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Financial Success Analysis of Companies Operating in the BIST Health Sector Using the TOPSIS Method[1]

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Abstract

Businesses need financial information to see their past and current performance and to make decisions regarding their strategic goals, and they obtain this information from financial statements and their analysis. The purpose of financial performance measurement is to provide information to those who will make decisions about the financial situation of the business. Financial performance analyzes can support business managers in making future decisions, as well as provide information about the business to those who will invest in the business and enable lending institutions to make decisions about granting loans to the business. Multi-criteria decision-making methods (MCDM) can be defined as mathematical methods that can be used to reach the most accurate decision in decision-making problems with multiple alternatives. These methods, which are frequently used and developed today, are methods that enable the optimal decision to be easily reached by saving both time and cost. In this study, analysis was made by applying TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), which is one of the multi-criteria decision-making methods. It is among the findings of the study that the TOPSIS method is a cost-free and simple method that can be applied to make the best choice among a certain number of alternatives, when the correct evaluation factors and the importance levels of the evaluation factors are determined correctly. In this study, the financial performances of healthcare sector companies traded in Istanbul Stock Exchange for the 2020-2022 period were examined with the TOPSIS method, one of the multi-purpose decision-making methods, and the companies were ranked according to the results obtained. While analyzing the companies, data obtained from financial statements were used. In the analysis, liquidity ratios, activity ratios, financial structure ratios and profitability ratios were used from the ratios obtained from the financial statements. According to the data obtained, companies are ranked according to their performance over the years. According to the results of the study, Lokman Hekim Engurusağ Health Tourism Education Service Corporation (LKMNH) and Tapdi Oksygen Special Health and Education Services (TNZP) demonstrated successful performance, while Nasmed Special Health Service (EGEPO) showed the lowest overall performance.

Keywords: Financial Performance, Financial Ratios, BIST Health Sector, TOPSIS

BİST Sağlık Sektöründe Faaliyet Gösteren Şirketlerin TOPSİS Yöntemiyle Finansal Başarı Analizi

İşletmeler, geçmiş ve mevcut performanslarını görebilmek ve stratejik hedeflerine yönelik kararlar alabilmek için finansal bilgiye ihtiyaç duyarlar. Bu bilgileri ise finansal tablolardan ve bu tabloların analizinden elde ederler. Finansal performans ölçümünün amacı, işletmenin finansal durumu hakkında karar verecek kişilere bilgi sağlamaktır. Finansal performans

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analizleri, işletme yöneticilerinin geleceğe yönelik kararlar almasını destekleyebileceği gibi, işletmeye yatırım yapacak kişilere işletme hakkında bilgi sunmakta ve kredi kuruluşlarının işletmeye kredi verip vermeme konusunda karar almalarına da imkân sağlamaktadır. Çok kriterli karar verme yöntemleri (ÇKKV), birden fazla alternatifin bulunduğu karar verme problemlerinde en doğru karara ulaşmak için kullanılabilen matematiksel yöntemler olarak tanımlanabilir. Günümüzde sıklıkla kullanılan ve geliştirilen bu yöntemler, hem zaman hem de maliyet tasarrufu sağlayarak optimal karara daha kolay ulaşılmasını sağlayan yöntemlerdir. Bu çalışmada, çok kriterli karar verme yöntemlerinden biri olan TOPSIS (İdeal Çözüme Benzerlik Yoluyla Tercih Sıralama Tekniği) yöntemi uygulanarak analiz yapılmıştır. Çalışmanın bulguları arasında, doğru değerlendirme faktörleri ve bu faktörlerin önem düzeyleri doğru şekilde belirlendiğinde, TOPSIS yönteminin belirli sayıdaki alternatifler arasından en iyi seçimi yapmak için uygulanabilecek maliyetsiz ve basit bir yöntem olduğu yer almaktadır. Bu çalışmada, 2020-2022 dönemi için Borsa İstanbul'da işlem gören sağlık sektörü şirketlerinin finansal performansları, çok amaçlı karar verme yöntemlerinden biri olan TOPSIS yöntemiyle incelenmiş ve elde edilen sonuçlara göre şirketler sıralanmıştır. Şirketlerin analizinde finansal tablolardan elde edilen veriler kullanılmıştır. Analizde, finansal tablolardan elde edilen oranlardan likidite oranları, faaliyet oranları, finansal yapı oranları ve kârlılık oranları kullanılmıştır. Elde edilen verilere göre şirketler, yıllar itibarıyla performanslarına göre sıralanmıştır. Çalışmanın sonuçlarına göre, Lokman Hekim Engürüsağ Sağlık Turizm Eğitim Hizmetleri A.Ş. (LKMNH) ve Tapdi Oksijen Özel Sağlık ve Eğitim Hizmetleri A.Ş. (TNZP) başarılı performans göstermiş; Nasmed Özel Sağlık Hizmetleri A.Ş. (EGEPO) ise genel olarak en düşük performansı sergilemiştir

