**Evaluation of Financial Performances of SME’s Listed in the Bist Sme Industrial Index by Using TOPSIS Multicriteria Decision Making Method [[1]](#footnote-1)**

Selcuk Kendirli 2[[2]](#footnote-2), Muhammet Selcuk Kaya 3 and Mustafa Bilgin 4

2 Hitit University, FEAS department of Finance and Banking

3 Hitit University, FEAS department of Finance and Banking)

4 Hitit University, FEAS department of Finance and Banking

In this study, financial performances of SMEs that listed in the BIST SME Industrial Index are evaluated by using TOPSIS multicriteria decision making method. The datas of the study acquired from annual financial statements that reported between 2016-2018 period. Financial performance ranks of SMEs are determined for each year and thus comparative financial performances of SMEs are detected.

BIST SME Industrial Index is an index includes stocks of industrial SMEs traded in BIST Stars, BIST Main and BIST Emerging Companies markets. SMEs have great importance for Turkish economy, with their dynamizing roles and with their crucial roles in the regional development and job creation. According to the Turkey Statistical Institute data, Turkish SMEs constitute 99.8 % of all enterprises in Turkey. At the same time Turkish SMEs provide 72.7% of total employment, 62% of total sales and 58% of total investments of Turkish Economy.

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is one of the multicriteria decision making methods that commonly used in the evaluation of financial performances of firms. The TOPSIS method is based on two main points: the positive ideal solution and the negative ideal solution. With the help of the TOPSIS method, the distances positive ideal solutions and negative ideal solutions of all options are calculated. Options are ranked according to their proximity to the positive ideal solution and their distance to the negative ideal solution.

Keywords: SME, Financial Performance, TOPSIS, Multicriteria Decision Making, BIST SME Industrial Index.

JEL Codes: *D53, G15, G17, O16*

How to cite: Mihoreanu, L. (2019). THE HEALTH SECTOR - FROM DESIDERATUM TO REAL REFORM. Journal of Economic Development, Environment and People, 8(2). doi: <http://dx.doi.org/10.26458/jedep.v8i2.627>

1. Introduction

SMEs (Small and Medium-Sized Enterprises) are among the most important elements of economic life with their contributions to employment and their structures that can easily adapt to changes. In all national economies, more than 70% of firms are SMEs and in most countries more than 90% of firms are SMEs (OECD,2017). As awareness of the importance of SMEs in the economy increases, governments and international organizations are increasing their policies to support SMEs. In this context, Borsa İstanbul has decided to establish SME Industry Index and BIST SME Industry index started to be calculated as of December 2013.

Financial performance is a result-oriented type of business performance based on the use of financial indicators of firm, reflecting the degree of fulfillment of economic objectives of firm (Başdar, 2019). Evaluation of the financial performance of SMEs is of great importance for the owners, investors, lenders and other stakeholders. In this respect, multi-criteria decision making methods that allow comparative measurement of different alternatives are among the methods used extensively in the measurement of financial performance of firms.

TOPSIS was developed by Hwang and Yoon in 1980 and is a multi-criteria decision-making method that has been applied in many different areas from firm performance measurement to car selection. In the TOPSIS method, two values called positive ideal solution and negative ideal solution are calculated. The different alternatives are ranked according to their proximity to the positive ideal solution and their distance to the negative ideal solution (Özbek, 2017).

1. Literature Review

Bakırcı, Eslamian Shiraz and Sattary (2014) have determined the financial performance of 14 companies in the Iron and Steel Industry main industry sector between the years 2009-2011 by using TOPSIS and DEA (Data Envelopment Analysis) multi-criteria decision making methods. They used Data Envelopment Analysis super efficiency and TOPSIS methods to determine the performance rankings of the firms that they determined their relative efficiency levels by DEA. Although they attained approximate firm financial performance rankings, financial performance rankings they determined with using TOPSIS and DEA methods are not exactly same.

Özçelik and Kandemir (2015) have determined the financial performance of 7 tourism companies traded on BIST between 2010 and 2014 by using the financial ratios of the firms as a basis for the TOPSIS method.

Sakarya and Akkuş (2015) analyzed the financial performance of cement companies traded in BIST between the years 2010-2013 using TOPSIS method, They analyzed firm financial performance firstly by using traiditional financial ratios and then by using cash flow ratios. As a result of the study, differences are detected between the results obtained according to traditional financial ratios and the results obtained according to cash flow rates.

Akbulut and Coşkun (2015) determined the financial performances of 32 manufacturing companies traded on BIST between 2010 and 2012 by TOPSIS method and analyzed the correlation between the companies' market value/book value ratios and companies’ TOPSIS scores. As a result of the study, they found that there is no statistically significant relationship between the stock market performances determined by using market value/book value ratios and the financial performances determined by TOPSIS method.

