of leading sports clubs, delivering valuable insights for optimizing financial strategies in the sports industry.

3.3 AHP (Analytic Hierarchy Process)

The Analytic Hierarchy Process (AHP), developed by Thomas L. Saaty, is a method designed to address multi-criteria decision-making problems. It simplifies complex decision-making by structuring the problem into a hierarchical model and quantifying the relative importance of each element within that hierarchy. The AHP method involves several key steps, notably pairwise comparisons and the synthesis of their outcomes (Güngör et al., 2009). The fundamental mechanism of AHP includes determining priorities and calculating the consistency ratio to ensure reliable decision-making.

3.3.1. Creating the Pairwise Comparison Matrix

Decision-makers evaluate the relative importance of nn elements (criteria or alternatives) on a scale from 1 to 9 and create a pairwise comparison matrix. In this matrix, aij represents the relative importance of element i concerning element j. There is a symmetric relationship (Munier and Hontoria, 2021).

3.3.2. Calculation of the Priority Vector

The relative importance (weight) of each criterion or alternative is determined using the eigenvector of the pairwise comparison matrix. As a practical method, the elements of each column are summed, and each matrix element is then normalized by dividing it by its column sum. The normalized values for each row are averaged to compute the priority vector (weights) (Li et al., 2013).

3.3.2.1. Calculation of the Consistency Ratio (CR)

The consistency ratio is used to evaluate the reliability of the pairwise comparisons made by decision-makers. It is calculated through the following steps (Al-Harbi, 2001).

Consistency Index (CI)

$$CI = \frac{\lambda_{max-n}}{n-1}$$

This is calculated using the maximum eigenvalue of the matrix and n the number of elements.

3.3.2.2. Random Consistency Index (RI)

RI represents the average consistency index for matrices randomly generated based on their size. The values for RI are obtained from a predetermined table (Gaudenzi et al., 2006).

Consistency Ratio (CR)

$$CR = \frac{CI}{RI}$$

A CR value of 0.10 (or 10%) or less indicates that the matrix is consistent. If the CR exceeds this threshold, the pairwise comparisons need to be reevaluated. The AHP method facilitates a systematic assessment of the relative importance of various criteria and alternatives in the decision-making process. This approach is particularly valuable when multiple criteria exist, and these criteria have varying levels of importance (Tektaş and Ortaçsu, 2003).

3.4. TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) Method

TOPSIS is a method utilized in multi-criteria decision-making (MCDM) scenarios. Introduced by Hwang and Yoon in 1981, it ranks a set of alternatives based on their resemblance to the ideal and negative-ideal solutions (Podvezko, 2009). The method operates on the principle of maximizing an alternative's closeness to the ideal solution while minimizing its distance from the negative ideal solution. This approach effectively evaluates the relative performance of alternatives against these optimal and worst possible outcomes (Akyüz et al., 2011).

Key Steps and Formulas of the TOPSIS Method:

Creating the Decision Matrix: This matrix includes alternatives and (a_i) criteria.

$$A = \begin{matrix} \alpha 11 & \alpha 12 & \alpha 13 \\ \alpha 21 & \alpha 22 & \alpha 23 \\ \alpha 31 & \alpha 32 & \alpha 33 \end{matrix}$$

Normalizing the Decision Matrix: Each element is normalized using a specific formula

$$rij = \frac{a_{ij}}{\sqrt{\Sigma_{i=1}^{m} a_{ij}^2}} for\ i\ = 1,2, \dots, m\ and\ j = 1,2, \dots, n$$

Constructing the Weighted Normalized Decision Matrix: Weights are assigned to each normalized element according to the relevance of the criterion (W_j).

$$v_{ij=}\, w_j \,.\, r_{ij}$$

Determining the Positive-Ideal and Negative-Ideal Solutions:

The solution (A^+)

$$A^+ = \{\max v_{ij} \,|j \in J;\ \min v_{ij} | j \in J'\}$$

The Solution (A^-)

$A^- = \{\min v_{ij} \,|j \in J;\ \max v_{ij} | j \in J'\} J$ represents the benefit and J' cost criteria, respectively (Papathanasiou et al., 2018).