Anahtar Kelimeler: Finansal Performans, Finasal Oranlar, BIST Sağlık Sektörü, TOPSIS.

Introduction

Financial system; It is a structure that includes various participants and institutions and integrates with rules to ensure that these factors continue in a harmonious manner. Within this structure, there are many investors and parties in need of funds, from households to the state. The financial system, which brings these parties together through various institutions, is of great importance for the country's economies. For this reason, the functioning and performance of the factors within the financial system are also important.

The financial performance of companies can be measured using various methods. But ratio analysis is one of the leading methods of measuring financial performance. Thanks to ratio analysis reflecting financial performance, companies can evaluate and keep under control liquidity, financing structure, activity, profitability, growth and capital market performance indicators. Additionally, thanks to ratio analysis, companies can achieve their goals and implement their strategies (Örs, Takıl and Altın, 2015).

The TOPSIS method is a popular multi-criteria decision-making technique that allows selecting the best alternative by evaluating multiple criteria. The method is based on the logic that an alternative is "closest to the best (ideal) solution" and "farthest from the worst (anti-ideal) solution." The application basically consists of 6 steps. These steps are:

Creating the Decision Matrix: A matrix is created where the alternatives to be evaluated are in the rows, and the decision criteria are in the columns.

Calculating the Normalized Decision Matrix: The criteria are standardized by dividing the values in each criterion by the square root of the sum of their squares (thus eliminating unit differences).

Creating the Weighted Normalized Matrix: Each column of the normalized matrix is multiplied by the criterion weights determined by experts or methods.

Determining Ideal and Anti-Ideal Solutions: The ideal solution (A^+) is created by selecting the largest values for the utility (desired maximum) criteria and the smallest values for the cost (desired minimum) criteria. The anti-ideal solution (A^-) is created by selecting the smallest values for the utility criteria and the largest values for the cost criteria.

Calculating Distances: The Euclidean distances of each alternative to the ideal and anti-ideal solutions are calculated.

Calculating Relative Proximity to the Ideal Solution: A proximity coefficient is calculated for each alternative. As the coefficient approaches 1, the performance of the alternative improves.

In this study, the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method, a multi-criteria decision-making method widely used in practice, was employed to evaluate the performance of the

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firms. In analyzing the performance of firms, 14 ratio variables were used, drawing upon the literature. The ratios used in the analysis were divided into four categories: Solvency Ratios, Turnover Ratios, Financial Structure Ratios, and Profitability Ratios. The analysis of the firms was carried out using the TOPSIS method with these 14 ratios obtained from these groups.

1. Literature Review

The literature review revealed that the measurement of financial performance was not carried out using the TOPSIS method, one of the methods for multi-criteria decision-making in the context of the BIST health sector, but that studies were conducted using other methods for multi-criteria decision-making.

Soysal, Kayalı, and Aktaş (2017) examined the financial ratios of 17 cement companies listed on the Borsa Istanbul from 2010 to 2016. They found that the ranking of some companies fluctuated constantly, while others strengthened and improved their financial structures.

Gümüş et al. (2017) evaluated the financial valuation analysis of 15 cement production companies listed on Borsa Istanbul based on their 2016 annual reports. Based on the results of the TOPSIS methodology, Soysal et al. (2017) concluded that the results obtained using traditional financial ratios differ from the results obtained using cash flow ratios.

In their study, Şit et al. (2017) evaluated the financial performance of companies listed on the BIST Base Metal Index. They utilized the TOPSIS method, a Multi-Criteria Decision Making Technique, for their evaluation. Published data from the companies between 2011 and 2015 were used in the study. The results revealed that the performance of all companies varied and varied across years.