Akgün and Soy Temür (2016) determined the financial performances of 2 airline companies registered in BIST transportation index between 2010 and 2015 using TOPSIS method.

İlkuçar and Çifci (2016) evaluated financial performances of 6 electric generation companies for 2015 by using TOPSIS method.

Aytekin and Karamaşa (2017) analyzed financial performances of 6 insurance companies traded in BIST by using 6 financial indicators within the period of 2011-2015. They obtained financial performances rankings of 6 insurance firms by using fuzzy (shannon’s entropy based) TOPSIS method.

Balcı (2017) examined financial performances of 27 public hospitals between 2014 and 2015 by using TOPSIS method. As a result of the study, significant differences were observed among financial performances of public hospitals by year.

Metin, Yaman and Korkmaz (2017) determined the financial performance of 11 energy companies traded in BIST between 2010 and 2015 by using TOPSIS and MOORA methods and compared the performance rankings obtained in both methods.

Orçun and Eren (2017) financial performance of technology companies traded on BIST between 2010 and 2015 analyzed by using TOPSIS method. In addition, financial performance rankings and stock exchange returns rankings of the companies for the relevant periods were analyzed and no significant relationship could be determined.

Kayalı and Aktaş (2018) examined the financial performances of firms in the automotive sector traded on BIST between 2010 and 2015 using TOPSIS method. As a result of the study, they were determined that some companies have maintained their place in financial performance rankings and some companies have changed their place in the rankings year to year.

Özçelik and Küçükçakal (2019) analyzed the financial performance of financial leasing and factoring companies traded in BIST between 2009 and 2016 by TOPSIS method. They used the liquidity, activity and profitability ratios of the companies as criteria in TOPSIS method.

1. Data and Methodology

Financial ratios of 42 firms listed in the BIST SME Industrial Index between 2016-2018 years are used as decision criteria of TOPSIS analysis. Three main financial ratio group are selected as decision criteria; liquidity ratios, turnover ratios and profitability ratios. Annual financial reports of 42 firm are obtained from website of the Public Disclosure Platform (kap.gov.tr) and financial ratios are calculated for each firm and year. The financial ratios used in this study were selected through literature review. The list of financial ratios are shown at table 1:

|  |  |  |  |
| --- | --- | --- | --- |
| **Group of Financial Ratios** | **Selected Ratio**  | **Calculation Formula of The Selected Ratio**  | **Abbreviation** |
| **Liquidity Ratios** | Current Ratio | Current Assets/Current Liabilities | CuR |
| Acid-Test Ratio  | Current Assets-Inventories / Current Liabilities | AcTR |
| Cash Ratio | Cash+ Marketable Securities / Current Liabilities | CaR |
| **Turnover Ratios**  | Accounts Receivable Turnover Ratio  | Net Sales / Average Accounts Receivable | ARTR |
| Inventory Turnover Ratio | Cost of Good Sold/Average Inventory | ITR |
| Total Asset Turnover Ratio | Net Sales / Total Assets | TATR |
| **Profitability Ratios**  | Net Profit Margin | Net Income / Sales | NPM |
| Return on Equity | Net Income / Average Shareholder’s Equity | ROE |
| Operating Profit Margin  | Operating Earnings / Revenue | OPM |

Table. 1. Selected Financial Ratios

Liquidity ratios are the ratios that reveal the ability of a firm to pay its current assets and overdue (short-term) debts. Turnover rates are the ratios that show how effectively firms use their assets. Profitability ratios indicate the effectiveness of the firm in terms of profit making in the operating period(Okka, 2009).

With TOPSIS method, alternatives are sorted according to certain criteria. The TOPSIS method has 6 steps (Özdemir, 2015; Özbek,2017):

Step 1 is the formation of the decision matrix. The decision matrix is a matrix of decision criteria and factors. It can be shown as follows:



Step 2 is the creation of a normalized matrix. After squaring each aij value in the decision matrix, the square root of the sum of squares is taken for each criterion. After taking the square root of the sum of the squares of the data on the basis of criteria, each data is divided by the square root of the sum of the squares of the data of the criteria to which it belongs, and the normalization matrix is completed.



Step 3 is the creation of a weighted decision matrix. The weights of the evaluation criteria () are determined. The sum of all weights must be equal to 1. The weighted decision matrix is generated by multiplying the data of the criteria by the weights of the criteria.