Calculating the Distance of Alternatives to Positive-Ideal and Negative-Ideal Solutions:

Distances are calculated to (S_i^+) : $S_i^+ = \sqrt{\sum_{j=1}^{n} (vij - A_j^+)^2}$

both the ideal and negative-ideal solution (S_i^-) : $S_i^- = \sqrt{\sum_{j=1}^{n} (vij\ -\ A_j^-)^2}$

Calculating Relative Proximity for Each Alternative: Relative closeness (C_i) is computed with a formula

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-}$$

C_i that yields a value between 0 and 1, indicating the closeness of an alternative to the ideal solution. A value closer to 1 suggests greater proximity to the ideal solution (Ren et al., 2007).

Ranking: Alternatives are ranked based on their closeness values; the highest C_i values indicate the best choices (Chakraborty, 2022). The TOPSIS method offers a systematic approach to ranking alternatives based on multidimensional criteria, aiding decision-makers in complex decision-making environments (Orçun and Eren, 2017).

4. Results

4.1. Data Preparation

This study includes businesses from the sports sector that are traded in Borsa Istanbul (BIST). Currently, there is no sports-oriented index within BIST. Companies were identified by reviewing their trading names and fields of activity to determine their sector involvement, which primarily includes football, basketball, volleyball, and other sports. Data for these companies were sourced from the public disclosure platform at https://www.kap.org.tr/Sektörler, an essential public information resource for enterprises listed in Borsa Istanbul. The sample for this research comprises the following sports clubs: Beşiktaş (BJKAS), Trabzonspor (TSPOR), Galatasaray (GSRAY), and Fenerbahçe (FENER).

Table 1. Sports Companies Traded on BIST-Borsa Istanbul

Galatasaray: GSRAY
Fenerbahçe: FENER
Beşiktaş: BJKAS
Trabzonspor: TSPOR

Source: https://www.kap.org.tr/tr/bist-sirketler

The financial ratios of Galatasaray (GSRAY), Fenerbahçe (FENER), Trabzonspor (TSPOR), and Beşiktaş (BJKAS) sports clubs are analyzed in this study. Specifically, the analysis considers the balance sheet data for the third quarters of 2019/9, 2020/9, 2021/9, 2022/9, and 2023/9 to accurately reflect the impacts of the COVID-19 pandemic. The study focuses on key financial ratios including liquidity ratios, leverage ratios, operating efficiency ratios, and profitability ratios. Unlike some studies, stock market performance ratios are not considered; only financial analysis ratios are analyzed. The performance criteria of these financial ratios were used to evaluate the financial position and performance of each club based on predetermined weights. These weights are subject to change depending on the strategic goals and priorities of the clubs and thus influence the outcome of the analysis. In evaluating the financial ratio criteria, equal weights were assigned to each sports club.

This revised version maintains the original information but presents it in a clearer, more structured format suitable for academic or professional discourse.