Siew et al. (2017) used the TOPSIS method, a Multi-Criteria Decision Making Technique, in their study. The authors used data published on the Malaysian Stock Exchange between 2011 and 2015. In their study, they utilized data from eight companies listed on the Malaysian Stock Exchange. Based on the results, they systematically presented information showing the companies' performance using tables.

Rosini and Gunawan (2018) evaluated the performance of the aviation sector in their study and used ratio analysis. They also used TOPSIS analysis, a Multi-Criteria Decision-Making Technique, along with Data Envelopment Analysis (DEA). Correlation coefficient analysis was also conducted to examine the relationship between variables.

Perçin and Aldalou (2018) compared the financial performance of Turkish Airlines and Pegasus Airlines using fuzzy AHP, fuzzy TOPSIS, and key performance indicator (KPI) analysis. According to the results of these analyses, Pegasus Airlines demonstrated higher financial performance than Turkish Airlines.

In a study by Perçin and Aldalou (2018), the financial performance of Turkish Airlines and Pegasus Airlines was compared using fuzzy AHP, fuzzy TOPSIS, and KPI analysis. This study also showed that Pegasus Airlines exhibited higher financial performance than Turkish Airlines.

Çağıran Kendirli et al. (2019) analyzed the financial performance of participation banks and commercial banks in Turkey. The analysis was based on banking data from the period before (2005–2008), during (2008–2011), and after (2011–2015) the crisis. The study concluded that Turkey was less affected by the financial crisis than other countries. While commercial banks were leaders both before and after the crisis, banks performed better in the crisis year, achieving a higher financial value and increased profitability.

Kendirli et al. (2020) conducted an analysis using the TOPSIS multi-criteria decision-making method to evaluate the financial assessments of enterprises listed in the BIST Small and Medium-Sized Enterprises (SME) Industrial Index. The study compared the financial performance of SMEs separately for the years 2016-2018. According to the results of their study, the top five companies with the highest financial performances in 2018 are Çimbeton, Federal-Mogul İzmit Piston and Pin, Gediz Packaging, Doğan Burda Magazine, Mega Polietilen Foam.

Taze Dry Food, Birlik Textile, Diriliş Textile, Sanifoam Foam, and Emek Electric Industry are ranked at the bottom of the 2018 financial performance ranking with the lowest financial performances.

Federal-Mogul Izmit Piston and Pin company was ranked in the first two ranks every year between 2016-2018. Based on this information, it can be said that Federal-Mogul İzmit Piston and Pin company consistently

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showed a high financial performance between 2016-2018. Sanifoam Foam and Emek Electric Industry are the last two companies in all years between 2016-2018.

Mercan and Metin (2020) analyzed the financial status of companies listed on the BIST Electricity Index. They used published data from 2014 to 2018. They conducted their assessments using VIKOR and COPRAS multi-criteria decision-making methods. The results of the study indicated that the two methods did not differ in terms of company performance rankings.

In his study, Yılmaz (2020) analyzed deposit banks operating in Türkiye. He used 10 financial ratios as evaluation tools. He used the TOPSIS method, a Multi-Criteria Decision-Making Method, as his analysis method. He used the banks' 2018 fiscal year data in the analysis process. The results of the study revealed that foreign-owned banks operating in Türkiye performed better than domestically owned banks.

Söylemez (2020) analyzed basic metal industry companies listed on the BIST in his study. He used published data covering the period 2010-2019. The methods used in the study were the TOPSIS Multi-Criteria Decision Making Method and gray relational analysis. Twenty-five financial indicators were used in the evaluation process. The study highlighted that the two applied methods yielded similar results in assessing financial performance, suggesting that users can freely choose either method for financial performance analysis. However, he noted that the study could be expanded by including additional multi-criteria decision-making methods beyond the two employed.

Daver (2023) conducted a study evaluating the Turkish banking sector using gray relational analysis. Data from the 72-month period between January 2017 and January 2023 were used in the study. The results of the study indicated that the ranking of index changes and the gray ranking yielded the same results in determining the top two positions. The study also found that the implementation decisions taken during the COVID-19 pandemic influenced the results.

In his study, Dayı (2024) analyzed healthcare businesses listed in the BIST Healthcare Services sector, ranging in number from 1 to 4, using data from 2016 to 2023. As part of the analysis, financial statements were evaluated using ratio analysis. Fifteen ratios were used to evaluate company performance. The study's results revealed that businesses are generally financed with equity. Businesses are advised to increase their liquidity levels and utilize their assets more effectively.