Step 4 is to obtain ideal and negative ideal solution values. After obtaining the weighted decision matrix, maximum values of positive criteria and minimum values of negative criteria are determined and ideal solution values are found. Negative ideal solution values are obtained by determining minimum values of positive criteria and maximum values of negative criteria. Ideal and Negative Ideal solutions are expressed in the following formulas:

Step 5 is to obtain the distance from ideal and negative ideal points. In the TOPSIS method, the Euclidean distance is used to calculate the distance to ideal and non-ideal points. Euclidean distance is calculated by the following formulas:

Step 6 is the calculation of the proximity to the ideal solution. The ideal and negative ideal discrimination measures are used to calculate the proximity of each decision point to the ideal solution. and shows the absolute closeness of the respective decision point to the ideal solution, and the absolute proximity of the relevant decision point to the negative ideal solution. The relative proximity to the ideal solution is calculated by the following formula:

1. Results and Discussion

Firstly, the selected financial ratios of 42 firms included in the BIST SME industry index between 2016-2018 were calculated. As an example of the calculated financial ratios, the financial ratios for 2018 are given in the table 2.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BNTAS.E** | **BRKSN.E** | **BRMEN.E** | **BURCE.E** | **BURVA.E** | **CMBTN.E** | **DAGI.E** | **DENCM.E** | **DIRIT.E** | **DITAS.E** | **DOBUR.E** |
| **CuR**  | 4,58 | 1,09 | 0,40 | 0,92 | 1,73 | 1,17 | 1,90 | 1,03 | 0,46 | 1,54 | 2,52 |
| **AcTR** | 3,11 | 0,80 | 0,40 | 0,47 | 1,00 | 1,13 | 1,01 | 0,64 | 0,14 | 0,89 | 2,43 |
| **CaR** | 1,32 | 0,15 | 0,37 | 0,04 | 0,16 | 0,14 | 0,26 | 0,00 | 0,03 | 0,08 | 1,16 |
| **ARTR** | 3,23 | 6,28 | 19,90 | 1,42 | 2,81 | 87,43 | 1,70 | 4,52 | 3,07 | 3,85 | 30,03 |
| **ITR** | 3,09 | 4,55 | 0,89 | 2,54 | 5,66 | 3,77 | 4,36 | 3,30 | 18,66 | 4,74 | 3,91 |
| **TATR** | 0,40 | 1,20 | 0,02 | 0,30 | 1,21 | 2,16 | 0,77 | 0,86 | 0,23 | 1,38 | 1,66 |
| **NPM** | 0,13 | 0,01 | -4,23 | -0,07 | 0,00 | 0,04 | -0,06 | 0,00 | -1,23 | 0,07 | 0,03 |
| **ROE** | 0,07 | 0,02 | -0,22 | -0,05 | 0,02 | 0,20 | -0,08 | -0,01 | -0,86 | 0,26 | 0,10 |
| **OPM** | 0,14 | 0,05 | -0,02 | 0,04 | 0,12 | -0,03 | 0,08 | 0,05 | -0,88 | 0,15 | 0,04 |
|  | **DOGUB.E** | **EMKEL.E** | **ERSU.E** | **FMIZP.E** | **FORMT.E** | **GEDZA.E** | **IZFAS.E** | **IZTAR.E** | **KRSTL.E** | **LUKSK.E** | **MAKTK.E** |