Table 2. Financial Ratios-Performance Criteria

CR- Current Ratio = Current Assets / Short-Term Liabilities	The current ratio is a liquidity ratio calculated by dividing current assets by short-term liabilities. The purpose of the current ratio is to measure a company's ability to pay its short-term debts and to determine whether its net working capital is sufficient. .
LR- Liquidity Ratio = Current Assets - Inventories / (Short Term Liabilities)	The liquidity ratio measures a company's ability to repay existing debts using cash and cash equivalents, excluding inventories. Inventories are not included in the calculation because their cash conversion rate is slower than other current assets. This ratio indicates the extent to which liquid assets can cover short-term debts. For safety, the ideal ratio is at least 1, and a higher ratio is generally preferred by businesses.
CaR-Cash Ratio = Cash and Cash Convertible Assets / (Short-Term Liabilities)	The cash ratio is a liquidity measure that assesses a company's ability to meet short-term obligations using its most liquid assets. This ratio is calculated by comparing the company's cash and cash equivalents (such as highly liquid securities) to its short-term liabilities. The cash ratio is crucial for understanding how quickly the company can pay its debts in an emergency since it only includes the most liquid assets.
LeR-Leverage Ratio = Total Liabilities / (Total Assets)	The leverage ratio is a financial metric indicating the proportion of a company's total debt to its total assets. It shows how much debt the company uses to finance its operations and how much of the asset structure is financed by debt. A high leverage ratio suggests that the company is operating with more debt, implying higher risk, while a low leverage ratio indicates less debt and therefore lower risk.

FDR- Financial Debt Ratio = LTV Financial Debt + U.V. Financial Debt / (Total Assets)	The financial debt ratio expresses the proportion of a company's financial liabilities to its total assets. This ratio shows how much of the company's assets are financed by debt, particularly considering long-term and short-term debt. Financial debts typically include bank loans, bonds, and other debt instruments.
AT- Asset Turnover = Net Sales / Total Assets	Asset turnover is a financial performance ratio that measures how efficiently a company utilizes its assets to generate sales or revenue. This ratio indicates the effectiveness of the company in generating revenue from its assets, with a high ratio implying high efficiency in asset utilization.
DTR- Debt Turnover Ratio= Total sales / (Total debts)	Debt turnover measures how frequently a business repays its debts over a specific period, usually a year. It serves as an indicator of the operational efficiency of the business.
IT- Inventory Turnover = Cost of Sales / (Average Inventory)	Inventory turnover is a financial performance metric that shows how quickly a company sells and replenishes its inventory. This ratio is calculated by dividing the sales for a specific period by the average inventory during that period. A high inventory turnover ratio indicates that the company is selling its inventory quickly and managing its cash flow effectively. This metric is used to evaluate the efficiency of a company's inventory management.
ETR- Equity Turnover Rate= Net sales / (Average Share-holders Equity)	The equity turnover ratio measures the amount of sales generated by a business using its equity. This ratio indicates how effectively a business uses its equity to generate sales and measures the efficiency of sales relative to the equity used to finance its assets.
ROA-Return on Assets = Net Profit for the Pe-riod/(Total Assets)	Return on assets (ROA) is a financial performance ratio that assesses how much profit a company generates using its total assets. This ratio evaluates the efficiency and effectiveness of the company's asset investments, indicating how well the company can generate profit from its assets.
ROE- Return on Equity = Net Profit / Equity	Return on equity (ROE) is a financial performance ratio that shows how much profit a company generates by using its equity. It measures the return that investors earn on their capital investments in the company, determining the effectiveness and efficiency of the company in utilizing investor capital to generate profit.

NPM-Net Profit Margin = Net Profit / (Total Revenue)	Net profit margin is a financial ratio that measures the percentage of net income generated from a company's total revenue. It is calculated by dividing net profit by total revenue and is expressed as a percentage. This ratio indicates how efficiently a company converts its revenue into actual profit, reflecting its overall profitability.

4.2. Equal Weighted Analysis of Accounting Indicators of Sports Companies with AHP Method

In this study, 12 financial ratios used to measure the financial health of four major Turkish football clubs traded in Borsa Istanbul were evaluated with equal weights using the Analytic Hierarchy Process (AHP) method. These ratios include liquidity ratios, leverage ratios, operating efficiency ratios, and profitability ratios. Each financial ratio was given equal importance and therefore a weight value of 0.0833 (1/12) was used for each ratio. This equal-weighting approach was preferred to ensure a comprehensive and balanced assessment of the financial performance of the clubs. Each ratio evaluates different aspects of the club's financial position, and the equal weighting of these ratios aims to maintain the objectivity of the analysis.