In their study, Sönmez and Büyüköztürk (2024) evaluated the profitability of brokerage firms using various multi-criteria decision-making techniques. They used return on assets, return on equity, price-earnings ratio, and debt-to-funds ratio as variables. The EDAS method was used to measure and compare the profitability of brokerage firms. Financial data published between 2019 and 2023 were used for the evaluation. They ranked the results according to the profitability structure of the firms.

In their study, Akın and Aktan (2024) analyzed the financial performance of four healthcare organizations listed on the Borsa Istanbul (BIST) using the entropy model and gray relational analysis. They used consolidated annual financial data published between 2021 and 2022 for the analysis. The financial data were calculated using financial ratios under four main headings: liquidity, financial structure, activity, and profitability, and 23 subheadings. The results of the study indicated that businesses with relatively higher cash ratios, net working capital turnover, financing ratios, and net profit margins also performed better.

Sönmez and Soydaner (2025) analyzed companies operating in the healthcare sector in Turkey. The study used data published between 2018 and 2023. The analysis employed MAIRCA and MABAC methods. The results of the study indicated that 2018 was a poor year for the healthcare sector, while 2023 was identified as the best year in terms of performance.

2. Analysis of Healthcare Enterprises Listed on the Istanbul Stock Exchange (BIST) Using the TOPSIS Method

The research aims to evaluate companies' financial performance in the Health index traded in Borsa Istanbul with TOPSIS management. The study shows that there are 5 companies in the BIST Health Index. However, European Investment Holding (AVHOL) was excluded from the analysis among these businesses because the necessary data could not be provided. For this reason, research was conducted on 4 companies in the study.

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Within the scope of the study, 2022-2023 financial data of the companies in question were used. The financial data used in this study is information published by the companies. These data were obtained from the Public Disclosure Platform and the companies' official websites. Companies within the scope of the research are given in Table 1.

Table 1. Companies Included in the Scope of Analysis

Firm Name	BIST (Istanbul Stock Exchange) Code
Lokman Hekim Engurusağ Health Tourism Education Service Corporation	LKMNH
MLP Health Service	MPARK
Nasmed Special Health Service	EGEPO
Tapdi Oksygen Special Health and Education Services	TNZP

The variables we defined for conducting the TOPSIS analysis and their abbreviations are given in Table 2 below. These criteria were determined taking into account the literature. In addition, the weighting ratio of each criterion required for the application of the TOPSIS method is given equally on a group basis (each group has a weight of 0.25), taking into account the literature. Then, the ratio criterion within each group was distributed equally within the group by dividing the ratio of 0.25 by the number of ratios. Table 2 lists the groups and criteria in question.

Table 2. Ratios Used in the Study and Their Contents

GROUPS	RATIOS	DESCRIPTION
PAYMENT POWER RATIOS	Rtio1 (Current Ratio)	Current Asset/Short Term Foreign Resources
	Rtio2 (Acid Test Ratio)	(Current Asset-Stock)/ Short Term Foreign Resources
	Rtio3 (Cash Ratio)	Cash Asset/Short Term Foreign Resources
TURNOVER RATE RATIOS	Rtio4 (Receivables Turnover Rate)	Sales/Trade Receivables
	Rtio5 (Active Revolution Rate)	Sales/Total Assets
	Rtio6 (Current Assets Turnover Rate)	Sales/Current Assets
FINANCIAL STRUCTURE RATIOS	Rtio7 (Financial Leverage)	Total Foreign Resources/Total Assets
	Rtio8 (Equity Ratio)	Equity/Total Assets
	Rtio9 (Financing Rate)	Equity/Total Foreign Resources
	Rtio10 (Short Term Foreign Resource Rate)	Short Term Foreign Resources/Total Assets
	Rtio11 (Long Term Foreign Resource Rate)	Long Term Foreign Resources/Total Assets
PROFITABILITY RATIOS	Rtio12 (Asset Profitability Ratio)	Net Profit/Total Assets
	Rtio13 (Return on Equity Ratio)	Net Profit/Equity
	Rtio14 (Net Profit Ratio)	Net Profit/Sales