| **CuR**  | 0,32 | 1,26 | 4,41 | 5,50 | 1,06 | 4,86 | 2,21 | 0,63 | 2,56 | 1,61 | 1,52 |
| **AcTR** | 0,10 | 0,70 | 1,59 | 5,09 | 0,96 | 3,84 | 1,27 | 0,49 | 2,18 | 0,91 | 1,27 |
| **CaR** | 0,01 | 0,05 | 0,01 | 0,06 | 0,07 | 1,67 | 0,42 | 0,04 | 0,14 | 0,08 | 0,35 |
| **ARTR** | 1,83 | 1,41 | 0,78 | 18,62 | 5,61 | 6,13 | 1,10 | 7,20 | 9,94 | 1,61 | 2,36 |
| **ITR** | 5,24 | 3,17 | 9,58 | 9,05 | 1,22 | 4,68 | 1,72 | 10,12 | 2,99 | 2,53 | 1,04 |
| **TATR** | 0,20 | 0,47 | 0,17 | 1,30 | 0,63 | 0,84 | 0,56 | 0,41 | 1,13 | 0,21 | 0,41 |
| **NPM** | -0,51 | 0,04 | 0,01 | 0,27 | 0,09 | 0,17 | 0,03 | -0,01 | 0,03 | 0,50 | -0,17 |
| **ROE** | -0,25 | 0,05 | 0,00 | 0,42 | 0,37 | 0,18 | 0,03 | -0,01 | 0,05 | 0,18 | -0,15 |
| **OPM** | -0,38 | 0,04 | 0,00 | 0,27 | 0,22 | 0,26 | 0,07 | 0,04 | 0,04 | -0,03 | 0,23 |
|  | **MEGAP.E** | **MERKO.E** | **NIBAS.E** | **OYLUM.E** | **OZRDN.E** | **POLTK.E** | **PRZMA.E** | **RODRG.E** | **RTALB.E** | **SAFKR.E** | **SAMAT.E** |
| **CuR**  | 9,73 | 1,13 | 0,78 | 0,66 | 1,52 | 3,71 | 5,09 | 1,59 | 3,79 | 2,03 | 1,33 |
| **AcTR** | 8,22 | 0,33 | 0,64 | 0,54 | 0,85 | 3,04 | 2,98 | 0,83 | 3,35 | 1,38 | 0,12 |
| **CaR** | 0,58 | 0,01 | 0,11 | 0,01 | 0,06 | 0,56 | 0,08 | 0,20 | 0,71 | 0,28 | 0,00 |
| **ARTR** | 4,52 | 1,28 | 7,90 | 11,29 | 3,14 | 3,27 | 0,95 | 1,08 | 4,54 | 3,65 | 1,39 |
| **ITR** | 5,79 | 6,26 | 4,85 | 2,83 | 4,79 | 1,53 | 0,92 | 2,72 | 2,45 | 3,45 | 23,92 |
| **TATR** | 0,86 | 0,77 | 0,46 | 0,63 | 1,09 | 0,64 | 0,21 | 0,65 | 0,31 | 1,02 | 1,01 |
| **NPM** | 0,02 | -0,08 | -0,12 | -0,04 | 0,10 | 0,08 | 0,04 | 0,07 | -0,02 | 0,14 | 0,00 |
| **ROE** | 0,02 | -0,22 | -0,09 | -0,06 | 0,23 | 0,06 | 0,01 | 0,11 | -0,01 | 0,22 | -0,02 |
| **OPM** | 0,06 | -0,02 | -0,03 | -0,05 | 0,15 | 0,10 | 0,09 | 0,02 | -0,59 | 0,04 | 0,09 |
|  | **SANFM.E** | **SAYAS.E** | **SEYKM.E** | **SNPAM.E** | **TACTR.E** | **TKURU.E** | **TMPOL.E** | **VANGD.E** | **YAPRK.E** |
| **CuR**  | 0,88 | 1,34 | 5,69 | 2,29 | 0,29 | 1,47 | 1,07 | 5,34 | 1,08 |
| **AcTR** | 0,59 | 0,74 | 3,64 | 1,71 | 0,24 | 0,81 | 0,87 | 5,15 | 0,76 |
| **CaR** | 0,01 | 0,05 | 0,31 | 0,47 | 0,00 | 0,27 | 0,03 | 0,18 | 0,07 |
| **ARTR** | 5,15 | 2,12 | 3,25 | 3,62 | 6,24 | 1,80 | 6,23 | 4,15 | 6,25 |
| **ITR** | 3,70 | 8,91 | 4,67 | 3,44 | 7,17 | 4,15 | 1,71 | 27,19 | 10,47 |
| **TATR** | 1,09 | 0,72 | 0,91 | 0,36 | 0,15 | 0,65 | 0,87 | 0,07 | 0,59 |
| **NPM** | 0,01 | -0,43 | 0,11 | 0,16 | -0,45 | -0,32 | -0,02 | 0,15 | 0,11 |
| **ROE** | 0,05 | -0,91 | 0,12 | 0,09 | -0,16 | -1,33 | -0,05 | 0,01 | 0,10 |
| **OPM** | 0,10 | 0,03 | 0,13 | 0,31 | -0,37 | -0,31 | 0,10 | -0,38 | 0,30 |