4.3. Research Limitations

One of the limitations of the study is that many sports clubs are operating in Turkey. Due to the difficulties in accessing the financial data of all clubs, the study is limited to Beşiktaş, Trabzonspor, Fenerbahçe, and Galatasaray sports clubs traded on BIST-Borsa Istanbul. It is thought that a study that will be conducted by accessing the financial data of all clubs in the sports sector can make important contributions to determining the effects of the COVID-19 pandemic process. Another limitation is that there are quite a lot of ratios used in financial analysis. Ten financial ratios were used in the study, but it is recommended to examine more ratios for a more comprehensive study.

4.4. Findings of the Study

In the findings of the research, the findings obtained with the data of 2023-9 are reported below, and the data and calculations of 2022-9, 2021-9, 2020-9, and 2019-9 are shown in the

Appendix tables. In the first stage, a decision matrix was created. Rows show alternatives and columns show criteria. Between 2019 and 2023, Galatasaray and Fenerbahçe emerged as the most financially successful clubs in Turkish football. Galatasaray led in 2019 with a Ci* score of 0.626, standing out with strong sponsorship revenues and profitability ratios. However, Fenerbahçe took over the financial performance leadership in the following four years (2020-2023). Effective liquidity management, diversified revenue strategies, and efficient debt management enabled Fenerbahçe to maintain financial stability. The club minimized the impacts of the pandemic and economic fluctuations by increasing digital broadcasting rights, sponsorship revenues, and fan engagement. With superior operational efficiency and profitability ratios, Fenerbahçe outperformed its rivals in financial sustainability during this period.

Table 3. Financial Ratios-Performance Criteria Decision Matrix 2023-9

	CR	LR	CaR	LeR	FDR	AT	DTR	IT	ETR	ROA	ROE	NPM
TSPOR	1,01	0,96	0,01	25	107,65	0,39	3,01	23,84	-2,32	-54,69	-113,58	322,56
FENER	1,02	0,98	0,1	48,33	118,09	0,64	2,21	26,87	-2,96	-1,3	6,91	5,85
BJKAS	0,7	0,66	0,01	73,64	184,33	0,58	1,92	28,16	-0,72	-31,98	-51,98	39,87
GSRAY	0,63	0,55	0,06	28,98	111,54	0,81	2,15	18,23	-4,1	2,74	13,28	-13,85

A normalized decision matrix was generated from the data in the decision matrix created during the second stage.

Table 4. Normalized Decision Matrix 2023-9

	CR	LR	CaR	LeR	FDR	AT	DTR	IT	ETR	ROA	ROE	NPM
TSPOR	0,588304045	0,593078662	0,085125653	0,260311065	0,40132029	0,312831988	0,638074275	0,485051953	-0,413545266	-0,862258618	-0,902838772	0,99138719
FENER	0,594128837	0,605434468	0,851256531	0,503233351	0,440240715	0,513365314	0,468486428	0,546700754	-0,527626719	-0,020496182	0,054927064	0,017979957
BJKAS	0,407735476	0,40774158	0,085125653	0,766772274	0,687184106	0,465237316	0,407010833	0,572947273	-0,128341634	-0,504206082	-0,413185062	0,122540325
GSRAY	0,366961929	0,33978465	0,510753918	0,301752587	0,415822249	0,649727975	0,455767339	0,370910113	-0,730834306	0,043199646	0,105561709	-0,042567933

The third stage involves determining the importance rankings of the evaluation criteria. At this stage, the significance of each criterion is quantified using weights. These weights reflect the importance of the criteria in the evaluation process and are typically normalized to sum up to one. In the standard decision matrix, the performance of each alternative is ranked according to various evaluation criteria. In the weighted standard decision matrix, these values are multiplied by the assigned weights. This method provides a weighted approach to evaluating alternatives, emphasizing the significance of each criterion.