The TOPSIS method, developed by Hwang and Yoon, is a multi-criteria decision-making procedure used to identify the positive and negative ideal solutions. The positive ideal solution is characterized by the lowest costs and the highest benefits, while the negative ideal solution represents the one with the highest costs and the lowest benefits. The alternative that is farthest from the negative ideal solution but not closest to the positive

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ideal solution is considered the preferred alternative. The TOPSIS method comprises six steps (Dumanoğlu and Ergül, 2010: 105–107; Alsu and Taşdemir, 2017: 226–227):

Step 1: Creating a decision matrix for TOPSIS Analysis

The rows of the decision matrix contain the decision items with their respective advantages, and the columns contain the evaluation criteria for the decision-making process. The resulting matrix A is called the initial matrix and is represented as follows:

$$A_{ij} = \begin{matrix} Faktors \\ \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1p} \\ a_{21} & a_{22} & \dots & a_{2p} \\ \vdots & & & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mp} \end{bmatrix} \end{matrix} Decision\ Criterias$$

In the TOPSIS Multi-Criteria Decision Making Method, in the A matrix system placed in the table, the m values correspond to the number of decision points and the n values correspond to the number of evaluation factors for the study.

Step 2: Creating the normalized decision matrix for TOPSIS Analysis (N)

The normalized decision matrix to be used in the TOPSIS analysis is created with the values taken from the A matrix system and is calculated using the formula given below in the text:

$$N_{ij=}\frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} (i = 1, \dots., m\ ve\ j = 1, \dots., n$$

Step 3: Creating a weighted standard decision matrix (V)

First, the weighting values (Wi) of the evaluation factors are determined:

$$\sum_{i=1}^{n} W = 1$$

Next, the elements in each column of the N matrix are multiplied by the corresponding wi value, creating the V matrix. The weights of the evaluation factors are W1, W2,……, and are denoted as Wn. To create the weighted normalized decision matrix, the columns of the V matrix are calculated by multiplying the values in the columns of the R matrix by the corresponding weight factor values.

Step 4: Generating Ideal (A+) and Negative Ideal (A-) Solutions

To determine the expected ideal solution set for TOPSIS analysis, the largest of the weighted evaluation factors within the V matrix, that is, the negative of the V matrix system specified in Step 3, is selected. The expected ideal solution set for the TOPSIS analysis system is calculated using the formula given in the text.

$$A^- = \{(minv_{ij}\ being)\}$$

$$\Rightarrow A^-\{v_1^-, v_2^-, \dots\dots\dots, v_n^-\} \text{are the minimum values for each column}$$

Step 5: Calculating the Distances Between Alternatives

In this step, the distances to the theorems of the positive and negative ideal solutions are calculated. The distance of each alternative to the positive ideal solution is calculated using the formula below.

$$S_i^* \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^*\right)^2} \qquad \text{i} = 1,2, \dots\dots\dots \text{m}$$

The distance to each alternative negative solution set needed for the TOPSIS analysis method will be calculated using the formula given in the text.

$$S_i^- \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^-\right)^2} \qquad \text{i} = 1,2, \dots\dots\dots \text{m}$$

Step 6: Calculating the Relative Proximity to the Ideal Solution

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In the final step, the similarity to the ideal solution for each alternative is calculated based on positive and negative distance measurements from the ideal solution. The calculation of the similarity to the ideal solution is performed using the following formula:

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

Within the TOPSIS analysis method, distances to ideal and non-ideal solution points are used to calculate the relative proximity of each decision point to the ideal solution. This relative proximity is denoted by Ci*. Ci* takes values in the range $0 \leq Ci^* \leq 1$, where Ci* = 1 represents the absolute proximity of the respective decision point to the ideal solution and Ci* = 0 represents the absolute proximity to the negative ideal solution. In other words, Ci* = 0 represents the closest point to the negative ideal solution point within the TOPSIS analysis system. Ci* values calculated from the system are listed in order of magnitude to indicate their importance for the decision points. The TOPSIS method evaluation was generally analyzed using the Excel data evaluation system. In this context, the financial performance of companies listed on the BIST Electricity Index was analyzed using the TOPSIS method. The study used publicly disclosed data from the 2022-2023 period. The TOPSIS solution for 2022 is presented in detail throughout the study as an example. The resulting data is presented in a tabular format within a general ordering framework. The decision matrix, derived from the first step of the TOPSIS framework and utilizing the 2022 financial data, is presented in Table 3.