Table. 2. Financial Ratios for 2018 of 42 SME Listed in BIST SME Industry Index

Selected financial ratios are used as decision matrix. In step 2, the normalized matrix is formed by dividing each of the proportions in the decision matrix by the square root of the sum of the squares of the proportions. The weighted normalized matrix was obtained by weighting the normalized matrix. Equal weight was given to each decision criterion (financial ratio) while weighting process was made and the weight given to each ratio was 1/9. After weighting, the maximum and minimum values for each decision criterion (financial ratio) were determined as ideal solution points and negative ideal solution points.

After obtaining ideal and negative ideal solution points, the distance to ideal and non ideal points were obtained by using $S\_{i}^{\*}=\sqrt{\sum\_{j=1}^{n}(v\_{ij}-v\_{j}^{\*})^{2}}$ and $S\_{i}^{-}=\sqrt{\sum\_{j=1}^{n}(v\_{ij}-v\_{j}^{-})^{2}}$ formulas. Finally, the proximity to the ideal solution was calculated by using $C\_{i}^{\*}=\frac{S\_{i}^{-}}{S\_{i}^{-}+S\_{i}^{\*}}$ formula.

|  |
| --- |
| **BIST SME Industry Index Year 2016 TOPSIS Ranking** |
| **Rank** | **Company Name** | **TOPSIS Score** | **Sector** |
| **1** | Sönmez Cotton | 0,607 | Textile, Clothing, Leather |
| **2** | Federal-Mogul İzmit Piston and Pin | 0,571 | Metal Goods, Machinery and Equipment Making |
| **3** | Gediz Packaging | 0,542 | Chemical, Petroleum Rubber, Plastic |
| **4** | Çimbeton Cement | 0,514 | Stone Soil Based |
| **5** | Politeknik Metal | 0,508 | Chemical, Petroleum Rubber, Plastic |
| **6** | Mega Polyethylene Foam | 0,505 | Chemical, Petroleum Rubber, Plastic |
| **7** | RTA Laboratories | 0,481 | Chemical, Petroleum Rubber, Plastic |
| **8** | Seyitler Chemistry | 0,478 | Chemical, Petroleum Rubber, Plastic |
| **9** | Doğan Burda Magazine | 0,473 | Paper and Paper Products Printing |
| **10** | Bandırma Packaging Materials | 0,461 | Metal Goods, Machinery and Equipment Making |
| **11** | Formet Steel Door  | 0,460 | Metal Goods, Machinery and Equipment Making |
| **12** | Lüks Velvet | 0,455 | Textile, Clothing, Leather |
| **13** | Yaprak Farm  | 0,455 | Agriculture, Forestry and Fisheries |
| **14** | Özerden Plastic Products  | 0,442 | Chemical, Petroleum Rubber, Plastic |
| **15** | Prizma Press Typography | 0,441 | Paper and Paper Products Printing |
| **16** | Safkar Ege Cooling | 0,437 | Metal Goods, Machinery and Equipment Making |
| **17** | Kristal Cola Beverages | 0,430 | Food, Beverages & Tobacco |
| **18** | Taze Dry Food  | 0,415 | Manufacturing Industry / Food, Beverages & Tobacco |
| **19** | İzmir Brush | 0,412 | Chemical, Petroleum Rubber, Plastic |
| **20** | Ersu Fruit and Food | 0,411 | Food, Beverages & Tobacco |
| **21** | Saray Printing | 0,411 | Metal Goods, Machinery and Equipment Making |
| **22** | Berkosan  | 0,409 | Chemical, Petroleum Rubber, Plastic |
| **23** | Dagi Clothing | 0,405 | Textile, Clothing, Leather |
| **24** | Iz Livestock and Food | 0,403 | Agriculture, Forestry and Fisheries |
| **25** | Te-mapol Polymer Plastic | 0,399 | Chemical, Petroleum Rubber, Plastic |
| **26** | Rodrigo Textile | 0,398 | Textile, Clothing, Leather |
| **27** | Say Advertising Building Decoration | 0,396 | Metal Goods, Machinery and Equipment Making |
| **28** | Burçelik Valve | 0,388 | Metal Main Industry |
| **29** | Burçelik Stell Casting | 0,388 | Metal Main Industry |
| **30** | Ditaş Doğan Spare Parts Manufacturing | 0,381 | Metal Goods, Machinery and Equipment Making |
| **31** | Makine Tool Industry | 0,379 | Metal Goods, Machinery and Equipment Making |
| **32** | Oylum Industrial Investments | 0,373 | Food, Beverages & Tobacco |
| **33** | Niğde Concrete | 0,363 | Stone Soil Based |
| **34** | Merko Food Industry Trade | 0,348 | Food, Beverages & Tobacco |
| **35** | Denizli Glass Industry | 0,333 | Stone Soil Based |
| **36** | Doğusan  | 0,273 | Stone Soil Based |
| **37** | Birlik Textile | 0,260 | Textile, Clothing, Leather |
| **38** | Taç Agricultural Products  | 0,244 | Agriculture, Forestry and Fisheries |
| **39** | Diriliş Textile | 0,162 | Textile, Clothing, Leather |
| **40** | Vanet Food Industry | 0,147 | Food, Beverages & Tobacco |
| **41** | Emek Electrical Industry | 0,001 | Metal Goods, Machinery and Equipment Making |
| **42** | Sanifoam Sponge | 0,001 | Chemical, Petroleum Rubber, Plastic |

Table. 3. BIST SME Industry Index Year 2016 TOPSIS Ranking

According to the results in the Table 3, the top five companies with the highest financial performances in 2016 are; Sönmez Cotton, Federal-Mogul İzmit Piston and Pin, Gediz Packaging, Çimbeton Cement and Polytechnic Metal. Additionally, Taç Agricultural Products, Diriliş Textile, Vanet Food Industry, Emek Electrical Industry and Sanifoam Sponge, are the ranked at the bottom of the 2016 financial performance ranking with the lowest financial performances.