Table 5. Weighted Normalized Decision Matrix 2023-9

	CR	LR	CaR	LeR	FDR	AT	DTR	IT	ETR	ROA	ROE	NPM
TSPOR	0,049025337	0,049423222	0,007093804	0,021692589	0,033443357	0,026069332	0,053172856	0,040420996	-0,034462106	-0,071854885	-0,075236564	0,082615599
FENER	0,049510736	0,050452872	0,070938044	0,041936113	0,036686726	0,042780443	0,039040536	0,045558396	-0,043968893	-0,001708015	0,004577255	0,00149833
BJKAS	0,033977956	0,033978465	0,007093804	0,063897689	0,057265342	0,038769776	0,033917569	0,047745606	-0,010695136	-0,042017173	-0,034432089	0,010211694
GSRAY	0,030580161	0,028315388	0,042562827	0,025146049	0,034651854	0,054143998	0,037980612	0,030909176	-0,060902859	0,00359997	0,008796809	-0,003547328

In the fourth stage, the positive and negative ideal solutions are identified based on the values derived from the weighted standard decision matrix. These values embody the best and worst potential outcomes for the alternatives and are crucial to the decision-making process.

Table 6. Ideal Distance Values - Negative Ideal Distance Values 2023-9

	CR	LR	CaR	LeR	FDR	AT	DTR	IT	ETR	ROA	ROE	NPM
Si*	0,049510736	0,050452872	0,070938044	0,063897689	0,057265342	0,054143998	0,053172856	0,047745606	-0,010695136	0,00359997	0,008796809	0,082615599
Si-	0,030580161	0,028315388	0,007093804	0,021692589	0,033443357	0,026069332	0,033917569	0,030909176	-0,060902859	-0,071854885	-0,075236564	-0,003547328

In the fifth stage, distances to the calculated positive and negative ideal solutions are measured using Euclidean distance values.

Table 7. Ideal Distance Values - Negative Ideal Distance Values 2023-9

IDEAL DİSTANCE VALUES	**Si***	**NEGATİVE IDEAL DİSTANCE VALUES**	**Si-**
TSPOR	0,143484804	**TSPOR**	0,096799635
FENER	0,094723602	**FENER**	0,13216654
BJKAS	0,119949489	**BJKAS**	0,090014221
GSRAY	0,118851935	**GSRAY**	0,121783318

In the final stage of the TOPSIS method, closeness rates to the ideal solution are calculated. These calculations are based on the distances of each decision alternative to both the positive and negative ideal points. During this process, the distance from each decision point to the positive ideal solution is denoted as S+, and the distance to the negative ideal solution as S-

Si*= (0,094723602, 0,118851935, 0,119949489, 0,143484804)

Si-= (0,13216654, 0,121783318, 0,090014221, 0,096799635)

In the research, the calculated closeness values to the ideal solution for 2023-9 and the calculated values for 2019-9, 2020-9, 2021-9, and 2022-9 are comparatively summarized in the table below.

Table 8. Comparative Results Table for the Period (2019-9, 2020-9, 2021-9, 2022-9, 2023-9)

2019-9	Ci*	2020-9	Ci*	2021-9	Ci*	2022-9	Ci*	2023-9	Ci*
GSRAY	0,626950899	FENER	0,614081957	FENER	0,674441511	FENER	0,492940312	FENER	0,582513365
TSPOR	0,603080503	TSPOR	0,590212851	GSRAY	0,467336168	GSRAY	0,483482898	GSRAY	0,506090926
FENER	0,492941971	BJKAS	0,46709618	BJKAS	0,405426508	BJKAS	0,432397602	BJKAS	0,428713232
BJKAS	0,492676798	GSRAY	0,299374199	TSPOR	0,276427319	TSPOR	0,313581484	TSPOR	0,402854366

Table 8 presents a comparative analysis using the TOPSIS method among the four major Turkish sports clubs—Galatasaray (GSRAY), Trabzonspor (TSPOR), Fenerbahçe (FENER), and Beşiktaş (BJKAS)—for the period from 2019 to 2023, specifically during the ninth month of each year. The table includes Ci* values, which represent the consolidation index measuring each club's relative performance against the ideal solution. The higher these values, the closer a club is to the ideal solution, indicating superior performance.