Table 3: Decision Matrix for 2022

1. Step **2022 Year Decision Matric**

Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio4	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14
LKMNH	0,8089	0,6651	0,1117	7,0083	0,7736	3,0975	0,4937	0,5063	0,0000	0,3088	0,1849	0,1478	0,2919	0,1911
MPARK	0,8741	0,7268	0,2027	6,2802	0,8358	2,7142	0,5624	0,4376	0,7781	0,3523	0,2101	0,2097	0,4791	0,2508
EGEPO	1,7217	1,5987	1,0767	11,1816	0,3868	2,5934	0,3075	0,6925	2,2519	0,0866	0,2209	-0,1135	-0,1639	-0,2935
TNZP	2,2173	2,0302	1,4291	10,2952	0,4825	2,1204	0,1980	0,8020	4,0502	0,1026	0,0954	0,1195	0,1490	0,2476

Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio4	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14
LKMNH	0,6543	0,4424	0,0125	49,1166	0,5984	9,5944	0,2437	0,2564	0,0000	0,0953	0,0342	0,0218	0,0852	0,0365
MPARK	0,7640	0,5282	0,0411	39,4415	0,6986	7,3666	0,3163	0,1915	0,6055	0,1241	0,0441	0,0440	0,2295	0,0629
EGEPO	2,9643	2,5560	1,1593	125,0283	0,1496	6,7255	0,0946	0,4795	5,0710	0,0075	0,0488	0,0129	0,0269	0,0861
TNZP	4,9166	4,1216	2,0423	105,9903	0,2328	4,4961	0,0392	0,6432	16,4042	0,0105	0,0091	0,0143	0,0222	0,0613
Total	9,2991	7,6482	3,2551	319,5766	1,6795	28,1827	0,6938	1,5706	22,0807	0,2375	0,1362	0,0930	0,3638	0,2469
Total Square Root	3,0494	2,7655	1,8042	17,8767	1,2959	5,3087	0,8329	1,2532	4,6990	0,4873	0,3691	0,3049	0,6032	0,4969

The second step used within the TOPSIS analysis system attempts to present the normalized decision matrix values for the 2022 financial data in Table 4. This step involves squaring the numbers representing the values in the column containing each value within the decision matrix. The normalized matrix system is obtained by dividing the sum of the data obtained from the resulting numbers by the square root.

Table 4: 2022 normalization decision matrix created for TOPSIS analysis

2. Step **Normalized Matrix**

Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio4	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14

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LKMNH	0,2146	0,1600	0,0069	2,7475	0,4618	1,8073	0,2926	0,2046	0,0000	0,1956	0,0926	0,0717	0,1413	0,0735
MPARK	0,2505	0,1910	0,0228	2,2063	0,5391	1,3876	0,3797	0,1528	0,1289	0,2547	0,1196	0,1442	0,3805	0,1266
EGEPO	0,9721	0,9242	0,6425	6,9939	0,1155	1,2669	0,1135	0,3826	1,0792	0,0154	0,1322	0,0423	0,0446	0,1733
TNZP	1,6123	1,4904	1,1320	5,9290	0,1796	0,8469	0,0471	0,5132	3,4910	0,0216	0,0247	0,0468	0,0368	0,1234
TOPLAM	3,0494	2,7655	1,8042	17,8767	1,2959	5,3087	0,8329	1,2532	4,6990	0,4873	0,3691	0,3049	0,6032	0,4969
														40,7
Weight Rating	0,075	0,068	0,044	0,440	0,032	0,131	0,020	0,031	0,116	0,012	0,009	0,008	0,015	**0,012**

In the third step of the TOPSIS application, a normalized decision matrix was generated using weights determined by the weighted average method for the relevant year using 2022 data. The weighted normalized decision matrix obtained using the data is presented in Table 5.