|  |
| --- |
| **BIST SME Industry Index Year 2017 TOPSIS Ranking** |
| **Rank** | **Company Name** | **TOPSIS Score** | **Sector** | **Difference in Ranking** |
| **1** | Federal-Mogul İzmit Piston and Pin | 0,768 | Metal Goods, Machinery and Equipment Making | +1 |
| **2** | Mega Polyethylene Foam | 0,597 | Chemical, Petroleum Rubber, Plastic | +4 |
| **3** | Gediz Packaging | 0,586 | Chemical, Petroleum Rubber, Plastic | 0 |
| **4** | Politeknik Metal  | 0,582 | Chemical, Petroleum Rubber, Plastic | +1 |
| **5** | RTA Laboratories | 0,580 | Chemical, Petroleum Rubber, Plastic | +2 |
| **6** | Burçelik Valve | 0,563 | Metal Main Industry | +22 |
| **7** | Sönmez Textile | 0,561 | Textile, Clothing, Leather | -7 |
| **8** | Formet Steel Door | 0,555 | Metal Goods, Machinery and Equipment Making | +3 |
| **9** | Seyitler Chemistry | 0,552 | Chemical, Petroleum Rubber, Plastic | -1 |
| **10** | Çimbeton | 0,552 | Stone Soil Based | -6 |
| **11** | Doğan Burda Magazine | 0,547 | Paper and Paper Products Printing | -2 |
| **12** | Yaprak Farm | 0,546 | Agriculture, Forestry and Fisheries | +1 |
| **13** | Ditaş Doğan Spare Parts Manufacturing | 0,531 | Metal Goods, Machinery and Equipment Making | +17 |
| **14** | Saray Typography | 0,525 | Metal Goods, Machinery and Equipment Making | +7 |
| **15** | Özerden Plastic | 0,524 | Chemical, Petroleum Rubber, Plastic | -1 |
| **16** | Dagi Clothing | 0,523 | Textile, Clothing, Leather | +7 |
| **17** | Makine Tool Industry | 0,521 | Metal Goods, Machinery and Equipment Making | +14 |
| **18** | Kristal Cola | 0,520 | Food, Beverages & Tobacco | -1 |
| **19** | Berkosan | 0,519 | Chemical, Petroleum Rubber, Plastic | +3 |
| **20** | Ersu Fruit and Food | 0,519 | Food, Beverages & Tobacco | 0 |
| **21** | Taze Dry Food  | 0,519 | Food, Beverages & Tobacco | -3 |
| **22** | Taç Agricultural Products | 0,513 | Agriculture, Forestry and Fisheries | +16 |
| **23** | Prizma Press Typography | 0,510 | Paper and Paper Products Printing | -8 |
| **24** | Bandırma Packaging Materials | 0,508 | Metal Goods, Machinery and Equipment Making | -14 |
| **25** | Safkar Ege Cooling | 0,503 | Metal Goods, Machinery and Equipment Making | -9 |
| **26** | Say Advertising Building Decoration | 0,493 | Metal Goods, Machinery and Equipment Making | +1 |
| **27** | İzmir Brush | 0,492 | Chemical, Petroleum Rubber, Plastic | -8 |
| **28** | Te-mapol Polymer Plastic | 0,491 | Chemical, Petroleum Rubber, Plastic | -3 |
| **29** | Lüks Velvet | 0,491 | Textile, Clothing, Leather | -17 |
| **30** | Rodrigo Textile | 0,484 | Textile, Clothing, Leather | -4 |
| **31** | Denizli Glass Industry  | 0,477 | Stone Soil Based | -4 |
| **32** | Oylum Industrial Investments | 0,476 | Food, Beverages & Tobacco | 0 |
| **33** | Burçelik Stell Casting | 0,474 | Metal Main Industry | -4 |
| **34** | İz Livestock and Food | 0,473 | Agriculture, Forestry and Fisheries | -10 |
| **35** | Diriliş Textile | 0,462 | Textile, Clothing, Leather | -5 |
| **36** | Niğde Concrete | 0,446 | Stone Soil Based | -3 |
| **37** | Birlik Textile | 0,432 | Textile, Clothing, Leather | 0 |
| **38** | Doğusan  | 0,391 | Stone Soil Based | -2 |
| **39** | Merko Food Industry Trade | 0,350 | Food, Beverages & Tobacco | -5 |
| **40** | Vanet Food Industry  | 0,285 | Food, Beverages & Tobacco | 0 |
| **41** | Sanifoam Foam | 0,001 | Chemical, Petroleum Rubber, Plastic | +1 |
| **42** | Emek Electric Industry  | 0,001 | Metal Goods, Machinery and Equipment Making | -1 |

Table. 4. BIST SME Industry Index Year 2017 TOPSIS Ranking and Changes in Ranking Compared to Last Year's Ranking

According to the results in the Table 4, the top five companies with the highest financial performances in 2016 are; Federal-Mogul İzmit Piston and Pin, Mega Polyethylene Foam, Gediz Packaging, Politeknik Metal and RTA Laboratories.