4.5. Yearly Evaluations

2019: Galatasaray achieved the highest score, ranking first, followed by Trabzonspor, Fenerbahçe, and Beşiktaş, respectively.

2020: Fenerbahçe ascended to first place with the highest Ci* value, Trabzonspor maintained its second-place position, Beşiktaş moved up to third, and Galatasaray dropped to fourth.

2021: Fenerbahçe maintained the top position, Galatasaray improved to second, Beşiktaş declined to third, and Trabzonspor fell to fourth.

2022: Fenerbahçe continued to lead with the highest performance, securing first place for the third consecutive year, followed by Galatasaray, Beşiktaş, and Trabzonspor.

2023: Fenerbahçe sustained its leadership in performance, ranking first once again, with Galatasaray in second, Beşiktaş in third, and Trabzonspor in fourth.

5. Discussion

This study evaluates the impact of the COVID-19 pandemic and the Ukraine-Russia war on the financial health of Turkish Super League football clubs listed on Borsa Istanbul using AHP and TOPSIS methods. The findings highlight significant and multifaceted effects of these global events on the financial stability of sports clubs.

The COVID-19 pandemic led to substantial losses in ticket sales, match-day revenues, and other commercial incomes due to the postponement or spectator-free continuation of football leagues. For instance, Galatasaray experienced a revenue decrease of approximately 40%, Fenerbahçe 35%, Beşiktaş 30%, and Trabzonspor 25%. These losses resulted in severe cash flow constraints and challenges in managing short-term debts. The Ukraine-Russia war further increased global economic uncertainties, significantly impacting the Russian economy with rapid inflation. This situation led to declines in growth rates in major economies like the Eurozone and the United Kingdom and rising energy prices. These economic impacts further destabilized the financial balance of Turkish football clubs. The results indicate that clubs like Fenerbahçe and Galatasaray have managed their financial strategies effectively despite adverse economic conditions. Fenerbahçe consistently topped the performance rankings since 2020, demonstrating superior financial resilience. Galatasaray, though initially leading in 2019, generally secured the second position in subsequent years. This underscores the importance of financial discipline and diversified revenue streams.

External factors such as spectator-free matches and uncertainties in sponsorship agreements during the pandemic adversely impacted revenue streams. However, clubs like Fenerbahçe and Galatasaray navigated these challenges by developing alternative revenue sources such as digital broadcasting rights.

The study proposes various strategies to strengthen the financial framework of the clubs, enhancing their resilience against future economic shocks. These strategies include optimizing cost management, restructuring debt, diversifying income, and enhancing risk management. Particularly during economic uncertainty, diversifying revenue and minimizing costs are crucial for enhancing the financial sustainability of clubs. In conclusion, this study illustrates that clubs that adeptly manage their financial strategies, even under challenging economic conditions, are better positioned to withstand financial crises and sustain their financial health. The findings offer valuable insights for other clubs, reaffirming the importance

of diversified income sources and financial discipline. By implementing these recommendations, Turkish Super League football clubs can enhance their financial sustainability and better adapt to future economic crises.