Table 5: Weighted normalized decision matrix created for the TOPSIS method for the year 2022

3. Step	**Obtaining the weighted normalized matrix**													
Firm /Ratio	**Rtio1**	**Rtio2**	**Rtio3**	**Rtio4**	**Rtio5**	**Rtio6**	**Rtio7**	**Rtio8**	**Rtio9**	**Rtio10**	**Rtio11**	**Rtio12**	**Rtio13**	**Rtio14**
LKMNH	0,0161	0,0109	0,0003	1,2083	0,0147	0,2360	0,0060	0,0063	0,0000	0,0023	0,0008	0,0005	0,0021	0,0735
MPARK	0,0188	0,0130	0,0010	0,9703	0,0172	0,1812	0,0078	0,0047	0,0149	0,0031	0,0011	0,0011	0,0056	0,1266
EGEPO	0,0729	0,0629	0,0285	3,0757	0,0037	0,1654	0,0023	0,0118	0,1247	0,0002	0,0012	0,0003	0,0007	0,1733
TNZP	0,1209	0,1014	0,0502	2,6074	0,0057	0,1106	0,0010	0,0158	0,4035	0,0003	0,0002	0,0004	0,0005	0,1234

In the fourth step of the TOPSIS method, the ideal and negative ideal solutions were determined. The maximum values obtained for each column in this study represent the ideal solution ($A+$), while the minimum values represent the negative ideal solution ($A-$). The ideal and negative ideal solutions generated in the fourth step for TOPSIS are presented in Table 6.

Table 6: Ideal and negative ideal solution expressions for the 2022 data generated for the TOPSIS analysis

4.Step														
Ideal Solution	0,0161	0,0109	0,0003	0,0000	0,0172	0,1654	0,0000	0,0118	0,1247	0,0031	0,0000	0,0000	0,0000	0,0000
Negative Solution	0,0729	0,0629	0,0285	0,0000	0,0037	0,0000	0,0023	0,0000	0,0000	0,0002	0,0012	0,0000	0,0000	0,0000

For the TOPSIS analysis, the distance measurements between the alternatives generated in step 5 were calculated. In this step, the distances of the resulting alternatives to the ideal solution set are calculated, both positive and negative. The values expressed for the ideal solution are extracted from the weighted, normalized matrix values and squared. The ideal distance (Si^{+}) for each resulting decision point is determined by taking the square root of the sum. The resulting data from the calculations are presented in Table 7.

Table 7: Ideal distance values for TOPSIS analysis in 2022

Firm /Ratio	**Rtio1**	**Rtio2**	**Rtio3**	**Rtio4**	**Rtio5**	**Rtio6**	**Rtio7**	**Rtio8**	**Rtio9**	**Rtio10**	**Rtio11**	**Rtio12**	**Rtio13**	**Rtio14**
LKMNH	0,0000	0,0000	0,0000	1,2083	-0,0025	0,0706	0,0060	-0,0055	-0,1247	-0,0007	0,0008	0,0005	0,0021	0,0735
MPARK	0,0027	0,0021	0,0007	0,9703	0,0000	0,0158	0,0078	-0,0071	-0,1099	0,0000	0,0011	0,0011	0,0056	0,1266
EGEPO	0,0568	0,0520	0,0282	3,0757	-0,0135	0,0000	0,0023	0,0000	0,0000	-0,0029	0,0012	0,0003	0,0007	0,1733
TNZP	0,1049	0,0905	0,0499	2,6074	-0,0115	-0,0548	0,0010	0,0040	0,2788	-0,0028	0,0002	0,0004	0,0005	0,1234

5. Step

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Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio4	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14	TOTAL	S+*
LKMNH	0,0000	0,0000	0,0000	1,4599	0,0000	0,0050	0,0000	0,0000	0,0156	0,0000	0,0000	0,0000	0,0000	0,0054	1,486	1,219
MPARK	0,0000	0,0000	0,0000	0,9414	0,0000	0,0002	0,0001	0,0001	0,0121	0,0000	0,0000	0,0000	0,0000	0,0160	0,970	0,985
EGEPO	0,0032	0,0027	0,0008	9,4600	0,0002	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0300	9,497	3,082
TNZP	0,0110	0,0082	0,0025	6,7984	0,0001	0,0030	0,0000	0,0000	0,0777	0,0000	0,0000	0,0000	0,0000	0,0152	6,916	2,630

For TOPSIS analysis, negative ideal solution values are subtracted from the weighted, normalized matrix values, and the squares are calculated. The negative ideal distance ($Si-$) for each decision point is determined by taking the square roots of the sums. The calculated data is presented in Table 8.