Doğusan, Merko Food Industry Trade, Vanet Food Industry, Sanifoam Foam, Emek Electric Industry are the ranked at the bottom of the 2017 financial performance ranking with the lowest financial performances.

|  |  |
| --- | --- |
| **BIST SME Industry Index Year 2018 TOPSIS Ranking** |  |
| **Rank** | **Company Name** | **TOPSIS Score** | **Sector** | **Difference in Ranking** |
| 1 | Çimbeton | 0,621 | Stone Soil Based | +9 |
| 2 | Federal-Mogul İzmit Piston and Pin | 0,613 | Metal Goods, Machinery and Equipment Making | -1 |
| 3 | Gediz Packaging | 0,606 | Chemical, Petroleum Rubber, Plastic | 0 |
| 4 | Doğan Burda Magazine | 0,601 | Paper and Paper Products Printing | -7 |
| 5 | Mega Polietilen Foam | 0,588 | Chemical, Petroleum Rubber, Plastic | -3 |
| 6 | Bandırma Packaging | 0,564 | Metal Goods, Machinery and Equipment Making | +18 |
| 7 | Seyitler Chemistry | 0,551 | Chemical, Petroleum Rubber, Plastic | +2 |
| 8 | Sönmez Textile | 0,536 | Textile, Clothing, Leather | -1 |
| 9 | Vanet Food Industry | 0,534 | Food, Beverages & Tobacco | +31 |
| 10 | Politeknik Metal  | 0,534 | Chemical, Petroleum Rubber, Plastic | -6 |
| 11 | Yaprak Dairy Farm | 0,529 | Agriculture, Forestry and Fisheries | +1 |
| 12 | Ditaş Doğan Spare Part Manufacturing | 0,525 | Metal Goods, Machinery and Equipment Making | +1 |
| 13 | Formet Stell Door  | 0,524 | Metal Goods, Machinery and Equipment Making | -5 |
| 14 | Safkar Ege Cooling | 0,523 | Metal Goods, Machinery and Equipment Making | +9 |
| 15 | Kristal Cola | 0,521 | Food, Beverages & Tobacco | +3 |
| 16 | Özerden Plastic | 0,520 | Chemical, Petroleum Rubber, Plastic | -1 |
| 17 | Saray Typography | 0,516 | Metal Goods, Machinery and Equipment Making | -3 |
| 18 | Burçelik Valve | 0,510 | Metal Main Industry | -12 |
| 19 | Prizma Press Typography | 0,509 | Paper and Paper Products Printing | +4 |
| 20 | Lüks Velvet | 0,504 | Textile, Clothing, Leather | +9 |
| 21 | İzmir Brush | 0,504 | Chemical, Petroleum Rubber, Plastic | +6 |
| 22 | Berkosan | 0,504 | Chemical, Petroleum Rubber, Plastic | -3 |
| 23 | Ersu Fruit and Food  | 0,501 | Food, Beverages & Tobacco | -3 |
| 24 | Rodrigo Textile | 0,497 | Textile, Clothing, Leather | +6 |
| 25 | İz Livestock and Food | 0,495 | Agriculture, Forestry and Fisheries | +9 |
| 26 | Dagi Clothing | 0,494 | Textile, Clothing, Leather | -10 |
| 27 | Machine Tool Industry | 0,493 | Metal Goods, Machinery and Equipment Making | -10 |
| 28 | Te-mapol Polymer Plastic | 0,492 | Chemical, Petroleum Rubber, Plastic | 0 |
| 29 | Denizli Glass Industry  | 0,489 | Stone Soil Based | +2 |
| 30 | Oylum Industrial Investments | 0,480 | Food, Beverages & Tobacco | +2 |
| 31 | Niğde Concrete | 0,478 | Stone Soil Based | +5 |
| 32 | RTA Laboratories  | 0,476 | Chemical, Petroleum Rubber, Plastic | -27 |
| 33 | Burçelik Steel Casting | 0,474 | Metal Main Industry | 0 |
| 34 | Merko Food Industry | 0,467 | Food, Beverages & Tobacco | +5 |
| 35 | Taç Agricultural Products  | 0,423 | Agriculture, Forestry and Fisheries | -13 |
| 36 | Say Advertising. | 0,421 | Metal Goods, Machinery and Equipment Making | -10 |
| 37 | Doğusan  | 0,406 | Stone Soil Based | +1 |
| 38 | Taze Dry Food | 0,372 | Food, Beverages & Tobacco | -17 |
| 39 | Birlik Textile | 0,328 | Textile, Clothing, Leather | -2 |
| 40 | Diriliş Textile | 0,315 | Textile, Clothing, Leather | -5 |
| 41 | Sanifoam Foam  | 0,001 | Chemical, Petroleum Rubber, Plastic | 0 |
| 42 | Emek Electric Industry  | 0,001 | Metal Goods, Machinery and Equipment Making | 0 |

Table. 5. BIST SME Industry Index Year 2018 TOPSIS Ranking and Changes in Ranking Compared to Last Year's Ranking

According to the results in the Table 5, 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 the 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 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.