6. Conclusion and Recommendations

The COVID-19 pandemic and the Ukraine-Russia war have had significant and multifaceted impacts on the global economy, affecting various sectors, including sports. This study, utilizing AHP and TOPSIS methods, assessed the financial performance of Turkish Super League football clubs listed on Borsa Istanbul, focusing on key accounting indicators. The COVID-19 pandemic led to severe disruptions in the sports industry, with football leagues being postponed or played without spectators, resulting in substantial losses in ticket sales, match-day revenues, and other commercial incomes. For example, Galatasaray experienced a revenue decrease of approximately 40%, Fenerbahçe 35%, Beşiktaş 30%, and Trabzonspor 25%. These losses caused significant cash flow constraints and challenges in managing short-term debts. Clubs faced near-zero matchday revenues, and sponsorship deals and merchandise sales drastically decreased due to pandemic restrictions. In early 2022, the onset of the Ukraine-Russia war exacerbated global economic uncertainties. The war had a profound impact on the Russian economy, with GDP expected to decrease by 1.5% in 2022 and 2.6% by the end of 2023, while inflation is projected to exceed 20% in 2022. Globally, the war is anticipated to cause a GDP decline of 0.5% in 2022 and 1% in 2023. The Eurozone's GDP growth is expected to fall by 0.9% in 2022 and 1.5% in 2023, with inflation projected at 5.5% in 2022 and 2.1% in 2023. The UK's GDP growth is anticipated to decline by 0.8% in 2022 and 0.5% in 2023. The increase in natural gas prices by 20% since the onset of the war has further inflated energy bills and overall inflation. The combined effects of the COVID-19 pandemic and the Ukraine-Russia war have posed substantial challenges for Turkish football clubs. Despite these challenges, clubs like Fenerbahçe and Galatasaray have managed to maintain relatively stable financial performances. For instance, in 2020, Fenerbahçe's financial performance indicator Ci* was recorded at 0.614, significantly higher than Galatasaray's 0.299, indicating a more resilient financial structure. Fenerbahçe continued to perform well in 2021 and 2022, with Ci* values of 0.674 and 0.492, respectively. Using the AHP method, the study assigned equal weights to various financial ratios, such as liquidity ratios, leverage ratios, operating efficiency ratios, and profitability ratios, to evaluate the overall financial health of the clubs. The TOPSIS method then ranked the clubs based on their closeness to the ideal solution. In 2023, for example, Trabzonspor had a positive ideal distance value (Si*)

of 0.144 and a negative ideal distance value (Si-) of 0.097, leading to a Ci* value of 0.403. These calculations demonstrated Trabzonspor's financial standing relative to other clubs. These findings underscore the importance of financial discipline, income diversification, and proactive risk management. Recommendations for the clubs include optimizing cost management, exploring debt restructuring options, and developing innovative revenue streams such as digital broadcasting rights and e-sports. Establishing a comprehensive risk management framework is essential to enhance resilience against potential future financial shocks. Strengthening relationships with investors, sponsors, and fans can also help diversify financial resources and provide support during economic crises. In conclusion, this study illustrates that clubs that adeptly manage their financial strategies even under challenging economic conditions are better positioned to withstand financial crises and sustain their financial health. The findings offer valuable insights for other clubs, reaffirming the importance of diversified income sources and financial discipline. By implementing these recommendations, Turkish Super League football clubs can enhance their financial sustainability and better adapt to future economic crises. Based on the findings of this study, several strategic recommendations are proposed for club managers and investors. Firstly, diversifying revenue streams is crucial for ensuring financial sustainability. Exploring alternative revenue models such as digital broadcasting rights, e-commerce platforms, and international sponsorship agreements can enhance clubs' financial resilience during crisis periods. Additionally, effective debt management and restructuring will help stabilize the financial position of clubs.

Club managers are encouraged to adopt a data-driven management approach to continuously monitor and improve financial performance. Regular assessment of accounting indicators and preparedness for crisis scenarios are essential steps in this process. For investors, prioritizing transparency and risk management when evaluating clubs' long-term growth potential and financial structures is recommended.

Finally, investing in digital platforms and innovative projects aimed at increasing fan engagement can boost both financial revenues and brand value. Such strategies will not only address short-term challenges but also help clubs achieve long-term financial sustainability goals.

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