Table 8: 2022 negative ideal distance values for TOPSIS analysis

Weighted-negative ideal solution

Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio4	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14
LKMNH	-0,0568	-0,0520	-0,0282	1,2083	0,0110	0,2360	0,0037	0,0063	0,0000	0,0022	-0,0004	0,0005	0,0021	0,0735
MPARK	-0,0541	-0,0499	-0,0275	0,9703	0,0135	0,1812	0,0055	0,0047	0,0149	0,0029	-0,0001	0,0011	0,0056	0,1266
EGEPO	0,0000	0,0000	0,0000	3,0757	0,0000	0,1654	0,0000	0,0118	0,1247	0,0000	0,0000	0,0003	0,0007	0,1733
TNZP	0,0480	0,0385	0,0217	2,6074	0,0020	0,1106	-0,0014	0,0158	0,4035	0,0001	-0,0010	0,0004	0,0005	0,1234

Weighted - square of negative ideal solution

Firm /Ratio	Rtio1	Rtio2	Rtio3	Rtio5	Rtio6	Rtio7	Rtio8	Rtio9	Rtio10	Rtio11	Rtio12	Rtio13	Rtio14	TOPLAM	S-*
LKMNH	0,0032	0,0027	0,0008	1,4599	0,0001	0,0557	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	1,5225	1,234
MPARK	0,0029	0,0025	0,0008	0,9414	0,0002	0,0328	0,0000	0,0000	0,0002	0,0000	0,0000	0,0000	0,0000	0,9809	0,990
EGEPO	0,0000	0,0000	0,0000	9,4600	0,0000	0,0274	0,0000	0,0001	0,0156	0,0000	0,0000	0,0000	0,0000	9,5031	3,083
TNZP	0,0023	0,0015	0,0005	6,7984	0,0000	0,0122	0,0000	0,0003	0,1628	0,0000	0,0000	0,0000	0,0000	6,9780	2,642

In step 6 of the TOPSIS analysis, the relative closeness to the ideal solution was calculated. The negative ideal value was divided by the sum of the negative ideal value and the ideal values. As a result of the studies, the closeness to the ideal solution was calculated as "$Ci+$". The ideal solution data obtained from the studies are presented in Table 9.

Table 9: Company rankings resulting from the 2022 relative closeness to the ideal solution data generated for the TOPSIS analysis

				Ci	
	S+*	S-*	S-* + S+*	S-* / (S-* + S+*)	
LKMNH	1,219	1,234	2,453	0,50304147	1
MPARK	0,985	0,990	1,975	0,50140992	2
TNZP	3,082	3,083	6,164	0,50008032	3
EGEPO	2,630	2,642	5,271	0,50111202	4

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3. Result and Conclusion

The evaluation of the performance data obtained as part of the study showed that the company with the best performance generally varied from year to year. According to the data obtained, "Lokman Hekim Engurusağ Health Tourism Education Service Corporation (LKMNH)" in 2022 and "Tapdi Oksygen Special Health and Education Services (TNZP)" in 2023 show the best performance and rank at the top. It was observed that "Nasmed Special Health Service (EGEPO)" had the lowest financial performance in 2022 and 2023. In this study, the financial performances of the companies included in the health index whose shares are traded on BIST were evaluated by using 14 financial ratios and the TOPSIS method. In new research, financial performance can be evaluated in other sectors with different financial ratios and new methods. The results obtained in this article may be guiding for research that will carry out these studies. When making evaluations for investors, taking these research results into consideration may provide guidance for them.

Ethical Considerations of the Study

It is declared that the study was designed to realistically and ethically meet the needs, and that integrity was maintaining in obtaining data, concluding the study, and publishing the results. Ethical committee approval was not required for this research. No research requiring ethics committee approval was conducted in this study.

Informed Consent

There was no need to obtain informed consent from individuals, as the study did not involve any procedure or interventions on human participants.

Author Contributions

Idea/Concept: S.K, Z.L, S.A.; Design: S.K, Z.L, S.A.; Supervision/Consultancy: S.K ,Z.L, S.A.; Resources: S.K,Z.L,S.A.; Data Collection and/or Processing: S.K, Z.L, S.A.; Analysis and/or Interpretation: S.K ,Z.L,S.A.; Literature Review: S.K,Z.L,S.A.; Writing: S.K, Z.L, S.A.; Critical Review: S.K, Z.L, S.A.

Conflict of Interest Statement

The author declares no conflict of interest.

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Declarations

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