1. Conclusion

TOPSIS, which is one of the Multi Criteria Decision Making methods, is used in the evaluation of the past performance of companies or organizations as well as many decision making problems. In this study, financial performance rankings of 42 firms included in BIST SME Industry index were determined separately for each year between 2016-2018 by using TOPSIS method. The liquidity ratios used in financial performance measurement are the ratios that show the financial performance of the firms in terms of their ability to pay their due debts, their activity ratios to show their effective use of their assets, and their profitability ratios in terms of revealing the returns they generate as a result of their activities. Therefore, the liquidity, efficiency and profitability of the companies were evaluated together in the financial performance measurement made with TOPSIS method. Different methods or different financial ratios may be used in subsequent studies. In addition, the results can be compared with the stock market performances of the firms.

**References**

1. Akbulut, R., & Coşkun, A. (2015). A Research on Financial Performance of Manufacturing Businesses That are Traded on BIST. Journal of Accounting & Finance.
2. Akgün, M. ve Soy Temür, A. (2016). Evaluation of Financial Performance with TOPSIS Method of Companies Which Are Listed In Transportation Index In The Istanbul Stock Exchange. Int. Journal of Management Economics and Business, ICAFR 16 Special Issue, 173-186.
3. Aytekin, A., & Karamaşa, Ç. (2017). Analyzing Financial Performance Of Insurance Companies Traded In BIST via Fuzzy Shannon’s Entropy Based Fuzzy TOPSIS Methodology. Alphanumeric Journal, 5(1), 71-84.
4. Bakırcı, F., Shiraz, S. E., & Sattary, A. (2014). Financial Performance Analysis of Iron, Steel Metal Industry Sector Companies in The Borsa Istanbul: DEA Super Efficiency and TOPSIS Methods. Ege Akademik Bakis, 14(1), 9.
5. Balcı, N. (2017). Financial Performance Analysis With TOPSIS Technique: A Case Study Of Public University Hospitals in Turkey. Yönetim ve Ekonomi Araştırmaları Dergisi, 15(Özel Sayı 1), 155-176.
6. Başdar, C. (2019). Financial Performance Multicriteria Decision Making Methods. Bursa: Ekin Publishing, 11.
7. İlkuçar, M., & Çifci, A. (2016). Performance evaluation of electricity generation companies traded on BIST according to the financial parameters through the application of TOPSIS method. International Journal of Social Sciences and Education Research, 2(3), 1010-1021.
8. Kayalı,C., A. & Aktas, İ. (2018) Performance Evaluation and Analysis through the TOPSIS Method of Firms in the Automotive Sector Trading in BIST. Karabuk University Journal of Social Sciences Institute. 8(1), 44-59.
9. Metin, S., Yaman, S., & Korkmaz, T. (2017). Determination of Financial Performance by TOPSIS and MOORA Methods: A Comparative Application on BIST Energy Firms. Kahramanmaras Sutcu Imam University Journal of Social Sciences, 14 (2), 371-394.
10. OECD. (2017). Enhancing the Contributions of SMEs in a Global and Digitalised Economy.
11. Okka, O. (2009). Analytical Financial Management Theory and Problems. Ankara: Nobel Publishing, p 104-114.
12. Orçun, Ç., & Eren, B. S. (2017). Financial Performance Evaluation with TOPSIS Method: An Application on XUTEK. Journal of Accounting & Finance, (75).
13. Özbek, A. (2017) Multicriteria Decision Making Methods and Problem Solutions with Excel Concept Theory Application. Ankara: Seçkin Publishing, p. 202-203.
14. Özçelik, H., & Kandemir, B. (2015). The Evaulation of the Financial Performances of the Tourism Enterprises Traded on BIST with TOPSIS Method. Balikesir University Journal of Social Sciences Institute, 18(33).
15. Özçelik, H., & Küçükçakal, Z. (2019). Analysis of Financial Performance of Financial Leasing and Factoring Companies Traded on BIST by TOPSIS Method. Journal of Accounting and Finance, (81).
16. Özdemir, M. (2015). Multi Criteria Decision Making Methods for Solving Operational, Managerial and Strategic Problems for Operators, Engineers and Managers. B. F. Yıldırım and E. Önder (Ed.). TOPSIS (135). Bursa: Dora Publishing House.
17. Sakarya, Ş., & Akkuş, H. T. (2015). Comperative Analysis of Traditional Ratios with Cash Flow Ratios on Measuring Financial Performance: A Practice on BIST Cement Companies With TOPSIS Method. Afyon Kocatepe University Economics and Administrative Sciences Journal, 17(1), 109-123.
1. This study is a revised and recontrolled version of the study presented at the ECONALANYA 2019 congress held on 24-25th October 2019 in Alanya, Turkey. [↑](#footnote-ref-1)
2. Corresponding author. Tel.: +00905423239238; fax: +903642257711. *E-mail address*:selcukkendirli@yahoo.com, selcukkendirli@hitit.edu.tr. [↑](#footnote-ref-2)